MINNESOTA POLLUTION CONTROL AGENCY

Category	Note	Final 2005 Emissions (pounds)	Final 2005 Confidence	Final 2005 Comments	Final 2008 Emissions (pounds)	Final 2008 Confidence	Final 2008 Comments
Major Category: Emissions Incidental to Energy Production							
Coal Use (Electric Utility)	1	1716.3	High		1263.5	High	
Coal Use (Commercial/Institutional/ Industrial)	2	69.2	Medium		61.5	Medium	
Volatilization (Coal Ash)	3	0.0	Very Low	This category is included because changes in pollution control equipment and the use of coal ash may make this a significant category.	0.0	Very Low	This category is included because changes in pollution control equipment and the use of coal ash may make this a significant category.
Petroleum Refining	4	12.9	Medium		4.6	Medium	
Petroleum Product Utilization	5	27.1	Very Low		77.7	Very Low	
Wood Combustion	6	30.5	High		35.6	Medium	
Biomass other than Wood	7	0.0	Medium		0.0	Medium	
Natural Gas Combustion	8	0.3	Low		0.6	Medium	
Asphalt Manufacturing	30	4.3	Low		3.3	Low	
Agriculture, Food, and Kindred Products	31	1.1	Low		1.0	Low	
Miscellaneous Industrial Processes	33	0.2	Low		0.2	Low	
Wood, Pulp/Paper, and Publishing Products	34	5.1	Low		3.1	Low	
Subtotal: Emissions Incidental to Energy Production		**1867.1**			**1451.3**		
% of Total State Emissions		56%			51%		

MINNESOTA POLLUTION CONTROL AGENCY

Category	Note	Final 2005 Emissions (pounds)	Final 2005 Confidence	Final 2005 Comments	Final 2008 Emissions (pounds)	Final 2008 Confidence	Final 2008 Comments
Major Category: Emissions due to the Purposeful Use of Mercury in Products							
Proportional to Mercury Content of Solid Waste							
Volatilization (Solid Waste Collection/Processing)	9	169.0	Low		159.3	Very Low	
Incineration (On-site Household Waste)	10	40.0	Very Low		35.3	Very Low	
Volatilization (Spills/Land Dumping)	11	24.0	Low	Assumption for these emissions was that 25% of mercury in lamps not recycled is volatilized.	23.3	Very Low	
Volatilization (Landfills)	12	2.1	Low		1.7	Very Low	
Volatilization (Land Application of Compost)	13	0.2	Low		1.5	Low	
Proportional to Mercury Content of Liquid Waste							
Volatilization (Land Application of Sludge)	14	1.6	Low		0.7	Low	
Recycling Activities							
Smelters/Electric Arc Furnaces (EAFs)	15.1	138.7	Medium		265.4	Low	
Shredders that Recycle Cars/Appliances	15.2		Medium				
Recycling Mercury from Products within MN	16	65.0	Medium		1.2	Medium	
Non-Ferrous Metal Recycling (Al/Pb/etc.)	17	0.9	Low		0.6	Low	
Dental Mercury							
Dental Preparations	18	62.4	Low		58.8	Very Low	
Cremation	19	80.0	Low		97.9	Low	

MINNESOTA POLLUTION
CONTROL AGENCY

Category	Note	Final 2005 Emissions (pounds)	Final 2005 Confidence	Final 2005 Comments	Final 2008 Emissions (pounds)	Final 2008 Confidence	Final 2008 Comments
				Incineration			
Municipal Solid Waste Combustion	20	49.2	High		30.8	High	
Incineration (Sewage Sludge)	21.1	8.5	High		8.4	High	
Incineration (Industrial Sludge)	21.2		High		0.7	High	
Incineration (Medical Waste)	22	0.4	High		0.8	High	
Incineration (Hazardous Waste)	23	0.3	Medium		0.2	High	
Incineration (Industrial)	24	0.0	Low		7.1	High	In earlier inventories, this category was "Class IV incinerators," but was poorly quantified.
				Manufacturing/Use of Non-Dental Mercury-Containing Products			
Mercury Product Manufacturing in MN	25	42.0	Low		22.8	Low	
General Laboratory Use	26	10.0	Low		8.9	Very Low	
Volatilization (Dissipative Use) (Personal Care Products)	27	0.8	Low		0.8	Low	
Subtotal: Associated to Purposeful Use of Mercury		**695.1**			**726.0**		
% of Total State Emissions		21%			26%		
				Major Category: Emissions Incidental to Material Processing			
Ferrous Mining/Processing	28	734.8	High	2005 emissions included 19 lb from dust and 6.6 lb from fuel	648.5	High	2005 emissions included 19 lb from dust and 6.6 lb from fuel
Thermal treatment of soil	29	0.8	Low	Based on an average of 5,000 tons of surface soil heated annually, with an assumed mercury concentration of 0.08 ppm, and all mercury is emitted.	0.00	Low	Based on an average of 5,000 tons of surface soil heated annually, with an assumed mercury concentration of 0.08 ppm, and all mercury is emitted.
Mineral Products	32	13.8	Low		17.2	Low	
Subtotal: Emissions Incidental to Material Processing		**749.4**			**665.8**		
% of Total State Emissions		23%			23%		
STATEWIDE EMISSIONS TOTAL		**3,312**			**2,843**		

General Notes:

The Final 2005 mercury emissions are a combination of 2005 point source emissions and 2005 non-point source emissions.

The Final 2008 mercury emissions are a combination of 2008 point source emissions and 2008 non-point source emissions.

Confidence intervals: High +/- 10%; Medium +/- 25%; Low +/- 50%; Very Low +/- 100% or more.

Category	Note	Final 2011 Emissions (pounds)	Final 2011 Confidence	Final 2011 Comments	Final 2014 Emissions (pounds)	Final 2014 Confidence	Final 2014 Comments
Major Category: Emissions Incidental to Energy Production							
Coal Use (Electric Utility)	1	938.0	High		834.9	High	MN Power Boswell 3 reductions
Coal Use (Commercial/Institutional/ Industrial)	2	95.1	Medium		49.0	High	Increased fuel use.
Volatilization (Coal Ash)	3	0.0	Very Low	This category is included because changes in pollution control equipment and the use of coal ash may make this a significant category.	0.0	Very Low	This category is included because changes in pollution control equipment and the use of coal ash may make this a significant category.
Petroleum Refining	4	38.3	Medium		20.7	Medium	St. Paul Park Refinery reported higher emissions
Petroleum Product Utilization	5	66.6	Very Low		43.2	Very Low	Changed to EPA's emissions factor
Wood Combustion	6	52.4	Medium		79.3	Low	
Biomass other than Wood	7	8.7	Medium		0.0	Medium	Moved out of Petroleum Product Utilization
Natural Gas Combustion	8	2.0	Medium		3.0	Medium	
Asphalt Manufacturing	30	5.6	Low		4.6	Low	
Agriculture, Food, and Kindred Products	31	0.4	Low		0.1	Low	
Miscellaneous Industrial Processes	33	0.8	Low		0.0	Low	
Wood, Pulp/Paper, and Publishing Products	34	5.7	Low		4.0	Low	Emissions from boilers at paper mills
Subtotal: Emissions Incidental to Energy Production		**1213.6**			**1038.8**		
% of Total State Emissions		45%			46%		

MINNESOTA POLLUTION CONTROL AGENCY

Category	Note	Final 2011 Emissions (pounds)	Final 2011 Confidence	Final 2011 Comments	Final 2014 Emissions (pounds)	Final 2014 Confidence	Final 2014 Comments
Major Category: Emissions due to the Purposeful Use of Mercury in Products							
Proportional to Mercury Content of Solid Waste							
Volatilization (Solid Waste Collection/Processing)	9	278.6	Very Low		290	Low	Working on improving methodology to estimate emissions
Incineration (On-site Household Waste)	10	55	Very Low		33.2	Low	
Volatilization (Spills/Land Dumping)	11	21.2	Very Low		4.13	Very Low	
Volatilization (Landfills)	12	3.1	Very Low		2.5	Very Low	
Volatilization (Land Application of Compost)	13	0.3	Low		0.8	Low	
Proportional to Mercury Content of Liquid Waste							
Volatilization (Land Application of Sludge)	14	1.5	Low		0.6	Low	
Recycling Activities							
Smelters/Electric Arc Furnaces (EAFs)	15.1	83.8	High		70.5	High	
Shredders that Recycle Cars/Appliances	15.2	7.66	Low		8.6	Low	New stack test information EPA ICR
Recycling Mercury from Products within MN	16	0.02	Medium		0.02	Medium	Evaluation during mercury rule outreach
Non-Ferrous Metal Recycling (Al/Pb/etc.)	17	0.3	Low		0.5	Low	
Dental Mercury							
Dental Preparations	18	55.2	Very Low		15.4	Medium	
Cremation	19	111.7	Low		95	Medium	Based of number of cremations per year

Category	Note	Final 2011 Emissions (pounds)	Final 2011 Confidence	Final 2011 Comments	Final 2014 Emissions (pounds)	Final 2014 Confidence	Final 2014 Comments
Incineration							
Municipal Solid Waste Combustion	20	26	High		33.3	High	
Incineration (Sewage Sludge)	21.1	49.8	High		11.7	High	Seneca WWTP reported higher emissions
Incineration (Industrial Sludge)	21.2	0.01	High		0.0	High	
Incineration (Medical Waste)	22	0.7	High		0.3	High	
Incineration (Hazardous Waste)	23	0.05	High		0.01	High	
Incineration (Industrial)	24	13.1	High		11.0	High	In earlier inventories, this category was called Class IV incinerators and was poorly quantified, e.i. Enviro-Chem
Manufacturing/Use of Non-Dental Mercury-Containing Products							
Mercury Product Manufacturing in MN	25	14.3	Low		0.1	High	
General Laboratory Use	26	7.7	Very Low		7.9	Very Low	
Volatilization (Dissipative Use) (Personal Care Products)	27	0.06	Low		0.05	Low	
Subtotal: Associated to Purposeful Use of Mercury		**730.2**			**585.7**		
% of Total State Emissions		27%			26%		
Major Category: Emissions Incidental to Material Processing							
Ferrous Mining/Processing	28	745.4	High		651.9	High	New source in the inventory
Thermal treatment of soil	29	0.00	Low		0.04	Low	
Mineral Products	32	16.2	Low		3.0	High	Lime kilns at Sugar beet manufacturering facilites
Subtotal: Emissions Incidental to Material Processing		**761.6**			**655.0**		
% of Total State Emissions		28%			29%		
STATEWIDE EMISSIONS TOTAL		**2,705**			**2,279**		

General Notes:

The Final 2011 mercury emissions are a combination of 2011 point source emissions and 2011 non-point source emissions.

The Final 2014 mercury emissions are a combination of 2014 point source emissions and 2011 non-point source emissions.

Confidence intervals: High +/- 10%; Medium +/- 25%; Low +/- 50%; Very Low +/- 100% or more.

Category	Note	Final 2015 Emissions (pounds)	Final 2015 Confidence	Final 2015 Comments	Final 2016 Emissions (pounds)	Final 2016 Confidence	Final 2016 Comments
Major Category: Emissions Incidental to Energy Production							
Coal Use (Electric Utility)	1	359.8	High	Reductions due to controls installed, moving from coal to natural gas, and other.	172.9	High	Reductions due to controls installed, moving from coal to natural gas, and other strategies.
Coal Use (Commercial/Institutional/ Industrial)	2	46.5	High	Improved emission estimates for coal boilers (i.e. stack tests to replace EPA default estimates) for 2015.	48.8	High	Improved emission estimates for coal boilers (i.e. stack tests to replace EPA default estimates) for 2015.
Volatilization (Coal Ash)	3	0.0	Very Low	This category is included because changes in pollution control equipment and the use of coal ash may make this a significant category.	0.0	Very Low	This category is included because changes in pollution control equipment and the use of coal ash may make this a significant category.
Petroleum Refining	4	2.8	Medium	Refining Hg estimates fluctuate from year to year. St. Paul Park Refinery changed process.	3.7	Medium	Refining Hg estimates fluctuate from year to year. St. Paul Park Refinery changed process.
Petroleum Product Utilization	5	38.7	Very Low	Switched to EPA emission factor in 2008. MPCA may improve confidence in the future.	88.9	Very Low	Switched to EPA emission factor in 2008. MPCA may improve confidence in the future.
Wood Combustion	6	102.7	Low	Switched to EPA emission factor for 2014. There are errors. MPCA will work with EPA in 2017 to clarify.	29.9	Low	Data from a University of Minnesota study (Nater, Pang. Mercury in Wood - 1999) shows that mercury content of wood is considerably lower than EPA's estimate used for previous years.
Biomass other than Wood	7	4.4	Medium		1.1	Medium	
Natural Gas Combustion	8	3.2	Medium		2.7	Medium	
Asphalt Manufacturing	30	4.1	Low		4.1	Low	
Agriculture, Food, and Kindred Products	31	1.2	Low		0.2	Low	
Miscellaneous Industrial Processes	33	1.9	Low		1.8	Low	
Wood, Pulp/Paper, and Publishing Products	34	3.4	Low		3.4	Low	Primarily emissions from boilers at paper mills.
Subtotal: Emissions Incidental to Energy Production		**568.7**			**357.5**		
% of Total State Emissions		34%			26%		

Category	Note	Final 2015 Emissions (pounds)	Final 2015 Confidence	Final 2015 Comments	Final 2016 Emissions (pounds)	Final 2016 Confidence	Final 2016 Comments
Major Category: Emissions due to the Purposeful Use of Mercury in Products							
Proportional to Mercury Content of Solid Waste							
Volatilization (Solid Waste Collection/Processing)	9	290	Low	Mass balance study on waste incinerators was performed to improve estimate for 2014.	289.7	Low	Mass balance study on waste incinerators was performed to improve estimate for 2014 nonpoint emissions.
Incineration (On-site Household Waste)	10	33.2	Low		33.2	Low	
Volatilization (Spills/Land Dumping)	11	4.13	Very Low	EPA emission factor used in 2014	18.2	Very Low	EPA emission factor used in 2014 nonpoint emissions.
Volatilization (Landfills)	12	1	Very Low	EPA emission factor used in 2014	4.3	Very Low	EPA emission factor used in 2014 nonpoint emissions.
Volatilization (Land Application of Compost)	13	0.8	Low	EPA emission factor used in 2014	0.8	Low	EPA emission factor used in 2014 nonpoint emissions.
Proportional to Mercury Content of Liquid Waste							
Volatilization (Land Application of Sludge)	14	0.6	Low		0.6	Low	
Recycling Activities							
Smelters/Electric Arc Furnaces (EAFs)	15.1	63.6	High	In 2011 one MN steel melter was separated into this new category from a combined category with shredding in 2008.	55.0	High	In 2011, one steel melter was separated into this new category from the 2008 combined category of shredding and melting.
Shredders that Recycle Cars/Appliances	15.2	4.7	Low	In 2011 steel shredders were separated into this new category from a combined category with MN steel melters in 2008.	4.7	Low	In 2011, steel shredders were separated from steel melters into this new category.
Recycling Mercury from Products within MN	16	0.02	Medium	MPCA learned during mercury rule making process that 2008 estimates were too high.	1.2	Medium	MPCA learned during mercury rule making process that 2008 estimates were too high.
Non-Ferrous Metal Recycling (Al/Pb/etc.)	17	0.5	Low		0.5	Low	
Dental Mercury							
Dental Preparations	18	15.4	Medium	EPA emission factor used in 2014	15.4	Medium	EPA emission factor used in 2014 nonpoint emissions.
Cremation	19	95	Medium	A study was performed in conjuction with the U of M to improve estimates for 2014.	96.7	Medium	A study was performed in conjuction with the U of M to improve estimates for 2014 nonpoint emissions.

Category	Note	Final 2015 Emissions (pounds)	Final 2015 Confidence	Final 2015 Comments	Final 2016 Emissions (pounds)	Final 2016 Confidence	Final 2016 Comments
				Incineration			
Municipal Solid Waste Combustion	20	32.1	High	Category had Hg emission controls installed prior to 2005.	32.0	High	Category had Hg emission controls installed prior to 2005.
Incineration (Sewage Sludge)	21.1	16.7	High	Category had Hg emission controls installed prior to 2005.	9.2	High	Category had Hg emission controls installed prior to 2005.
Incineration (Industrial Sludge)	21.2	0.0	High	Category had Hg emission controls installed prior to 2005.	0.0	High	Category had Hg emission controls installed prior to 2005.
Incineration (Medical Waste)	22	0.3	High	Category had Hg emission controls installed prior to 2005.	0.3	High	Category had Hg emission controls installed prior to 2005.
Incineration (Hazardous Waste)	23	0.01	High	Category had Hg emission controls installed prior to 2005.	0.4	High	Category had Hg emission controls installed prior to 2005.
Incineration (Industrial)	24	0.3	High	Category had Hg emission controls installed prior to 2005.	0.2	High	Category had Hg emission controls installed prior to 2005.
				Manufacturing/Use of Non-Dental Mercury-Containing Products			
Mercury Product Manufacturing in MN	25	0.2	High	Toxic Release Inventory. Company stack tested in 2014.	0.2	High	Emissions reported under Toxic Release Inventory. Company stack tested in 2014.
General Laboratory Use	26	7.9	Very Low		7.7	Very Low	
Volatilization (Dissipative Use) (Personal Care Products)	27	0.05	Low	EPA emission factor used in 2014	0.5	Low	EPA emission factor used in 2014 nonpoint emissions.
Subtotal: Associated to Purposeful Use of Mercury		**566.5**			**570.8**		
% of Total State Emissions		34%			41%		
				Major Category: Emissions Incidental to Material Processing			
Ferrous Mining/Processing	28	509.0	High	Mercury Rule requires reductions by 2025.	441.0	High	There was an overall production decrease across the industry from 2015 to 2016 (~3m long tons fewer) 2016 production: ~28.0m long tons
Thermal treatment of soil	29	0.04	Low		0.00	Low	
Mineral Products	32	8.5	High	Improved emission estimates for 2014 (i.e. stack tests instead of EPA default factors).	9.0	High	Improved emission estimates for 2014 (i.e. stack tests instead of EPA default factors).
Subtotal: Emissions Incidental to Material Processing		**517.5**			**450.0**		
% of Total State Emissions		31%			33%		
STATEWIDE EMISSIONS TOTAL		**1,653**			**1,378**		

General Notes:

The Final 2015 mercury emissions are a combination of 2015 point source emissions and 2014 non-point source emissions.

The Final 2016 mercury emissions are a combination of 2016 point source emissions and 2014 non-point source emissions.

Confidence intervals: High +/- 10%; Medium +/- 25%; Low +/- 50%; Very Low +/- 100% or more.

MINNESOTA POLLUTION CONTROL AGENCY

Category	Note	Final 2017 Emissions (pounds)	Final 2017 Confidence	Final 2017 Comments	Final 2018 Emissions (pounds)	Final 2018 Confidence	Final 2018 Comments
**Major Category: Emissions Incidental to Energy Production**
Coal Use (Electric Utility)	1	181.7	High	Reductions due to controls installed, moving from coal to natural gas, and other strategies. Previous value was 169.5 lb due to a reporting error from Xcel Energy - Sherco.	166.6	High	Reductions due to controls installed, moving from coal to natural gas, unit retirements, and other strategies.
Coal Use (Commercial/Institutional/ Industrial)	2	33.7	High	Improved emission estimates for coal boilers (i.e. stack tests to replace EPA default estimates) since 2015.	33.6	High	Coal use fluctuates from year to year.
Volatilization (Coal Ash)	3	0.0	Very Low	This category is included because changes in pollution control equipment and the use of coal ash may make this a significant category.	0.0	Very Low	This category is included because changes in pollution control equipment and the use of coal ash may make this a significant category.
Petroleum Refining	4	3.5	Medium	Refining mercury estimates fluctuate from year to year.	3.4	Medium	Refining mercury estimates fluctuate from year to year.
Petroleum Product Utilization	5	47.0	Medium	LADCO created a thorough rail (locomotive and railyard) inventory for the 2017 National Emissions Inventory that updated fuel usage for locomotives and fixed errors in estimating emissions from railyards.	48.3	Medium	LADCO created a thorough rail (locomotive and railyard) inventory for the 2017 National Emissions Inventory that updated fuel usage for locomotives and fixed errors in estimating emissions from railyards.
Wood Combustion	6	24.4	Low	Data from a University of Minnesota study (Nater, Pang. Mercury in Wood - 1999) shows that mercury content of wood is considerably lower than EPA's estimate used for previous years.	24.1	Low	
Biomass other than Wood	7	0.6	Medium	This category was moved out of the 'Petroleum Product Utilization' category in 2014.	0.8	Medium	
Natural Gas Combustion	8	7.7	Medium	Increases in emission likely due to the increased usage of natural gas as a result of moving away from coal-fired combustion.	5.2	Medium	CEMS data for MN Power - Boswell Units 1 & 2 found lower emissions than previous years' estimates (~2 lb decrease).
Asphalt Manufacturing	30	4.0	Low		3.7	Low	
Agriculture, Food, and Kindred Products	31	0.3	Low		0.3	Low	
Miscellaneous Industrial Processes	33	1.5	Low		1.1	Low	
Wood, Pulp/Paper, and Publishing Products	34	3.5	Low	Primarily emissions from boilers at paper mills.	3.6	Low	Primarily emissions from boilers at paper mills.
Subtotal: Emissions Incidental to Energy Production		**307.7**			**290.7**		
% of Total State Emissions		20%			19%		

MINNESOTA POLLUTION CONTROL AGENCY

Category	Note	Final 2017 Emissions (pounds)	Final 2017 Confidence	Final 2017 Comments	Final 2018 Emissions (pounds)	Final 2018 Confidence	Final 2018 Comments
Major Category: Emissions due to the Purposeful Use of Mercury in Products						
Proportional to Mercury Content of Solid Waste						
Volatilization (Solid Waste Collection/Processing)	9	215.2	Medium	The previous mass balance study on waste incinerators was updated to include recent years of ash testing data to improve emission factor estimate. The amount of solid waste produced and collected went up roughly 19% from 2014 to 2017.	229.9	Medium	Estimated 2018 MN emissions. Compared to previous year: Waste collected/processed +0.2% Hg content from ash testing data +32%
Incineration (On-site Household Waste)	10	29.7	Low		31.6	Low	Estimated 2018 MN emissions. Compared to previous year: Household waste -1.7% Hg content from ash testing data +32%
Volatilization (Spills/Land Dumping)	11	33.9	Very Low	MPCA was previously using a report by Ed Swain to estimate emissions that followed EPA's population based methodology. For 2017 nonpoint emissions, we used EPA's methodology with updated numbers for per capita emissions.	33.9	Very Low	Primarily emissions from fluorescent lamp breakage (29.8 lb). Estimated using EPA's 2017 methodology with updated numbers for per capita emissions.
Volatilization (Landfills)	12	1.7	Very Low	EPA emission factor used in 2017 nonpoint emissions.	2.3	Very Low	Estimated 2018 MN emissions. Compared to previous year: Waste landfilled -2.2% Hg content from ash testing data +32%
Volatilization (Land Application of Compost)	13	7.4	Low	EPA emission factor used in 2017. Composting greatly increased from 2014 to 2017 (overall state total went from 43K tons to 660K tons) with most composting occuring in the metro counties.	8.1	Low	Estimated 2018 MN emissions. Compared to previous year: Waste composted +4.2% Hg content from ash testing data +32%
Proportional to Mercury Content of Liquid Waste						
Volatilization (Land Application of Sludge)	14	0.4	Low		0.4	Low	
Recycling Activities						
Smelters/Electric Arc Furnaces (EAFs)	15.1	57.0	High	In 2011, one steel melter was separated into this new category from the 2008 combined category of shredding and melting.	11.6	High	Significant reduction in mercury emissions due to installation of activated carbon injection at Gerdau Ameristeel (53 lb to 5 lb).
Shredders that Recycle Cars/Appliances	15.2	6.8	Low	In 2011, steel shredders were separated from steel melters into this new category.	6.3	Low	
Recycling Mercury from Products within MN	16	1.2	Medium	Emissions from fluorescent lightbulb recycling. No updates to 2017 non-point inventory estimates.	1.2	Medium	Emissions from fluorescent lightbulb recycling. No updates to 2017 non-point inventory estimates.
Non-Ferrous Metal Recycling (Al/Pb/etc.)	17	0.4	Low		2.0	Low	Increase due to new stack test data from one facility (Spectro Alloys) in 2018.
Dental Mercury						
Dental Preparations	18	15.6	Medium	EPA emission factor used in 2017 nonpoint emissions.	15.9	Medium	Estimated 2018 MN nonpoint emissions. Estimated by MN-specific methods.
Cremation	19	110.4	Medium	Increase due to an increase in the expected number of cremations (still using the study performed with the U of M for emission factors).	119.3	Medium	Estimated 2018 MN nonpoint emissions. Used the amount of cremations tracked by MDH annually and the study performed with the U of M for emission factors, ages 63+.

Category	Note	Final 2017 Emissions (pounds)	Final 2017 Confidence	Final 2017 Comments	Final 2018 Emissions (pounds)	Final 2018 Confidence	Final 2018 Comments
Incineration							
Municipal Solid Waste Combustion	20	25.2	High	Category had Hg emission controls installed prior to 2005.	25.4	High	Category had Hg emission controls installed prior to 2005.
Incineration (Sewage Sludge)	21.1	8.6	High	Category had Hg emission controls installed prior to 2005.	9.0	High	Category had Hg emission controls installed prior to 2005.
Incineration (Industrial Sludge)	21.2	0.0	High	Category had Hg emission controls installed prior to 2005.	0.0	High	Category had Hg emission controls installed prior to 2005.
Incineration (Medical Waste)	22	0.3	High	Category had Hg emission controls installed prior to 2005.	0.3	High	Category had Hg emission controls installed prior to 2005.
Incineration (Hazardous Waste)	23	0.6	High	Category had Hg emission controls installed prior to 2005.	0.7	High	Category had Hg emission controls installed prior to 2005.
Incineration (Industrial)	24	0.2	High	Category had Hg emission controls installed prior to 2005.	0.2	High	Category had Hg emission controls installed prior to 2005.
Manufacturing/Use of Non-Dental Mercury-Containing Products							
Mercury Product Manufacturing in MN	25	0.1	High	S J Electro Systems (switch manufacturer) performed emissions testing in 2014. Emissions reported under Toxic Release Inventory.	0.1	High	
General Laboratory Use	26	9.5	Very Low		9.5	Very Low	
Volatilization (Dissipative Use) (Personal Care Products)	27	0.4	Low	EPA emission factor used in 2014 nonpoint emissions.	0.4	Low	
Subtotal: Associated to Purposeful Use of Mercury		**524.7**			**508.1**		
% of Total State Emissions		34%			34%		
Major Category: Emissions Incidental to Material Processing							
Ferrous Mining/Processing	28	683.0	High	Large production increase across the industry from 2016-2017 (~10m long tons more) 2017 production: ~37.7m long tons	695.6	High	Small production increase across the industry from 2017-2018 (~2m long tons more) 2018 production: ~39.1m long tons
Thermal treatment of soil	29	0.00	Low		0.00	Low	
Mineral Products	32	13.1	High	Improved emission estimates since 2014 (i.e., emissions tests instead of EPA default factors).	12.5	High	
Subtotal: Emissions Incidental to Material Processing		**696.0**			**708.0**		
% of Total State Emissions		46%			47%		
STATEWIDE EMISSIONS TOTAL		**1,528**			**1,507**		

General Notes:

The Final 2017 mercury emissions are a combination of 2017 point source emissions and 2017 non-point source emissions.

The Final 2018 mercury emissions are a combination of 2018 point source emissions and 2017 non-point source emissions with some 2018 MN-specific estimates.

Confidence intervals: High +/- 10%; Medium +/- 25%; Low +/- 50%; Very Low +/- 100% or more.

Category	Note	Final 2019 Emissions (pounds)	Final 2019 Confidence	Final 2019 Comments	Final 2020 Emissions (pounds)	Final 2020 Confidence	Final 2020 Comments
Major Category: Emissions Incidental to Energy Production							
Coal Use (Electric Utility)	1	125.6	High	Reductions due to controls installed, moving from coal to natural gas, unit retirements, and other strategies. Larger decreases at Xcel Energy, Minnesota Power, and Northshore Mining facilities.	94.1	High	Reductions due to controls installed, moving from coal to natural gas, unit retirements, and other strategies. Larger decreases at Xcel Energy, Minnesota Power, and Northshore Mining facilities.
Coal Use (Commercial/Institutional/Industrial)	2	30.8	High	Coal use fluctuates from year to year.	33.3	High	Coal use fluctuates from year to year. Increases primarily from Southern MN Beet Sugar (+8.3 lb) with overall decrease at three American Crystal Sugar facilities (-2.8 lb)
Volatilization (Coal Ash)	3	0.0	Very Low	This category is included because changes in pollution control equipment and the use of coal ash may make this a significant category.	0.0	Very Low	This category is included because changes in pollution control equipment and the use of coal ash may make this a significant category.
Petroleum Refining	4	3.2	Medium	Refining mercury estimates fluctuate from year to year.	3.4	Medium	Refining mercury estimates fluctuate from year to year.
Petroleum Product Utilization	5	47.9	Medium	LADCO created a thorough rail (locomotive and railyard) inventory for the 2017 National Emissions Inventory that updated fuel usage for locomotives and fixed errors in estimating emissions from railyards.	36.7	Medium	Small reduction in the amount of diesel fuel usage.
Wood Combustion	6	21.8	Low		18.5	Medium	Decrease primarily due to new stack test data at one facility (Sappi cloquet, -2.3 lb) and lower wood burned at Minnesota Power - Hibbard Renewable Energy Center
Biomass other than Wood	7	0.7	Medium		0.6	Medium	
Natural Gas Combustion	8	3.3	Medium	MN Power - Boswell Units 1 & 2 shutdown in December 2018 (~2 lb decrease).	2.9	Medium	
Asphalt Manufacturing	30	3.8	Low		4.0	Low	
Agriculture, Food, and Kindred Products	31	0.2	Low		0.2	Low	
Miscellaneous Industrial Processes	33	1.2	Low		1.1	Low	
Wood, Pulp/Paper, and Publishing Products	34	3.7	Low	Primarily emissions from boilers at paper mills.	3.7	Low	Primarily emissions from boilers at paper mills.
Subtotal: Emissions Incidental to Energy Production		**242.1**			**198.5**		
% of Total State Emissions		17%			16%		

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Category	Note	Final 2019 Emissions (pounds)	Final 2019 Confidence	Final 2019 Comments	Final 2020 Emissions (pounds)	Final 2020 Confidence	Final 2020 Comments
Major Category: Emissions due to the Purposeful Use of Mercury in Products						
Proportional to Mercury Content of Solid Waste						
Volatilization (Solid Waste Collection/Processing)	9	209.6	Medium	Estimated 2019 MN emissions. Compared to previous year: Waste collected/processed +0.8% Hg content from ash testing data -10%	217.2	Medium	Estimated 2020 MN emissions. Compared to previous year: Waste collected/processed +2.3% Hg content from ash testing data +1%
Incineration (On-site Household Waste)	10	30.6	Low	Estimated 2019 MN emissions. Compared to previous year: Household waste +7.1% Hg content from ash testing data -10%	27.0	Low	Estimated 2020 MN emissions. Compared to previous year: Household waste -12.9% Hg content from ash testing data +1%
Volatilization (Spills/Land Dumping)	11	33.9	Low	Primarily emissions from fluorescent lamp breakage (29.8 lb). Estimated using EPA's 2017 methodology with updated numbers for per capita emissions.	34.1	Low	Primarily emissions from fluorescent lamp breakage (30.2 lb). Estimated using EPA's 2020 methodology with updated numbers for per capita emissions.
Volatilization (Landfills)	12	2.5	Low	Estimated 2019 MN emissions. Compared to previous year: Waste landfilled +15% Hg content from ash testing data -10%	2.3	Low	Estimated 2020 MN emissions. Compared to previous year: Waste landfilled +3.3% Hg content from ash testing data +1%
Volatilization (Land Application of Compost)	13	7.2	Low	Estimated 2019 MN emissions. Compared to previous year: Waste composted -1.3% Hg content from ash testing data -10%	7.9	Low	Estimated 2020 MN emissions. Compared to previous year: Waste composted +7.5% Hg content from ash testing data +1%
Proportional to Mercury Content of Liquid Waste						
Volatilization (Land Application of Sludge)	14	0.4	Low		0.3	Low	
Recycling Activities						
Smelters/Electric Arc Furnaces (EAFs)	15.1	5.9	High	Further reductions at Gerdau Ameristeel (5 lb to 2 lb) and lower production at Prospect Foundry.	4.3	High	Reductions primarily due to lower production at Prospect Foundry and Badger Foundry.
Shredders that Recycle Cars/Appliances	15.2	3.9	Low	Further reductions at Gerdau Ameristeel (6 lb to 4 lb).	4.6	Low	Increase due to Northern Metals - Becker operating in 2020 but not 2019.
Recycling Mercury from Products within MN	16	1.2	Medium	Emissions from fluorescent lightbulb recycling. No updates to 2017 non-point inventory estimates.	1.2	Medium	Emissions from fluorescent lightbulb recycling. No updates to 2017 non-point inventory estimates.
Non-Ferrous Metal Recycling (Al/Pb/etc.)	17	1.9	Medium		1.6	Medium	
Dental Mercury						
Dental Preparations	18	16.0	Medium	Estimated 2019 MN nonpoint emissions. Estimated by MN-specific methods.	15.9	Medium	Estimated 2020 MN nonpoint emissions. Estimated by MN-specific methods.
Cremation	19	123.7	Medium	Estimated 2019 MN nonpoint emissions. Used the amount of cremations tracked by MDH annually and the study performed with the U of M for emission factors, ages 63+.	141.3	Medium	Estimated 2020 MN nonpoint emissions. Used the amount of cremations tracked by MDH annually and the study performed with the U of M for emission factors, ages 63+.

Category	Note	Final 2019 Emissions (pounds)	Final 2019 Confidence	Final 2019 Comments	Final 2020 Emissions (pounds)	Final 2020 Confidence	Final 2020 Comments
Incineration							
Municipal Solid Waste Combustion	20	18.0	High	Great River Energy decomissioned and began demolition of their three existing refuse-derived fuel (RDF) combustion units in 2019 (~8.5 pound decrease).	12.8	High	New stack tests at Xcel Energy -Key City/Wilmarth (-4.3 lb) and additional smaller increases/decreases at multiple facilities.
Incineration (Sewage Sludge)	21.1	8.3	High		7.5	High	
Incineration (Industrial Sludge)	21.2	0.0	High		0.0	High	
Incineration (Medical Waste)	22	0.3	High		0.3	High	
Incineration (Hazardous Waste)	23	0.4	High		0.5	High	
Incineration (Industrial)	24	0.8	High		0.8	High	
Manufacturing/Use of Non-Dental Mercury-Containing Products							
Mercury Product Manufacturing in MN	25	0.1	High		0.1	High	
General Laboratory Use	26	9.5	Very Low		9.3	Very Low	
Volatilization (Dissipative Use) (Personal Care Products)	27	0.4	Low		0.4	Low	
Subtotal: Associated to Purposeful Use of Mercury		**474.8**			**489.4**		
% of Total State Emissions		34%			39%		
Major Category: Emissions Incidental to Material Processing							
Ferrous Mining/Processing	28	676.3	High	Small production decrease across the industry from 2018-2019 (~2m long tons less) 2019 production: ~37.1m long tons	539.4	High	Large production decrease across the industry from 2019-2020 (~7m long tons less), new stack test data 2020 production: ~30.1m long tons
Thermal treatment of soil	29	0.00	Low		0.00	Low	
Mineral Products	32	11.7	High		12.2	High	Decrease (~1.8 lb) due to overall lower lime production at sugar beet plants. 2020 production: ~229k tons vs. 2019 production: ~273k tons
Subtotal: Emissions Incidental to Material Processing		**688.0**			**551.6**		
% of Total State Emissions		49%			44%		
STATEWIDE EMISSIONS TOTAL		**1,405**			**1,239**		

General Notes:

The Final 2019 mercury emissions are a combination of 2019 point source emissions and 2017 non-point source emissions with some 2019 MN-specific estimates.

The Draft 2020 mercury emissions are a combination of 2020 point source emissions and 2020 non-point source emissions.

Confidence intervals: High +/- 10%; Medium +/- 25%; Low +/- 50%; Very Low +/- 100% or more.

Category	Note	Final 2021 Emissions (pounds)	Final 2021 Confidence	Final 2021 Comments	Draft 2022 Emissions (pounds)	Draft 2022 Confidence	Draft 2022 Comments
Major Category: Emissions Incidental to Energy Production
Coal Use (Electric Utility)	1	104.8	High	Increases due to higher coal usage at Xcel Energy - Allen S. King (+5.7 lb) and Minnesota Power - Boswell (+8.6 lb), with decreases due to retirements at Otter Tail Power (-2.7 lb) and lower coal usage at Hibbing Public Utilties (-0.9 lb).	114.0	High	Increases due to higher emission factors at Minnesota Power - Boswell (+10.8 lb) and Virginia Public Utilities (+1.7 lb), with decreases due to lower coal usage and emission factors at Xcel Energy - Sherburne (-3.4 lb).
Coal Use (Commercial/Institutional/ Industrial)	2	31.1	High	Primarily emissions from coal use at sugar beet processing facilities (~30 lb). Decrease due to overall lower coal usage at sugar beet processing facilities (-2.4 lb).	37.0	High	Primarily emissions from coal use at sugar beet processing facilities (~36.2 lb). Increase due to overall greater coal usage at sugar beet processing facilities (+6.2 lb).
Volatilization (Coal Ash)	3	0.0	Very Low	This category is included because changes in pollution control equipment and the use of coal ash may make this a significant category.	0.0	Very Low	This category is included because changes in pollution control equipment and the use of coal ash may make this a significant category.
Petroleum Refining	4	3.3	Medium	Refining mercury estimates fluctuate from year to year.	3.3	Medium	Refining mercury estimates fluctuate from year to year.
Petroleum Product Utilization	5	43.1	Medium	Increase in the amount of diesel fuel usage.	39.9	Medium	Decrease in the amount of diesel fuel usage.
Wood Combustion	6	24.2	Medium	Increase primarily due to new stack test data at two facilities (Sappi Cloquet, +3.9 lb) (Hedstrom Lumber, +1.8 lb).	21.3	Medium	Decrease primarily due to new stack test data at one facility (Sappi Cloquet, -1.8 lb)
Biomass other than Wood	7	0.6	Medium		0.4	Medium	
Natural Gas Combustion	8	2.9	Medium		3.1	Medium	
Asphalt Manufacturing	30	4.2	Low		3.9	Low	
Agriculture, Food, and Kindred Products	31	0.1	Low		0.4	Low	
Miscellaneous Industrial Processes	33	1.0	Low		0.9	Low	
Wood, Pulp/Paper, and Publishing Products	34	3.8	Low	Primarily emissions from boilers at paper mills.	3.9	Low	
Subtotal: Emissions Incidental to Energy Production		**219.0**			**228.1**		
% of Total State Emissions		16%			17%		

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Category	Note	Final 2021 Emissions (pounds)	Final 2021 Confidence	Final 2021 Comments	Draft 2022 Emissions (pounds)	Draft 2022 Confidence	Draft 2022 Comments
Major Category: Emissions due to the Purposeful Use of Mercury in Products							
Proportional to Mercury Content of Solid Waste							
Volatilization (Solid Waste Collection/Processing)	9	184.1	Medium	Estimated 2021 MN emissions. Compared to previous year: Waste collected/processed +3.1% Hg content from ash testing data -18%	191.1	Medium	Estimated 2022 MN emissions. Compared to previous year: Waste collected/processed +7.6% Hg content from ash testing data -4%
Incineration (On-site Household Waste)	10	20.6	Low	Estimated 2021 MN emissions. Compared to previous year: Household waste -7.2% Hg content from ash testing data -18%	19.0	Low	Estimated 2022 MN emissions. Compared to previous year: Household waste -4.4% Hg content from ash testing data -4%
Volatilization (Spills/Land Dumping)	11	34.1	Low	Primarily emissions from fluorescent lamp breakage (30.2 lb). Estimated using EPA's 2020 methodology with updated numbers for per capita emissions.	34.1	Low	Primarily emissions from fluorescent lamp breakage (30.2 lb). Estimated using EPA's 2020 methodology with updated numbers for per capita emissions.
Volatilization (Landfills)	12	1.7	Low	Estimated 2021 MN emissions. Compared to previous year: Waste landfilled +4.2% Hg content from ash testing data -18%	1.9	Low	Estimated 2022 MN emissions. Compared to previous year: Waste landfilled -3.8% Hg content from ash testing data -4%
Volatilization (Land Application of Compost)	13	6.4	Low	Estimated 2021 MN emissions. Compared to previous year: Waste composted -1.4% Hg content from ash testing data -18%	9.4	Low	Estimated 2022 MN emissions. Compared to previous year: Waste composted +51.9% Hg content from ash testing data -4%
Proportional to Mercury Content of Liquid Waste							
Volatilization (Land Application of Sludge)	14	0.3	Low		0.3	Low	
Recycling Activities							
Smelters/Electric Arc Furnaces (EAFs)	15.1	2.3	High	Reduction due to the Gerdau Ameristeel EAF not operating in 2021 (-2.1 lb) with small increases at Prospect Foundry, Badger Foundry, and Northern Iron & Machine.	2.2	High	
Shredders that Recycle Cars/Appliances	15.2	1.5	Low	Reduction due to the Gerdau Ameristeel EAF not operating in 2021 (-3.6 lb) with small increase at Northern Metals - Becker (+0.5 lb).	1.3	Low	
Recycling Mercury from Products within MN	16	1.2	Medium	Emissions from fluorescent lightbulb recycling. No updates to 2017 non-point inventory estimates.	1.2	Medium	Emissions from fluorescent lightbulb recycling. No updates to 2017 non-point inventory estimates.
Non-Ferrous Metal Recycling (Al/Pb/etc.)	17	1.8	Medium		1.8	Medium	
Dental Mercury							
Dental Preparations	18	16.0	Medium	Estimated 2021 MN nonpoint emissions. Estimated by MN-specific methods.	16.0	Medium	
Cremation	19	148.2	Medium	Estimated 2021 MN nonpoint emissions. Used the amount of cremations tracked by MDH annually and the study performed with the U of M for emission factors, ages 63+.	149.6	Medium	Estimated 2022 MN nonpoint emissions. Used the amount of cremations tracked by MDH annually and the study performed with the U of M for emission factors, ages 63+.

| Category	Note	Final 2021 Emissions (pounds)	Final 2021 Confidence	Final 2021 Comments	Draft 2022 Emissions (pounds)	Draft 2022 Confidence	Draft 2022 Comments
				Incineration			
Municipal Solid Waste Combustion	20	25.3	High	New stack tests at Hennepin Energy Recovery Center (+15.3 lb) and at Xcel Energy - Red Wing (-2.9 lb) with additional smaller increases/decreases at multiple facilities.	13.1	High	New stack tests at Hennepin Energy Recovery Center (-16 lb) with additional smaller increases/decreases at multiple facilities.
Incineration (Sewage Sludge)	21.1	8.5	High		8.4	High	
Incineration (Industrial Sludge)	21.2	0.0	High		0.0	High	
Incineration (Medical Waste)	22	0.7	High		0.8	High	
Incineration (Hazardous Waste)	23	1.1	High		0.0	High	Emissions were previously from the incinerator at a 3M Cottage Grove facility which was permanently shutdown.
Incineration (Industrial)	24	0.8	High		0.6	High	
				Manufacturing/Use of Non-Dental Mercury-Containing Products			
Mercury Product Manufacturing in MN	25	0.1	High		0.1	High	
General Laboratory Use	26	9.3	Very Low		9.3	Very Low	
Volatilization (Dissipative Use) (Personal Care Products)	27	0.4	Low		0.4	Low	
Subtotal: Associated to Purposeful Use of Mercury		**464.5**			**460.6**		
% of Total State Emissions		34%			35%		
				Major Category: Emissions Incidental to Material Processing			
Ferrous Mining/Processing	28	681.8	High	Large production increase across the industry from 2020-2021 (~8.5m long tons more), new stack test data 2021 production: ~38.7m long tons	622.5	High	Large production decrease across the industry from 2021-2022 (~6.8m long tons less), new stack test data 2022 production: ~31.9m long tons
Thermal treatment of soil	29	0.00	Low		0.00	Low	
Mineral Products	32	11.4	High		13.2	High	
Subtotal: Emissions Incidental to Material Processing		**693.1**			**635.7**		
% of Total State Emissions		50%			48%		
STATEWIDE EMISSIONS TOTAL		**1,377**			**1,324**		

General Notes:

The Draft 2021 mercury emissions are a combination of 2021 point source emissions and 2020 non-point source emissions with some 2021 MN-specific estimates.

The Draft 2022 mercury emissions are a combination of 2022 point source emissions and 2020 non-point source emissions with some 2022 MN-specific estimates.

Confidence intervals: High +/- 10%; Medium +/- 25%; Low +/- 50%; Very Low +/- 100% or more.

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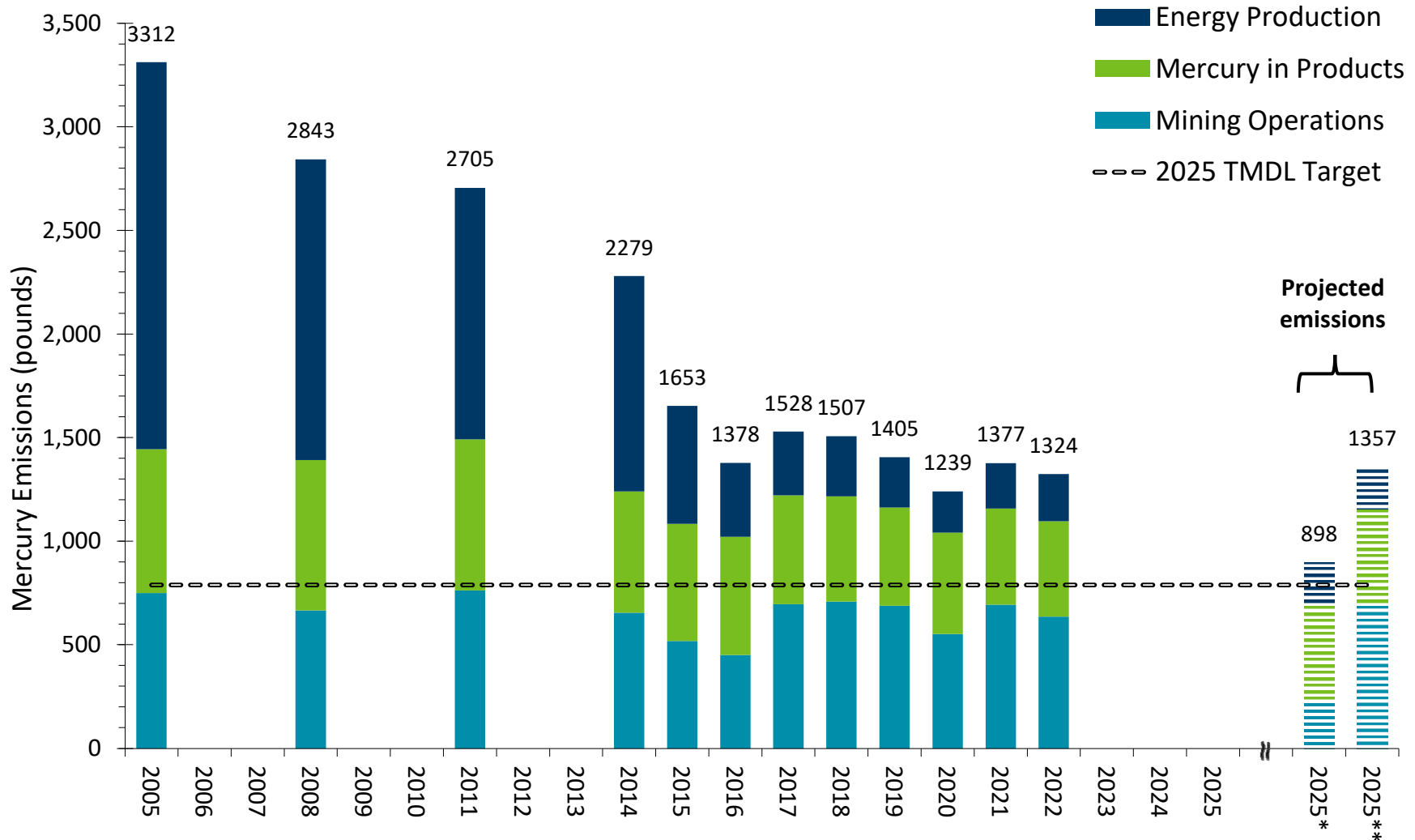
* This projection is based on the ferrous mining/processing industry in northern MN meeting the required 72% reduction specified in Minn. R. 7007.0502.
** This projection is based on the ferrous mining/processing industry's proposed reductions in each mercury reduction plan applied to the baseline emissions as calculated by MPCA.