



# Mercury Minimization Plan Guide

National Pollutant Discharge Elimination System  
(NPDES) Wastewater Program

*Doc Type: Pollutant Minimization Plans*

## Additional Information on Page 8

**Instructions:** This guide was created to assist you in completing your Mercury Minimization Plan (MMP). The guide provides details on each of the five steps and suggested resources to complete the information. The attached Sector Worksheets can be used to record your plan and implementation of the activities to provide future mercury reductions. Additional information can be found on page 8.

## Facility Information

Date (mm/dd/yyyy): \_\_\_\_\_

Facility name: \_\_\_\_\_ Permit No.: \_\_\_\_\_

Facility address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip code: \_\_\_\_\_

Preparer name: \_\_\_\_\_ Preparer's telephone: \_\_\_\_\_

## Background

Mercury is present in all municipal and many industrial wastewater discharges. Mercury is a powerful neurotoxin that affects human health and the environment. A naturally-occurring element, mercury does not breakdown into less harmful substances over time. Instead, mercury released into the environment accumulates in fish and animal tissues, a process known as bioaccumulation. Widespread mercury contamination has prompted the Minnesota Department of Health to issue fish consumption advisories throughout the state. Most of Minnesota's impaired waters are contaminated by mercury and other bio-accumulative toxins. The Minnesota Pollution Control Agency (MPCA) is carefully evaluating all mercury discharges in the state.

## Provide a Facility Description Update

The MPCA has a facility description from the most recent permit application. In order to review and process your MMP to make sure that it meets permit requirements, it would be helpful to:

- Briefly describe any changes in your facility, collection system or operation process in the last five years, including changes in industrial, commercial or institutional users or their discharges in Table A.
- Record any place within the facility where you are monitoring for mercury and the results in Table B.

**Table A – Changes in your facility**

Change	Year 1	Year 2	Year 3	Year 4	Year 5
Facility					
Collection System					
Operation Process					
Changes in Industrial Users (added or removed)					
Other					

**Table B – Monitoring for Mercury**

Location	Results

# Step 1: Measure Your Wastewater Treatment Facilities (WWTFs) Influent, Effluent, and Biosolids Mercury Concentrations

## Compile influent and effluent mercury measurements taken at the WWTF

Some facilities may not have data at this time. If data has been collected in the past, provide a summary of mercury influent and effluent concentrations and biosolids monitoring data, using the most recent five years of monitoring data. Most operators can expect changes in mercury levels over time due to daily, seasonal or annual variations; as a result of changes in facility operations or contributions from business or domestic sources. Business sources include industrial, commercial and institutional users. Note any trends and describe in the MMP.

## Working your data into a MMP

You can use *Discharge Monitoring Reports (DMR)* or *Supplemental Report Forms* (daily values) to complete Tables A and B. Additional monitoring beyond what is required by your NPDES Permit may be useful for preparing your MMP.

## Mass load

Determining mass loading estimates from individual sources to a WWTF will help decide where to best remove the most mercury from the influent to most effectively reduce the discharger's effluent concentrations. The more mass influent removed, the more likely effluent will respond accordingly.

Usually WWTF operators use concentration (nanograms per liter or ng/L) to describe mercury levels. To calculate mass load in the table, multiply the concentration and the flow (million gallons per day or MGD) by 3.785—a conversion factor.

For WWTFs with industrial, commercial, and institutional users, mass load will be useful for goal setting later in this guide.

$$\text{Mass load (mg/day)} = \text{Flow (MGD)} \times \text{Concentration (ng/L)} \times 3.785$$

## Record data in Table C, or submit your own spreadsheets.

If you submit your own spreadsheets, attach copies at the end of your MMP. (There is no need to duplicate information in this Microsoft Word table.) Complete one table for each year of data. Insert additional tables as needed.

**Table C – W WTF calendar month average influent and effluent data**

	Year:						Year:					
	Influent			Effluent			Influent			Effluent		
	Flow (MGD)	Conc. (ng/L)	Mass (mg/day)	Flow (MGD)	Conc. (ng/L)	Mass (mg/day)	Flow (MGD)	Conc. (ng/L)	Mass (mg/day)	Flow (MGD)	Conc. (ng/L)	Mass (mg/day)
Jan												
Feb												
Mar												
Apr												
May												
Jun												
Jul												
Aug												
Sep												
Oct												
Nov												
Dec												
<b>Annual average</b>												

**Table D – Flow/Load Information**

Summary Data		Formula	Mg	Grams (divide by 1000)
Annual influent flow	mg/yr	Annual average influent flow (MGD) x 365		
Annual effluent flow*	mg/yr	Annual average effluent flow (MGD) x 365 (if available)		
Annual influent mercury load	mg/yr	Annual influent flow [million gallons (MG)] x Annual average influent mercury concentration (ng/L) x 3.785		
Annual effluent mercury load	mg/yr	Annual effluent flow* (MG) x Annual average effluent mercury concentration (ng/L) x 3.785		
Mercury percent removal	%	[Annual average concentration (ng/L) - Annual average effluent concentration (ng/L)] / Annual average influent concentration (ng/L) x 100		

mg = milligrams                      ng/L = nograms per Lister  
 mg/yr = milligrams per year      MGD = million gallons per day

The examples below show how potential inputs would result in answers for the table on the preceding page. Insert your plant's input numbers to determine answers.

**Influent example**

4.0 MGD x 365 days/year x 120 ng/L influent mercury concentration x 3.785 = 663,132 mg/yr or 663.1 grams/year (divide by 1000 to divert to grams)

**Effluent example**

3.9 MGD x 365 days/year x effluent mercury concentration 4 ng/L x 3.785 = 22,552 mg/yr or 22.6 grams/year (divide by 1000 to convert to grams.)

**Step 2: Evaluate the Mercury Reduction Potential of Your Users**

Many sources of mercury discharge into your wastewater treatment plant. As appropriate for your facility, you should consider dental clinics, hospitals, medical clinics, nursing homes, schools, and industries with potential for mercury contributions. You may need to consult with other municipal staff to identify all possible contributing industrial, commercial and institutional sources, especially small operations.

Determining existing and potential sources of mercury concentrations and/or loading to the facility is actually three sub-steps, identify, measure (monitor) and prioritize those that could result in the greatest reduction.

**Identify**

Identify a list of potential mercury dischargers by reviewing the attached sector worksheets and start recording your sources. Sector Worksheets are available for:

- Medical facilities
- Dental facilities
- Schools
- Industrial facilities
- Residential, Collection Systems, and Septage Sources

**Measure**

In some cases dischargers should be monitored individually for a baseline reading. In other instances, there may be a large number of similar individual dischargers, and representative sampling may be more efficient. Sometimes, it may be helpful to review other program results for a specific sector to provide estimates. For more information on mercury monitoring, consult U.S. Environmental Protection Agency (EPA) Region 5, "Mercury Pollutant Minimization Program Guidance" at [http://www.epa.gov/npdes/pubs/pt\\_region5\\_mercury\\_pmp\\_guidance.pdf](http://www.epa.gov/npdes/pubs/pt_region5_mercury_pmp_guidance.pdf) pages 6-7. Also the Western Lake Superior Sanitary District (WLSSD) in Duluth, Minnesota, has created a "Blueprint for Mercury Elimination". Please see pages 10 and 11 of this report at [http://www.wlssd.com/pollution\\_mercury\\_prevention.php](http://www.wlssd.com/pollution_mercury_prevention.php).

## Prioritize

Take time now to complete the sector worksheets with information and data. Complete as much of each worksheet as appropriate for your WWTF. Add extra rows as needed. Use utility bills or accounts as a reference. You may want to contact your facilities to obtain some of the information. Record your contact information on the worksheets.

WLSSD's "Blueprint for Mercury Elimination" also has helpful information on prioritizing which facilities to work with. The following information comes from page 10 in the guide:

*"Evaluate which of these sources have the greatest opportunity for reducing mercury. Work with the largest sources of mercury first. It is important to consider the following:*

- *The loading to the plant from each contributor.*
- *The range of mercury concentrations.*
- *The number of each type of contributor in your community."*

Depending on the businesses that discharge to your facility, you may want to conduct walk-throughs to inventory their specific mercury sources, sample effluent to determine the concentration of mercury, or conduct ongoing monitoring. WLSSD's publication mentioned above, has a section on monitoring, called "How important is monitoring?" at [http://www.wlssd.com/uploads/WLSSD\\_Blueprint\\_Mercury\\_Reduction.pdf](http://www.wlssd.com/uploads/WLSSD_Blueprint_Mercury_Reduction.pdf).

---

## Step 3: Evaluate Your WWTF's Mercury Reduction Potential

---

An evaluation of past and present WWTF operations is helpful to determine those operating procedures that maximize mercury removal within the facility. WLSSD's case study ("Blueprint for Mercury Elimination" pages 20-21.) of its facility provides the following information:

- WWTF process chemicals including caustic soda, sulfuric acid, and ferric chloride can contain mercury. New purchases of these chemicals can be screened for mercury levels.
- A checklist and survey were developed for WWTF maintenance staff to use in identifying sources of mercury in their work areas.
- Clean out of interceptor lines may create a mercury discharge, especially below historic dischargers of mercury containing waste.

### Analyzing your data

Note variations or patterns in your WWTF data and wastewater data from your businesses. The relative importance of daily, weekly, seasonal, and annual trends depend on the specific activities at the WWTF and your industrial, commercial and institutional users.

The time at which samples are collected can impact your data. Spikes or trends in mercury concentration can result from business patterns or collection system cleanouts.

Changes in products and discharges of mercury from business or domestic sources will affect future mercury levels. Being aware of how businesses and the community are changing will help you build more accurate projections of future mercury levels. Changes in equipment or operational practices at businesses during the monitored period or in the future may impact your influent as well.

### Record patterns and trends

As part of your analysis, evaluate past and present WWTF operations to determine the procedures that maximize mercury removal. Several technologies, such as sand filters, membrane filtration, and adsorbants/filtration have shown promise or are effective in removing mercury.

### Compare mercury treatment of your WWTF with other WWTFs

Typical POTW wastewater influent is 50 - 500 ng/L. Typical wastewater effluent ranges from 1 - 20 ng/L. See the chart on page 8 of "US EPA Mercury Pollutant Minimization Program Guidance." at [http://www.epa.gov/npdcs/pubs/pt\\_region5\\_mercury\\_pmp\\_guidance.pdf](http://www.epa.gov/npdcs/pubs/pt_region5_mercury_pmp_guidance.pdf).

---

## Step 4: Summarize mercury reduction activities implemented during the last five years.

---

### Prevention first

Mercury can be reduced at the source by eliminating or minimizing it through product substitution or other means. You may not be able to reduce mercury to needed levels by implementing only one approach. You may need to work with a variety of businesses and WWTF processes. Your community and the businesses that discharge to your facility may have already completed some activities to reduce mercury. (See EPA chart in Table E.) This section discusses how to summarize past mercury reduction activities.

Has your community or facility implemented any source reduction or WWTF optimization activities in the past five years? Take credit for those efforts and list past mercury reduction activities below.

**Past Mercury reduction strategies – past five years**

Please use the attached worksheets to record and review information on each sector. Use the space below to highlight the Mercury reduction activities during the past five years.

**Medical facilities**

---



---



---

**Dental facilities**

---



---



---

**Schools**

---



---



---

**Industrial facilities**

---



---



---

**Residential, collection systems, and septage sources**

---



---



---

**Examples:** Below is a table from EPA's "Mercury Pollutant Minimization Program Guidance." (Table E) It provides some examples of activities that may have been completed in your community. The sector worksheets may also provide ideas, and can be used as worksheets to record activities done by sector businesses and community groups.

**Table E – Direct contributors to address in Mercury Pollution Management Plans**

Sector	Activity	Performance Measure	Goal
<b>Medical – hospitals, clinics, nursing homes, veterinarians</b>	<ul style="list-style-type: none"> <li>• Mail American Hospital Association (AHA) best management practices (BMP) literature</li> <li>• Workshops</li> <li>• Onsite visits</li> <li>• BMP requirements</li> <li>• Permits</li> </ul>	<ul style="list-style-type: none"> <li>• Date/content of mailing</li> <li>• Participation/Reduction</li> <li>• Progress, quantity recycled</li> <li>• Adoption/implementation</li> </ul>	Mercury-free wherever practicable. Spill management.
<b>Dental Clinics</b>	<ul style="list-style-type: none"> <li>• Mail appropriate BMP literature</li> <li>• Meetings with dentists</li> <li>• Onsite visits</li> <li>• Survey(s)</li> <li>• Adherence to American Dental Association's (ADA's) BMPs (voluntary or mandatory)</li> <li>• Mercury recycling(voluntary or mandatory)</li> </ul>	<ul style="list-style-type: none"> <li>• Date/content</li> <li>• Participation</li> <li>• Adoption /implementation</li> <li>• Quantity recycled</li> </ul>	Capture and recycle mercury used or generated. Minimize mercury discharges.

Sector	Activity	Performance Measure	Goal
	<ul style="list-style-type: none"> <li>Adoption of removal equipment meeting ISO standards(voluntary or mandatory)</li> <li>Permits</li> </ul>	<ul style="list-style-type: none"> <li>Adoption/implementation (Note: Certain facilities do not use or generate mercury, some measures may not apply)</li> </ul>	
<b>Schools – secondary</b>	<ul style="list-style-type: none"> <li>Mail BMP literature</li> <li>Workshops</li> <li>Onsite visits</li> <li>Permits</li> </ul>	<ul style="list-style-type: none"> <li>Date/content</li> <li>Participation</li> <li>Reduction progress</li> <li>Quantity of mercury recycled</li> </ul>	Mercury free wherever practicable. Spill management.
<b>Schools – Colleges/Technical, laboratories</b>	<ul style="list-style-type: none"> <li>See Medical and School Sectors</li> </ul>	<ul style="list-style-type: none"> <li>See Medical and School Sectors</li> </ul>	
<b>Other industries and businesses with potential for mercury contributions</b>	<ul style="list-style-type: none"> <li>Mail chemical/equipment literature</li> <li>Onsite visit during pretreatment inspection</li> <li>Application of local limits and/or require BMPs for IUs</li> <li>Require PMPs in IU permits</li> </ul>	<ul style="list-style-type: none"> <li>Reduction progress</li> <li>Quantity recycled</li> </ul>	Phase out of mercury containing devices and chemicals. Spill management.
<b>General Public</b>	<ul style="list-style-type: none"> <li>Promote mercury clean sweeps</li> <li>Displays at community events</li> <li>Public service announcements</li> <li>Outreach at schools</li> <li>Establish local mercury website</li> </ul>	<ul style="list-style-type: none"> <li>Date/contents</li> <li>Quantity of mercury recycled</li> <li>Website hits</li> </ul>	Reduced use of mercury containing products. Recycling of mercury products. Spill management.

## Step 5: Create an Implementation Plan for Mercury management and reduction measures for the next five years.

### Select Mercury reduction strategies

To start preparing your implementation plan, use the resources listed in this guidance and the attached sector worksheets to evaluate reduction strategies specific to your facility and mercury contributors. Prioritize activities according to the potential reduction opportunities of mercury contributors that have been recorded in the sector worksheets.

### Develop a timeline

Create a timeline for implementing the strategies. Set milestones to review the reduction goals and strategies to determine if changes are needed. If businesses will be closely involved in helping you achieve an influential goal, meet with them to confirm the implementation plan.

Throughout the implementation plan, explain your choice of reduction strategies, timelines or milestones. You may want to explain why you chose one option over another.

### Include additional information

In some cases, including additional information in your implementation plan may be helpful:

- Will all the strategies combined reduce total mercury to achieve your goal?
- If a phased implementation is planned, explain why.
- Will you need to collect additional information before finalizing the MMP?
- How will you reassess goals and strategies at the milestones?
- What is the potential for new mercury contributions from domestic or business sources?
- What is the potential for increases from existing sources?

### Describe your implementation plan (Include reduction strategies and a timeline.)

Looking ahead five years, focus on preventive practices—those practices that reduce mercury at the source before it becomes a waste.

### Mercury reduction strategies – Next five years

After reviewing the information collected in tables in this guide and sector worksheets, use the space below to highlight the Mercury reduction activities planned for the next five years.

**Medical facilities**

---

---

---

**Dental facilities**

---

---

---

**Schools**

---

---

---

**Industrial facilities**

---

---

---

**Residential, collection systems, and septage sources**

---

---

---

**Certification**

Preparer  
(please print): \_\_\_\_\_

Title: \_\_\_\_\_ Date \_\_\_\_\_

Signature: \_\_\_\_\_

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

Authorized agent  
(if different): \_\_\_\_\_

Title: \_\_\_\_\_ Date: \_\_\_\_\_

Signature: \_\_\_\_\_

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

**Submission of MMP**

You may be required to submit a MMP to the MPCA. If you have a MPCA permit, (NPDES/SDS) please review it carefully to ensure that your submission is complete and on time. Your NPDES/SDS Permit will also specify how and where the MMP must be submitted.

## Additional Information

---

### Purpose of the Mercury Minimization Plan guide

This document was created to assist municipalities, companies, consultants, operators, permittees, etc. to identify and reduce sources of mercury in collection and treatment systems. This document will also assist you in creating a Mercury Minimization Plan (MMP) to comply with permit requirements. Using the guide is optional and your MMP may be prepared using an alternate format. However, this guide may speed up the process of organizing and understanding your mercury data and, therefore, allow the MPCA to review your plan more quickly.

### Mercury reduction

You may currently have mercury limits in your wastewater permit, or may receive mercury limits in the near future. Included in this guide are some mercury reduction ideas you may choose to implement whether there are permit requirements, or not. While the primary mercury reduction goal is to meet the mercury limits specified in your permit, the purpose of doing a MMP is to evaluate discharges to the system, to determine possible sources of mercury to wastewater facility influent, as well as identify potential mercury reduction options. If you have a MPCA permit (NPDES/SDS) please review it carefully to ensure that your submission is complete and on-time. Your permit will specify how and where the MMP must be submitted. If you are required to create and submit a MMP, the MPCA will review your MMP and may contact you to discuss your submittal. You may implement your MMP at any time in order to meet your permit goals as well as reduce mercury in the environment.

### MMP submittal requirements

Individual permits will indicate exactly who needs to provide a MMP and will specify where it should be sent and when. In general, all municipal major facilities and municipal minor facilities that will be upgrading to major status will be required to submit a new or updated MMP when the permit is issued or reissued. MMPs are also required for minor facilities that discharge to the Lake Superior Basin. MMPs may be required for minors that do not discharge to the Lake Superior Basin on a case by case basis. The requirements to submit a MMP will be included in permits as compliance schedules.

**Note:** If you have previously submitted a MMP, you must update the MMP and submit it to the MPCA. If you are a major facility discharging in the Great Lakes Basin, you are also required to send in an annual plan update.

### Five steps to build your MMP

At a minimum, the MMP must include the following:

1. A summary of mercury influent and effluent concentrations and biosolids monitoring data using the most recent five years of monitoring data, if available.
2. Identification of existing and potential sources of mercury concentrations and/or loading to the facility.
3. An evaluation of past and present WWTF operations to determine those operating procedures that maximize mercury removal.
4. A summary of any mercury reduction activities implemented during the last five years.
5. A plan to implement mercury management and reduction measures during the next five years.

### Facilities that Discharge to Lake Superior

These facilities are required to send in an annual update of the MMP to the MPCA Water Quality Submittals Center by March 1 of each year (per MN Rule 7052.0250,) following MPCA approval of the MMP. The annual report shall include, but is not limited to:

- a) All MMP program monitoring results for the year.
- b) A list of potential sources of mercury.
- c) A summary of all actions taken to meet the effluent limit for mercury.
- d) Any updates of the control strategy.

All mercury monitoring data collected during the previous year should be included with the annual report. This includes tracking of source reduction activities; influent, effluent, and biosolids data; and data collected from potential sources.

### For More Information

If you have questions on how to use these resources or how to prepare a MMP, the following assistance is available.

**Regulatory requirements** and assistance with preparing a MMP:

**MPCA staff contact:**

Jaramie Logelin, Pretreatment Coordinator  
Duluth Office  
525 Lake Avenue South, Suite 400, Duluth, MN 55802  
218-302-6640 or 800-657-3864  
Jaramie.logelin@state.mn.us

**Non-regulatory technical assistance**, including prevention options and assistance identifying reduction strategies for a MMP:

**Minnesota Technical Assistance Program (MnTAP)**  
612-624-1300 or 800-247-0015