Disposal guidance for mercury-catalyzed polyurethane flooring and subflooring

Waste/Hazardous Waste 4.25 • May 2008

Minnesota Pollution Control Agency

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School districts and other building owners have legitimate concerns about the costs and requirements for removal and proper management of mercury-catalyzed polyurethane flooring and contiguous subflooring material.

Mercury-catalyzed polyurethane flooring (MCPF) was manufactured by several companies, including, but not limited to: 3M, American Biltrite Rubber Co., Inc., Athletic Polymer Systems, Crossfield Products, Mondo Rubber, Pitzer Inc., Robbins Sports Surfaces, Selby Battersby & Company, and Sportan Surfaces, Inc.

According to the flooring manufacturers and test data, the finished flooring typically contains 550 to 1,100 parts per million (ppm), or 0.055 – 0.11 percent, mercury when first installed, usually present in phenylmercuric acetate. The level of mercury declines with age, as some of the mercury vaporizes from the flooring.

The current policy of the Minnesota Pollution Control Agency (MPCA) on testing and disposal of flooring, described below, is based on the MPCA's policy for landfill disposal of contaminated soils, renovation, and demolition debris, as described in the attached Program Management Decision Memo dated May 2007. The MPCA recognizes that these requirements may have significant cost implications for building owners. Building owners will have to observe these requirements if they have flooring that must be removed now or in the future.

Unfortunately, there is no technology for treating MCPF to remove and recover the mercury so that the rest of the flooring material can be managed as solid waste without restriction.

For removal of MCPF in schools, costs for removal, disposal and associated cleanup are fundable under Health and Safety (FIN 349). Costs of replacement flooring are not fundable under Health and Safety, as described in the Minnesota Department of Education letter to superintendents dated June 20, 2007.

Testing requirements and management/disposal options

Building owners will need to have a representative sample of the flooring tested if the floor is to be removed. It may be necessary to hire a consultant to ensure that the sample is representative of the entire floor. The testing for both total and leachable mercury must be performed by an independent, certified lab. The states and the U.S. Environmental Protection Agency (EPA) have standards relating to both of these testing measures. If the subflooring will be removed, it will

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Treatment and disposal options for mercury-catalyzed polyurethane flooring (MCPF) and subflooring*

	Passes TCLP** (below hazardous waste level for mercury in leachate - 0.2 mg/l)	Fails TCLP (above hazardous waste level for mercury in leachate - 0.2 mg/l)
≤10 ppm total mercury	Disposal in a solid waste landfill in Minnesota that is permitted to accept this waste type Disposal in an out-of-state landfill that is permitted to accept this waste type	Disposal in an out-of-state hazardous waste landfill that is permitted to accept this waste type Treatment/stabilization may be required by the state or landfill.
>10 ppm total mercury	Disposal in an out-of-state landfill that is permitted to accept this waste type Treatment/stabilization may be required by the state or landfill.	Disposal in an out-of-state hazardous waste landfill that is permitted to accept this waste type Treatment/stabilization may be required by the state or landfill.

*In accordance with the May 8, 2007, MPCA Program Management Decision for Disposal of Mercury-contaminated Soils and Demolition Debris

**Toxicity Characteristic Leaching Procedure

also have to be tested for both total and leachable mercury. The results of these analyses must be retained for at least three years after the flooring is removed and disposed. (Please share your flooring mercury test data with the MPCA and the Minnesota Department of Health to enable them to collect as much data as possible to continue to develop appropriate policy for disposal of this material.)

If total mercury is **equal to or less than** 10 parts per million (ppm) total mercury *and* leachable mercury is **below** the hazardous waste limit of 0.2 mg/l, the material can go to a solid waste landfill in Minnesota if the landfill is permitted to take this waste type. The MPCA wants this nonhazardous mercury-containing waste to go to landfills where releases to the air and to the groundwater will be minimized. This material may also be sent to an out-of-state landfill that is permitted to accept this waste type. The MPCA maintains a list of landfills, including several in Wisconsin and Iowa, that can accept this type of waste.

If leachable mercury is **above** the hazardous waste limit, regardless of total mercury concentration, the waste must go to a hazardous waste landfill outside of Minnesota. The receiving state and landfill may have additional treatment/stabilization requirements, depending on total and leachable mercury levels.

If total mercury is **above** 10 ppm *and* leachable mercury is **below** the hazardous waste limit, the waste must go out of state to a landfill that is permitted to accept this waste type. This could be either a solid waste or hazardous waste landfill. The receiving state and landfill may have additional treatment/stabilization requirements, depending on total mercury levels. You are encouraged to contact the landfill in advance regarding these potential requirements.

Covering mercury-catalyzed flooring with new flooring will not solve the problem.

The MPCA and the MDH do not recommend covering mercury-catalyzed flooring with new flooring material. Covering existing flooring will not eliminate the issue. School districts and other building owners should be aware of the following concerns:

1. Mercury vapor penetrates many materials including plastics and wood. It is possible that mercury vapor concentrations will again reach levels of concern after a mercury-containing floor is covered with new flooring.

2. Covering the flooring may increase the amount of material that will need special handling in the future when the entire floor is removed. It is illegal to dilute hazardous materials for the purpose of meeting disposal criteria.

Additional recommendations to building owners responsible for the removal of MCPF

- If the flooring material tests hazardous (>0.2 mg/l TCLP) and/or contains more than 10 ppm total mercury, contact the MPCA for assistance.
- If the flooring material tests hazardous (>0.2 mg/l TCLP) and the subflooring will also be removed, have a representative sample of the subflooring tested to determine whether it is hazardous or nonhazardous.
- Require your contractors and subcontractors to isolate the work area and use procedures that will minimize release of mercury, flooring particles and dust during the demolition and disposal process.
- Confirm who is responsible for:
  - securing the removed flooring and subflooring material while it is on the school property and
  - releasing the material from school property for proper disposal.

Whom to contact for more information

If you have questions about the testing, removal or disposal of mercury-catalyzed polyurethane flooring and subflooring, contact the following MPCA personnel:

Don Nelson, solid waste disposal, Municipal Division (phone 651/296-8621, e-mail don.nelson@state.mn.us)

Ray Bissonnette, hazardous waste, Industrial Division (phone 651/297-8588, e-mail raymond.bissonnette@state.mn.us)

If your building is in the seven-county Twin Cities Metropolitan Area, contact the appropriate county environmental health department.

PROGRAM MANAGEMENT DECISION MEMO

ISSUE: Disposal of mercury-contaminated soils and renovation/demolition debris in Minnesota landfills

EFFECTIVE DATE: 5/8/2007

REPLACES: Program Management Decision Memo "Disposal of Mercury-contaminated Soils in Minnesota Landfills," effective March 1, 2004

DECISION

Non-hazardous mercury-contaminated soils and construction/demolition debris free of elemental mercury from products subject to regulation under Minn. Stat. 115A.932 can be accepted in lined Minnesota landfills as part of an approved industrial solid waste management plan (ISWMP) within the following parameters:

- Waste with total levels of 0-4 ppm. No special handling requirements
- Waste with total levels of 4-10 ppm, if immediately covered with six (6) inches of soil upon acceptance.
- Waste at total levels >10 ppm may be acceptable with written pre-approval from the MPCA, on a case-by-case basis, depending on volume and concentration. Transporting vehicles must be lined, and the waste covered, with polyethylene sheeting. The waste must be immediately covered with six (6) inches of soil upon acceptance. This approval will be considered on a case-by-case basis. In order to determine mercury emission levels during waste acceptance, the MPCA may monitor emissions before, during, and after waste acceptance at a landfill. In addition, the MPCA will examine landfill-gas monitoring data to ascertain whether increased amounts of mercury are being vented. Based on the results, it is possible that waste at total levels >10 ppm may not be allowed at landfills with active gas extraction.

This decision provides for disposal in appropriate Minnesota landfills of soils and construction/demolition debris contaminated by mercury at concentrations which are non-hazardous. This decision does not apply to wastes other than soils and construction/demolition debris. For example industrial wastes such as ash are not subject to this policy. This policy does not apply to materials which have Standing Beneficial Use Determinations, or those that have received a Case Specific Beneficial Use Determination. This allowance does not include elemental mercury or materials contaminated with free mercury, which must be managed as hazardous waste.

BACKGROUND

The recent history of changing policies governing mercury disposal has led to confusion among regulators, local units of government, waste generators, consultants, and landfill operators. As a result, the MPCA is adopting one policy for mercury-contaminated soils and construction/demolition debris. In addition, past policies were extremely conservative, which often led to the transportation of waste out of state, for disposal in similarly, or even less-protective, disposal environments. This policy includes special waste handling procedures to reduce potential emission, based upon the mercury levels in the waste.

Disposal of wastes contaminated by mercury must be approved of within a landfill's ISWMP. In evaluating request for approval, solid waste staff should consider a range of potential risk factors, including, but not limited to, releases due to methylation of mercury, vaporization during disposal and through gas vents, and

leaching into ground water. Written request by the landfill, and approval by the MPCA, must be received prior to acceptation of waste covered by this policy.

In some circumstances, it may be possible to segregate wastes contaminated at high levels from those that are not, reducing the mount of material which must be disposed of out of state. All such determinations should be made in consultation with MPCA staff.

A formal letter outlining this final policy, including the website link, will be immediately sent to landfills and County Solid Waste Administrators. MPCA remediation, solid waste, and hazardous waste program staff will implement this policy change when advising outside parties of appropriate disposal options for mercury-contaminated waste.

RELEVANT STATUTES AND RULES

- Minn. Stat. § 115A.932: Prohibition of disposal of mercury or mercury-containing devices in Minnesota landfills;
- Minn Rules, chapter 7045.0120, subpart 1, article F: Exempts disposal of coal ash from governance by hazardous waste rules, and
- Minn. Rules, chapter 7001.3300: industrial solid waste management plans.

RATIONALE

The following is a summary of historical policies governing mercury-contaminated waste:

Minnesota Statutes, section 115A.932 restricts disposal of mercury, in some forms and from certain sources, in Minnesota landfills. At the same time, some of the sites being redeveloped around the state contain mercury contaminated soils or materials within structures may be contaminated from past improper disposal practices. In some cases, these soils or materials may need to be removed from the site, depending upon the levels of contamination and the planned land and site uses. In addition, routinely generated industrial wastes such as foundry sand, wastewater sludge, and slag can contain residual mercury.

How should such materials be disposed of, and under what circumstances should the MPCA require that such material be shipped out of state for disposal? There are also ethical and environmental issues regarding whether it makes sense to ship Minnesota's mercury contaminated waste to another state, if it might be managed safely here.

MPCA staff often had interpreted Minnesota Statutes, section 115A.932 to mean that essentially no mercury could be disposed of in Minnesota landfills, regardless of its nature or source, and that the mercury contaminated material must be disposed of in accordance with Minnesota Rules, chapter 7045.

It appears, however, that Minnesota Statutes, section 115A.932 had been interpreted too broadly, to prohibit disposal of materials it was not intended to prohibit. At the time the statute was developed, the Legislature was concerned about potential mercury contamination from mercury-containing devices, mercury-containing compounds, or bulk mercury, being intentionally placed in solid waste for disposal. It can be argued that the legislature did not intend for the statute to apply, for example, to soils contaminated by historical use of coal ash as fill material.

This broad reading of the law has led to confusing and conflicting requirements for disposal practices. On the one hand, the MPCA sent a memo to landfill operators (June 1, 2000) stating that materials which "passed" a TCLP test may be disposed of in a landfill, and that this level for mercury (0.2 ppm in the TCLP leachate) is used in industrial solid waste management plans as a cut-off for acceptance of mercury-containing materials. Again, the concern was mainly over acceptance of bulk mercury or mercury-containing devices and debris.

A leaching test is simply a method for determining whether a concentration of a contamination in soils or other materials are high enough that the contaminant can leach out of the material at concentrations that exceed thresholds established by the United States Environmental Protection Agency (EPA). Therefore, the test helps determine whether the material should be evaluated and handled as a hazardous waste.

On the other hand, an MPCA remediation program had begun using a concentration of 0.7 ppm in soil (rather than in leachate) as the criterion for determining whether to ship the soil out of state for disposal in a hazardous waste landfill. At that time, this level corresponded to the MPCA's risk-based "soil reference value" (SRV) for residential land use. It may be argued, however, that using the 0.7 ppm concentration as the cut-off level for sending such soil out of state for disposal did not necessarily make sense. SRVs represent conservative screening levels up to which contamination might safely remain in place under certain exposure conditions. Establishment of final cleanup levels may involve reducing on-site concentrations, altering exposure conditions, or some combination of the two. The 0.7 ppm level had been developed solely to be used as a risk screening level for mercury contamination in soils in a setting to be redeveloped for residential use. So, it was possible to build a house or a child's play area on soils containing mercury at concentrations up to 0.7 ppm.

The MPCA's "Risk-based Guidance" documents from which this level was drawn also suggested that soils with mercury contamination of up to 2 ppm might remain in place under commercial or industrial land-use scenarios. Therefore, using 0.7 ppm as the criterion for determining whether to ship soils from some sites out of state (not allowing them to be placed in landfills) could result in the paradox of allowing soils at other sites contaminated at concentrations of up to at least 2 ppm to remain in place beneath new developments. It stands to reason, then, from a risk standpoint, that soils contaminated at concentrations at least somewhat higher than 0.7 ppm might safely be placed in lined landfills, where even long-term exposures would be quite limited.

In order to recommend a disposal cut-off level for concentrations of mercury in soils, in March of 2004, a Program Management Decision Memo was issued which allowed soils contaminated with mercury at concentrations of up to 4 ppm to be disposed of in municipal solid waste landfills (and possibly some other types), because 4 ppm was a pragmatic benchmark that should protect human health from an air emission pathway, and yet did not unduly restrict management of soils contaminated by ash and other waste often encountered at cleanup sites.

This approach represented a reasonable compromise among the current range of disposal practices involving mercury contaminated soils. For example, the MPCA currently allows coal ash (commonly a source of mercury in soils from redevelopment sites) to be spread as a portion of the daily cover on municipal solid waste (MSW) landfills. In addition, there are landfills in Minnesota operated by utility companies specifically for disposal of coal ash. Indeed, Minnesota already approves application of soils with mercury concentrations significantly higher than those recommended in this policy (17 ppm) to agricultural lands as a soil amendment. Moreover, disposing of contaminated soil in an appropriate landfill is essentially moving an old, unmanaged release to be managed in safer, more controlled conditions, rather than creating a new release of mercury. This decision applied to mercury-contaminated soils only.

In late 2005, a request for a reevaluation of MPCA policy was received. The request was made after two large projects involving renovations of buildings that were contaminated from past, improper disposal of mercury and/or mercury-containing devices were undertaken. The request stated that using the Residential SRV as a disposal standards was too stringent, and caused an economic hardship due to increased costs from transporting debris out of Minnesota. The MPCA's reevaluation of the policy suggested that using the Residential SRV for mercury disposal was indeed too stringent a standard when applied to controlled disposal of waste in a lined landfill. The MPCA examined the totals data from one of the above projects and the vast majority of the waste fell below 1.5 ppm, which is the current Industrial SRV. That appeared to be a reasonable threshold. As a result, the MPCA decided that it would allow disposal of mercury-contaminated renovation/demolition debris in a lined landfill at levels up to 1.5 ppm. This was communicated to landfills and County Solid Waste Administrators in a letter dated July 14, 2006.

In September of 2006, the MPCA was approached regarding disposal of large amounts of mercury-contaminated soil that were being generated as a result of remediation of a salvage yard. A large amount of the soil exceeded the 4 ppm threshold allowance, so was therefore being disposed of out of state. The MPCA learned it was being disposed of in a biopile in Wisconsin, which is a less protective environment than a lined landfill. Additional data provided showed completed and pending soil remediation projects totaling over 85,000 cubic yards of contaminated soil that exceeded 4 ppm, that would be disposed of outside of Minnesota.

The MPCA concludes that with special handling at landfills, based on total levels, mercury-contaminated wastes can be safely accepted within Minnesota. The Minnesota Department of Health was consulted regarding this policy, and it found it to be reasonable.

APPROVAL

I have reviewed this management decision and I concur.

Signed: (signature)
Date: 5/8/07
Tim Scherkenbach
Assistant Commissioner

Signed: (signature)
Date: 5/8/07
James L. Warner, P.E.
Director, Industrial Division

Signed: (signature)
Date: 5/8/07
Lisa Thorvig
Director, Municipal Division

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Gary Pulford
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