BURNS McDONNELL

Industrial Solid Waste Management Plan (ISWMP)

CROW WING COUNTY
MINNESOTA

Crow Wing County
MMSW Landfill SW-376

Project No. 129741

June 2021

Industrial Solid Waste Management Plan (ISWMP)

prepared for

Crow Wing County
MMSW Landfill SW-376
Brainerd, MN

Project No. 129741

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LIST OF ABBREVIATIONS

Abbreviation	Term/Phrase/Name
ACM	asbestos containing material
ADC	alternative daily cover
AFFF	Aqueous Film Forming Foam
County	Crow Wing County
CWD	chronic wasting disease
DOT	Department of Transportation
DRO	Diesel Range Organics
EPA	United States Environmental Protection Agency
FFB	fabric filter bags
GRO	Gas Range Organics
Hauler's Manual	Crow Wing County Solid Waste Haulers Manual
HDPE	high density polyethylene
HHW	household hazardous waste
ISWMP	Industrial Solid Waste Management Plan
Landfill	Crow Wing County Mixed Municipal Solid Waste Landfill, SW-376
LFG	landfill gas
MCPF	mercury-catalyzed polyurethane flooring
mg/kg	milligrams per kilogram
MnTAP	Minnesota Technical Assistance Program
MMSW or MSW	mixed municipal solid waste
MPCA	Minnesota Pollution Control Agency

Abbreviation	Term/Phrase/Name
NESHAP	National Emission Standards for Hazardous Air Pollutants
PAHs	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyl
pCi/g	picocuries per gram
PCS	petroleum contaminated soils
PFAS	Per- and Polyfluoroalkyl Substances
PMD	MPCA Program Management Decision (PMD) for a Standardized Level of Generator Knowledge for Evaluation of Shredder Residue under the Minnesota Hazardous Waste Regulations, August 31, 2006
ppm	parts per million
RCRA	Resource Conservation and Recovery Act
SDS	Safety Data Sheet
SRVs	Soil Reference Values
TCLP	toxicity characteristic leaching procedure
WWTP	wastewater treatment plant

1.0 INTRODUCTION

This Industrial Solid Waste Management Plan (ISWMP) was developed as a revision of the existing ISWMP and to address wastes that will be considered for disposal at Crow Wing County (County) Mixed Municipal Solid Waste Landfill, SW-376 (Landfill). The ISWMP was developed in accordance with Minn. R. 7035.2535, Subp. 5. The Landfill permittee is the County, as the Landfill is owned by the County and operated by a private operator under contract to the County.

The Landfill is permitted to accept mixed municipal solid waste (MMSW or MSW) and non-hazardous solid waste generated by industry that meet the criteria as outlined in this ISWMP. As the Landfill owner, the County reserves the right to reject and not accept for disposal any waste that it deems may be harmful to public health and the environment, has not been properly characterized as a non-hazardous solid waste, and/or will affect Landfill operations. **The Landfill will not accept hazardous materials or suspected hazardous waste for storage or disposal under any circumstances.**

1.1 Purpose and Scope

The basic objectives of this ISWMP are:

- Generally, to protect public health and the environment by ensuring that wastes are properly evaluated and managed;
- Identify wastes for acceptance at the Landfill; and
- To address waste screening and evaluation of specific wastes to be accepted.

This ISWMP requires approval by the Minnesota Pollution Control Agency (MPCA). Any future amendments or changes in management practices or other policies will be submitted for approval prior to implementation.

1.2 Regulatory Requirements

Owners of all solid waste management facilities in Minnesota are required to develop and implement an ISWMP in accordance with the Minn. R. 7035.2535, Subp. 5.

Because the Landfill is lined and has a leachate collection system, the policy of the County will be to accept any non-hazardous industrial waste generated within the County that would not affect Landfill operation or the treatability of the leachate. The Landfill will not accept industrial waste generated outside the County without approval of the County Board of Commissioners.

It is the policy of the County that all requests for disposal of non-hazardous industrial wastes into the Landfill will be submitted to the County prior to disposal. For the purpose of this ISWMP, Industrial Solid Waste will be defined as in Minn. R. 7035.0300, Subp. 45, which reads as follows:

> *“"Industrial solid waste" means all solid waste generated from an industrial or manufacturing process and solid waste generated from nonmanufacturing activities such as service and commercial establishments. Industrial solid waste does not include office materials, restaurant and food preparation waste, discarded machinery, demolition debris, municipal solid waste combustor ash, or household refuse.”*

1.3 General Site Conditions

The Landfill is located approximately 6 miles northeast of Brainerd on Hwy 210 in the portions of Section 25 and Section 26, Oak Lawn Township, Township 46N Range 30W. Currently, the County has identified a total of 564 acres for solid waste management. The permitted acres include the MMSW Landfill (SW-376), the closed MMSW Landfill (SW-111), a closed Potlatch Monofill (SW-533), and a demolition debris facility (SW-440). The remaining area provides space for facility administration offices, a household hazardous waste (HHW) facility, monitoring systems, landfill gas (LFG) and leachate management systems, waste tires, white goods, used electronics, antifreeze, used oil/filters, waste battery management, a recycling drop-off center, recycled glass, yard waste and brush storage, mattress collection and storage building, and a buffer zone. Due to the design of the Landfill, it is deemed as a suitable disposal site for non-hazardous industrial solid waste.

1.3.1 Liner Design

The Landfill is lined with two-feet of clay and a 60-mil high density polyethylene (HDPE) geomembrane. Above the liner is an 18-inch layer of drainage sand. A network of leachate collection piping is provided in trenches in the bottom of the Landfill.

1.3.2 Leachate Collection

The Landfill has been provided with a leachate collection and pretreatment system. The collected leachate drains by gravity to a pump station located outside of the Landfill. The leachate is then pumped to the first of four pretreatment ponds operated in series. The ponds are lined with two layers of 60-mil HDPE geomembrane with leak detection monitoring. Beneath the leachate collection trenches, a network of leak detection piping is provided. Should the liner system leak, the leak detection system is designed to serve as a secondary leachate collection system.

Leachate sample collection and analysis is conducted in accordance with the MPCA Solid Waste Permit, SW-376. Leachate sampling and analysis is outlined in the Leachate Management Plan (Section 5) of the Permit Reissuance Report, Crow Wing County Landfill, SW-376 (latest version).

1.3.3 Hydrogeologic Monitoring

The Landfill is provided with a number of monitoring wells and is located in an area with no downgradient drinking water wells. Groundwater monitoring is completed in accordance with the MPCA Solid Waste Permit, SW-376. Sampling and analysis is outlined in the Environmental Monitoring Plan (Section 7) of the Permit Reissuance Report, Crow Wing County Landfill, SW-376 (latest version).

Detailed information concerning the design of the facility can be found in the Engineering Report and other permit documents. Detailed information concerning site hydrogeology and groundwater monitoring plan can be found in a series of hydrogeological reports and the environmental monitoring work plan. All of these documents are on file with the MPCA.

1.4 Plan Amendment

This ISWMP will be reviewed on an annual basis, or more frequently as conditions warrant, to determine its adequacy in dealing with industrial wastes received at the site. The ISWMP will be amended whenever management practices change or when wastes identified herein change. The amended ISWMP will be submitted to the MPCA for review and approval prior to implementation.

2.0 IDENTIFICATION AND NOTIFICATION

2.1 Generator Identification

Generator identification was completed as part of the existing ISWMP. In the event that a new industrial waste generator is identified, a letter of introduction that includes the waste inventory form (Appendix A) will be sent to the generator. In addition, generators will also receive a copy of the County's Industrial Waste Landfill Acceptance Policy upon request for disposal of a new industrial waste type. This policy and procedure outlines the County's policy for industrial waste acceptance as well as provides the procedure for obtaining approval, typical testing and associated costs, and identified laboratories to complete the testing. The Policy is also located in Appendix A.

2.2 Generator Notification

Generator identification and notification will continue to take place through the evaluation process established in this ISWMP. It will be assumed that generators are unaware of the industrial solid waste management requirements.

If unapproved industrial waste is delivered to the Landfill, the hauler is informed to return the waste back to the generator. The generator is instructed to contact the County to begin the disposal approval process. If an unapproved waste is delivered to the landfill leaking, or exhibiting hazardous characteristics, the Minnesota Duty Officer will be contacted by the Landfill and the response will be coordinated with the State.

Identified generators will be sent the Notification Letter, Waste Inventory Form, and Industrial Waste Landfill Acceptance Policy (Appendix A). A follow-up meeting with a representative of the generator may be initiated to further discuss the requirements and procedures for accepting and managing industrial wastes.

Annually, during hauler license renewals, the County provides haulers with a copy of the *Crow Wing County Solid Waste Haulers Manual* (Hauler's Manual). The Hauler's Manual provides a reminder to all haulers and generators that industrial solid waste must be approved according to the ISWMP and guidelines for the handling and disposal of non-hazardous industrial waste.

2.3 Hauler Requirements

The waste haulers using the Landfill are important in gathering information used to ensure that the wastes are delivered and unloaded according to the methods specified in the ISWMP. Haulers are required to certify that they will comply with the following procedures as a condition of their being granted a license

by the County. As part of the annual licensing, the County sends out a Hauler's Manual that emphasizes the concerns with industrial waste.

All industrial waste generators served by the hauler will be notified by the hauler of the required procedure for acceptance of industrial waste. The hauler will utilize leak proof containers for hauling loads containing putrescible wastes, as stated in Minn. R. 7035.0800, and will not deliver industrial waste to the Landfill without prior approval. The hauler will also be required to institute a random inspection program to ensure that industrial waste loads are properly identified.

3.0 WASTE EVALUATION PROCEDURE

3.1 Waste Disposal Application

Any new industrial waste generators will be required to demonstrate to the satisfaction of the County that the industrial waste is not a hazardous waste, does not contain excessive free liquid, and will not have a deleterious effect on the Landfill operations or leachate treatability. After the generator has so demonstrated to the County, the County will allow disposal of the waste in the Landfill. The procedure for making such a demonstration is as follows.

When an initial contact is made by an industrial waste generator, indicating interest in utilizing the Landfill for the disposal of non-hazardous industrial waste, the generator receives a copy of the Waste Evaluation Form (Appendix B). The written procedures identify the information and analysis that must be provided for review and consideration prior to the acceptance of the special waste for disposal. The information on the Waste Evaluation Form is divided into four categories:

- Generator Information – company name and address;
- Physical Characteristics of Waste – waste name, generating process, quantity, physical state and packaging;
- Chemical Properties of Waste – chemical analysis; and
- Certification – the generator certifies that the information is complete and accurate.

If industrial waste is delivered to the Landfill for disposal without prior authorization, the County will follow procedures outlined in Section 4.3. The County will determine the number of samples for analysis based on the quantity of waste. Should the volume of waste exceed the estimated volume, the County may decline to accept the additional waste for disposal. The generator must then reapply for the additional volume and perform all necessary testing for acceptance at the Landfill.

3.2 Required Analysis

As required in the County's approval procedure, a Waste Evaluation Form (Appendix B) must be completed and signed by an authorized company representative. The County will evaluate whether the proposed industrial waste is an unacceptable waste at the facility due to regulatory, physical, or chemical criteria. This criterion is detailed below.

3.2.1 Physical Characteristics

If a material is indicated as being off-spec, damaged or out of date, the material may be of use to some other industry that is not concerned if the material is not in perfect condition. In these cases, the County

will refer the generator to the Minnesota Technical Assistance Program (MnTAP). This source may find a way to recycle the waste. If the waste cannot be recycled, then the form can be reviewed to determine if any physical properties of the waste are incompatible with the facility design and operation. Some examples of when physical characteristics of the waste may limit its acceptance are:

- Delivery of a wet or bulky waste that cannot be handled with existing facility equipment;
- Insufficient storage space to stockpile a waste until it can be disposed of appropriately;
- Availability of a separate disposal area if the operator decides that a waste should not be co-disposed with other wastes (MSW or otherwise) being disposed of at that time;
- Disposal exceeds the processing abilities of the facility equipment; or
- Failure of a paint filter test (EPA Method 9095B). The Landfill may accept only solid waste and cannot accept waste with free liquids. The paint filter test is used to determine the absence or presence of free liquid in either a containerized or bulk waste.

If a waste has been initially rejected for handling at the facility, the generator may be able to alter the physical state or characteristics of the waste to make it compatible with Landfill requirements.

3.2.2 Chemical Characteristics

Chemical criteria to determine if a material proposed for disposal is considered a hazardous waste is listed in the current Minn. R. 7045.0131, *Characteristics of Hazardous Waste.* Any industrial waste exhibiting the characteristics of ignitability, an oxidizer, corrosivity, reactivity, lethality, and/or toxicity is classified as a hazardous waste by Minnesota Statutes and Rules and will not be accepted at the Landfill.

The chemical characteristics of the waste may be evaluated through the use of several analytical testing procedures. In most cases, the request for review form, together with the Safety Data Sheet (SDS) for the waste will be sufficient to determine whether the waste may be accepted. Depending on the content of the request for review form and SDS, the types of information and various tests sometimes requested are:

- Chemical composition analysis;
- Toxicity characteristic leaching procedure (TCLP) results; and
- Data demonstrating that the waste is not a free liquid.

Determination of the need to perform a chemical analysis will be made by the County. Industrial waste generators will be expected to bear the financial responsibility for performing the necessary testing.

Based on the results of the waste evaluation, the County will determine the specific requirements for managing the waste. Consideration will be given to the specific notification, evaluation, management and inspection requirements for each approved waste.

For approved industrial wastes, a letter will be sent to the generator identifying the conditions of approval. The letter will identify the type and volume of industrial waste approved as well as any requirements for delivery frequency, pre-treatment, packaging, delivery, disposal, and testing. Test results along with the approval letter from the County will be on file at the Landfill.

3.2.2.1 Chemical Composition Analysis

The chemical composition of a waste is determined by using standard analytical procedures to identify the presence of elements like lead, cadmium, arsenic, sulfur, etc. or organic compounds like phenols, polychlorinated biphenyls (PCBs) or solvents. The results from a chemical composition analysis can be expressed as either a percentage (if a chemical makes up a large portion of a waste), or in the units of parts per million (ppm) or milligrams/kilogram (mg/kg), if a chemical makes up a smaller portion of the waste.

By knowing the chemical composition of a waste, the County can identify chemical elements that may be harmful to the environment or facility operations and therefore require future analytical work.

Generally, a full-scale chemical composition analysis of every element in the waste is not needed. Most waste generators are familiar with their generating process, waste products, and typically have an SDS or other chemical characterization on hand for the raw materials used in the process. This information helps narrow the type of additional testing necessary. For example, the SDS or a description of the waste generating process may indicate that no organics, nickel or cyanide are used in the process. It would then be unnecessary to test for these elements in a chemical composition analysis or TCLP test.

However, a full-scale chemical composition analysis should be performed when:

- Very little is known about the waste;
- The generating process has unknown raw inputs or final waste;
- There is not an SDS available for the raw product or final waste;
- Unknown raw materials went into the product;
- The material is from a spill cleanup or abandoned drum of unknown waste; or
- It is required by Section 5.0 of this ISWMP.

3.2.2.2 TCLP Leaching Test

The TCLP is designed to simulate leaching that takes place when a waste is placed in a solid waste land disposal facility. The TCLP is one of the Resource Conservation and Recovery Act (RCRA) hazardous characteristic analyses designated by the United States Environmental Protection Agency (EPA) to determine if a waste material is hazardous. If any of the 39 regulated constituents are detected in the waste extract at concentrations that exceed the limits specified by the EPA, the waste material is considered to be a hazardous waste (Table 3-1). The TCLP is published in 40 CFR 261.24, Appendix II – Method 1311 Toxicity Characteristics Leaching Procedures.

Table 3-1: Maximum Concentrations for TCLP Analysis

Contaminant	Hazardous Waste (mg/L)
Arsenic	5.00
Barium	100.00
Benzene	0.50
Cadmium	1.00
Carbon tetrachloride	0.50
Chlordane	0.03
Chlorobenzene	100.00
Chloroform	6.00
Chromium	5.00
o-Cresol	*200.00
m-Cresol	*200.00
p-Cresol	*200.00
Cresol	*200.00
2,4-Dichlorophenoxyacetic acid (2,4-D)	10.00
1,4-Dichlorobenzene	7.50
1,2-Dichloroethane	0.50
1,1-Dichloroethylene	0.70
2,4-Dinitrotoluene	0.13
Endrin	0.02
Heptachlor (and its epoxide)	0.008
Hexachlorobenzene	0.13
Hexachlorobutadiene	0.50
Hexachloroethane	3.00
Lead	5.00
Lindane	0.40
Mercury	0.20

Contaminant	Hazardous Waste (mg/L)
Methoxychlor	10.00
Methyl ethyl ketone	200.00
Nitrobenzene	2.00
Pentachlorophenol	100.00
Pyridine	5.00
Selenium	1.00
Silver	5.00
Tetrachloroethylene	0.70
Toxaphene	0.50
Trichloroethylene	0.50
2,4,5-Trichlorophenol	400.00
2,4,6-Trichlorophenol	2.00
2,4,5-TP (Silvex)	1.00
Vinyl chloride	0.20

*If o-, m-, and p-cresol concentrations cannot be differentiated, the total cresol (D026) concentration is used. The regulatory level of total cresol is 200 milligrams per liter.

3.3 Analytic Data Quality

Confidence in the information gathered during the waste evaluation process depends on the reliability of the laboratory conducting the tests. The County relies on the test results from laboratories employed by the waste generator. Thus, the County must have assurance that the laboratory results are accurate. A certification by the laboratory personnel that standard EPA or ASTM methods have been utilized in the waste analysis may be required, if requested, by the County during the waste evaluation process. Ultimately, it is the responsibility of the generator to supply the County with valid analytical data in the waste evaluation process.

In addition to considering the validity of the laboratory test results, the test samples are required to be representative of the entire waste stream. The Waste Evaluation Form has a certification from the generator that the information on the form is accurate and analyses have been performed on representative samples. If the waste stream is sufficiently variable, the County may request the generator to characterize the variability of the waste by additional samples.

3.4 Frequency of Testing

The decision on the frequency of testing required for any non-hazardous industrial waste is based upon the type of material in question, the process that is used to generate the waste, and the chemicals of concern in the waste. Some waste materials are very consistent in physical and chemical makeup and

may require only periodic testing. Alternatively, some waste materials will vary greatly with time and will need to be tested whenever the process that generates the waste is changed. At a minimum, industrial waste will be reevaluated and tested every three years. However, the County reserves the right to adjust testing frequency at their discretion based on information provided by the generator and evaluation of the waste.

A letter requesting the updated test results will be sent to each generator identifying the chemical compound which should be tested and the date by which test results should be forwarded to the County.

4.0 WASTE ACCEPTANCE AND INSPECTION

4.1 Waste Acceptance Criteria

Review of the Waste Evaluation Form begins by checking that all of the information about the waste generator is complete (Part 1). If this part is not complete, the form should be returned to the generator.

Part 2 of the form asks for specific physical and chemical information about the waste. Generally, not all of this information will be necessary to evaluate each waste. The generator will be alerted if the County wants an in-depth analysis of the waste and is responsible for analyzing a waste to determine its characteristics. If the generator refuses to test the waste or supply the County with other information about its characteristics, acceptance of the waste will be denied. If waste meets acceptance criteria but is determined to negatively impact landfill operations, it may be denied by the County.

4.1.1 Record Keeping

Once a determination is made regarding the acceptability of the waste, that decision is communicated to the waste generator through a letter. If the waste is accepted, the letter will specify disposal conditions such as quantity and frequency of disposal, and packaging requirements (Sample in Appendix C). Industrial solid waste that is received at the Landfill is currently tracked and recorded by tons as the loads are received at the gate. The hauler will not be allowed to unload any industrial solid waste without prior approval from the County. If industrial solid waste is discovered in a load that has not been evaluated according to the procedures discussed in this ISWMP, the waste will be left in place until the waste has been identified and the issue resolved with the Landfill and the County. In the meantime, the Landfill will relocate the working face. The hauler is then instructed to inform the generator of the waste to contact the County Waste Management Department so the waste can be evaluated. If the generator will not assist in the waste evaluation process, the hauler is instructed to pick up the waste and return it to the generator. If the hauler will not assist in the management process, they may be denied future use of the facility. The County reserves the right to bill the hauler for labor and expense costs for any testing or adjusted landfill operations.

4.1.2 Decision Tree

A decision tree is presented below and has been prepared for determining the acceptability of industrial solid wastes disposal at the Landfill. It is intended to assist the County in assuring that all necessary steps have been taken to thoroughly evaluate the waste. The waste evaluation process begins at the point where the generator has submitted the Waste Evaluation Form to the County for review, and the waste cannot be reused or recycled.

1. The generator must complete and sign the Waste Evaluation Form.
2. Is the physical state compatible with Landfill operations? If yes, proceed to the next step. If no, the waste may not be accepted at the facility.
3. Is a chemical evaluation needed? An exception to this generalization is empty pesticide containers.
4. Review the existing information on a waste to determine what chemicals may be in the waste. Information can include the following:
   a. Material Safety Data Sheets for the raw starting materials;
   b. Chemical composition analysis;
   c. A description of the generating process; or
   d. Data from a similar process or waste.

   The chemicals that should be noted when reviewing this information are any of the chemicals listed in Table 3-1.
5. Is chemical analysis of the waste necessary based on the information provided in step 4?
6. If chemicals of concern are identified, a TCLP test should be performed to determine if the waste is hazardous. In addition, site specific testing shall also be completed.
7. Compare TCLP and site-specific test results to the hazardous waste threshold limits.
   a. If TCLP test results are higher than the threshold limits, the waste is hazardous and should not be accepted at the site. The Landfill operator will then refer the generator to the MPCA (1-800-657-3864) or MnTAP (1-800-247-0015) for information on disposal procedures or waste exchange.
   b. If TCLP test results are lower than the threshold limits, the wastes are acceptable for disposal subject to management techniques and restrictions.
8. Acceptance of any industrial waste not identified in this ISWMP is subject to MPCA review and approval for disposal in the Landfill.

4.2 Inspection of Waste

The County will adopt a two-part inspection program for all non-hazardous industrial waste approved for disposal at the Landfill.

The first level of inspection involves the random checking of waste arriving at the Landfill while it remains on the truck. The Landfill operator conducts the inspection to ensure that all special approval conditions have been met (e.g., drummed waste must meet proper seasonal disposal requirements as laid out in Section 5.1). The inspection will also ensure that specific conditions of the approval letter are met

including the type and volume of industrial waste approved as well as any requirements for delivery frequency, pre-treatment, packaging, delivery, disposal, and testing.

The second level of inspection is performed by the Landfill operator when the waste is unloaded. The County is notified by the Landfill operator when an unacceptable waste has been received. The County will then follow-up by contacting the identified industrial client for the purpose of removing the waste and discussing the procedure for the acceptance of non-hazardous industrial waste.

4.3 Rejection of Waste

When industrial waste is delivered to the Landfill for disposal without prior authorization, the waste will be rejected and a Notification Letter and Waste Inventory Form (Appendix A) will be sent by the County to the generator informing them of the current policy governing the disposal of industrial waste and the reason for rejection of the waste in question. For waste of an approvable type for which no approval has been obtained, the County will explain the approval procedure as appropriate and assist the generator with compliance. The County will assist the generator in determining appropriate disposal means.

4.4 Operator Training

The Landfill Operators have been certified through the MPCA operator-training program. This certification is renewed on a regular basis. Topics included in the operator-training program are waste identification, working from engineering plans, and handling requirements for specific waste types. The operators will be fully familiar with the contents of this ISWMP and will work closely with the County to ensure that proper screening, identification and management procedures are followed. The operator will receive direction and assistance on an as-needed basis from the County. It will be emphasized that the operators must contact the County in any instance where previous training and experience is not sufficient for them to readily respond to a field situation.

5.0 SPECIFIC WASTES

The following non-hazardous industrial solid wastes are acceptable for disposal at the Landfill when the approval procedures outlined in Sections 2.0 through 4.0 have been followed and all relevant information has been submitted for review and approval. In addition, the following conditions must be met prior to the acceptance of the listed non-hazardous industrial wastes.

Industrial wastes outside the categories provided below will require County approval through the Industrial Solid Waste Management Program as well as MPCA approval. Other wastes will go through a similar testing and approval process as described below.

5.1 Empty Containers

5.1.1 General

All empty containers must be free of liquids and opened or punctured for inspection. Barrels received during winter operations (September 15 through April 15) or anytime during freezing weather must be opened and completely emptied to verify that they do not contain any frozen waste. Barrels received during summer operations (April 15 through September 15) must be punctured to guarantee that the waste within the drums is completely solidified. At no time will barrels containing free liquids or hazardous waste be accepted for disposal at the Landfill.

Empty pesticide and chemical containers will be accepted at the Landfill provided that proof is furnished to show that the containers are empty and have been rinsed. This proof is provided by the generator of the containers completing either a triple rinse certification form for pesticides or a RCRA-Clean form for chemicals and enclosing the associated form with each load delivered to the facility. To triple rinse, the generator shall flush the container three times, each time using a volume of water equal to ten percent of the container's capacity. The rinse water should then be added to the spray solution. The generator will be required to present the triple rinse certificates to the gate attendant upon delivery of the load. A copy of the triple rinse form and the RCRA-Clean form are provided in Appendix D.

The gate attendant will inspect containers to verify that they have been appropriately handled. If any raw product is observed in the containers, the whole load will be rejected. Containers that have any amount of liquid remaining in them will be rejected and returned to the generator.

5.1.2 Analysis Required

No additional testing is required for empty pesticide containers as long as the triple rinse certificates are completed and presented to the gate attendant upon delivery of the load.

5.1.3 Disposal Requirements

Generally, empty containers are set aside for recycling at the Landfill. In the instance that containers may be disposed at the facility, no special disposal practices will be required for empty pesticide containers. Upon passing the visual inspection, containers will be deposited at the working face along with the other waste.

5.1.4 Special Operating Considerations

Pesticides and herbicides can pose serious safety and health concerns to anyone handling or inspecting them. Care should be taken in inspecting empty pesticide containers and protective equipment should be worn to protect skin and eyes from any contact with free liquid.

5.2 Asbestos

5.2.1 General

The primary objective in safely handling asbestos waste is to prevent the release of asbestos-containing dust. The County will comply with the National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations (40 CFR Part 61, Subpart M- National Emission Standard for Asbestos) regarding the reporting and record keeping requirements for asbestos disposal. A copy of 40 CFR Part 61, Subpart M, Section 61.154 is attached to this report in Appendix E and incorporated herein by reference.

Asbestos will be accepted at the Landfill provided it is delivered in a manner that will not allow the asbestos to become airborne. Friable asbestos, typically used as pipe insulation, must be wetted and placed into bags at least 6-mil thick. The bags must be clearly marked with a warning label and the transporters name and address. The manifest also needs to include information on generator's name and address and the date. Asbestos containing construction materials (non-friable asbestos) will also be accepted at the facility including ceiling tiles, floor tiles, wall board, and house siding shakes. This material will be accepted in bulk form if it is wetted and covered.

5.2.2 Analysis Required

No additional testing of asbestos will be required.

5.2.3 Disposal Requirements

Asbestos will be accepted during normal facility operating hours when the wind velocity is less than ten miles per hour, on a sustained basis. All persons wishing to dispose of asbestos must call the Landfill office at (218) 828-4392 at least 24-hours prior to delivery to inform the office of the type and amount of asbestos. The Landfill manager will determine the delivery schedule. Scheduled deliveries may be cancelled if the wind velocity exceeds ten miles per hour, dependent on wind direction. Disposal of asbestos containing material (ACM) or cancellation of deliveries is at the discretion of the Landfill Operator.

Once these wastes are delivered to the Landfill, they will be directed to a separate area away from non-essential personnel. The disposal area will be in an excavation or trench that is large enough to contain the entire load and required cover material. Immediately after the customer's vehicle is moved away from the disposal area, the waste will be covered.

5.2.4 Special Operating Considerations

The inhalation of asbestos fibers can cause serious health concerns. Care should be taken when inspecting the bags or bulk form that they are properly wetted so that lose fibers may not cause harm. When disposing of the asbestos into the Landfill, the area must be covered immediately.

5.3 Burned Buildings

5.3.1 General

Recognizable portions of burned structures may be accepted into the demolition debris facility, SW-440 in accordance with the Crow Wing County Demolition Manual at the MPCA's discretion. For the burned waste that is not accepted within the demolition debris facility, disposal may occur within the SW-376 Landfill following the procedures below:

- A Burned Material Acceptance Form (Appendix I), with at least one signature from an involved fire department personnel, is required prior to disposal of burned material. Potential acceptance of the material and testing requirements are dependent on the form responses as outlined below.
- Burned materials must be completely extinguished, containing no embers that might start a fire in the Landfill.
- Customers who are responsible for disposing of burned material waste should be aware that the Crow Wing County Landfill only accepts burned material waste that has been completely extinguished for a minimum of 30 days.

Asbestos in burned buildings is acceptable at the Landfill if preapproved by the County and the MPCA and is delivered with a manifest. Friable asbestos shall be wetted and covered by the Landfill as soon as disposed.

Recently, the County has reported elevated levels of per- and polyfluoroalkyl substances (PFAS) in its Landfill leachate. While it is inevitable to have waste containing PFAS disposed in the Landfill, the County is trying to remain proactive about the problem by prohibiting the disposal of waste that contains a large amount of PFAS. Class B aqueous film forming foam (AFFF) firefighting foam is an area that is known to contain large amounts of PFAS. Therefore, the Crow Wing County Landfill will no longer accept any burned materials that have been extinguished with this product.

Class A AFFF typically does not contain PFAS; however, testing on the material to be disposed must be completed to demonstrate that it does not contain PFAS prior to acceptance at the Landfill.

5.3.1.1 AFFF Firefighting Foam

AFFF is a foam used to extinguish fires caused by flammable liquids. Fire departments use AFFF to smother fires because it separates the oxygen from the flammable liquid in order to extinguish a fire and prevent it from reigniting. Even though AFFF is a useful product, it is responsible for introducing PFAS into the environment (specifically with Class B foam).

PFAS have been a contaminant of concern among MPCA professionals because the chemicals are increasingly prevalent in the environment. PFAS can best be described as man-made chemicals used to create water resistant, stain resistant, and non-stick products. Currently, people, drinking water, and even plants have tested positive for PFAS. Therefore, the MPCA is completing numerous studies and trying to reduce the hazard potential for this product in the future.

5.3.2 Analysis Required

Customers that bring in burned material are responsible for identifying waste, reporting accurate information about waste, completing a Burned Material Acceptance form (Appendix I), obtaining proper information and signatures for disposal, providing written certification that the waste has been completely extinguished for 30 days at a minimum, and accepting full responsibility of any costs or damages that the Landfill incurs if the waste causes a fire or any other damages.

If the burned material was extinguished by the fire department, the customer must also discern whether AFFF was used (and if so, what type) as a means to smother the fire. The Crow Wing County Landfill will not accept for disposal any burned material waste that was exposed to Class B AFFF. Waste exposed

to Class A AFFF will require testing prior to acceptance. However, if the burned material waste is free of AFFF, the waste can be disposed of in the Landfill without testing, but only upon the completion of a Burned Material Acceptance Form (Appendix I). In addition to project information, the Burned Material Acceptance Form also requires at least one signature from an involved fire department personnel stating that the AFFF was not utilized.

5.3.3 Disposal Requirements

Ash and debris must be thoroughly wetted prior to disposal to minimize dust.

5.3.4 Special Operating Considerations

Ash and debris from burned structures may contain toxic substances due to many synthetic and other materials present in homes and buildings. Care should be taken when handling any materials from burned buildings.

5.4 PCB Wastes

PCB WASTES OF ANY CONCENTRATION WILL NOT BE ACCEPTED FOR DISPOSAL AT THE CROW WING COUNTY LANDFILL.

5.5 Non-Hazardous Spill Cleanup Waste

5.5.1 General

The Landfill will only accept spilled non-hazardous materials that do not contain free liquids (i.e., contaminated soil) if the MPCA requires disposal of the material in the Landfill rather than by land application or thin spreading. Non-hazardous spill cleanup wastes can be delivered in a variety of ways. They can arrive in bags, soils or contained in the absorbent pads used to clean up the spill.

5.5.2 Analysis Required

Chemical analyses are required to determine the non-hazardous nature of the waste. Non-hazardous spill cleanup wastes can contain a variety of different compounds. At a minimum, materials should be tested for PFAS, boron, sodium, and chloride and a TCLP test should be performed unless a known waste is spilled and can be readily identified. A free liquids test is also recommended. The generator must choose parameters to be tested from Table 3-1 and justify why any significant parameters were not tested. The generator has the responsibility of adequately proving the waste is non-hazardous. The frequency of testing for the required parameters is as follows:

Volume of Soil (cubic yards)	Number of Samples
0-50	1
50-500	2
500-1,000	3
1,000-2,000	4
2,000-4,000	5
Each additional 2,000	1 additional sample

Whenever available, information on soil type, moisture content, grain size analysis, etc. should be submitted as well.

The Landfill may, at its discretion, require additional testing based on the possible contaminants involved. No soil will be accepted that contains free liquids or exceeds any limits that classify it as hazardous waste.

5.5.3 Disposal Requirements

If wastes contain free liquids, they must be drained prior to delivery at the Landfill for disposal and the liquid must be properly treated by the generator off site. If suitable, soil wastes will be used as cover for the landfilling operation (Section 7.0). This will aid in reducing the concentration of volatile organic compounds, if present. Disposing of the wastes will primarily be dealt with on a case-by-case basis.

5.5.4 Special Operating Procedures

Non-hazardous spill cleanup wastes may contain compounds that are toxic to human beings and the environment. Care should be taken to properly protect skin and eyes from possible exposure to some of these compounds.

5.6 Petroleum Contaminated Soils (PCS)

5.6.1 General

Contaminated soil may arrive at the site from a variety of discrete sources. A source may have areas contaminated with different products or combinations of products. Typically, contaminated soils would be excavated from around storage tanks. The contaminants in question would be those associated with gasoline, oils, and fuel oils typically near tank removal or spill sites, including filling stations or petroleum hydrocarbon related industries.

Caution will be exercised to fully evaluate contaminants contained in the loads. The testing required by the Landfill is identical to that required by the MPCA Tanks and Spills Section, with the exception that the Landfill may require TCLP metals testing for some contaminated soil. The testing requirements were

made consistent with MPCA to accommodate responsible parties, who are reimbursed only for the testing required by MPCA, and not for additional tests required by soil processors.

If the contaminated soil is from a spill of a known hydrocarbon and the resulting contaminated soil is low volume (less than ten cubic yards), the County, at their discretion, may accept this material without testing.

5.6.2 Analysis Required

Soil from each site or area with a different product involved must undergo:

- Applicable tests as defined in Thermal Treatment of Petroleum Contaminated Soil Minnesota Pollution Control Agency, Tanks and Spills Section. The compounds to be analyzed for are benzene, toluene, ethyl benzene, xylene, Gasoline Range Organics (GRO), Diesel Range Organics (DRO), flashpoint, lead and total hydrocarbons as fuel oil/gasoline. If the contamination is from waste oil or unknown hydrocarbon mixtures, chromium, cadmium and PCB analysis is also necessary. The Landfill may require TCLP testing for heavy metals in this case. The frequency of testing for the required parameters is as follows:

Volume of Soil (cubic yards)	Number of Samples
0-50	1
50-500	2
500-1,000	3
1,000-2,000	4
2,000-4,000	5
Each additional 2,000	1 additional sample

- Testing for PFAS, boron, sodium and chloride are required for disposal at the Landfill. If the test results indicate acceptable levels, the material may be accepted for disposal.
- Whenever available, information on soil type, moisture content, grain size analysis, etc. should be submitted as well.

5.6.3 Disposal Requirements

The Landfill may, at its discretion, require additional testing based on the possible contaminants involved. No soil will be accepted that contains free liquids or exceeds any limits that classify it as hazardous waste.

5.6.4 Special Operating Considerations

Special operating conditions are not required.

5.7 Ethanol Contaminated Soil

5.7.1 General

Contaminated soil may arrive at the site from a variety of discrete sources. A source may have areas contaminated with different products or combinations of products. The contaminants in question would be those associated with ethanol spills, typically near storage tanks or spill sites, including filling stations or ethanol producing industries.

Caution will be exercised to fully evaluate contaminants contained in the loads. The testing required by the County conforms to that required by the MPCA Tanks and Spills Section, with the exception that the County may require TCLP metals testing for some contaminated soil.

5.7.2 Analysis Required

Soil from each site or area with a different product involved must undergo:

- Applicable tests as defined in Thermal Treatment of Petroleum Contaminated Soil Minnesota Pollution Control Agency, Tanks and Spills Section. Ethanol Contaminated Soils are tested to the same extents as PCS, plus the additional parameter of ethanol. The compounds to be analyzed for are ethanol, benzene, toluene, ethyl benzene, xylene, GRO, DRO, flashpoint, lead and total hydrocarbons as fuel oil/gasoline. The frequency of testing for the required parameters is as follows:

Volume of Soil (cubic yards)	Number of Samples
0-50	1
50-500	2
500-1,000	3
1,000-2,000	4
2,000-4,000	5
Each additional 2,000	1 additional sample

- Testing for PFAS, boron, sodium and chloride are required for disposal at the Landfill. If the test results indicate acceptable levels, the material may be accepted for disposal.

- Whenever available, information on soil type, moisture content, grain size analysis, etc. should be submitted as well.

5.7.3 Disposal Requirements

The Landfill may, at its discretion, require additional testing based on the possible contaminants involved. No soil will be accepted that contains free liquids or exceeds any limits that classify it as hazardous waste.

5.7.4 Special Operating Considerations

Special operating conditions are not required.

5.8 Rendering and Slaughterhouse Waste

5.8.1 General

The rendering process is used to remove fats and oils by melting lye and other caustic agents that are used during the rendering process and may be contained in the waste. The rendering and slaughterhouse wastes cannot exhibit signs of excessive free moisture. These types of wastes can cause odor problems in the Landfill.

Large numbers of animals or cattle from farms or farm industries, along with larger numbers of road kill from local, county and/or state agencies may be required to be handled as industrial waste. The County will evaluate the request for disposal on a case by case basis. Carcasses from processors will be handled as industrial waste as outlined below.

5.8.2 Chronic Wasting Disease

In February 2019, a wild deer tested positive for chronic wasting disease (CWD) within Crow Wing County. Therefore, the County began accepting deer carcasses at the facility that either had no testing completed or tested negative. The deer may be incinerated within an air curtain incinerator prior to disposal of the ashes within the Landfill to try to prevent the spread of CWD. The County may discontinue incineration at any time. Carcasses with a positive CWD test are required to be managed through the DNR (1-888-646-6367).

Small numbers of deer carcasses from individuals along with individual road kill from local, county and state agencies may be accepted and disposed of within a lined dumpster located at the self-haul area of the Landfill or as directed by the Operator. Large amounts of carcasses must follow the industrial policies within and call the Landfill prior to disposal to schedule a time for drop-off.

The County reserves the right to change these policies at any time, and the most recent information is available on the County's website at: https://crowwing.us/1566/Chronic-Wasting-Disease

5.8.3 Analysis Required

These wastes will be analyzed for heavy metals using the TCLP Test if the process generating the waste would suggest the potential for heavy metals. Generators are required to choose the parameters to be tested from Table 3-1 and justify any significant parameters that are excluded from the test. Testing for PFAS, boron, sodium and chloride are required for disposal at the Landfill. If the test results indicate acceptable levels, the material will be accepted at the Landfill. Additional analysis is required when process or raw material changes are made which could result in changes in waste characteristics.

5.8.4 Disposal Requirements

The major concerns with these wastes are its physical state and odors. The waste must be delivered in a state that is compatible with the Landfill disposal process and equipment. Because these wastes are highly putrescible and may create odor problems and attract vermin if not properly managed, they will be covered immediately upon disposal at the site.

5.8.5 Special Operating Considerations

Special operating conditions are not required.

5.9 Combustible Waste

Combustible or ignitable waste consists of materials that can create fires under certain conditions, are spontaneously combustible, or have a flash point less than 60°C (140°F). THESE WASTES WILL NOT BE ACCEPTED FOR DISPOSAL AT THE CROW WING COUNTY MMSW LANDFILL. The generator should consider incineration as an alternative disposal for these wastes.

Test methods that may be used to determine ignitability include the Pensky-Martens Closed-Cup Method for Determining Ignitability (Method 1010A), the Setaflash Closed-Cup Method for Determining Ignitability (Method 1020B), and the Ignitability of Solids (Method 1030).

5.10 Foundry Waste

5.10.1 General

Foundry wastes are typically generated through foundry molding processes. Foundry molding processes use non-hazardous binding agents to act as an adhesive to form the molds. Along with this material, floor

sweepings of powders and vermiculite may be delivered. Some of these materials, such as vermiculite, have very high absorbing capabilities. The molds are usually made of clay or sand.

5.10.2 Analysis Required

The main areas of concern for these wastes are the heavy metals and organic compounds. Therefore, foundry wastes will be tested for heavy metals using the TCLP Test. Generators must choose the parameters to be tested from Table 3-1 and justify why any significant parameters were not tested for. Core sands as well as molding sands will also be tested for PFAS, phenols, formaldehyde, boron, chloride and sodium. If the test results indicate that the waste is non-hazardous, and the detected concentrations are acceptable to the Landfill, the waste will be accepted. Foundry waste for which the manufacturing process definitively identifies the composition may be accepted without testing.

5.10.3 Disposal Requirements

Other acceptable foundry wastes will be disposed of in an area at the working face in order to minimize dust caused by too much handling. These wastes may be used for cover material as appropriate (See Section 7.0). The generator should also investigate the possibility of using these wastes in construction applications.

5.10.4 Special Operating Considerations

Site operators should be aware of the dust production during the handling of foundry wastes and should take protective precautions in order to avoid inhalation of dust particles. The use of a fiber mask is advised during high dust production periods.

5.11 Ash

5.11.1 General

Ash is produced by incineration processes in general. Ashes from MMSW incinerators will not be accepted at the Landfill. Any ashes accepted will be moistened.

5.11.2 Analysis Required

Wood ashes will be accepted without testing. Other ashes will be tested for heavy metals using the TCLP Test, PFAS, boron, chloride and sodium. Testing will be in accordance with the MCPA permit requirements at the time of generation. Other ash materials will be evaluated through the process described in this ISWMP. If the test results indicate acceptable levels, the material will be accepted at the Landfill. Additional analysis is required when changes in the material burned or incinerated are made which could potentially affect the characteristics of the ash.

5.11.3 Disposal Requirements

Typically, ash is spread over the current working face daily and mixed in with the MSW. Ash must be covered with daily cover.

5.11.4 Special Operating Considerations

During hot, dry periods, ash should be moistened by watering to minimize airborne or blowing ash.

5.12 Paint Waste

5.12.1 General

Paint wastes may contain metals such as cadmium, chromium, lead and/or boron. Paint wastes containing heavy metals, such as lead based paint, must be verified by the generators. The paint wastes will only be accepted in a non-liquid state. Drums containing paint wastes must adhere to seasonal disposal requirements as laid out in Section 5.1. Any drums delivered during winter months (September 15 to April 15) or during freezing weather must be opened and emptied to verify that they do not contain any frozen waste. Drums delivered during summer months (April 15 to September 15) must be punctured to guarantee that all waste is completely solidified. Paint wastes may be delivered in the form of filters, dust, rags, overspray ash, or in containers. All paint dust accepted at the Landfill must be moistened and covered to reduce the amount of dusting that could occur during transport and disposal. Note that moistened paint dust must still pass a paint filter test.

5.12.2 Analysis Required

The paint wastes will be tested for flash point (less than 60°C (140°F)) to determine if volatile organics are present. Additional analysis is required when process or raw material changes are made which affect the waste characteristics. Additional testing shall include heavy metals analysis (TCLP), PFAS, boron, chloride and sodium unless justification can be presented.

5.12.3 Disposal Requirements

Paint wastes must be dry enough to pass a paint filter test upon arrival at the Landfill. The wastes will be deposited at the bottom of the working face or in a separate cell.

5.12.4 Special Operating Considerations

Special operating conditions are not required.

5.13 Leachate Treatment Pond Sludge

5.13.1 General

Sludges are generated through a variety of wastewater treatment processes or commercial operations. Originally, sludges contain a lot of liquid. Federal and state regulations prohibit the deposition of liquids in a landfill due to operational problems and require all sludges to be dewatered before deposition.

5.13.2 Analysis Required

The sludge generated in the leachate pretreatment ponds at the Landfill shall be tested whenever the sludge is cleaned from each pond for disposal in the Landfill. In accordance with the Landfill permit, "If three separate sludge analyses do not exceed the TCLP limits, the analyses are consistent, the characteristics of waste accepted at the landfill are not changing, and constituents are not trending upwards, then the permittee may request a reduction of sludge monitoring for that pond." Additional details on how this sludge will be handled are outlined in the Leachate Management Plan (Section 5.8 – Treatment Pond Operation) within the Permit Reissuance Report, Crow Wing County Landfill, SW-376.

Leachate pond sludge will be analyzed through a TCLP Toxicity test and will also undergo a paint filter test to verify that there are no free liquids present prior to acceptance at the Landfill.

5.13.3 Disposal Requirements

All sludges must be dewatered prior to disposal. If the test results indicate that the waste is non-hazardous and the detected concentrations are acceptable to the Landfill, the sludge may be accepted.

5.13.4 Special Operating Conditions

The leachate pretreatment pond sludge will be segregated and dewatered prior to incorporation into the Landfill.

5.14 Wastewater Treatment Plant Sludge

5.14.1 General

Sludges are generated through a variety of wastewater treatment processes or commercial operations. Originally, sludges contain a lot of liquid. Federal and state regulations prohibit the deposition of liquids in a landfill due to operational problems and require all sludges to be dewatered before deposition. Sludge from a wastewater treatment plant (WWTP) shall meet Class B pathogen reduction standards and be tested as outlined below.

5.14.2 Analysis Required

WWTP sludge will be analyzed through a TCLP Toxicity test. Generators must choose the parameters to be tested from Table 3-1 and justify why any significant parameters were not tested. These wastes must be characterized in a waste evaluation form and presented to the Landfill. WWTP sludge will also undergo a paint filter test to verify that there are no free liquids present and must be tested for PFAS, boron, sodium and chloride. In addition, the WWTP sludge shall be tested for radiation content. WWTP sludge that has radiation levels above 5 picocuries per gram (pCi/g) will not be accepted at the Landfill.

Documentation must also be provided showing that the WWTP sludge has been treated to meet Class B pathogen reduction standards of Minnesota Administrative Rules, Chapter 7041, Sewage Sludge Management.

5.14.3 Disposal Requirements

All WWTP sludge must be dewatered prior to delivery at the Landfill for disposal. If the test results indicate that the waste is non-hazardous and the detected concentrations are acceptable to the Landfill, the waste may be accepted.

5.14.4 Special Operating Conditions

Loads which have a strong odor will be landfilled along with other wastes at the working face and covered immediately. Large deliveries should be scheduled far enough in advance to allow the Landfill to prepare for their arrival.

5.15 Water Treatment Sludge

5.15.1 General

Sludges are generated through a variety of treatment processes or commercial operations. Originally, sludges contain a lot of liquid. Federal and state regulations prohibit the deposition of liquids in a landfill due to operational problems and require all sludges to be dewatered before deposition. Sludge produced during drinking water treatment is generally considered to be a relatively clean sludge. However, certain water sources may increase the likelihood of mounting radiation levels in the sludge. Due to this concern, sludge produced from the treatment of drinking water shall be tested as described below.

5.15.2 Analysis Required

Sludge will be analyzed through a TCLP Toxicity test. Generators must choose the parameters to be tested from Table 3-1 and justify why any significant parameters were not tested. These wastes must be characterized in a waste evaluation form and presented to the Landfill. Sludge will also undergo a paint

filter test to verify that there are no free liquids present and must be tested for PFAS, boron, sodium and chloride. In addition, the sludge shall be tested for radiation content. Sludge that has radiation levels above 5 pCi/g will not be accepted at the Landfill.

5.15.3 Disposal Requirements

All sludges must be dewatered prior to delivery at the Landfill for disposal. If the test results indicate that the waste is non-hazardous and the detected concentrations are acceptable to the Landfill, the waste may be accepted.

5.15.4 Special Operating Conditions

Loads which have a strong odor will be landfilled along with other wastes at the working face and covered immediately. Large deliveries should be scheduled far enough in advance to allow the Landfill to prepare for their arrival.

5.16 Industrial Sludge

5.16.1 General

Sludges are generated through a variety of treatment processes or commercial operations. Originally, sludges contain a lot of liquid. Federal and state regulations prohibit the deposition of liquids in a landfill due to operational problems and require all sludges to be dewatered before deposition. Sludge produced during industrial processes shall be tested as described below.

5.16.2 Analysis Required

Sludge will be analyzed through a TCLP Toxicity test. Generators must choose the parameters to be tested from Table 3-1 and justify why any significant parameters were not tested. These wastes must be characterized in a waste evaluation form and presented to the Landfill. Sludge will also undergo a paint filter test to verify that there are no free liquids present and must be tested for PFAS, boron, sodium and chloride. Additional analysis is required when process raw material changes are made which affect the waste characteristics.

5.16.3 Disposal Requirements

All sludges must be dewatered prior to delivery at the Landfill for disposal. If the test results indicate that the waste is non-hazardous and the detected concentrations are acceptable to the Landfill, the waste may be accepted.

5.16.4 Special Operating Conditions

Loads which have a strong odor will be landfilled along with other wastes at the working face and covered immediately. Large deliveries should be scheduled far enough in advance to allow the Landfill to prepare for their arrival.

5.17 Storm Water Pond Sediment

5.17.1 General

Contaminated sediment from storm water or surface water dredging activities may be disposed of in a landfill if it cannot be used as clean fill. Dredged material shall be tested in accordance with the June 2015 *Managing Stormwater Sediment Best Management Practice Guidance* issued by the MPCA (provided in Appendix F). Prior to disposal, the generator must also provide for the County a map identifying the location of the source pond for each load brought to the Landfill.

5.17.2 Analysis Required

Sediment wastes will be analyzed through a TCLP Toxicity test. Generators must choose the parameters to be tested from Table 3-1 and justify why any significant parameters were not tested. These wastes must be characterized in a waste evaluation form and presented to the Landfill. Sediment wastes will also undergo a paint filter test to verify that there are no free liquids present and must be tested for PFAS, polycyclic aromatic hydrocarbons (PAHs), arsenic, copper, boron, sodium and chloride.

5.17.3 Disposal Requirements

Sediment must be dewatered prior to delivery at the Landfill for disposal. If the test results indicate that the waste is non-hazardous and the detected concentrations are acceptable to the Landfill, the waste may be accepted.

5.17.4 Special Operating Conditions

Loads which have a strong odor will be landfilled along with other wastes at the working face and covered immediately. Large deliveries should be scheduled far enough in advance to allow the Landfill to prepare for their arrival.

5.18 Road Related Waste

5.18.1 General

Road waste includes materials from street sweeping and Department of Transportation (DOT) wash bays. These wash bays consist of sand pits used to filter wastewater generated while washing DOT vehicles.

Due to increased salt application to roadways in the winter months, Minnesota road waste is highly susceptible to increased salt concentrations.

5.18.2 Analysis Required

Road waste materials will be analyzed through a TCLP Toxicity test. Generators must choose the parameters to be tested from Table 3-1 and justify why any significant parameters were not tested. These wastes must be characterized in a waste evaluation form and presented to the Landfill. Additional analysis is required when process raw material changes are made which affect the waste characteristics. In addition to the TCLP Toxicity test, the road waste materials must be tested for PFAS, PAHs, arsenic, copper, boron, chloride and sodium.

If street sweepings have been screened for material reuse, the residual portion of the screenings (trash and debris) shall still be considered an industrial waste and managed according to this Plan.

5.18.3 Disposal Requirements

No disposal restrictions are necessary. Road waste materials will be deposited at the working face.

5.18.4 Special Operating Considerations

If the material is dry upon receipt, it may produce dust during handling and operators should be aware of the risks of dust production. Protective precautions should be taken to avoid inhalation of dust particles. The use of a fiber mask is advised during high dust production periods.

5.19 Fiberglass and Resin Waste

5.19.1 General

Fiberglass is used in many processes, such as ion exchange in wastewater treatment and by individual industries during production processes. The major concern with these wastes is the organic compounds remaining in the fiberglass. If the wastes are allowed to cure adequately, they are of much less concern since hardening takes place as organic compounds evaporate. Fiberglass, urethane, polyurethane and epoxy resin wastes can be found in liquid, semi-solid or solid forms. These wastes will be accepted only fully cured and in a solid state. Disposal will not be permitted if the waste exhibits any of the following physical characteristics: (a) styrene odor, (b) release of heat, or (c) excessive stickiness to the touch. If the waste is received at the Landfill in drums, the drums must adhere to seasonal disposal requirements as laid out in Section 5.1. Drums received during winter operations (September 15 to April 15) or during freezing weather must be opened and emptied to verify that they do not contain any frozen waste. Drums received during summer operations must be punctured to guarantee that all waste is completely solidified.

5.19.2 Analysis Required

The TCLP test must be used as a minimum in the analysis of resin wastes. Generators must choose the appropriate parameters to test for from Table 3-1 and justify why any significant parameters were not tested for. Waste will also be tested for PFAS, boron, sodium and chloride. Generators must characterize this waste annually in a waste evaluation form and present it to the Landfill. Additional analysis is required when process or raw material changes are made which affect the characteristics of the waste.

5.19.3 Disposal Requirements

No disposal restrictions are necessary as long as the fiberglass and/or resins have been adequately cured. They will be deposited at the working face and covered immediately. The generator should consider the alternative of incineration of these wastes.

5.19.4 Special Operating Considerations

Some resin waste loads are mixed with floor sweepings and other dusty materials. If this is the case, the resin waste will be buried immediately. Operators should be aware that the inhalation of fiberglass dust can cause breathing problems and lung damage. Appropriate safety precautions should be practiced to protect from inhalation of resin fibers and dust delivered with the resin wastes.

5.20 Spent Activated Carbon Filters

5.20.1 General

Sand is occasionally used to filter drinking water, and filters are used in the treatment of waste waters. Carbon filters are also used in treating drinking water or contaminated ground water. Contaminants such as metals and organic compounds are removed by absorption into the carbon material. Carbon is often regenerated and reused a number of times before it is considered wasted. Management of these wastes will be dependent on what chemical constituents these wastes were used to collect.

5.20.2 Analysis Required

Activated carbon filters are used to remove organics and metals from water and other liquids. Therefore, it is necessary to first know what is being filtered and the appropriate analysis conducted. Filters that have been removing metals will be tested for heavy metal contamination using the TCLP Test. Generators must choose the parameters to be tested from Table 3-1 and justify why any significant parameters were not tested. In addition, analysis for PFAS, boron, chloride and sodium will be required. Any filters whose evaluation demonstrates classification as a hazardous waste will be rejected. In

addition, the filters shall be tested for radiation content. Filters that have radiation levels above 5 pCi/g will not be accepted at the Landfill.

5.20.3 Disposal Requirements

Whole filters will be landfilled in an area separate from the working face. Spent filters containing collected hydrocarbons and organic solvents are candidates for incineration.

5.20.4 Special Operating Considerations

Special operating conditions are not required.

5.21 Construction Waste

Construction and demolition debris containing empty containers, asbestos, paint waste, fiberglass, urethane, polyurethane and epoxy resin will be managed as described in previous Sections 5.1, 5.2, 5.12, and 5.19, respectively.

Construction and demolition debris will normally be placed in the demolition debris land disposal facility (SW-440) operating on the same site as the Landfill (SW-376). Materials prohibited from the demolition debris facility, such as treated wood or loads of demolition debris mixed with other refuse (dirty demo), will be disposed of in the MMSW Landfill and recorded as industrial waste, but will not require pre-approval.

5.22 Medical Waste

The Landfill will accept medical waste that is not hazardous or infectious. Haulers and, to the extent possible, generators will be reminded of regulating agencies for and prohibition in the Landfill of hazardous and/or infectious medical wastes. Delivered wastes will be inspected as described in Section 4.2. Loads discovered to contain hazardous or infectious medical waste will be rejected. If a load containing hazardous or infectious medical waste has been dumped, the entire load will be segregated and the hauler will be required to remove and properly dispose of the waste.

5.23 Invasive Vegetative Waste

The Landfill will accept vegetative waste that has been identified as an invasive species and that is non-hazardous. The Landfill must obtain approval from the MPCA prior to accepting this waste for disposal. Haulers and, to the extent possible, generators will be reminded of the regulating agencies for and prohibition of disposal in a landfill of vegetative (yard) waste. Delivered wastes will be inspected as described in Section 4.2. Loads discovered to contain hazardous waste will be rejected. If a load

containing hazardous waste has been dumped, the entire load will be segregated and the hauler will be required to remove and properly dispose of the waste.

5.24 Mercury-Catalyzed Polyurethane Flooring and Mercury-Contaminated Demolition Debris and Soil

Mercury-catalyzed polyurethane flooring (MCPF) must be tested prior to disposal within the Landfill in accordance with MPCA's fact sheet *Mercury-catalyzed Polyurethane Flooring and Mercury-contaminated Demolition Debris and Soil*, September 2014 (provided in Appendix G). A representative sample of the flooring (and subflooring) to be removed, other related debris, and soils contaminated by naturally-occurring mercury or historical practices needs to be tested for both total and leachable mercury by an independent, certified lab. If the total mercury is equal to or less than 1000 ppm and leachable mercury is below the TCLP limit of 0.2 mg/L, then the material is suitable for disposal within the Landfill, with no MPCA approval for MCPF or with preapproval from the MPCA for other related debris and soil. If the sample exceeds these limits, it is not suitable for disposal within the Landfill.

5.25 Shredder Residue Waste

5.25.1 General

Shredder residue waste, also known as shredder fluff, is the non-metallic waste scrap from mechanically shredded automobiles, household and commercial appliances, or other household and commercial items. Shredder fluff shall be tested in accordance with the MPCA's *Program Management Decision (PMD) for Evaluation and Management of Shredder Residue Waste*, September 2006 (provided in Appendix H).

5.25.2 Analysis Required

Shredder fluff must be tested for TCLP, PFAS, PCBs, boron, sodium, and chloride at a frequency of two tests per 250 tons (one test taken by the generator prior to acceptance of the material and the second taken randomly by the operator at the working face for verification, but paid for by the generator) as outlined in the PMD. Generators must choose the appropriate parameters to test for from Table 3-1 and justify why any parameters were not tested. Generators must characterize this waste in a waste evaluation form and present it to the County. Additional analysis is required when process or raw material changes are made which affect the characteristics of the waste.

Generators will also need to prepare a protocol document to establish procedures and Quality Assurance/Quality Control for monitoring and laboratory services for this material. The protocol document shall present the following information:

- Brief discussion of the material
- Summary of current monitoring system
- Tabulation of existing laboratory analysis
- Monitoring schedule
- Monitoring objectives
- Field equipment
- Field sampling order and methods
- Field and laboratory Quality Assurance/Quality Control
- Sample containers, preservation, handling, and transportation
- Decontamination methods
- Documentation procedures

The final protocol document shall be approved by the County prior to commencing hauling. Upon receipt of the load, an additional sample may be pulled for analysis at the County's discretion. The analysis of this sample will be funded by the generator.

5.25.3 Disposal Requirements

The disposal location of the shredder fluff will be as directed by the Landfill operator. The Landfill operator must be given a 24-hour notice of when the material will be brought to the Landfill and it must not be mixed with any other waste.

5.26 Fabric Filter Bags

5.26.1 General

Fabric filter bags (FFB) (e.g., baghouse filters) are used to control emissions of air pollutants.

5.26.2 Analysis Required

FFBs will be tested for TCLP, PFAS, boron, chloride and sodium. If the test results indicate acceptable levels, the material will be accepted at the Landfill. Additional analysis is required when changes in the process are made which could potentially affect the characteristics of the filters. FFBs that are generated from wood manufacturing processes that do not contain solvents of glues will not need to undergo testing.

5.26.3 Disposal Requirements

FFBs should be covered with other wastes or daily cover after acceptance to prevent unnecessary dust generation. In addition, the Operator may require the bags to be wet prior to disposal.

5.26.4 Special Operating Considerations

Care should be taken when handling fabric filter bags to not release any dusts from the bags.

6.0 UNACCEPTABLE WASTES

6.1 Regulatory Criteria

Wastes that are classified and regulated by the MPCA as special waste streams outside of the MMSW category will be unacceptable wastes for disposal at the Landfill (SW-376). Other wastes that the County has determined to be unacceptable are presented below.

6.1.1 Unacceptable Wastes for Landfill Disposal

- Hazardous wastes;
- Sewage sludge, septic tank pumpings, sewage sludge compost, or sewage unless it has been or will be treated to meet Class B pathogen reduction standards as laid out in Minn. R. 7041;
- Infectious wastes, unless approved by the MPCA;
- Radioactive wastes;
- Waste containing PCBs;
- Waste that could spontaneously burn or that could ignite other waste because of high temperatures; and
- Free liquids.

Items that will not be placed in the waste disposal area but will be accepted at the facility for recycling include:

- Waste oil;
- Antifreeze;
- HHW;
- Waste tires;
- Yard waste and brush;
- White goods;
- Lead acid batteries; and
- Electronics.

6.2 Exempt Wastes

The following wastes are considered exempt from the procedures defined in this ISWMP:

- Office wastes;
- Mixed municipal solid wastes;

- Paper and cardboard wastes from manufacturing processes or packaging;
- Food and beverage packaging and handling materials;
- Food wastes not containing free liquids;
- Aluminum, iron, steel, glass, wood, and hardened, cured plastic wastes;
- Dewatered sewage sludge that has been treated by a process to significantly reduce pathogens pursuant to Minn. R. 7041.0100 to 7041.4700 and does not contain free liquids as determined by passing the paint filter test;
- Compost, including sewage sludge, produced in accordance with Minn. R. 7035.2836;
- Grit and bar screening from a wastewater treatment plant; and,
- Ash from boilers and incinerators using only untreated wood as a fuel source.

If any of the wastes listed above contain or are suspected to contain any amounts of non-exempt materials, the waste will be evaluated and managed in accordance with the procedures and policies described in this ISWMP.

7.0 ALTERNATIVE DAILY COVER

7.1 General

The Landfill has MPCA approval to use foundry sand, from the Lakeland Mold Foundry, as alternative daily cover (ADC). This is the only industrial waste stream currently approval as ADC. The Landfill will obtain the necessary MPCA approvals prior to the use of any other industrial waste as alternative daily covers at the Landfill.

7.2 Analytic Criteria

An evaluation of the chemical constituents of an industrial waste that could be utilized as daily cover is appropriate when there is a potential exposure health threat to the facility workers. When a waste is used as a cover material, the most important exposure pathways for facility workers are inhalation, ingestion and dermal contact for various chemical parameters that may occur in the waste matrix.

The MPCA Site Response Section developed soil screening reference values for chemical parameters for the multiple exposure pathways of inhalation, ingestion, and dermal contact. These evaluation criteria were developed to determine response action levels for near surface soils at contaminated sites. The soil screening values are presented on a total basis. Therefore, when specific parameters of concern are known or suspected to exist in the waste material, the analytic work must be completed on a total basis.

Table 7-1 lists the Action Limits for Alternative Daily Cover at the Landfill and is based on the MPCA's soil screening values, which are listed for the majority of TCLP parameters and 20 times the TCLP action limits set by the EPA. This information is presented as a general guide for the majority of chemical parameters that are likely to be encountered but is not an all-inclusive list. If unlisted parameters are identified as a concern, a detailed risk assessment may be conducted to determine appropriate maximum levels for the exposure pathways.

Table 7-1: Action Limits for Alternative Daily Cover Evaluation Maximum Concentration

Parameter	CAS No.	Action Limit (mg/kg)*
Arsenic	7440-38-2	12.0
Barium	7440-39-3	2,000
Benzene	71-43-2	3.5
Cadmium	7440-43-9	20
Carbon tetrachloride	56-23-5	0.6
Chlordane	57-74-9	0.6
Chlorobenzene	108-90-7	25
Chloroform	67-66-3	5.0
Chromium	7440-47-3	100
o-Cresol	95-48-7	1,000
m-Cresol	108-39-4	1,000
p-Cresol	106-44-5	110
1,4-Dichlorobenzene	106-46-7	150
1,2-Dichloroethane	107-06-2	6.0
1,1-Dichloroethene	75-35-4	0.3
2,4-Dinitrotoluene	121-14-2	2.6
Lead	7439-92-1	100
Mercury	7439-97-6	1.0
Methyl ethyl ketone	79-93-3	2,000
Pentachlorophenol	87-86-5	85
Pyridine	110-86-1	100
Selenium	7782-79-2	20
Silver	7440-22-4	100
Tetrachloroethylene	127-18-4	14
Trichloroethylene	79-01-6	10
2,4,5-Trichlorophenol	95-95-4	2,300
2,4,6-Trichlorophenol	88-06-2	40
Vinyl chloride	75-01-4	0.025
TPH (DRO+GRO)	NA	500 ppm

Notes:
*VOCs and Inorganic contaminant limits set by MPCA Tier 2 Soil Reference Values (SRVs), unless value exceeds 20 times the RCRA TCLP action limit based on Total Concentrations.

8.0 OPERATING RECORDS

8.1 Daily Records

Records will be maintained regarding the amount of industrial solid waste delivered each day. The daily records will include the generator's name, the volume of waste delivered for disposal, and the date received.

8.2 Solid Waste Placement

The location, including the horizontal dimensions in the phase, and the quantity of waste will be recorded for each delivery of industrial solid waste received in quantities greater than ten cubic yards as follows:

- Wastes which will be approved for disposal under this ISWMP that are routinely delivered in quantities greater than ten cubic yards include sand castings from a foundry, plastic bumper parts from a bumper reconditioning plant, and general refuse other than sludge or ash from a paper mill.
- These wastes will be deposited at the working face and will be scattered throughout the fill area.
- For record keeping purposes, the entire fill area will be considered to contain these wastes. Segregating these wastes is not practical or beneficial.
- The location of other wastes approved under this ISWMP which are delivered in quantities greater than ten cubic yards will be recorded, with the exception of dirty demo loads recorded as industrial waste.

8.3 Annual Report

The annual report for the facility will include summary information regarding the quantity of industrial waste received. The total yearly amounts of industrial solid waste received at the Landfill will also be reported in the annual report.

APPENDIX A – NOTIFICATION LETTER, WASTE INVENTORY FORM AND INDUSTRIAL WASTE LANDFILL ACCEPTANCE POLICY

CROW WING COUNTY

15728 State Highway 210
Brainerd, MN 56401-3522

Phone: (218) 824-1290
Fax: (218) 824-1291

Date: _____

Dear Generator:

I am writing on behalf of the Crow Wing County Sanitary Landfill as it relates to the Industrial Solid Waste Management Plan (ISWMP). This plan provides the necessary steps which the landfill must go through to evaluate industrial waste brought to the landfill either by your solid waste hauler, transfer sites or yourself. The ISWMP is required by our solid waste permit and the Minnesota Pollution Control Agency (MPCA) enforces its implementation.

Your cooperation is needed in the implementation of this plan, and this letter will explain the procedures that must be followed. MPCA rules govern these procedures.

Please find enclosed with this letter a Waste Inventory Form for your business to complete and return to this office. In completing the form, review your company's waste stream and determine whether any of the following waste types are present:

1. Waste containing polychlorinated biphenyls;
2. Spills of non-hazardous materials;
3. Rendering and slaughterhouse wastes;
4. Wastes that could spontaneously combust or that could ignite other waste because of high temperatures;
5. Foundry waste;
6. Ash from incinerators and power plants;
7. Paint residues, paint filters and paint dust;
8. Sludge, including lime sludge, wood sludge and paper sludge;
9. Fiberglass, urethane, polyurethane, and epoxy resin waste; and
10. Spent activated carbon filters.

After a review of the Waste Inventory Form, I may contact you to obtain more specific information about the waste and to develop proper management procedures. By establishing management procedures prior to delivery of your wastes to the landfill, we will be able to use the most efficient means to handle the waste and protect human health and the environment. The entire management process will involve these steps:

1. Submittal of Waste Inventory Form;
2. Request for additional information, if necessary;
3. Decision concerning waste acceptance and proper delivery procedures;
4. Delivery of waste and inspection of waste at facility; and
5. Final management of waste.

As a reminder, state rules prohibit the storage, processing or disposal of the following wastes at the Crow Wing County Sanitary Landfill:

1. Hazardous wastes;
2. Sewage sludge, septic tank wastes, sewage sludge compost, or sewage unless it has been or will be treated by a process to significantly reduce pathogens;
3. Infectious wastes, unless approved by the MPCA;
4. Radioactive wastes;
5. Waste containing polychlorinated biphenyl's (PCB);
6. Waste that could spontaneously burn or that could ignite other waste because of high temperatures;
7. Wastes containing free liquids;
8. Waste oil, tires, yard waste, white goods and lead acid batteries will not be placed in the Landfill but will be accepted at the facility.

Also according to state laws, the following wastes are considered exempt from the procedures defined in the ISWMP:

1. Mixed municipal solid waste;
2. Paper and cardboard wastes from manufacturing processes or packaging;
3. Food and beverage packaging and handling materials;
4. Food not containing free liquids;
5. Aluminum, iron, steel, glass, wood and hardened, cured plastic waste;
6. Dewatered sewage sludge that meets the Class B reduction standards in Part 7040.1300, subpart 3;
7. Compost including sewage sludge compost produced in accordance with Part 7035.2836;
8. Grit and bar screening from a wastewater treatment plan; and
9. Ash from boilers and incinerators using only wood as a fuel source.

Your cooperation in this preliminary assessment of the type of industrial solid waste generated is appreciated. If you have any questions or wish to discuss this program further, please feel free to contact me at (218) 824-1290.

Sincerely,

Doug Morris
Crow Wing County Solid Waste Coordinator

WASTE INVENTORY FORM

Company Name (please print): _____

Address: _____

_____

Contact Person/Title:

_____

Phone: _____ SIC Code: _____

WASTE TYPE GENERATED	AMOUNT GENERATED/WK
1. Empty Chemical Containers (e.g., any containers that held hazardous wastes, pesticides or compressed gas)	_____
2. PCB Contaminated Wastes	_____
3. Asbestos	_____
4. Spilled Non-hazardous Material	_____
5. Petroleum Contaminated Soils	_____
6. Rendering and Slaughterhouse Wastes (e.g., dead animals or animal parts)	_____
7. Foundry Wastes (e.g., sands, cores, molds, powders)	_____
8. Ash	_____
9. Paint Residue, Filters and Dust (e.g., filters, paint dust, paint contaminated cloth, paint containers, overspray paint, paint-contaminated blasting media)	_____
10. Sludges (e.g., grease trap wastes, paper processing sludge, commercial laundry filterings, fiberglass processing settling pond sludge, sewage treatment plant bar screenings, lime sludge, etc.)	_____

WASTE TYPE GENERATED	**AMOUNT GENERATED/WK**
11. Epoxy, Fiberglass & Urethane Resins (e.g., 2-part formula protective coatings, water softener vessels, related manufacturing spoils)	_____
12. Spent Filters (e.g., drinking water filters including sands, wastewater filters, ground water treatment filters, gas or vapor filters, etc.)	_____
13. Ink Sludge, Solvents, Cleanup Materials (e.g., ink sludge, ink related solvents, ink contaminated cloth and paper, etc.)	_____
14. Machining Wastes (e.g., metal or plastic wastes from drilling, lathing or milling; including cutting fluids)	_____
15. Electrical Component Wastes (e.g.. circuit boards, wire, capacitors, cathode ray tubes from computers, TVs, radios)	_____

Other: _____

Other: _____

In accordance with state laws, the following wastes are considered exempt from the procedures defined in the ISWMP and do not need to be considered when completing this form:

1. Mixed municipal solid waste;
2. Paper and cardboard wastes from manufacturing processes or packaging;
3. Food and beverage packaging and handling materials;
4. Food not containing free liquids;
5. Aluminum, iron, steel, glass, wood and hardened, cured plastic waste;
6. Dewatered sewage sludge that meets the Class B reduction standards in Part 7040.1300, subpart 3;
7. Compost including sewage sludge compost produced in accordance with Part 7035.2836;
8. Grit and bar screening from a wastewater treatment plan; and
9. Ash from boilers and incinerators using only wood as a fuel source.

Please identify your waste hauler: _____

Generator Certification: This sheet contains true and accurate descriptions to the best of my knowledge of the industrial solid waste that my company generates.

Name: _____ Title: _____

Signature: _____ Date: _____

Land Services Department
Policy and Procedure

Industrial Waste Landfill Acceptance Policy

To: Industrial Solid Waste Generators
From: Chris Pence – Division Manager Environmental Services
Date: May 17, 2017
Re: Acceptance of Industrial Waste at the Crow Wing County Landfill

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The following policy and procedure is effective immediately and should be kept as a reference. Industrial solid waste acceptance is governed by the Minnesota Pollution Control Agency (MPCA) (Minn. R. 7035.2535, Subp. 5) and the most up to date version of the County's Industrial Solid Waste Management Plan (ISWMP) and MPCA Permit SW-376.

Policy:

Generators of the industrial solid waste are required to complete all testing necessary to verify the waste is non-hazardous and acceptable for disposal at the Crow Wing County Landfill (Landfill). Hazardous waste can only be managed at a permitted hazardous solid waste facility. The Landfill is permitted to accept mixed municipal solid waste (MMSW or MSW) and non-hazardous solid waste generated by industry that meet the criteria as outlined in the ISWMP.

In addition, the County manages treated leachate through land application and additional industrial waste testing parameters are required. These additional tests are required prior to waste acceptance to ensure the waste will not affect Landfill operation or the treatability of the leachate.

Procedure:

Upon request for disposal of industrial solid waste at the Landfill the following process will be utilized:

1. The generator must complete and sign the Waste Evaluation Form. The waste must be solid and all known chemical information (Safety Data Sheets for the raw starting materials; chemical composition analysis; a description of the generating process; or data from a similar process or waste) shall be provided.
2. The County will review the existing information on a waste to determine what chemicals may be in the waste and if additional chemical evaluation is needed.
3. If chemicals of concern are identified, a toxicity characteristic leaching procedure (TCLP) test should be performed to determine if the waste is hazardous. In addition, site specific testing shall also be completed. The County will provide a list of testing requirements. The generator can request dropping parameters if justification is provided.
4. The County will compare TCLP and site specific test results to the hazardous waste and site specific threshold limits to determine if material is acceptable for disposal and provide notification to the generator.

Typical testing requirements and approximate associated costs include:

Testing Parameter	Estimated Cost
TCLP Metals	$103 – $271
TCLP Volatile Organic Compounds (VOCs)	$97 – $300
TCLP Semivolatile Organic Compounds (SVOCs)	$175 – $350
TCLP Pesticides	$80 – $250
TCLP Herbicides	$150 – $200
TCLP Polychlorinated Biphenyls (PCBs)	$55 – $195
Paint Filter	$10 – $37
Site Specific: Boron and Sodium	$21 – $36
Site Specific: Chloride	$20 – $32
Site Specific: Per- and Polyfluoroalkyl Substances (PFAS)	$295 – $510

Note: This list may not be all inclusive of parameters required to be tested for depending on the waste type. In addition, estimated costs are provided to give a general guidance and are in no way guaranteed. The responsible generator is required to complete and pay for testing directly through the selected laboratory.

Known list of laboratories (this list is not meant to be all inclusive and additional laboratories likely exist that perform this work):

- Pace – 612-607-1700
- MVTL – 507-354-8517
- Test America – 800-593-8519

Additional Information on Hazardous Wastes:

Businesses, nonprofit organizations and units of government that generate most types of hazardous waste at their sites have to work with the MPCA. Not all hazardous wastes in Minnesota are subject to reporting, fees or licensing, even if their generation, storage and disposal are regulated by the MPCA. Your first step is to obtain a free Hazardous Waste Identification Number (HWID) for your site from the MPCA. This number is also commonly known as an "EPA Id Number". HWID are permanently assigned to your site, not to you as a business, so if your business moves, you must get a new HWID for the site. For more information on identifying and managing hazardous waste in Minnesota, see the MPCA's Hazardous Waste Publications webpage or contact MPCA directly at 651-296-6300 or 800-657-3864.

APPENDIX B – WASTE EVALUATION FORM

CROW WING COUNTY
NON-HAZARDOUS INDUSTRIAL SOLID WASTE
REQUEST FOR REVIEW

1. GENERAL INFORMATION:

a. Generator's Name _____

b. Generator's Address _____
_____

c. Contact Person _____ Title _____
Phone: Business Hrs _____ After Hrs _____

d. Emergency Contact _____ Title _____

Phone: Business Hrs _____ After Hrs _____

e. General Description of Waste _____
_____

f. Process Creating Waste _____

2. WASTE PROPERTIES AT 25°C

a. Physical State (Solid, powder ,liquid, sludge, etc.) _____

b. Density (Specify units) _____

c. pH _____

d. Vapor Pressure (mm Hg) _____

e. Flash Point (Specify units) _____

f. Paint Filter Test: Pass_____ Failed_____

3. Complete Waste Composition (Percent by wt)
_____
_____
_____
_____

4. Is this a hazardous waste as defined by US EPA? _____
Is this a hazardous waste as defined by the MPCA? _____

5. Anticipated Annual Quantity (Specify units) _____

6. Attachments (MSDS, etc.) _____

The information provided herein and herewith are true and complete to the best of my knowledge.

Signature _____ Date _____
Typed or Printed Name _____ Title _____

APPENDIX C – SAMPLE APPROVAL LETTER

Crow Wing County
Solid Waste Office
Doug Morris
15728 State Highway 210, Brainerd, MN 56401
☎ 218-824-1290
Fax 218-824-1291

Doug.Morris@crowwing.us

Date

Contact
Address

Re: Review of a Non-hazardous Solid Waste Requests

Dear:

Our office received your Requests for Review of a non-hazardous Industrial Solid Waste concerning approval to dispose of _____.
Based on the information submitted in the Waste Evaluation Form(s) and attached certifications, the description and characterization of the waste submitted to this office indicates the waste is currently defined as an acceptable industrial solid waste as identified within the Crow Wing County Industrial Solid Waste Management Plan (ISWMP). Approval is recommended by this office for disposal of this material at the Crow Wing MMSW Landfill, SW-376. This approval is subject to the following conditions:

1. Management of the waste. For record keeping purposes it will be disposed at a location directed by the landfill operator.
2. The landfill operator must be given 24 hours notice of when the material will be delivered to the landfill.
3. The approved waste must not be mixed with any other waste.

If the waste type, quantity or packaging differs from the conditions stated above, you must contact me prior to shipping the waste for disposal.

Winter landfill operating hours - Monday through Friday is 7:00 am to 5:00 pm. Thank you for your cooperation in this matter. If you have any questions need or any additional information, you can contact me at the above number during business hours or the landfill operator at (218) 828-4392.

Sincerely,

Douglas R. Morris
Solid Waste Coordinator

cc: MPCA Regional Office Brainerd (w/enclosed Request for Review)
Marvin Stroschein, Crow Wing County Landfill Operator (w/enclosed Request for Review)

APPENDIX D – CONTAINER RINSE FORMS

CROW WING COUNTY LANDFILL

15732 State Highway 210 Phone: (218) 828-4392
Brainerd, MN 56401-3522 Fax: (218) 828-2842

PESTICIDE CONTAINER RINSE FORM

PESTICIDE CONTAINERS

Empty pesticide containers are subject to Minnesota Department of Agriculture regulations and must be pressure rinsed or triple-rinsed prior to disposal or salvage.

Empty containers must properly pressure rinsed or triple rinsed to be considered acceptable for landfill disposal in Minnesota. Containers which meet these definitions are not subject to further review by the MPCA staff; therefore, no additional industrial waste application process is required. The certificate, as designated below is for use between the Landfill owner/operator and the generator.

EMPTY CERTIFICATION

I hereby certify that the containers described below are in fact, empty and rinsed as outlined on the attached sheet. Also, I maintain that the containers hold absolutely **no** free moisture. Free moisture is defined as moisture that can be removed by the force of gravity.

No. of containers _____ Size_____

No. of containers _____ Size_____

No. of containers _____ Size_____

No. of containers _____ Size_____

No. of containers _____ Size_____

_____ _____

Date Name

_____

Address

HOW TO PROPERLY RINSE

Two different procedures are effective for proper rinsing of pesticide containers: pressure-rinsing and triple-rinsing.

PRESSURE-RINSING

A special nozzle is attached to the end of a hose to force the remaining pesticide from the container. Pressure-rinsing, which may be faster and easier than triple-rinsing, can be used with plastic and non-pressurized metal pesticide containers.

HOW TO PRESSURE-RINSE

1. Remove cover from container. Check cover and container threads for pesticide. Rinse covers separately in a bucket of water for more than one minute and pour this rinse water into the spray tank.
2. Empty pesticide into the spray tank and let container drain for 30 seconds.
3. insert pressure-nozzle by puncturing through the lower side of the pesticide container.
4. Hold the container upside down over the sprayer tank opening so rinsate will run into the sprayer tank.
5. Rinse for length of time recommended by the manufacturer (generally 30 seconds or more). Wiggle nozzle to rinse all inside surfaces. Be sure hollow handles are well rinsed.
6. Let containers dry and then put cover back on container.

TRIPLE-RINSING

It means rinsing the container three times. Triple-rinsing can be used with plastic, non-pressurized metal, and glass containers.

HOW TO TRIPLE-RINSE

1. Remove cover from the container.
2. Empty the pesticide into the sprayer tank and let the container drain for 30 seconds.
3. Fill the container 10% to 20% full of water or rinse solution.
4. Secure the cover on the container.
5. Swirl the container to rinse all inside surfaces.
6. Remove cover from the container. Add the rinsate from the container to sprayer tank and let drain for 30 seconds or more.
7. Repeat steps 2 through 5 **two more times.**
8. Let containers dry and then put cover back on container.

REMEMBER

- To read and to follow all label instructions.
- To wear appropriate protective gear when working with pesticides.
- Never to reuse a pesticide container for any purpose.
- To dispose of all pesticide containers properly.
- When not using a water nurse tank, always use a back-flow prevention device when filling sprayer tanks or rinsing pesticide containers.
- Mixing and loading sites should be at least 150 feet away from all wells.

CROW WING COUNTY LANDFILL
15732 State Highway 210 Phone: (218) 828-4392
Brainerd, MN 56401-3522 Fax: (218) 828-2842

CHEMICAL CONTAINER "RCRA-EMPTY" FORM

CHEMICAL CONTAINERS

Empty chemical containers are subject to Minnesota Pollution Control Agency regulations and must meet the "RCRA-empty" requirements prior to disposal or salvage.

Empty containers must have all material that can be removed by the method commonly used for that type of container has been removed. For example, if material is normally removed from a container by pouring, the container must be able to be overturned completely with no dripping. Containers which meet this definition are not subject to further review by the MPCA staff; therefore, no additional industrial waste application process is required. The certificate, as designated below is for use between the Landfill owner/operator and the generator.

EMPTY CERTIFICATION

I hereby certify that the containers described below are in fact, "RCRA-empty". Also, I maintain that the containers hold absolutely **no** free moisture. Free moisture is defined as moisture that can be removed by the force of gravity.

No. of containers _____ Size_____

No. of containers _____ Size_____

No. of containers _____ Size_____

No. of containers _____ Size_____

No. of containers _____ Size_____

_____ _____

Date Name

_____

Address

APPENDIX E – NATIONAL EMISSION STANDARD FOR ASBESTOS

Title 40: Protection of Environment
PART 61—NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS

Subpart M—National Emission Standard for Asbestos

Authority: 42 U.S.C. 7401, 7412, 7414, 7416, 7601.

Source: 49 FR 13661, Apr. 5, 1984, unless otherwise noted.

§ 61.154 Standard for active waste disposal sites.

Each owner or operator of an active waste disposal site that receives asbestos-containing waste material from a source covered under §61.149, 61.150, or 61.155 shall meet the requirements of this section:

(a) Either there must be no visible emissions to the outside air from any active waste disposal site where asbestos-containing waste material has been deposited, or the requirements of paragraph (c) or (d) of this section must be met.

(b) Unless a natural barrier adequately deters access by the general public, either warning signs and fencing must be installed and maintained as follows, or the requirements of paragraph (c)(1) of this section must be met.

(1) Warning signs must be displayed at all entrances and at intervals of 100 m (330 ft) or less along the property line of the site or along the perimeter of the sections of the site where asbestos-containing waste material is deposited. The warning signs must:

(i) Be posted in such a manner and location that a person can easily read the legend; and

(ii) Conform to the requirements of 51 cm × 36 cm (20&inch;×14&inch;) upright format signs specified in 29 CFR 1910.145(d)(4) and this paragraph; and

(iii) Display the following legend in the lower panel with letter sizes and styles of a visibility at least equal to those specified in this paragraph.

Legend	Notation
Asbestos Waste Disposal Site	2.5 cm (1 inch) Sans Serif, Gothic or Block.
Do Not Create Dust	1.9 cm (3/4 inch) Sans Serif, Gothic or Block.
Breathing Asbestos is Hazardous to Your Health	14 Point Gothic.

Spacing between any two lines must be at least equal to the height of the upper of the two lines.

(2) The perimeter of the disposal site must be fenced in a manner adequate to deter access by the general public.

(3) Upon request and supply of appropriate information, the Administrator will determine whether a fence or a natural barrier adequately deters access by the general public.

(c) Rather than meet the no visible emission requirement of paragraph (a) of this section, at the end of each operating day, or at least once every 24-hour period while the site is in continuous operation, the asbestos-containing waste material that has been deposited at the site during the operating day or previous 24-hour period shall:

(1) Be covered with at least 15 centimeters (6 inches) of compacted nonasbestos-containing material, or

(2) Be covered with a resinous or petroleum-based dust suppression agent that effectively binds dust and controls wind erosion. Such an agent shall be used in the manner and frequency recommended for the particular dust by the dust suppression agent manufacturer to achieve and maintain dust control. Other equally effective dust suppression agents may be used upon prior approval by the Administrator. For purposes of this paragraph, any used, spent, or other waste oil is not considered a dust suppression agent.

(d) Rather than meet the no visible emission requirement of paragraph (a) of this section, use an alternative emissions control method that has received prior written approval by the Administrator according to the procedures described in §61.149(c)(2).

(e) For all asbestos-containing waste material received, the owner or operator of the active waste disposal site shall:

(1) Maintain waste shipment records, using a form similar to that shown in Figure 4, and include the following information:

(i) The name, address, and telephone number of the waste generator.

(ii) The name, address, and telephone number of the transporter(s).

(iii) The quantity of the asbestos-containing waste material in cubic meters (cubic yards).

(iv) The presence of improperly enclosed or uncovered waste, or any asbestos-containing waste material not sealed in leak-tight containers. Report in writing to the local, State, or EPA Regional office responsible for administering the asbestos NESHAP program for the waste generator (identified in the waste shipment record), and, if different, the local, State, or EPA Regional office responsible for administering the asbestos NESHAP program for the disposal site, by the following working day, the presence of a significant amount of improperly enclosed or uncovered waste. Submit a copy of the waste shipment record along with the report.

(v) The date of the receipt.

(2) As soon as possible and no longer than 30 days after receipt of the waste, send a copy of the signed waste shipment record to the waste generator.

(3) Upon discovering a discrepancy between the quantity of waste designated on the waste shipment records and the quantity actually received, attempt to reconcile the discrepancy with the waste generator. If the discrepancy is not resolved within 15 days after receiving the waste, immediately report in writing to the local, State, or EPA Regional office responsible for administering the asbestos NESHAP program for the waste generator (identified in the waste shipment record), and, if different,

the local, State, or EPA Regional office responsible for administering the asbestos NESHAP program for the disposal site. Describe the discrepancy and attempts to reconcile it, and submit a copy of the waste shipment record along with the report.

(4) Retain a copy of all records and reports required by this paragraph for at least 2 years.

(f) Maintain, until closure, records of the location, depth and area, and quantity in cubic meters (cubic yards) of asbestos-containing waste material within the disposal site on a map or diagram of the disposal area.

(g) Upon closure, comply with all the provisions of §61.151.

(h) Submit to the Administrator, upon closure of the facility, a copy of records of asbestos waste disposal locations and quantities.

(i) Furnish upon request, and make available during normal business hours for inspection by the Administrator, all records required under this section.

(j) Notify the Administrator in writing at least 45 days prior to excavating or otherwise disturbing any asbestos-containing waste material that has been deposited at a waste disposal site and is covered. If the excavation will begin on a date other than the one contained in the original notice, notice of the new start date must be provided to the Administrator at least 10 working days before excavation begins and in no event shall excavation begin earlier than the date specified in the original notification. Include the following information in the notice:

(1) Scheduled starting and completion dates.

(2) Reason for disturbing the waste.

(3) Procedures to be used to control emissions during the excavation, storage, transport, and ultimate disposal of the excavated asbestos-containing waste material. If deemed necessary, the Administrator may require changes in the emission control procedures to be used.

(4) Location of any temporary storage site and the final disposal site.

(Secs. 112 and 301(a) of the Clean Air Act as amended (42 U.S.C. 7412, 7601(a))

[49 FR 13661, Apr. 5, 1990. Redesignated and amended at 55 FR 48431, Nov. 20, 1990; 56 FR 1669, Jan. 16, 1991]

APPENDIX F – MPCA MANAGING STORMWATER SEDIMENT BEST MANAGEMENT PRACTICES GUIDANCE, JUNE 2015

Managing Stormwater Sediment Best Management Practice Guidance

Minnesota Pollution Control Agency

June 2015

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

Document number: wq-strm4-16

Table of Contents

Stormwater Sediment Best Management Practices

What's New?

- Land use category definitions have been revised.
- Minor changes have been made to the "Stormwater Sediment Spreadsheet" to make the spreadsheet easier to use when calculating benzo[a]pyrene (B[a]P) equivalents and comparing contaminant concentrations in stormwater sediment to soil reference values.
- Sediment sampling is required regardless of the volume of sediment to be excavated.
- General information about hydraulic dredging has been added.

This document provides guidance for stormwater collection and conveyance systems which have been designed, constructed, operated, and maintained for the purpose of providing treatment of stormwater. Stormwater collection and conveyance systems help protect infrastructure from flooding and they collect and concentrate pollutants to prevent them from reaching lakes, rivers, streams, wetlands, and other waters of the state where they could have a negative effect on water quality, aquatic animals, or human health. Managing contamination and pollutants in stormwater collection and conveyance systems should be expected and sampling is required prior to disposal, or beneficial use (e.g. fill, topsoil, or compost) to determine proper management.

This guidance document will help you think through important steps associated with sediment removal projects. These may include:

- Who is responsible for managing stormwater sediment
- Land use within a drainage area
- Sampling sediment and what laboratory analysis is required
- How to calculate BaP equivalents for carcinogenic polycyclic aromatic hydrocarbons (cPAHs)
- Management requirements for contaminated sediment;
- Where contaminated stormwater sediments are accepted for disposal

This document is intended to help those responsible for operation and maintenance of stormwater systems determine when sediment removal is needed, and what steps to consider during the course of managing a sediment removal project. This is guidance. It is not a comprehensive list of everything you may need to do when managing a sediment removal project.

Other considerations may also include:

- Proximity to high value resources or sensitive ecological features
- Landscape variations, and soil types
- Management of native or invasive species
- A wide range of other variables that may be encountered from one municipality to the next, or one project to the next

This guidance was developed with special assistance from the cities of Burnsville, Circle Pines, Maplewood, Roseville, St. Paul, White Bear Lake, and Woodbury, Minnesota.

Background

Action was taken during the 2009 Minnesota Legislative session which included funding to conduct research on stormwater pond sediment contamination and to help Minnesota cities clean-out contaminated stormwater ponds. (House File Number 1231 Passed by the Minnesota Legislature on May 18, 2009 and approved by Governor Tim Pawlenty on May 22, 2009.)

Research concluded that polycyclic aromatic hydrocarbons (PAHs) are often responsible for the greatest contamination problems in stormwater pond sediment (Crane et al. 2010). Research conducted on stormwater pond sediments in the Minneapolis-St. Paul, Minnesota metropolitan area showed that PAHs are the primary contaminants of concern affecting disposal decisions (Polta et al. 2006; Crane et al. 2010). PAHs persist in the environment and pose a risk to animals, plants, and people at elevated concentrations. These contaminants are formed by the incomplete combustion of organic materials, such as wood, oil, and coal, as well as occurring naturally in crude oil and coal (Crane et al. 2010).

Coal tar-based sealants are a major source of PAHs in urban sediments where these products are used in the surrounding watershed (Mahler et al. 2012). The Minnesota Pollution Control Agency's (MPCA) research (Crane 2014) determined that coal tar-based sealants were the most important source of PAHs (67.1%), followed by vehicle emissions (cars and trucks) (29.5%) and pine wood combustion (3.4%).

The Legislation also provided funding for municipalities who pass ordinances banning or restricting the use of coal tar-based sealants. Twenty-nine municipalities passed such ordinances before legislation in the spring of 2013 banned coal tar-based sealants state wide effective January 1, 2014 (Minnesota Statutes section 116.202).

The 2009 Legislation also directed the MPCA to develop stormwater best management practices (BMPs) to avoid or mitigate impacts of PAH contamination from coal tar-based sealants. The MPCA provides guidance for the operation and maintenance of constructed stormwater collection systems. BMPs can be found in the Minnesota Stormwater Manual at this location http://stormwater.pca.state.mn.us/index.php/Main_Page.

Stormwater collection and conveyance systems are commonly referred to as stormwater ponds, stormwater control devices, wet detention basins, or National Urban Runoff Program (NURP) ponds.

This document provides guidance for sediment removal projects from stormwater ponds that have been designed, constructed, operated and maintained for the purpose of providing treatment of stormwater.

Sediment removal from lakes, rivers, streams, and wetlands may be subject to additional requirements such as a permit from the Department of Natural Resources (DNR) to allow work below the ordinary high water level. Permit determinations are guided by DNR hydrologists based on geographical location. A list of DNR hydrologists by area is available on the DNR web site at http://files.dnr.state.mn.us/waters/area_hydros.pdf.

Sediment may also be generated in other stormwater collection devices such as rain gardens, infiltration swales, sumps, traps, pipes, and/or other conveyance structures. This guidance may be adapted for other situations to determine representative contaminant concentrations. The analytical component outlined in Appendix A may be applied to other sediment sampling situations, but the MPCA does not have specific sampling guidance at this time for those situations and it is not necessary to follow this guidance for other types of sediment removal projects. The sampling guidance provided in Appendix A is strictly for sampling sediment from stormwater ponds that have been designed, constructed, operated, and maintained for the purpose of providing treatment of stormwater.

Sediment disposal costs

The high cost to manage contaminated stormwater sediment has brought operation and maintenance of stormwater ponds into the public spotlight. Unregulated sediment is characterized as sediment that does not have contamination exceeding the residential soil reference values. Unregulated sediment may be managed locally and without disposal restrictions. Disposal costs for stormwater sediment removal projects with contamination exceeding the industrial soil reference values is regulated as a solid waste and the cost for disposal can be as much as three times more expensive than unregulated sediment depending on the type and level of contamination. The high cost to manage contaminated sediment emphasizes the importance of source control to reduce the loading of contamination into stormwater ponds.

Sediment removal process

Inventory and maintenance needs.

Evaluating and testing sediment.

Engineering, contracting, and work plans.

Excavating sediment.

Site restoration.

Records and documentation to keep on file.

1. Inventory and maintenance needs

Assessing need and planning sediment removal projects includes a number of steps that range from estimating lost capacity to notifying neighbors about plans to maintain the stormwater collection system. For municipalities who are managing dozens, or sometimes hundreds of stormwater ponds, starting with an inventory and a maintenance prioritization process is recommended.

Some municipalities find it helpful to develop a flowchart or other prioritization scheme to triage and track priority sediment removal projects. Topics of importance may include:

- Have priorities been identified by city inspections – sediment level, lost capacity, other needs?
- Accessibility. Does the city already have access via parkland, easement, or outlot? Are there access points for machinery and trucks?
- What are the sediment analysis results? Can the city afford to remove and manage the sediment?
- Is the downstream lake or sub-watershed a priority?
- What is the expected cost/benefit from the project?
- Can a stormwater pond be expanded, or redesigned to provide greater benefit?
- Is surveying needed to assess lost capacity and depth of excavation?
- How will you measure or estimate the volume of cubic yards of sediment to be removed?
- Have sediment deltas and inlet/outlet structures been identified/located?
- Are communications with other stakeholders important/public relations?
- Are visual inspections, notes, checklists, or photos to track maintenance projects needed?

The first phase of work identifies need and determines if a sediment removal project is even necessary. This may include a preliminary survey to gage sediment depth and provide a rough

estimate of the number of cubic yards of sediment to be removed. This assessment and planning will help guide work plan development and contracting if a sediment removal project is deemed necessary.

2. Evaluating and testing sediment

Sediment samples are collected and compared to MPCA's Remediation Division soil reference values (SRVs) to determine where excavated sediment may be beneficially used or disposed. This affects work plan development, including contract specifications for bidding projects and is an important part of the management process.

- Guidance for *collecting samples and testing sediment* are summarized in Appendix A.
- Guidance *comparing contaminant analytical data (concentrations) to SRVs and* calculating *B[a]P equivalents* are summarized in Appendix B.

There are two sets of SRVs based on the following Remediation soil land use categories:

Residential land includes lawn surrounding single family housing and newly developed single family residences, multi-family housing, condominiums, playgrounds, sports fields, beaches, produce gardens, long-term care facilities, correctional housing, hospitals, campgrounds, child care centers, churches, schools, wildlife areas, local/state/national forests, and public or private erodible trails are included in this category.

Industrial land includes lawns, yards, and landscaping that surround hotels, office buildings, retail stores, shopping centers, and restaurants and industrial property, public utility facilities, rail and freight facilities, storage facilities, warehouses, office buildings and manufacturing facilities.

The analytical results and calculation of B[a]P equivalents are compared to the MPCA's Remediation Divisions SRV values to determine management or treatment options.

Management options include:

Use of excavated sediment as unregulated fill. Contaminant concentrations from the list of analytes, including cPAHs expressed as B[a]P equivalents and any other site-specific contaminants are all below the Residential SRVs. The excavated sediment is unregulated fill and does not require any special management.

Determination of excavated soil as regulated solid waste. One or more of the required list of analytes, including cPAHs expressed as B[a]P equivalents and any other site-specific contaminants exceed the Residential SRVs but do not exceed the Industrial SRVs. The excavated sediment requires special management and cannot be used as unregulated fill. Excavated sediment can be managed in accordance with the MPCA's BMPs for the Off-Site Use of Unregulated Fill available at: http://www.pca.state.mn.us/index.php/view-document.html?gid=13503.

Excavated sediment that is not considered unregulated fill is most commonly guided to a solid waste landfill. Depending on the types and concentrations of contaminants; sediment may need to be disposed of at a Municipal Solid Waste (MSW) landfill that has an industrial solid waste management plan. This means contaminated sediment must go to a MSW landfill that has a liner and a leachate collection system.

MSW landfills in Minnesota that can accept contaminated sediment are listed at this webpage:

http://www.pca.state.mn.us/veiz806 or, the list can be accessed directly at this link: http://www.pca.state.mn.us/index.php/view-document.html?gid=12806.

Some additional landfills that are permitted to accept industrial waste, and which may also accept contaminated stormwater sediments, include:

1. Voyageur Industrial Landfill in Cannon Falls, Minnesota
2. Vonco II Landfill in Becker, Minnesota
3. Vonco V Landfill in Duluth, Minnesota
4. Shamrock Environmental Landfill in Cloquet, Minnesota
5. Dem-Con Landfill in Shakopee, Minnesota
6. Veolia E S Rolling Hills Landfill in Buffalo, Minnesota
7. SKB Rosemount Industrial Waste Facility in Rosemount, Minnesota

Guidance for analytical data comparing contaminants to SRVs and calculating B[a]P equivalents are summarized in Appendix B. At this time testing sediment for metals other than copper and arsenic is not required. However, contractors who remove and/or transport sediment, or facilities that beneficially re-use or dispose of sediment may require test results for heavy metal concentrations. This may be an important variable as sediment removal projects are planned and samples are collected and compared. It is recommended that you consult with contractors and contact disposal or re-use facilities to ensure they will be able to accept your waste and to determine what additional sampling requirements (if any) may be required by the facility.

3. Engineering, contracting, and work plans

Work plan development includes a wide range of logistics including, but not limited to:

- Notification of residents and neighbors;
- How to access the site and what machinery will be needed to remove sediment.
- Define how sediment will be removed, measured, and paid for.
- Testing or analysis requirements for the destination disposal or treatment facility.
- Plans for erosion control.
- Tree removal, environmental impact, depth to ground water, and risks associated with the displacement of wildlife or invasive species.
- Lack of design and/or construction documentation (no “as-built” records).
- Estimating water draw-down needs and the amount of time and oversight needed to drain the stormwater collection system.
- What permits (if any) may be required by your local watershed district, county, or the MDNR. The MPCA does not require a permit or notification for routine maintenance of stormwater ponds, but cities are advised to keep records and documentation of their sediment removal projects as outlined in this guidance and as required by the Municipal Separate Storm Sewer Systems (MS4) Permit.
- Defining appropriate BMPs for dewatering (e.g., rock riprap, sand bags, plastic sheeting, or other accepted energy dissipation measures), such that the discharge does not adversely affect the receiving water or downstream landowners.
- Ensuring that water from pumping or draw-down activities is discharged in a manner that does not cause nuisance conditions, erosion in receiving channels, or erosion on down-slope properties. This also includes inundation of wetlands causing significant and/or adverse impact. The general rule of thumb is “keep it clear”.
- How sediment will be transported and a process to track the volume of sediment removed.

- Defining logistics, administrative, and engineering requirements, surveys, dewatering processes, site access and easements, rock entrance and off-site tracking needs, coordination with adjacent cities, and/or watershed districts and the Minnesota Department of Transportation.

4. Excavating sediment

Sediment excavation projects can take place during the winter or summer.

Benefits to sediment removal projects in the winter include:

- Winter excavations greatly reduce the risk that rain may cause flooding and erosion of dewatered ponds, or turbid runoff conditions.
- Access with trucks and heavy machinery is easier in the winter when soil surrounding stormwater ponds freezes solid.
- Adjacent residents and neighbors have windows closed and this means less noise, less dust, less odor, and fewer disturbances overall.
- Water can be pumped down so remaining water can freeze solid. Pumping should be discontinued before the bottom of the pond is disturbed and sediment is stirred up making the water turbid. Remaining water should be allowed to freeze solid trapping any suspended sediment in ice. The ice can then be skimmed off with a bulldozer so it can be piled within the pond. This keeps turbid water in the basin after snow and ice melt during spring thaw.

Winter excavation projects also have a few drawbacks. They include:

- Shorter working days
- Problems associated with working in freezing conditions and sub-zero weather
- The use of lights after dark to extend the work day

Sediment removal can begin once snow and ice have been skimmed off and piled within the pond.

Once sediment is removed, final grading should achieve a natural (gradual) slope for all banks. Ice and snow that has been stockpiled in the pond should be evenly distributed throughout the basin once sediment has been removed. This will allow water and remaining sediment to be retained in the pond. Temporary stabilization of slopes and banks should ensure control of erosion and prevent site run-off during spring snowmelt and the first rain events of the season. Clean-up and removal of temporary infrastructure should be done working your way out of the site. Once equipment and temporary infrastructure (such as transport roads and rock entrances) is removed, it will be cost prohibitive and essentially impossible to make additional corrections.

Summer excavations include the risk of unexpected rain fall events that can complicate a conventional sediment removal project and sometimes delay the project for days and increase the risk to receiving waters down-stream. Small projects (less than one acre) may be completed in one day or less and risks associated with unexpected rain fall events can be minimized or avoided altogether. Small projects don't require a permit, but safeguards and best management practices are still required to ensure negative down-stream impacts to receiving waters are prevented. Large projects that will disturb one or more acres upland are required to have a Construction Stormwater Permit to ensure best management practices are implemented as the scale of the project and potential risks to receiving waters increase.

One method of sediment removal that can be used during the summer months is called hydraulic dredging. This process utilizes a watercraft or floating dredging device with a large centrifugal pump to remove sediment. Saturated mud and sand (often referred to as muck) is removed from

the stormwater pond and discharged into a large filter bag (or series of bags) upland. This process may allow sediment to be pumped hundreds and sometimes thousands of feet away from the pond depending on site conditions. Water that drains from the filter bag is channeled to a secondary treatment system with a flocculent that provides additional filtration before the water is returned to the stormwater pond. Benefits to hydraulic dredging include:

- Allows work to be performed during warm weather conditions.
- May be better suited for sites that are difficult to access with large trucks or large machinery.
- In many cases it will result in less disturbance for neighbors as the dredging operation is generally more quiet than operating various types of heavy machinery.
- Impacts to reptiles (turtles) and amphibians (frogs) may be less as they are not hibernating in the sediment and are able to move away from the slow moving dredge.
- Filter bags and treatment of the water that drains from them reduce fugitive dust and provide a secure way to store sediment while the sediment dries out.
- No need to bypass flows in the watershed which can be difficult if the watershed draining to the pond is large.
- Hydraulic dredging can take place even when there are significant groundwater inputs to the pond.
- Scheduling and costs are typically more predictable and are not likely to vary as they might with conventional excavation methods.
- Hydraulic dredging has a longer working season. Sediment removals via hydraulic dredging can be performed roughly eight months of the year depending on site conditions and seasonal variations from year to year.
- Hydraulic dredging projects are not impacted by rainfall and can continue operations during rainfall if desired.

Hydraulic dredging projects also have a few drawbacks. They include:

- Segregating specific areas of the pond by contaminate levels may be difficult or impossible.
- The necessary area needed for dewatering and storage may not be available depending on the specific sit.
- In drought years there may be too little water in the pond to effectively float and propel the dredge.
- Projects are typically more expensive than conventional excavation methods.
- Sediment pumped to filter bags must be handled a second time when the bags are opened and sediment is loaded into trucks for transportation off site.
- Grinding or mulching dense vegetation can be a messy and difficult process when large amounts of woody debris (logs, stumps) are encountered. Dense vegetation can slow down the dredging process and it may also increase time and cost.

Regardless of method; survey work is usually conducted to better estimate the amount of sediment to be removed and to identify the depths of excavation in order to restore desired capacity. If the removal volume is not defined by surveying then establishing a standard volume per truck and calculating the volume based on truck loads leaving the site can be used to track the volume in cubic yards.

Excavating or removing sediment from stormwater collection systems requires care to prevent turbid water and pollutants from impacting down-stream waters such as wetlands, streams,

rivers, or lakes. This is just as true for winter sediment removal projects as it is for projects conducted during the summer months.

5. Site restoration and erosion control

Site restoration work should be conducted as soon as weather conditions permit and may include:

- Additional clean-up or maintenance of inlet and outlet structures.
- Additional site stabilization work including sediment and erosion control.
- Establishing plants, seed, sod, mulch, or vegetation to prevent erosion (above water line).
- Professional engineer sign-off on project completion.

Erosion control (temporary and permanent) are typically incorporated into plans and specifications for stormwater sediment removal projects. Permanent erosion-control features may include provisions for:

1. Vegetative buffer strips around the pond
2. Design of grassed waterways and overflow channels
3. Armoring of spillways and banks, or other features needed to prevent erosion for the life cycle of the stormwater collection and conveyance system

Temporary erosion control features may include provisions such as mulch, tackifiers, or erosion control blankets to prevent erosion until seeding takes root and vegetation becomes established. Erosion of banks, side slopes, safety benches, spillways, outfalls, channels, and adjacent upland areas disturbed by machinery are all priority areas during site restoration. These areas should be stabilized as quickly as possible to prevent erosion.

Areas susceptible to erosion should be inspected frequently following a sediment removal project. If erosion occurs the eroded areas should be restored as quickly as possible. If erosion persists action must be taken immediately to protect downstream receiving wasters with permanent erosion control. Permanent features may include:

- Bioengineering strategies
- Turf reinforcement mats
- Vegetated-concrete-block-armoring
- Properly sized riprap and filter materials

Vegetated buffer strips (25 feet or more) are recommended to surround the stormwater pond (whenever possible) to prevent erosion from the pond's immediate tributary. Establishing vegetation not only helps maintain the integrity of the pond, it also helps with the ponds overall appearance. Establishing vegetation is important, but care should be taken to prevent trees, shrubs, or brush from growing within 15 feet of the toe of the embankment, or 25 feet from the inlet and outlet structures. Roots can damage pipes and other infrastructure, but trees and shrubs can also clog inlets and outlets and prevent the stormwater pond from functioning properly.

6. Records and documentation to keep on file

It is important to keep good records about the operation and maintenance of stormwater collection systems. Good records will not only assist with an accurate inventory and triage of stormwater ponds, but they can also provide the basis for sound planning in the future. Important records and documentation for sediment removal projects may include:

- Inspection dates and frequency of inspections **(Required by MS4 Permit)**

- Description of maintenance and dates performed **(Required by MS4 Permit)**
- The unique ID# of the pond **(Required by MS4 Permit)**
- Employee training records **(Required by MS4 Permit)**
- Volume of sediment removed in cubic yards **(Required by MS4 Permit)**
- Evaluation, testing, and/or laboratory results **(Required by MS4 Permit)**
- Place of disposition/disposal **(Required by MS4 Permit)**
- "As Built" prints or plans if they exist
- The name and geographical location of the pond with reference to nearest cross roads
- Contractor information, shipping papers/manifests/contractual agreements
- Any other observations about the sediment removal, or work performed, that will help the city operate and maintain that site in the future

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Appendix A: Sediment Sampling and Analytical Technical Guidance

This technical guidance should be shared with staff or environmental consultants responsible for sampling sediments and interpreting the analytical results for the owner or responsible party. It is the responsibility of the owner or responsible party to either train their staff or select consultants who can perform these tasks.

What's New?

- MPCA now requires sediment sampling be conducted regardless of the volume of sediment to be excavated.
- Information regarding selection of a laboratory.

Sediment sampling

The US Environmental Protection Agency's (EPAs) report on "Methods for Collection, Storage and Manipulation of Sediments for Chemical and Toxicological Analyses: Technical Manual" (USEPA 2001) provides guidance on sediment monitoring plans, collection of whole sediments, field sample processing, transport and storage of sediments, sediment manipulations, and quality assurance/quality control (QA/QC) issues. This report should be used as a resource by owners or responsible parties, and their consultants, for sampling and processing stormwater pond sediments. In particular, this user-friendly document provides pictures of sediment sampling equipment, flowcharts for making decisions, check lists, and boxes of important bulleted items.

Sediment characterization

Stormwater pond sediments are very complex, and chemical results can vary greatly within a few yards of each sample. This feature makes it more difficult to provide generic guidance for a broad suite of stormwater ponds. Stormwater ponds may also vary in size and shape, and some ponds may have multiple inlets and outlets. Finally, the type of land uses in the drainage areas of the ponds can influence contaminant concentrations in the pond sediments.

Based on the MPCA's 2009 stormwater pond study (Crane 2014), coal tar-based sealant sources comprised 67.1% of total PAHs in surface sediments of ponds located primarily in residential, commercial, and industrial land use areas. Watersheds where coal tar-based sealants are used on driveways and parking lots will have higher concentrations of PAHs in nearby stormwater pond sediments than those that use either asphalt-based sealants (which have much lower concentrations of PAHs), no sealant, or use other material such as concrete, permeable pavers, or gravel for driveways and parking lots. Even though a statewide ban on coal tar-based sealants went into effect January 1, 2014 in Minnesota, abraded coal tar-based sealant particles from existing driveways and parking lots will continue to wash off into stormwater collection and conveyance systems for years to come. As these parking lots and driveways are sealed with asphalt-based sealants in the future, and with the elimination of new applications of coal tar-based sealants, concentrations of PAHs contamination in sediment deposits is expected to be reduced over time.

The MPCA is requiring owners or responsible parties to sample sediments prior to their disposal to determine concentrations of 17 cPAHs, 10 noncarcinogenic PAHs, and the following metals: arsenic, barium, cadmium, chromium, copper, lead, mercury, selenium, and silver. A list of the specific cPAHs

and noncarcinogenic PAHs can be found in MPCA's "Summary of Stormwater Pond Sediment Testing Results" spreadsheet available on MPCA's website MS4 stormwater web page at: http://www.pca.state.mn.us/sbiza7c. Click on the "Permit" tab and scroll down to the bottom under the "Additional Items" heading. It is the responsibility of the owner or responsible party to evaluate the drainage area of each stormwater collection system to determine whether spills, improper disposal, or the potential for a release from commercial or industrial operations indicate that sampling for other contaminants are needed. For example, if sediment is being removed from a pond in an industrial park and there has been a release of contaminants known to accumulate in sediments (example, nickel from a metal plating facility), the owner or responsible party should include those contaminants on the list for sampling.

Analysis of sediment samples for particle size and total organic carbon (TOC) is optional, but this information may be useful for some beneficial reuse scenarios of the excavated sediment.

The analytical laboratory will provide guidance on how much sediment is needed for each analysis. Since it can sometimes take several months from the time field sampling is conducted to when the analytical results become available, the field sampling needs to be conducted early on in the process to provide timely assessments of management options. Sediment sampling for required analytical parameters needs to be conducted regardless of the volume of sediment to be excavated from the pond.

General guidance for characterizing sediment is as follows:

- Sampling should be to the planned depth of excavation or greater. The MPCA has provided previous guidance to collect sediment samples in two foot intervals (e.g., 0 – 2 ft, 2 - 4 ft), but it is up to the owner or responsible party to collect sediment samples that will cover the depth to be dredged. If it is easier in the field to collect two foot depth intervals, then by all means continue to do this. The important issue is to send a sediment sample to the analytical laboratory that is representative of the entire depth interval to be excavated. Since collecting sediment from two or more long (2 ft) cores may entail a large mass of sediment, it may be easier to slice the core from top to bottom and only analyze half of the slice; this slice can be combined with a deeper layer slice to provide one composite sample for the analytical laboratory to analyze. It is not acceptable to randomly scoop out bits of sediment from different portions of the sediment core to composite together since doing so may miss out on the historical record of sediments (and contaminants) deposited in different depth intervals.
- Core samplers are more appropriate to use to obtain cohesive sediment samples at a depth than grab samplers. Grab samplers can be used to collect surface samples if the sediment samples are too floccy (loose) with vegetative detritus (e.g., parts of cattail stalks/leaves) or are too sandy to be retained in a core sampler.
- Geopositional coordinates need to be collected at the location of each sample site.
- The number of samples to be collected depends on the surface area of the pond. [Note: this is a change in policy from previous MPCA guidance (Stollenwerk et al. 2011) that recommended the number of samples per the estimated volume of dredge material.] The goal is to collect sediment samples that are representative of the material that will be removed to maintain the functionality of the stormwater pond.
- Multiple samples need to be collected, particularly since some compounds may not be detected in all areas of the pond.
- For stormwater ponds with a surface area less than or equal to one acre, at least two stations need to be sampled for chemical analysis. Sample sites may either be selected randomly or by a transect from the main inlet to the outlet of the pond.

- For ponds greater than one acre and less than four acres, one sampling station should be located in each acre and portion of an acre of the pond. In some cases, multiple samples may need to be collected at the same station and composited together to provide an adequate mass of sediment for the analytical work. Sample sites may either be selected randomly or in a transect from the main inlet to outlet of the pond.
- For ponds larger than four acres, divide the pond into four sections (quadrants) as shown in Figure A-1. Select at least five sites (i.e., subsamples) within each quadrant using either the dice pattern shown in Figure A-1 or using a random sampling strategy. Sediment from each subsample needs to homogenized (mixed well) in a precleaned container (large 4 L Pyrex mixing cups work well; larger volumes can use precleaned buckets). An equal aliquot of sediment from each subsample is then composited together to form the sediment sample for that quadrant that is submitted to the analytical laboratory.
- For natural ponds larger than four acres that have an irregular shape, such as bays off the main pond, each bay should be sampled if it is targeted for dredging. Depending on the size of the bay, use the aforementioned guidance for developing a sampling plan.
- If more than 10 samples are collected for analysis (possibly from a study of multiple ponds during the same time period), a field replicate sample needs to be collected for every 10 samples (i.e., 10% of samples). A field replicate is collected in close proximity to the other sample and provides a measure of field precision.
- Remove any rocks, pebbles, trash, large invertebrates (like beetles), or large pieces of detritus from each subsample and composite sample.
- Overlying water needs to be decanted from the subsamples and composite sediment sample in the field prior to splitting the sample into the sample jars.
- Sediment samples from stormwater ponds can vary in their consistency. Some samples may be loose ("soupy") if they contain a lot of cattail or wetland plant detritus. In these cases, collect extra sediment to ensure the laboratory will have enough mass of sediment to conduct their analyses.
- Sediment samples need to be homogenized (mixed well) before splitting the sample into pre-cleaned jars for the PAH and metals analyses. Many laboratories will measure the percent moisture of the sediment samples to convert the results to dry weight measurements. In some cases, the laboratories may provide a separate sampling container for percent moisture, and it may be billed as a separate analysis. The analytical laboratory will provide pre-cleaned jars and sample labels for their clients.
    - It is important with PAHs to use amber, pesticide-grade, pre-cleaned glass jars with Teflon™-lined lids since PAHs may be degraded by sunlight. Use a permanent marker to fill out the sample label; it is helpful to wrap clear packing tape around the label to secure it on the jar since sometimes the labels can come loose while the sample jars are stored on ice during field sampling.
    - The laboratory will provide separate containers for metals.
- Store the sediment samples on ice in a cooler during field sampling. Sample tracking forms or chain-of-custody forms are helpful to use during field sampling to record observations about the sediment samples and to provide field sampling information (e.g., sample station, date, time, sampling equipment, analyses to be done). Most analytical laboratories will provide their clients with chain-of-custody forms.

Submit samples to analytical laboratories

At the end of each field sampling day, either transfer the samples directly to the analytical laboratory, which is preferred, or store them in an interim refrigerator or freezer (depending on the specifications of the laboratory) prior to submittal. Some laboratories may provide a courier pick-up service. When out-

of-town laboratories are used, ship the samples on ice in sturdy coolers using an overnight courier; also use packing peanuts and consider wrapping each jar in bubble wrap.

The analytical laboratories will provide guidance on the holding times for samples based on the analytical parameter. Sediment samples can usually be frozen to extend the holding time, but care must be taken to only fill the sample jars two-thirds full to allow room for expansion while the sediment freezes.

To increase the success of the analytical work, follow these steps prior to submitting the sediment samples:

- Even with decanting overlying water during field sampling, the sample jars may contain a layer of water over the sediment. This water needs to be removed prior to analysis. Either the field sampler (if the samples are stored overnight at an interim facility) or the analytical laboratory needs to remove this overlying water. Laboratory staff will not automatically do this step, and the client needs to specify if they want this done. Use of a pre-cleaned, wide-bore pipette to remove overlying water is better than decanting the sample since it will not disturb the sediment as much in the jar. If the laboratory receives sediment samples that have a high water content, then there may not be enough mass of sediment available to do their analyses.
- Provide the analytical laboratory with recommendations on which sample(s) would make good candidate Matrix Spike/Matrix Spike Duplicate (MS/MSD) samples for the cPAH analysis. This is important since the laboratory receives a subsample of the field sample and does not have the field sampling observations the field sampling crew noted when the sample was collected. If guidance is not provided and the laboratory ends up selecting a sediment sample high in PAHs (as occurred with the MPCA's stormwater pond study), the results of the MS/MSD will not be as useful and the client will still be charged for this analysis. Good candidate samples would be expected to have lower concentrations of PAHs so that the spike level of the MS/MSD will be at least five times greater than the background sample. Avoid designating samples that have strong petroleum odors, have an oil sheen overlying the sediment, or are dark black and oily in appearance since these samples are likely to have high concentrations of PAHs or interferences.
- Provide a copy of the sample tracking form to the analytical laboratory when the samples are submitted or shipped to them.

How to Select an Analytical Laboratory:

Municipalities can access laboratory services through the Minnesota Department of Administration Cooperative Purchasing Venture (CPV) program. There is no charge to sign-up, and the CPV program is open to all municipalities. The CPV program allows municipalities to obtain laboratory services through state-negotiated contract prices. Municipalities who are not currently a CPV member, but would like to become one, may sign-up for this program at the Minnesota Department of Administration's website at: http://www.mmd.admin.state.mn.us/cpv2.htm. The Minnesota Department of Administration's website contains a comprehensive list of state-negotiated contracts. The following list is a sub-set specific to sampling and laboratory analysis.

S-792(5)	SAMPLING & LABORATORY ANALYSIS - ENVIRONMENTAL
L-377(5)	LAB ANALYSIS: AGE DATING OF YOUNG GROUNDWATER
L-369(5)	LAB ANALYSIS: CONTAMINANTS OF EMERGING CONCERN (CECs)
L-368(5)	LAB ANALYSIS: ENVIRONMENTAL ISOTOPE GEOCHEMISTRY
L-379(5)	LAB ANALYSIS-COLILERT®/ECOLI
L-347(5)	LABORATORY ANALYSIS - INVER. SAMP. PROC. & IDENT.

Laboratories that freeze dry the sediment samples prior to extraction and analysis for PAHs and metals, as well as other contaminants of potential concern, reduce or eliminate the problems of wet samples. These laboratories are also able to achieve lower detection limits and more quantitative determinations. Freeze drying of the sample also allows for complete homogenization of the sample matrix, which will result in improved precision. Although not a requirement, better results may be obtained using this preparation method.

Analytical methods

The primary analytical methods are provided below:

The extended list of PAHs, including 17 cPAHs (Table A-1) and noncarcinogenic PAHs, must be analyzed based on the most recent final version of EPA SW-846 Method 8270 by gas chromatography/mass spectrometry (GC/MS) with selective ion monitoring (SIM) as optional.

- Since sediments from stormwater ponds usually contain interfering compounds, it is required that the analytical laboratory run the sample extracts through clean-up columns, rather than just diluting the sample extract to reduce interfering compounds. An example clean-up process is to pass the sample extract through an alumina (and/or silica gel) column to isolate the hydrocarbon fraction. A layer of activated copper can be added to the bottom of the column or to the sample extract to remove any sulfur that may have been present in the samples. Refer to EPA SW-846 Method 8270D (section 11.2), and Method 3600C for guidance on appropriate cleanup techniques. When sample extracts are subjected to cleanup procedures, the associated batch quality control samples, i.e., method blank, laboratory control sample (LCS), MS/MSD etc., must also be subjected to the same cleanup procedures. Note that 14 cPAHs were detected in the MPCA's study of stormwater pond sediments (Crane in review), and either more cPAHs or a greater percentage of cPAHs may have been detected if clean-up columns had been used instead of diluting the sample extracts (Table A-2). These results, in addition to other factors described in Table A-2, were used to shorten the list of cPAHs from 25 to 17 compounds.
- The analytical laboratory must be asked to note J-flagged data that are in-between the method detection limit and the reporting limit.

- Metals, excluding mercury, should be analyzed by inductively coupled plasma—mass spectrometry (ICP—MS) using the most recent final version of EPA SW-846 Method 6020. Occasionally, confirmation of the metal may be needed using graphite furnace atomic absorption spectrophotometry.
- Mercury is analyzed by atomic absorption cold vapor spectrometry using EPA SW-7471.
- Percent moisture should be determined using reference method ASTM D2216 or as instructed by the sample preparation method.
- TOC, if needed, can be analyzed using the most recent final version of EPA SW-846 Method 9060.
- Particle size, if needed, can be analyzed multiple ways to determine percent sand, silt, and clay. If only the inorganic particle size fraction is needed, then the sediment samples will need to be pretreated to remove organic matter. If organic matter is included in the analysis, then the "apparent" (i.e., organic plus inorganic) particle size distribution will be determined.

QA/QC data quality indicators

The field sampling procedures and analytical methods include several QA/QC measures to ensure useable data are collected and measured. In particular, data quality indicators (DQIs) are qualitative and quantitative descriptors used in interpreting the degree of acceptability or utility of data. The principal DQIs are precision, bias, representativeness, comparability, and completeness; these terms are described further in Attachment 1. Establishing acceptance criteria for the DQIs sets quantitative goals for the quality of data generated in the analytical measurement process.

For cPAHs and noncarcinogenic PAHs by EPA Method 8270, the DQIs set by the MPCA are:

- Blanks: <five times the method detection limit (MDL); procedural blanks should be prepared with each analytical batch of 20 samples or less.
- Surrogate Recovery: 40-120% the recovery of the surrogate compounds are used to measure data quality in terms of accuracy (extraction efficiency).
- Laboratory Control Sample (LCS) and Matrix Spike (MS) Recovery: 40-120%; the percent recoveries of target analytes are calculated to measure data quality in terms of accuracy.
- MS/Matrix Spike Duplicate (MSD) Precision: relative percent difference (RPD) <30%; this is used to evaluate the data in terms of precision.
- Reporting Limit of 10-30 µg/kg dry weight for individual PAH compounds.

For metals (arsenic and copper):

- Blanks: <five times the MDL; procedural blanks should be prepared with each analytical batch of 20 samples or less.
- Precision (% RPD): <10%
- Accuracy: 85 – 115%
- Reporting Limit for metals: 0.10 mg/kg dry wt.

Electronic data requirements

- Electronic copies of the data should be obtained from the analytical laboratory in spreadsheet format (e.g., Microsoft Excel). Laboratories will normally report sample concentrations down to the reporting limit. Request that the laboratory also report sample concentrations down to the method detection limit to ensure B[a]P equivalents can be calculated appropriately (Appendix B).
- In the future, the MPCA may be interested in obtaining electronic copies of the analytical results for archiving it in the MPCA's database system. At the present time, though, the MPCA's database platform, EQuIS, is not set-up to accommodate sediment chemistry data.

References

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Stollenwerk, J., J. Smith, B. Ballavance, J. Rantala, D. Thompson, S. McDonald, and E. Schnick. 2011. Managing dredged materials in the State of Minnesota. Minnesota Pollution Control Agency, St. Paul, MN. MPCA document number wq-gen2-01. http://www.pca.state.mn.us/index.php/view-document.html?gid=12959.

USEPA. 2001. Methods for collection, storage and manipulation of sediments for chemical and toxicological analyses: Technical manual. U.S. Environmental Protection Agency, Office of Water, Washington, DC. EPA-823-B-01-002 (http://water.epa.gov/polwaste/sediments/cs/collection.cfm).

USEPA "SW-846 Test Methods for Evaluating Solid Waste", Update IV of the Third Edition; Methods 6020, 8270.

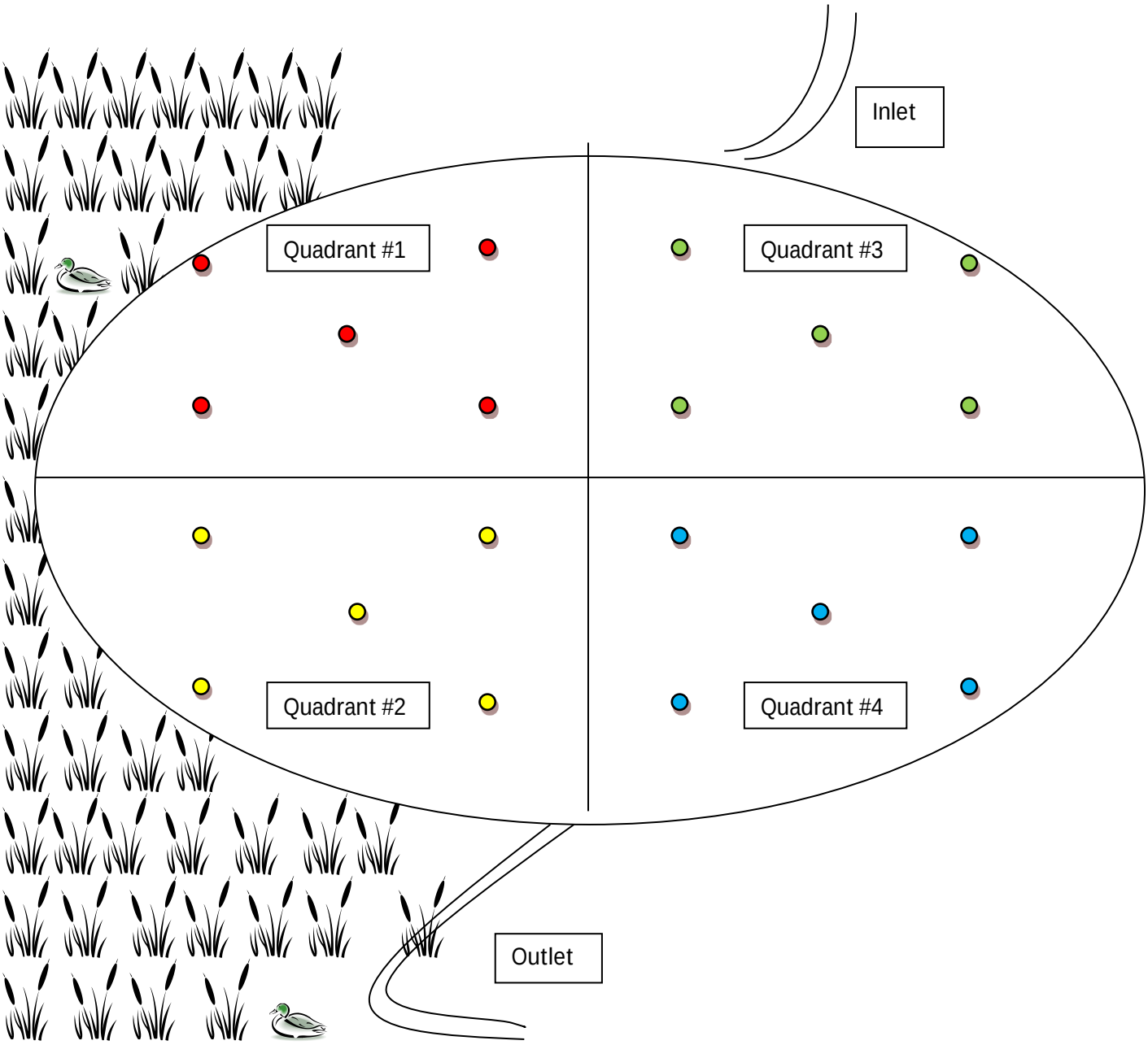

Figure A-1. Sediment sampling scheme for a stormwater pond greater than four acres in size.

Table A-1. List of PAHs to be Analyzed in Stormwater Pond Sediments

PAH Compounds Included in EPA Method 8270	cPAHs	U.S. EPA Group B2 Probable Human Carcinogens
Acenaphthene		
Acenaphthylene		
Anthracene		
Benzo[a]anthracene	X	X
Benzo[a]pyrene	X	X
Benzo[b]fluoranthene	X	
Benzo[j]fluoranthene	X	X
Benzo[e]pyrene		
Benzo[g,h,i]perylene		
Benzo[k]fluoranthene	X	X
Benzofluoranthenes (Total)		
Carbazole		
2-Chloronaphthalene		
Chrysene	X	X
Dibenz[a,h]acridine	X	
Dibenz[a,h]anthracene	X	X
Dibenzo[a,e]pyrene	X	
Dibenzo[a,h]pyrene	X	
Dibenzo[a,i]pyrene	X	
Dibenzo[a,l]pyrene	X	
7H-Dibenzo[c,g]carbazole	X	
Dibenzofuran		
7,12-Dimethylbenz[a]anthracene	X	
Fluoranthene		
Fluorene		
Indeno[1,2,3-cd]pyrene	X	X
3-Methylcholanthrene	X	
5-Methylchrysene	X	
1-Methylnaphthalene		
2-Methylnaphthalene		
Naphthalene		
Perylene		
Phenanthrene		
Pyrene		

Note: A combination of benzo[b]fluoranthene, benzo[j]fluoranthene, and/or benzo[k]fluoranthene frequently coelute together when sediments are analyzed

Table A-2. Percent of Detected cPAHs in a MPCA Study of Metro Area Stormwater Ponds (Crane in review)*

Parameter	# of Detects**	% Detected
Chrysene	44	73.3
Benzo[b&j]fluoranthene	42	70.0
Benzo[a]pyrene	41	68.3
Indeno[1,2,3-c,d]pyrene	38	63.3
Benzo[a]anthracene	34	56.7
Benzo[k]fluoranthene	34	56.7
Dibenzo[a,e]pyrene	33	55.0
Dibenzo[a,i]pyrene	32	53.3
Dibenzo[a,h]pyrene	23	38.3
Dibenzo[a,h]anthracene	15	25.0
Dibenz[a,h]acridine	10	16.7
3-Methylcholanthrene	4	6.7
Dibenzo[a,l]pyrene	4	6.7
5-Methylchrysene	1	1.7

* Sediment samples were analyzed without using clean-up columns. The reporting limits were elevated as a result of diluting the sample extracts to remove chemical interferences. A higher percentage of detected cPAHs probably would have been achieved if the sample extracts had been run through clean-up columns.

** Results exclude field replicate data; n = 60 samples.

The following cPAHs were not detected in any samples: 1,6-Dinitropyrene, 1,8-Dinitropyrene, 1-Nitropyrene, 2-Nitrofluorene, 4-Nitropyrene, 5-Nitroacenaphthene, 6-Nitrochrysene, 7,12-Dimethylbenz(a)anthracene, 7H-Dibenzo(c,g)carbazole, and Dibenz(a,j)acridine.

Note: the MPCA evaluated this list of 25 cPAHs to determine if some of these cPAHs could be dropped from the analytical list for stormwater pond sediments. As indicated in Appendix B, this list of 25 cPAHs was adopted from an air quality program at California EPA. However, not all of these atmospheric cPAHs in California may be of concern in stormwater pond sediments in Minnesota. The above data set was reviewed, in addition to the percentage of detected cPAHs in other sediment data sets available to the MPCA (including some other metro-area stormwater pond sediments and sites included under the MPCA's Remediation Program). Additional input to the MPCA's evaluation came from recommendations from the Minnesota Department of Health for cPAHs to analyze in stormwater pond sediments, as well as human health-based toxicity data, environmental fate information, the results of the MPCA's environmental forensic work to determine sources of PAHs in metro-area stormwater ponds (Crane in review), and commercial production information. All of this information was used to shorten the list of cPAHs from 25 to 17 compounds (Table A-1). As additional data become available, the MPCA will periodically assess whether further changes are needed to this list.

Attachment 1. Data quality indicators

This section is based on quality assurance/quality control (QA/QC) guidance provided by the U.S. Environmental Protection Agency (USEPA 2002). Data Quality Indicators (DQIs) are qualitative and quantitative descriptors used in interpreting the degree of acceptability or utility of data. The principal DQIs are precision, bias, representativeness, comparability, and completeness. Establishing acceptance criteria for the DQIs sets quantitative goals for the quality of data generated in the analytical measurement process.

Precision

Precision is a measure of agreement among replicate measurements of the same property, under prescribed similar conditions. This agreement is calculated as either the range (R) or as the standard deviation (s). It may also be expressed as a percentage of the mean of the measurements, such as relative percent difference (RPD) or relative standard deviation (RSD) (for three or more replicates).

Field precision is assessed through the collection and measurement of field replicates at a rate of one replicate per ten analytical samples. This allows intralaboratory precision information to be obtained on sample acquisition, handling, shipping, storage, preparation, and analysis. Both samples can be carried through the steps in the measurement process together to provide an estimate of short-term precision. An estimate of long-term precision can be obtained by separating the two samples and processing them at different times or by different people and/or analyzed using different instruments.

For duplicate measurements, relative percent difference (RPD) is calculated as follows:

$$RPD = \frac{|D_1 - D_2|}{(D_1 + D_2)/2} \times 100\%$$

RPD = relative percent difference

D_1 = sample value

D_2 = duplicate sample value

$|D_1 - D_2|$ = absolute value of the sample minus the duplicate sample values

For three or more replicates:

$$RSD = (s/x) \times 100$$

RSD = relative standard deviation

s = standard deviation of three or more results

x = mean of three or more results

Standard deviation is defined as follows:

$$s = ((\sum (y_i - \text{mean } y)^2 \times 1/(n-1)))^{0.5}$$

s = standard deviation

y_i = measured value of the ith replicate

mean y = mean of replicate measurements

n = number of replicates

Bias

Bias is the systematic or persistent distortion of a measurement process that causes errors in one direction. Bias assessments for environmental measurements are made using personnel, equipment, and spiking materials or reference materials as independent as possible from those used in the calibration of the measurement system. When possible, bias assessments should be based on analysis of spiked samples rather than reference materials so that the effect of the matrix on recovery is incorporated into the assessment. A documented spiking protocol and consistency in following that protocol are important to obtaining meaningful data quality estimates. Spikes should be added at different concentration levels to cover the range of expected sample concentrations. The use of spiked surrogate compounds for GC/MS (SIM) procedures for PAH compounds are used to assess for bias.

Accuracy

Accuracy is a measure of the closeness of an individual measurement of the average of a number of measurements to the true value. Accuracy includes a combination of random error (precision) and systematic error (bias) components that result from sampling and analytical operations.

Accuracy in the field is assessed through the adherence to all sample handling, preservation, and holding times. In order to assure the accuracy of the analytical procedures, an environmental sample will be randomly selected from each sample shipment received at the laboratory, and spiked with a known amount of the analytes to be evaluated. In general, a sample spike will be included in every set of 20 samples tested on each instrument. The spike sample will then be analyzed. The increase in concentration of the analyte observed in the spiked sample, due to the addition of a known quantity of the analyte, compared to the reported value of the same analyte in the unspiked sample determines the percent recovery. The percent recovery for a spiked sample is calculated according to the following formula:

$$\%R = 100\% \times (S-U)/C_{sa}$$

%R = percent recovery

S = measured concentration in spiked sample

U = measured concentration in unspiked sample

C_{sa} = actual concentration of spike added

For situations where a standard reference material (SRM) is used in addition to a matrix spike:

$$\%R = 100\% \times C_m/C_{srm}$$

%R = percent recovery

C_m = measured concentration of SRM

C_{srm} = actual concentration of SRM

Representativeness

Representativeness expresses the degree to which data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. Representativeness is a qualitative term that should be evaluated to determine whether *in situ* and other measurements are made and physical samples collected in such a manner that the resulting data appropriately reflect the media and phenomenon measured or studied.

For field data, representativeness is dependent upon the proper design of the sampling program and will be satisfied by ensuring that the field sampling plan is followed and that proper sampling techniques are used.

Representativeness in the laboratory is ensured by using the proper analytical procedures, meeting sample holding times, and analyzing and assessing laboratory duplicates for the chemistry samples.

Comparability

Comparability is the qualitative term that expresses the confidence that two data sets can contribute to a common analysis and interpolation. Comparability must be carefully evaluated to establish whether two data sets can be considered equivalent in regard to the measurement of a specific variable or groups of variables. In a laboratory analysis, the term comparability focuses on method type comparison, holding times, stability issues, and aspects of overall analytical quantitation.

There are a number of issues that can make two data sets comparable, and the presence of each of the following items enhances their comparability:

- Two data sets should contain the same set of variables of interest
- Units in which these variables were measured should be convertible to a common metric
- Similar analytical procedures and quality assurance should be used to collect data for both data sets
- Time measurements of certain characteristics (variables) should be similar for both data sets
- Measuring devices used for both data sets should have approximately similar detection levels
- Rules for excluding certain types of observations from both samples should be similar
- Samples within data sets should be selected in a similar manner
- Sampling frames from which the samples were selected should be similar
- Number of observations in both data sets should be of the same order or magnitude

These characteristics vary in importance depending on the final use of the data. The closer two data sets are with regard to these characteristics, the more appropriate it will be to compare them. Large differences between characteristics may be of only minor importance, depending on the decision that is to be made from the data.

Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions. Field completeness is a measure of the amount of valid measurements obtained from all the measurements taken in the project. Field completeness for sampling stormwater ponds should be greater than 95%. Laboratory completeness is a measure of the amount of valid measurements obtained from all the measurements taken in the project. Laboratory completeness should be greater than 95% of the total number of samples submitted to the analytical laboratories.

The calculation for percent completeness is as follows:

$$\%C = 100\% \times (V/n)$$

%C = percent completeness

V = number of valid measurements

n = number of measurements planned

Reference

USEPA. 2002. Guidance for quality assurance project plans. U.S. Environmental Protection Agency, Office of Environmental Information, Washington, DC. EPA/240/R-02/009. (http://www.epa.gov/quality/qs-docs/g5-final.pdf).

Appendix B: Soil Reference Values and Benzo[a]pyrene Equivalents

Appendix B provides guidance for comparing contaminant concentrations from stormwater pond sediment to the MPCA's Remediation Division Soil Reference Values (SRVs) and instructions for calculating benzo[a]pyrene (B[a]P) equivalents for carcinogenic polycyclic aromatic hydrocarbons (cPAHs).

Comparing sediment contaminant concentrations to SRVs

Soil Reference Values (SRVs):

SRVs are risk based values derived to assess potential human health exposures from soil at a Remediation cleanup site using a reasonable maximum exposure (RME) scenario. RME scenarios are intended to protect an entire population without being overly conservative by using reasonable upper bound estimates for the most sensitive exposure parameters and central tendency estimates for less sensitive exposure parameters.

They are intended to evaluate both potential non-cancer and cancer risks associated with a contaminant present in soil. Two separate SRVs are calculated for each contaminant, one for non-cancer risk and one for cancer risk. The final SRV reported as the Residential or Industrial SRV is the lower of the two. In other words, it is the smallest concentration of the contaminant that could potentially pose either a non-cancer or cancer risk. For example, for contaminant "X", if the non-cancer SRV is 10 mg/kg and the cancer SRV is 5 mg/kg, then the final SRV is reported as 5 mg/kg.

Since stormwater sediment removed from the stormwater pond is being evaluated for use on dry land as soil, SRVs are an appropriate conservative risk based values to evaluate potential human health risks.

"Summary of Stormwater Pond Sediment Testing Results" Spreadsheet:

MPCA's stormwater program "Summary of Stormwater Pond Sediment Testing Results" spreadsheet allows users to compare stormwater pond sediment data to SRVs. The spreadsheet is available on MPCA's website MS4 stormwater web page at: http://www.pca.state.mn.us/sbiza7c. Click on the "Permit" tab and scroll down to the bottom under the "Additional Items" heading.

The spreadsheet will open to the "BaP equiv. calculation" tab used to compare the data to the SRVs. There are three sections where data can be entered:

- Metals
- Noncarcinogenic PAHs
- Carcinogenic PAHs/ BaP Equivalents

For metals and noncarcinogenic PAHs

1. Enter the chemicals reporting limit into column B, "Reporting Limit"
2. Enter the core location (sample) data (concentrations) in columns E through J, "Core Location #"
3. Compare the chemical data (concentrations) in columns E&f, G&H and I&J to the Residential and Industrial SRVs listed in columns C and D

For carcinogenic PAHs/B[a]P Equivalents when all cPAHs have been detected

1. Enter the chemicals reporting limit in column B, "Reporting Limit"

2. Enter the core location data (concentration) into columns E, G and I, "Core Location #"
3. The spreadsheet automatically calculates the BaP Equivalent concentration in columns F, H and J, "BaP Equiv. Conc."
4. Compare the "Total B[a]P equivalents Detected Data Only" in columns F, H and J, row 39, to the Residential and Industrial SRVs listed for B[a]P in columns C and D

Please see additional details regarding the calculation of B[a]P equivalents, including the use of data that contains samples where cPAHs were not detected (nondetects), in the next section.

Calculating B[a]P equivalents

Minnesota Department of Health Guidance

The Minnesota Department of Health (MDH) issued new guidance regarding the calculation of B[a]P equivalents in August, 2013 that was revised in October, 2014 (http://www.health.state.mn.us/divs/eh/risk/guidance/pahguidance.pdf). Several new cPAHs were added to the required list to be analyzed that currently do not have analytical methods for soil. At this time it is not feasible to adopt MDH's August, 2013 guidance for use with the Remediation Division's soil reference values (SRVs). MPCA will continue to use the potency equivalency factor (PEF) method previously recommended by MDH to evaluate human health risks from cPAHs until new analytical methods for soil are developed for the new cPAHs on the revised list.

MDH's previous recommendation was based on evaluating the 25 cPAHs that the California Environmental Protection Agency (Cal EPA) identified as being probable or possible human carcinogens (Cal EPA 1993, 2009; MDH 2001). Since toxicity data does not exist for all individual cPAHs, they are evaluated according to how potent they are in relation to a reference contaminant, B[a]P. Assuming B[a]P has a toxicity of one, other cPAHs are assigned a PEF to indicate how toxic they are in comparison to B[a]P. Table B-1 lists B[a]P PEFs for 17 cPAHs to be measured in stormwater pond sediments (see Appendix A, Table A-2 for additional explanation). This section only pertains to cPAHs, which are evaluated by using B[a]P equivalents. Noncarcinogenic PAHs are evaluated individually and are not included in the total B[a]P equivalent concentration.

Table B-1. B[a]P Potency Equivalency Factors (PEFs)

cPAH	PEF	cPAH	PEF
Benz[a]anthracene*	0.1	Dibenzo[a,e]pyrene	1
Benzo[b]fluoranthene	0.1	Dibenzo[a,h]pyrene	10
Benzo[j]fluoranthene	0.1	Dibenzo[a,i]pyrene	10
Benzo[k]fluoranthene	0.1	Dibenzo[a,l]pyrene	10
Benzo[a]pyrene	***1.0***	7,12-Dimethylbenzanthracene	34
Chrysene	0.01	Indeno[1,2,3-c,d]pyrene	0.1
Dibenz[a,h]acridine	0.1	3-Methylcholanthrene	3
Dibenz[a,h]anthracene	0.56	5-Methylchrysene	1
7H-Dibenzo[c,g]carbazole	1		

* A common synonym for this compound is Benzo[a]anthracene

** Benzo[a]pyrene is the reference contaminant

Site sediment concentrations of individual cPAHs are multiplied by the corresponding PEF value in Table B-1 to obtain an individual B[a]P equivalent concentration. These individual B[a]P equivalent

concentrations are summed for all cPAHs to arrive at a total B[a]P equivalent concentration that is compared to the B[a]P SRV. For example, Table B-2 shows how the B[a]P equivalents were calculated for a hypothetical stormwater pond where all 17 cPAHs were detected in the sediment sample. The "Site Concentration" for each cPAH is entered into Column C. Each cPAH concentration is multiplied by the corresponding "Potency Equivalency Factor (PEF)"in Column B to arrive at the individual "BaP Equivalent" concentration in Column D. B[a]P equivalent concentrations are then summed to obtain the "Total BaP Equivalents" at the bottom of Column D.

Table B-2. Example – Calculating Total B[a]P Equivalents for Detected cPAH Data

A cPAH Contaminant	B Potency Equivalent Factor (PEF)	C Site Concentration mg/kg	D BaP Equivalent mg/kg
Benz[a]anthracene	0.1	2.190	0.219
Benzo[b]fluoranthene*	0.1	3.750	0.375
Benzo[j]fluoranthene*	0.1	0.000	0.000
Benzo[k]fluoranthene	0.1	1.320	0.132
Benzo[a]pyrene	1	2.270	2.270
Chrysene	0.01	2.790	0.028
Dibenz[a,h]acridine	0.1	0.219	0.022
Dibenz[a,h]anthracene	0.56	0.270	0.152
7H-Dibenzo[c,g]carbazole	1	0.160	0.160
Dibenzo[a,e]pyrene	1	0.828	0.828
Dibenzo[a,h]pyrene	10	0.419	4.190
Dibenzo[a,i]pyrene	10	0.391	3.910
Dibenzo[a,l]pyrene	10	0.150	1.500
7,12-Dimethylbenzanthracene	34	0.150	5.137
Indeno[1,2,3,-c,d]pyrene	0.1	1.350	0.135
3-Methylcholanthrene	3	0.170	0.512
5-Methylchrysene	1	0.160	0.160
		Total BaP Equivalents =	**19.730**

* In this example benzo[b]fluoranthene and benzo[j]fluoranthene coeluted. In other words, the combined concentration of both cPAHs was reported by the laboratory as 3.75 mg/kg benzo[b and j]fluoranthene. Since both contaminants have the same PEF value, 3.75 was entered for the sediment concentration of benzo[b]fluoranthene while the concentration of benzo[j]fluoranthene was entered as zero.

How to Handle Nondetect cPAH Data:

If the data contains cPAHs that were not detected (nondetects) use the instructions below for Kaplan Meier Statistics to calculate a B[a]P equivalent concentration.

Kaplan Meier Statistics

Step 1

- Determine the percentage of cPAH nondetects by dividing the number of nondetects by the total number of cPAHs sampled and then multiplying by 100. For example, if you sampled all 17 cPAHs and results indicated 10 nondetects, you would perform the following calculation to determine the percentage of nondetects: 10/17*100 = 58% nondetects.
    1. **If you have 80% or less nondetects, proceed to Step 2.**
    2. **If you have greater than 80% nondetects, proceed to step 3.**

Step 2 - 80% or Less Nondetects

- Use the "Summary of Stormwater Pond Sediment Testing Results" spreadsheet to calculate the potency equivalent factor (PEF) for each of the cPAHs analyzed. The spreadsheet is available on MPCA's website MS4 stormwater web page at: http://www.pca.state.mn.us/sbiza7c. Click on the "Permit" tab and scroll down to the bottom under the "Additional Items" heading.
    1. The spreadsheet will open to the "BaP equiv. calculation" tab.
    2. Under the "Carcinogenic PAH/B[a]P Equivalents Section, enter the site data (concentration) for any detected cPAH or the reporting limit for a nondetect cPAH in columns E, G and I, "Site Conc.", for each core location (sample).
    3. B[a]P equivalent concentration will automatically calculate and be displayed in the "BaP Equiv. Conc." columns F, H and J. The spreadsheet automatically multiples the "Potency Equiv. Factor (PEF)" in column C by the "Site Conc." In columns E, G and I.
    4. The "BaP Equiv. Conc." values from columns F, H and J are the values that need to be transferred to the Kaplan Meier spreadsheet.
- Use the "KMStats15" or Kaplan Meier Spreadsheet to calculate the "UCL95 (t)" or estimated 95th percent upper confidence limit of the mean BaP equivalent concentration. You will need to use a separate spreadsheet for each core location (sample).
    1. Order you cPAH data from highest to lowest concentration (for detects) or reporting limit (for nondetects) on the "Your Data Here" tab. When the concentration of a cPAH is below the reporting limit (usually reported as a <# on the laboratory report), use the reporting limit as the concentration.
        a. If you find it easier you can use a separate tab in the Kaplan Meier spreadsheet to order your data.
        b. List all the cPAH concentrations (for detects) or reporting limits (for nondetects) in the "Concentration" column.
        c. Order them highest to lowest.
        d. Combine those that are identical.
        e. Enter the number of times that exact **concentration** was reported for that sample under the "# Detects" column.
        f. Enter the number of times that exact **reporting limit** was reported for that sample under the "# Nondetects" column.
        g. It is possible to have a concentration and reporting limit that are the same value resulting in values under both the "# Detects" and "# Nondetects" columns.
        h. The last row entered always needs to be a detected concentration due to "Effron's Bias" as explained in the Kaplan Meier spreadsheet. Regardless of whether your last row is a detected or nondetected value, enter it as a detected value.

i. Multiply the "UCL95 (t)" value (estimated 95th% upper confidence limit of the mean) BaP equivalent concentration by the number of individual cPAHs analyzed to calculate the Kaplan Meier BaP equivalent concentration. This Kaplan Meier BaP equivalent concentration should be compared to the BaP soil reference value (SRV) for the applicable soil land use category (Residential or Industrial). Enter the Kaplan Meier BaP equivalent concentration in the "Summary of Stormwater Pond Sediment Testing Results" spreadsheet, column F, H or J, row 40, "Total B[a]P Equivalent Kaplan Meier". This is the concentration that should be compared to the BaP soil reference value (SRV) for the applicable soil land use category (Residential or Industrial) in columns C and D.

NOTE: If the laboratory reports the three fluoranthenes (benzo[b]fluoranthene, benzo[j]fluoranthene and benzo[k]fluoranthene) as total fluoranthenes count this as one cPAH. If the laboratory reports two of the fluoranthenes (benzo[b]fluoranthene and benzo[j]fluoranthene) as benzo[b,j]fluoranthene, count this as one cPAH.

Step 3 – Greater than 80% Nondetects

- When a dataset has greater than 80% nondetects, Kaplan Meier is no better than stating the BaP equivalent concentration is somewhere between the BaP equivalent concentration calculated when replacing the nondetects with the full reporting limit and when replacing the nondetects with zeros.

1. Determine if appropriate reporting limits have been used by comparing the reporting limits used for your samples (found in the laboratory report) to those listed in the Table B-3 below.
   a. If the reporting limit used by the laboratory for a cPAH is equal to or less than the reporting limit in the table, appropriate reporting limits were used for that cPAH. All cPAHs need to be checked. If all cPAHs have been analyzed using appropriate reporting limits, skip to number 2 below to calculate total BaP equivalents.
   b. If any of the cPAHs did not use an appropriate reporting limit, you cannot calculate BaP equivalents using the instructions in number 2 below. In this case, you will need to either re-analyze your samples for the cPAHs that did not have appropriate reporting limits or obtain new samples. The laboratory will be able to help you decide which one makes sense in your case.
      i. If the laboratory is able to re-run the sample and obtain a lower reporting limit, equal to or less than that in Table B1, it might be beneficial to run your sample again for that cPAH.
      ii. If the laboratory had to dilute your sample resulting in an increase in the reporting limit for a cPAH, you will probably need to obtain new samples.
2. To calculate BaP equivalents follow these steps:
   a. Request the lab report for all sample values down to the method detection limit rather than the reporting limit. Normally the lab will provide data down to the reporting limit although they are able to obtain data down to the method detection limit in most cases.
   b. In the "Summary of Stormwater Pond Sediment Testing Results", under the "Site Concentration" column, enter either 1) sample concentration down to the method detection limit if the lab was able to provide this or 2) ½ the detection limit if the lab was not able to provide a concentration down to the method detection limit for each cPAH for each core location (sample).
   c. The B[a]P equivalent concentration will automatically calculate in the "BaP Equivalent Concentration" column. The spreadsheet automatically multiples the "Potency Equivalent Factor (PEF)" column by the "Site Concentration" column and enters it into the "BaP Equivalent Concentration" column.

d. After all of the site Concentrations ("Site Concentration") have been entered, the total BaP equivalent concentration is displayed under the "Total BaP Equivalents Detected Data Only", row 39, under columns F, H and J, "BaP Equiv. Concentration" For each core location (sample). The spreadsheet automatically sums all of the individual cPAH "BaP Equivalent Concentration" Values and enters it into the "Total BaP Equivalents Detected Data Only" tab cell under each core location (sample).

Table B-3. cAPH Reporting Limits

Carcinogenic PAH (cPAH)	Potency Equivalent Factor (PEF)	Appropriate Maximum Reporting Limit
Benz[a]anthracene	0.1	0.01
Benzo[b]fluoranthene	0.1	0.03
Benzo[j]fluoranthene	0.1	0.03
Benzo[k]fluoranthene	0.1	0.03
Benzo[a]pyrene	1	0.01
Chrysene	0.01	0.01
Dibenz[a,h]acridine	0.1	0.01
Dibenz[a,h]anthracene	0.56	0.01
7H-Dibenzo[c,g]carbazole	1	0.01
Dibenzo[a,e]pyrene	1	0.01
Dibenzo[a,h]pyrene	10	0.01
Dibenzo[a,i]pyrene	10	0.01
Dibenzo[a,l]pyrene	10	0.01
7,12-Dimethylbenzanthracene	34	0.01
Indeno[1,2,3,-c,d]pyrene	0.1	0.01
3-Methylcholanthrene	3	0.01
5-Methylchrysene	1	0.01

References

Cal/EPA (California Environmental Protection Agency). 1993. Benzo[*a*]pyrene as a toxic air contaminant. Part B. Health effects of benzo[*a*]pyrene. Air Toxicology and Epidemiology Section, Office of Environmental Health Hazard Assessment, Berkeley, CA.

Cal/EPA. 2009. Technical support document for cancer potency factors: Methodologies for derivation, listing of available values, and adjustments to allow for early life stage exposures. Appendix B. Chemical-specific summaries of the information used to derive unit risk and cancer potency values. Office of Environmental Health Hazard Assessment, Oakland, CA. (http://www.oehha.ca.gov/air/hot_spots/2009/AppendixB.pdf).

Helsel, D.R. 2010. Summing nondetects: Incorporating low-level contaminants in risk assessment. Integr. Environ. Assess. Manage. 6:361-366. (article is freely available at: http://onlinelibrary.wiley.com/doi/10.1002/ieam.31/full).

Helsel, D.R. 2012. Statistics for Censored Environmental Data Using Minitab® and R. Second Edition. John Wiley & Sons, Inc.: Hoboken, NJ. (http://www.wiley.com/WileyCDA/WileyTitle/productCd-EHEP002278.html).

MDH (Minnesota Department of Health). 2001. Polycyclic aromatic hydrocarbons: Methods for estimating health risks from carcinogenic PAHs. Minnesota Department of Health, St. Paul, MN. (http://www.health.state.mn.us/divs/eh/risk/guidance/pahmemo.html).

MDH (Minnesota Department of Health). 2014. Guidance for Evaluating the Cancer Potency of Polycyclic Aromatic Hydrocarbon (PAH) Mixtures in Environmental Samples. Minnesota Department of Health, St. Paul, MN. (http://www.health.state.mn.us/divs/eh/risk/guidance/pahguidance.pdf).

APPENDIX G – MPCA FACT SHEET MERCURY-CATALYZED POLYURETHANE FLOORING AND MERCURY-CONTAMINATED DEMOLITION DEBRIS AND SOIL, SEPTEMBER 2014

Mercury-catalyzed Polyurethane Flooring and Mercury-contaminated Demolition Debris and Soil

Disposal in Minnesota

Mercury is an element that can cause harmful environmental and health effects when disposed of improperly. Because of previous practices, mercury contamination can be found in some soils and demolition debris in Minnesota. In one particular application, mercury was used as a catalyst in some types of synthetic flexible flooring between the 1960s and early 2000s. This flooring, called mercury-catalyzed polyurethane flooring (MCPF), is most commonly found in athletic facilities.

Normally, mercury and mercury-contaminated wastes are prohibited from land disposal in Minnesota under regulations of the Minnesota Pollution Control Agency (MPCA). However, the MPCA will allow some such wastes to be disposed in Minnesota landfills under the conditions discussed in this fact sheet.

Do I have MCPF in my building?

MCPF was most commonly used as a poured-in-place, rubber-like flooring and could be tinted to any color. It was made by many manufacturers under multiple brand names. The only way to determine whether a particular flooring contains mercury is to test a representative (full-thickness) sample using a reputable testing laboratory. The Minnesota Department of Health (MDH) administers a voluntary laboratory certification program. Although you are not required to use a certified laboratory, the MDH or MPCA can help you locate one if you choose.

Must I remove MCPF if I find it?

While Minnesota laws do not require you to remove MCPF, it may continue to release harmful gaseous mercury into a building's air for decades after installation. MDH has published indoor air quality guidance for mercury at http://www.health.state.mn.us/.

Mercury vapor from MCPF can penetrate and contaminate other materials, such as plastic and wood. Attempting to cover or seal MCPF instead of removing it may create more contamination and cost.

Ensure that anyone who may be exposed to the flooring or debris during removal (including employees, contractors, and students) is properly protected from exposure to mercury.

How must I dispose of suspected MCPF and related debris?

Before disposing of suspected MCPF and related debris, test representative samples of the flooring and any other debris for both total and leachable mercury content. The type of disposal allowed for the waste will depend on both of these values and is shown in Table 1 on the following page. Total mercury should be determined in parts per million (ppm) and leachable mercury in milligrams per Liter (mg/L).

Regardless of whether the waste is disposed of in a solid or hazardous waste landfill, ensure that the landfill is permitted to accept the waste and that you have performed any pre-treatment required by the receiving landfill. Additionally, transport the waste in a totally enclosed manner, such as in a truck bed lined and covered with plastic sheeting.

In addition to MCPF and related debris, soils contaminated by naturally-occurring mercury or historical practices, such as the use of coal combustion residuals as fill, may also be disposed according to Table 1.

Table 1: Allowed management of MCPF, related debris, and soils in Minnesota

Total mercury content	Non-hazardous waste (< 0.2 mg/L leachable mercury)	Hazardous waste (≥ 0.2 mg/L leachable mercury)
≤ 4 ppm total mercury	Minnesota solid waste landfill or out-of-state solid waste landfill ▪ No special handling required	Out-of-state hazardous waste landfill or treatment facility
4 < 10 ppm total mercury	Minnesota solid waste landfill or out-of-state solid waste landfill ▪ If in Minnesota, immediate coverage with 6 inches of soil	
10 - 1000 ppm total mercury*	Minnesota solid waste landfill or out-of-state solid waste landfill ▪ If in Minnesota, immediate coverage with 6 inches of soil and landfill maintains location & quantity records ***MCPF only:*** No MPCA preapproval needed ***All other related debris & soil:*** Must be preapproved by MPCA	Out-of-state hazardous waste landfill or treatment facility ▪ Land Disposal Restriction (LDR) may apply
> 1000 ppm total mercury	Out-of-state solid waste landfill	

More information

Guidance and requirements in this fact sheet were compiled from Minnesota Statutes, Chapters 115A and 116, and Minnesota Rules, Chapters 7035 and 7045, and incorporate regulatory interpretation decisions made by the MPCA on September 3, 2013. To review Minnesota Statutes and Rules, visit the Office of the Revisor of Statutes at https://www.revisor.mn.gov/pubs.

The MPCA's Small Business Environmental Assistance Program (SBEAP) can provide free, confidential compliance assistance. The Minnesota Technical Assistance Program (MnTAP) can help reduce your waste generation. Report all hazardous waste incidents to the Minnesota Duty Officer.

Metro County Hazardous Waste Offices

Anoka 763-422-7093
Carver 952-361-1800
Dakota 952-891-7557
Hennepin 612-348-3777
Ramsey 651-266-1199
Scott 952-496-8475
Washington 651-430-6655
Websites ..... http://www.co.[county].mn.us

Minnesota Technical Assistance Program

Toll free 1-800-247-0015
Metro 612-624-1300
Website ..... http://www.mntap.umn.edu

Small Business Environmental Assistance

Toll free 1-800-657-3938
Metro 651-282-6143
Website ..... http://www.pca.state.mn.us/sbeap/

Minnesota Pollution Control Agency

Toll free (all offices) 1-800-657-3864
Brainerd 218-828-2492
Detroit Lakes 218-847-1519
Duluth 218-723-4660
Mankato 507-389-5977
Marshall 507-537-7146
Rochester 507-285-7343
St. Paul 651-296-6300
Willmar 320-214-3786
Website ..... http://www.pca.state.mn.us

Minnesota Duty Officer

Toll free 1-800-422-0798
Metro 651-649-5451
Website ..... https://dps.mn.gov/divisions/bca/

Minnesota Department of Health

Toll free 1-888-345-0823
Metro 651-201-5000
Website ..... http://www.health.state.mn.us/

APPENDIX H – MPCA'S PMD FOR EVALUATION AND MANAGEMENT OF SHREDDER RESIDUE WASTE, SEPTEMBER 2006

Minnesota Pollution Control Agency

Hazardous Waste/Solid Waste Program Management Decision

Evaluation and Management of Shredder Residue Waste

Waste/Hazardous Waste #8.03 • September 2006

Shredder residue waste, also known as shredder fluff, shredder flock, and automotive shredder residue or ASR, is the non-metallic waste material remaining after removal of metal scrap from mechanically shredded automobiles, household and commercial appliances, or other household and commercial items.

Background

For shredder residue waste to be properly managed in Minnesota, the generator or importer of the waste must evaluate it to determine whether it is a hazardous waste under the Minnesota Solid Waste and Hazardous Waste Rules. The most common evaluation method is for the generator to use acquired knowledge regarding the contents and characteristics of the waste. Gaining the required level of detail of knowledge can be problematic, due to both the non-homogenous nature of shredder residue waste and the large volume of waste that can be generated in a short period of time, since it is practical to chemically analyze only a relatively small amount of the waste at any one time.

Method

Minnesota Pollution Control Agency (MPCA) staff analyzed wastes and contamination found at both current and former shredder residue waste generation sites to determine the identity and prevalence of the hazardous waste constituents most likely to be found in this waste stream. MPCA staff also examined protocols from many different agencies and jurisdictions for sampling shredder residue waste streams to determine a sampling protocol that would provide an accurate representation of the waste stream to enable correct evaluation and subsequent management of the waste, as well as be reasonable and practical for shredder residue waste generators to follow. Finally, MPCA staff reviewed potential disposal methods for shredder residue waste to ensure disposal that would comply with existing Rules and also protect human health and the environment.

Decision

The Program Management Decision (PMD) contained in the following four pages establishes a standard level of knowledge about a generator's shredder residue waste stream that is acceptable to the MPCA for that generator to correctly evaluate the waste stream. It also specifies the disposal methods the MPCA has determined are available for that waste under the existing Solid and Hazardous Waste Rules.

Application of this PMD by any generator or importer of shredder residue waste is optional. However, any generator or importer of such waste that is using other sampling or management methods must independently demonstrate that those methods will allow it to accurately evaluate and manage its waste.

Minnesota Pollution Control Agency • 520 Lafayette Rd. N., St. Paul, MN 55155-4194 • www.pca.state.mn.us
651-296-6300 • 800-657-3864 • TTY 651-282-5332 or 800-657-3864 • Available in alternative formats

Minnesota Pollution Control Agency

PROGRAM MANAGEMENT DECISION MEMO

Issue: Establishing a Program Management Decision for a Standardized Level of Generator Knowledge for Evaluation of Shredder residue Under the Minnesota Hazardous Waste Regulations.

Effective Date: July 24, 2006
This Program Management Decision (PMD) was reissued on August 31, 2006, to correct typographical errors contained in the July 24, 2006, PMD.

Decision:

1. **Purpose.** This PMD establishes a standard level of knowledge for generators of shredder residue waste to evaluate that waste under Minn. R. 7045.0214, Subp. 2, Item B, Subi. (2), and to determine appropriate management of that waste.

2. **Scope.** This PMD applies to all generators of shredder residue waste. For the purposes of this PMD, shredder residue waste, also known as shredder fluff, shredder flock, and automotive shredder residue (ASR), has the meaning assigned in Minn. Stat. §115A.90, Subd. 6a.

3. **Sampling and Analysis.**
   A. Sampling Procedure. The generator must sample shredder residue waste in accordance with the sampling requirements of the Code of Federal Regulations (CFR), Title 40, Part 761, Subpart R, located at 40 CFR 761.340 through 40 CFR 761.350.

   B. The generator must analyze the collected waste samples:

      (1) for polychlorinated biphenyls (PCBs) using the test methods described in the Code of Federal Regulations, Title 40, Part 761, Subpart R, located at 40 CFR 761.353 through 40 CFR 761.359; and

      (2) for the following Toxicity Characteristic contaminants using the test methods described in the Code of Federal Regulations, Title 40, Part 261, Subpart C, located at 40 CFR 261.24, as amended, or equivalent methods approved by the Commissioner of the Minnesota Pollution Control Agency, hereinafter the Commissioner, under the procedures in Minn. R. 7045.0075, Subp. 1:

         (a) Cadmium
         (b) Chromium
         (c) Lead
         (d) Mercury

   C. Sampling Frequency. All generators of shredder residue waste must sample the waste at an interval of 90 days (plus or minus 7 days), excepting that:

(1) Generators subject to the increased sampling frequency of Part 5, Subp. B or C of this PMD must sample at the specified interval; and

(2) Generators who are seeking to use this PMD for the first time may sample at a minimum interval of at least 7 days. These generators may begin managing their shredder residue waste under this PMD after collecting five samples and calculating an initial rolling average as required under Part 4 of this PMD.

4. **Status of the Shredder Residue Waste.** Generators must calculate a rolling average concentration for each of the five subject contaminants. The rolling average concentration for each contaminant is calculated from the five most recent sample results (hereinafter referred to as the rolling average). The oldest sample result is dropped from the average as each new value is added. All samples required by this PMD must be used to determine the rolling average; no additional samples may be used to determine the rolling average.

5. **Management of the Shredder Residue Waste.**

A. Shredder residue waste with a rolling average for each of the subject contaminants less than 80% of the maximum allowable concentration (MAC) listed in Minn. R. 7045.0131, Subp. 8 and Minn. R. 7045.0135, Subp. 5 may be disposed as an industrial solid waste at a landfill that meets or exceeds the liner requirement established in Minn. R. 7035.2815, and has the current version of this PMD incorporated into the Industrial Solid Waste Management Plan for the landfill.

B. If any individual sample for any of the subject contaminants exceeds 100% of the MAC listed in Minn. R. 7045.0131, Subp. 8 and Minn. R. 7045.0135, Subp. 5, another round of sampling must be conducted within 7 days.

C. Shredder residue waste with a rolling average for any of the subject contaminants that exceeds 80% of the MAC listed in Minn. R. 7045.0131, Subp. 8 and Minn. R. 7045.0135, Subp. 5 is not eligible for disposal in any solid waste landfill in Minnesota. Such shredder residue waste must be sampled at a sampling frequency of every 30 days rather than 90 days, as listed in Part 3, Subp. B of this PMD. This increased sampling requirement must be followed until the rolling average is less than 80% of the regulatory limit for three sampling events.

D. Shredder residue waste with a rolling average for any of the subject contaminants greater than or equal to 100% of the MAC listed in Minn. R. 7045.0131, Subp. 8 and Minn. R. 7045.0135, Subp. 5 is hazardous waste and subject to all the generator and management requirements referenced in Minn. R. 7045.0205, including the amended license application requirements of Minn. R. 7045.0243, Subp. 3, G.

E. If the concentration of a single sample increases the rolling average from below 80% of the MAC to greater than or equal to 100% of the MAC, the generator may no longer dispose as a material under this PMD. Before declaring that the entire waste stream is a hazardous waste, the MPCA will review information provided by the generator, including additional analysis of the same composite sample, to determine whether or not the value should be included in the rolling average. The result of this review will determine if the waste may remain regulated under this PMD.

This provision ensures that a non-representative value, known as a spike, will not necessarily disqualify a generator from operating under this PMD. In the development of this PMD, stakeholders indicated that very large values are possible even though no very large values were found in the MPCA evaluation of existing data. This provision is not intended to allow repeated spikes, but to clarify that assessment of the generator's process is permissible before final determination is made.

F. A generator of hazardous waste shredder residue remains subject to all requirements referenced in Minn. R. 7045.0205 until:

(1) the rolling average concentrations for all subject contaminants are less than the MACs listed in Minn. R. 7045.0131, Subp. 8 and Minn. R. 7045.0135, Subp. 5; and

(2) the generator has met the requirements of Minn. R. 7045.0243, Subp. 3, Item G; and

(3) the generator has documented under Minn. R. 7045.0217 that changes to its shredder residue-generating process reasonably preclude future generation of shredder residue hazardous waste.

G. Shredder residue waste must not be shipped from the generator for use as daily cover material in any landfill in Minnesota unless the landfill owner/operator has first received approval from the Commissioner. Any request for approval will be reviewed by the Commissioner to ensure that:

(1) the waste meets or exceeds the definition contained in Minn. R. 7035.0300, Subp. 23; and

(2) the requirements of the permit issued to the landfill by the Commissioner are being fully met; and

(3) the waste is not flammable and not litter-prone.

6. **Reporting and Recordkeeping.**

A. The generator must immediately (within 24 hours) notify the landfill accepting the material, county solid waste or hazardous waste staff (as applicable), and the Commissioner if the rolling average exceeds 80% or 100% of the MAC, as described in Part 5, Subp. C and D of this PMD.

B. Generators of shredder residue waste shall retain on-site and available for inspection all sample results, rolling average calculations and associated documentation for three years from the sampling date.

C. Generators of shredder residue waste shall submit to the Commissioner copies of any information reasonably necessary to determine compliance with this PMD upon request.

D. Prior to initial disposal in a Minnesota landfill, and every five years thereafter, shredder residue shall be tested for an extended list of contaminants, to be determined by the Commissioner.

7. **Compliance with this PMD.** Generators of shredder residue waste not in compliance with this PMD are subject to all applicable requirements of Minn. R. ch. 7035 and 7045.

APPROVAL

I have reviewed this management decision and I concur:

Signed: Lisa J. Thorvig
Date: 9-12-06
Lisa Thorvig
Director, Municipal Division

Signed: James L. Warner
Date: 9-12-06
James L. Warner, P.E.
Director, Industrial Division

APPENDIX I – BURNED MATERIALS ACCEPTANCE FORM

BURNED MATERIALS ACCEPTANCE FORM

CROW WING COUNTY LANDFILL
15732 STATE HWY 210
BRAINERD, MN 56401
STRO@BRAINERD.NET
(218)-828-4392

DATE_____

WORK SITE NAME_____

ADDRESS_____

PHONE NUMBER_____

OWNER NAME_____

DATE OF FIRE _____ (DISPOSAL SHALL BE AT LEAST 30 DAYS SINCE THE FIRE WAS COMPLETELY EXTINGUISHED)

DESCRIPTION OF MATERIALS

BASIC DESCRIPTION	TOTAL QUANTITY

SPECIAL HANDLING INSTRUCTIONS AND ADDITIONAL INFORMATION ABOUT FIRE OR DISPOSAL

_____

_____

_____

_____

_____

TRANSPORTER

NAME_____

ADDRESS_____

PHONE NUMBER_____

FIRE DEPARTMENT CERTIFICATION: *I HEREBY DECLARE THAT THE CONTENTS OF THIS CONSIGNMENT ARE FULLY AND ACCURATELY DESCRIBED ABOVE AND THE FIRE THAT PRODUCED THIS WASTE WAS NOT EXTINGUISHED USING CLASS B, AFFF MATERIAL.*

FIRE DEPARTMENT PERSONNEL SIGNATURE _____

DATE _____

PROJECT PERSONNEL CERTIFICATION: *I HEREBY DECLARE THAT THE CONTENTS OF THIS CONSIGNMENT ARE FULLY AND ACCURATELY DESCRIBED ABOVE TO THE BEST OF MY KNOWLEDGE, AND I AM RESPONSIBLE FOR THE CONSEQUENCES IF INFORMATION IS FOUND TO BE FALSE OR INACCURATE. I ALSO CLAIM FULL RESPONSIBILITY FOR COSTS OR DAMAGES THAT MAY RESULT AS A CONSEQUENCE OF THE BURNED MATERIAL THAT I DISPOSE OF IN THE CROW WING COUNTY LANDFILL.*

SIGNATURE_____ DATE_____

WASTE DISPOSAL OPERATOR SIGNATURE OF RECEIPT OF MATERIAL

LANDFILL PERSONNEL

NAME_____ TITLE_____

SIGNATURE_____ DATE_____

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F 952-229-2923
www.burnsmcd.com