



Report to Minnesota Legislature on

Management of Industrial Solid Waste and Construction and Demolition Debris in Land Disposal Facilities

January 15, 2009

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Acknowledgements

The Report to the Minnesota Legislature on the Management of Industrial Solid Waste and Construction and Demolition Debris in Land Disposal Facilities was authored by the appointed Work Group (see above). The process was supported and facilitated by the MPCA and its staff.

January 2009

For additional information on this Work Group, please visit: www.pca.state.mn.us/about/councils/cdilf/html
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Executive summary

Background

Issues leading up to the report

During its 2008 session, the Minnesota Legislature passed a bill calling for a work group to advise the Legislature on the land management of construction and demolition (C&D) and industrial wastes. Following are some of the issues that attracted the Legislature's interest: old Minnesota Pollution Control Agency (MPCA) rules that relate to industrial landfills (which the Work Group believes need to be comprehensively updated through a formalized process); the MPCA's use of guidance documents as well as rules in administering C&D and industrial waste landfills; and a legacy of groundwater contamination in Washington County in conjunction with a proposal by Xcel Energy to develop a new lined landfill in West Lakeland Township of Washington County that would receive fly ash from coal combustion. The Legislature also imposed a moratorium on the siting of new landfills, pending the adoption of new rules from the MPCA about groundwater sensitivity and financial guarantees at landfills.

A representative group

The Legislature directed the MPCA to appoint a work group that would generate a final report in six months. Members represented all sectors identified by the Legislature: counties, state agencies, private landfill owners, waste haulers, and environmental organizations. The Work Group held 12 full-day meetings.

Landfills are better managed now

It is important to note that most (and, perhaps, all significant) known instances of groundwater contamination emanating from landfills originated in unlined landfills that pre-date the MPCA's current regulatory regime. The Work Group focused its attention on landfills operating under the current regulatory regime, and on making recommendations for improvements.

Nondegradation goal

The underlying goal is to protect human health and the environment. Minnesota Statutes § 103H.001 sets a goal that groundwater be kept free of human-caused pollution. If not practicable at this time, the state is to encourage methods and technology so that this can be achieved.

Conclusions and recommendations

- 1. Regulatory mechanisms/forms of regulation.** Rules are the preferred form of regulation provided they are performance based; however, it is recognized that guidance can provide a useful transition into rules. The drafting of such rules and guidance documents must involve a stakeholder process, as was done with the Demolition Landfill Guidance (August 2005). [See Report Section 1.4.]
- 2. Environmental protection.** The Work Group encourages policymakers to set regulations that maximize environmental protection and minimize environmental risk, while recognizing the economic impacts and any unintended consequences that may result from implementation. Ideally, any new policies and/or regulations would be both environmentally responsible and economically feasible. [See Report Section 2.]
- 3. Financial assurance.** Landfill owners should be responsible for taking care of their sites, including closure and post-closure care. The Work Group supports the upcoming financial assurance rulemaking. [See Report Section 4.5.3.]
- 4. Environmental performance at demolition landfills.** The Work Group feels that the Demolition Landfill Guidance is working well enough that it should continue to operate for at least two more years before being incorporated into eventual rulemaking. One term that could use clarification is the term "liner" as used in the Demolition Landfill Guidance document: it is unstated whether a Class 3 demolition landfill must use a single liner or a composite liner equal to that of a mixed municipal solid waste (MMSW) landfill. Under current practice, industrial landfills that take such waste must have at least a composite

liner. The Work Group also notes that if a new document on industrial landfills is prepared the “Class 3 Landfill” section of the Demolition Landfill Guidance would need to be updated. [See Report Section 4.2.2.]

- 5. Environmental performance at industrial landfills.** The Work Group feels the current mix of statutes, rules, and policies with respect to industrial landfills is disjointed. The MPCA should develop a comprehensive risk-based policy addressing industrial waste management. Such a policy would ensure that regulations pertaining to the permitting and design of facilities accepting industrial waste will be clear, easily identifiable, and—most importantly—environmentally protective. Permitting of landfills taking industrial waste should be based around three key factors: local site characteristics (e.g., hydrogeology), waste types accepted, and engineered controls (e.g., landfill liners and caps). Since monofill, demo-like, and merchant industrial landfills differ significantly in the types of waste they accept, a certain degree of flexibility is required. [See Report Section 4.5.3.]
- 6. Groundwater sensitivity test for siting.** A single test for site suitability should not be used. Hearings in the 2008 Legislature raised the possibility of using the tritium concentration in groundwater as the definitive test for groundwater sensitivity when siting landfills. The Work Group recommends the use of site-specific hydrogeologic investigations to define groundwater character at proposed sites rather than the use of a single criterion such as tritium concentration, or intrinsic or geologic sensitivity maps (such maps must address a specified intended purpose at an appropriate scale). [See Report Section 2.6.]
- 7. Landfill siting:** Proper location is important, and the MPCA will be working on that through its rulemaking. [See Report Section 1.3.2.]
- 8. Possible role for guidance leading to rules.** Given the significant potential economic impact of the MPCA’s inability to site and permit new landfills until the adoption of new rules on groundwater sensitivity and financial assurance, and given that the Work Group’s opinion that preparing a guidance document now as a transition to rules is a valid approach to regulation, the Work Group recommends that the Legislature recognize that “guidance leading to rules” is a valid approach to achieving environmental protection and public health. The Work Group believes that guidance and rules need to be fast-tracked to avoid potentially severe economic impacts. [See Report Section 3.1.]
- 9. Permit-by-rule (PBR) demolition landfills.** Current regulations require no monitoring or inspection of demolition permit-by-rule (PBR) landfills. While the Work Group does not know of any pollution resulting from PBR facilities, no one has checked the groundwater for possible impacts. While the Work Group feels that PBR demolition landfills do play a legitimate role, it is concerned about misuse of PBR landfills and recommends tighter limits to their size, duration of operation, and usage, with counties retaining authority to make exceptions in cases of public need. The Work Group also suggests increased notification of neighbors and improved recording on deeds. The MPCA should consider a groundwater study to better understand risk. [See Report Section 4.1.1.]
- 10. Pre-demolition activities.** The Work Group believes that identifying and removing any hazardous materials or materials of concern prior to demolition is very important. The Work Group believes that ultimately, the building owner—not the contractor or disposal facility—needs to be the primary responsible party to ensure compliance with these regulations. The Work Group is aware that a current MPCA rulemaking seeks to ensure that these materials are removed from structures prior to the commencement of demolition, but the Work Group believes that the rule language as proposed remains inadequate. [See Report Section 4.2.1.]
- 11. A changing demolition waste stream going to landfills.** As part of its general oversight role, the MPCA needs to monitor this long-term trend: metals, concrete, asphalt, wood, and now shingles are being separated more effectively. This leaves the landfilled C&D waste stream with higher percentages of materials of concern: gypsum wallboard, unused glues and paints, and painted or treated wood, some of which are banned entirely from unlined landfills. This trend emphasizes the importance of good pre-demolition preparation and screening to minimize unused glues, paints, or treated wood entering C&D landfills. The C&D waste stream also changes with the introduction of new building materials. Therefore the environmental risks associated with C&D debris will need to be continually evaluated and studied. [See Report Section 4.2.6.]
- 12. MPCA data collection and analysis**
 - a. Not enough MPCA analysis of monitoring well data.** The MPCA has not been updating its 2003 broad analysis of groundwater data from wells around demolition landfills. Meanwhile more wells are

being added. At least every five years, MPCA staff should evaluate and report on what is known from well data about landfill effects, if any. [See Report Section 4.2.2.]

- b. **Validation needed for computer tools like IWEM.** The waste management industry and the state utilize modeling tools to predict the environmental performance of C&D and industrial landfills under specific circumstances, one of which is the Industrial Waste Evaluation Model (IWEM). The MPCA should validate the IWEM and other modeling assumptions using real-world data collected from Minnesota landfills. [See Report Section 2.5.4.]
- c. **Need leachate data for "pure demolition" waste at Class 1 unlined landfills.** Such landfills do not have liners and depend entirely on good waste screening procedures to keep any hazardous materials out. Without liners, it is impossible to test leachate at the base of the landfill. Therefore nothing is known in Minnesota about the leachate generated at such landfills. Other types of demolition landfills do have liners and therefore leachate to test, but are not representative because they accept a wider range of wastes. The MPCA could fill this information gap with a test-cell research study. [See Report Section 4.2.2.]

13. Solid waste management taxes and spending on C&D and industrial waste management.

- a. Less is being spent by the state on C&D and industrial management than the solid waste management (SWM) tax on such waste disposal brings in each year. Should there be a need for more spending to support the improved management or monitoring of C&D and industrial wastes, then the existing SWM tax revenue funding source should be prioritized to address issues related to C&D and industrial waste management.
- b. The current tax structure provides incentives for managing C&D and industrial waste separate from MMSW. Business and counties have built their facilities and SWM programs based on the existing SWM tax structure, and therefore the Work Group recommends that the current SWM tax structure and its inherent incentives for the proper management of these various waste streams not be changed. [See Report Section 3.1.]

14. Spending recommendations from the Work Group that would incur a cost (not in priority order):

- a. A test cell to sample leachate from Class 1 demolition landfills.
- b. Rulemaking/guidance to update the existing rules.
- c. A broad analysis of groundwater data on the scope of the study done by Mike Trojan of the MPCA in 2003.
- d. Groundwater testing around PBR demolition landfills. [See Report Section 3.1.]

Part 1. Introduction

The 2008 Minnesota Legislature mandated the creation of the Construction and Demolition and Industrial Solid Waste Landfill (CDIL) Work Group with the following language:

2008 Minnesota Session Laws Chapter 363, Article 5, Sec. 34. INDUSTRIAL AND CONSTRUCTION AND DEMOLITION LANDFILL WORKING GROUP.

The commissioner of the Pollution Control Agency shall, by July 15, 2008, convene a working group to develop, evaluate, and recommend policies and legislation regarding the management of industrial solid waste and construction and demolition debris in land disposal facilities. The commissioner shall appoint members of the working group, including representatives from counties, state agencies, private landfill owners, waste haulers, environmental organizations, and other interested parties to serve on the working group. The Pollution Control Agency shall serve as staff to the working group. The working group shall submit a report of its findings and recommendations to the chairs and ranking minority members of the senate and house of representatives committees with primary jurisdiction over environmental policy and environmental finance by January 15, 2009.

1.1 Issues leading to the creation of the CDIL Work Group

The 2008 Minnesota Legislature mandated the creation of the Work Group in response to immediate issues in the siting, design, and operation of these landfills. These landfills are primarily regulated by the MPCA.

Immediate impetus

During its 2008 session, the Minnesota Legislature passed a bill calling for a work group to advise the Legislature on the land management of construction and demolition (C&D) and industrial wastes. Following are some of the issues that attracted the Legislature's interest: old MPCA rules that relate to industrial landfills (which the Work Group believes need to be comprehensively updated through a formalized process); the MPCA's use of guidance documents as well as rules in administering C&D and industrial waste landfills; and a legacy of groundwater contamination in Washington County in conjunction with a proposal by Xcel Energy to develop a new lined landfill in West Lakeland Township of Washington County that would receive fly ash from coal combustion. The Legislature also imposed a moratorium on the siting of new landfills, pending the adoption of new rules from the MPCA about groundwater sensitivity and financial guarantees at landfills.

As a result, in addition to mandating the creation of the Work Group, the 2008 Legislature also imposed a moratorium on the siting of most new landfills. It also directed the MPCA to reexamine its methods for determining groundwater sensitivity to pollution from solid waste management facilities. Specifically, it charged the MPCA to review current rules and policies, and to develop new rules that will provide the MPCA with a process to include groundwater sensitivity and financial assurance to reduce risks to groundwater.

The Work Group believes that most, perhaps all, significant known instances of groundwater contamination emanating from landfill facilities came from unlined landfills that pre-date the MPCA's current regulatory regime.

The body of this report will provide background concerning the significant changes in landfill design, operations, and regulations that have resulted from the known instances of groundwater contamination that have occurred.

Longer-term issues

Industry, counties, and the MPCA previously identified areas of interest for improvement with landfills, made legislators aware of these concerns in previous sessions, and discussed the idea of convening a stakeholder work group to address these issues. The MPCA has initiated several related rulemaking efforts since 1988, focusing primarily, though not exclusively, on demolition landfills. These are typically smaller but more numerous than industrial landfills. These efforts have for the most part failed to produce the intended rules.

As a result, the MPCA often uses policies to fill the gap—particularly for the regulation of industrial landfills. Industrial landfills are regulated by a mix of rules, written guidance, and unwritten standard practices. Much of the MPCA's regulatory authority is exercised through a landfill permitting process, adapted from rules designed to regulate MMSW.

1.2 Sectors represented

Commissioner Brad Moore of the Minnesota Pollution Control Agency named the following members to the Construction and Demolition Debris and Industrial Solid Waste Landfill Work Group (hereinafter Work Group). Members named their own alternates.

County government sector:	<ul style="list-style-type: none">• Denny Siems, Olmsted County• Gary Bruns, Washington County• Doug Morris, Crow Wing County• Mike Lynn, Dakota County
State agency sector:	<ul style="list-style-type: none">• Jan Falteisek, Minnesota Department of Natural Resources• Daniel Peña, Minnesota Department of Health• John Wells, Minnesota Environmental Quality Board
Private landfill sector:	<ul style="list-style-type: none">• Ryan O’Gara, SKB Environmental• Terry Johnson, Waste Management Inc.• Manny Castillo, Xcel Energy• Jim Adrian, Grinning Bear Demolition Landfill• Craig Pagel, Iron Mining Association
Waste hauler sector:	<ul style="list-style-type: none">• Doug Carnival, National Solid Wastes Management Association• Steve Halgren, Veit USA
Environmental sector:	<ul style="list-style-type: none">• Marc Hugunin, Friends of Washington County• Dave Engstrom, Friends of Washington County• Gil Gabanski, Minnesota Ground Water Association
Other interested parties:	<ul style="list-style-type: none">• Fred Doran, RW Beck• Bob Tipping, Minnesota Geological Survey• Dan Hannan, Associated General Contractors of Minnesota• John McCain, McCain and Associates• Julie Ketchum, Waste Management Subcommittee, Minn. Chamber of Commerce• Frank Ongaro, MiningMinnesota

1.3 Work Group process

This was a broad-based stakeholder group, writing its own report. The scope of that report was focused on the specific legislative charge so that it could meet a tight deadline—six months from first meeting to report completion. MPCA staff provided coordination and support services, meeting facilities, note-taking, Web presence, technical presentations, and editing for format. The MPCA emailed documents to Work Group members and copied interested parties and MPCA staff. All meetings were open to observers. The Work Group managed participation by alternates and interested parties.

The Work Group proceeded in two stages: informational and report drafting. Meetings from July to October were chiefly devoted to presentations on technical matters and historical background. Beginning on October 30, the group began reacting to drafts prepared by members divided into sub-teams. All substantive material and all recommendations were proposed and agreed upon by the Work Group members. The MPCA drafted sections 1.2 and 1.3, covering meeting processes. The MPCA also offered assistance to the Work Group with editing the report and helped the Work Group assemble key messages from the report into an Executive Summary.

Number and location of meetings

After an organizational meeting at the MPCA on July 14, 2008, the appointed members met on August 4 in St. Cloud, making a final total of 12 meetings through January 15, 2009, the report deadline. At the St. Cloud meeting, members agreed to use meeting rooms at the MPCA office in St. Paul, and to shift to full-day meetings to be held on Thursdays at three-week intervals, until drafting began, at which time a more intense schedule would be considered. The Work Group added two meetings to its standing schedule to speed up drafting.

1.3.1 MPCA role and duties

Facilitation by the MPCA

At the group's request, the MPCA provided a staff facilitator, Rich Thul, who has a professional background in conducting public processes and stakeholder meetings.

Process

Planning was done during each meeting. MPCA staff followed up by typing notes and action items, sharing documents on a Web site or by email, identifying presenters, coordinating the presentations, and preparing draft agendas. Work Group members volunteered to serve on topical sub-teams to draft various sections of the report. The sub-teams proposed draft language content which was then reviewed by the whole Work Group during scheduled meetings. Later, the Work Group requested the MPCA to provide assistance through professional staff editors Theresa Gaffey and Nathan Cooley.

MPCA staff support and attendance

Three MPCA staff members attended all meetings: Rich Thul as facilitator; Nathan Cooley for document coordination, editing, and as a liaison to later rulemaking required by statute; and Jim Chiles for policy liaison, editing, and preparation of meeting notes. By way of technical resources, the MPCA named a hydrogeology staff lead, Neal Wilson, who coordinated information and joint presentations from other hydrogeologists and technical staff including Mike Trojan. The MPCA named two engineering staff leads: Kathy Holland-Hanson for demolition landfills and Robert Criswell for industrial landfills. These staff presented details on the siting and permitting of landfills while explaining the role of statutes, rules, and guidance documents. Theresa Gaffey served as the lead editor for the Work Group's report.

Information process, including member presentations

MPCA staff gathered a list of subjects the Work Group wanted information about, and scheduled presentations through the October 30 meeting. Some presentations were by panels of members, some by members individually, and some by the MPCA staff. The full presentations, mostly Microsoft Word and PowerPoint documents converted to portable document file (PDF) format, are available on the CDIL Work Group's website, hosted by the MPCA at www.pca.state.mn.us/about/councils/cdilf.html.

MPCA leadership attendance

While the MPCA did not name an MPCA representative to serve as a voting member, the Work Group later invited MPCA Division Director Lisa Thorvig to attend meetings in an ex officio (non-voting) capacity. Her role at meetings was to provide history of the subject area and the MPCA's perspective and role, to answer questions, to ensure that MPCA staff followed up on information requests, and to provide initial MPCA responses to Work Group ideas when asked. Individual sections in the Industrial and Municipal Divisions also sent leaders to some meetings, based on the agenda. Rebecca Walter provided liaison to legislative affairs.

1.3.2 Distinguishing the report from other MPCA duties

There are two other legislatively directed tasks for the MPCA to complete after the CDIL Work Group finishes its report to the Legislature. These were included in other sections of the budget bill that set up the CDIL Work Group (2008 Minnesota Laws, Chapter 363, Article 5). Since these deliverables are to follow the CDIL Work Group's report, their content will be informed by the Work Group's recommendations.

Rulemaking process for landfill siting and financial assurance (2008 Minnesota Laws, Chapter 363, Article 5, sections 24 and 33)

The MPCA will invite members of the Work Group to join a subsequent stakeholder group to offer advice to the MPCA during rulemaking, which is to include landfill siting and financial assurance to reduce risks to groundwater. The scope of this rule is not limited to C&D and industrial landfills. The Legislature imposed a limited moratorium on most types of new landfills until rules are adopted (see Appendix F).

Executive Summary 7. Landfill siting: Proper location is important, and the MPCA will be working on that through its rulemaking.

By January 15, 2010, the MPCA is to deliver a report to the Legislature:

"...on proposed rules, under Minnesota Statutes, section 116.07, subdivision 4, to prohibit the disposal of solid waste in specific areas due to the sensitivity of the area to ground water contamination."

1.3.3 Subjects covered in Work Group deliberations

The Work Group focused on this sentence from the legislative charge:

"The commissioner of the Pollution Control Agency shall, by July 15, 2008, convene a working group to develop, evaluate, and recommend policies and legislation regarding the management of industrial solid waste and construction and demolition debris in land disposal facilities."

1.3.4 Subjects not covered in Work Group deliberations

The Legislature directed a separate report to be delivered on the recycling potential of C&D waste generated in the metropolitan area, so the group did not attempt to duplicate that work.

1.3.5 Legislators' subsequent input at CDIL Work Group meetings

The Work Group heard brief talks from visiting Minnesota legislators (Rep. Brita Sailer and Rep. Julie Bunn) and was advised by a letter from Rep. Bunn and Sen. Kathy Saltzman about the background and purpose of the process. Legislative staff also observed some meetings. The following appear in Appendix B:

- Summary of Rep. Brita Sailer's comments to the CDIL Work Group
- Letter from State Rep. Julie Bunn and State Sen. Kathy Saltzman dated September 17, 2008
- Initial comments by Rep. Julie Bunn at December 11, 2008 CDIL Work Group meeting, responding to the December 4 early draft report

1.4 Regulatory trends and management options

1.4.1 Defining construction and demolition debris and industrial waste types

By Minnesota Rules, part 7035.0300, subpart 30, "demolition debris" means solid waste resulting from the demolition of buildings, roads, and other structures including concrete, brick, bituminous concrete, untreated wood, masonry, glass, trees, rock, and plastic building parts. Demolition debris does not include asbestos wastes. "Industrial waste," separate from demolition debris, is defined as being generated from industrial, manufacturing, or non-manufacturing activities (such as service and commercial establishments). Industrial waste does not include office materials, restaurant and food preparation wastes, discarded machinery, mixed municipal solid waste, or MMSW combustor ash.

Executive Summary 1. Regulatory mechanisms/forms of regulation. Rules are the preferred form of regulation provided they are performance based; however, it is recognized that guidance can provide a useful transition into rules. The drafting of such rules and guidance documents must involve a stakeholder process, as was done with the Demolition Landfill Guidance (August 2005).

1.4.2 Generation rates for C&D debris and for industrial wastes

Information about the statewide generation of C&D debris and industrial wastes has been reported by inference. In a six-county area overseen by the Solid Waste Management Coordinating Board (SWMCB), a construction, demolition, and industrial waste study estimated that 1.2 million tons of C&D waste and 1.1 million tons of industrial waste were landfilled in 2006. The SWMCB presumes that the majority of these wastes were generated within the metropolitan area.

(http://www.swmcb.org/resources/studies_policy_reports/non_municipal_solid_waste)

1.4.3 Regulatory trends and facility information for C&D and industrial wastes

Regulatory trends from 1971 to the present. Prior to 1971, Minnesota landfills were called “dumps” and accepted all types of waste, including MMSW. Open burning was not uncommon.

Since 1971, Minnesota has instituted some type of permitting process for landfills. At that time, the MPCA began a permitting program whereby landfills had to be designed, constructed, and operated in accordance with Minnesota Rules. The 1971 Rules prohibited certain areas for disposal, required “maintenance and operation” practices, and, for the first time, required a solid waste facility to get a permit. Also for the first time, all types of waste were prohibited from any “area which was unsuitable because of topography, geology, hydrology, or soils.” Additionally, waste could no longer cause “pollution of the groundwater and surface water,” and facilities had to establish a water monitoring program.

Some unlined landfills and dumps pollute groundwater. Beginning in the 1980s, the water monitoring programs increasingly detected contaminants in groundwater that could threaten the drinking water supply. As a result, by the middle 1980s, the MPCA recognized a need to prevent the acceptance of hazardous wastes at all solid waste landfills. The MPCA provided varying standards based on the type of waste (as a form of risk management), and provided for the long-term care of the most problematic of facilities. The MPCA promulgated new rules for solid waste in 1988.

The big boom—the 1988 rules. These rules addressed specific design and operational standards for demolition debris landfills, created a new facility called a permit-by-rule (PBR) demolition landfill, and created new waste standards for storage and transfer facilities. The rulemaking left the 1971 rules in effect for industrial facilities. The 1988 rules, as amended by Subtitle D of the federal Resource Conservation and Recovery Act (RCRA), were a milestone, and mandated better standards for unacceptable wastes, an industrial solid waste management plan (ISWMP), additional location standards, cost estimates (for closure, post-closure, and contingency action), and mandated financial requirements for non C&D and industrial landfills. Financial assurance was not mandated by the 1988 rules, but became the MPCA’s required permit practice for industrial landfills. Plans and estimates of cost for the closure, post-closure period, and contingency action were required for industrial landfills through permitting.

Updated site location standards. The 1988 rules prohibited additional zones for landfills such as shorelands, wetlands, and floodplains; industrial landfills could no longer be located in any area prohibited by the 1971 rules. Prohibitions for demolition debris landfills included the no-go zones just mentioned, plus any site on which there existed active karst features including sink-holes, disappearing streams, and caves. The standards for demolition PBR landfills dropped the adjective “*active-karst*,” but for additional protection, added the requirement that there be at least five feet of vertical distance between the “lowest fill elevations” and the “water table.” There was and is no separate rulemaking for construction debris in the 1988 rules.

Trends following the adoption of the 1988 Rules. With the 1988 rules and additional staff, the MPCA did a more effective job in reducing the environmental risk associated with solid waste. And beginning in the early 1990s, the MPCA began to concentrate on efforts to streamline the rules, tie them to environmental risk, reduce unproductive administrative requirements, and focus (with the help of the former Office of Environmental Assistance, which has since combined with the MPCA), on recycling and reuse of solid waste. Starting in the early to late 1990s, proposed revisions to the 1988 rules were discussed between the MPCA and outside stakeholders but were never put into rule. Prompted by a diversion of resources, stakeholder pressure, and new and existing industry practices not adequately addressed in state or federal rules, the MPCA refined various administrative policies, most formally called “program management decisions,” to address permitting or compliance issues on a case-by-case basis.

Recent efforts to ensure consistent regulation and encourage the reuse of materials. Within the last few years, additional efforts by the MPCA have resulted in improved regulatory tools: the adoption of the new beneficial use and transfer facility rules, and the development of guidance on the design and operation of C&D debris and industrial waste landfills (2005). Also in recent years, a policymaking group of managers at the MPCA have touched on some issues, such as financial assurance, which are relevant to C&D debris and industrial wastes.

Current status. Landfill practices in the state are currently regulated by a comprehensive set of rules that are enforced by the United States Environmental Protection Agency (EPA), the MPCA, and local governmental entities such as counties and large metropolitan communities. Solid waste landfills in Minnesota can generally be broken into three broad categories: mixed municipal solid waste (MMSW), C&D debris, and industrial solid waste (ISW). The current regulatory requirements for these waste streams are different. However, specific waste types are sometimes found in more than one type of landfill.

Mixed municipal solid waste landfills are stringently regulated. Current facilities can be generally characterized as having an engineered composite liner to contain the wastes, an engineered cap to prevent the infiltration of rain water, a gas collection system to collect methane gas generated from the decomposition of organic wastes, a leachate collection system to collect any liquids that may be present, and a groundwater monitoring network to monitor for potential releases.

C&D debris landfills are currently regulated by a combination of rules and guidance as described elsewhere in this document. C&D debris is characterized by three primary sub-waste streams: demolition, renovation, and new construction. Some demolition landfills receive waste from all three waste streams. There are four types of C&D landfills: PBR, Class 1, Class 2, and Class 3. In general, the landfill type is dependent upon the waste stream permitted to be disposed in the facility.

Requirements for the industrial disposal facilities are defined in rules and by each facility's site-specific permit. The design and operational specifications for these facilities is ultimately dependent upon their solid waste permit. As a result, as discussed in section 2.5, significant inconsistencies exist between industrial solid waste landfills.

1.4.4 Management of C&D and industrial waste

Background

The management of solid waste has been a challenge for society since the expansion of the metropolitan areas in the 1960s. Over time, the composition of the wastes and the methods employed to manage these wastes have changed. With the recognition of this challenge, federal and state government took the initiative to regulate the management of solid wastes. Practices such as open dumps, burning dumps, and burn barrels are now banned. Currently, the goal of Minnesota's solid waste management policy is to protect the state's land, air, water, and other natural resources and the public by reducing the amount and toxicity of the wastes that are generated, by recovering useable materials and energy from wastes, by reducing dependence on land disposal of waste, by coordinating waste management among political subdivisions, and by ensuring the orderly and deliberate development of waste management facilities.

Today, Minnesota defines solid wastes as MMSW (garbage), C&D debris, and other non-hazardous wastes such as industrial wastes. Minnesota Statutes § 115A.02 defines a preferred hierarchy for the management of solid waste. Solid waste is to be managed as high on the hierarchy scale as is feasible. Minnesota's preference of waste management practices follows in the order of most to least preferred:

- waste reduction and reuse
- waste recycling
- composting of yard waste and food waste
- resource recovery through mixed municipal solid waste composting or incineration
- land disposal which produces no measurable methane gas or which involves the retrieval of methane gas as a fuel for the production of energy to be used on-site or for sale
- land disposal which produces measurable methane and which does not involve the retrieval of methane gas as a fuel for the production of energy to be used on-site or for sale

While significant advancements have been made in the management of solid waste, the Work Group has identified an ongoing challenge that must be acknowledged. The proper management of solid wastes is dependent upon the establishment and enforcement of the proper level of regulations, rules, and programs. Specifically, our collective experience is that the promulgation of overly stringent rules with the intention of eliminating all risks from the operation of a landfill often has the unintentional effect of increasing the risk that wastes will not be collected and managed properly within a permitted disposal facilities, but will instead be illegally dumped in the countryside or burned in a barrel.

Types of land disposal

The C&D and industrial waste streams vary and generally end up in one of seven kinds of landfills:

1. demolition debris (Class 1 demolition landfill)
2. demolition debris and some select construction debris (which are usually designated off-specification wastes or are “like” demolition debris) (Class 2 demo)
3. demolition debris, construction wastes, and some industrial wastes below 50% by total volume (Class 3 demo)
4. demolition debris, construction debris, or various industrial wastes below the hazardous waste threshold or some percentage thereof, greater than 50% by total volume (often called a merchant landfill)
5. industrial waste, often called monofill waste, and generally associated with a particular industry such as coal power utilities (ash), secondary metal smelting, wood products, or agricultural processing, (monofill industrial landfill)
6. industrial landfill permitted to take industrial, demolition, and refurbishing waste (demo-like industrial landfill)
7. MMSW landfills

Incentives toward a multi-waste facility

The MPCA practice has been to require an ISWMP for all the facilities accepting industrial waste. Increasingly, because application of the C&D and industrial solid waste guidance is requiring better data, groundwater monitoring is becoming the norm for most facilities taking C&D and industrial solid waste. Hence, private and public facility owners and operators perceive that waste types Class 2, Class 3, and the merchant landfill, have become, with time, similar in supporting infrastructure. Likewise, other landfill expenditures associated with state taxes, liners, and leachate collection systems converge and are marginally less than the gain in revenue as a facility expands the waste types it can accept. The main consideration is often the cost of an additional liner and some form of financial assurance. Thus, if the capital is available, why not maximize revenue? Based on experience, private landfills have been tempted to capture a larger market share with multi-waste facilities. County C&D landfills are established as a service to their residents and businesses and are not intended to generate revenue.

Because it increasingly makes more economic sense to build a facility that accepts more waste types to increase market share, the last 15 years have seen the permitting or re-permitting of facilities with increases in capacity and acceptable waste types for merchant landfills. So, although the Minnesota Rules separately classify landfills into demolition and industrial, in practice the waste types are increasingly co-mingled in landfills with more advanced engineering controls.

The rise of recycling of C&D and industrial waste

The recycling of C&D debris and industrial wastes has been a common practice since the mid 1990s. The early facilities were mostly smaller-scale roll-off transfer station facilities. Recycling practices at the early facilities usually consisted of depositing the contents of one or more waste roll-off boxes on a tipping floor and hand sorting the material with limited assistance by mechanized equipment into two or more waste streams. The materials recovered at these facilities include metals, wood, paper, and limited amounts of other recyclables. In the last two years, interest in higher volume mechanized processing of C&D debris has significantly increased. Currently, there are several (as many as 9) facilities in the metropolitan area that process C&D debris and

recover recyclable materials. The materials recovered at these facilities include wood, metal, cardboard, concrete, and shingles.

Reuse and recycling of marketable materials

The recycling of waste is considered the second-highest waste management method in the state's waste management hierarchy. Recycling can be defined as the reprocessing of specific waste streams such as steel, aluminum, glass, and paper to form new products. Recycling preserves natural resources, reduces energy consumption, and potentially reduces climate change gas emissions.

The recycling of any material is a function of its price as a commodity, the development of end-use markets, and the degree to which an item is sorted within the waste stream. Some form of recovery operations can occur through a generator (such as a contractor), at a transfer facility, and at the various landfills.

A typical C&D waste stream contains wood, concrete and blocks, roofing, paper, drywall, dirt, metal, plastic, asphalt, and insulation. In the C&D waste stream, metals provide the highest market value, as they can be re-melted and reused in the manufacturing of new products. Metals, including aluminum, copper, brass, and steel, are commonly recovered. Corrugated cardboard, common as construction debris from shipping and storing products, can be used to manufacture kraft bags, corrugating medium, and boxboard. Clean wood has good value for uses such as landscaping mulch or compost, bio-fuel, animal bedding, and compost bulking agents.

Industrial waste is predominately contaminated soil, followed by various ash by-products, and smaller parts of asbestos, slag material (often from smelting or energy production), sludges, recycling residuals, medical waste, packaging, foundry wastes, miscellaneous factory wastes, brick, and other wastes.

There are several aspects to material recovery. Most generators do some type of source separation prior to bringing materials to the landfill. The materials separated prior to landfill delivery include cardboard, wood, metal, clean concrete, brick, and asphalt. Several landfills do some type of recovery on-site. These operations could involve simple hand-sorting, or a more complex method involving grinding/shredding, screening, and possible mechanical separation of metals (both ferrous and non-ferrous). The C&D materials recovered on-site include clean wood and pallets, metal (copper, brass, aluminum, cast iron, and steel), concrete, brick, asphalt, cardboard, and vinyl siding. C&D waste is also commonly sorted at transfer facilities. Materials most commonly recycled from transfer stations include recyclable concrete, asphalt, ferrous metal, wood, corrugated cardboard, and non-ferrous metals. Industrial waste is being recycled earlier in the waste stream and typically not at transfer facilities. Material recovered from C&D facilities also includes alternative daily cover (for use at landfill operations) and biomass fuels.

The rise of new markets for separated materials

As mentioned, new markets for materials recovered from C&D debris have been developed or are in the development stage. Competitive and mature markets exist for some recoverable materials, including concrete, ferrous and non-ferrous metals, clean wood debris, cardboard, and paper.

Additional markets are being developed for tear-off asphalt shingles for use in pavement. Currently the SWMCB is working with the MPCA, the Minnesota Department of Transportation (Mn/DOT), and the asphalt paving industry to research, develop, and approve a Mn/DOT specification for the use of tear-off asphalt shingles in highway pavement. This effort is slow to progress and has limited funding.

Clean, unpainted gypsum wallboard constitutes a significant percentage by weight of the construction debris stream. Gypsum wallboard is readily recycled into new wallboard or processed for use as a soil amendment but the recyclability in Minnesota is stunted by the lack of a gypsum recycler in the market.

Markets for several other C&D debris materials have recently emerged, including carpeting and reusable ceiling tile. A Minnesota-based textile manufacturer has begun accepting post-consumer carpet and separated foam padding from transfer station operators and directly from the public for recycling into textile products. At least one metropolitan area C&D debris service provider has reported collecting ceiling tile for reuse.

Currently, much work is being done in the metropolitan area to identify potential uses for asphalt roofing waste (shingles and hot mix asphalt), as a fuel for cement kilns, and as a source of aggregate for use in road base, new shingles, and cold mix pavement applications.

1.4.5 Beneficial use

The beneficial use of a solid waste is generally defined as the recycling of a waste stream from one process as the raw materials for another. For example, the combustion of sub-bituminous coal in a pulverized coal boiler results in the generation of a waste stream that has the consistency of talcum powder called fly ash. Under certain conditions, this fly ash has physical properties similar to Portland cement and can be readily used as a partial cement replacement for concrete structures. The benefits of beneficial use is that landfill capacity is saved, natural resources are conserved, and global climate change emissions are potentially averted, and in some cases, the quality of the material produced is enhanced.

Toward this end, the MPCA has promulgated solid waste utilization rules (Minnesota Rules, part 7035.2860), which absolves certain wastes with a potentially beneficial use from the normal solid waste regulatory regime, due to their perceived lack of a threat to the environment, a high valued use, and an acknowledged use in construction applications and other products. There also is a mechanism in this rule for parties to make an application to the MPCA to request a use determination on other candidate waste materials. The rule also allows certain pilot projects to demonstrate the use and benign environmental impact of certain waste types on the environment.

Specifically, the solid waste utilization rules identify three regulatory frameworks that can be utilized to gain approval for a use:

- standing beneficial use determinations (SBUD)
- case-specific beneficial use determinations (CSBUD)
- demonstration/research projects (DRP)

As a result, the solid waste utilization rules identify a category of beneficial uses that do not need any regulatory approval. This category is referred to as standing beneficial use determination (SBUD), and includes uses such as the practice of replacing Portland cement with fly ash.

The entire list of standing uses is extensive but includes such things as using specified forms of crushed concrete and brick as a replacement for virgin aggregate as a base for roads and driveways. Other candidate materials are found in the rule and include various types of slags, bottom ashes, and certain “clean” fly ashes formed during the production of electricity. The utilization rules also identify a process that allows for a case-specific beneficial use determination (CSBUD) to assess whether a new use is acceptable.

Finally, the rules establish procedures for individuals to explore a potential beneficial use through a limited demonstration/research project (DRP) even if the use is not currently allowed by rule or permit. If successful the DRP can be used to support the development of a BUD for the specific use.

Part 2. Environmental performance of landfills

The CDIL Work Group makes the recommendations listed below regarding environmental performance of landfills, based upon two fundamental tenets: The goal of protecting Minnesota's natural resources through policies of improving waste management practices, and preventing degradation of groundwater quality, which are codified in the two following Minnesota Statutes:

Minnesota Statute 115A.02 Legislative Declaration of Policy; Purposes.

(a) It is the goal of this chapter to protect the state's land, air, water, and other natural resources and the public health by improving waste management in the state to serve the following purposes:

- (1) reduction in the amount and toxicity of waste generated;
- (2) separation and recovery of materials and energy from waste;
- (3) reduction in indiscriminate dependence on disposal of waste;
- (4) coordination of solid waste management among political subdivisions; and
- (5) orderly and deliberate development and financial security of waste facilities including disposal facilities.

(b) The waste management goal of the state is to foster an integrated waste management system in a manner appropriate to the characteristics of the waste stream and thereby protect the state's land, air, water, and other natural resources and the public health. The following waste management practices are in order of preference:

- (1) waste reduction and reuse;
- (2) waste recycling;
- (3) composting of yard waste and food waste;
- (4) resource recovery through mixed municipal solid waste composting or incineration;
- (5) land disposal which produces no measurable methane gas or which involves the retrieval of methane gas as a fuel for the production of energy to be used on-site or for sale; and
- (6) land disposal which produces measurable methane and which does not involve the retrieval of methane gas as a fuel for the production of energy to be used on-site or for sale.

Minnesota Statute 103H.001 Degradation Prevention Goal.

It is the goal of the state that ground water be maintained in its natural condition, free from any degradation caused by human activities. It is recognized that for some human activities this degradation prevention goal cannot be practicably achieved. However, where prevention is practicable, it is intended that it be achieved. Where it is not currently practicable, the development of methods and technology that will make prevention practicable is encouraged.

Executive Summary 2. Environmental protection. *The Work Group encourages policymakers to set regulations that maximize environmental protection and minimize environmental risk, while recognizing the economic impacts and any unintended consequences that may result from implementation. Ideally, any new policies and/or regulations would be both environmentally responsible and economically feasible.*

2.1 Recommendations

1. Regulation of C&D and industrial landfills should be based upon environmental performance requirements using a risk-based evaluation of waste toxicity characteristics, hydrogeologic characteristics, and engineered controls, rather than prescriptive design requirements. To be effective, regulations must be understood by both industry and the regulators but responsibility must remain with the regulators to apply and enforce the regulations.
2. Regulation should initially be in the form of published guidance developed through a stakeholder process. Rule-writing should be conducted after sufficient experience is gained with applying, enforcing, and measuring the results of guidance-based regulation.
 - a. The current MPCA guidance for C&D landfills, adopted in 2005, is adequate and should continue in effect for another two years to complete a full five-year permit renewal cycle so that all permitted C&D landfills are brought into compliance with those guidance requirements.
 - b. New guidance should be adopted for industrial landfills. The guidance should define siting requirements and location standards, establish the scope of required hydrogeologic investigations, and correlate landfill containment design requirements with waste toxicity characteristics and site hydrogeologic characteristics.
 - c. New guidance should be adopted to clarify post-closure care regulations and to establish regulations for terminating post-closure care obligations for all landfills including C&D and industrial landfills.

3. The MPCA should undertake the following tasks:
 - a. Conduct the necessary research to characterize leachate from unlined Class 1 and Class 2 demolition landfills.
 - b. Research and address issues related to emerging chemical compounds.
 - c. Make use of reported monitoring data to evaluate the environmental performance of C&D and industrial landfills, validate environmental performance models, and report performance results.
 - d. Evaluate the definition of “groundwater sensitivity” as used by the Department of Natural Resources (DNR) and Minnesota Geological Survey (MGS), and determine its applicability to the landfill siting process within the overall context of risk-based environmental performance requirements that considers waste toxicity characteristics, hydrogeologic characteristics, and engineered controls.

2.2 Background

The degree to which protection of human health and the environment is achieved through landfill regulation is the result of interaction of multiple “environmental performance” parameters that are grouped into three categories: 1) toxicity characteristics of the waste, 2) hydrogeologic characteristics of the landfill site, and 3) engineered controls and monitoring systems of the landfill.

MMSW landfills are regulated according to a strict set of prescriptive rules (Minnesota Rules, part 7035.2815, promulgated in 1988). In contrast, C&D and industrial landfills are regulated through a combination of non-prescriptive rules supplemented by policy decisions, and in the case of Class 1, 2, and 3 C&D landfills, by adopted guidance that was developed through a stakeholder process. The MPCA regulates non-PBR landfills through facility permits that are renewed every five years.

This C&D and industrial landfill regulatory framework operates under a risk-based approach to achieving a targeted level of environmental performance in that it relies upon professional judgment, interpretation, and flexibility in evaluating the interaction of the environmental performance parameters.

2.3 Environmental performance parameters

The parameters that influence environmental performance of a landfill can be grouped into three general categories:

- waste toxicity characteristics
- hydrogeologic characteristics
- engineered control systems

Determining the engineering system required, as described in the permit, in order to control the waste in the hydrogeologic setting, is the essence of managing risk and achieving acceptable environmental performance. In some cases, a set of prescriptive controls is required by permit for specific waste types and hydrogeologic settings with a resultant presumption that acceptable environmental performance will be achieved. In other cases, a detailed evaluation of non-prescriptive controls is made to predict whether the proposed controls, in combination with waste type and hydrogeologic setting, will produce acceptable environmental performance.

In order for an adverse impact to result from a contaminant release from a landfill, there must be present a “contaminant of concern,” an “exposure pathway,” and a “contaminant receptor.” Current rules consider human and non-human receptors. The following paragraphs present background information on exposure pathways and receptors, and discuss the environmental performance variables.

2.3.1 Exposure pathways

An exposure pathway is the link from the contaminant source to a receptor, and includes those parameters that affect the movement of a contaminant once it is released from the waste.

Receptors must be exposed to (come into physical contact with) contaminants emanating from a landfill in order for potentially adverse health effects to occur. For a receptor to come into contact with contaminants, there must be a completed exposure pathway, which consists of five factors:

1. A **source** of the contaminants of concern (COC) (chemical releases and spills).
2. **Environmental transport**, which allows a COC to move from the landfill site (through soil, air, groundwater, and/or surface water) and bring it into contact with people or other species.
3. A **point of exposure** which is the place where people or other species come into direct contact with the COC.
4. A **route of exposure**, which is how a person or other species comes into contact with the COC (ingestion, inhalation, dermal contact).
5. A **population at risk/receptor** includes people or other species that may come into physical contact with site-related COC.

Exposure pathways can also be characterized by the timing and duration of the exposure. Exposure to a chemical contaminant in and of itself does not necessarily result in adverse health effects. A chemical's ability to affect a person's or other species' health is also controlled by a number of other factors, including:

- How much of the chemical to which a receptor is exposed (the dose).
- How long a person or other species is exposed to the chemical (duration of exposure).
- The chemical's toxicity.

2.3.2 Contaminant receptors

In a general sense, the term "contaminant receptor" refers to the exposure of human or other species to COCs at the end of the exposure pathway. However, Minnesota Rules require establishment of an artificial receptor located within the landfill property; this is known as the "compliance boundary." Generally, the compliance boundary is a horizontal boundary (defined as either the property boundary or 200 feet from the waste footprint, whichever is less), and compliance at this boundary is deemed protective for future development of land surrounding the landfill.

Characterization of a landfill site includes a well survey to identify all public and private water supply wells within a set radius of the landfill. This helps to ensure that the wells located downgradient of the landfill are evaluated and protected from harm in the case of a potential release.

2.3.3 Waste toxicity characteristics

The characteristics of the waste placed in a landfill have a direct effect on the level of risk that would result from a contaminant release from the landfill. The existing C&D landfill guidance recognizes this factor by requiring different levels of engineered controls based upon waste type, along with consideration of the hydrogeologic characteristics of the site. Industrial wastes have wider ranging contaminant characteristics, and therefore require more detailed evaluation of the waste and of site-specific conditions in order to determine engineered control requirements that will result in acceptable environmental performance. The potential risk posed by a particular facility can be reduced by operational controls (e.g., facility waste acceptance restrictions and waste screening procedures can keep waste containing COCs out of a landfill), and by landfill development schedules (e.g., managing the size of the working face, and the timing of cell construction and closure).

2.3.4 Hydrogeologic characteristics

Hydrogeologic characteristics are the site-specific soil and groundwater properties of a landfill site that control the movement of contaminants into and with groundwater. These properties include porosity (voids) of geologic materials, permeability (how well the voids are connected), formation thickness, depth to groundwater, hydraulic gradient (the pressure difference that drives groundwater flow) and attenuation (the interaction of contaminants with geologic materials that affects their movement with groundwater).

Collectively these factors determine the flow direction (pathway), flow velocity, and groundwater concentrations for contaminants moving from a source to a receptor. With the exception of hydraulic gradient, these factors are, for the most part, static over time. The hydraulic gradient can be modified or influenced by landfill design components such as stormwater ponds, underdrains, groundwater pumping systems, and barrier

walls. It can also be affected by changes in high capacity groundwater pumping near the site, and by changing short-term (weather) and long-term (climate) atmospheric conditions.

Current Minnesota Rules, part 7035.2815, subpart 3, require a detailed investigation to determine hydrogeologic characteristics for siting and expanding MMSW and combustor ash landfills. This investigation is used to develop a conceptual model of groundwater flow, which serves as the basis for design of a groundwater monitoring network to detect and intercept a contaminant release. These same rules are currently applied by policy for C&D and industrial landfill siting and expansion, although the scope of the investigation may be reduced based upon the presumed level of risk posed by the specific waste type to be landfilled.

Under current practice, results from hydrogeologic investigations at a site are used primarily for determining if a site is monitorable and remediable, and for design of the groundwater monitoring system. The hydrogeologic investigation is not explicitly used to determine general suitability of a landfill site or to establish engineered control requirements (except for depth to the water table). Guidance should be developed, as a transition to rules, that addresses the scope and use of a hydrogeologic site investigation in determining site suitability and engineered control requirements as part of a risk-based environmental performance evaluation.

2.3.5 Engineered control systems

Engineered landfill control systems can be designed to provide physical barriers that modify the intrinsic hydrogeologic characteristics of a site with the effect of reducing the risk of release of contaminants to the environment. These engineered features include liners, leachate collection systems, leak detection systems, and caps/cover systems. The design and construction of engineered controls are performed under the direction of licensed professional engineers, who must certify their design and construction. The engineered controls available to engineers are not static, but change over time as new technologies and products are developed and as knowledge improves concerning how water and contaminants move through these natural and engineered structures.

2.4 Legacy of environmental performance of Minnesota landfills

The legacy of environmental contamination caused by solid waste disposal practices in Minnesota and across the nation is well known. This section provides a brief summary of why this legacy exists. Much of the information in this section is taken from *Minnesota History of Solid Waste Management*, published as Appendix B to the *2005 Solid Waste Policy Report* (MPCA, March 2006, <http://www.pca.state.mn.us/oea/policy/policy2005.cfm>).

Open dumps existed across the state with little formal oversight or management through the 1960s. This resulted in placement of all types of waste, some hazardous, into the ground with no engineered controls, an activity that would be considered illegal today. The MPCA was created in 1967; however it did not have authority to regulate solid waste until 1969. In the early 1970s, the MPCA placed emphasis on closing dumps and creating “sanitary landfills,” however there was no requirement that sanitary landfills be lined. The link between solid waste disposal practices (with no engineered containment) and groundwater contamination was first identified in 1974, when monitoring reports from the newly created sanitary landfills started to show groundwater impact, an early warning that sanitary landfills could cause pollution problems.

Substantial legislation occurred in the 1980s to address the contamination problems created by landfilling, culminating with the promulgation of rules regulating MMSW landfills in 1988. The 1988 rules addressed landfill siting criteria and established requirements for liners, leachate collection, groundwater monitoring, closure/post-closure care, and financial assurance. The rules also required that unlined MMSW landfills be closed by 1992. The basis for all these activities was the detection of COCs in close proximity to these unlined landfills rather than direct effects on human health and the environment.

Contamination plumes have emanated from some of these open dumps and unlined sanitary landfills that operated prior to 1992. Most of the older unlined landfills have been thoroughly characterized and secondary engineered improvements have been completed (i.e., capping). Ongoing environmental monitoring is also completed at these facilities. However, some of this legacy contamination is just now being discovered (e.g., the perfluorocarbon [PFC] plume related to the Washington County closed landfill).

2.5 Current practices for Minnesota landfills

Current landfilling practices have evolved as a response to the environmental contamination resulting from legacy landfilling practices. Current rules for MMSW and combustor ash landfills were promulgated in 1988 and 1992, respectively, and contain prescriptive requirements for liners, leachate collection systems, leak detection, and final cover that typically exceed federal Subtitle D requirements. Current rules for C&D and industrial landfills are largely non-prescriptive, and are supplemented by published guidelines and unpublished policies. C&D and industrial landfill guidelines and policies are designed to emulate the effect of the prescriptive MMSW landfill rules by considering the contaminant/hydrogeology/engineered-control interaction and imposing siting and design requirements for C&D and industrial landfills that address environmental performance requirements.

2.5.1 C&D and industrial landfill location standards

Current Minnesota Rules defining location standards for C&D and industrial landfills include the following extracted language:

7035.2825 DEMOLITION DEBRIS LAND DISPOSAL FACILITIES.

Subp. 2. Location standards for permit-by-rule facilities. Demolition debris land disposal facilities permitted-by-rule must not be located:

- A. on a site with karst features including sinkholes, disappearing streams, and caves;
- B. within wetland areas;
- C. within a floodplain area;
- D. within a shoreland area; and
- E. with a water table within five feet of the lowest fill elevation.

7035.2825 DEMOLITION DEBRIS LAND DISPOSAL FACILITIES.

Subp. 7. Location standards for permitted facilities. The owner or operator of a permitted demolition debris land disposal facility must not locate the facility on a site: with active karst features including sinkholes, disappearing streams, and caves; or where the topography, geology, or soil is inadequate for protection of ground or surface water.

7035.1600 PROHIBITED AREAS FOR INDUSTRIAL SOLID WASTE LAND DISPOSAL FACILITIES.

The fill and trench areas of industrial solid waste land disposal facilities are prohibited within the following areas:

- A. 1,000 feet from the normal high water mark of a lake, pond, or flowage;
- B. 300 feet from a stream;
- C. a regional floodplain;
- D. wetlands;
- E. within 1,000 feet of the nearest edge of the right-of-way of any state, federal, or interstate highway or of the boundary of a public park or of an occupied dwelling. Permission may be granted under this item, without these distance requirements, at the discretion of the commissioner, taking into consideration such factors as noise, dust, litter, and other aesthetic and environmental considerations;
- F. locations considered hazardous because of the proximity of airports; and
- G. an area which is unsuitable because of topography, geology, hydrology, or soils.

References in these location standards to physical settings that are “inadequate,” “unsuitable,” or “prohibited” have, in practice, been applied primarily to geotechnical stability considerations rather than hydrogeologic characteristics. Application of MMSW location standards (Minnesota Rules, part 7035.2815 subpart 2) to C&D and industrial landfill siting would clarify this ambiguity with regard to the hydrogeologic setting.

2.5.2 Dry-tomb landfills

As applies to C&D and industrial waste, most environmental contamination from legacy landfills was caused by two processes. First, inappropriate materials such as liquid waste in drums or hazardous wastes were allowed into the landfills. Second, water percolating through the landfills leached contaminants from the waste then carried those contaminants into groundwater or surface water. The current approach to minimizing the potential for contamination from landfills is to exclude inappropriate waste materials, and to limit leaching potential by operating landfills as “dry-tombs.”

Currently, landfills are developed as a series of “cells” that are typically filled and closed in three to five years. This practice limits the amount of rainfall that infiltrates the waste. When a landfill liner is used, it allows the water that percolates through the waste during operations to be collected, removed, and treated. When a cell is closed, a “final cover” or “cap” is constructed over the waste to minimize infiltration of water after closure.

After the cap is constructed, the water that infiltrated the waste during the “open” phase of cell operations (leachate) slowly drains. If the landfill is lined, this leachate is collected, removed from the landfill, and treated. As long as the cap functions as designed to prevent water infiltration, the waste will drain and dry out within five to 10 years, and leachate production will effectively cease. At this point, the liner beneath the waste has served its function and is no longer the critical component of the landfill containment system, because the contaminant-release mechanism effectively ceases with the cessation of leachate production.

Long-term environmental performance of most landfill containment systems relies primarily on the cap performing its function of limiting the infiltration of water into the waste. Current cap design requirements and performance characteristics vary with landfill class. An important factor in placing reliance on the cap for long-term environmental protection is that the cap is a near-surface feature that can be inspected, maintained, repaired, and even improved or replaced if necessary.

2.5.3 Engineered control systems

The basic elements of engineered control systems for landfills include liners, leachate collection systems, leak detection lysimeters, and caps. These elements are designed to limit water infiltration into a landfill, contain and remove leachate that is generated, and detect/contain leakage. These basic elements are described below.

Natural clay liners

Landfill liners constructed using natural clay soils (“engineered liners”) are used to enhance the in-situ geology by placing an additional layer of natural low-permeability soil in the landfill site. The environmental performance of engineered clay liners is predictable with a high degree of certainty because they are constructed with rigorous construction quality control and quality assurance. The natural clay material used to construct an engineered clay liner is a product of ancient glacial activity. The stability and permeability characteristics of clay remain virtually unchanged over millennia. These same characteristics make clay desirable for landfill liner systems. Theory predicts that such systems could also remain effective for millennia, because the liner is designed to be confined and protected from exposure to desiccation and freeze-thaw cycles by the cover and overlying waste.

Geosynthetic clay liners

A geosynthetic clay liner (GCL) is a manufactured product used in many waste-containment facilities such as landfills and wastewater ponds. GCLs consist of a layer of sodium bentonite (a natural clay mineral) that has very low permeability (one to two orders of magnitude lower than “natural” clay) sandwiched between polypropylene geotextiles. GCLs have been used both in conjunction with and as a substitute for natural clay liners. The bentonite in the GCL has the same expected performance life as natural clay liners.

Geomembrane liners

A geomembrane liner is a manufactured product also used in many waste-containment facilities. Geomembrane liners are essentially impervious, although leakage can occur through manufacturing and installation defects. Geomembrane liners are constructed under rigorous construction quality control and quality assurance requirements. A relatively new technology, electrical leak location testing, allows for

locating and repairing manufacturing and installation defects after installing the protective layer of drainage soils, but prior to placing the liner into service.

The most current comprehensive research on the life expectancy of polyethylene geomembranes (most commonly used geosynthetic liner) was published in an EPA document *Assessment and Recommendations for Improving the Performance of Waste Containment Systems* (EPA, December 2002, EPA/600/R-02/099; <http://www.epa.gov/nrmrl/pubs/600r02099/600R02099.pdf>). A summary of the research results is provided below.

Degradation of the engineering properties of polyethylene geomembranes occurs as a result of oxidation of the polymer chains. Geomembrane formulations include an antioxidant additive to inhibit the oxidation process. The antioxidant additive is depleted over time, so the effect of the antioxidant is to delay the onset of the oxidation process rather than prevent oxidation altogether. The long-term aging process for polyethylene geomembranes involves three discrete stages:

1. Antioxidant depletion time
2. Oxidation induction time
3. Time after completion of the oxidation induction time to reach a specified reduction in a significant engineering property

For the purposes of the study, the EPA established the geomembrane service life to be the point at which the engineering properties have been reduced by 50 percent. A 50 percent change in properties is usually taken by polymer engineers to be a significant change and is called the “half-life.” The EPA performed accelerated aging studies and used Arrhenius modeling to estimate the time for each of the three aging stages and arrive at an estimated geomembrane service life. The EPA study results indicate an estimated service life (half-life) for a 60-mil high-density polyethylene geomembrane to be on the order of 1,000 years, based upon the duration of the aging stages shown in the table.

Aging stages	Duration (years)
Antioxidant depletion	200
Induction time	20
Half-life of engineering property	750
Service life estimate (half-life)	970

Composite liners

Composite liners generally include a low-permeability soil layer (natural clay or GCL) overlain by a geomembrane. A composite liner utilizes the essentially impervious geomembrane for primary containment, and is backed up by the low-permeability soil layer for secondary containment in case manufacturing or installation defects are present in the geomembrane.

Leachate collection systems

A leachate collection system consists of a drainage layer (sand or synthetic drainage net) placed over the liner with embedded collection pipes that drain to a sump. Leachate draining out of the waste flows across the liner through the drainage layer and is routed to the sump through the collection piping. Leachate that accumulates in the sump is removed for treatment. The leachate collection system serves the important function of limiting the depth of leachate ponding (“head pressure”) on the liner.

Movement of contaminants through the liner is controlled by head pressure on the liner and the permeability and thickness of the liner. Leachate collection systems are designed to limit the leachate head pressure to one foot maximum (0.43 psi). When the head pressure is removed (leachate production ceases after capping) contaminant migration through the low-permeability soil liner is minimal. The permeability and thickness of the liner are designed in conjunction with the cell operating life and design head pressure so that contaminants do not migrate all the way through the liner prior to stopping due to lack of head pressure.

Leak detection lysimeters and secondary liner systems

Leak detection lysimeters and secondary liner systems are installed below the primary liner to contain and allow detection of leakage through the primary liner. A leak detection lysimeter is equipped with a monitoring system to allow removal and analysis of collected liquids. Leak detection lysimeters, when used, are generally installed beneath the landfill sump since the greatest potential for leachate head on the primary liner is present there, but can be installed beneath the entire extent of the primary liner.

In addition, facilities can be constructed with two liner and leachate collection systems which also function as a leak detection system as well as providing secondary containment.

Caps/final cover

Caps or final cover systems consist of soil layers to support vegetative growth and prevent erosion, and may include a barrier layer (clay or geomembrane liner) beneath the vegetative soil layers. The cap features and functions include surface sloping to prevent ponding and promote runoff, water retention within the vegetative soil layers to promote vegetative growth and evapo-transpiration, and barrier layers to prevent deep percolation into the waste. A relatively new capping technology is referred to as an evapo-transpirative (ET) cap or phytocap. This technology uses a “sponge and pump” concept rather than barrier layers to prevent deep percolation into the waste. The “sponge” consists of thicker soil layers that absorb and store infiltration from rainfall without allowing percolation into the waste. The “pump” consists of robust, deep-rooted vegetation (prairie grasses and hybrid trees) that remove the stored water through evapo-transpiration. Since these ET cap systems work with natural processes rather than resisting them, their long-term performance is much less reliant on maintenance activities than engineered barrier systems.

2.5.4 Analytical tools

A number of analytical tools (e.g., HELP, IWEM, MODFLOW, MT3D, PATH3D, MIGRATE, SUTRA, SESOIL, FEFLOW, MLAEM, GFLOW), developed by the EPA, the U.S. Geological Survey, and others, can be used to analyze the expected environmental performance of engineered control systems, to evaluate contaminant transport through hydrogeologic settings, and to predict resultant contaminant concentrations at the compliance boundary. Professional judgment is required in selecting analytical tools, applying them to a specific site, and interpreting the results.

Use of such analytical tools for landfill siting and permitting may be warranted depending upon the waste toxicity characteristics, the complexity of the hydrogeologic setting, and the proximity of receptors. The Work Group supports the use of analytical tools for linking the design of engineered controls to the hydrogeologic characteristics of a site, and recommends that the MPCA address the use and validity of such tools using existing data.

Executive Summary 12b. MPCA data collection and analysis; Validation needed for computer tools like IWEM.
The waste management industry and the state utilize modeling tools to predict the environmental performance of C&D and industrial landfills under specific circumstances, one of which is the Industrial Waste Evaluation Model (IWEM). The MPCA should validate the IWEM and other modeling assumptions using real-world data collected from Minnesota landfills.

2.5.5 Long-term care

C&D and industrial landfill permits include requirements for 20 years of post-closure care by the permittee. Post-closure care includes routine inspection, groundwater monitoring, cap maintenance, site security, and response to inspection- and monitoring-triggered contingencies. To date, no landfills permitted since the early 1990s have been released from post-closure care requirements. Prevention of long-term environmental impacts is dependent on some combination of the waste characteristics, hydrogeologic setting, and the maintenance of dry-tomb conditions described in section 2.5.2.

Engineered control systems for landfills have been in use for about 35 years. The environmental performance of these systems has thus far been at or above specified levels, but evaluation is limited to 20 years of observations. Monitoring programs for new facilities should include provisions for collecting data needed to assess the long-term performance of engineered barriers, and operators and regulators of existing facilities should collect these data to the extent practical using in-place monitoring systems. (*Assessment of the Performance of Engineered Waste Containment Barriers*, Committee to Assess the Performance of Engineered Barriers, National Research Council, National Academies Press, 2007).

2.6 Landfill siting criteria

The MPCA should evaluate the definition of “groundwater sensitivity” as used by the DNR and by the MGS, and determine its applicability to the landfill siting process within the overall context of risk-based environmental performance requirements that consider waste characteristics, hydrogeologic setting, and engineered controls.

The Work Group recommends that siting regulations be based upon the evaluation of environmental performance requirements that address the life cycle of the landfill, from proposal phase through the end use of the site.

The Work Group recommends that siting be addressed through the existing regulatory approval mechanisms for environmental review (EAW/EIS) and permitting. Within the environmental review process, site location is evaluated considering factors such as traffic, noise, dust, hydrogeologic setting, and surface water. The MPCA addresses siting conditions for C&D and industrial landfills during its permitting process by applying the location standards for MMSW landfills. The Work Group recommends that the MPCA formalize the application of these standards for C&D and industrial landfills.

Consistent with the state goal of non-degradation of groundwater resources, the landfill siting process should also consider non-degradation of surface water and potential impacts to other (non-human) species that exist in the environment.

Executive Summary 6. Groundwater sensitivity test for siting. A single test for site suitability should not be used. Hearings in the 2008 Legislature raised the possibility of using the tritium concentration in groundwater as the definitive test for groundwater sensitivity when siting landfills. The Work Group recommends the use of site-specific hydrogeologic investigations to define groundwater character at proposed sites rather than the use of a single criterion such as tritium concentration, or intrinsic or geologic sensitivity maps (such maps must address a specified intended purpose at an appropriate scale).

Part 3. Solid waste taxes and fees

3.1 The solid waste management tax

The solid waste management (SWM) tax, found in Minnesota Statutes Chapter 297H, is applied at a rate of 60¢ per cubic yard for disposal of non-MMSW waste. If the non-MMSW is calculated by weight, the tax is \$2 per ton for C&D and 46.2¢ per ton for industrial; these conversion rates were formulated after consultation between the Department of Revenue, the MPCA, and representatives from the waste industry. For MMSW, the SWM tax is imposed on waste management fees at a rate of 9.75% for residential generators and 17% for commercial generators. The different rates for non-MMSW and MMSW were set, in part, to reflect each waste stream's potential for environmental risk. The SWM tax also exists, in part, in lieu of a permit fee on all solid waste facilities.

Under Minnesota Statutes § 297H.13, subdivision 2, 30% of SWM tax revenue is deposited in the State General Fund. The remaining 70% of the SWM tax revenue or \$33.76 million, whichever is greater, is allocated to the Environmental Fund (created under Minnesota Statutes § 16A.531, subdivision 1), which also receives money from other environmental fees, loan repayments, and legislative appropriations. See the table on the following page for revenue flows from 2005 to 2008. In FY 1999, the solid waste activities funded out of the Environmental Fund were only 70% of the SWM tax revenue deposited that year (note: additional money for solid waste activities came from the General Fund at that time).

The solid waste activities funded by the SWM tax include MPCA solid waste regulatory programs, the closed landfill programs, SCORE grants, environmental assistance (former OEA), solid waste enforcement at DNR, and the attorney general's office (insurance recovery). Also included in the above expenditures is an appropriation to the Department of Health for public drinking water issues related to contaminated sites. All expenditures are subject to appropriation by the Legislature.

Some Work Group members contend that when the SWM tax was created, a review or "trigger" clause was to be included that allowed a one-time recalibration of the tax rates based on projections of revenues to be collected in FY 1999. Those working on the revenue projections during the inception of the SWM tax were not able to get accurate data on potential revenue generation from commercial and industrial waste, which is nearly all managed by private firms and so they intended this clause as a means of checking their projections and estimates. Based on initial collection rates after the SWM tax took effect, the Department of Revenue did not project in 1998 that excess revenue would be collected in FY 1999, and therefore the original tax rate stands as legislated in 1997.

On the one hand, representatives of the waste hauling industry believe that the tax rate should have been lowered anyway to more accurately reflect actual revenue in FY 1999. They also state that the original intent of the legislation was

Executive Summary 8. Possible role for guidance leading to rules. Given the significant potential economic impact of the MPCA's inability to site and permit new landfills until the adoption of new rules on groundwater sensitivity and financial assurance, and given that the Work Group's opinion that preparing a guidance document now as a transition to rules is a valid approach to regulation, the Work Group recommends that the Legislature recognize that guidance leading to rules is a valid approach to achieving environmental protection and public health. The Work Group believes that guidance and rules need to be fast-tracked to avoid potentially severe economic impacts.

Executive Summary 13. Solid waste management taxes and spending on C&D and industrial waste management. Less is being spent by the state on C&D and industrial management than the SWM tax on such waste disposal brings in each year. Should there be a need for more spending to support the improved management or monitoring of C&D and industrial wastes, then the existing SWM tax revenue funding source should be prioritized to address issues related to C&D and industrial waste management.

The current tax structure provides incentives for managing C&D and industrial waste separate from MMSW. Business and counties have built their facilities and SWM programs based on the existing SWM tax structure, and therefore the Work Group recommends that the current SWM tax structure and its inherent incentives for the proper management of these various waste streams not be changed.

Executive Summary 14. Spending recommendations from the Work Group that would incur a cost (not in priority order):

- *A test cell to sample leachate from Class 1 demolition landfills.*
- *Rulemaking/guidance to update the existing rules.*
- *A broad analysis of groundwater data on the scope of the study done by Mike Trojan of the MPCA in 2003.*
- *Ground water testing around PBR demolition landfills.*

to fix collections at \$44.5 million per year. On the other hand, observes the MPCA, the SWM tax as passed and signed contained no provision to cut the tax rate, after the one-time adjustment authorization for FY 1999 expired. In this respect, states the MPCA, the SWM tax operates similarly to the old Solid Waste Generator Assessment and the SCORE sales tax on garbage collection that the SWM tax displaced: revenues will rise if waste disposal goes up and revenues will drop if key indicators fall.

Unfortunately, as stated earlier, 30% of the SWM tax revenue does not go to support solid waste activities. Furthermore, at times the solid waste program expenditures have focused on MMSW and hazardous waste, so the revenue generated from non-MMSW (roughly \$5.13 million per year) has benefited the management of MMSW more than non-MMSW. Therefore, should there be a need for more spending to support the improved management or monitoring of C&D and industrial wastes, the existing SWM tax structure and revenue should be used to fund these initiatives. Additionally, the current tax structure provides incentives for managing C&D and industrial waste separately from MMSW, and in the process, preserving valuable MMSW airspace. Businesses and counties have built their facilities and solid waste programs based on the existing tax structure, and therefore the Work Group recommends that the current SWM tax structure and its inherent incentives for proper management not be changed.

Revenues from SWM tax

Fiscal year	Total SWM tax revenues	SWM tax revenues deposited in Environmental Fund	Amount spent from Env. Fund for solid waste activities
FY 2005	\$59,546,000	\$29,752,000*	\$40,706,000
FY 2006	\$63,472,000	\$43,281,000	\$45,516,000
FY 2007	\$64,356,000	\$46,199,000	\$43,250,000
FY 2008	\$67,333,000	\$47,139,000	\$39,049,000

**Note: under previous budgeting law, Environmental Fund received 50% of revenue.*

3.2 Other fees

3.2.1 County solid waste fee authority

Minnesota Statutes § 115A.919 authorizes counties in which a landfill is located to impose a volume-based fee on landfill operators. The revenue is required to be credited to the county’s general fund and used only for:

- programs to reduce reliance on landfills
- costs associated with landfill closure, post-closure, and clean-up
- “Purposes of mitigating and compensating for the local risks, costs, and other adverse effects” of having the landfill located in the county

As enacted in 1984, the fee was initially capped at 25¢ per cubic yard, but the cap for most landfills was removed in 1988. Due to the reduced potential for environmental risk, the fee on C&D landfills is capped at 50¢ per cubic yard. The statute was also amended in 1991 to allow a county to assess an additional fee per cubic yard on waste generated in another county (not to exceed \$7.50 per cubic yard). Many counties prefer the flexibility and increased revenue of Host Community Fee Agreements, which will be discussed later, and have opted to not enact a solid waste fee.

3.2.2 City or town solid waste fee authority

Minnesota Statutes § 115A.921 authorizes certain cities and towns to impose a fee on landfills within the city or town. Initially the fee was capped at 15¢ per cubic yard, increased to 35¢ in 1988, and to \$1 in 1989. Due to the reduced potential for environmental risk, the fee on C&D landfills is capped at 50¢ per cubic yard. Two-thirds of the revenues must be used for landfill abatement or “for mitigating and compensating for the local risks, costs and other adverse effects” of having the landfill located in the city or town. The balance may be used for any general fund purpose. Many cities and townships prefer the flexibility and increased revenue of Host Community Fee Agreements, which will be discussed later, and have opted to not enact a solid waste fee.

3.2.3 Host community fee agreements

In lieu of county and city/township fees, many facilities have negotiated Host Community Fee Agreements. These agreements can be structured in a variety of ways, but fees are typically assessed on the unit of waste disposed of (cubic yard or ton) or as a percentage of gross revenue from the facility. Expenditures related to

the revenue from these agreements are not restricted and are much more flexible. They may be used for any general fund purpose the local unit desires. Examples of how Host Community Fee Agreements have greatly benefited communities are funding for libraries, community/activity centers, community organizations, etc.

3.2.4 Other

Minnesota statute also imposes the Metropolitan Solid Waste Landfill Fee and the Greater Minnesota Landfill Clean-up Fee and authorizes county service charges. However, these fees and charges address MMSW and will not be discussed, since they are not applicable to non-MMSW.

Part 4. Facility-specific discussion

4.1 Permit-by-rule land disposal of demolition debris facilities

Minnesota Rules, part 7035.2825, subparts 2 to 6, govern demolition landfills that are granted permit-by-rule (PBR) status under Minnesota Rules, part 7001.3050, subpart 3. These PBR provisions were adopted November 21, 1988. The MPCA reason for allowing PBR landfills for demolition debris is located in a document called the Statement of Need and Reasonableness on pages 582 and 583. It states:

"The Agency believes that a reasonable approach to managing the disposal of small quantities of demolition debris is through the permit-by-rule status. The potential for environmental impacts from these facilities is small and the administrative process to obtain a permit would take longer than the facility would be in operation in many circumstances. Therefore, the Agency proposes to establish in rule standards for small, short-term facilities but eliminate the administrative process. In this way, the Agency will be able to focus its work efforts on larger, potential environmentally-sensitive projects yet ensure that minimum protective measures are employed at all disposal sites."

The PBR landfill rules list a minimal amount of locational standards, design requirements, operation and maintenance requirements, closure and post-closure requirements, and notification requirements. These standards and requirements are very brief but important. The question here is whether or not any of the said standards or requirements is followed or enforced other than the notification requirement.

The requirements related to notification of a proposed PBR landfill are located in Minnesota Rules, part 7035.2825, subpart 6. See Appendix C for a copy of the current MPCA notification form. The rule states:

"The owner or operator of a new facility shall submit such a letter before operations begin. To obtain a permit-by-rule landfill permit and begin operation of a permit-by-rule facility, a person must simply complete a 4-page notification form and send it to the agency. The notification must include the initial date of operation, the type of waste accepted, the capacity of the site, the location of the site, the users of the facility, and the expected date of closure."

4.1.1 Recommendations for PBR demolition landfills

The Work Group has developed the following recommendations regarding PBR landfills:

- **There is a continued need for PBR landfills.** Based on the information provided, there remains a very real economic need for PBR landfills. This need was also highlighted in the *Minnesota Construction, Demolition, and Industrial Waste Study*, by the SWMCB; dated September 2007, section 3.1.2 "Solid Waste Administrator's Association (SWAA) Survey." There are many areas in rural Minnesota where the distance to a permitted site is too great. Not allowing the continued use of demolition PBR landfills would cause the illegal dumping of waste and greater environmental damage in remote areas. Therefore, the Work Group recommends the continued use of these types of facilities if they are not located in close proximity to permitted sites.
- **PBR landfills should not be located within 15 miles of a permitted facility.** The Work Group does not feel that having to haul demolition debris 10 to 15 miles to a permitted site represents economic hardship.
- **PBR landfills can only accept onsite waste.** The Work Group also recommends that PBR landfills be allowed only when disposing of waste from that property, in other words, no waste can be brought in from off site. This change will go a long way toward answering the problem of sites staying open too long or accepting too much waste.

Executive Summary 9. Permit-by-rule (PBR) demolition landfills. Current regulations require no monitoring or inspection of PBR demolition landfills. While the Work Group does not know of any pollution resulting from PBR facilities, no one has checked the groundwater for possible impacts. While the Work Group feels that PBR demolition landfills do play a legitimate role, it is concerned about misuse of PBR landfills and recommends tighter limits on their size, duration of operation, and usage, with counties retaining authority to make exceptions in cases of public need. The Work Group also suggests increased notification of neighbors and improved recording on deeds. The MPCA should consider a groundwater study to better understand risk.

- **The maximum amount of waste allowed at a demolition PBR landfill should be lowered from 15,000 cubic yards to 2,000 cubic yards.**
- **PBR landfills should be allowed to stay open for a maximum of 90 days.**
- **Greater MPCA and local government oversight is required.**

The biggest concern of the Work Group regarding PBR landfills is whether these PBR rules and standards are being followed. From what we have learned, they are not. We would recommend a greater MPCA oversight, starting with modifying the existing *Standard State Notification Form* used for each PBR facility. The new form should have a signature line where the proposed operator acknowledges that he understands and will follow all rules and regulations. The form should also have signature lines for the appropriate county official and the MPCA compliance officer or engineer stating that the site meets all the required locational standards. No disposal will be allowed until all signatures have been obtained. In addition to this new form, the owner of any building going into a PBR landfill site must also complete the existing *MPCA Notification of Intent to Perform a Demolition Form*. As an additional requirement, a completed and signed *Pre-Inspection Checklist* must also be on file with the MPCA before any waste can enter the site.

- **Notification of adjacent property owners is required.**
Also the state or county should be required to give notice to adjacent land owners that a PBR is planned next to their property. This notification should be given at least 30 days before final signatures and the notice to proceed is given to the PBR owner/operator.
- **The Legislature should fund a groundwater and air monitoring study of PBR landfills to determine their environmental performance.**
- **MPCA should modify the existing requirements for a county solid waste management plan** to expand the section that deals with demolition debris to address under what circumstances that county would allow a PBR landfill. Any future PBR landfill within any county will also need to comply with that county's solid waste management plan. Also, as part of the plan, a county will have the authority to increase the size of a PBR or accept off-site waste on a case-by-case basis (e.g., economic development projects, natural disaster, etc.).
- **MPCA should be required to inspect the site a minimum of one time during waste placement and one time after final closure to determine compliance.** The Work Group believes that this follow through by the MPCA is the most important component to the continued use of PBR demolition facilities. Without the MPCA commitment to this type of follow through, the environmental performance of these types of facilities is in question.
- **The county or state needs to verify that the PBR location is placed on the property deed.** County or state must assure that the PBR landfill location is appropriately attached to the property deed.
- **MPCA should clarify what is meant by "water table" as one of its criteria.**
- **MPCA needs to provide a solution to the Work Group's PBR concerns that does not require an in-depth hydrogeologic investigation.**
- **MPCA needs to review the intent of the farm waste exclusion relative to demolition waste.**

4.1.2 Environmental performance (including siting and groundwater protection)

The standards and requirements for PBR landfills on the surface appear to be adequate for the protection of the environment for small volumes of demolition debris if the rules are followed precisely. There has never been any groundwater or air monitoring conducted at any PBR landfill sites to determine their environmental performance. Currently, there are no known or documented cases of groundwater contamination or air quality problems associated with a PBR landfill.

4.1.3 Economic consideration (including financial assurance)

There appear to be real economic reasons for establishing PBR landfills. First as mentioned above, the MPCA has shortened the administrative process which saves costs for both the generator and for the regulatory

agency. But the real economic consideration may very well have been the lack of available permitted facilities near the demolition project (or even within certain counties).

Another ongoing issue with local units of government has been dealing with abandoned buildings. As the cost for demolition and disposal goes up to remove a building, it may be cheaper for the property owner just to let the property go to tax forfeit. This increases further an existing issue—how to deal with abandoned buildings.

Having to haul demolition debris long distances could potentially cause economic hardship. The generator would possibly consider illegal dumping of the waste because of the cost to properly dispose of the waste at a permitted landfill located a great distance from the site. It is reasonable to assume that having all of the demolition in one place rather than scattered throughout the area illegally is important. It seems reasonable to allow PBR landfills for these reasons if they are truly operated in compliance with the current rules.

The Work Group does not feel that there is a need for financial assurance for PBR landfills because of their small size and short duration of operations.

4.1.4 Operations

Very little information is available about the operation of these types of facilities. It appears that there has been very limited oversight provided by the MPCA on these types of facilities, so the Work Group does not know if they are currently being operated properly. We believe that if the rules are followed, operations and maintenance would be adequate and acceptable for handling small amounts of this type of waste.

4.1.5 Regulations

One issue that needs to be resolved concerns the MPCA's assumption that farms are exempt from PBR requirements. When one reads the farm exemption (Minnesota Statutes § 17.135), the exemption applies to the disposal of solid waste. Minnesota Statutes § 116, does not clearly define demolition debris in the definition of solid waste (in fact, demolition debris is not defined anywhere in statute—this lack of definition is another issue that will need to be addressed). The major part of Minnesota Statutes § 17.135 that leads one to believe that it was not intended to include demolition debris is the statement: "this exception does not apply if regularly scheduled pickup of solid waste is reasonable available...." Demolition debris is not a regularly scheduled pickup, but an as-needed basis. This leads one to believe that the authors did not intend to include (at the very least did not consider) demolition debris when they drafted this exemption.

By Minnesota Statutes § 115A.42, counties are encouraged to improve local solid waste management planning activities and efforts. Under Minnesota Statutes § 115A.46, counties are required to have a solid waste management plan. The location standard in Minnesota Rules, part 7035.2825, subpart 2E, "with a water table within five feet of the lowest fill elevation" is poorly defined. A definition for water table needs to be established such that seasonal high water indications, perched water lenses, and non-yielding water-bearing units are not confused with "water table." The depositional environment along with the depth to an aquifer that may yield appropriate volumes for drinking water should also be taken into consideration for a PBR disposal site.

Current rules and regulations for these facilities should be adequate if they were strictly followed. The problem is that many times they are not. More oversight from the MPCA will be required for them to operate properly.

4.1.6 Changing conditions

From what has been learned, it appears that the PBR rules have at times been stretched beyond their limits. There is evidence that PBR landfills have stayed open longer than the one year maximum time frame, and that the 15,000 cubic yard maximum disposal limit has been exceeded. It also appears that at times, certain operators have opened one PBR landfill after another on the same property, thereby, getting around the rules for getting a fully permitted site. Because of these issues, we feel that it is time to change how these facilities are permitted and managed.

A broader vision needs to be taken and greenhouse gas emissions need to be taken in account. A properly managed PBR landfill may be environmentally preferable to hauling this material a great distance due greenhouse gas emissions from the hauling trucks.

4.2 Class 1 demolition landfills

The C&D waste stream consists of three primary sub-waste streams: demolition, renovation, and new construction. While the MPCA tracks volumes and tonnages of C&D waste disposed of at permitted Class 1, 2, and 3 landfills, facilities are not required to breakout the percentages of each sub-waste stream. Based on some national figures (*Characterization of Building-Related Construction and Demolition Debris in the U.S.*, EPA, June 1998), demolition accounts for 48% of the C&D waste stream, while 44% of the waste stream is due to renovation, and only 8% of the waste stream is generated by new construction. The *Minnesota Construction, Demolition, and Industrial Waste Study* (www.swmcb.org/resources/studies_policy_reports/non_municipal_solid_waste) attempted to answer this question via a facility survey. The results varied greatly depending on the facility—some reported as much as 70% construction to 30% demolition, while others reported 10% construction to 90% demolition. The quantity and type of waste material received by demolition landfills varies somewhat by the type of activity performed: site clearance, roadwork excavation, building demolition, and construction/renovation. Some demolition landfills receive waste from all these types of activities; some accept only a more limited spectrum; for example, some accept waste originating strictly from demolition operations.

The MPCA guidance related to the Class 1, 2, and 3 demolition landfills is outlined in the *Demolition Landfill Guidance* document (Appendix D, <http://www.pca.state.mn.us/publications/w-sw5-04.pdf>) from August 2005. The guidance Document resulted from an involved stakeholder process. After much discussion and compromise, the policies included in the *Guidance Document* were accepted by the MPCA and stakeholders. Previously, the permits issued to facilities were inconsistent in terms of waste acceptance and environmental performance (liners, monitoring, financial assurance, etc.). The Guidance Document established consistency with these permits going forward. The Guidance Document classifies demolition landfills into three classes. The class is determined by the acceptable wastes allowed at the facility, which in turn determines the environmental controls over the facility (i.e., liners, monitoring, screening procedures) that will be necessary.

Table from MPCA Demolition Landfill Guidance Document

Demolition landfills	Class 1	Class 2	Class 3
Site evaluation	All sites will need to conduct a site evaluation to verify that location standards are met, soils are evaluated, depth to the water table is identified, and groundwater flow direction is defined. (See Site Evaluation section.)		
Acceptable wastes	Acceptable C&D Waste List (See list in Acceptable Waste section.)	Acceptable C&D waste list + incidental nonrecyclable packaging consisting of paper, cardboard and plastic + demo-like industrial wastes comprised of wood, concrete, porcelain fixtures, shingles, or window glass.	All C&D wastes + most industrial wastes
Waste screening	Stringent screening is required.	Screening is required.	Screening is required.
Industrial solid waste management plan (ISWMP) contents	Describe screening procedures, address asbestos-containing materials (ACM) if applicable.	Describe screening procedures and identify additional C&D wastes and specific demo-like industrial wastes to be accepted; address ACM if applicable. Develop waste acceptance criteria.	Describe screening procedures and identify additional C&D wastes and specific industrial wastes to be accepted; address ACM if applicable. Develop waste acceptance criteria.
Groundwater monitoring	Determined by decision matrix in the Groundwater Monitoring section.	Yes	Yes
Liner	No	Determined by decision matrix in the Liner section.	Yes
Reclassification	NA	If the facility takes more than 50% industrial waste based on annual gate receipts, it should be reclassified as an industrial landfill.	

This Guidance Document provides standards and practices as an assurance that these facilities are repositories of only those wastes appropriate for disposal at these sites and the long-term monitoring of the environment. The question is whether or not the existing rules and guidance are followed, enforced, or need modification.

4.2.1 Recommendations

The Work Group has developed the following recommendations regarding rules and guidance and leachate/data research.

► Recommendations regarding rules and guidance

- **The MPCA should continue to focus on its waste reduction, reuse, and recycling hierarchy for managing C&D waste.** Our recommendations are similar to the Minnesota Climate Change Advisory Group’s recommendations for the management of MMSW, maximizing source reduction and recycling. The MPCA needs to continue and even expand its efforts to maximize the beneficial reuse regulations. The Mn/DOT needs to finalize its specifications allowing the reuse of recycled shingles in bituminous roads.
- **The MPCA should improve its pre-demolition requirements to ensure that more toxic/hazardous materials are removed from the C&D waste stream.** The MPCA needs to more stringently regulate the building owner, rather than the contractor or disposal facility, to ensure that the waste generated is “clean” prior to leaving the C&D site. It is very important to keep out unacceptable waste from waste facilities. Below are some items that the Work Group recommends to help achieve this goal:
 1. The MPCA should require mandatory pre-demolition training for demolition contractors.
 2. The MPCA should require the building owner to complete a Pre-Inspection Demolition Checklist and to provide this to the waste disposal site.
 3. The MPCA should continue applying its demolition Guidance Document to demolition landfills. Applying this Guidance Document has resulted in significant progress toward addressing concerns about environmental performance and monitoring.
 4. The MPCA needs to review and modify the existing definitions in Minnesota Statutes concerning C&D debris. The MPCA’s Guidance Document states that this has been an ongoing issue between the MPCA and facility owners/operators.
 5. The MPCA is currently promulgating a pre-demolition rule that is a good start, but these draft rules as now written do not go far enough to ensure a closed-loop/check and balance approach to regulating C&D waste.
- **Some Work Group members expressed a preference for the MPCA to use rules rather than guidance as the preferred mechanism to regulate C&D waste.** They believe rules offer more consistency and are easier to enforce than guidance. Other members liked the flexibility to respond to changing conditions offered by the MPCA’s use of written guidance (when applied consistently, developed with stakeholder input, and leading to rules) as a tool in its regulatory tool box.
- **The MPCA needs to work with the facilities in reviewing existing operating requirements to help lower their operational cost, but still provide adequate environmental protection.** For example, instead of requiring an annual topographic survey, allow

Executive Summary 10. Pre-demolition activities. The Work Group believes that identifying and removing any hazardous materials or materials of concern prior to demolition is very important. The Work Group believes that ultimately, the building owner—not the contractor or disposal facility—needs to be the primary responsible party to ensure compliance with these regulations. The Work Group is aware that a current MPCA rulemaking seeks to ensure that these materials are removed from structures prior to the commencement of demolition, but the Work Group believes that the rule language as proposed remains inadequate.

the survey to be completed once every three years or when the landfill accumulates 15,000 cubic yards of waste, or whichever comes first.

- **The MPCA should improve outreach to industry, to local governments, and to communities.** The MPCA will need some kind of outreach program to be initiated to disseminate any changes or information to building owners, demolition contractors, haulers, and disposal site operators.
- **While respecting the economic considerations of Greater Minnesota, the MPCA should continue to structure its policies in a way that encourages Class 1 facilities to address environmental concerns.**
- **A one-size-fits-all approach to regulating Class 1 landfills will not work.** There is too great of an economic difference between the metropolitan area and Greater Minnesota. How can landfills located in areas with a population density of 29 people per square mile in Greater Minnesota compete with landfills in the metropolitan population where the density is 945 people per square mile? Plus, waste generators in Greater Minnesota are faced with the cost of moving any material farther to a market or viable disposal option. This is further highlighted when considering that in the metropolitan area, the average annual volume is over 100,000 tons per facility; in Greater Minnesota, it is less than 10,000 tons. It is important to note that regulators use a one-size-fits-all approach to other waste streams such as MMSW, ash waste, hazardous waste (except for differences in rules for large, small, and very small quantity hazardous waste generators). Disposal facilities can pose as much of an environmental threat to groundwater in Greater Minnesota as in the metropolitan area, but having no facility poses an even greater risk.

➤ Recommendations regarding leachate/data and research

- **The MPCA should investigate the issue of leachate acceptance by wastewater treatment facilities so that a lack of willingness to accept leachate does not unnecessarily hinder landfills wishing to install liners and collect leachate.** As more facilities are lined, there is little certainty that local wastewater treatment plants will accept the leachate. The MPCA should work with wastewater treatment plants to ensure that there are viable leachate management options.
- **The MPCA needs to support efforts initiated by the Northeast Minnesota Building Deconstruction Work Group and to promote this effort statewide.**
- **The MPCA needs to evaluate and implement items brought forth in the “white papers” currently being completed under Phase II of the SWMCB’s Minnesota Construction, Demolition, and Industrial Waste Study.**
- **The future results from the newly established groundwater monitoring can be used in deciding future rules.** If significant impacts are identified, the MPCA should then structure its policies in one of two ways. First, Class 1 facilities will need to install proper environmental controls such as liners and leachate collection systems. Second, if the products that are causing the concerns can be identified, these should be banned from Class 1 landfills, removing the source of the contamination and removing the requirement to install environmental controls. This ties into the “front-end” and “end-of-use” concept outlined below.

4.2.2 Environmental performance

Class 1 demolition landfills may only accept the wastes identified in the Guidance Document (see Appendix D). Since Class 1 landfills are generally unlined, the MPCA and stakeholders felt it necessary to restrict the acceptable materials list to only those that were considered inert.

Class 1 landfills depend greatly on upfront screening to remove unacceptable wastes prior to disposal. However, it should be noted that the SWMCB's Waste Composition Study (http://www.swmcb.org/resources/studies_policy_reports/non_municipal_solid_waste, Table 3–12) shows 0.3% of the waste stream analysis was unused product/hazardous waste and 0.8% of the waste stream was green-treated wood. Since these facilities do not have liners or leachate collection, these unacceptable wastes may pose a threat to groundwater quality if not properly screened out. As more groundwater monitoring wells are installed, the ability to evaluate groundwater impacts resulting from the small amount of unacceptable waste that does make it through the screening process improves. Continual evaluation of future environmental liabilities from all disposal options will be required as new and future concerns arise (i.e., boron, PFCs, etc.).

The environmental impact of Class 1 landfills is not well known, since many Class 1 landfills did not have groundwater monitoring wells. As part of the new demolition Guidance Document, more groundwater monitoring wells have been installed. As time goes by, there will be more data for the MPCA to evaluate these sites' environmental performance.

Executive Summary 4. Environmental performance at demolition landfills. *The Work Group feels that the Demolition Landfill Guidance is working well enough that it should continue to operate for at least two more years, before being incorporated into eventual rulemaking. One term that could use clarification is the term "liner" as used in the Demolition Landfill Guidance document; it is unstated whether a Class 3 demolition landfill must use a single liner or a composite liner equal to that of a mixed municipal solid waste (MMSW) landfill. Under current practice, industrial landfills that take such waste must have at least a composite liner. The Work Group also notes that if a new document on industrial landfills is prepared the "Class 3 Landfill" section of the Demolition Landfill Guidance would need to be updated.*

Executive Summary 12c. MPCA data collection and analysis; need leachate data for "pure demolition" waste at Class 1 unlined landfills. *Such landfills do not have liners and depend entirely on good waste screening procedures to keep any hazardous materials out. Without liners, it is impossible to test leachate at the base of the landfill. Therefore nothing is known in Minnesota about the leachate generated at such landfills. Other types of demolition landfills do have liners and therefore leachate to test, but are not representative because they accept a wider range of wastes. The MPCA could fill this information gap with a test-cell research study.*

Executive Summary 12a. MPCA data collection and analysis; not enough MPCA analysis of monitoring well data. *The MPCA has not been updating its 2003 broad analysis of groundwater data from wells around demolition landfills. Meanwhile more wells are being added. At least every five years, MPCA staff should evaluate and report on what is known from well data about landfill effects, if any.*

4.2.3 Economic consideration

In the *Minnesota Construction, Demolition, and Industrial Waste Study*, (September 2007) the SWMCB identifies that in 2006, 1,100,000 tons of demolition waste were disposed of at the landfills located within the metropolitan area; while 400,000 tons of demolition waste were disposed of in Greater Minnesota. As outlined in Table 3-3 of that study, 46% of the population is within Greater Minnesota, but this population lives in 96.4% of the state's land area. This greatly affects the economy of scale as outlined by the map of the state (see followin page) that shows an absence of facilities in some counties.

The SWMCB study also outlined the results of a Solid Waste Administrators Association (SWAA) survey. The survey identified that almost 50% of the Greater Minnesota counties operated one of these facilities. The counties felt that they must operate a county facility due to the fact there would be no other disposal option available for their residents, and the county wanted to ensure that their residents had a viable disposal option available. Some county-owned facilities will only accept waste from within that county. The private sector has not established a facility in these counties due to the very small size (less than 10,000 tons) of these facilities, resulting in little or no profit margin for operation. In addition, 50% of the county-run facilities felt they had to keep the tip fee low enough, through subsidy, to encourage their residents to utilize the facility. Also in Greater Minnesota, some of the privately operated disposal facilities operate in conjunction with another aspect of their business: gravel operations, waste hauler, demolition contractor, etc. In these cases, they also may be subsidizing the disposal site as a service to their customer base.

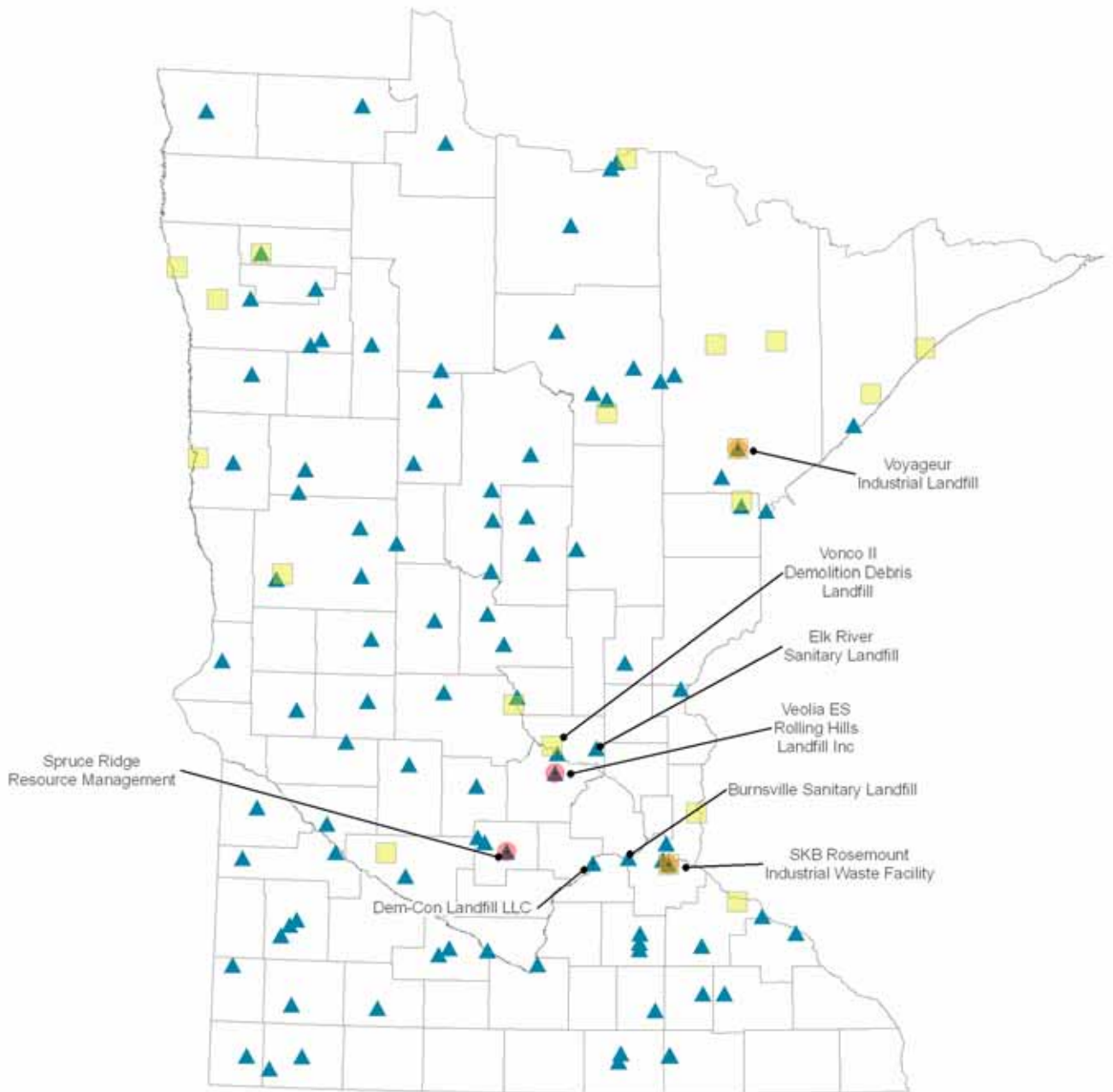
Some owners of private landfills in Greater Minnesota note that they are able to operate their facilities at a profit, while keeping tip fees low. The question as to why some facilities in Greater Minnesota are able to operate at a profit while others are forced to subsidize is perhaps one that can be investigated in the future. A key issue this investigation needs to address is how many of those facilities making a profit are operating a facility that is taking in a small volume and keeping its tipping fee low. Low volume ties into fewer revenues while at the same time their expenditure for permitting and groundwater monitoring is similar to larger facilities—opposite concept of economy of scale.




A large concern voiced by counties in Greater Minnesota is illegal dumping. In the report referenced above, we see a 3 to 1 ratio of demolition waste volume in the metropolitan area versus Greater Minnesota. Is this an indicator of this concern? If we look at the annual SCORE reports concerning MMSW tonnage, the ratio between the metropolitan and Greater Minnesota is almost 1 to 1. In addition, when we reviewed the Zenith Report, *Open Burning in Rural Minnesota* (OEA, 2005), they estimated that 45% of the people in Greater Minnesota occasionally use a burn barrel, fire pit, fireplace, wood stove, or other method to dispose of their garbage (see Appendix E for reference list). Additionally, PBR landfill sites may become the norm for Greater Minnesota. There has been a significant decrease in PBRs in the past 10 years; counties do not want to start a trend back to PBRs—or worse, more illegal burning and dumping. It is uncertain whether these concerns would materialize if more stringent environmental controls were placed on Class 1 facilities.

It should be noted that C&D waste generated in larger quantities would usually require a contracted hauler. Most contracted haulers will properly dispose of waste at permitted disposal facilities. It is unreasonable to assume that these haulers would risk their businesses by illegally disposing of waste. Still, it is important to note demolition haulers are not licensed as MMSW haulers are, and certain unlicensed haulers may consider illegal dumping an option. It is reasonable to assume that this represents a small portion of the population and relates to smaller quantities of generated waste. It is also reasonable to assume that such individuals would illegally dispose of waste no matter what the tip fees are at local permitted disposal sites.

Relative to MMSW, transfer stations are typically built when a disposal facility is not located within a given distance, usually around 30 miles. If any rule changes or MPCA regulatory action results in closure of Greater Minnesota demolition debris landfills, transfer stations may become necessary to facilitate waste disposal at an alternate landfill. A question that may need further investigation is: will demolition debris be generated in large enough quantities within many of the Greater Minnesota counties to make it economically beneficial for a demolition transfer station to be constructed or will existing MMSW transfer stations be willing to manage this new stream?

Map of Minnesota C&D and industrial landfills



-  Accepts industrial waste
-  Accepts demolition waste
-  Merchant landfill that accepts industrial & demolition waste

A fear for many Greater Minnesota counties is that as the cost for the demolition of a building goes up, economics may force more in-place abandoned buildings. We can look at what happened to the MMSW stream when many facilities closed due to the increased Subtitle D requirements (liners and leachate management)—110 landfills closed with only 21 facilities currently open. The MPCA reported that some existing demolition facilities closed due to the new requirements outlined in the new Guidance Document. Will this trend continue if additional requirements are added to demolition landfills (liners and leachate management) similar to what happened with the MMSW? Historically, private companies have had very little interest in developing waste management facilities in Greater Minnesota due to a limited economy of scale. Most Greater Minnesota solid waste facilities (transfer stations, landfills, and waste-to-energy facilities) were built with county funding.

Leachate management is a considerable additional expense. There is the initial cost for the installation of the liner, and then there is also the annual expense of managing the leachate generated while the facility is operational and into the post-closure period. Then there is the question for many Greater Minnesota facilities on where they can have their leachate treated. Greater Minnesota wastewater treatment plants have limited capacity and are unwilling to permit industrial discharges, like leachate, that have variable or unknown concentrations. As with MMSW landfills in the early 1990s, leachate would likely need to be hauled to the Twin Cities.

4.2.4 Operations

As part of permitting a demolition landfill in Minnesota, the following operating practices must be addressed:

- **Responsible trained personnel.** Appropriate supervision of facility operations, and also training requirements for all on-site employees.
- **Routine procedures and protocols.** Operations manual required for facility and training in site safety/operational practices required of all staff.
- **Defined listing of acceptable and unacceptable waste.** Waste allowable for receipt well defined with personnel trained in identification.
- **Inspection of all incoming waste.** Visual inspection of material when delivered and also when placed on working face.
- **Isolation of suspect materials.** Requirement for isolation of suspect material and proper disposal of unacceptable and suspect wastes.
- **Groundwater monitoring.** Many more sites now have this requirement. Monitoring will provide upgradient (background) and downgradient groundwater monitoring for appropriate parameters on an annual basis.
- **Record keeping.** Maintain records of waste receipts and waste placement.
- **Closure/post-closure care plan.** Design for installation and maintenance of final cover.

The MPCA has a *Notification of Intent to Perform a Demolition Form* that must be completed prior to the demolition of commercial or government structures. For most Greater Minnesota Class 1 facilities, this addresses less than 10 to 20% of the total volume coming in. A majority of the waste stream is from residential structures, which are excluded from completing this form. An outstanding issue is how to address this aspect of the waste stream.

The first step for any demolition project should include a walk-through visual inspection. The MPCA has created a *Pre-Demolition Inspection Form* to document this effort. This is a very in-depth checklist to ensure that hazardous materials are removed prior to demolition actions. Also during this effort, materials that have marketable value can be identified for reuse or recycling so they can be segregated and recovered. As a result of this effort to isolate hazardous items for separate disposal, the demolition waste that is ultimately delivered to landfills is comprised of mostly inert material. A successful safeguard for the environment is waste originating from a highly specialized and trained industry versus untrained, and often indifferent, casual generators. The following are issues about which the Work Group has concerns:

- The *Pre-Demolition Inspection Form* is only a “voluntary” form to be completed.
- The form does not identify waste disposal avenues for any of the waste found.
- There are no requirements that this completed form be shown to the disposal site prior to disposal.
- The building owner should ultimately be held responsible to ensure compliance with regulations.

4.2.5 Regulations

The MPCA is currently undertaking rulemaking to address pre-demolition activities. As outlined in this effort, “The purpose of this is to ensure that hazardous material or items present in structures are removed prior....” The Work Group feels that the rules are a good start, but the rules do not go far enough to ensure a closed loop—it lacks a checks-and-balances approach. Ultimately, the building owner—not the contractor or disposal facility—needs to be the primary responsible party in order to ensure that hazardous materials are removed prior to commencement of demolition. Generally, building owners will pay the cost of properly removing these materials if they know they will bear the ultimately responsibility.

An important consideration is that waste screening cannot be assumed to be 100% effective and that a certain portion of these materials will end up going to disposal facilities. This is especially pertinent to residential structures that, unlike commercial or industrial structures, are not currently held to the same standards for the removal of hazardous materials.

One major issue as outlined in the guidance is in defining C&D debris. Demolition debris does not include asbestos waste or construction debris. Both are considered industrial waste under existing state statute, and before they can enter into a demolition landfill, that facility must have an ISWMP to address this waste stream.

Many of the current rules and regulations are adequate if followed.

4.2.6 Changing conditions

With the implementation of the new demolition Guidance Document, the MPCA is already beginning to see some benefits. Certain facilities have scaled back their acceptance list to match the environmental protection measures present at their facility. Additionally, some facilities have moved to lining their facilities (becoming either Class 2 or Class 3). Also groundwater monitoring wells are being installed at several Class 1 facilities. All of these actions are evidence that the demolition landfill guidance has been a success. At the same time, there has been the closure of some sites due to increased costs for compliance. Operators told MPCA that six or more landfills closed as a consequence of the guidance. One of the greatest concerns for Greater Minnesota counties was how significant the impact of the new guidance will be on the next round of permit renewals. How do you keep cost down and still meet state standards?

The C&D waste stream composition has been well documented in the SWMCB’s *Minnesota Construction, Demolition, and Industrial Waste Study*. However, as more materials are recovered from the waste stream for recycling and processing, this will have an impact on the composition of the remaining waste still being landfilled. As more materials with mature end markets like metals and concrete and as end markets grow for materials like wood and roofing shingles, the remaining waste stream will likely have higher concentrations of materials of concern such as gypsum wallboard, unused product/hazardous materials, painted/treated wood, etc. Furthermore, the C&D waste stream will evolve according to the changes in building materials; the maxim that “today’s construction debris is tomorrow’s demolition debris” applies to this concept. For these reasons, the environmental risks associated with C&D debris will need to be continually evaluated and studied.

Executive Summary 11. A changing demolition waste stream going to landfills. *As part of its general oversight role, the MPCA needs to monitor this long-term trend: metals, concrete, asphalt, wood, and now shingles are being separated more effectively. This leaves the landfilled C&D waste stream with higher percentages of materials of concern: gypsum wallboard, unused glues and paints, and painted or treated wood, some of which are banned entirely from unlined landfills. This trend emphasizes the importance of good pre-demolition preparation and screening to minimize unused glues, paints, or treated wood entering C&D landfills. The C&D waste stream also changes with the introduction of new building materials. Therefore the environmental risks associated with C&D debris will need to be continually evaluated and studied.*

4.3 Class 2 Demolition Landfills

The Class 2 facility can take the same material as a Class 1, plus incidental non-recyclable packaging (consisting of paper, cardboard, and plastic) and demo-like industrial waste. The importance of an ISWMP is critical in describing the procedures for the acceptance of demo-like industrial waste to be accepted.

The MPCA guidance related to the Class 2 demolition landfills is outlined in the demolition Guidance Document. This Guidance Document provides standards and practices for these facilities. The question is whether or not the existing rules and guidance are followed, enforced, or need changing.

4.3.1 Recommendations

Similar to Class 1, see 4.2.1. The MPCA needs to create a checklist to address new construction.

4.3.2 Environmental performance

Similar to Class 1, see 4.2.2. Since Class 2 is a step up, a liner may be required as determined by decision matrix in the liner section of the guidance.

4.3.3 Economic consideration

Similar to Class 1, see 4.2.3. With the larger range of material that can be accepted, these facilities have the potential of having a larger waste stream.

For the Class 2 facilities that are required to have a liner, they will have the additional expense of managing the leachate they generate. Once a liner has been installed, leachate is being generated regardless of the volume of waste being placed into the landfill. This additional expense has to be recovered, either through greater waste volume, higher tipping fee, or both.

4.3.4 Operations

Similar to Class 1, see 4.2.4. The largest additional operational difference is managing an ISWMP and taking in more new construction waste. The ISWMP outlines to any potential generator who may use this type of facility, the procedures and protocols their materials must comply with before acceptance.

Where the MPCA has created the *Pre-Demolition Inspection Form* to assist in this effort, there is no guidance for construction contractors to assist them on acceptable material for this type of facility.

4.3.5 Regulations

Similar to Class 1, see 4.2.5. Again, it needs to be stressed that many of the current rules and regulations are adequate if followed.

4.3.6 Changing conditions

Similar to Class 1, see 4.2.6. The largest impact will be the implementation of the new Guidance Document.

With the additional expense of a liner and leachate management, facility owners will need to recover this expense. In order to cover costs, facilities will be looking at increasing the amount of waste entering this type of facility or raising tipping fee rates.

4.4 Class 3 Demolition landfills

The Class 3 facility can take the same material as a Class 1 and 2, *plus* most industrial waste. The importance of an ISWMP is even more critical in describing the procedures for the acceptance of demo-like industrial waste to be accepted. In terms of the acceptable industrial wastes, these facilities more closely resemble merchant industrial and MMSW facilities than demolition landfills.

MPCA guidance related to the Class 3 demolition landfills is outlined in the Demolition Landfill Guidance Document, dated August 2005. This Guidance Document provides standards and practices for these facilities. The question is whether or not the existing rules and guidance is followed, enforced, or need changing.

4.4.1 Recommendations

Similar to Class 1 and 2, see 4.2.1 and 4.3.1.

Since Class 3 demolition landfills have ISWMPs equal to those of merchant industrial and MMSW facilities, the state would benefit from including these facilities when establishing a clear industrial waste policy in rules. A good model for such a policy is Dakota County that has a thorough and detailed policy in place (found in County Ordinance 110) that ensures safe environmental practices for the management of industrial waste, while still offering the industry flexibility to utilize available technology and designs. For example, based on environmental protection/liner design, there has been a clear policy that merchant industrial or MMSW landfills with subtitle D single composite liners and single leachate collection are only allowed to accept waste that tests up to half of hazardous limits (50% of RCRA's toxicity characteristic leachate procedure (TCLP) test). However, variances allow landfills with superior environmental protection such as dual liners and dual leachate collection systems to be allowed to accept waste up to TCLP hazardous limits. This is reasonable since a secondary leachate collection system allows a facility to detect a failure in the primary liner without a release to groundwater, whereas a liner failure at a facility with only one leachate collection system would likely not be detected until impacts were detected in groundwater monitoring wells. Ordinance 110 also contains effective regulations governing waste acceptance and screening procedures that greatly help to reduce the risk of unacceptable waste being disposed of in landfills by ensuring that each load entering the facility matches what has previously been characterized and approved.

The Class 1 and 2 facilities can be considered demolition landfills, but a Class 3 facility is in reality a version of an industrial landfill. As such it should be viewed under this for any requirements relating to these facilities. A single liner is highly questionable for these facilities.

4.4.2 Environmental performance

This type of facility must have groundwater monitoring and a liner with leachate collection. Historical data indicate that these facilities are protective and have not impacted groundwater. Over time, the MPCA will gain more data with which to evaluate the environmental performance of these sites on both groundwater and leachate quality.

4.4.3 Economic consideration

Similar to Class 1 and 2, see 4.2.3 and 4.3.3. With the larger range of material that can be accepted, these facilities have the potential of receiving more waste.

4.4.4 Operations

Similar to Class 1 and 2, see 4.2.4 and 4.3.4. Managing an ISWMP is even more critical.

4.4.5 Regulations

Similar to Class 1 and 2, see 4.2.5 and 4.3.5. Again, it needs to be stressed that many of the current rules and regulations are adequate if followed. The only exception is concerning what is meant by "liner" in the Guidance Document. The Guidance Document doesn't specify liner type.

4.4.6 Changing conditions

Similar to Class 1 and 2, see 4.2.6 and 4.3.6. The largest impact will be the implementation of the new Guidance Document.

4.5 Industrial waste land disposal into monofill, private on-site demo-like industrial, merchant, and MMSW landfills

4.5.1 Recommendations

General recommendations

As identified in the economic and regulatory sections, there are discrepancies as to how industrial landfills are treated in siting and financial assurance. The Work Group recommends that the MPCA follow the legislative mandate to develop rules that address siting and financial assurance discrepancies. The most efficient method of accomplishing the legislative mandate would be to incorporate the pieces of the existing MMSW rules that are being incorporated in permits as financial assurance. Additionally the MMSW siting criteria should also be incorporated since these take into account potential environmentally sensitive sites. The MMSW rules also provide additional siting review through the requirement of hydrogeologic studies to identify potential groundwater environmental impacts.

The MPCA should develop in rules a comprehensive risk-based policy addressing industrial waste management. Such a policy would ensure that regulations pertaining to the permitting and design of facilities accepting industrial waste will be clear, easily identifiable, and—most importantly—environmentally protective.

The best way to address the permitting inconsistencies would be for the MPCA to adopt a clear set of rules for permitting new solid waste disposal facilities.

Merchant landfills

Specifically, the focus should be on providing a consistent level of protection for facilities that are approved to accept a variety of waste streams. Since monofill and captive industrial disposal facilities have less variable and more predictable waste streams than those accepted by merchant industrial, C&D, and MMSW facilities, a certain degree of flexibility is required.

To facilitate this flexibility, the regulations should be based upon a central principal that the design criteria and permitting requirements are based upon the risks associated with the wastes streams that will be accepted at the facility. This concept is not new. The Municipal Solid Waste Combustor regulations (adopted April 20, 1992) established a “maximum leachate contaminant level.” Facilities that generate leachate that has a monitored constituent that exceeds the applicable criteria are required to meet a more stringent set of design criteria than those facilities that meet the criteria. The limitation of this system is that it relies upon the collection and testing of representative samples of leachate generated from the operation of an existing facility.

Another approach has been implemented in Dakota County’s Ordinance 110. This ordinance has established a thorough and detailed process that ensures safe environmental practices for the management of industrial waste, while still offering the industry flexibility to utilize available technology and designs. For example, based on environmental protection/liner design, there has been a clear policy that merchant industrial or MMSW landfills with subtitle D single composite liners and single leachate collection are only allowed to accept waste that tests up to half of hazardous limits (50% of TCLP). However, variances allow landfills with enhanced environmental protection such as dual liners and dual leachate collection systems to be allowed to accept waste up to TCLP hazardous limits. Ordinance 110 also contains effective regulations governing waste acceptance and screening procedures that greatly help to reduce the risk of unacceptable waste being disposed of in landfills by ensuring that each load entering the facility matches what has previously been characterized

Definitions

Monofill is a land disposal facility permitted and designed to receive a uniform and well-defined non-hazardous solid waste stream. Examples may include coal ash, mining debris, or industrial manufacture process wastes.

Private on-site demo-like industrial landfill is a land disposal facility that is owned and operated for the sole purpose of the disposal of non-process solid wastes generated by the owner or owner’s affiliate.

Merchant landfill is a land disposal facility that accepts solid waste for disposal from any entity that is willing to pay its tipping fee, and has wastes that meet its criteria of acceptance. Examples would include C&D, industrial, and MMSW landfills.

and approved. The advantage of this system is that it establishes waste acceptance criteria based upon the facility design.

The Work Group is not recommending the adoption of the MLCL criteria established in the Municipal Solid Waste Combustor Ash Rule, or the direct incorporation of Dakota County's Ordinance 110. What we are recommending is the promulgation of a final solid waste rule that incorporates the central principal that is common to both of these regulations, i.e., the establishment of risk-based criteria.

The adoption of regulations based upon this central principal would also allow the MPCA to set consistent regulations on specific industrial wastes to promote proper management. Such policies could include beneficial uses but also disposal practices, such as wastes that might react differently in an acidic MMSW landfill environment than an industrial waste landfill. Such wastes might be more appropriately managed in a non-MMSW industrial waste landfill.

Monofills

Since industrial monofills accept only one type of industrial waste, the approach to regulations may need to be different than for the other types of industrial landfills. The MPCA has developed guidance to evaluate liner design for demolition or industrial landfills. The Work Group recommends separating the industrial landfill piece from the demolition piece in the existing Guidance Document. Further, industry should participate in revising the Guidance Document. The guidance should specifically address the needs of industrial monofills. The revised guidance for industrial landfills (including the piece on industrial monofills) should be in effect for a period of five years. The MPCA should undertake rulemaking during the five-year period that the Guidance Document is in effect.

Private on-site demo-like landfills

As private on-site demo-like landfills only accept waste from a list of specifically permitted non-process material generated by the permitted facility, this group should be considered separate from both the merchant and monofill industrial landfills. So as to better understand the differences, the Work Group recommends that the MPCA develop an industrial landfill guidance document to address the variations in each landfill type. The Work Group also recommends that new private on-site demo-like landfill sites continue to be required to seek a facility permit in cooperation with the MPCA and county agencies; however, it believes that it would be inappropriate for them to be regulated against the same criteria as other landfills given their uniqueness. Therefore, the permitting process should include a risk-based site analysis completed under the direction of a developed MPCA guidance document, thereby allowing for site-by-site consideration of permitting requirements.

4.5.2 Environmental performance (including siting and groundwater protection)

The majority (86%) of industrial landfill facilities are lined and have groundwater monitoring programs. The remaining are legacy facilities that were in operation before the promulgation of industrial rules. The unlined industrial landfill facilities have implemented engineered capping projects to reduce water infiltration.

Current Minnesota Rules limit where landfills can be located (see section 2.5.1 C&D and industrial landfill location standards).

The MPCA, through rules and permitting authority, has developed guidance for liners and groundwater monitoring program requirements that are protective of the environment. As a result of these efforts, the MPCA has been able to identify elements of concern that have been detected in wells surrounding industrial landfill facilities, and has developed plans to monitor and control impacts.

4.5.3 Economic consideration (including financial assurance)

According to the Bureau of Economic Analysis, the state of Minnesota has a gross domestic product (GDP) of \$254 billion, of which an estimated 17% is directly impacted by industrial landfills. The sugar beet, pulp wood, manufacturing, mining, and electric utilities depend on having engineered landfills to manage the waste products generated by their processes.

Merchant industrial and MMSW landfills serve numerous and various types of Minnesota industries by providing for the disposal of non-hazardous industrial waste.

The inability to site, permit, and operate industrial landfills in Minnesota could potentially have an adverse impact on the state's GDP. Cost of managing the waste would increase if industrial waste has to be hauled to another state. These increased costs will be passed on to final product cost. In some instances, it may require some manufacturing operations to move out of the state in order to maintain a competitive situation in the marketplace.

Additionally, according to the SWMCB CD&I report, contaminated soil from cleanups and development projects is the largest waste stream at merchant industrial landfills. The increased costs of having to transport and manage this material in out-of-state landfills would have a negative effect on future development and would increase the costs of cleaning up contaminated lands.

Financial assurance

Minnesota Rules do not have a requirement for financial assurance of industrial landfills. However under permitting powers, the MPCA has required that industrial landfills have financial assurance. The amount of financial assurance for an industrial landfill is established during the permitting process, where contingency, closure costs, and post-closure costs are developed by the permittee and the MPCA. According to MPCA data, there are 21 industrial landfills in Minnesota. Of those, 12 have been required to have financial assurance.

The Minnesota Rules provide several mechanisms to meet the financial assurance permit requirements. These are trust funds, surety bonds guaranteeing payment into a trust fund, self-insurance, and letters of credit. For the self-insurance option, the company operating the landfill must submit a detailed financial statement that proves that there is sufficient cash on hand to cover contingency and closure costs. To account for inflation and cost of money, these mechanisms are updated on an annual basis.

The 12 facilities have a total of \$47.7 million in MPCA-approved financial assurance. The range in financial assurance is from \$1.1 million to \$7 million.

Industrial landfills with trust funds have cash in interest bearing accounts. This form of financial assurance is clearly more secure in protecting the state's future liability, since the funding is already allocated and would not be impacted by bankruptcies, etc. Initially, the financial assurance might be in the form of bonds, but as deposits are made into the trust fund, the facility would draw down the amount bonded for.

4.5.4 Operations

The operation of an industrial waste facility is governed by Minnesota Statutes and Minnesota Rules and is clarified in a permit issued by the MPCA. The primary guidance for operations of an industrial solid waste facility is provided by the MPCA in Minnesota Rules, part 7035.1700. Within that rule, there are general statements about what the operator must avoid (i.e., subpart B: "Industrial waste must not be deposited in a

Executive Summary 5. Environmental performance at industrial landfills. *The Work Group feels the current mix of statutes, rules, and policies with respect to industrial landfills is disjointed. The MPCA should develop a comprehensive risk-based policy addressing industrial waste management. Such a policy would ensure that regulations pertaining to the permitting and design of facilities accepting industrial waste will be clear, easily identifiable, and—most importantly—environmentally protective. Permitting of landfills taking industrial waste should be based on three key factors: local site characteristics (e.g., hydrogeology), waste types accepted, and engineered controls (e.g., landfill liners and caps). Since monofill, demo-like, and merchant industrial landfills differ significantly in the types of waste they accept, a certain degree of flexibility is required.*

Executive Summary 3. Financial assurance. *Landfill owners should be responsible for taking care of their sites including closure and post closure care. The Work Group supports the upcoming financial assurance rulemaking.*

manner that allows material or leachings there from to cause pollution of groundwater or surface water.”) as well as a specific guidance related to the general statement, when it is appropriate.

The rules generally govern three major areas of operation of an industrial waste landfill:

- site management
- waste management
- pollution prevention

While Minnesota Rules outline both general and specific guidance, it is ultimately the site permit, which has to be renewed/updated every five years, that provides specific procedures related to the operation areas indicated above. The site permit must identify how the state rules for landfill operations are being followed as they relate to the specific site and waste type that is to be disposed of. Within the permit, the MPCA has the opportunity to customize conditions as appropriate. The following general guidance is outlined in the Minnesota Rules for each of the areas of operation:

Site management

- Sanitary facilities, communications, and site screening must be provided.
- There has to be controlled access to the site with an all-weather road that is properly maintained.
- The site has to be identified with a sign that has specific details about the site operation.
- Surface water must be managed and diverted around the operating portion of the facility.
- A minimum setback must be maintained from adjacent properties.

Waste management

- A state-certified operator has to be on site during posted time of operation.
- The waste must be properly compacted to a dense state and covered with a suitable six-inch cover.
- Intermediate cover, having a minimum thickness of 12 inches, must be placed on waste that is over 120 days old.
- The active disposal area must be as small as possible.
- Wind-borne waste must be managed to minimize amount that leaves the disposal area, and waste blown from the site must be collected daily.
- The operation is to include vector (rodent, insect, etc.) control.
- The operation is to include dust control.
- There must be adequate equipment to accomplish the tasks indicated above and to respond to site emergencies/fires that may arise.
- Scavenging waste is not to be allowed.

Pollution prevention

- A leachate management plan is to be implemented.
- An environmental monitoring system (EMS) is to be installed to determine if there is leakage from the facility to the environment.
- The waste must maintain a minimum separation from groundwater.
- Erosion protection from cover soils must be provided.

4.5.5 Regulations

Minnesota Rules, parts 7035.1590 to 7035.1900, plus 7035.2500, address siting, design, maintenance/operations permitting, certification, compliance, and closures for industrial landfills. These are legacy rules that are neither prescriptive nor performance based to the level that this Work Group is proposing for future rules. The MPCA through their permitting jurisdiction also applies the MMSW Management Facility General Technical Requirements (Minnesota Rules, parts 7035.2525 to 7035.2655), which specifically exempt industrial landfills. The MPCA further applies the Financial Assurance Requirements Rules (Minnesota Rules, parts 7035.2665 to 7035.2805). This set of rules was drafted for MMSW and combustor ash facilities.

In addition to the industrial rules and MMSW rules that are implemented by permitting authority, the MPCA has developed guidance documents for liner design.

The MPCA regulates industrial landfills by applying a combination of industrial rules, MMSW rules, and Guidance Documents through permits. This process relies on guidance, policies, rules, and best professional judgment to provide protective permits; however, this may lead to inconsistencies in permitting requirements for different facilities that accept industrial waste.

4.5.6 Changing conditions

The permitting of new industrial solid waste facilities is cyclical, depending in part upon existing facility capacity and the availability of adjacent land for expansion. Recent efforts to permit new industrial waste disposal facilities have been met with increased levels of public resistance. Increased public concern regarding the siting and permitting of these facilities has increased the time required to get a facility approved.

Industrial wastes entering merchant facilities (industrial, MMSW, or C&D) will vary in volume and composition depending on many factors, including development, changes in industrial operations, new/closing industries, etc. For example, industries may change their internal processes which may change the characteristics of the resulting waste. Industries might open new facilities generating new types of industrial waste or, conversely, some facilities might close, eliminating waste streams altogether. Since this waste stream is constantly changing, facilities need to be permitted and designed to accommodate this variation.

Appendix A: Meeting dates

With a few exceptions noted, Work Group meetings were generally scheduled on Thursdays from 9 a.m. to 3 p.m., and at the MPCA's St. Paul office. These started on a three-week rotation, which accelerated to weekly or bi-weekly meetings toward the end:

1. Monday, July 14, 2008, at MPCA
2. Monday, August 4, 2008, (St. Cloud)
3. Monday, August 25, 2008, at MPCA
4. Thursday, September 18, 2008, at MPCA
5. Thursday, October 9, 2008, at MPCA
6. Thursday, October 30, 2008, at MPCA
7. Thursday, November 13, 2008, at MPCA
8. Thursday, November 20, 2008, at MPCA
9. Thursday, December 4, 2008, at MPCA
10. Thursday, December 11, 2008, at MPCA
11. Thursday, December 18, 2008, at MPCA
12. Thursday, January 8, 2009, at MPCA

Appendix B: Legislator communications

Summary of Rep. Brita Sailer's comments at the 8/25/2008 CDIL Work Group meeting

Don't put demolition landfill operators in untenable positions with uneconomic requirements.

Yes, we do need groundwater protection and fully monitored groundwater, and need effective inspection up front at demolition sites.

We also want a level playing field so competitors don't take advantage of the good actors—don't want to penalize those doing things correctly.

Don't set us up for illegal dumping because there are so few landfills left.

Initial comments by Rep. Julie Bunn at 12/11/2008 CDIL Work Group Meeting, responding to the December 4 early draft report

Legislators do appreciate the time you have put into the process.

Re: the origin of the CDIL Work Group: the impetus for the Work Group followed comments from the MPCA and interested parties on the guidance document for C&D landfills, and on how industrial guidance has not been written. Some told us that industrial rules were needed. MPCA said it might be time to revisit the industrial rules. In the discussions other ideas came up and the idea for a Work Group came from that. So it's not just based on siting of landfills and screening of waste.

Also we wanted the MPCA to pursue a tightly focused rulemaking process.

The CDIL Work Group idea didn't come directly out of the Washington County landfill issue. Instead, it came from issues that legislators became aware of while researching the other landfill issues, from comments made by MPCA staff, and from was from issues mentioned by the Association of Minnesota Counties.

Re: the draft text on tritium testing and groundwater sensitivity, there is no intent at the Legislature to make siting impossible. We moved on from tritium because of advice from nonpartisan staff. They said the tritium test might have merit but they didn't know, and that historically such issues have been addressed through rulemaking.

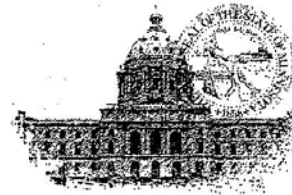
Re: groundwater sensitivity, the tritium test should be on the table along with other standards. Tritium testing was not rejected by the legislature or staff as an invalid approach; it is just that staff recommended that the rulemaking approach is preferred.

Legislators are reading your drafts and will continue to read them; they're already coming up with ideas, such as, how we might adapt the Dakota County ordinance. We may ask for clarification from the MPCA and Work Group members after your report is done.

The 2009 Legislative Session will be shaped by the state budget deficit, and that will affect what's possible. It could be that spending plans would have to wait for the future but policy could be done sooner.

So the legislative interest in your work continues.

State Senator Kathy Saltzman
State Representative Julie Bunn



Minnesota State Legislature

September 17, 2008

Commissioner Brad Moore
Minnesota Pollution Control Agency
520 Lafayette Road N.
St. Paul, MN 55155-4194

Dear Commissioner Moore:

Based on the discussion at our meeting with you and your staff on September 8th, and on further input received from your staff, as chief authors of the legislation that created the Work Group, this letter confirms the additional issues on which the Construction, Demolition and Industrial Landfill Work Group will make recommendations to the legislature in its report due January 15, 2009. While we understand that equal attention will not be given to all of these issues, and that the key issues of management at the landfills themselves will remain at the center of the Work Group's efforts, we do expect that the Work Group will at least consider, reflect and make preliminary recommendations regarding them. These issues are as follows:

Keeping Marketable, Recyclable, and Problem Materials Out of Landfills

- 1) Under MPCA's proposed pre-demolition rule, which requires inspection and removal of certain materials prior to demolition, what entities are responsible for conducting these activities? By what process will documentation of these activities be provided to disposal facilities and the PCA?
- 2) In light of the 2008 Strategic Plan and the positive contribution recycling can make to help achieve the state's greenhouse gas reduction goals, the MPCA agrees we need more attention to separation and recycling opportunities for shingles, drywall, and biomass for fuel. How can this Work Group advance these issues?
- 3) Similarly, more attention needs to be paid to beneficial-use opportunities for single-stream industrial wastes now going to landfills. How can this Work Group advance this goal?
- 4) In the development of rules to ensure adequate screening of incoming materials in order to prevent the landfilling of material that facilities are prohibited from accepting under their permit because of the environmental risk they pose, what should be the requirements for documentation/certification from generators and/or haulers? What should be the components of a protocol for a physical inspection of load samples?
- 5) Should facilities accepting construction and demolition debris be required to set aside "material exchange" areas where items such as windows, doors and lumber can be diverted from the landfill and left to be picked up and reused? Can this be done cost effectively and safely? What other materials might be included?

Rulemaking

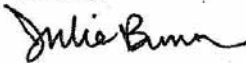
6) Given next year's rulemaking for solid waste, is there a continuing role for permit-by-guidance and permit-by-rule disposal facilities? Why is such treatment necessary for some facilities rather than operating under rule?

7) Does PCA have sufficient air quality and groundwater monitoring data to make a successful case for the need for siting/operations rules that are more protective of these resources? Are there other potential barriers to rulemaking? What are they and how can they be overcome, and in what timeframe?

We expect that your staff will provide the Construction, Demolition and Industrial Waste Working Group a copy of this letter prior to or at the outset of their meeting on Thursday September 18th, 2008.

(Please note that Rep. Jean Wagenius, Environment and Natural Resources Finance Division Chair, was involved in discussions with us around these issues over the last two months. While she attended the Sept. 8th meeting, she is unfortunately out of the office on legislative business today and unable to review or sign this letter.)

Sincerely,



Rep. Julie Bunn
District 56



Sen. Kathy Saltzman
District 56

Appendix C: PBR Notification Form

This form is available as a pdf at <http://www.pca.state.mn.us/publications/w-sw3-39.doc>



Demolition Debris Disposal Facility Permit-By-Rule (PBR)

PBR Identification Number: _____

Print or type application in a legible manner. Before submitting, make a photocopy for your records. A response letter will be issued.

The completed form is to be returned to:
(including all appropriate attachments)

Beckie Olson
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, Minnesota 55155-4194

Eligible criteria

1. Owners/operators of PBR demolition debris disposal facilities must comply with Minn. R. 7001.3050, subp. 3, item B
2. The facility must
 - Have a low potential for adverse effects human health and the environment
 - Involve less than 15,000 cubic yards of demolition debris
 - Operate less than a total of 12 consecutive months and
 - Not be located adjacent to another demolition debris permit-by-rule facility
3. Use is restricted to a specific owner/operator having a substantial volume of non-putrescible material resulting from the demolition of buildings, roads, or other man-made structures.
4. The facility must meet the location standards set forth in Minn. R. 7035.2555 and Minn. R. 7035.2825, subp. 2
5. The facility must be designed in accordance with Minn. R. 7035.2825, subp. 3
6. Owners and operators must comply with the operating standards in Minn. R. 7035.2825, subp. 4
7. The facility must be closed in accordance with Minn. R. 0735.2825, subp. 5

Demolition debris includes concrete, brick, bituminous concrete, untreated wood, masonry, glass and plastic building parts. Demolition does not include asbestos; new construction waste materials such as carpeting, sheetrock or plywood; glues, tars, solvents, caulking, resins or their containers; household garbage, refuse or rubbish; or any hazardous infectious or liquid waste material

I. County Acknowledgement: This section must be completed by the County Solid Waste Administrator or Zoning Officer. This section is meant to notify the County of the applicant's intent so that all local ordinances and plans can be met.

Signature: _____ Date: _____
Name: _____
Title: _____ Phone: _____
Email: _____
Address: _____
City: _____ State: MN ZIP: _____
Comments: _____

II. Facility Information: (Please include map showing location)

A. Facility location (For modifications/re-issuances only please add Permit No.)

Facility name: _____ Permit No. _____ PBR ID No. SW-
Address: _____
City: _____ State: MN ZIP: _____

B. Legal description of property

_____ Acres _____ ¼ _____ ¼ _____ ¼ _____ ¼ Section _____ T _____ N R _____ W
Township Name: _____ MN Legislative District _____
Latitude: _____ Deg _____ Min _____ Sec North
Longitude: _____ Deg _____ Min _____ Sec West

C. Current land use: _____

D. Is the proposed facility located:

1. On a site with karst features including sinkholes, disappearing streams and caves? Yes No
2. Within wetland areas? Yes No
3. Within a flood plain area? Yes No
4. Within a shoreland area? (*Within 300 feet of a stream or river, or 1000 feet of a lake or pond*) ? Yes No
5. Within 50 feet of the property boundary? Yes No
6. Within 5 feet of the seasonal high ground water table? Yes No

E. Distance to the nearest *permitted* demolition landfill: _____ miles

Facility Name: _____ Permit No. SW-_____

Address: _____

City: _____ State: MN ZIP: _____

F. Is the facility adjacent to, or will it include, any other type of solid waste management activity? Yes No

If "yes" explain: _____

III. Operational Information:

A. Certified operator information:

Name: _____ Cert. No: _____

Location of most recent training: _____

Date of most recent training: _____ Expiration date: _____

B. General site description: _____

C. Dates of operation:

Date open: _____ Date closed: _____

D. Anticipated amount of waste to be accepted at site in cubic yards only: _____

E. Describe type/s of waste and origin:

Waste type: _____ Origin: _____

Waste type: _____ Origin: _____

Waste type: _____ Origin: _____

F. Describe equipment to be used in the disposal area for:

Confining: _____

Handling: _____

Compacting: _____

IV. Design Information:

A. Describe the site preparation and other design features necessary to construct and operate the facility. Items to address include: clearing and grubbing, topsoil stripping and stockpiling, fill area excavation, surface water diversion, drainage and erosion-control structures, and availability and location of cover material. *Please attach additional pages if needed.*

B. Describe the design considerations of the final slopes for the fill area, the drainage ways and final cover (*minimum 2%, maximum 20%*). *Please attach additional pages if needed*

C. Describe the design of the final cover: (*Minimum 2 feet thickness*)

Type of cover soil: _____

Type of vegetation: _____

Other: _____

V. Closure and Postclosure:

A. Final use of site after closure:

B. When the facility is closed: A notation must be placed on the property deed by the County Recorder indicating the waste type, volume and location.

C. Site closure form: A Site Closure Form must be complete within 30 days of closure and sent to the Minnesota Pollution Control Agency. It must include verification of the deed notation by the County Recorder.

D. Follow-up inspections: The site must be inspected after closure at least once a year between June and September for settlement and erosion problems. All problems must be corrected within two (2) weeks.

VI. Certification:

I certify under penalty of law that this document and all attachments were prepared under my direction of supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, the information submitted is, to the best of my knowledge and belief, true, accurate and complete.

I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment.

I further certify that the construction and operation of the above-described facility will be in accordance with the conditions of the Minnesota Pollution Control Agency demolition disposal permit-by-rule requirements.

Landowner

Signature: _____ Date: _____

Name: _____ Phone: _____

Title: _____ Fax: _____

Email: _____

Organization: _____

Address: _____

City: _____ State: _____ Zip: _____

Owner (Applicant)

Signature: _____ Date: _____
Name: _____ Phone: _____
Title: _____ Fax: _____
Email: _____
Organization: _____
Address: _____
City: _____ State: _____ Zip: _____

Operator

Signature: _____ Date: _____
Name: _____ Phone: _____
Title: _____ Fax: _____
Email: _____
Organization: _____
Address: _____
City: _____ State: _____ Zip: _____

VII. Required Actions:

Minnesota Solid Waste Management Rules require that you:

- A. Have an Emergency Response Plan in accordance with Minn. R. 7035.2595;
- Inspect the site at least once each year in accordance with Minn. R. 7035.2535, subp. 4;
- Close the facility in accordance with Minn. R. 7035.2625 using at least 2 feet of compacted soil; and,
- Provide 20 years of Postclosure Care in accordance with Minn. R. 7035.2645.
- B. This notification form must be submitted no later than ten **working** days before accepting waste.

Appendix D: Demolition landfill guidance

The full document (w-sw5-04) with appendices is available at <http://www.pca.state.mn.us/publications/w-sw5-04.pdf>.

Background

The state solid waste rules allow the Minnesota Pollution Control Agency (MPCA) Commissioner considerable discretion to set site evaluation, design, monitoring, and operational requirements for demolition landfills. The exercise of this discretion has resulted in a lack of consistency in the way that the MPCA has applied these requirements to demolition landfills throughout the state.

Ground water monitoring requirements have become an emerging issue with regard to assessing impacts from demolition landfills. Historically, the hypothesis in the professional arena has been that only inert materials are deposited at demolition landfills; thus, there is no impact to ground water quality, and therefore no need for ground water monitoring.

In 2003, the MPCA decided to test this hypothesis by evaluating the limited amount of ground water monitoring data from demolition landfills. The results of this evaluation indicated that some demolition landfills do impact ground water quality. Therefore, a more thorough approach is needed relative to hydrogeologic evaluations, and in determining groundwater monitoring requirements when siting and managing demolition landfills.

Purpose

This guidance is intended to provide improved consistency and predictability in how the MPCA, counties, facility owners, and facility operators manage demolition landfills under the existing solid waste management rules in the following areas:

- locating the facility
- developing initial site evaluation information
- determining facility classification
- identification of an acceptable waste list
- appropriate waste-screening procedures
- contents of an industrial solid waste management plan
- need for ground water monitoring
- liner requirements

This guidance will be applied to all new and existing demolition landfills in accordance with the implementation plan included in appendix C.

Location standards

The single most effective action that owners/operators of demolition landfills can take is to locate demolition landfills in areas that will inherently protect ground water and surface water from the risks of contamination. Prohibited locations which must be avoided include active karst topography, flood plains and other areas likely to result in groundwater contamination. The following are the basic landfill location standards that apply to demolition landfills:

Minn. R. 7035.2555 LOCATION STANDARDS, provides the following location restrictions on all solid waste management facilities.

Subpart 1. Floodplains. An owner or operator may not locate a new solid waste management facility in a floodplain.

Subp. 2. Other location standards. An owner or operator may not establish or construct a solid waste management facility in the following areas:

A. within a shoreland or wild and scenic river land use district governed by chapters 6105 and 6120;

B. within a wetland; or

C. within a location where emissions of air pollutants would violate the ambient air quality standards in chapters 7005, 7007, 7009, 7011, 7017, 7019, and 7028 and parts 7023.0100 to 7023.0120.

In addition, Minn. R. 7035.2825 provides the following location restrictions on permitted demolition debris land disposal facilities.

Subp. 7. Location standards for permitted facilities. The owner or operator of a permitted demolition debris land disposal facility must not locate the facility on a site:
 A. with active karst features including sinkholes, disappearing streams, and caves; or
 B. where the topography, geology, or soil is inadequate for protection of ground or surface water.

To better determine what is meant by “floodplain,” reference should be made to the 100-year floodplain as shown on maps provided by the Federal Emergency Management Act (FEMA). Other setback distances that are applied to landfill siting based on the above rule references are 1,000 feet from a lake and 300 feet from a river, stream or creek.

Because the Solid Waste Rules prohibit the placement of demolition landfills in areas that would result in groundwater contamination, an existing permitted landfill that does not meet the location standards above will not be re-permitted. The owner/operator may request a variance to these location standards under the process outlined in Minn. R. 7000.7000. If a variance is requested, MPCA staff will consult with the commissioner as to whether the request is appropriate and will discuss the need for additional site investigation, monitoring, and/or environmentally protective measures based on the specific site circumstances.

Facility classification

One of the bigger problems with the current demolition landfill rules is that they are open ended and leave a great deal of facility requirements to Commissioner discretion. This does not work well to promote consistency in management requirements given the many variables and permutations that exist between publicly owned and privately owned, large operations and small operations, metro sites and rural sites, etc. Therefore, several meetings were held in June and August of 2005 to discuss an appropriate approach to take with demolition landfills. It was agreed that a three-class system approach to demolition landfills was warranted. Based on these meetings and subsequent discussions, the following classification system for demolition landfills was developed.

Demolition landfills	Class 1	Class 2	Class 3
Site evaluation	All sites will need to conduct a site evaluation to verify that location standards are met, soils are evaluated, depth to the water table is identified, and groundwater flow direction is defined (See Site Evaluation section.).		
Acceptable wastes	Acceptable C&D waste list (See list in Acceptable Waste section.)	Acceptable C&D waste list + Incidental nonrecyclable packaging consisting of paper, cardboard and plastic + Demo-like industrial wastes comprised of wood, concrete, porcelain fixtures, shingles, or window glass	All C&D wastes + Most industrial wastes
Waste screening	Stringent screening is required.	Screening is required.	Screening is required.
Industrial solid waste management plan (ISWMP) contents	Describe screening procedures, address asbestos-containing materials (ACM) if applicable.	Describe screening procedures and identify additional C&D wastes and specific demo-like industrial wastes to be accepted; address ACM if applicable. Develop waste acceptance criteria.	Describe screening procedures and identify additional C&D wastes and specific industrial wastes to be accepted; address ACM if applicable. Develop waste acceptance criteria.
Groundwater monitoring	Determined by decision matrix in the Groundwater Monitoring section.	Yes	Yes
Liner	No	Determined by decision matrix in the Liner section.	Yes
Reclassification	NA	If the facility takes more than 50% industrial waste based on annual gate receipts, it should be reclassified as an industrial landfill.	

Site evaluation

When permitting or re-permitting a demolition landfill, specific tasks associated with a site evaluation must be completed to determine whether the site meets the location standards. The site evaluation will more precisely identify potential risks, as well as help identify the need for long-term ground water monitoring. If an owner/operator is applying for the re-issuance of an existing permit, all the information specified below must be on record or must be established prior to permit re-issuance.

The permit application shall include:

- verification that the site meets the location standards;
- sufficient documentation to establish the separation distance between the lowest fill elevation and the water table;
- sufficient information to establish groundwater flow direction; and
- a description of the on-site soils.

Site-specific conditions may be defined through the use of existing soil borings, test pits, or any other MPCA-approved method. The level of detail will be dictated by the geologic complexity of the site.

For re-permitting of existing facilities and the permitting of new facilities, the need for a hydrogeologic evaluation will be based upon the data submitted in the Site Evaluation Report. The number of borings in the hydrogeologic evaluation should be sufficient to enable interpretations that reasonably anticipate groundwater flow and pollutant migration.

Acceptable waste

Minn. R. 7035.0300 provides the following definitions:

Subp. 30. **Demolition debris.** "Demolition debris" means solid waste resulting from the demolition of buildings, roads, and other structures including concrete, brick, bituminous concrete, untreated wood, masonry, glass, trees, rock, and plastic building parts. Demolition debris does not include asbestos wastes.

Subp. 31. **Demolition debris land disposal facility.** "Demolition debris land disposal facility" means a site used to dispose of demolition debris.

Minn. Stat. 115A.03 provides the following definition:

Subd. 7. **Construction debris.** "Construction debris" means waste building materials, packaging, and rubble resulting from construction, remodeling, repair, and demolition of buildings and roads.

As can be seen by these definitions, demolition debris is a much smaller subset of the larger overarching category of construction debris. Therefore, the demolition debris land disposal facility rules were written to address the proper disposal of this smaller universe of waste. This is verified by the discussion in the Statement of Need and Reasonableness (SONAR) for Minn. R. 7035.0300, subp. 30, "In the past, unusable construction materials were included in the definition of demolition debris. Construction materials are waste supplies resulting from the construction, remodeling, and repair of buildings and roads. This material will consist of waste paints, building putty, packaging, sealants, oils, etc. This definition is needed to clarify that construction waste is not considered to be demolition debris and must be handled differently."

This separation of construction debris and demolition debris has been an issue between the MPCA and facility owners/operators. Strict adherence and enforcement of these rules in the acceptance of waste at demolition debris land disposal facilities has not been consistently implemented by MPCA staff. Owners/operators have expressed their concern regarding the ability to identify the origin of materials. For example, how can one tell by looking at a 2x4 whether it is coming from the demolition of a structure as compared to the construction or remodeling of a structure, or, for that matter, from an industry, such as a cabinetmaker or mobile home manufacturer? This has led to the evolution of a much broader interpretation by staff and owner/operators as to what constitutes acceptable waste for disposal at demolition landfills. During the last rule revision effort, the rule advisory committee came to consensus on a revised definition for "construction and demolition (C&D) debris" which included lists of materials as being acceptable as well as unacceptable for disposal at demolition debris land disposal facilities.

For the purpose of implementation of this guidance, “construction and demolition (C&D) debris” means materials resulting from the alteration, construction, destruction, rehabilitation, or repair of physical structures, such as houses, buildings, industrial or commercial facilities, and roadways. This definition also includes wastes generated from land-clearing activities.

The MPCA has developed a list of C&D wastes that may be accepted by any demolition landfill which is referred to as the “Acceptable C&D Waste List.”

Acceptable C&D waste list

- Bituminous concrete (includes asphalt pavement and blacktop)
- Concrete (including rerod)
- Stone
- Uncontaminated soil
- Masonry (bricks, stucco and plaster)
- Untreated wood (including painted, stained and/or varnished dimensional lumber, pallets, tree stumps, grubbing, root balls, particle board, plywood, fencing and dock materials)
- Siding (Includes vinyl, masonite, untreated wood, aluminum and steel.)
- Wall coverings
- Electrical wiring and components
- Roofing materials
- Duct work
- Wall board, sheet rock
- Built-in cabinetry
- Plumbing fixtures
- Affixed carpet and padding
- Ceramic items
- Conduit and pipes
- Glass (limited to window and door glass from buildings and structures)
- Insulation (Includes fiberglass, mineral wool, cellulose, polystyrene and newspaper.)
- Plastic building parts
- Sheathing
- Molded fiberglass
- Rubber
- Drain tile
- Recognizable portions of burned structures
- Metal
- Ceiling tile
- Wood and vinyl flooring
- Asbestos-containing materials (pursuant to an approved ISWMP)

Class I demolition landfills will be limited to taking only those C&D wastes listed above.

Class II demolition landfills may take the C&D wastes listed above, incidental nonrecyclable packaging consisting of paper, cardboard and plastic, and limited demo-like industrial waste. Demo-like industrial waste accepted by Class II demolition landfills is limited in composition to wood, concrete, porcelain fixtures, shingles or window glass. These additional waste types need to be identified in the facility’s ISWMP.

Class III demolition landfills may accept all C&D wastes and most industrial wastes as defined by the facility’s ISWMP.

Waste screening

All owners/operators need to establish a waste screening area where incoming loads would first be dumped and sorted through to remove unacceptable materials prior to pushing the waste into the working face. Most Class I demolition landfills will not have groundwater monitoring. Therefore, waste screening and sorting at Class I demolition landfills will be paramount to ensuring that only acceptable materials are disposed in them. Groundwater monitoring will be conducted at all Class II demolition landfills; however, liners will not be required for most of these facilities. Therefore, waste screening is also an important feature for Class II and III demolition landfills.

Best management practices for waste screening procedures are provided in appendix B.

Industrial solid waste management plan

All owners/operators need to submit an industrial solid waste management plan (ISWMP) pursuant to 7035.2535 subp 5. If a demolition landfill is accepting anything other than those wastes identified in the Acceptable C&D Waste List, the owner/operator needs to specifically identify those wastes in the landfill’s ISWMP as required by Minn. R. 7035.2535, subp. 5. Item A(2) of this subpart requires the ISWMP to include, but not be limited to, *a procedure for evaluating waste characteristics, including the specific analyses that may*

be required for specific wastes, and the criteria used to determine when analyses are necessary, the frequency of testing, and analytical methods to be used.

The frequency and number of samples required will depend on the variability of the waste proposed for acceptance. For a new facility, the testing should be completed before the waste is accepted so that these characteristics may be factored into the design and monitoring requirements for the facility. For existing facilities, waste must be evaluated prior to acceptance and at regular intervals throughout the life of the facility, but at least during each re-permitting event, to determine the need for changes in the facility’s design or monitoring requirements. It may be necessary to establish a compliance schedule for existing facilities for conducting an analysis of wastes currently accepted at the facility.

The ISWMP shall include waste-acceptance criteria and procedures for rejecting waste that does not meet the acceptance criteria. Each facility is responsible for determining its own waste-acceptance criteria. For MSW landfills, which are required to have composite liners, the acceptance criterion is that the waste passes the Toxicity Characteristic Leach Procedure (TCLP) test (i.e., that it not be a hazardous waste). Since most of our demolition landfills do not have liners, simply testing to determine whether a waste is hazardous or not does not provide adequate protection of the environment. Therefore, the TCLP would not be an appropriate acceptance criterion to be used. In the past, facilities have proposed many different acceptance criteria for use in their ISWMPs. Here are a few examples of the acceptance criteria that have been approved previously:

- 50% (or some other fraction) of the hazardous waste limits based on either TCLP or Synthetic Precipitation Leach Procedure (SPLP) testing;
- 10 times (or some other multiplier) of the drinking water standards [Health Risk Limit (HRL) or Maximum Contaminant Level (MCL)];
- Soil Reference Value (SRV) – residential or industrial; and,
- Soil Leaching Value (SLV) – residential or industrial.

The proposed waste acceptance criteria must be justified by the permittee, to verify that the site is adequately designed, located and monitored to accept the wastes proposed for disposal. If the best available information and data indicate that the facility is not protective of the environment, given the proposed waste-acceptance criteria, the facility may be required to either lower its proposed waste-acceptance criteria or change the facility design to ensure protection of the environment. This decision will be made on a case-by-case basis using the best available data and information. Input parameters would be included in the permit application along with the results of the modeling.

If during the life of the facility, a new industry moves into the area and asks a landfill to accept its wastes, the following decision matrix should help the landfill decide whether it may take the waste.

Industrial Solid Waste Matrix		Is the waste identified in the facility's ISWMP as an acceptable material?	
		Yes	No
Do test results of the waste indicate that it will meet the acceptance criteria identified in the facility's ISWMP?	Yes	OK to accept waste.	If facility would like to accept waste, a revised ISWMP* must be submitted to the MPCA for review and approval prior to acceptance. Otherwise, DO NOT ACCEPT WASTE.
	No	DO NOT ACCEPT WASTE.	DO NOT ACCEPT WASTE.
*The MPCA will provide templates and forms to ease the process of writing and modifying ISWMPs.			

Groundwater monitoring

Based on the limited amount of groundwater-monitoring data collected from demolition landfills, it has been noted that some demolition landfills do impact groundwater quality. Based on discussions with stakeholders, it was agreed that facilities that accept only those materials identified on the Acceptable C&D Waste List risk to the environment may be minimal. However, there may be risk factors that would trigger the need for groundwater monitoring at these facilities. Facilities that accept wastes beyond the Acceptable C&D Waste List pose a greater threat to the environment. Therefore, all Class II and III landfills should conduct groundwater monitoring. For Class I landfills, the decision matrix above should be used to determine whether groundwater monitoring may be required. This matrix was developed utilizing the MPCA Tier II Soil Leach Value (SL V) model. The permittee may propose an alternative model. Input parameters would be included in the permit application along with the results of the modeling.

Many models exist for determining the fate of contaminants in a groundwater-flow regime. The facility owner/operator shall be responsible for selecting a model to use. Input data for the model must be identified with proper site-specific justification provided for the values selected. A facility's owner/operator is encouraged to work closely with the MPCA hydro geologist assigned to the site when selecting a groundwater model and in identifying input data for the model.

Groundwater Monitoring Decision Matrix*		Soil Type		
		Clay	Silt	Sand
Depth to water table	5 feet or more	No	Yes or provide justification	Yes or provide justification
	At least 10 feet	No	No	Yes or provide justification

*This matrix was developed using the MPCA Tier II SL V model.

To initiate a consistent approach to groundwater monitoring, the following criteria should be used to establish an effective groundwater-monitoring program at a demolition landfill.

Ground water monitoring network

- A minimum of 3 piezometers and/or groundwater monitoring wells must be installed to establish groundwater flow direction. The piezometers must be triangulated around the existing or proposed site and surveyed to a relative datum.
- Groundwater-flow direction will be established by monitoring groundwater-level measurements on a semi-monthly basis (twice each month) for a one- to three-month period depending on site-specific hydrogeology. The number of measurements required may be changed based on local hydrogeologic conditions.
- Based on the groundwater-flow direction established above, a minimum of three monitoring wells must be installed, one up-gradient and two down-gradient of the existing or proposed location. Additional wells may be required, depending on the location of human and/or environmental receptors relative to the landfill.
- Down-gradient wells should be placed within the property boundary, but not farther than 200 feet from the edge of the waste fill area.
- Wells should be screened in the water table as dictated by site-specific conditions.

Monitoring frequency

- Routine sampling, limited to spring, summer and fall events, shall take place for a minimum of three years. This sampling is in addition to the required baseline sampling.
- Monitoring parameters for this time period shall include the Parameter Lists identified in appendix A.
- After the initial three-year time period, the permittee may request a modification to both the monitoring frequency and the parameter list.

Liners

Class I landfills will not have liners.

All Class III landfills should have liners.

For Class II landfills, the following decision matrix should be used to determine whether a liner may be required.

Liner Decision Matrix		Soil type		
		Clay	Silt	Sand
Depth to Water Table	5 feet or more	No	Run model.	Yes
	At least 10 feet	No	Run model.	Run model

Many models exist for evaluating the need for a landfill to have a liner. The facility owner/operator is responsible for selecting a model to use.

The U.S. Environmental Protection Agency Industrial Waste Management Evaluation Model (IWEM) may be used to determine whether a liner is needed. The MPCA has prepared a fact sheet, *Guidance of Industrial Waste Management Evaluation Model (IWEM)*, that describes how to use this model. The guidance will be

posted soon on the MPCA’s Web page. The permittee may propose an alternative model. Input parameters would be included in the permit application along with the results of the modeling.

If modeling indicates the need to install a liner, the MPCA has *prepared Guidance for Liner Design for Demolition Debris or Industrial Solid Waste Landfills* for reference in designing liner systems.

Limited availability landfills

The MPCA acknowledges that some demolition landfills accept an extremely small quantity of waste on an annual basis. These Class I facilities are located in remote areas and exist solely to provide a service to the community so as to avoid or eliminate illegal dumping. As such, additional environmental-protective measures, such as groundwater monitoring or liners, may be too expensive to allow these landfills to operate. The MPCA will make every attempt to ensure that these factors are considered when determining the need for additional environmental-protective measures at these sites.

Contact information

For more information on demolition landfills, the first point of contact should be the MPCA solid waste engineer assigned to the region in which your facility is located:

The engineer should be able to identify the appropriate hydrogeologist assigned to your site.

MPCA Office	Engineer, Phone No.
Duluth:	Brett Ballavance, (218) 723-4837
Brainerd:	Dan Vleck, (218) 855-5007
Detroit Lakes:	Kathy Holland-Hanson, (218) 846-0470
Marshall/Willmar	Tony Bello, (651) 296-7272
Rochester	Sherri Nachtigal, (507) 280-2997
Twin Cities Metro	Mike Lynn, (651) 296-8584 Geoff Strack, (651) 296-7716

Stakeholders list

The MPCA thanks the representatives from the following stakeholders for their participation in developing this guidance document:

- BFI
- Crow Wing County
- Dem-Con Landfill
- Grinning Bear Demolition Landfill
- Hubbard County
- Lake County
- McLeod County
- Minnesota Office of Environmental Assistance
- National Solid Wastes Management Association
- Olmsted County
- Ottertail County
- ProSource Technologies
- Rock County
- RW Beck
- Sherburne County
- SKB Environmental
- St Louis County
- Todd County
- Veit Companies
- Waste Management Inc.
- Western Stearns Demolition Landfill

Appendix E: References

CDIL Work Group's website, hosted by the MPCA: www.pca.state.mn.us/about/councils/cdilf.html

Minnesota CD&I Waste Study 9-07, Solid Waste Management Coordinating Board:
http://www.swmcb.org/resources/studies_policy_reports/non_municipal_solid_waste

Assessment and Recommendations for Improving the Performance of Waste Containment Systems (EPA, December 2002, EPA/600/R-02/099): <http://www.epa.gov/nrmrl/pubs/600r02099/600R02099.pdf>

Open Burning In Rural Minnesota: Interviews with residents about health, environmental, legal, enforcement and safety concerns regarding open burning of garbage and household waste; January 2005; Zenith Research Group–Duluth, Minnesota: <http://www.pca.state.mn.us/oea/publications/burnbarrel/burnbarrel-survey2005.pdf>

2005 Solid Waste Policy Report: (MPCA, March 2006, <http://www.pca.state.mn.us/oea/policy/policy2005.cfm>)

Assessment of the Performance of Engineered Waste Containment Barriers, Committee to Assess the Performance of Engineered Barriers, National Research Council, National Academies Press, 2007

Appendix F: Landfill moratorium statute

Minnesota Statutes, § 116.07, Subdivision 4, as amended (extract of pertinent language):

The rules for the disposal of solid waste shall include site-specific criteria to prohibit solid waste disposal based on the area's sensitivity to groundwater contamination, including site-specific testing. The rules shall also include modifications to financial assurance requirements under subdivision 4h that ensure the state is protected from financial responsibility for future groundwater contamination. Until the rules are modified to include site-specific criteria to prohibit areas from solid waste disposal due to groundwater contamination sensitivity, as required under this section, the agency shall not issue a permit for a new solid waste disposal facility, except for:

- (1) the reissuance of a permit for a land disposal facility operating as of March 1, 2008;
- (2) a permit to expand a land disposal facility operating as of March 1, 2008, beyond its permitted boundaries, including expansion on land that is not contiguous to, but is located within 600 yards of, the land disposal facility's permitted boundaries;
- (3) a permit to modify the type of waste accepted at a land disposal facility operating as of March 1, 2008;
- (4) a permit to locate a disposal facility that accepts only construction debris as defined in section 115A.03, subdivision 7;
- (5) a permit to locate a disposal facility that:
 - (i) accepts boiler ash from an electric energy power plant that has wet scrubbed units or has units that have been converted from wet scrubbed units to dry scrubbed units as those terms are defined in section 216B.68;
 - (ii) is on land that was owned on May 1, 2008, by the utility operating the electric energy power plant; and
 - (iii) is located within three miles of the existing ash disposal facility for the power plant; or
- (6) a permit to locate a new solid waste disposal facility for ferrous metallic minerals regulated under Minnesota Rules, chapter 6130, or for nonferrous metallic minerals regulated under Minnesota Rules, chapter 6132.