

Closed Landfill Program

2010 Report to the Legislature



Minnesota Pollution Control Agency

December 2010

Legislative Charge

Minn. Statutes § 115b.412, subd. 10 Report

By December 1 of each year, the commissioner shall report to the environment and natural resources committees and to the appropriate finance committees of the Senate and the House of Representatives on the commissioner's activities under sections 115B.39 to 115B.43 and the commissioner's anticipated activities during future fiscal years.

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Consolidating Waste at the East Mesaba Landfill,
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Estimated cost of preparing this report (as required by Minn. Stat. § 3.197)

Total staff time: 98.5 hrs.	\$4,317.00
Production/duplication	\$200.00
Total	<u>\$4,517.00</u>

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This report is available in alternative formats upon request, and online at www.pca.state.mn.us

Document number: lrc-clf-1sy10

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Executive Summary

The 1994 Landfill Cleanup Act (LCA) created Minnesota's Closed Landfill Program (CLP). The CLP is an alternative to Superfund for cleaning up and maintaining closed landfills and was the first such program in the nation. The CLP is unique because it is the only program that gives the Minnesota Pollution Control Agency (MPCA) the responsibility to "manage" up to 112 closed, state-permitted, mixed-municipal solid waste landfills to mitigate risks to the public and the environment. The CLP manages these sites by:

- monitoring environmental impacts and site conditions associated with each landfill
- determining the risk each landfill poses to public health, safety and the environment
- implementing remedial response actions to help reduce site risks
- maintaining the landfill properties, the landfill covers, and operating any remedial systems that might be present
- working with local governments to incorporate land-use controls at and near the landfills to protect human health and safety as well as the state's investment involving response actions taken and equipment purchased
- measuring how well the CLP is managing the risk at the landfills

The LCA (Minn. Stat. § 115B.412, subd. 10) requires the MPCA to provide a report to the Minnesota Legislature on the activities of the previous fiscal year (FY) and anticipated future work. This report fulfills the requirement and covers FY 2010 (July 1, 2009, to June 30, 2010) activities.

The report provides detailed information on how the CLP managed the closed landfills in the program during FY 2010. The following pages give an overview of the CLP, discuss program activities that were accomplished in FY 2010, and provide a look ahead to FY 2011.

Program highlights in FY 2010 included:

- completing or starting major remedial response actions at 14 sites
- completing one Closed Landfill Use Plan (CLUP) while initiating six others with local government units
- preventing over 24 million pounds of methane gas from entering the atmosphere
- capturing nearly 13 million gallons of landfill leachate by removing it from, or preventing it from reaching, the groundwater

The CLP spent \$28,002,456 in contractual and administrative costs in FY 2010 to accomplish these and other activities. Future CLP work will require additional steps to manage the risks at these sites by upgrading landfill covers and gas systems, conducting investigations, monitoring groundwater and landfill gas impacts, and working with local governments to implement appropriate land-use controls to protect the public using land at and near the landfills. Major construction, costing more than \$10 million each, is ongoing at the Washington County and Western Lake Superior Sanitary District (WLSSD) landfills. The final two major construction projects are anticipated to be at the Flying Cloud and Freeway landfills. These two projects are currently estimated to cost close to \$70 million to address significant environmental concerns. As these and other activities are completed, the CLP anticipates fewer corrective actions and greater focus on operation and maintenance and long-term land-use-planning activities.

Program Overview

Purpose

The 1994 LCA created Minnesota’s CLP so the state could effectively protect human health, safety and the environment associated with 112 closed, state-permitted, mixed municipal solid waste landfills throughout Minnesota. The program’s goals to help achieve this outcome include managing the risks associated with human exposure to landfill contaminants and methane gas and mitigating the degradation of groundwater and surface water. Managing these risks is best accomplished by implementing certain strategies, including (1) understanding the extent and magnitude of contaminant and methane gas impacts, as well as the overall risks, at each site; (2) maintaining the landfills and operating any remediation systems; (3) implementing construction-related response actions to reasonably address contaminant and methane gas migration issues; and (4) working with local governments to manage on-site and nearby land use. Table 1 summarizes the CLP’s desired outcome, goals and strategies.

Table 1: Outcome, goals and strategies of the CLP

Desired outcome	Goals	Strategies
Protect human health, safety, and the environment associated with closed landfills	Manage the risk Minimize human exposure to contaminants and methane gas Minimize degradation of groundwater and surface water	Understand extent and magnitude of contamination and methane gas migration Clean up and/or control groundwater contamination Control or reduce methane gas migration Cooperatively manage land use Operate and maintain landfills

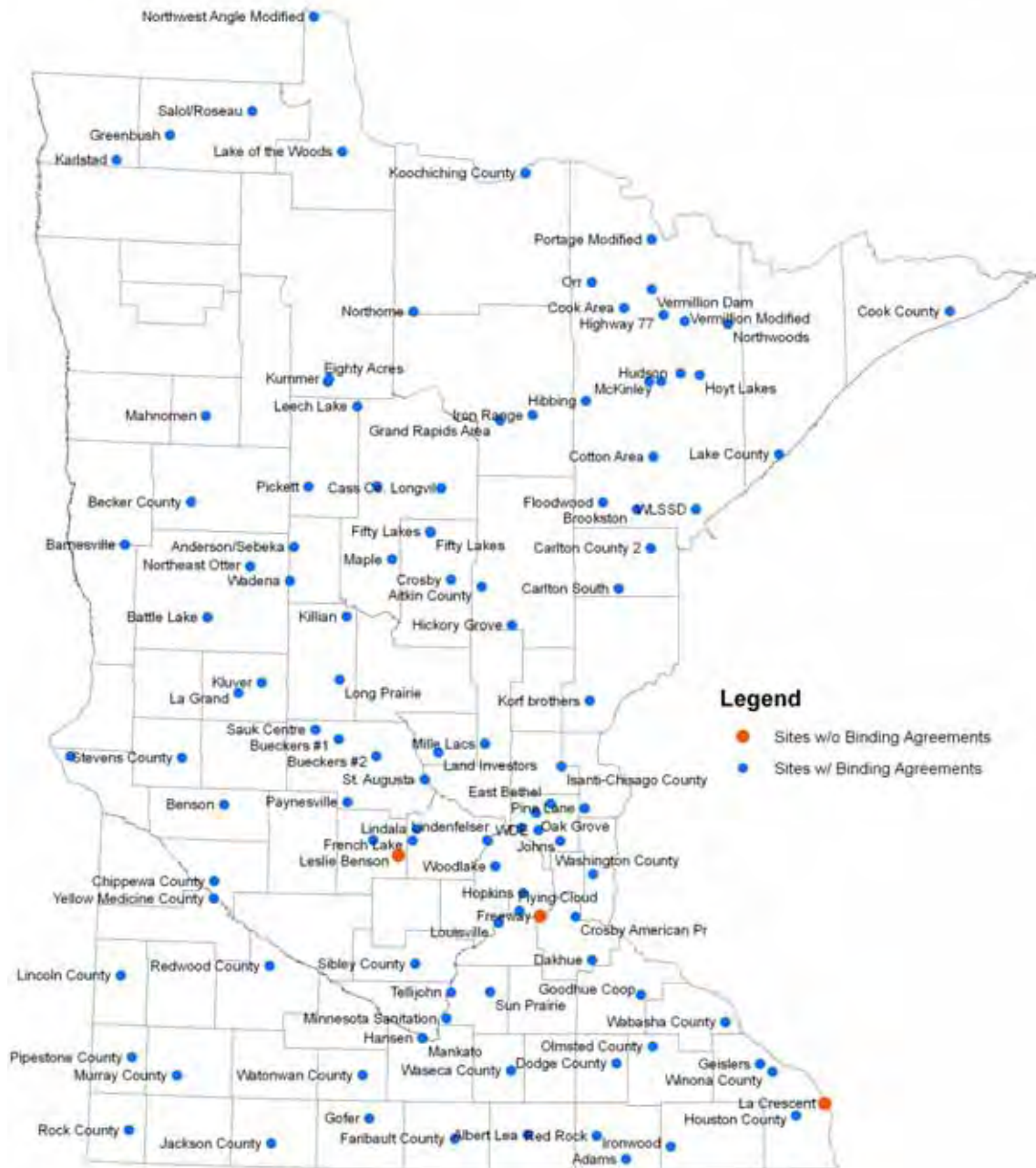
The CLP manages the risk to public health and safety in a cyclical fashion referred to as the “Risk Management Cycle.” First, site information pertinent to understanding the risks at each landfill is collected (monitoring groundwater, methane gas, nearby land use) and stored in a database. Second, the CLP evaluates the information, identifies the risks at each site and determines each site’s numerical risk using a risk-scoring model, and identifies the most practical response actions needed to lower the risk. Third, response actions are implemented based on several factors, including risk-score ranking, available resources (funds, staff), other required site work (operations and maintenance (O&M), repairs), and other initiatives that are agency and program priorities (e.g., renewable energy). Fourth, the response actions implemented are measured for effectiveness and the monitoring of site conditions is continued.

How sites enter the CLP

Before landfills are accepted into the CLP, certain requirements as stated in a Landfill Cleanup Agreement or Binding Agreement (BA) – typically executed between landfill owners/operators and the state – must be met. Once these requirements are fulfilled, a Notice of Compliance (NOC) is issued to the owner/operator. At this point, the site enters the program and the state takes over responsibility for the landfill.

Through June 30, 2010, 109 landfill owners/operators had executed a Landfill Cleanup Agreement and received a NOC. Currently, three landfills are qualified for entry into the CLP but have not yet executed a BA. Significant progress has been made in developing a BA for the La Crescent Landfill and a NOC is expected to be issued in FY 2011. However, similar efforts have been challenging regarding the Freeway and Leslie Benson landfills since the LCA does not require a date by which these sites must enter the program. The Freeway Landfill is of particular concern, given its high risk score and past failed efforts to formally enter the site into the CLP. The MPCA is considering appropriate alternative steps to address this situation. Figure 1 shows the location of all 112 qualified facilities including the three that currently do not have a Landfill Cleanup Agreement.

Figure 1. Locations of CLP landfills



The LCA also requires the CLP to reimburse eligible parties for past cleanup costs. Past reimbursements to landfill owners, operators and responsible parties total \$37,107,759 while reimbursements to the U.S. Environmental Protection Agency (EPA) amount to \$4,014,550. The Freeway Landfill is the only site that remains eligible for reimbursement to the EPA, at a cost of \$17,000, when it enters the program.

Funding

Funding for the CLP comes from three major sources:

- the Remediation Fund
- general obligation bonds
- settlements from landfill-related insurance coverage

In addition, closed landfills with financial assurance accounts were required to deposit remaining balances into the Remediation Fund to enter the program. Also, the 3M Company has provided the CLP \$8 million for PFC-related remedies at the Washington County Landfill per the consent agreement it has with the MPCA.

Transfers from the Environmental Fund

The Environmental Fund is used to support many programs at the MPCA including, in part, the CLP. Various sources of revenue are deposited into the Environmental Fund. A portion of this fund is then transferred into the Remediation Fund for use at CLP sites and for other remediation programs. Minnesota Laws (2009), Ch. 37, Art. 1, sec. 3, subd. 6 requires \$40 million to be transferred from the Environmental Fund to the Remediation Fund for the FY 2010–2011 biennium.

General obligation bonds

General obligation bonds are used to fund capital improvements, including the construction of remedial systems and the acquisition of land, at publicly owned CLP sites. Since 1994, the Minnesota Legislature has made a number of authorizations of general obligation bonds for these activities at closed landfills. Unused bonds more than four years old, however, must be canceled according to Minn. Stat. § 16A.642. These authorizations, together with the cancelations, have resulted in a total authorization of \$95.8 million of bonds for use at closed landfills. Through FY 2010, more than \$87 million of general obligation bonds has been spent on construction activities and land acquisitions at 51 sites.



Aerial photo of construction at the Washington County Landfill

Financial assurance

Minn. R. 7035.2665 requires owners of mixed municipal solid waste landfills remaining in operation after July 1, 1990, to set aside funds to pay for the cost of facility closure, postclosure care, and contingency action. Because several of the landfills that entered the CLP were still in operation as of July 1, 1990, their owners were required to meet these financial assurance rules. As part of the LCA, the owners of these landfills, upon entering the CLP, were required to transfer their financial assurance balances to the MPCA after having met closure requirements.

From inception of the CLP through FY 2010, the state has received a total of \$15,406,837 in financial assurance payments from owners or operators of 25 closed landfills. An additional \$1,781,489 that would have been collected from Waste Management of Minnesota, Inc. for the Anoka-Ramsey Landfill was waived because Waste Management of Minnesota, Inc. agreed to waive its reimbursement claim by an equal amount. Unless legislative changes allow additional sites to qualify for the CLP and transferring remaining financial assurance funds is required, no additional financial assurance dollars are anticipated in the future.



Prairie burn at the Olmsted County (Oronoco) Landfill

Insurance recovery

The LCA authorizes the MPCA and the Attorney General's office to seek to recover a fair share of the state's landfill cleanup costs from insurance carriers based upon insurance policies issued to responsible persons who are liable for cleanup costs under the state Superfund law. This would include insurance policyholders who owned or operated the landfills, hauled waste containing hazardous substances to the landfills, or arranged for the disposal of waste containing hazardous substances at the landfills. Under the LCA, the MPCA and Attorney General may negotiate coverage settlements directly with insurance carriers. If a carrier has had an opportunity to settle with the state and fails to do so, the state may sue the carrier directly to recover cleanup costs to the extent of the insurance coverage issued to responsible persons.

The state commenced six lawsuits against 56 insurance companies with assistance from the state's Special Attorneys that have been appointed by the Attorney General's office. As of June 30, 2010 two of the six lawsuits remained to be settled.

The state's settlement efforts in FY 2010 continued to focus on negotiating global settlements with insurance carriers that have been sued by the state. Global settlements resolve all of an insurance carrier's liability for all of the landfills covered by the 1994 Landfill Cleanup Act. No new settlements were reached with insurance carriers in FY 2010. However, payments from six settlements reached in prior fiscal years, totaling \$9,503,516, were deposited in the Remediation Fund in FY 2010. Of this amount, 2,859,033 was paid to the Special Attorneys for legal representation; \$635,478 was credited to the natural resources damages (NRD) account for the NRD portion of the settlements; and \$3,004,502 was paid to the Closed Landfill Investment Fund. The state did not issue settlement offers to any additional insurance carriers in FY 2010. Through FY 2010, the state's share of deposits into the state treasury from insurance carrier settlements total \$87 million.

Under the LCA, insurance carriers may request that the state's claims for natural resource damages (NRDs) at any of the landfills in the CLP be included in settlements with the state. NRD payments received in FY 2010 as a result of settlements amounted to \$635,478. Total NRD payments received through June 30, 2010, equal \$8,655,425. Through its Remediation Fund Grants Program, the Minnesota Department of Natural Resources (DNR) uses NRD recoveries to rehabilitate, restore or acquire natural resources to remedy injuries or losses to natural resources resulting from a release of a hazardous substance. In FY 2010, the DNR awarded \$500,000 to the City of Lindstrom for acquisition of a 74-acre nature area and park.



Cover construction at the WLSSD Landfill, St. Louis County

3M Settlement Agreement and Consent Order

The MPCA executed a Settlement Agreement and Consent Order with the 3M Company in May 2007 that authorized 3M to take response actions to address releases of PFCs at three disposal sites. As part of this agreement, 3M agreed to provide the MPCA \$8 million for the MPCA's remedial actions at the Washington County Landfill. \$3.7 million has been spent through FY 2010.

Closed Landfill Investment Fund

In 1999, the Minnesota Legislature established the Closed Landfill Investment Fund (CLIF) for the purpose of setting aside and investing money for future postclosure care of the CLP landfills. The legislature foresaw the need to plan for a way to fund the state's obligation to care for these landfills in perpetuity. Initially, \$5.1 million was transferred from the former Solid Waste Fund to the CLIF in each of the first four years. In addition, proceeds from settlements with insurance carriers (see Insurance recovery) were deposited equally in the Remediation Fund and the CLIF. The CLIF cannot be used to fund postclosure care activities until after Fiscal Year 2020. During the 2010 legislative session, however, the legislature transferred \$48 million from the CLIF to the General Fund to help address the state's budget shortfall. As of June 30, 2010, approximately \$113,000 remained in the CLIF. Legislation requires, however, that \$12 million, plus interest, be transferred back to the CLIF in each of four fiscal years starting in FY 2014.



Wolf at the WLSSD Landfill, St. Louis County

Program Activities in Fiscal Year 2010

Fiscal Year 2010 expenditures

Program expenditures for FY 2010 totaled \$28,002,456. A summary of these expenditures is found in Table 2. Expenditures for each landfill in FY 2010 are itemized in Appendix A.

Table 2. CLP expenditures

Expenditure type	FY 2010	Cumulative
Closed Landfill Program Administration and Support	\$2,221,009	\$35,290,353
Remedial Response Actions*	\$18,231,346	\$166,449,988
Operation and Maintenance	\$4,487,525	\$53,392,701
CLP Legal Counsel (Attorney General)	\$69,465	\$2,324,108
Insurance Recovery Legal Counsel (Attorney General)	\$134,078	\$3,086,621
Insurance Recovery Legal Counsel (Special Attorneys)	\$2,859,033	\$38,900,369
EPA Reimbursement	\$0	\$4,014,550
Responsible Party Reimbursements	\$0	\$37,107,759
Total	\$28,002,456	\$340,566,450

Expenditure information is based on MAPS data for the time period of July 1, 2009, to June 30, 2010.

*These activities include both Bond and non-Bond expenditures through June 30, 2010.

Collecting site information

Site risks are evaluated by monitoring groundwater, surface water, and landfill gas migration. Currently, the CLP samples over 2,750 monitoring points comprised of monitoring wells, gas probes, residential wells, surface waters, piezometers and springs. These data are stored in a database referred to as the “Environmental Data Management System.” Routine inspections are also conducted at each landfill. Site conditions are observed and items needing repair are noted. In addition, any nearby development that is observed is recorded.

Understanding and evaluating site risks

Site information that is collected is evaluated to help ascertain risks at each site. Minn. Stat. § 115B.40, subd. 2 requires the MPCA to establish and update a priority list for preventing or responding to releases of hazardous substances, pollutants and contaminants, or decomposition gases at closed landfills. The CLP uses a scoring model by which it determines risk at each site. Landfills are scored based on hazards present at each site (monitoring data and field observations), the conditions that exacerbate those hazards (example: subsurface conditions), and the likelihood the public will be exposed to those hazards (distance to wells and buildings, population density). Landfills with high risk scores receive a high ranking or priority.

The CLP scored and ranked the landfills and identified response actions for several of the high-risk sites in late 2009. These response actions ranged from constructing new liners and covers to installing gas vents to implementing Closed Landfill Use Plans (see Local land use controls). The 30 highest-ranking landfills on the risk priority list can be found in Table 3. Several response actions were already under way at some sites or were anticipated to be implemented in FY 2010. However, because design work at a few of the sites with lower risk scores had been completed and were already slated for construction before the new ranking system was used, work at these sites in FY 2010 took precedence over some of the higher-scoring landfills. Also, some remedial response actions have already been completed for some of these landfills and the remedies undertaken are being monitored. Risk scores for these sites should decrease over time while the effectiveness of the remedies is measured. An updated priority list will be developed in early 2011.

Not all CLP construction activities are necessarily reflected in this priority list because not all construction is directly risk related. For example, construction may be necessary to replace an aging active gas system, leachate-collection system, or equipment or parts — even at landfills that have a low risk score and ranking.

Table 3. Site risk priority list (Top 30) – November 2009

Priority ranking	Landfill	Risk score	Initial response action completed or needed to lower risk score	Status
1	Washington County	262220	Major construction underway to relocate waste on site on triple-lined cells	Ongoing
2	Hopkins	21300	Install additional passive gas vents; study to determine alternative response actions	FY 2011-12
3	Kummer	18150	Monitor effectiveness of newly installed passive gas vents	Ongoing
4	Becker County	18022	CLUP to address future land use	Ongoing
5	WLSSD	16880	Major construction underway to relocate dump waste, consolidate waste, upgrade cover, improve surface water drainage, create new wetlands, install active gas system	Ongoing
6	Freeway	14190	Major construction to relocate waste on lined cell	No BA
7	Waste Disposal Engineering	12800	Cryogenic pilot study to remove organic vapors & solvents from hazardous waste pit / Construct permanent system	FY 2011-12
8	Korf Bros.	9040	Install additional gas probes / CLUP	Completed/ FY 2012
9	Woodlake	7400	Install additional gas vents to reduce off-site migration	Completed
10	East Bethel	7310	Monitor effectiveness of newly upgraded cover & gas-collection system	Ongoing
11	Crosby American Properties	6860	Install additional passive gas vents near property boundary	FY 2011
12	Dodge County	6150	Install additional passive gas vents	Completed
13	Mille Lacs County	6070	Monitor effectiveness of recently relocated waste on lined cell / CLUP	Ongoing/ Completed
14	Red Rock	6047	Groundwater investigation	Ongoing
15	Isanti - Chisago	6026	Install additional passive gas vents	Completed
16	Flying Cloud	5065	Design to upgrade active gas system and cover	Ongoing
17	Houston County	4673	Study of additional gas mitigation measures; Land survey	FY 2011-12
18	Carlton County No. 2	4590	Surface water investigation / CLUP	Ongoing
19	Pine Lane	4445	CLUP to address future land use	FY 2011
20	East Mesaba	4410	Consolidate waste and construct new cover	FY 2011-12
21	Kluver	4203	Acquire adjacent buffer property, transfer landfill property title to state / CLUP	Completed / FY 2011
22	Koochiching County	4111	Feasibility study to address leachate management & cover issues / Design & construct	Completed/ FY 2011-12
23	Albert Lea	3911	Monitor effectiveness of recently relocated waste from city dump & adjacent landfill waste onto lined cell	Ongoing
24	Lindala	3790	CLUP to address future land use	FY 2011
25	Oak Grove	3716	Surface water investigation (biomonitoring/peizometers)	FY 2011
26	Paynesville	3690	Upgrade cover system for adjacent disposal area	FY 2012
27	Anoka - Ramsey	3644	CLUP to address future land use	Ongoing
28	Ironwood	3630	CLUP to address future land use	FY 2012
29	Maple	2473	Monitor effectiveness of recently upgraded cover & improved site access controls	Ongoing
30	Winona County	2296	Monitor effectiveness of newly constructed lined cell, cover, leachate collection & active gas systems / CLUP	Ongoing/ FY 2011

Response actions taken

Various response actions were taken in FY 2010 to address the risks posed by the closed landfills. These actions included implementing remedial response actions that were focused on reducing risks at the sites and were based on, in part, the risk priority list. Response actions also included O&M activities at all the landfills.

Remedial response actions

The CLP takes remedial response actions at landfills to help manage the risks, as well as lower the risk priority scores, at closed landfills. Remedial response actions taken at closed landfills in FY 2010 included groundwater investigations, cover construction, waste consolidation, and installation of active and passive gas systems. In addition, land surveys are also conducted for land-management purposes. Table 4 summarizes these activities and their costs.

The CLP uses contractors to help complete some of these response actions. One contract involves investigation, designing response actions, and providing construction oversight. A second contract is for drilling services.

Table 4: Remedial Response Actions in FY 2010

Landfill	Remedial Response Action	Expenditures
Albert Lea	Completed construction of lined cell at landfill for relocating waste from nearby city dump & adjacent landfill contaminated soils	\$ 1,121,740
Chippewa County	Completed installation of gas vents	\$ 48,599
Dodge County	Completed installation of gas vents	\$ 103,927
East Mesaba	Completed design for new cover, passive gas vents, relocating waste	\$ 42,629
Flying Cloud	Completed feasibility study for future construction of new cover & waste consolidation	\$ 109,393
Isanti-Chisago	Completed installation of gas vents	\$ 48,599
Koochiching County	Completed pre-design field investigation; ongoing design of new cover & passive gas system	\$ 110,184
Maple	Completed upgrade of cover, installation of additional passive gas vents, & improved site access controls	\$ 158,838
McKinley	Completed title search & abstract to transfer title to state	\$ 1,638
Mille Lacs County	Completed leachate removal following cover construction; completed CLUP to address future land use	\$ 6,169
Washington County	Ongoing construction for relocating waste on site into lined cells; ongoing drinking water response actions to address PFCs	\$ 8,366,532
WDE	Completed installation & began operation of a soil vapor/cryogenic extraction system for the hazardous waste pit	\$ 427,099
WLSSD	Ongoing cover construction & installation of active gas system	\$ 7,567,546
Woodlake	Completed installation of gas vents	\$ 48,609
12 Sites	Completed or began land surveys or county record searches	\$ 69,844
Total		\$ 18,231,346

The costs shown are for invoices paid in FY 2010, not necessarily total project costs.

Local land use controls

Managing the risks associated with the closed landfills not only involves cleanup and long-term operation and maintenance, but also managing land use on and near the landfills so that the public living or working nearby can do so in a safe manner. Since it is unlikely that a reasonable cleanup effort will eliminate all the risks associated with a landfill, proper management and regulation of land use at and near a closed landfill is an additional important factor in assuring long-term protection from the risks posed by the facility. Future use of property at and around closed landfills needs to be planned carefully and responsibly.

For each landfill, the MPCA is required to develop a Closed Landfill Use Plan (CLUP) in which the MPCA (1) determines the appropriate land use at the landfill where the MPCA is implementing environmental response actions; and (2) provides information about property at or near the landfill that may be affected by groundwater and/or surface water contamination and methane gas migration. The purpose of each CLUP is to (1) protect the health and safety of those living on, or occupying land near, the landfill; and (2) protect the integrity of the landfill and the MPCA's response action equipment.

Minn. Stat. § 115B.412, subd. 9 requires LGUs to make their local land use plans consistent with the MPCA's CLUP. The CLP will specifically identify land uses it designates for the property described in the BA, property with adjacent waste, adjacent buffer property, and adjacent property where response-action equipment is operated. The MPCA will recommend that local government units (LGUs) adopt a new zoning district — "Closed Landfill Restricted" — for these properties. The MPCA may recommend zoning allowing for other uses on certain properties depending on the land uses identified and circumstances of the property.

Minn. Stat. § 115B.412, subd. 4 (Affected Property Notice) requires the MPCA to provide LGUs with information that describes the types, locations and potential movement of hazardous substances, pollutants and contaminants, or methane gas related to the landfill. LGUs are required to incorporate this information into their land use plans and to notify persons applying for a permit to develop affected property of the existence of this information and, on request, to provide them a copy of the information. In addition, the MPCA will work with LGUs to identify appropriate land-use controls on affected properties outside the landfill that best protects public health and safety.

In FY 2010, the CLP completed a CLUP for the Mille Lacs County Landfill and initiated CLUPs at six other sites. The CLP also began creating site maps showing known areas of groundwater contamination and areas of potential methane gas and groundwater concern to assist LGUs in their land-use planning efforts. Figure 2 is an example map depicting a groundwater area of concern. The CLP intends to complete more than ten CLUPs in FY 2011.



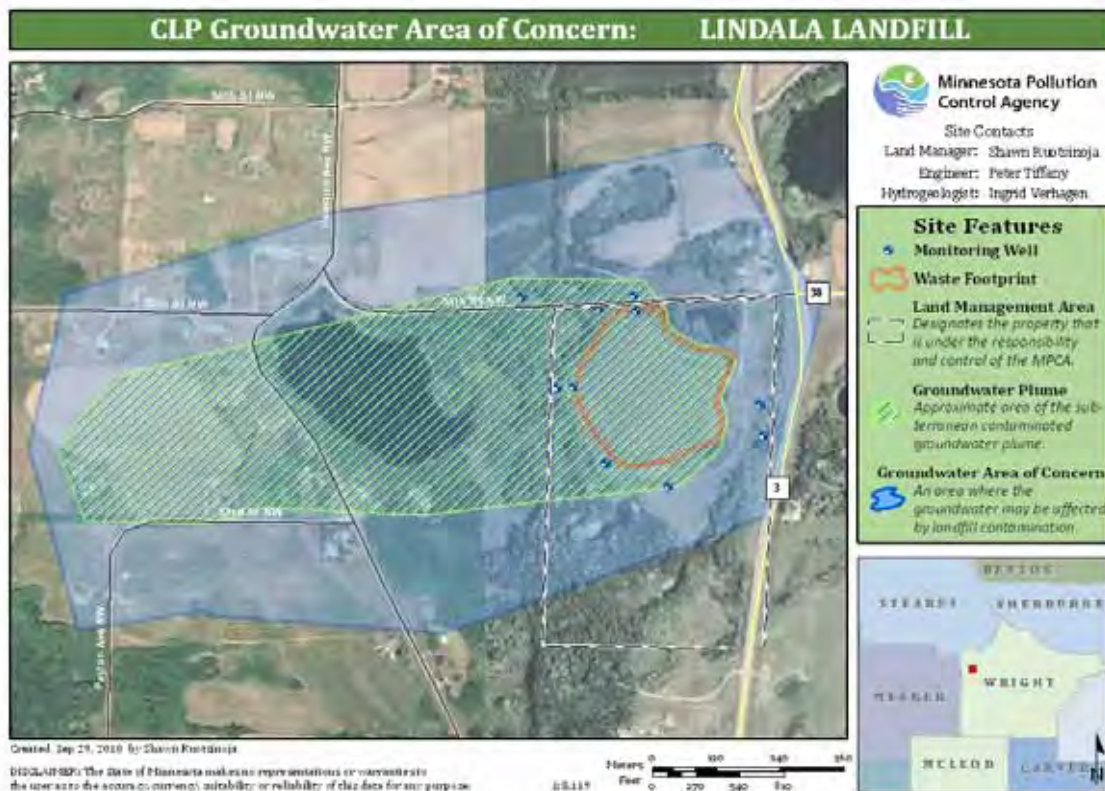
Residential development adjacent to the Hopkins Landfill, Hennepin County

Operation and maintenance

The MPCA is responsible for the long-term care of all CLP landfills in perpetuity. Depending on the site, operation and maintenance (O&M) activities include mowing, sampling and analysis, inspections, general repair and maintenance, providing and maintaining alternative water supplies or water-treatment systems, and operation of active gas- and groundwater-treatment systems or gas-to-energy systems. In FY 2010, the CLP removed white goods, silt fences, and other exposed waste at four sites. O&M costs totaled nearly \$4.5 million in FY 2010. Costs for each site are provided in Appendix A.

Many of the O&M activities are performed by firms under contract with the state. One contract is for routine O&M activities, a second is for sampling and analytical services, a third is for mowing the landfills, and a fourth is for leachate collection and disposal.

Figure 2. Example area of concern map



Alternative energy opportunities

Over the past few years, the CLP has been involved with opportunities for alternative energy because of two important resources it has: landfill gas and open space.

Landfill gas can be used as a boiler fuel or for the production of electricity. Currently, four Stirling cycle engines that can generate up to 180 kW of electricity (enough to meet the electrical needs of 110 homes) operate at the WDE Landfill in Andover. These engines generated 174,744 kWh of electricity in FY 2010. Planergy/Ramsey Methane, LLC, having purchased the gas rights from the former landfill owner, generated 4,166,732 kWh of electricity in FY 2010 using the gas generated by the Anoka-Ramsey Landfill in Ramsey. However, due to a decrease in available methane, Planergy/Ramsey Methane terminated its operation at the site in April 2010.

The MPCA sought proposals from interested solar panel installers in FY 2010 as part of a pilot project to explore the feasibility of operating solar panels at the CLP landfills. A contractor was selected to install solar panels on top of part of the Olmsted County Landfill. The MPCA and the contractor are working on an agreement that will allow the contractor to lease a portion of the landfill from the MPCA. Installation of a solar panel system capable of producing up to 2 MW of electricity is anticipated to begin in the spring of 2011.

State ownership of landfills and adjacent property

CLP landfills are owned by local governments, the state, or are privately owned. As of June 30, 2010, the MPCA owned 28 landfills totaling 2,145 acres across Minnesota. Acquiring ownership was done in those cases where state ownership provided the best method of controlling access and to help manage the facility. In many cases, the previous owner of the property transferred title to the MPCA upon entry of the site into the CLP. In addition to the landfill property itself, the MPCA has acquired adjacent properties as buffer at 21 sites totaling 660 acres to protect human health and safety. Appendix B provides a complete list of property owned by the state.

In FY 2010, the CLP acquired 21.4 acres of the Kluver Landfill through transfer and purchased 7.4 acres of buffer adjacent to the same site. Also, one acre of buffer at the Anoka-Ramsey Landfill was acquired by the City of Ramsey through friendly condemnation. The CLP is in the process of acquiring title, at no cost, at seven additional landfills in the program (Barnesville, Benson, Crosby American Properties, East Mesaba, Flying Cloud, McKinley and WDE), with a number of others pending. In addition, the CLP is currently working on acquiring property adjacent to the Barnesville and Koochiching landfills as buffer due to waste and/or landfill gas concerns, or for implementing additional response actions.

Measuring progress

MPCA staff use environmental and other indicators to measure the progress of the CLP. Currently, two environmental indicators are measured: (1) the volume of landfill leachate that is removed from, or is collected before it has a chance to impact, groundwater, and (2) the amount of landfill gas emissions that are captured and destroyed. Both, if left unabated, have the potential to cause risk to public health and the environment. However, these program measures are currently being evaluated and new measures are being considered that may better reflect the program's overall management of risk at the closed landfills.

Leachate reduction

Landfill leachate is the liquid that has percolated through solid waste. This leachate contains extracted, dissolved or suspended materials from the solid waste. Some of the response actions completed at closed landfills have removed leachate from groundwater or have significantly reduced the amount of leachate from reaching groundwater. Completely eliminating leachate generation at unlined landfills is impossible given current technology, knowledge and economics. However, several activities can be done to reduce the amount of leachate each landfill generates, thereby minimizing the potential impact leachate can have on groundwater. Those activities include relocating poorly covered waste and waste originally placed in or near groundwater, reducing waste footprints, placing impermeable covers over waste, and collecting and treating leachate and contaminated groundwater. In certain situations, although expensive, constructing a bottom liner and relocating the waste on top of that liner can provide the greatest safeguard to protecting public health and the environment. Waste placement on a bottom liner system was completed at the Mille Lacs County Landfill in FY 2010 and is currently underway at the Washington County Landfill.

Improved or synthetic covers greatly reduce the infiltration of precipitation into the waste, thereby reducing the volume of leachate produced. The CLP has implemented cover enhancements at over 50 closed landfills since inception of the program.

The CLP also re-contours landfill surfaces, establishes vegetative growth on landfill covers, and constructs holding basins to further reduce the amount of surface water likely to come into contact with waste and form leachate. The CLP also operates 10 leachate-collection systems and six groundwater-collection systems at 16 sites. This prevented an estimated 12.7 million gallons of leachate from reaching, or remaining in, the groundwater in FY 2010 (see Table 5).

Table 5. Volume of leachate prevented from reaching or remaining in the groundwater in FY 2010

Landfill	Type of system	Volume pumped (gallons)	% Leachate	Leachate (gallons)
Albert Lea	Leachate collection	2,205,600	100	2,205,600
Anoka – Ramsey	Groundwater treatment	148,040,572	1	1,480,406
Becker County	Groundwater treatment	106,628,878	1	1,066,289
Cook County	Leachate collection	142,681	100	142,681
East Bethel	Groundwater treatment	22,838,108	1	228,381
Isanti – Chisago	Groundwater treatment	9,280,749	1	92,807
Ironwood	Groundwater treatment	16,900,960	1	169,010
Koochiching County	Leachate collection	505,000	10	50,500
Mille Lacs County	Leachate collection	403,200	100	403,200
Northeast Otter Tail County	Leachate collection	11,800	100	11,800
Olmsted County	Leachate collection	572,100	100	572,100
Washington County	Leachate collection	3,311,820	100	3,311,820
WDE	Groundwater treatment	45,173,692	4	1,806,948
Winona County	Leachate collection	519,000	100	519,000
WLSSD	Leachate collection	13,118,100	2	262,362
Woodlake	Leachate collection	393,859	100	393,859
TOTAL				12,716,762

Landfill gas reduction

Landfill gas, primarily methane, is a concern with closed landfills because (1) it can migrate off site and become an explosive hazard, and (2) it is a greenhouse gas. Methane is generated as landfill waste decomposes and needs to be managed because it accumulates beneath the landfill cover. Currently, most landfills in the CLP have some type of passive gas-extraction system that helps alleviate methane buildup.

It is not currently possible to totally eliminate landfill gas escaping to the environment. However, installation of active gas-collection systems at larger sites can significantly reduce landfill gas emissions directly to the atmosphere. In FY 2010, 21 landfills had active gas-extraction systems or flares in operation. The active gas system at the Koochiching County Landfill did not operate in FY 2010 due to too low a gas volume. The Anoka-Ramsey Landfill, in addition to having a flare to burn gas from the active gas-extraction system, had a gas-to-energy plant, owned and operated by Planergy/Ramsey Methane, LLC that converted the gas to usable electricity. However, due to a significant decrease in economically available methane, Planergy/Ramsey Methane chose to terminate its operation. The WDE Landfill is addressing gas issues by both a flare and gas-to-energy system that began operating last year (see Alternative Energy Opportunities). Unique is a solar-powered, single-vent flare at the Kummer Landfill that destroys methane.

Active landfill gas-extraction systems and flares provide the following beneficial uses:

- reduction in methane migration and vegetative loss;
- overall reduction in greenhouse gases;
- reduction of volatile organic compounds that would otherwise migrate to groundwater; and
- gas-to-energy use.

In FY 2010, 24 million pounds of methane were destroyed by the gas-extraction and gas-to-energy systems that are operated at CLP landfills (see Table 6). Since 2000, these systems have prevented about 261 million pounds of methane (2.49 million metric tons of CO₂ equivalents) from entering the atmosphere. Stack test results from earlier studies generally show greater than 99 percent destruction of methane and other contaminants in the CLP's enclosed flares.

Table 6. Methane destroyed by gas-extraction and gas to-energy systems in FY 2010

Landfill	Gas flow (cfm)	% Methane in landfill gas	Operation hours	Methane destroyed (lb)
Albert Lea	131	46	6,971	1,119,024
Anoka - flare	232	44	1,785	485,099
Anoka - Planergy engines	232	45	7,569	2,117,111
Becker County	57	34	3,913	206,632
Dakhue	85	44	3,263	328,814
East Bethel	79	35	8,751	644,516
Flying Cloud	355	46	8,462	3,693,860
Grand Rapids	87	38	6,069	534,170
Hopkins	68	25	7,288	333,715
Koochiching County*	0	0	0	0
Kummer (solar flare)	3**	43	8,322	28,697
Lindenfelser	69	40	8,318	606,788
Louisville	281	41	8,488	2,615,899
Oak Grove	79	52	8,650	948,715
Olmsted	157	44	8,151	1,488,791
Pine Lane	132	46	6,557	1,071,528
St. Augusta	69	39	7,737	548,860
Tellijohn	71	29	8,158	445,508
Washington County	74	42	3,170	261,415
Watsonwan County	58	34	5,180	276,476
WDE (flare)	95	46	8,459	986,483
WDE (gas-to-energy engines)	34	46	2,472	104,824
Winona County	81	50	6,424	696,948
Woodlake	418	49	8,588	4,666,958
TOTAL				24,210,831

*System shut down and is being evaluated.

**Estimated

Future measurements

Additional environmental and program measurements are being considered for the future. For example, using its GIS database, the CLP can now track changes in acreage of each landfill's groundwater plume, as well as the groundwater and methane gas areas of concern. In addition, the CLP is considering tracking the amount of impacted land (in acres) that becomes subject to local land use controls that protect public health and safety as well as land returned to productive use. This will provide the program a way to measure how well its response actions are affecting the size of the environmental impacts from the landfills while, at the same time, measure how well the public's exposure to these impacts via land use is being managed.



Consolidating waste at the East Mesaba Landfill, St. Louis County

Looking Ahead to FY 2011

Anticipated new projects

In FY 2011, the CLP will implement remedial response actions based on its site priority ranking system and to repair or upgrade existing remedial and monitoring systems. However, this work will depend on available funding. Projects that began previous to using the new priority system will continue to be worked on in FY 2011 even if they currently rank lower than other sites. Table 7 lists the anticipated response actions at specific landfills, assuming funding is available. Additional activities for FY 2011 include ongoing water/whole-house filter services to residents near the Washington County, Becker County, Kluver, Lindala, and Mille Lacs County landfills.

Table 7. Anticipated remedial response actions for FY 2011

Landfill	Response action
Anoka-Ramsey	CLUP to address future land use
Becker County	CLUP to address future land use
Carlton County No. 2	Surface water investigation; CLUP to address future land use
Carlton County South	CLUP to address future land use
Crosby American Properties	Install additional gas vents to address methane migration
East Mesaba	Complete design, begin construction of waste consolidation & new cover
Eighty Acres	CLUP to address future land use
Flying Cloud	Complete design of new cover & active gas extraction system; transfer landfill property title to state
French Lake	CLUP to address future land use
Hopkins	Install additional gas vents
Houston County	Land survey
Kluver	CLUP to address future land use; surface water drainage & cover repair
Koochiching County	Complete design to address leachate management, cover issues & to convert active gas extraction system to a passive gas system
Kummer	CLUP to address future land use
La Grand	CLUP to address future land use
Lindala	CLUP to address future land use
McKinley	Relocate waste to the East Mesaba Landfill
Oak Grove	Surface water investigation
Olmsted County	CLUP to address future land use
Pine Lane	CLUP to address future land use
Red Rock	Groundwater investigation; land survey
Washington County	Continue waste relocation remedy; install additional monitoring wells
WDE	Complete cryogenic pilot study of vapor extraction at hazardous waste pit & procure permanent vapor-extraction system
Winona County	CLUP to address future land use
WLSSD	Complete Phase II construction to relocate/consolidate waste, upgrade cover & active gas-extraction system

Additional Information

Additional information about the CLP, including landfill-specific information, can be found on the MPCA's Website at <http://www.pca.state.mn.us/cleanup/landfill-closed.html>.

Program Contacts

For more information about the CLP, contact:

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- **Doug Day**, Unit Supervisor, Closed Landfill Program, 651-757-2302, 800-657-3864
- **Jeff Lewis**, Section Manager, Closed Landfill and Superfund Programs, 651-757-2529, 800-657-3864

Appendix A: Fiscal Year 2010 site costs

Landfill Name	MPCA salary & expenses	Attorney General support	Operation & maintenance	Design/ construction non-bond	Design/ construction bond	Landfill totals
Adams (Relocated)	\$ 900					\$ 900
Aitkin Area	\$ 5,491		\$ 55,871			\$ 61,362
Albert Lea	\$ 21,258	\$ 4,549	\$ 314,105		\$ 1,121,740	\$ 1,461,652
Anderson-Sebek	\$ 1,177	\$ 331	\$ 2,517			\$ 4,025
Anoka-Ramsey	\$ 12,705	\$ 10,294	\$ 290,292	\$ 45,174		\$ 358,465
Barnesville	\$ 1,569	\$ 239	\$ 2,069			\$ 3,877
Battle Lake	\$ 1,438		\$ 4,317			\$ 5,755
Becker County	\$ 3,910		\$ 124,708			\$ 128,618
Benson	\$ 1,020		\$ 7,365			\$ 8,385
Big Stone County	\$ 1,180		\$ 11,217			\$ 12,397
Brookston Area	\$ 1,308		\$ 6,475			\$ 7,783
Bueckers #1	\$ 2,168		\$ 6,907			\$ 9,075
Bueckers #2 (Relocated)	\$ 369					\$ 369
Carlton County #2	\$ 4,443		\$ 9,275			\$ 13,718
Carlton County South	\$ 2,727		\$ 4,471			\$ 7,198
Cass County (L-R)	\$ 1,669		\$ 8,098			\$ 9,767
Cass County (W-H)	\$ 2,136		\$ 4,020			\$ 6,156
Chippewa County	\$ 4,698		\$ 13,276	\$ 48,599		\$ 66,573
Cook Area	\$ 1,785		\$ 6,565			\$ 8,350
Cook County	\$ 2,419	\$ 399	\$ 44,639			\$ 47,457
Cotton Area	\$ 937		\$ 6,565			\$ 7,502
Crosby	\$ 2,892	\$ 34	\$ 12,844			\$ 15,770
Crosby American Properties	\$ 4,275	\$ 5,187	\$ 12,257			\$ 21,719
Dakhue	\$ 4,383	\$ 125	\$ 59,220			\$ 63,728
Dodge County	\$ 6,015		\$ 7,666	\$ 103,927		\$ 117,608
East Bethel	\$ 10,079	\$ 21	\$ 193,718	\$ 88		\$ 203,906
East Mesaba	\$ 18,453	\$ 1,048	\$ 7,181	\$ 42,629		\$ 69,311
Eighty Acre	\$ 4,002		\$ 4,899			\$ 8,901
Faribault County	\$ 2,480		\$ 13,304			\$ 15,784
Fifty Lakes	\$ 2,612		\$ 3,570			\$ 6,182
Floodwood	\$ 970		\$ 5,520			\$ 6,490
Flying Cloud	\$ 18,653	\$ 1,938	\$ 45,522	\$ 109,393		\$ 175,506
Freeway	\$ 9,758	\$ 8,322	\$ 41,000			\$ 59,080
French Lake	\$ 2,059		\$ 4,273	\$ 2,932		\$ 9,264
Geislars (Relocated)	\$ 21					\$ 21
Gofer	\$ 2,641		\$ 13,163			\$ 15,804
Goodhue Co-Op	\$ 949		\$ 6,627			\$ 7,576
Grand Rapids	\$ 2,878		\$ 101,623			\$ 104,501
Greenbush (Relocated)	\$ 337			\$ 894		\$ 1,231
Hansen	\$ 1,385		\$ 3,288			\$ 4,673
Hibbing	\$ 1,182		\$ 3,891			\$ 5,073
Hickory Grove	\$ 2,324		\$ 2,757			\$ 5,081
Highway 77	\$ 607		\$ 1,935			\$ 2,542
Hopkins	\$ 2,402		\$ 85,112			\$ 87,514
Houston County	\$ 1,768		\$ 12,996			\$ 14,764
Hoyt Lakes	\$ 369		\$ 1,269			\$ 1,638
Hudson	\$ 11,141		\$ 43,202			\$ 54,343
Iron Range	\$ 1,269		\$ 4,179			\$ 5,448
Ironwood	\$ 15,780		\$ 111,535			\$ 127,315
Isanti-Chisago	\$ 14,291	\$ 46	\$ 88,569	\$ 62,707		\$ 165,613
Jackson County	\$ 744		\$ 8,614			\$ 9,358
Johnson Bros.	\$ 473		\$ 1,670			\$ 2,143
Karlstad	\$ 1,009		\$ 3,707	\$ 894		\$ 5,610
Killian	\$ 1,292		\$ 4,739			\$ 6,031
Kliver	\$ 16,564	\$ 16,587	\$ 81,176			\$ 114,327
Koochiching County	\$ 19,168		\$ 167,536	\$ 110,184		\$ 296,888
Korf Bros.	\$ 2,430		\$ 9,596			\$ 12,026
Kummer	\$ 2,173	\$ 68	\$ 41,765			\$ 44,006
La Crescent	\$ 1,094	\$ 2,953				\$ 4,047
La Grand	\$ 2,313		\$ 2,156			\$ 4,469
Lake County	\$ 508	\$ 296	\$ 12,599			\$ 13,403
Lake of The Woods County	\$ 600		\$ 4,407	\$ 894		\$ 5,901

Landfill Name	MPCA salary & expenses	Attorney General support	Operation & maintenance	Design/ construction non-bond	Design/ construction bond	Landfill totals
Land Investors (Relocated)	\$ 39		\$ 1,655			\$ 1,694
Leech Lake	\$ 826	\$ 160	\$ 4,656			\$ 5,642
Leslie Benson	\$ 1,058	\$ 2,747				\$ 3,805
Lincoln County (Relocated)	\$ 21					\$ 21
Lindala	\$ 9,074	\$ 11	\$ 18,117	\$ 2,932		\$ 30,134
Lindenfelder	\$ 2,083		\$ 64,246			\$ 66,329
Long Prairie	\$ 5,514	\$ 23	\$ 6,487			\$ 12,024
Louisville	\$ 5,934	\$ 1,892	\$ 81,260			\$ 89,086
Mahnomen County	\$ 703		\$ 1,126			\$ 1,829
Mankato	\$ 1,429		\$ 5,811			\$ 7,240
Maple	\$ 18,200	\$ 46	\$ 5,172	\$ 158,838		\$ 182,256
McKinley	\$ 1,744	\$ 4,640	\$ 1,513	\$ 1,638		\$ 9,535
Meeker County	\$ 1,384		\$ 16,161			\$ 17,545
Mille Lacs County	\$ 28,454		\$ 73,551	\$ 6,169		\$ 108,174
Minnesota Sanitation	\$ 1,618		\$ 101,004			\$ 102,622
Murray County	\$ 1,462	\$ 23	\$ 15,420			\$ 16,905
Northeast Otter Tail	\$ 2,035		\$ 74,438			\$ 76,473
Northome	\$ 844		\$ 5,588			\$ 6,432
Northwest Angle	\$ 469		\$ 883	\$ 894		\$ 2,246
Northwoods	\$ 1,020		\$ 10,928			\$ 11,948
Oak Grove	\$ 2,834		\$ 93,798	\$ 70		\$ 96,702
Olmsted County	\$ 26,420	\$ 1,026	\$ 123,299			\$ 150,745
Orr	\$ 220					\$ 220
Paynesville	\$ 5,929		\$ 4,395			\$ 10,324
Pickett	\$ 1,678	\$ 251	\$ 8,599			\$ 10,528
Pine Lane	\$ 2,315		\$ 70,118			\$ 72,433
Pipestone County	\$ 1,117		\$ 10,984			\$ 12,101
Portage Mod. (Relocated)	\$ 449					\$ 449
Red Rock	\$ 3,793	\$ 34	\$ 20,448			\$ 24,275
Redwood County	\$ 1,263		\$ 14,407			\$ 15,670
Rock County	\$ 1,059		\$ 11,845			\$ 12,904
Salo/Roseau	\$ 3,223	\$ 467	\$ 7,597	\$ 894		\$ 12,181
Sauk Centre	\$ 1,883		\$ 4,748			\$ 6,631
Sibley County	\$ 9,089		\$ 15,807			\$ 24,896
St. Augusta	\$ 13,219	\$ 148	\$ 78,495			\$ 91,862
Stevens County	\$ 1,582		\$ 7,103			\$ 8,685
Sun Prairie	\$ 1,706		\$ 9,362			\$ 11,068
Tellijohn	\$ 5,245		\$ 83,125			\$ 88,370
Vermillion Dam (Relocated)	\$ 952					\$ 952
Vermillion Modified	\$ 1,109		\$ 8,892			\$ 10,001
Wabasha County	\$ 856	\$ 11	\$ 14,132			\$ 14,999
Wadena County	\$ 2,523					\$ 2,523
Waseca County	\$ 4,667		\$ 49,559			\$ 54,226
Washington County	\$ 96,856	\$ 7,843	\$ 222,717	\$ 8,366,532		\$ 8,693,948
Watsonwan County	\$ 3,334		\$ 95,805			\$ 99,139
Waste Disposal Eng (WDE)	\$ 29,441	\$ 650	\$ 391,327	\$ 427,169		\$ 848,587
Winona County	\$ 13,611		\$ 93,183			\$ 106,794
WLSSD	\$ 59,056	\$ 308	\$ 91,216	\$ 2,905,782	\$ 4,661,764	\$ 7,718,126
Woodlake	\$ 9,087	\$ 844	\$ 255,564	\$ 48,609		\$ 314,104
Yellow Medicine County	\$ 937		\$ 12,026			\$ 12,963
Administration & Support	\$ 1,561,993	\$	\$ 53,257			\$ 1,492,865
TOTAL	\$ 2,221,009	\$ 69,465*	\$ 4,487,525	\$ 12,447,842	\$ 5,783,504	\$ 25,009,345

*Attorney General Support costs do not include Attorney General and Special Attorney costs associated with insurance recovery

Appendix B: State ownership of landfills and adjacent property

Site Name	County	Landfill acres	Buffer acres	Twp	Range	Sect	Donated
Anderson/Sebeka	Wadena	27		137	35	29	Y
Anoka/Ramsey	Anoka	317		32	25	27	Y
Anoka/Ramsey Buffer	Anoka		22	32	25	23	N
Bueckers #1	Stearns	17	13	126	32	31	Y
Dakhue	Dakota	80		113	18	24	Y
East Bethel	Anoka	60		33	23	8&9	Y
East Bethel Buffer	Anoka		0.3	33	23	8	N
East Mesaba	St. Louis	128		58	17	15	Y
French Lake	Wright	11		120	28	28	Y
French Lake Buffer	Wright		69	120	28	28	N
Isanti/Chisago	Isanti	40		35	23	1	Y
Kluver	Douglas	21.4		129	37	27	Y
Kluver Buffer	Douglas		7.4	129	37	27	N
Kummer Buffer	Beltrami		10	147	33	32	N
La Grande	Douglas	77.2		128	38	18	Y
Land Investors, Inc.	Benton	9		36	30	11	Y
Leech Lake	Hubbard	60		145	32	13	Y
Leech Lake Buffer	Hubbard		16	145	32	13	N
Lindala	Wright	60		120	28	3	Y
Lindala Buffer	Wright		23	120	28	3	Y
Lindenfelser	Wright	60		120	24	26	Y
Lindenfelser Buffer	Wright		11	120	24	26	N
Long Prairie	Todd	28		129	32	18	Y
Long Prairie Buffer	Todd		100.7	129	32	18	N
Oak Grove	Anoka	160		33	24	28	Y
Oak Grove Buffer (3 Properties)	Anoka		6	33	24	28	N
Olmsted	Olmsted	252		108	14	27	Y
Olmsted Buffer	Olmsted		47	108	14	27	y
Paynesville	Stearns	63		122	32	22	Y
Pickett	Hubbard	16		140	34	7	Y
Pickett Buffer	Hubbard		4	140	34	7	Y
Pine Lane	Chisago	44		33	21	16/17/20	Y
Pine Lane Buffer	Chisago		22	33	21	16/17/20	N
Pipestone	Pipestone	40		107	44	31	Y
Red Rock	Mower	80		108	17	32	Y
Red Rock Buffer	Mower		81	108	17	32	N
Salol	Roseau	102		162	38	15	Y
Sauk Centre Buffer	Stearns		14	126	34	14	N
St. Augusta	Stearns	48		123	27	17/12	Y
St. Augusta Buffer	Stearns		43	123	27	7	Y
St. Augusta Buffer	Stearns		35	123	27	7	N
Sun Prairie	Le Sueur	80		111	24	24	Y
Wabasha County	Wabasha	29		109	24	24	Y
Washington Co. Buffer	Washington		20	29	21	10	N
WDE Buffer	Anoka		6	32	24	27	N
WLSSD	St. Louis	150		31	51	14	Y
Woodlake	Hennepin	85		118	23	8	Y
Woodlake Buffer	Hennepin		110	118	23	8	Y
Total		2,144.6	660.4				