



PUBLIC NOTICE

Date posted: 12/23/2024

DEQ Requests Comments on Proposed City of Hood River Mercury Minimization Plan

HOW TO PROVIDE PUBLIC COMMENT

Facility name: City of Hood River

Permit type: Domestic NPDES

Comments due by: Wednesday, Jan. 22, 2025
at 5 p.m.

Send written comments to:

By mail: Permit Coordinator, Oregon DEQ
800 SE Emigrant Ave., Ste 330 Pendleton OR 97801

By email: Water.Permits@deq.oregon.gov

The Oregon Department of Environmental Quality invites the public to provide written comments on the proposed Mercury Management Plan for the City of Hood River's wastewater treatment facility.

Summary

Subject to public review and comment, DEQ intends to approve the Mercury Management Plan, which documents the facility's program to identify and reduce sources of mercury in the city's wastewater. The plan was drafted in accordance with requirements stipulated in the facility's National Pollution Discharge Elimination System Permit. Part of the review process is an opportunity for public comment.

About the facility

The facility provides domestic wastewater treatment for residents and businesses in the City of Hood River. The proposed plan is provided with this notice.

What types of pollutants does the Mercury Management plan regulate?

The Mercury Management Plan required by the permit describes programs the city has utilized to minimize mercury introduced to the wastewater treatment plant. It also assesses and the permit regulates the amount of mercury discharged to the Columbia River.

What happens next?

DEQ may hold a public hearing on the proposed plan if one is requested by 10 or more people or from an organization representing at least 10 or more members.

DEQ will consider and respond to all comments received and may request that the city modify the plan based on received comments.

Translation or other formats

[Español](#) | [한국어](#) | [繁體中文](#) | [Русский](#) | [Tiếng Việt](#) | [العربية](#)
800-452-4011 | TTY: 711 | deqinfo@deq.oregon.gov

For more information

View information about this proposed action by contacting DEQ's Water Quality Permit Coordinator, at water.permitter@deq.oregon.gov or 541-613-1125 to make an appointment to review the documents in person.

Non-discrimination statement

DEQ does not discriminate on the basis of race, color, national origin, disability, age or sex in administration of its programs or activities. Visit DEQ's [Civil Rights and Environmental Justice page](#).



City of Hood River Mercury Minimization Plan 2024-2028

Based On The **State of Oregon Department of Environmental Quality**

Mercury Minimization Plan Template

Contact: Erich Brandstetter
Water Quality Division
700 NE Multnomah St., Suite 600
Portland, OR 97232

Table of Contents

1. Facility Information	1
2. Mercury Sources	1
3. Implementation Plan for Mercury Management and Reduction Measures for (at least) the Next Five Years	2
4. Facility Changes	4
5. Mercury Monitoring (total mercury)	5
6. Summarize Mercury Reduction Activities Implemented	6
7. Certification	8

Attachment 1 - Test Results of Septage Composites

Attachment 2 - Test Results of Trunkline Sampling

Attachment 3 - Test Results of Significant Industrial User Sampling

Attachment 4 - 5 Year Summary of Test Results (Concentration and Mass) on Source Water, Influent and Effluent Sampling

Attachment 5 - Hood River Best Management Practices for Mercury Waste Management in Hospitals and Medical Facilities

Attachment 6 - Hood River Dentist, Inspection Form and Dental Best Management Practices

Attachment 7 - Hood River School Form Letter and ATSDR Mercury Audit and Follow Up Checklist

Attachment 8 - Yearly Average of Influent and Effluent Mercury Concentration and Mass Along with Calculated Mercury Mass Disposed of in Biosolids

Attachment 9 - Mercury Control, Proposed Language For Hood River City Sewer Use Ordinance

1. Facility Information

		Date (01/09/2024):		Previously submitted (12/15/2022)	
Facility name:	City of Hood River Wastewater Treatment Plant	EPA Ref No.: OR002078 Permit No. 101729			
Facility address:	818 Riverside Drive				
City:	Hood River	State:	Oregon	ZIP code:	97031
Preparer name:	Wayne W. Heinemann	Preparer's telephone:		208 420 4862	
Preparer organization:	Jacobs/OMI	Preparer's email:		Wayne.Heinemann@Jacobs.com	
Technical contact name:	Same	Technical contact telephone:		Same	
Legal contact name:	Adam Schmid	Legal contact telephone:		(541) 387-5205	

2. Mercury Sources

Overview

Table 1. Source Summary

Source Categories	Mercury			Notes/Comments
	Current	Potential	N/A	
Septage	☒	☐	☐	Higher concentration low flow. Septage continues to have a higher level than the influent of the treatment plant. Since this is coming from multiple sources it is thought at this time to not be controllable. The high removal rate of the plant, however is a buffer against these discharges. (See Attachment 1)
Trunkline 2,3 (4 trunks total) Section of the City	☒	☐	☒	Sampling of Trunk Lines indicate that the older portion of the City may have an elevated mercury level. This is in keeping with other municipalities that the author of the Hood River MMP has investigated including a much bigger City (Albuquerque). (See Attachment 2)
Industry	☐	☐	☒	All SIU's are food producers and do not have mercury (see Attachment 3). They highest reading was 1.5 ng in their discharge almost all SIU testing is below 1.0 ng/L (See Attachment 3)

Source Water	☐	☐	☒	The source water to the City is snow melt off Mount Hood and test results show non-detect at a RL of 0.5 ng/L and ML of ~0.08 ng/L (See Attachment 4).
Schools	☐	☒	☐	Sampling was not required in the last MMP
Medical Facilities	☐	☒	☐	Sampling was not required in the last MMP
Select SIC Codes, including listed in instructions	☐	☒	☐	Sampling was not required in the last MMP, Hood River will review a list of SIC/NAICS codes in the new MMP to identify potential mercury dischargers.
	☐	☐	☐	
	☐	☐	☐	
	☐	☐	☐	

3. Implementation Plan for Mercury Management and Reduction Measures for (at least) the Next Five Years

Overview

Medical facilities

Hood River will submit to the hospitals and medical facilities that are connected to the Hood River Treatment Plant, one time during the next 5 years, the information and BMPs found in Attachment 5.

Dental facilities

Most dental facilities no longer performed silver fillings, however, in the next MMP dental facilities will be revisited since old silver filling may still be processed in these facilities. All dentist locations will be revisited one time during the five year plan to assure that silver trap manifest are up to date and properly filed. The list of dental establishments and an example survey form used during the previous onsite inspections are found in Attachment 6. Attachment 6 also has the "The Environmentally Responsible Dental Office Guide to Best Management Practices of Dental Wastes" which will be provided at the time of inspection.

Schools

The schools will be provided BMPs and other resources one time during the 5 year period. The source of the documents is ATSDR with addition education materials on mercury from the CDC. In this cycle of the MMP a response will be requested from the schools and materials will be hand delivered. The letter and audit form previously used is found in Attachment 7. The letter will be modified to assure a response from the schools or onsite visits will be conducted and conversations documented. The new letter will be provided during the first year of the new MMP.

Industrial facilities

Hood River Significant users will be required to perform annual sampling and testing during the next MMP as required to meet local limits. This testing is required as part of the IPP program under the requirements found in 40CFR403.

Heating, ventilation and air conditioning (HVAC)

HVAC was not specified in the last MMP but will be included in this MMP. Hood River will industries corresponding to SICs 24xx, 26xx, 28xx, 32xx, 33xx, 34xx, 36xx, and Tables 1-3 of ODEQ's 037-Form-MMP checklist. While sampling and testing of each of the identified locations may not be economically feasible in this new MMP, sampling in the collection system will be reviewed along the trunk lines to determine if these SIC codes correspond to high concentration trunklines that contribute to too the trunkline results. In addition to the trunkline sampling if during the MMP it becomes clear that a specific discharger is a significant source of mercury additional sampling will be conducted.

Residential, collection systems, and septage sources

Residential discharges are not financially amendable to sampling and testing. Instead a public education approach will be used. Mailers will be provided with the monthly water bill once per year. The mailers will provide information on how to avoid discharges of mercury and will also include a link to the City of Hood River's website in a folder setup as a Mercury website which will be useful for residents to learn more.

The last MMP did not specify actions to be taken with the collection system. Due to an effort to determine if cleaning the digesters would interfere with mercury testing in 2018, however, the four trunklines leading into the treatment plant were tested and it was found that trunk line 2 had an elevated mercury content and trunk line 3 had a substantially higher concentration. The results of this testing if found in Attachment 2. During the third quarter of the first and last years of the new MMP, the four trunkline locations will be sampled and tested.. On the same day as collection system sampling the source water and influent will be sampled and tested. In order to account for treatment plant detention time on the day after the described sampling event the effluent will be sampled and tested for mercury.

As specified in the last MMP septage continues to be one of the prime sources of mercury. Since this septage will be discharged without regard to discharge location, the current Hood River policy of accepting septage is probably the current best option due to the fact that the treatment plant removes approximately 96% percent of the mercury entering the plant. Septage comes from a large number of sources and testing each load is impractical. Hood River will better characterize this source by compositing for a month during year 2 through 4 to determine the average mercury content for the month.

Total 5 Year Mercury Sampling Schedule

Qtr/Location	1.Water Intake 2.WWTP Influent 3.WWTP Effluent	Main Trunkline*	Septage	Contingent Samples (To be used only if commercial establishments are located)
3 rd 2024	3	4	0	2
3 rd 2025	3	0	1	2
3 rd 2026	3	0	1	2
3 rd 2026	3	0	1	2
3 rd 2027	3	4	0	2
Total Each	15	8	3	10
Total Samples				36

4. Facility Changes

Facility

No infrastructure additions or removals occurred during the MMP's 5 year period. One anaerobic digester that was filled with solids and off-line was cleaned and put back on line in September 2018. The solids were removed and trucked to disposal. The washwater used to clean the digester was then returned to the headworks of the plant. This washwater increased the influent sample taken on 9/13/2018 to 2170 ng/L mercury at the influent. This mercury was associated with settleable material which resettled inside the plant resulting in a discharged effluent during this operation that was not elevated above the levels of normal operation. This was also confirmed by trunkline samples taken that day and a septage composite. The influent minus the sum of the trunklines and the septage resulted in an influent value that is mid-range of the other data taken during the five years covered by the last MMP.

Influent plus septage	Sum of Trunks plus septage	Interference from digester cleaning
8.53335	gm - 0.90896	gm = 7.62439
The sum of the trunk lines and septage leads to an estimate of influent of 0.9086 gm without interference.		

The effluent data since that time may indicate an increased solids retention and consequent mercury capture resulting in lower mercury discharges. The trunkline samples taken on this date were not specified in the prior MMP but results indicate that the third trunk tested has a higher concentration. The new MMP will focus on confirming this fact and working upward from the previous high concentration sampling site.

Collection System

No significant changes have occurred in the collection system beyond normal addition of service area due to residential growth.

Changes in Industrial Users (added or removed)

No SIUs were removed during the period. Two Additional SIUs were added. The new industries include Turtle Island Foods and pFriem Family Brewers. Both of these are food production and have very low mercury concentrations in their discharges.

Changes in Source Water Supply

No Changes

Other

No additional point sources or changes were identified.

5. Mercury Monitoring (total mercury)

Table 1. Wastewater treatment plant calendar month average influent, effluent and biosolids data
(See Attachment 4)

Date	Location	Result (ug/L)	Quantitation Limit (ug/L)
	5 Year Average Source Water	U-below mdl	0.0050 RL, 0.00008-0.00020 MDL
	5 Year Average Influent	0.200 µg/L	0.00417 RL, 0.00025 MDL
	5 Year Average Effluent	0.0019 µg/L	0.0050 RL, 0.00008-0.00020 MDL

Table 2. Flow/Load Information (see Attachment 8)
(Biosolids provide mass only, direct measurement results in non-detect)

Year	Influent			Effluent			Bio-Solid		
	Flow	Conc.	Mass	Flow	Conc.	Mass	Flow	Conc.	Mass
Year 1									
Year 2									
Year 3									
Year 4									
Year 5									

Table 3. Other Monitoring for Mercury (See Attachments 1 and 2)
All test results in throughout this document were generated using Method 1630 E.)

Location	Sample Type	Form of Mercury	Method / Analytical Limit	Analytical Results / Units
			/	/
			/	/
			/	/
			/	/

6. Summarize Mercury Reduction Activities Implemented during (at least) the Previous Five Years (from the date this plan was prepared):

Overview

All promised aspects of the prior MMP were accomplished.

1. Conducted sampling and mass calculations.
2. Met the full sampling schedule. In addition to the eleven (11) scheduled sampling dates Hood River has conducted an additional 14 sampling events (all 25 included influent, effluent sampling and 8 source water samples). Also in addition to the plans required testing of source, influent and effluent sampling the City sampled at 4 trunkline sites and 3 composite samples of septage.
3. The prior MMP identified that the City SIUs are not a significant source of mercury.
4. Inspections were conducted at the dental offices.
5. Information was prepared or delivered to dental, medical and school establishments.
6. Language was prepared for the sewer ordinance (see Attachment 9). Still confirming that language was adopted.
7. Reviewed system for areas that might go anaerobic and cause methylation but did not find areas other than the POTWs digester.
8. No user was identified that used caustic produced using the mercury cathode method.

Medical facilities

Provided BMP document (Using the form submitted to ODEQ with prior MMP submission) to Medical Facilities one time during the 5 year period.

Dental facilities

Most dental facilities no longer performed silver fillings, however, in the next MMP these will be revisited since old silver filling may still be processed in these facilities. All dentist locations in Attachment 6 were visited and inspected including review of onsite manifest to assure that silver trap manifest are up to date and properly filed.

Schools

A letter and inspection/support documents were provided to the schools below. The source of the documents is ATSDR with additional education materials on mercury from the CDC. The documents used were found and used after the last MMP was submitted.

Hood River County School District
Hood River Middle School
May Street Elementary

Westside Elementary

The letter did not request a response back which will be addressed in the next MMP to determine if the BMPs are utilized. Additional websites which were supplied to the schools were found at:¹

<https://www.atsdr.cdc.gov/dontmesswithmercury/>

https://www.atsdr.cdc.gov/dontmesswithmercury/mercury_school.html

<https://www.atsdr.cdc.gov/dontmesswithmercury/videos.html>

https://www.atsdr.cdc.gov/dontmesswithmercury/for_teachers.html

Industrial facilities

During the past 5 years the industrial facilities were inspected and sampled for mercury. Mercury discharges in these food producing Significant Industrial Users is near zero. Results of testing are found Attachment 3.

Heating, ventilation and air conditioning (HVAC)

The last MMP did not specify these establishments and were not mentioned by ODEQ in the telecommunications that occurred leading to the MMP that was approved and adopted.

Residential, collection systems, and septage sources

See attachments 1 and 2. Additional monitoring was not specified and not mentioned by ODEQ in the telecommunications that occurred leading to the MMP that was approved and adopted.

MMP Evaluation

The previous MMP was completed very early in the Oregon process of requiring POTWs to submit a plan. ODEQ at the time stated that it was one of the three best submitted at the time of its submittal and it was used for a time as a model for other permit holder to follow. Never the less, while the promised actions provided a very useful baseline, the actual detective work needed to identify potential dischargers was limited. Since the time of the Hood River MMP the preparer of the original document has designed numerous other MMPs including a large City (Albuquerque) and industrial MMPs. The Hood River plan was an important springboard toward preparing these additional plans and the new MMP comes full circle. Especially useful to the new plan is the ability to obtain a very comprehensive SIC/NAICS database and use these codes to determine actual users that should be investigated. This along with additional sampling in the collection system will add to the current substantial database and has high probability of lowering mercury in future years.

Mercury/Hazardous Material Drop Off

The City/County currently does not have a Mercury/Hazardous Materials drop off location or event.

¹ Note: Only three websites were supplied. ASTDR has changed there site since the time of school mailings, the four sites shown contain the material that was originally contained in three sites.

7. Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Preparer

(please print): Wayne W. Heinemann

Senior Director of Operations and
Pretreatment Consulting,

Title: Jacobs Engineering Date 1/09/2024

Signature: Wayne W. Heinemann

Phone: 208 420 4862 Fax: NA

Wayne.Heinemann@Jacobs.com

Authorized
agent

(if different):

Adam Schmid

Title: Public Works Director Date: 8/8/2024

Signature: Adam Schmid

Phone: 541-387-5205 Fax: _____

Attachment 1
Test Results of Septage Composites

Hood River Septage

Hood River Mercury Minimization Plan

Test Results and Mass Calculations

Year	Quarter	Date	RL	ML	Septage		
			ng/L		ng/L	Flow MGD	g/d
2018	1	3/8/2018	0.50	0.20		0.01	0.00
2018	2	5/23/2018	0.50	0.20		0.00	0.00
2018	3	9/11/2018			2130.00	0.0031	0.03
		9/12/2018			123000.00	0.0044	2.03
		9/13/2018	0.50	0.20	991.00	0.0035	0.01

Attachment 2
Test Results of Trunkline Sampling

Hood River Mercury Minimization Plan

Trunk Line Testing

Test Results and Mass Calculations		New section along where distillery is			Older section of Town			Section headed out due south also contains older section of town			West end		
Year	Date	Trunk 1			Trunk 2			Trunk 3			Trunk 4		
		ng/L	Flow MGD	g/d	ng/L	Flow MGD	g/d	ng/L	Flow MGD	g/d	ng/L	Flow MGD	g/d
2018	3/8/2018			0.00			0.00			0.00			0.00
2018	5/23/2018			0.00			0.00			0.00			0.00
2018	9/11/2018			0.00			0.00			0.00			0.00
	9/12/2018			0.00			0.00			0.00			0.00
	9/13/2018	26.50	0.26	0.03	106.00	0.26	0.10	758.00	0.26	0.74	22.30	0.26	0.02

Attachment 3
Test Results of Significant Industrial User Sampling

Full Sail Brewing Company

SUMMARY DATA		Arsenic (T)	Cadmium	Chrome (T)	Copper	Cyanide	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Zinc
Ave. Industry Concentration.		2.405 ug/L	0.037 ug/L	2.640 ug/L	23.650 ug/L	ND	2.910 ug/L	0.001 ug/L	2.430 ug/L	3.075 ug/L	1.110 ug/L	0.027 ug/L	66.350 ug/L
8/17/2021	Influent	2.75 ug/l	0.047 ug/l	2.83 ug/l	20.7 ug/l		2.56 ug/l	0.0008 ug/l	2.19 ug/l	3.81 ug/l	1.51 ug/l	0.029 ug/l	93.1 ug/l
8/18/2021	Influent	2.06 ug/l	0.027 ug/l	2.45 ug/l	26.6 ug/l		3.26 ug/l	0.0006 ug/l	2.67 ug/l	2.34 ug/l	0.71 ug/l	0.024 ug/l	39.6 ug/l

Hood River Juice Company

SUMMARY DATA		Arsenic (T)	Cadmium	Chrome (T)	Copper	Cyanide	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Zinc
Ave. Industry Concentration.		1.550 ug/L	0.049 ug/L	3.280 ug/L	10.330 ug/L	ND	0.394 ug/L	0.000 ug/L	0.125 ug/L	2.275 ug/L	0.520 ug/L	0.030 ug/L	27.750 ug/L
8/17/2021	Influent	1.44 ug/l	0.027 ug/l	2.32 ug/l	3.96 ug/l		0.164 ug/l	0. ug/l	0.17 ug/l	0.91 ug/l	0.11 ug/l	0.039 ug/l	11.1 ug/l
8/18/2021	Influent	1.66 ug/l	0.07 ug/l	4.24 ug/l	16.7 ug/l		0.624 ug/l	0.0004 ug/l	0.08 ug/l	3.64 ug/l	0.93 ug/l	0.021 ug/l	44.4 ug/l

pFriem Family Brewers

SUMMARY DATA		Arsenic (T)	Cadmium	Chrome (T)	Copper	Cyanide	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Zinc
Ave. Industry Concentration.		8.640 ug/L	0.461 ug/L	2.095 ug/L	34.950 ug/L	ND	0.402 ug/L	0.001 ug/L	1.500 ug/L	2.715 ug/L	1.450 ug/L	0.041 ug/L	89.300 ug/L
8/17/2021	Influent	10.9 ug/l	0.602 ug/l	2.26 ug/l	41.8 ug/l		0.342 ug/l	0.0015 ug/l	1.86 ug/l	2.36 ug/l	1.63 ug/l	0.053 ug/l	98.9 ug/l
8/18/2021	Influent	6.38 ug/l	0.319 ug/l	1.93 ug/l	28.1 ug/l		0.461 ug/l	0.0011 ug/l	1.14 ug/l	3.07 ug/l	1.27 ug/l	0.029 ug/l	79.7 ug/l

Turtle Island Foods

SUMMARY DATA		Arsenic (T)	Cadmium	Chrome (T)	Copper	Cyanide	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Zinc
Ave. Industry Concentration.		0.575 ug/L	0.049 ug/L	6.290 ug/L	28.200 ug/L	ND	1.107 ug/L	0.000 ug/L	3.560 ug/L	13.750 ug/L	0.440 ug/L	0.023 ug/L	59.900 ug/L
8/17/2021	Influent	0.34 ug/l	0.035 ug/l	5.16 ug/l	29.8 ug/l		0.773 ug/l	0.0007 ug/l	3.63 ug/l	11.6 ug/l	0.27 ug/l	0.024 ug/l	41.4 ug/l
8/18/2021	Influent	0.81 ug/l	0.063 ug/l	7.42 ug/l	26.6 ug/l		1.44 ug/l	0.0003 ug/l	3.49 ug/l	15.9 ug/l	0.61 ug/l	0.022 ug/l	78.4 ug/l

Attachment 4
5 Year Summary of Test Results (Concentration and
Mass) on Source Water, Influent and Effluent
Sampling

Hood River Mercury Minimization Plan

Test Results and Mass Calculations

Year	Quarter	Date	RL	ML	Water Intake			WWTP Influent			WWTP Effluent			Net Gain g/d	Net Gain/Loss Source to Effluent	g/d Disposed In Sludge
			ng/L	ng/L	ng/L	Flow MGD	g/d	ng/L	Flow MGD	g/d	ng/L	Flow MGD	g/d	Source to Influent		
2018	1	3/8/2018	0.50	0.20	U	1.28	0.001			0.00	1.74	1.28	0.008		0.007	
2018	2	5/23/2018	0.50	0.20	U	0.97	0.001		0.97	0.00	0.97	0.97	0.004		0.003	
2018	3	9/13/2018	0.50	0.20	U	1.04	0.001	2170	1.04	8.52	1.37	1.04	0.005	8.52	0.005	8.515
2018	4	11/28/2018	0.50	0.20	U	1.25	0.001			0.00	2.72	1.25	0.013		0.012	
2019	1	2/27/2018	0.50	0.20	U	1.46	0.001	57	1.46	0.32	1.27	1.44	0.007	0.32	0.006	0.310
2019	2						0.000			0.00			0.000		0.000	
2019	3	9/23/2019	0.50	0.20	U	1.11	0.001		1.11	0.00	2.59	1.02	0.010		0.009	
2019	4						0.000			0.00			0.000		0.000	
2020	1						0.000			0.00			0.000		0.000	
2020	2						0.000			0.00			0.000		0.000	
2020	3	9/20/2020	0.50	0.20	U	0.93	0.001	121	0.93	0.43	0.73	0.93	0.003	0.43	0.002	0.424
2020	4						0.000			0.00			0.000		0.000	
2021	1	3/1/2021	0.50	0.20		1.51	0.000		1.51	0.00	2.06	1.51	0.012		0.012	
2021	2	5/5/2021	0.50	0.20		1.07	0.000	68	1.07	0.27	3.64	1.07	0.015	0.27	0.015	0.259
2021	2	5/6/2021	0.50	0.20		1.10	0.000	95	1.10	0.39	3.11	1.10	0.013	0.39	0.013	0.382
2021	3	9/29/2021	0.50	0.08	U	1.02	0.000	155	1.02	0.60	3.41	1.02	0.013	0.60	0.013	0.585
2021	4						0.000			0.00			0.000		0.000	
2022	1	3/16/2022	0.50	0.79		1.56	0.000		1.56	0.00	1.50	1.56	0.009		0.009	
2022	2	4/25/2022	0.50	0.20		1.081	0.000	192	1.08	0.79	1.49	1.08	0.006	0.79	0.006	0.780
2022	2	4/26/2022	0.50	0.20		1.205	0.000	116	1.21	0.53	1.60	1.21	0.007	0.53	0.007	0.522
2022	2	4/27/2022	0.50	0.20		1.19	0.000	289	1.19	1.31	2.18	1.19	0.010	1.31	0.010	1.297
2022	2	5/5/2022	0.50	0.20		1.11	0.000	ND	1.11		4.10	1.11	0.017		0.017	
2022	3	8/4/2022	0.50	0.20		1.00	0.000			0.00	1.76	0.00	0.000		0.000	
2022	3	9/21/2022	0.50	0.08	U	0.92	0.000	100	0.92	0.35	3.70	0.92	0.013	0.35	0.013	0.335
2022	4						0.000			0.00			0.000		0.000	
Additional Testing Conducted for Local Limits Development																
2021	3	8/13/2021	0.50	0.08		0.993		89	0.99	0.34	1.40	0.99	0.005	0.34	0.005	0.331
2021	3	8/14/2021	0.50	0.08		1.019		68	1.02	0.26	1.10	1.02	0.004	0.26	0.004	0.256
2021	3	8/15/2021	0.50	0.08		1.026		105	1.03	0.41	1.20	1.03	0.005	0.41	0.005	0.403
2021	3	8/16/2021	0.50	0.08		1.036		242	1.04	0.95	1.15	1.04	0.005	0.95	0.005	0.945
2021	3	8/17/2021	0.50	0.08		1.021		1100	1.02	4.25	1.09	1.02	0.004	4.25	0.004	4.248
2021	3	8/18/2021	0.50	0.08		0.974		95	0.97	0.35	1.24	0.97	0.005	0.35	0.005	0.346
2021	3	8/19/2021	0.50	0.08		0.965		306	0.97	1.12	1.01	0.97	0.004	1.12	0.004	1.114
					U			200		0.64	1.93			0.79	0.01	0.78

Note:

- The RL and ML in local limits table is for effluent, due to dilution the RL's and ML's for Influent are 4.17 and 0.25 ng/L respectively
- Since all actual samples taken at the source were undetect the assumption for the influent and effluent is that the source is undetect, the cells without actual test data are blank in Column G
- Sludge mass is based on subtraction of Effluent mass from Influent mass. Sludge testing was not in the original MMP and is not recommended in the new MMP due to the fact that actual pounds of sludge disposed cannot be accurately measured in a WWTP and mercury levels in sludge are always reported as ND.
- All flows used to calculate mass are based on WWTP effluent meter. It is recognized that more source water entered the system than exited, however, since the concentration of mercury in the source water is near zero the additional water does not affect the final mass numbers.
- The data on 9/13/18 was not used in the averages due to interference from digester cleaning.

Mercury Hood River Biosolids

Biosolids Mercury Results Extracted from Lab Reports

Date	Result mg/kg-dry	RL
1/10/2018	0.14	0.0568
4/12/2018	0.0784	0.0118
7/17/2018	0.0794	0.0189
11/13/2018	0.558	0.0137
3/6/2019	0.204	0.0716
6/12/2019	0.261	0.0701
7/17/2019	0.19	0.0662
10/7/2019	0.337	0.0195
1/22/2020	ND	0.4
4/20/2020	0.82	0.4
7/24/2020	5.6	0.4
12/8/2020	0.73	0.4
1/20/2021	0.22	0.0132
5/5/2021	0.325	0.0156
7/15/2021	0.178	0.0662
10/19/2021	0.237	0.0662

Date	Result mg/kg-dry	RL
2/7/2022	0.311	0.0637
4/26/2022	0.401	0.0668
8/2/2022	2.25	0.0932
11/16/2022	0.497	0.0415
1/31/2023	0.0341	0.00927
5/16/2023	0.281	0.0568
7/18/2023	0.347	0.0636
10/10/2023	0.289	0.0641
2/12/2024	0.0486	0.00687
4/23/2024	0.406	0.07
7/29/2024	0.491	0.0701
10/21/2024	0.407	0.0743

Attachment 5
Hood River Best Management Practices for Mercury
Waste Management in Hospitals and Medical
Facilities

Hood River Best Management Practices for Mercury Waste Management in Hospitals and Medical Facilities



Prepared by Hood River WWTP for the control of mercury discharged to the sanitary collection system by Hospitals.

Table of Contents

Introduction	3
#1 Inventory/Disposal	3
Elemental Mercury	4
#2 Mercury Elimination & Recycling	5
Using Substitutes	5
Eliminating Mercury	5
#3 Environmental Release	6
Spills	6
Clean Up	7
#4 Records	7
#5 Training	8

Appendices

Mercury Checklist for Hospitals	10
Hood River WWTP Discharge Prohibitions	14
Hood River WWTP Local limits	15
Acknowledgements	16

**1 gram of
mercury**

There is enough mercury - about 1 gram - in 20 fluorescent light bulbs to contaminate a day's supply of drinking water for 1 million people.

Introduction

The Hood River WWTP Mercury Best Management Practices (BMPs) for Hospitals are designed to prevent pollution, and assist hospitals in the proper management of mercury and mercury waste in their day-to-day activities. This best management practices booklet contains a set of recommended operating procedures and guidelines designed to reduce the amount of mercury discharged to the City of Hood River's sanitary sewer system, a publicly owned treatment works (POTW). Proper implementation of these procedures is intended to protect Oregon's natural environment from the discharge of hazardous mercury-containing compounds.



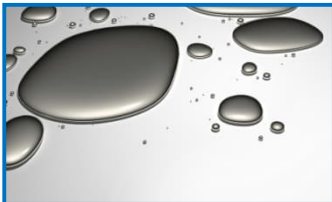
Hospitals have a responsibility not only to their patients, but to their communities, and can play an active role in preventing illness. Two ways to do this are through recycling and reducing the use of hazardous materials in the facility. When mercury is spilled, it comes into contact with air and evaporates into an invisible, odorless toxic vapor. Acute and chronic exposures to mercury can negatively impact cognition, personality, sensory, and motor functions.

This manual identifies certain practices that hospitals should follow. These recommendations are summarized at the end of each topic as [BMP Summary Recommendations](#). In addition, guidance is given on practices that offer environmentally preferable practices for hospitals and may help save money through waste minimization. These will be summarized in each section under the heading, "[Consider the following.](#)"

BMP #1 – INVENTORY AND DISPOSAL

Mercury Inventory

All hospitals should complete a mercury products inventory. Mercury is typically found in many areas in hospitals. Items such as thermometers, sphygmomanometers (blood pressure cuff), thermostats,



switches, gauges, batteries, light bulbs, laboratory stains and solutions can all contain mercury. Mercury in broken or outdated equipment is often improperly discarded as red bag waste or trash and sent to the incinerator. Incineration causes mercury vapors to escape into the air, starting a trail of pollution with the smallest creatures at the bottom of the food chain ending with those at the top, like humans. Some rooms and

offices may still have supplies of elemental mercury tucked away in a storeroom. This supply, especially if it is forgotten or poorly managed, exists as a potential risk to the environment, patients and employees and can be very expensive to clean up.

Do not pour mercury down the drain. It is highly toxic to organisms at the wastewater treatment plant. Mercury is also heavy and can become stuck in sink traps, creating a health risk. Properly dispose of or recycle elementary mercury, mercury compounds, and mercury containing instruments and products. It is always more cost effective to dispose of mercury than clean it up. Make sure all mercury thermometers and other mercury devices are stored in non-breakable containers and are secured in an air-tight locked container until they are properly disposed of or recycled.

Recycle all unused free mercury. Many hazardous waste haulers will accept elemental mercury for recycling.

BMP #1 Summary Disposal Recommendations

Never discard elemental mercury in any sink or drain, sharp container, biohazard waste bag (red bag) or trash.

Always recycle or dispose of all mercury-containing materials through a licensed mercury waste recycler or handler.

Consider the following:

Use non-mercury alternatives to reduce the risk of an elemental mercury spill.

Designate all sinks as “Sanitary Use Only – No Chemical Disposal” to eliminate any chance of accidental discharge in the sink.



BMP #2 – MERCURY ELIMINATION & RECYCLING

All hospitals should have an action plan in place to eliminate mercury-containing items found as a result of the inventory. Instruments and products such as thermometers or blood pressure cuffs can easily be replaced with non-mercury alternatives. Alcohol and electronic thermometers are readily available and sufficiently accurate. Aneroid blood pressure devices are just as effective as the mercury versions. Electronic thermostats and non-mercury switches are also widely available. For immobile items, such as thermostats or switches, place labels indicating they contain mercury so when they need to be replaced they can be properly handled and disposed of. For items with no alternatives, properly handle, store, and recycle to prevent spills.

Contact your county's solid waste department to determine if a hazardous waste program is available for hospitals. If one is not available, contact a hazardous waste contractor or recycler. You can also contact the manufacturer of the product; many will recycle the item for free, especially if you purchase the mercury-free alternative from them. Review fluorescent light bulb information on the proper recycling of used bulbs.

Use video and power point presentations to show employees the hazards of mercury properties in order to eliminate hands on access to mercury. Visit <http://www.osha.gov/SLTC/mercury/index.html> to find out more about proper handling of mercury.

Implement and enforce a no-mercury policy to prevent the purchase of mercury-containing items if alternatives exist and to prevent mercury from entering the hospital or medical facility.

BMP #2 Summary:

Use non-mercury alternatives when available.

Label immobile items.

Implement and enforce a no-mercury policy.

Dispose of used light bulbs, and other mercury containing items through a licensed mercury waste recycler or handler.

Consider the following:

Have the hospital take a Mercury-Free Zone Pledge.

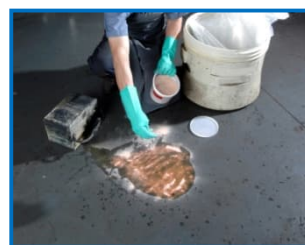
Include a Mercury-Free Purchasing Policy.

BMP #3 - ENVIRONMENTAL RELEASE



Spills

It is important to be prepared for a mercury spill. Spilled mercury can evaporate at room temperature and be inhaled; it can also spread long distances and settle in cracks and porous materials like cloth, carpet, or wood,



slowly emitting vapors over a long period of time. Keep everyone away from contaminated areas. Even small amounts of mercury can pose a risk to human health and the environment. Exposure to mercury by inhalation is of particular concern in managing a spill. Designate a professional spill cleanup firm to respond or designate a competent trained staff person to be immediately notified in case of a spill. This person should be properly trained in the appropriate use of a mercury spill kit, cleanup procedures, required personal protective clothing, decontamination and disposal. Mercury spill kits are available from companies that specialize in Occupational Safety and Health Administration compliance supplies. Before purchasing a kit, make sure it includes complete instructions on how to perform a spill clean-up. Train staff members in proper spill cleaning procedures.

Establish emergency plans for small spills (less than 2 tablespoons) and for large spills (more than 2 tablespoons or one pound), consider hiring a professional spill response company to provide help for large spills or if mercury contaminates carpeting or porous flooring. Do not handle mercury in carpeted areas because it is very difficult to collect all of the contaminants if there is a spill. In the event of a mercury spill, put on nitrile gloves (do not use latex gloves as mercury can penetrate latex) along with other appropriate proper protective equipment and clean it up immediately. Never use a vacuum cleaner, mop or broom to clean up a spill. A vacuum cleaner has the potential to spread mercury dust and/or vapor throughout the area in the vacuum exhaust. Heat from the motor will also increase the amount of mercury vapor in the air. Mops and brooms will spread the mercury, making proper cleanup more difficult and costly.

Prevent spills by storing items in secure locations until the items can be properly disposed of or recycled. Make sure mercury-containing products are well protected against breakage. Double bag any item containing liquid mercury and then place bag in a covered non-breakable container.

BMP #3 – Summary Environmental Release Recommendations

Be prepared for a spill.

Only have OSHA trained staff handle any spill regardless of size.

Prevent spills through proper storing.

Consider the following:

Require all personnel who may come into contact with mercury-containing materials to review the Occupational Safety and Health Administration's proper mercury safe handling and disposal procedures at the OSHA Web site:

<http://www.osha.gov/SLTC/mercury/index.html>

BMP #4 - RECORDS

Hospitals should maintain a written or electronic log of all completed inventory lists indicating where all mercury is located or stored in the hospital. In addition, retain receipts, shipping manifests and other certified documentation from the recycler or hazardous waste hauler of all mercury waste recycling and disposal shipments. These documents should be kept on file for at least three years, and should be made available to authorized Hood River WWTP inspectors upon request.



BMP #4 - Summary Records Recommendations

Retain the following records for three years:

- Completed mercury inventory list

- All waste recycle/disposal receipts and shipping manifests.

Documentation for all employees attending annual training

**1 gram of
Mercury**

A tiny speck of mercury - the size of the period at the end of this sentence - can contaminate a 36-ounce fish. This is about 1/100 of a gram.

BMP #5 - TRAINING

Proper knowledge and handling of mercury and all items containing mercury is vital to preventing accidental exposure and release of hazardous materials into the environment. A proper training program should include all five of the Hood River WWTP Best Management Practices included in this manual. Anyone who handles or has the potential to come into contact with mercury-containing materials should be trained in these BMPs for proper mercury waste handling requirements.

Help raise awareness about mercury safety by educating employees to have an awareness and understanding of the pervasiveness of mercury in their work place, communities, and environment and how and why this is an environmental and health concern.

BMP #5 Summary Training Recommendations

Use these Hood River WWTP Best Management Practices to teach proper handling techniques to all staff who may come into contact with mercury-containing materials.

Consider the following:

Consider educating employees about mercury through pay check/stub notifications and posters in the work place.

Include Mercury education at annual training workshops.

Mercury Audit: Assessment Checklist for Hospitals

Item	No	Yes	Use?	How Many/ How Much?	Location?
Liquid mercury					
Mercury thermometers					
Mercury barometers					
Mercury vacuum gauges					
Mercury spectral tubes					
Mercury molecular motion device					
Center tubes					
Feeding tubes					
Mercury oxide					
Mercury (II) chloride					
Miller abbot tubes					
Mercury nitrate					
Mercury iodine					
Mercury fever thermometers					
Sphygmomanometers (blood pressure devices) - with silver liquid					
Laboratory ovens					
Mercuric batteries					
Fluorescent lamps (bulbs)					

Item	No	Yes	Use?	How Many/ How Much?	Location?
Mercury thermostats					
Various types of lamps (light bulbs: mercury vapor, metal halide, high-pressure vapor sodium, high intensity discharge (HID))					
Mercury gauges					
"Silent" light switches					
Mercury float control switches (e.g., on sump pumps)					
Flow meters with mercury					
Other equipment with					
Older fungicides and pesticides (manufactured prior to 1991)					
Latex paint (manufactured prior to 1992)					
Mercury cooking thermometer (kitchen)					

Item	No	Yes	Use?	How Many/ How Much?	Location?
True vermilion paint (contains mercuric sulfide)					
Mercury oxide/mercury zinc batteries (old alkaline type, prior to 1996 and button batteries)					
Other					

Appendix B

Industrial Pretreatment

PROHIBITED DISCHARGES AND LOCAL LIMITS

[provide list of prohibited discharges to sewer system here, if applicable]

For additional copies of this guide or more information, please visit our web site:

<http://ci.hood-river.or.us/pageview.aspx?id=19165>

Or contact:

Hood River WWTP

818 Riverside Drive
Hood River, OR 97031
541.386.2432

Attachment 6
Hood River Dentist, Inspection Form and Dental
Best Management Practices

2018 Hood River Survey of Dentist

A Kidz Dental Zone	419 E State St #4	(541) 387-8688
A Kidz Dental Zone: Wohlford Steven DDS	419 State St	(541) 387-8688
Belmont Dental Plaza	1825 Belmont Ave	(541) 386-3818
Bruce Burton, DMD	1002 10th St #1	(541) 386-2020
Cascade Dental Products Co	926 12th St	(541) 386-1143
Chris R Chapman Licensed	926 12th St	(541) 386-2012
Crompton Dental	505 Sherman Ave	(541) 386-3848
Crompton Dental LLC	505 Sherman Ave # 2	(541) 386-3848
Crompton Dental LLC: Crompton Mark E DDS	505 Sherman Ave	(541) 386-3848
David V Taylor	1835 Belmont Ave	(541) 386-2666
Dr William D Payne DMD	307 E Sherman Ave	(541) 386-2999
Dr. Aron T. Geelan, DMD	849 Pacific Ave	(541) 386-6380
Dr. Daniel J. Madden, DDS	1805 Belmont Ave	(541) 386-4255
Dr. Elizabeth A. Aughney, DDS	849 Pacific Ave	(541) 386-6380
Dr. Evonne Nadelhoffer, DDS	849 Pacific Ave	(541) 386-6380
Dr. Randolph E. Price, DDS	1825 Belmont Ave	(541) 386-3818
Dr. Ruth G. Kosmalski, DDS	1835 Belmont Ave	(509) 493-2244
Flaiz Rebecca DDS	1825 Belmont Ave	(541) 386-3818
Gorge Dental Andrew Olsson DDS	405 13th St	(541) 387-2244
Gove Shelley	505 Sherman Ave # 2	(541) 386-3848
Hodson Kathy	419 E State St # 4	(541) 387-8688
Hood River Dental	1805 Belmont Ave	(541) 386-4255
Hood River Dental	307 E Sherman Ave	(541) 386-2999
J. Kyle House, D.D.S., F.A.A.P.D	419 State St #4	(541) 387-8688
La Clinica	849 Pacific Ave	(541) 386-6380
La Clinica Del Carino Family: Clement F Michael DDS	849 Pacific Ave	(541) 386-6380
La Clinica Del Carino Family: Cullen Victor DDS	849 Pacific Ave	(541) 386-6380
La Clinica Del Carino Family: Didier Erica L MD	849 Pacific Ave	(541) 386-6380
La Clinica Del Carino Family: Irving Shelley D DDS	849 Pacific Ave	(541) 386-6380
La Clinica Del Carino Family: Kruger Kristine A MD	849 Pacific Ave	(541) 386-6380
La Clinica Del Carino Family: Ransom James A DDS	849 Pacific Ave	(541) 386-6380
La Clinica Del Carino Family: Venusti Elise DDS	849 Pacific Ave	(541) 386-6380
Little Shredders Dental	1615 Woods Ct	(541) 490-4993
Marshall Dennis R DDS	1835 Belmont Ave	(541) 386-2666
Neil Watanabe PC	505 Sherman Ave	(541) 386-3484
ONE COMMUNITY HEALTH	849 Pacific Ave	(541) 386-6380
Pat Freeman Dental	1216 12th St	(541) 386-3525
Price Randy E DDS	1825 Belmont Ave	(541) 386-3818
Schmidt Dental Center	1825 Belmont Ave	(541) 386-3818
Scott W. Edgar	1700 12th St	(541) 716-5072
Straightline Orthodontics	1002 10th St #2	(541) 716-5032
The Denture Specialist	926 12th St	(541) 386-2012
TJ Finlayson DMD	1835 Belmont Ave	(541) 386-2666
Waterfront Endodontics	501 Portway Ave	(541) 436-2740
Waterfront Endodontics, Travis Chapman DMD	501 Portway Ave #202	(541) 436-2740
Wilson Street Medical Clinic	1101 Wilson St	(541) 436-4144
Wixman Harvey DDS	505 Sherman Ave	(541) 386-3484

All establishments from the 10/10/08 update have been confirmed as still in business, still operated by replacement dentist or have been permanently closed.

Dental Office Inspection Checklist

Practice name: _____

Address: _____

Contact: _____

Phone: _____ Fax: _____

Dentists at this office: _____

Person responsible for waste hauling: _____

Person responsible for amalgam separator: _____

USD inspector: _____ Date: _____

Re-inspection date to verify corrections of deficiencies: _____

1. Amalgam Waste Management

Required Waste Management Practices ☐ Applicable ☐ Not applicable

Does office comply?

Yes No N/A

- | | | | |
|--------------------------|--------------------------|--------------------------|--|
| ☐ | ☐ | ☐ | [1a] Do not rinse chair-side traps, vacuum screens, and amalgam separator equipment in a sink or other sanitary sewer connection. [USD Ordinance 36 Section 2.02 (b) (1)]
_____ |
| ☐ | ☐ | ☐ | [1b] Properly recycle or dispose of chair-side traps, vacuum screens, and amalgam separator equipment. [36 Section 2.02 (b) (1)]
_____ |
| ☐ | ☐ | ☐ | [2a] Train staff in proper handling and disposal of amalgam materials and fixer-containing solutions. [36 Section 2.02 (b) (2)]
_____ |
| ☐ | ☐ | ☐ | [2b] Keep record of this staff training. [36 Section 2.02 (b) (2)]
_____ |
| ☐ | ☐ | ☐ | [3] Collect, package, label, store and manage amalgam wastes in accordance with state and local regulations. For example, a practice may use a large well-sealed plastic container to hold used chair-side traps, vacuum screens, amalgam separator wastes, used capsules, extracted teeth, and other amalgam wastes for recycling. [36 Section 2.02 (b) (3)]
_____ |
| ☐ | ☐ | ☐ | [4] Use a vacuum line disinfectant that does not contain bleach or other chlorine-containing disinfectant. [136 Section 2.02 (b) (4)]
_____ |
| ☐ | ☐ | ☐ | [5] Use pre-measured amalgam capsules. Use of bulk mercury is prohibited. [36 Section 2.02 (b) (5)]
_____ |

Other Comments:

Required Amalgam Separator ☐ Applicable ☐ Not applicable

Manufacturer: _____ Model: _____

Vendor: _____ Date installed: _____

Separator location: _____ Maintenance by: _____

Amalgam waste hauler: _____

Separator waste hauler: _____

Does office comply?

Yes No

☐ ☐ [6a] Install an ISO-11143 Certified Amalgam Separator Device in the office vacuum system. This device is certified as removing a minimum of 95% of amalgam. [36 Section 2.02 (c) (2)]

☐ ☐ [6b] The amalgam separator system is certified at flow rates comparable to the actual flow rate of the office's vacuum suction system. [36 Section 2.02 (c) (2)]

☐ ☐ [6c] Neither the separator device nor the related plumbing include an automatic flow bypass. [36 Section 2.02 (c) (2)]

☐ ☐ [7] Amalgam separator is operated and maintained in accordance with manufacturer's recommendations. [36 Section 2.02 (c) (4)]

Date of last service: _____

☐ ☐ [8] Amalgam separator waste is disposed of using an authorized hauler, recycler or disposal facility. [36 Section 2.02 (b) (3)]

Comments Regarding Amalgam Separator:

2. Other Hazardous Waste Management

Type of X-ray ☐ Film ☐ Digital

Does office comply?

Yes No N/A

☐ ☐ ☐ [8a] Collect, package, label, store and manage x-ray chemical wastes in accordance with state and local regulations. [36 Section 2.01.2 (d), i)]

☐ ☐ ☐ [8b] Collect, package, label, store and manage x-ray film and lead foil wastes in accordance with state and local regulations. [36 Section 2.01.2(d), (i)]

☐ ☐ ☐ [9] Collect, package, label, store and manage glutaraldehyde in accordance with state and local regulations. [36 Section 2.01.2 (d), (i)]

Comments Regarding Other Wastes:



The Environmentally Responsible Dental Office

A Guide to Best Management Practices of Dental Wastes

Updated October 2016

Effective in 2007 Senate Bill 704

Office Practices to Avoid

- **NEVER** use bulk mercury for amalgam;
- **NEVER** pour bulk elemental mercury waste in the garbage, red bag or down the drain;
- **NEVER** place amalgam waste of any kind (including extracted teeth with amalgams) in the biohazard (red) bag. Biohazard bags are incinerated and/or treated and placed in conventional landfills that do not have liners. Both types of disposal can lead to mercury entering the environment;
- **NEVER** rinse traps, filters, or screens over or down the drain or into a waste basket- Use disposable traps only.
- **NEVER** disinfect teeth or any item containing amalgam with any method that uses heat;
- **NEVER** dump spent fixer down the drain;
- **NEVER** throw lead foil from x-rays in the trash (for liability reasons, it is not recommended that lead foil be given to patients, staff or others).

Oregon Dental Waste BMPs

1. Use **pre-capsulated alloys** only (do not put capsules in red bag)
2. Salvage, store and recycle **non-contact amalgam** (amalgam left over from a capsule not used in restoration)
3. Recycle/dispose of **extracted teeth with amalgam** in one of the following ways:
 - Disinfect (in bleach) and give to patient,
 - Check with amalgam recycler/disposal services to see if they will accept teeth (store in sealed container following disinfection)-Check ODA recycling list on ODA website for recycler list www.oregondental.org

DO NOT PUT EXTRACTED TEETH WITH AMALGAM IN THE RED BAG!
DO NOT PUT EXTRACTED TEETH WITH AMALGAM IN THE STERILIZER!
4. **Extracted teeth with no amalgam** can be put in the red bag!
5. Use **disposable chair side traps** only. Recycle traps – Check ODA recycle list.
6. Replace **screens, traps, & vacuum pump filters** regularly – do not rinse and re-use traps and filters.
7. Handle chair-side traps and vacuum filters as **amalgam waste**.
8. Store amalgam wastes in **separate airtight, labeled containers**.
DO NOT PLACE AMALGAM UNDER FIXER! STORE DRY!
9. Recycle **all** amalgam wastes through an **amalgam recycler or a Mercury collection event**.
10. Train staff members in mercury/amalgam **spill clean up procedures**.
11. **Recycle used lead foil** (*Due to potential liability, we do not recommend giving lead to patients, staff or others*).
12. **Do not** dump spent fixer down the drain. **Recover and recycle**.

Visit www.oregondental.org for a list of recycler/disposal services that includes statewide pick-up, mail disposal or offer drop-off services at their location.

Definitions

- **AMSA:** Association of Metropolitan Sewerage Agencies
- **Bioaccumulation:** The concentration of a particular substance in the bodies of organisms, increasing with the animal's level in the food chain.
- **Bioavailability:** The degree to which or rate at which a substance is absorbed or becomes available at the site of physiological activity
- **Biosolids:** Solid or semisolid material obtained from treated wastewater, often used as fertilizer
- **Combined Sewer Systems:** Systems that carry sewerage from facilities/residences, as well as storm water

- **Indirect Dischargers:** Facilities that discharge wastewater to municipal sewer systems (rather than directly to a water body)
- **Life Cycle Costing:** Cost evaluation that takes into account both initial costs and future costs and benefits (savings) of an investment over some period of time
- **Mixing Zone:** The area in which a sewerage plant's discharge initially combines with the surrounding water
- **NPDES:** National Pollutant Discharge Elimination System (permits POTW discharges)
- **POTW:** Publicly Owned Treatment Works (your local wastewater and sewage treatment plants)
- **PPB:** Parts per billion: one pinch of salt in one thousand tons of potato chips
- **PPM:** Parts per million; a pinch of salt in one ton of potato chips is also one part (salt) per million parts (chips).
- **RCRA:** Resource Conservation and Recovery Act (governs handling of hazardous wastes)

Oregon Dental Association's

Guide to Best Management Practices (BMP's) of Dental Wastes

- I. **Introduction.** The following recommendations were developed in 1998 by the ODA Office Safety Committee in cooperation with the City of Portland Bureau of Environmental Services and other water/environmental agencies throughout the state of Oregon. The ODA and its component dental societies have worked with Oregon water/environmental agencies to accept these recommendations in lieu of further regulation and permitting requirements. Senate Bill 704 (2007 legislation) now requires all Oregon dental offices to implement these practices regardless of whether the dentist is an ODA member.

ODA expresses many thanks to the City of Portland, the Association of Clean Water Agencies and the Oregon Department of Environmental Quality for working with the ODA on management of dental office hazardous waste. We also wish to thank the principal authors of this document: Beryl Fletcher, ODA Director, Professional Affairs, Murray Bartley DMD, Ph.D., Past Chair, Office Safety Committee and John G. Colasurdo D.M.D. Additional thanks are extended to the Western Lake Superior Sanitary District for resource information provided to our authors.

- II. Background.** The Oregon Dental Association has developed this guide to assist dentists in managing the disposal of dental office wastes. Reduction of toxic substances at the source is the pollution prevention goal of the U. S. Environmental Protection Agency and Oregon's Department of Environmental Quality (DEQ). Local city and county wastewater agencies are required to implement programs to reduce toxic wastes from entering our streams, sewers and landfills. The Oregon Dental Association, Oregon DEQ, the League of Oregon Cities, the Oregon Board of Dentistry and the Association of Clean Water Agencies are asking local and county agencies to work with the ODA and dentists in their communities to implement and educate ODA's Best Management Practices Program for dental offices. This program is helpful to these agencies in implementation of a toxics reduction program in response to another legislative bill (Senate Bill 737 – 2007 legislation)

In late 1996, ODA began discussions with DEQ and the City of Portland Bureau of Environmental Services as they were reviewing local discharge limits for silver and other hazardous substances. Of key interest to these agencies was mercury including amalgam, (Federal EPA includes amalgam in the mercury category), x-ray fixer (silver) and lead foil. Also of interest, was the use and disposal of chemiclave materials. The regulatory agencies encourage the conversion from chemiclaves to autoclaves. (This is not mandatory and only requested as old equipment is needed to be replaced.)

ODA and its component dental societies continue to work with Oregon wastewater agencies and dental offices whereby dentists will implement, "Best Management Practices" (BMP's) for recycling of amalgam, lead foil and x-ray fixer. With the passage of Oregon Senate Bill 704 all dental offices must implement the BMP's where previously it was a voluntary effort.

ODA strongly encourages all dental offices to recycle mercury, amalgam, lead foil and xray fixer. If dental offices recycle these materials there will be no need to enact further and more costly regulation of dental offices.

- III. Recycling assistance.** Companies have been identified which will assist dental offices in recycling of these materials. ODA does not endorse or recommend any particular company. A few suggestions to help dental offices to implement the BMP Program and where to look for recycling assistance include:

1. The ODA recycler list of recycling/recovery vendors available on ODA's website.
<http://www.oregondental.org/i4a/pages/index.cfm?pageid=3381>
2. Review the yellow pages of your local telephone book under "recyclers" or "hazardous waste."
3. Contact your nearest DEQ hazardous waste station for collection events in your area. Outside the Portland Metro area, some events are sponsored by DEQ and in some areas they are sponsored locally. You may also want to check with your local county waste management department or local garbage hauler for events in your area. For DEQ events check
<http://www.deq.state.or.us/lq/sw/hhw/hhwfacilitymap.htm>
4. METRO in Portland, 1-800-732-9253 is available for disposal. METRO's recycling stations are located at:
 1. Central Transfer Station at 6161 N. W. 61st. Street in Portland
 2. Oregon City Transfer Station at 2001 Washington Street, Oregon City.You must contact METRO prior to bringing in amalgam, liquid mercury or other wastes.
5. There are also mail-service recycling and other companies which may accept or pick-up your wastes. Make sure you follow guidelines from each company for packaging, preparation and/or mailing. Always keep a record of what, how much and when you ship. You may refer to the recycling list on ODA's website for names of recycling companies.

IV. Amalgam (Mercury) Waste. In order to meet EPA's pollution prevention goal, the Oregon Dental Association's Best Management Practices (BMP's) prevent amalgam waste from entering the air, sewage system or the garbage. Amalgam wastes include:

Amalgam particles are considered a potential source of mercury not only in the sewer, but ground water, streams and rivers. (per EPA) Amalgam particles are created when old fillings are removed and new fillings are mixed. Dental offices recapture amalgam particles with chair side screens or traps, suction pump filters, (use only disposable screens/traps and filters) and avoid disposal of amalgam down the drain, in the trashcan, or in the red bag.

Unused amalgam in a capsule following a restoration being placed is another item to be recycled. Process the unused amalgam and store dry in a sealed container. The empty capsules should also be recycled.

Extracted teeth with amalgam also should be disposed of with other amalgam wastes.

For your reference, a list of recyclers is on ODA's website. You may wish to consult with the company of your choice, as to specifications for storage and disposal preparation of amalgam particles. ODA does not endorse or recommend any particular company.

Some simple techniques for properly collecting, storing and transporting amalgam include:

1. Install amalgam traps chair-side and in the suction line just before the vacuum pump. Clean the trap area and bowl and recycle using only disposable traps on a regular basis to ensure equipment efficiency. Follow proper recycling method by recycling whole trap with wastes either at a DEQ sponsored collection event or with one of the recyclers listed on ODA's recycling list. Many recyclers will take the whole trap. (Do not have staff pick through trap. This creates other OSHA exposure issues.) Do not put traps or filters in with red bag (infectious or sharps) wastes. Replacing the traps and filters regularly will improve the suction and extend the life of your vacuum pump.
2. **Line cleansers with bleach can dissolve mercury from amalgam particles in dental wastewater. Use line cleansers that do not contain bleach or chlorine.** Flush the vacuum system with line solution before changing the chair-side trap. (Do it before you go home, and then change the trap the first thing in the morning.) Check with your manufacturer for the type of line solution to be used. (If you have an amalgam separator that requires a specific solution be used, check with your chair/equipment manufacturer to ensure the solution suggested will not void any equipment warranty.)
3. Unused amalgam in a capsule following a restoration being placed is another item to be recycled. Process the unused amalgam and store dry in a sealed container. (Do not store under fixer.) Recycle the empty capsules as well with amalgam wastes.
4. Extracted teeth with amalgam should not be put in the red bag with infectious or incinerated wastes nor should they be disinfected in the sterilizer. Disinfect (with bleach) and either give to the patient, or check with amalgam recyclers that take traps and filters to see if they will accept. Store in sealed container following disinfection. Do not store under fixer. Check ODA's website for up-to-date recycling list for all BMP wastes.
5. Use barrier techniques such as gloves, glasses and mask when handling traps. (chairside or vacuum pump) Use utility gloves for cleaning up and handling these wastes.
6. Disposal/ Recycling services
 - a. Some disposal/recycling services allow you to dispose of gloves, bags and paper towels used in collecting the used amalgam. If allowed, pull the cuff of the glove over the amalgam trap, and off hand and fingers, inverting the glove and collecting the amalgam trap inside. Tie a knot in the glove to secure the trap inside. If not allowed, you will need to check with recycling service to obtain information on what to do with contaminated gloves, paper towels etc. Many times if contaminated with human tissue and/or body fluid, gloves and towels can be put in red bag. But traps and suction pump filters should never be put in red bag.

- b. Some disposal/recycling services require that the amalgam waste be disinfected and also documented in some way that it was disinfected prior to disposal pick up. You may use your normal disinfectant solution. Check with your disposal/recycler for any special form to document the waste was disinfected or check to see if you may simply include a statement on your letterhead that the amalgam waste has been disinfected. **DO NOT HEAT STERILIZE ANY AMALGAM WASTES!!**
- 7. Keep all containers with recycled waste, in cool, dry area. Avoid sunlight and high humidity. **DO NOT KEEP AMALGAM STORED WITH FIXER.** Most recyclers of amalgam want the material as dry as possible. They do not want fixer (which contains silver) mixed with the amalgam. Contact recycler for their instructions.
- 8. Some recyclers pay for clean scrap amalgam, but may not pay for amalgam that is mixed with other wastes from traps. These recyclers request that clean scrap amalgam and mixed amalgam be kept separate to aid the ease of recycling. You can send waste amalgam to the recycler via common carrier (i.e. UPS) in a strong suitable container with proper labeling, storage, manifesting prior to shipping. You may also wish to contact:
 - a. DEQ'S website for collection events in your area <http://www.deq.state.or.us/lq/sw/hhw/hhwfacilitymap.htm> Be sure to contact event coordinator prior to bringing to event for disposal.
 - b. Check ODA's website for a BMP recycler list at www.oregondental.org

Some recyclers who accept other materials may also accept amalgam if using their service to dispose of x-ray fixer, gold or other dental wastes. (E.g. these same recyclers may also take extracted teeth with amalgam)

- 9. The American Dental Association recommends that small amounts of elemental mercury can be made into amalgam by reacting with alloy. This amalgam scrap should be placed in a sealed container and recycled. ADA no longer recommends that amalgam be stored under fixer. Store amalgam dry in a tightly sealed container.
- 10. Some recyclers of amalgam accept contaminated elemental mercury spills, and absorbents from cleaning up spills of mercury. This material should be managed as a hazardous waste, with proper labeling, storage, manifesting, and shipping. Check DEQ's website www.deq.state.or.us or American Dental Association at www.ada.org for spill clean up procedures.
- 11. The ODA and ADA recommend that all dentists use encapsulated amalgam vs. mixing restorative material from bulk sources.
- 12. Used (empty) amalgam capsules should be recycled. Many recyclers allow you to place in the same container for recycling as other amalgam wastes.

V. X-ray Fixer

1. X-ray fixer is considered a hazardous waste because of its high silver content. However, fixer is easily recyclable. Recycling is the management method recommended by regulatory agencies. There are two suitable methods of managing fixer waste:
 - a. You may use a silver recovery unit⁷ for your developing system; or
 - b. You may give, sell, or pay someone that operates a silver recovery unit to take your fixer.
2. For your reference, a list of spent fixer (silver) recyclers is included on ODA's recycler list. If you dispose of your fixer off-site, collect and store it in a closed plastic container labeled: Hazardous Waste— Used Fixer—Contains only fixer. Many recyclers want to be sure that the liquid does not contain developer. If it does, it could actually remove silver from the recycling equipment. The liquid that has run through a recovery unit can be disposed of down the drain.
3. Some local photo developing companies will accept x-ray fixer from dental offices. You may wish to check with those companies in your area.

As we move to digital x-ray units, the fixer and lead wastes will not be an issue for dental offices.

VI. X-ray Developer. Developer solutions should not be mixed with fixer solutions. Waste developer can be washed down the drain, if it is not mixed with fixer. Flush the drain thoroughly as you discharge developer down the drain. Some units mix the fixer and developer after they are spent. The resulting solution is hazardous. However, you may purchase an adapter kit to keep the fixer and developer separate. Check with your equipment manufacturer for adapter kits. You may also wish to check with your local DEQ hazardous waste disposal site as to whether they also may take used developer.

VII. Lead Foil or Lead Shields. Lead foil that shields X-ray film or protective lead shields should not be disposed of in the garbage. These materials are hazardous waste unless they are recycled for their scrap metal content.

Many of the Les Schwab Tire Centers will accept lead foil from dental offices. This is acceptable to DEQ as Les Schwab is approved for making their tire weights. Check with the local Les Schwab Center to see if they will accept your lead foil. Other companies also accept lead waste. There are many mail-in programs for dentists to recycle lead foil. A list of lead re-claimers/recyclers is listed on ODA's recycler list.

⁷ Silver recovery units only make economic sense if the flow is 2 or 3 gallons of fixer per week. These small recovery units have an operating life of only about six months. They are filled with iron wool and will rust over time. Once rusted, the unit does not pick up silver. The problem with silver removal equipment is most dental offices generate only small amounts of silver and the cost of the silver recovery equipment can be expensive. The smallest known unit was Kodak's Chemical Recovery Cartridge, Junior Model II. This model will most likely need to be changed out approximately every six months depending upon the flow volume and rust development. While this unit will treat up to 100 gallons in that time period, only a large dental office would generate such a large flow of fixer. The option to purchase a silver recovery unit might only be possible if several dentists found it feasible to collectively share a unit.

It is also noted that some dental offices use the lead foil themselves or give it to patients to melt down for fishing weights or to make buckshot. This is not a recommended BMP. Dental offices are especially encouraged not to give the lead foil to staff, patients or other persons due to potential for liability for handling and/or disposal by those persons.

VIII. Chemiclave Waste. Normal use and discharge of chemiclave solutions is acceptable although discouraged. Agencies would like to encourage dentists to move away from chemiclave sterilization to autoclaves. Normal use and sewer disposal of solutions (in normal use) is acceptable. Flush following disposal with several gallons of water so that it does not sit in the sink trap or does not give a slug of material to the sewer system.

We recommend that dental offices buy only the amount of chemical sterilizer that they need; this will eliminate the need to dispose of the excess material.

If a dental office switches to an autoclave and has a supply of unused formaldehyde, it is recommended they give the unused chemicals to a dentist who still uses a chemiclave. The agencies would like to avoid a large “slug” of formaldehyde at any one time down the sewer line.

IX. Labeling. The container in which you store your hazardous waste must be labeled with the words “hazardous waste” with a description of the waste. Example: “Hazardous Waste - Used fixer - contains only fixer.”

The date you start filling the container should be written on the container or on a label. Standard labels are commercially available. Make sure you keep a written record of any material you send or deliver to a recycling entity. Be sure to request a “Certificate of Recycling or Disposal”. This could be simply a note on their letterhead that they received “x” gallons of fixer and that it would be processed in their silver recovery unit.

You may also wish to refer to labeling instructions for hazardous materials in OR-OSHA requirements for employee safety for handling or disposal.

Dental Waste Best Management Practices

Waste	Source	Management Practice(s)
Amalgam particles	Traps, Screens, Excess mix	Send to a recycler. Do not incinerate or put in with red bag wastes. Dispose of as hazardous waste. Refer to ODA recycler list.
Waste Mercury	Bottled mercury, spills, spill cleanup	Manage as hazardous waste - recycle (<i>see ODA recycle list</i>) Check ADA or DEQ web sites for clean up procedures

Extracted Teeth	Extracted teeth with amalgam	Manage as hazardous waste - Do not put in Red Bag or sharps container. Disinfect (w/bleach). Do not put in sterilizer. Store dry in sealed container (No Fixer) Check with trap and filter recyclers for disposal. Extracted teeth with no amalgam may be put in red bag.
<i>Empty</i> Amalgam capsules <i>Partially filled</i> Amalgam capsules		Dispose of with an amalgam recycler or DEQ collection event. Mix and recycle unused portion of amalgam capsule prior to recycling.
Fixer	X-ray processing	Sell, give away (many photofinishers will take) or pay to have silver reclaimed. Other options are to buy a silver recovery system or recycle with hazardous waste disposal service or agency
Developer	X-ray processing	Discharge to sewer system
Combined fixer and developer	X-ray processing	Purchase adapter kit to separate and follow methods listed above
X-ray Film Packets	Patient x-rays	Send lead foil to re-claimer. Do not give to patients, staff or others
Chemiclave	Sterilizer	Replacement with autoclave recommended when needed; discourage use of formaldehyde
	Chemiclave used chemicals	Discharge to sewer & flush with several gallons of water.
	Chemiclave unused chemicals:	Use hazardous waste disposal service or give to another office that uses a Chemiclave.

Questions to Ask Your Recycling or Disposal Company:

1. **What kind of amalgam waste do you accept?** ☐ Contact amalgam (traps, filters, gloves) ☐ Non-contact amalgam (scrap amalgam) ☐ Extracted teeth with amalgam: ☐ Must disinfect; or ☐ Disinfection not necessary
☐ Empty amalgam capsules
 2. **Do your services include pick up of amalgam waste from dental offices?**
☐ Yes ☐ No If 'No', can amalgam waste be shipped to you? ☐ Yes ☐ No
 3. **Do you provide packaging for storage, pick up or shipping of amalgam waste?**
☐ Yes ☐ No
 4. **If packaging is not provided, how should the waste be packaged?**
-

5. **What types of wastes can be packaged together?**
-

6. **Do you accept whole filters from the vacuum pump for recycling?**
☐ Yes ☐ No
 7. **Is decontamination/disinfection required for amalgam waste?**
☐ Yes ☐ No
 8. **How much do your services cost?**
-

9. **Do you pay for clean non-contact amalgam (scrap)?**
☐ Yes ☐ No
10. **Do you accept empty amalgam capsules and/or extracted teeth with amalgam restorations?**
Extracted teeth ☐ Yes ☐ No
Empty amalgam capsules ☐ Yes ☐ No

- 11. What type of licenses or certifications (e.g. EPA) does your company hold to recycle or dispose of wastes?**

Type of License(s): _____

License #(s) _____

- 12. Does your company use the proper forms required by EPA and other state or local agencies for conducting business and disposal?**

☐ Yes ☐ No

What forms (include agency and form #'s) are required? _____

- 13. What type of certification is provided to document that the material was properly recycled?**

- 14. Where does the waste collected from dental offices go?**

- 15. What type of contracts do you have with other waste recyclers/disposal services or landfills?**

- 16. How long has your company been in business?**

- 17. Where do you ship or dispose of mercury wastes for recycling or disposal?**

- 18. Where do you dispose of silver or lead wastes (if you also accept these wastes)?**

19. What do you do with extracted teeth waste (if you accept them)?

20. What is the level of your environmental liability insurance?

21. Can you provide customer references to us? Please list two or three?

22. Is proper protective equipment available and used by employees?

☐ Yes ☐ No

Attachment 7
Hood River School Form Letter and ATSDR Mercury
Audit and Follow Up Checklist



November 26, 2018

To: Name of School and address

The City of Hood River, as part of their wastewater discharge permit has been required to develop a mercury control program to reduce discharges of mercury from their treatment system. While the City's discharge is well below state water quality standards and one of the best in Oregon, the state is requesting this program to continue to improve on this important toxic material. This reduction program is intended to protect both the community and the environment. Mercury has come under continuously increased focus due to its toxic effects to nervous systems, lungs and kidneys. Additionally, once mercury has been discharged to the environment it is persistent and degrades the environment both in the water and in the river/lake sediments.

Within school systems, the best way to control mercury both in terms of student exposure and protecting against release of mercury to the environment is locate and remove all sources of mercury. Consequently, the City is requesting your school to conduct a walk through audit to assure that mercury and mercury bearing compounds are not present and if present to consider mercury free alternatives. An audit checklist from the Agency for Toxic Substances and Disease Registry (ATSDR) has been attached for this purpose. The ATSDR is an independent operating agency within the Department of Health and Human Services and works in conjunction with the Centers for Disease Control and Prevention (CDC). Additionally, it is recommended that your school consider the following recommendations and resources also available from the ATSDR:

- Develop a Long Term Mercury Policy -
<https://www.atsdr.cdc.gov/dontmesswithmercury/policy.html>
- Review methods to dispose of mercury if found -
https://www.atsdr.cdc.gov/dontmesswithmercury/disposal_info.html
- Consider lessons available to teachers to help students understand the danger of mercury -
https://www.atsdr.cdc.gov/dontmesswithmercury/for_teachers.html
- Use videos as class room teaching materials -
<https://www.atsdr.cdc.gov/dontmesswithmercury/videos.html>

Your assistance and cooperation is appreciated.

For questions please contact:

Wayne W. Heinemann
Jacob Engineering
460 Main Ave. South, The Tech-Hut
Building
Twin Falls, Idaho 83301 U.S.A.
208-734-2898 | Mobile 208-420-4862

Sent on behalf of:

Mark A. Lago
Director of Public Works
City of Hood River
211 2nd Street
Hood River, OR 97031
(541) 387-5205

Mercury Audit and Follow-Up Checklist

Find possible sources of mercury in your school and decide how to manage them safely.

School Name: _____

Auditor Name: _____ Audit Date: _____

★ Instructions

Walk through your school to identify sources of mercury.

1. If you find sources of mercury, write down the location, the number of items, and if they are in use.
2. Label sources of mercury with a tag that says **"Danger: Do Not Touch."** If you think an item has mercury in it but you aren't sure, treat it like a source of mercury.
3. Contact your local health department to learn how to get rid of products that contain mercury safely. Specific steps must be followed to ensure safe disposal of mercury, and they vary depending on the source. If you don't follow them, you risk doing more harm than good.

Make your audit easier:

Before your walk-through, ask school nurses, janitors, and science teachers about possible sources of mercury.

Science Rooms and Labs, Home Economics, and Art Classrooms				
Items to look for	Location(s)	Number	In use (Yes/No)	Labeled
<i>Example item</i>	<i>Top shelf of back closet, Room 302</i>	<i>8</i>	<i>No</i>	<i>✓</i>
Barometers				
Elemental mercury				
Hydrometer				
Hygrometer				
Inorganic Mercury Compounds: • Mercury chloride • Mercury iodine • Mercury nitrate • Mercury oxide • Mercury sulfate • Millon's solution • Nessler's reagent • Zenker's solution				

Mercury Audit and Follow-Up Checklist

Science Rooms and Labs, Home Economics, and Art Classrooms

<i>Items to look for</i>	<i>Location(s)</i>	<i>Number</i>	<i>In use (Yes/No)</i>	<i>Labeled</i>
Mercury molecular motion device				
Mercury spectral tubes				
Sling psychrometer				
Thermometers				
Vacuum gauges				
Vermilion paint				

School Nurse's Office and Medical Supply Storage

<i>Items to look for</i>	<i>Location(s)</i>	<i>Number</i>	<i>In use (Yes/No)</i>	<i>Labeled</i>
Blood pressure meters				
Thermometers				

Electrical and Heating Equipment, Lighting, and Facility Supply Storage Areas

<i>Items to look for</i>	<i>Location(s)</i>	<i>Number</i>	<i>In use (Yes/No)</i>	<i>Labeled</i>
Float control switches				
Flow meters with mercury switches				
Fluorescent, vapor, metal halide, and high-pressure sodium lamps				
Fluorescent light bulbs				
Fungicides and pesticides (If the product was made before 1994, check the label for mercury.)				
Latex or marine paint and floor varnishes (If the product was made before 1992, check the label for mercury.)				
Mercury gauges				
Mercury oxide or mercury zinc batteries				
Older model microwave ovens				
Other equipment with mercury switches (e.g., flame sensors, fire alarms, safety valves)				
"Silent" light switches				

Mercury Audit and Follow-Up Checklist

Electrical and Heating Equipment, Lighting, and Facility Supply Storage Areas				
<i>Items to look for</i>	<i>Location(s)</i>	<i>Number</i>	<i>In use (Yes/No)</i>	<i>Labeled</i>
Thermometers in freezers and refrigerators				
Thermostats				
Other:				

Notes:

Attachment 8
Yearly Average of Influent and Effluent Mercury
Concentration and Mass Along with Calculated
Mercury Mass Disposed of in Biosolids

Hood River Mercury Minimization Plan

Average Concentration and Mass by Year

Year	WWTP Influent			WWTP Effluent			Net Gain g/d Source to Influent	Net Gain/Loss Source to Effluent	g/d Disposed In Biosolids
	ng/L	Flow MGD	g/d	ng/L	Flow MGD	g/d			
Year 1	231	1.04		1.70	1.13	0.01	0.91	0.004	0.904
Year 2	57	1.46	0.32	1.27	1.28	0.009	0.32	0.006	0.314
Year 3	121	0.93	0.43	0.93	0.93	0.003	0.43	0.002	0.424
Year 4	232.27	1.07	0.81	1.86	1.07	0.01	0.89	0.01	0.89
Year 5	186	1.09	0.76	2.49	1.09	0.01	0.77	0.01	0.76

Note: Year 4 includes the 7 samples taken for local limits.

Attachment 9
Mercury Control, Proposed Language For Hood
River **City** Sewer Use Ordinance

Mercury Control Requirements

Authority to Require User Mercury Minimization Plans

The City Engineer may, in the City Engineer's discretion, require any user to develop and submit a mercury minimization plan. Submitted Mercury minimization plans must be approved by the City Engineer shall contain at a minimum a description of the areas and process in user's operation with potential to increase mercury in the users discharge, Best Management Practices to control mercury and sampling and testing procedure to demonstrate lower mercury discharges. Upon plan approval the user shall meet the plan at all times.

Dental Facilities

Dental facilities shall, at all times, have installed, maintained, properly cleaned and operated mercury amalgam separators to control mercury bearing waste streams. Dentist shall be exempted from the requirement to obtain an Industrial Wastewater Discharge Permit as long as Best Management Practices for Amalgam Waste as promulgated by the American Dental Association (October 2007) are implemented to control Mercury bearing waste streams including but not limited to the use of an amalgam separator; staff training on amalgam waste handling, management and disposal; and vacuum system/amalgam separator maintenance recordkeeping.



State of Oregon
Department of
Environmental
Quality

State of Oregon Department of Environmental Quality

Mercury Minimization Plan Review Checklist

Contact: Erich Brandstetter
Water Quality Permitting and Program Development Section
700 NE Multnomah St., Suite 600
Portland, OR 97232

Purpose

- Assist DEQ staff in review of MMPs,
- Increase consistency among reviews, and
- Provide a format for documenting reviews

Review Information

1	Name of facility			
2	NPDES Permit No.			
3	Type of facility	☐ New ☐ Existing	☐ Major ☐ Minor	☐ Municipal ☐ Industrial
4	Name/Phone of reviewer			
5	MMP submittal date			
6	Date of review			

Mercury Minimization Plan Review

Item		Present?	Comments
Required For All Facilities			
7	Facility information, including date and responsible party name and signature	☐ Yes ☐ No	
8	Inventory of potential sources (must be updated at least every 5 years)	☐ Yes ☐ No	
9	Implementation plan for mercury management and reduction measures for (at least) the next 5 years	☐ Yes ☐ No	
Required For All Renewals. Included if Applicable for New MMPs			
10	Description of changes (if any) to the facility, collection system, industrial uses or source water supply (Domestic only)	☐ Yes ☐ No ☐ N/A	
11	Description of changes (if any) to the facility, such as changes to processes or materials used (Industrial only)	☐ Yes ☐ No ☐ N/A	
12	Mercury data for effluent and other (if any) monitoring	☐ Yes ☐ No ☐ N/A	

Item		Present?	Comments
13	Annual average effluent concentrations and mass loads for biosolids (domestic only)	☐ Yes ☐ No ☐ N/A	
14	Annual average biosolids concentrations and mass loads (domestic only)	☐ Yes ☐ No ☐ N/A	
15	Summary of mercury reduction activities implemented during (at least) the last five years	☐ Yes ☐ No ☐ N/A	
Optional (MMP actions should generally increase at each renewal)			
17	BMP requirements or limits for industrial and commercial sources of mercury to the collection system (domestic only)	☐ Yes ☐ No	
18	Inspections of or outreach to specific sectors, such as dentist offices (domestic only)	☐ Yes ☐ No	
19	Laboratory housekeeping, use and disposal practices (domestic only)	☐ Yes ☐ No	
20	Public education (domestic only)	☐ Yes ☐ No	
21	BMPs that reduce mercury	☐ Yes ☐ No	
22	Material substitution	☐ Yes ☐ No	
23	Material recovery	☐ Yes ☐ No	
24	Spill control and collection	☐ Yes ☐ No	
25	Waste recycling (collection of mercury-containing items)	☐ Yes ☐ No	
26	Process modifications	☐ Yes ☐ No	
27	Employee education	☐ Yes ☐ No	
28	Additional monitoring (for example, to investigate current or potential sources of mercury)	☐ Yes ☐ No	

Instructions

Overview

- Mercury Minimization Plans (MMPs) can vary widely from “very simple” to “complex”, depending upon the type of facility (such as industrial, small domestic or large domestic) and mercury source potential. The minimization practices should focus on sources and wastes that originate with and are under the reasonable control of a facility, and not on the pollutants in the rainwater or source water. Furthermore, sources of methylmercury or conditions that may lead to the formation of methylmercury should be prioritized over the removal of total mercury. The permittee will develop the MMP and submit to DEQ for review. DEQ will use the MMP checklist to review the MMP. DEQ requires that the permittee use the DEQ MMP template in writing their MMP. However, with DEQ approval, a different format may be used. MMPs that do not use the template will require closer scrutiny by DEQ to ensure that they contain all the required components. Goals of the MMP may include:
- Reduction or elimination of potential sources of methylmercury and total mercury within the production process (industrial facilities) or collection area (wastewater treatment plants),
- Improved public and business awareness of mercury issues,
- Reduction in the transfer of mercury from effluent to the watershed or airshed via biosolids, and
- Quantification of the effectiveness of the Mercury Minimization Plan to eliminate or reduce the mass load of mercury in the discharge.

At a minimum, Mercury Minimization Plans must include:

- Name and signature of party responsible for developing or reviewing the plan
- Plan submittal date
- Identification and evaluation of current and potential mercury (both methyl mercury and total mercury) sources (for domestic facilities this includes industrial, commercial, and residential sources)
- An implementation plan that includes specific methods for reducing mercury

In addition, MMP updates must include:

- Changes (if any) that may affect mercury, such as changes to operations, treatment, and chemicals used
- Mercury sample results for samples collected during the past five years
- Annual average effluent mercury concentrations and mass loads
- Annual average biosolids concentrations and mass loads (domestic facilities only)
- Summary of mercury reduction activities implemented during (at least) the past five years

Specific actions will vary between permittees. The first MMP a permittee submits may be small. But it is DEQ's expectation that MMPs will expand and MMP actions will increase with each renewal. The checklist provides broad categories to address potential actions.

Facility Information

Verify that information in this section is complete and correct.

Mercury Sources

- Some common uses for mercury are to conduct electricity, measure temperature and pressure, act as a biocide, preservative, and disinfectant, as well as a catalyst for reactions. Within industry, there are all possible types of mercury products installed in distribution boxes, electrical surrounding equipment, boiler rooms, sumps, machinery, measuring instruments, and so on.
- The permittee should conduct an inventory of potential sources of mercury by reviewing existing information sources and, if applicable, sampling at various points within the collection system. See *Section 4.3.3 of the Reasonable Potential Analysis IMD*¹ for more information on developing and conducting a source investigation. DEQ determined that the industrial categories of timber products; paper products; chemical products; glass, clay, cement, concrete, gypsum products; primary metal industries; fabricated metal products; and electronic instruments have potential for mercury in discharge. These categories correspond to SICs 24xx, 26xx, 28xx, 32xx, 33xx, 34xx, and 36xx. Table 1 lists manufacturing processes that may use mercury. Table 2 lists many of the likely sources of non-process mercury often found at industrial facilities. 0 provides additional details on most of these items. Table 3 lists many of the likely sources of non-industrial, mercury pollution for collections systems and facilities. Finally, the MMP should also consider any naturally occurring sources of mercury such as mine tailings or volcanic soils.

Table 1. Manufacturing processes that use or generate mercury

- | | |
|--------------------------------------|---|
| • Chlorine production (Chlor-alkali) | • Emissions treatment (wet pack scrubbers) |
| • Portland cement | • Municipal waste combustors |
| • Mining – such as gold mining | • Hospital, medical and infectious waste incinerators |
| • Caustic soda production | • Hazardous waste |
| • Sulfuric acid production | |

¹ Internal Management Directive, Reasonable Potential Analysis Process for Toxic Pollutants Version 3.1, Feb. 12, 2012.

Table 2. Potential sources of mercury in industrial facilities

- Automobiles and other vehicles
- Abs breaking systems*
- Switches
- Hood lighting*
- Trunk lighting*
- Collision sensors
- Acceleration sensors for air bags and seatbelts
- Tilt switches
- Heated car rear windows
- Batteries and battery chargers
- Alkaline-manganese batteries
- Zinc-carbon batteries with mercury added
- Button cell mercuric-oxide batteries
- Battery chargers
- Bilge pumps
- Boilers
- Cathode ray tubes
- Central clocks and time clocks
- Circuit breakers
- Cosmetics
- Dishwashers and parts washers (electrical switches)
- Door bells
- Drains and waste pipes (residual mercury from previous operations)
- Dyes and pigments
- Electrical distribution boxes
- Electronics, liquid crystal displays (such as in cameras and camcorders) and circuit boards
- Float switches and level meters
- Flow meters
- Heating, ventilation and air conditioning equipment (HVAC)
- Central air conditioning units and heating plants
- Gas ovens – flame sensor contains mercury
- Electric ovens – heat sensor contains mercury
- Interlock switches
- Laboratory reagents
- Lamps
- Neon lights
- High intensity discharge (HID)
- Mercury vapor lights
- Fluorescent lamps
- Metal halide lamps
- High pressure sodium lamps
- Ultraviolet lamps
- Lifts for disabled
- Measuring and control instruments
- Microwave Ovens
- Paint Additives (suspended in 1991)*
- Pesticides*
- Pharmaceuticals
- Preservatives for human and animal medical products, such as vaccines
- “Rubber” flooring (the type frequently used in gyms and sports facilities in the 1970s)*
- Signal alarms
- Skylifts (leveling)
- Solvents
- Sprinkler Systems (Old)*
- Sump Pumps

- Freezers and refrigerators (automatic lights)*
- Fungicides*
- Gauges (such as manometers, barometers, and vacuum gauges)
- Switches (tilt switches, volumeters, time switches, landing switches)
- Thermometers
- Thermostats
- Transformers (gas-operated relays)

*Mercury is no longer added, but may be found in older materials and goods.

Table 3. Consumer and commercial products that may contain mercury

- Antiques
- Batteries
- Dental amalgam
- Compact fluorescent lights and other fluorescent light bulbs
- Necklaces and other jewelry
- Paint
- Skin-lightening creams
- Switches and relays
- Thermometers
- Thermostats
- Thimerosal in vaccines

Implementation Plan

- This section describes the wide variety of actions that may be taken to reduce mercury concentrations. The checklist includes general categories of actions in the “optional” section. The implementation plan must include specific actions such as:
- Potential mercury-reduction activities
- Policy measures that could be enacted by a municipality to reduce or eliminate mercury
- Municipal activities designed to encourage businesses and residents to reduce mercury
- Activities that municipal and industrial dischargers can implement internally to reduce mercury
- The plan should be tailored to the size of the facility, availability of resources, and the types of mercury sources that may be contributing to mercury in the facility’s effluent. Smaller publicly owned treatment works may not need as intensive a plan for mercury reduction and monitoring. For example, the city of Holly, Michigan’s plan mainly consists of a program that offers homeowners new mercury-free thermometers in exchange for mercury thermometers, as well as collecting and disposing other mercury-containing equipment from homeowners and businesses. In contrast, Superior, Wisconsin’s Mercury MMP includes activities involving homeowners, auto shops, camps, dental offices, fluorescent bulb recycling, mercury-free schools, thermostat recycling, and various methods of outreach.
- In some cases, there may be opportunities to coordinate MMP development with a permittee’s Pretreatment Program. Major publicly owned treatment works with a pretreatment program are currently required to evaluate discharges by significant industrial users and if needed, establish local limits and monitor for a suite of metals, including mercury. In some cases, DEQ may require (per 40 CFR 403.5 (c)(2)) a publicly owned treatment work to develop a pretreatment program and local limits to address mercury. Some publicly owned treatment works may select to voluntarily develop a pretreatment program and develop local limits as a measure to ensure their compliance with their NPDES permit and biosolids disposal requirements. The local limits may be structured in a manner to allocate available pollutant loadings to specific industrial dischargers. Mercury data and information gathered from the pretreatment program should be included as part of the MMP. The pretreatment program may

serve as a principal element of the MMP, although other sources outside of the industrial scope of the pretreatment program must still be addressed.

- Table 4 presents examples of potential activities by sector. Table 5 provides another look at activities that may be completed for different sectors. These actions range from various pollution reduction efforts (such as switching to less toxic source materials or community education efforts to reduce pollutants from entering a wastewater treatment facility) to installing more effective treatment technologies.
- This section also should describe any methods that the permittee may use to engage specific individuals and businesses who would be implementing activities described in the plan, such as schools, HVAC stores, dentists, and others. Activities could include workshops, mailings, public service announcements, partnerships, websites, and more.

Table 4. Potential mercury reduction activities and applicability to different sectors

Activity	Type of permittee		Applicable to the Following Sectors						
	Muni	Industrial	General	HVAC	Dental Facilities	Medical Facilities	Construction	Schools and Colleges	POTWs
Ban disposal of mercury-containing products	x								
Establish local limits or BMP requirements	x		x	x	x	x	x	x	x
Mercury collection and recycling events	x		x	x		x		x	
Establish a mercury-collection center	x								
Internal mercury inventories	x	x	x	x	x	x		x	x
Replace mercury-containing products with non-mercury containing products	x	x	x	x	x	x		x	x
Education regarding mercury spill cleanup and risks of mercury exposure	x	x	x	x	x	x	x	x	x
Mail BMP literature	x			x	x	x	x	x	
Outreach activities, such as: Promoting mercury recycling events. Displays at community events Public service announcements Establish a mercury website.	x		x						
Onsite visits to verify BMP implementation and identify mercury containing devices	x		x	x		x	x	x	
Evaluation of wastes hauled to POTWs and/or landfills	x								x
Influent and effluent monitoring	x	x							x
Identification and evaluations of conditions (such as anaerobic conditions) that contribute to the methylation of elemental mercury	x	x							x

Table 5. Example mercury reduction measures for various sectors (from EPA's "Mercury Pollutant Minimization Program Guidance")

Sector	Activity	Performance Measure	Goal
Medical – hospitals, clinics, nursing homes, veterinarians	• Mail American Hospital Association (AHA) best management practices (BMP) literature • Workshops • Onsite visits • BMP requirements • Permits	• Date/content of mailing • Participation/Reduction • Progress, quantity recycled • Adoption/implementation	Mercury-free wherever practicable. Spill management.
Dental Clinics	• Mail appropriate BMP literature • Meetings with dentists • Onsite visits • Survey(s) • Adherence to American Dental Association's (ADA's) BMPs (voluntary or mandatory) • Mercury recycling (voluntary or mandatory) • Adoption of removal equipment meeting ISO standards (voluntary or mandatory) • Permits	• Date/content • Participation • Adoption /implementation • Quantity recycled • Adoption/implementation (Note: Certain facilities do not use or generate mercury, some measures may not apply)	Capture and recycle mercury used or generated. Minimize mercury discharges.
Schools – secondary	• Mail BMP literature • Workshops • Onsite visits • Permits	• Date/content • Participation • Reduction progress • Quantity of mercury recycled	Mercury free wherever practicable. Spill management.
Schools – Colleges/Technical, laboratories	• See Medical and School Sectors	• See Medical and School Sectors	See Medical and School Sectors
Other industries and businesses with potential for mercury contributions	• Mail chemical/equipment literature • Onsite visit during pretreatment inspection • Application of local limits and/or require BMPs for IUs • Require PMPs in IU permits	• Reduction progress • Quantity recycled	Phase out of mercury containing devices and chemicals. Spill management.
General Public	• Promote mercury clean sweeps • Displays at community events • Public service announcements • Outreach at schools • Establish local mercury website	• Date/contents • Quantity of mercury recycled • Website hits	Reduced use of mercury containing products. Recycling of mercury products. Spill management.

Policy measures

- Municipalities may enact ordinances or policies that would require businesses and residents to implement mercury reduction activities. Such ordinances could include:
- Ban improper disposal of mercury-containing products,
- Establish BMP requirements for construction and other activities to reduce erosion, or
- Adopt zoning ordinances with requirements for reducing impervious surfaces.

Activities to encourage mercury reduction

- The MMP for municipal dischargers should include activities designed to encourage recycling and removing mercury-containing instruments from homes and businesses (see Table 2 and Table 3 for typical mercury-containing devices). Types of businesses that may be targeted include dental offices (due to mercury amalgam²), laboratories at secondary schools and colleges, medical offices and hospitals, HVAC wholesalers and retailers, electronics supply and manufacturing and other industries that discharge into the municipality's sewer system. The industrial categories of timber products; paper products; chemical products; glass, clay, cement, concrete, gypsum products; primary metal industries; fabricated metal products; and electronic instruments were determined by DEQ to have potential for mercury in discharge. These categories correspond to SICs 24xx, 26xx, 28xx, 32xx, 33xx, 34xx, and 36xx. Examples of activities include:
- Promoting and coordinating events to collect mercury-containing devices;
- Conducting inspections on proper use, maintenance, and disposal of amalgam separators;
- Providing mercury-recycling containers for light bulb or battery collection;
- Establishing a mercury collection center;
- Publishing a website on mercury risks and mercury minimization;
- Conducting outreach to organizations that typically have mercury-containing devices, including education on cleanup procedures, spill prevention, and the risk of mercury exposure;
- Encouraging exchange of mercury-containing devices for non-mercury containing devices (for example, providing non-mercury thermostats at cost);
- Mailing BMP literature to facilities that typically have mercury-containing devices;
- Conducting onsite visits to businesses, schools, hospitals, and construction sites to perform education, verify BMP implementation and identify mercury containing devices; and
- Encouraging businesses to conduct inventories of mercury-containing devices.

Activities to implement internally

- Some activities are more applicable to internal operations. For example, both POTWs and industrial dischargers should conduct an internal inventory of mercury-containing devices and identify ways to eliminate or minimize the use of such devices. In addition, monitoring of

² Oregon AND FEDERAL legislation already requires amalgam separators for any dental offices that use amalgam. However, municipalities may wish to have an inspection program or outreach program to dental offices to ensure that amalgam separators are properly used and maintained.

influent, effluent, biosolids (as already required), and the collection system should be included as part of the plan, as appropriate.

- Changes that may affect mercury
- MMP renewals must describe changes that may impact mercury concentrations.

Mercury Monitoring

- MMP renewals must include, at a minimum, monitoring data collected during the previous permit cycle. This must include:
- Influent and effluent mercury concentrations and mass loads (such as discharge, monitoring reports, and priority pollutant scans),
- Biosolids mercury concentrations and mass loads,
- Pretreatment monitoring data, and
- Mercury measurements at other locations (if any).

If data has been collected prior to submitting a first time MMP, at a minimum, data collected during the previous five years must be included.

Previous Mercury Reduction Activities

- MMP renewals must include a description of previous mercury reduction activities, with emphasis on the preceding permit cycle. When applicable, this section should include information about the amount of mercury that has been recycled or removed from the effluent stream and environment.
- First time MMPs may include a description of previous mercury reduction activities, if applicable.

Appendix A: Source Details

Automobiles and other vehicles

- Vehicle trunk and hood light switches often contain mercury. If the light goes on when the lid is partially up, or if the bulb housing is mounted at an angle to the hood, a mercury switch is probably being used. Collision sensors may contain mercury. A variety of manufacturing processes use relays to control power to heater or pumps. Relays that contain mercury switches activate airbags, anti-lock brakes (primarily found in four-wheel drive vehicles), some seat belt systems, and some automatically adjusting suspension systems. Some agricultural equipment, military vehicles, mass transit vehicles, and fire hook and ladder equipment also contain mercury switches.

Batteries and battery chargers

- Mercury containing batteries provide a compact and precise voltage source to power metering electronics. Mercuric oxide (mercury zinc) batteries and button batteries are the only batteries made in the United States that may contain added mercury. Mercuric oxide batteries offer a reliable and constant rate of power discharge and are made in a wide variety of sizes intended for use in electronic devices. New equipment models generally require zinc air batteries. The shelf life of mercuric oxide batteries is up to ten years.

Bilge pumps

- The float switches within the bilge pump may contain mercury.

Boilers

- Small boiler rooms often contain tube thermometers and other thermometers. Oil level gauges for remote measurements are also common.

Cathode ray tubes

- Mercury is contained within the fluorescent tubes that provide the source of light in the Liquid Crystal Displays (LCD). Mercury is used the LCD backlights.
- No mercury is required in CRT fabrication. Although the quantities of mercury are not large, they cannot be discounted given the toxicity of mercury to both human health and the environment.

Combustion sources

- Combustion sources include utility boilers, medical waste incinerators, municipal waste combustors, commercial/industrial boilers, hazardous waste combustors, residential boilers, wood combustion, sewage sludge incinerators and crematories. Mercury emissions from these sources (excluding wood-fired residential heaters) account for an estimated 125 Mg/yr (138 tons/yr) or 87 percent of the mercury emissions generated annually in the United States.

Cosmetics

- Historically mercury has been added to cosmetics as a skin-whitening additive. Today, the use of mercury compounds as cosmetic preservative ingredients is limited to eye area cosmetics at concentrations not exceeding 65 parts per million of mercury calculated as the metal (about 100 ppm or 0.01% phenylmercuric acetate or nitrate) and provided no other effective and safe preservative is available for use. Mercury compounds are readily absorbed through the skin on topical application and have the tendency to accumulate in the body. They may cause allergic reactions, skin irritation or neurotoxic manifestations.

Dishwashers and parts washers (electrical switches)

- Temperature gauges and various mercury-containing switches are installed in dishwashers and in industrial parts washers.

Drains and old waste pipes

- In dental surgeries and other premises where mercury is used, amalgam and metallic mercury may have collected in waste pipes, leaching mercury into the sewer system.

Dyes and pigments

- Mercury sulfide has been incorporated into organic pigments used to make paints and inks. The mercury is primarily found in the red (vermillion) color family.

Electrical distribution boxes and electric installations

- Mercury is often found in relays located in distribution boxes in buildings, such as for regulating stair lights.

Electronics

- Liquid crystal displays (such as in cameras and camcorders) may contain mercury. Printed circuit cards in electrical components in machinery and equipment can contain mercury. Companies specializing in dismantling electronic equipment should handle this in an environmentally safe way.

Float switches and level meters

- Float switches are used in factories, sewage plants and sump pumps to maintain a given level of liquid. The float switch is a round or cylindrical float with a switch attached to it. The switch keeps the circuit closed until the float reaches a certain height. Then the mercury slides down, opening the circuit and shutting off the pump.

Flow meters

- Flow meters are used for measuring liquid (water, sewage or product) flow. Some flow meters contain large quantities of mercury - 5 kilograms and more.

Freezers and refrigerators

- Freezers and refrigeration equipment may have mercury switches in the internal lid light within the light socket. If a chest freezer has a light in the cover and no visible mechanical switch, then it contains a mercury switch. This device senses when the lid is raised and turns on the light.

Fungicides

- At one time mercury chloride was one of the active ingredients used in fungicide chemicals.

Gauges: manometers, barometers, and vacuum gauges

- Many barometers and vacuum gauges found in machinery contain mercury. Liquid mercury in the gauges responds to air pressure in a precise way that can be read on a calibrated scale. Several mercury-free alternatives are available.
- Some operate on the same principle as mercury gauges but use mercury-free liquids in the tube.
- Needle or bourdon gauges operate under a vacuum with a needle indicator. Electronic gauges can be used to measure pressure, but they must be calibrated with a mercury manometer. Equipment manufacturers recommend that service technicians use a needle or digital gauge to test the systems they are servicing, but that they calibrate the gauges they use in the field with a mercury manometer kept at their shop.
- Mercury manometers occasionally need servicing to maintain their accuracy, and elemental mercury often remains as a waste. If the manometer is hard to read because of dirt and moisture in the tube, the mercury needs to be removed and replaced.

Heating, ventilation and air conditioning equipment (HVAC)

- Manometers, thermostats, thermometers, relays, and so on may contain mercury.
- Flame sensors in furnaces may contain mercury. The metal flame sensor consists of a metal bulb and thin tube attached to a gas-control valve. The mercury is contained inside the tube and expands or contracts to open and shut the valve.
- Gas meters installed before 1961 contain a mercury regulator attached to the gas meter.
- Many electric and gas appliances (such as ranges, ovens, clothes dryers, water heaters, furnaces, and space heaters) have pilot lights that use mercury-containing heat or flame sensors.
- Large housing estates and industrial areas often have a central heating plant with mercury-containing flue-gas meters, tube thermometers, thermostats, pressure switches, oil level gauges, flow meters, and so on.

Interlock switches

- Mercury switches consist of a mercury-filled tube with electrodes at each end. When the tube is tilted the mercury flows to either end cutting off the circuit on one end while opening it on the other side. They often function as on/off switches.

Industrial chemicals

- Caustic Soda
- The majority of sodium hydroxide (caustic soda) is commercially produced through electrolytic cell processing. The balance is produced through chemical processes. The electrolytic cells used to make the caustic soda contain mercury.

Laboratory reagents

- Mercury is used as a preservative in laboratory reagents and related chemicals. In laboratories, hospitals, and schools mercury has been used as a reagent for different analyses, as well as in thermometers and other measuring instruments.

Lamps

- Fluorescent and HID lighting is an excellent business and environmental choice because they can use up to 50 percent less electricity than incandescent lighting. However, used fluorescent lamps, mercury vapor lamps, metal halide lamps, high pressure sodium lamps, and neon lamps must be managed properly because they contain mercury. Some HID lamps may also be hazardous due to lead content, primarily due to the use of lead solder.
- Disposal Options for Mercury Containing Lamps:
- Businesses should manage and dispose of mercury-containing lamps as universal wastes, for which the regulatory requirements are much simpler than hazardous wastes.
- Mark the lamp storage area with the words "Fluorescent lamps for recycling". Do not break or crush lamps because mercury may be released. If lamps are accidentally broken, store them in a sealed container. Pick up spilled powder and add it to the sealed container. Arrange with a lamp transporter to pick them up.

Lifts for disabled

- Various electrical switches contained in the lift mechanism contain mercury.

Measuring and control instruments

- A number of types of machinery and equipment can contain mercury. Examples include level indicators in skylifts and mobile ladders, industrial welding equipment, forestry machinery, gas-operated relays in transformers and manufacturing machinery.
- Mercury switches are found in a variety of items ranging from chest freezers to sump pumps. Mercury-containing tilt switches are found in or under the lids of clothes washers and chest

freezers. They stop the spin cycle or turn on a light. They are also found in motion sensitive and position-sensitive safety switches in clothes irons and space heaters. If a mechanical switch is not visible in these items, a mercury switch is probably being used. Float switches are commonly used in sump pumps and bilge pumps to turn the equipment on and off when the water is at a certain level. These switch devices are often visible.

Paint additives

- Mercury sulfide has been incorporated into organic pigments used to make paints and inks. The mercury is primarily found in the red (vermillion) color family. (Suspended in 1991)

Pesticides

- Methyl mercury is a key ingredient in pesticides and fungicides used to treat grains and seeds.

Pharmaceuticals

- Mercury is used as a preservative for human and animal medical products (for example, vaccines).

Rubber flooring

- The type frequently used in gyms and sport facilities in the 1970's. Rubber flooring installed in gymnasiums during the early 1970s contained a mercury catalyst (3M Brand Tartan Track, and other brands).

Sumps and tanks

- In low-lying areas in buildings, for example, you may find pumping equipment regulating the water level with sender level switches that can contain mercury. Tanks and cisterns can also have switches containing mercury.

Switches – Tilt switches, volumeters, time switches, landing switches

- Mercury is contained in temperature-sensitive switches and mechanical tilt switches. Mercury tilt switches are small tubes with electrical contacts at one end of the tube. As the tube tilts, the mercury collects at the lower end, providing a conductive path to complete the circuit. When the switch is tilted back, the circuit is broken. Reed switches are small circuit controls that are used in electronic devices. Their electronic contacts are wetted with mercury to provide an instantaneous circuit when the switch is closed and then an instantaneous current interruption when the circuit is broken.

Skylifts

- Skylifts may have level indicators or switches that contain mercury.

Sprinkler systems (old)

- Many of the pressure gauges on these older systems contain mercury.

Thermometers

- In a mercury or alcohol thermometer, the liquid expands as it is heated and contracts when it is cooled, so the length of the liquid column is longer or shorter depending on the temperature.

Thermostats

- Mercury-containing thermostat probes may be found in several types of gas-fired appliances that have pilot lights, such as ranges, ovens, clothes dryers, water heaters, furnaces, or space heaters. The metal probe consists of a metal bulb and thin tube, referred to as an ampoule, attached to a gas-control valve. The mercury is inside the tube and expands or contracts to open and shut the valve. Although non-mercury thermostat probes have been used in these appliances, you should treat all probes as though they contain mercury, unless you know that they do not.
- Mercury thermostat probes, also known as flame sensors or gas safety valves, are most commonly present as part of the safety valve that prevents gas flow if the pilot light is not lit. In this application the bulb of the thermostat probe projects into or near the pilot light. These are commonly present in gas ovens and may be present in any other appliance with a pilot light. A mercury thermostat probe may also be present as part of the main temperature-controlling gas valve. In this application, the probe is in the air or water that is being heated and is not directly in contact with any flame. These are typically found in older ovens, clothes dryers, water heaters, and space heaters.
- Mercury-containing tilt switches have been used in thermostats in homes and offices for more than 40 years. They provide accurate and reliable temperature control, require little or no maintenance, and do not require a power source. However, each switch contains approximately 3 grams of mercury.
- Mercury-free thermostats are available. Electronic thermostats, for example, provide many of the same features as mercury thermostats.

Transformers

- Mercury arc rectifiers within electrical transformers operate based on an arc between a pool of mercury and a metal anode that only allows current to pass in one direction. Multiple anodes are typically used, fed from a multiple-phase transformer, the arc jumping from the cathode pool to each anode in sequence. There may be three, six or even twelve transformer phases, each feeding one anode.