DRAFT Multiple Discharger Variance and Permitting Strategy for Mercury
Fiscal Years 2020 - 2024
May 20, 2019

Michigan hereby proposes a multiple discharge variance (MDV) from the water quality standard (WQS) for mercury, for facilities under the National Pollutant Discharge Elimination System (NPDES) program that meet the requirements of 40 CFR 131 (Water Quality Standards) and 40 CFR 132 (Water Quality Guidance for the Great Lakes System). The WQS variance is limited to a period of 5 years and allows eligible dischargers to discharge mercury concentrations in excess of the water quality-based effluent limits (WQBELs) necessary to meet the existing WQS of 1.3 nanograms per liter (ng/L) for the protection of wildlife, and 1.8 ng/L for the protection of human health, of the Part 4 Rules, Water Quality Standards, promulgated under Part 31, Water Resources Protection, of the Natural Resources and Environmental Protection Act (NREPA), 1994 PA 451, as amended (Part 4 Rules). Michigan proposes the WQS variance based on its findings, that justify the need for a WQS variance consistent with the requirements of 40 CFR Part 131.14. A Mercury Permitting Strategy developed by the Michigan Department of Environmental Quality (MDEQ), Water Bureau, now the Michigan Department of Environment, Great Lakes, and Energy (EGLE), Water Resources Division (WRD), in 2000 and updated in 2004, 2009, and 2015, established the MDV for mercury consistent with R 323.1103, Variances, of the Part 4 Rules. Michigan is seeking approval for an MDV for mercury for Fiscal Years (FY) 2020-2024, October 1, 2019 to September 30, 2024.

The information included in the proposed MDV supports the findings that efforts under previous MDVs have been successful in reducing mercury to the environment; that there is currently no cost effective treatment for reducing effluent mercury concentrations to meet the water quality standard of 1.3 ng/L; and that human caused mercury in the atmosphere is the major source of mercury to Michigan surface waters.

Regulatory Framework

Variances from a WQS are allowed under state and federal regulations. Michigan Rule 323.1103, Variances, of the Part 4 Rules, allows for a variance from a Michigan WQS that is the basis for a WQBEL in an NPDES permit where various conditions prevent the attainment of WQS (Attachment A). Federal requirements under 40 CFR Part 131.14, Water Quality Standards Variances, provides states, territories and authorized tribes a mechanism to adopt WQS variances. Michigan is part of the Great Lakes System and therefore is not only subject to 40 CFR Part 131, but also 40 CFR Part 132, Water Quality Guidance for the Great Lakes System Procedure 2, Variances from Water Quality Standards for Point Sources.

Scope of Facilities Eligible for Consideration under the MDV

Michigan's Part 8 Rules, Water Quality-Based Effluent Limit Development for Toxic Substances, promulgated under Part 31, Water Resources Protection under the NREPA (Part 8 Rules), is used to establish WQBELs for toxic substances for point source discharges that are protective of the designated uses of surface waters of the state. The WQBELs for mercury are developed for NPDES permitted facilities following provisions contained within Michigan's R 323.1211, Reasonable Potential for Chemical Specific WQBELs, of the Part 8 Rules, and are incorporated into NPDES permits when mercury is, or may be discharged at a level that has the reasonable potential to cause or contribute to an exceedance of the WQS. In summary, for each discharge for which facility-specific effluent mercury data is provided, a statistical analysis is conducted to determine if there is reasonable potential for a proposed discharge concentration of mercury to exceed the WQBEL necessary to meet the WQS. If reasonable potential exists for exceedance of a WQBEL, and the facility existed prior to March 23, 1997, the facility is eligible for consideration under the MDV.

Designated Uses

Sections 101(a) and 303(c)(2)(A) of the federal Clean Water Act requires states to identify appropriate uses for all waterbodies, and provide, where attainable, water quality (in the form of WQS) for the protection and propagation of fish, shellfish, wildlife, and recreation in and on the water. Designated uses describe the various uses of waters that are considered desirable and identify those waters that should be protected. At a minimum, all surface waters in Michigan are designated and protected for all of the following uses: agriculture, navigation, industrial water supply, warmwater fishery, other indigenous aquatic life and wildlife, partial body contact recreation, total body contact recreation (May 1 to October 31), and fish consumption. A select group of rivers and inland lakes and the Great Lakes and connecting channels are designated and protected for coldwater fisheries and public water supply (R 323.1100, Designated Uses, of the Part 4 Rules).

Many of Michigan waters are not supporting designated uses for other indigenous aquatic life and wildlife, and/or fish consumption due to mercury in the water column and/or fish tissue. There are 76,421 river miles, 872,037 acres of inland lakes and reservoirs, 41,943 square miles of Great Lakes open water, 2,998 miles of Great Lakes shoreline, and 125 miles of connecting channels in Michigan. Michigan's draft 2018 Clean Water Act sections 303(d), 305(b), and 314 Integrated Report (IR) uses data from the fish contaminant and water chemistry monitoring programs, in addition to others, to assess specific surface waters impacted by mercury and other pollutants. The IR identifies 14,289 miles of rivers and streams, 272,741 acres of inland lakes and reservoirs, all of the Great Lakes open water and shorelines, and all of connecting channels in Michigan as not supporting one or more designated uses due to elevated concentrations of mercury in the ambient water column or in fish tissue (EGLE, 2019 in draft).

Information outlined in the MDV and further evaluated and explained in the Statewide Michigan Mercury Total Maximum Daily Load (TMDL), approved by USEPA in September 2018 (MDEQ, 2018), demonstrated that the human-caused condition of mercury air deposition, prevents the attainment of the existing use and cannot be remedied within the term of this variance. Atmospheric mercury deposition in Michigan accounts for 98.6% of the mercury load to Michigan surface waters, while NPDES discharges account for 1.4%. Atmospheric mercury deposition comes from local (in-state sources), regional, national, and global sources that are both anthropogenic (80%) and natural (20%) in origin (MDEQ, 2018). Most contributions to mercury deposition originate from outside Michigan. In-state sources make up 7.8% of the state's atmospheric mercury load (MDEQ, 2018). Atmospheric mercury deposition originating from sources within and outside of Michigan must be controlled in order to reduce concentrations of mercury in fish tissue to protect human health and wildlife.

Data and Analysis Review

Mercury is a naturally-occurring metal that is prevalent throughout the global environment. The well-known neurotoxic properties of mercury make it dangerous, at high exposure levels, for both humans and wildlife, especially the young. Human exposure through consumption of fish is the principal public health concern with mercury in the environment. Mercury emitted to the atmosphere can be transported short and long distances from its source before being deposited to land and water. The widespread loading of mercury into the Great Lakes region causes mercury-related fish consumption advisories throughout the Great Lakes System. In Michigan, the majority of mercury pollution in waterbodies is a result of atmospheric deposition from human activities originating from local, regional, national, and global sources (MDEQ, 2018). The widespread impacts of mercury deposition in Michigan is reflected in the results from multiple monitoring programs for fish, wildlife, and ambient water.

Ambient Water Data

The Water Chemistry Monitoring Program (WCMP) began in 1998 with fixed sampling in Michigan's Great Lakes Connecting Channels, Saginaw Bay, Grand Traverse Bay, and selected tributary stations. A probabilistic design, or statistical sampling, was added to the WCMP in 2005 to gain the ability to extrapolate the data for statewide and regional analyses. The development of the MDV is supported using the most recent quality assured dataset from 2013 through 2017.

Great Lakes Connecting Channels

Total mercury concentrations are measured monthly from April through November at single upstream and downstream locations in each Great Lakes Connecting Channel: St. Marys River, St. Clair River, and Detroit River. These locations, one near the head and one near the mouth, are used to determine WQS attainment and

measure water quality changes over time. Geometric means of the 2013 to 2017 WCMP data at the St. Mary's and St. Clair River stations met the WQS of 1.3 ng/L with a range of 0.34 to 0.43 ng/L. Geometric mean concentrations in the Detroit River from 2013 to 2017 exceeded the WQS at the upstream station with a geometric mean of 1.55 ng/L. The WQS was met at the downstream station with a geometric mean of 1.05 ng/L.

Selected Tributaries Stations

The 2013 data collected at 31 WCMP tributary stations indicate many Michigan rivers in their downstream reaches exceed the total mercury WQS of 1.3 ng/L. The geometric mean of the total mercury data collected in 2013 was calculated for each station, with results ranging from less than the quantification level (<0.50 ng/L) to 5.4 ng/L. The WQS of 1.3 ng/L was exceeded at 24 of the 31 stations, resulting in 77% of the tributary stations exceeding the WQS.

Probabilistic River and Stream Analysis

A probabilistic river and stream analysis included 252 sites that were monitored over a five-year period from 2013 through 2017. The geometric mean of the entire mercury dataset collected during this time period was calculated at each station. The WQS of 1.3 ng/L was exceeded at 156 of the 252 stations resulting in 62% of the probabilistic stations exceeding the WQS.

Fish Tissue Data

Michigan has a statewide fish consumption advisory, which was first issued in 1988 by the Michigan Department of Community Health (MDCH), now known as Michigan Department of Health and Human Services (MDHHS). The advisory applies to certain species from all inland lakes and reservoirs, based on a preponderance of data indicating mercury concentrations were elevated in those species in most lakes and impoundments. The MDCH historically used a trigger level for mercury of 0.5 mg/kg to determine issuance of statewide mercury fish consumption advisory guidelines when developing public health advisories for the Michigan Fish Consumption Advisory Program (MDCH, 2013). In 2013, a change to the approach used by the MDHHS for developing fish consumption advisories was completed. The MDHHS developed a range of fish consumption screening values (FCSVs) for mercury that are used to recommend meal consumption categories (e.g., 1 meal per month versus 2 meals per month, etc.), and are protective for everyone, including vulnerable populations such as people with existing medical conditions and unborn and young children. Screening values for the meal consumption categories range from 0.07 mg/kg mercury to 2.2 mg/kg (i.e. a "do not eat" meal category trigger). Mercury was quantified in all but one of 3,710 fish fillet samples collected from inland waters between 2008 and 2017. Mercury concentrations exceeded the lowest MDHHS FCSV of 0.07 mg/kg in 3,266 samples (88%), and the average concentration exceeded 0.07 mg/kg in at least one species from all but seven of the 207 waterbodies sampled during that time period.

EGLE does not use the MDHHS meal consumption guidelines related to mercury for determining designated use support. Fish tissue mercury concentrations from specific waterbodies are compared to Michigan's fish tissue value for mercury of 0.35 mg/kg, the concentration that is not expected to pose a health concern to people consuming 15 grams or less of fish per day. The methodology used by EGLE to derive the fish tissue residue value is consistent with the methodology used by the USEPA to derive a national fish tissue residue value and consistent with federal requirements for the Great Lakes Basin (USEPA, 2001). Since 2008, a total of 208 inland waterbodies have been sampled for fish tissue; of those, 108 waterbodies had at least one species with an average mercury concentration of at least 0.35 mg/kg. Many of Michigan's surface waters are impaired due to mercury and do not support the fish consumption designated use.

Long-term trend analysis (1990-2015) for fish tissue data indicates that mercury concentrations in fish from the Great Lakes, connecting channels, and inland waters of Michigan have generally remained static over that period. A detailed discussion of the specifics of this analysis is included in Michigan's Fish Contaminant Trend Summary (Bohr, 2019).

Wildlife Data

A reduction in mercury concentrations occurred in herring gull eggs across the Great Lakes from 1967-2009 as a result of reduced mercury emissions (Evers et al., 2011). Decreases in mercury concentrations also occurred in herring gull eggs from five Michigan colonies between the time periods 2002 to 2006 and 2008 to 2012 (Fuentes et al., 2014). Decreases in mercury concentrations in nesting bald eagles in Michigan occurred from 1986 to 2008, with a slight increase occurring between 2009 and 2012 (Fuentes and Bowerman, 2014). The slight increase found between 2009 and 2012 occurred in eagles nesting in inland and Great Lakes territories. Data collected from 2002 to 2010 indicated that concentrations of mercury in bald eagles in Great Lake states are at levels that can cause subclinical neurological damage (Rutkiewicz et al., 2011).

Air Quality Data

In Michigan, the majority of mercury pollution is a result of atmospheric deposition. Atmospheric mercury deposition in Michigan comes from local (i.e., in-state sources), regional, national, and global sources that are both anthropogenic (human-caused) and natural in origin. Most contributions to mercury deposition originate from outside Michigan. In-state sources make up 7.8 percent of the state's atmospheric mercury load (MDEQ, 2018). Atmospheric mercury deposition originating from sources within and outside of Michigan must be controlled in order to reduce concentrations of mercury in fish tissue to protect human health and wildlife.

Ambient air concentrations of mercury from event precipitation samples were measured over ten years by the University of Michigan Air Quality Laboratory (2009), in collaboration with MDEQ at three sites (Dexter, Pellston, and Eagle Harbor, Michigan). There is a clear decreasing spatial trend of wet mercury deposition from south to north (Dexter, Michigan to Eagle Harbor, Michigan), but no statistically significant statewide trend has been observed over this same time period (MDEQ, 2008). Evers et al. (2011) also reported no evidence of appreciable decline in wet deposition in the Great Lakes and Canada between 2002 and 2008. The Michigan Statewide Mercury Total Maximum Daily Load, approved by the USEPA, identifies multiple studies that show in other parts of the country, mercury wet deposition has been decreasing and can be attributed to reduction in mercury in commercial products and reductions from coal-fired utilities (MDEQ, 2018).

An emission inventory was developed in 2002 by MDEQ, Air Quality Division (AQD), for anthropogenic emissions of mercury located within the state of Michigan. An emission inventory, compiles emissions from point, area, and mobile sources. Point sources include specific industrial facilities, such as a steel mill or power plant. Area sources include small pollution sources like fluorescent light bulb crushers that do not emit sufficient quantities of criteria pollutants to require reporting to the annual point source inventory. Mobile sources include on-road vehicular traffic and off-road equipment, such as agricultural and construction equipment. The most recent mercury emission inventory available is from 2011. The 2011 mercury air emissions inventory demonstrated a 20 percent reduction in mercury emissions relative to the 2002 inventory. The AQD plans to develop a mercury emissions inventory for 2014 and 2017 by the end of 2019 to track further progress in reduction.

Highest Attainable Condition

The requirements of 40 CFR Part 131.14 specify a variance must represent the highest attainable condition (HAC) achievable by the permittee. The HAC is the condition that is both feasible to attain and is closest to the protection afforded by the designated use and criteria. The requirements of 40 CFR Part 131.14 requires consideration of feasible pollutant control technologies more stringent than those required by sections 301(b) and 306 of the Clean Water Act prior to adopting a water quality variance.

Treatment for mercury involves removal from wastewater, usually in the form of precipitation, adsorption of mercury onto a media, such as carbon, or filtering wastewater through a semi permeable membrane to remove mercury. While these treatments may offer reductions in mercury, there is no single treatment that has been proven to reliably meet the mercury WQS without environmental cost (USEPA 2007). Treatment would involve mercury from one form (i.e., wastewater) being transformed into another, such as solid waste, which would remain in the environment. Conversely, prevention and source reduction eliminate or reduce the mercury from entering the environment. While source reduction may take several

permit cycles, the benefits are more desirable than the negative impacts of treatment.

Michigan has reviewed the available information regarding end-of-pipe treatment for mercury, including the effectiveness of the treatment and associated costs (Ohio EPA, 1997 and USEPA 2007). The Ohio analysis concluded that end-of-pipe treatment to meet the WQS would cause widespread social and economic impacts and that a general (e.g., statewide) mercury variance was appropriate. The USEPA analysis concluded treatment could reduce mercury to less than 2.0 ng/L. However, this treatment could require multiple steps, increasing cost and include using flocculants which can be an additional source of mercury. In addition, treatment effectiveness is based on other constituents of the wastewater, indicating no single treatment would be effective for all dischargers, and costs could vary greatly based on site specific conditions. Due to uncertainty with treatment and success shown through implementation of the PMP's, Michigan believes end-of-pipe controls are not feasible and source reduction and elimination are the best options for reducing mercury in the effluent of Michigan NPDES facilities.

Michigan supports the position that pollution prevention and waste minimization programs for mercury should be the first steps in restoring water quality. WRD completed a review of publicly-owned wastewater treatment facilities in Michigan with data from August 2013 to July 2018 with long-term average effluent mercury concentrations of 1.3 ng/L or lower. Of the 47 publicly-owned wastewater treatment facilities reviewed, 16 (34%) employed non-membrane filtration, six (13%) are considered by WRD to employ advanced treatment (without non-membrane filtration), and 25 (53%) implement mercury PMPs without AWT limits or non-membrane filtration (Figure 1). This suggests that PMPs are effective in reducing mercury in wastewater effluent at a level similar to non-membrane filtration and advanced wastewater treatment.

Consistent with the federal regulations in 40 CFR 131.14(b), the HAC for facilities covered by the MDV consists of an interim effluent limit that reflects the mercury effluent level currently achievable (LCA) through operation of the existing pollution control technologies at each facility at the time the MDV is adopted. An LCA is derived using facility-specific effluent data and inclusion in a NPDES permit requires a facility-specific PMP. The method used by EGLE to derive LCA-based limits is detailed in Policy and Procedure WRD-004 (MDEQ, 2011). EGLE's PMP requirements are outlined in R 323.1213(d) of the Part 8 Rules.

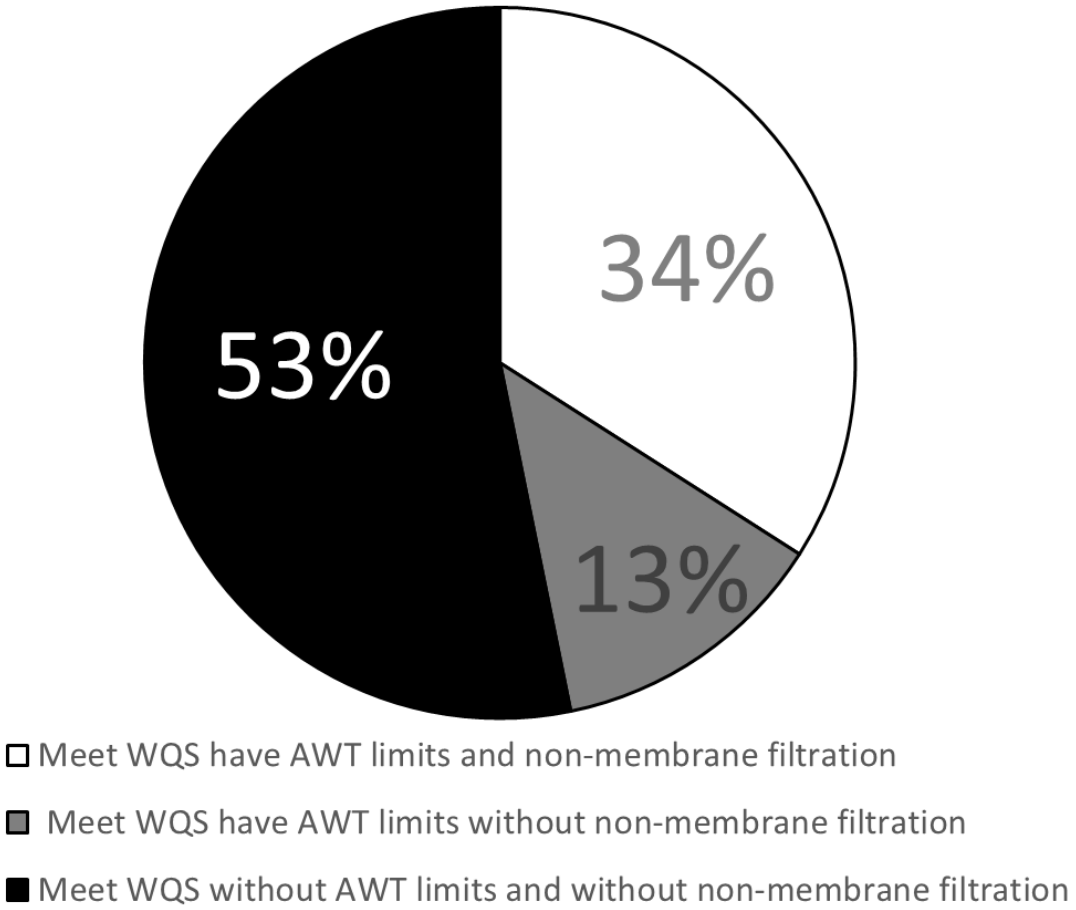

Figure 1: The pie graph shows NPDES publicly-owned wastewater treatment facilities with long-term mean mercury effluent concentrations from August 2013 to July 2018. There were 47 facilities with long-term mean mercury effluent concentrations less than or equal to 1.3 ng/L. Of the 47 facilities, 53% do not have non-membrane filtration or AWT limit and are effectively utilizing PMPs.

Term of the Variance

A WQS variance is a time-limited designated use and criterion that reflects the HAC during the term specified of the variance. All underlying designated uses and associated criteria remain applicable and are not covered under this MDV. Once approved by the USEPA, the MDV will be the applicable WQS. Effluent limits included in NPDES permits will be reflected as the HAC for each facility eligible under the MDV and require facility specific Pollutant Minimization Program (PMP) plans and implementation.

In order to meet the HAC, facilities are required to meet the interim requirements applicable throughout the term of this WQS variance. The interim requirements represent the effluent condition that reflects the greatest pollutant reduction achievable with the pollutant control technologies installed at the time the state adopts the WQS variance. These interim requirements will be represented as an LCA in an NPDES permit. The development of a site-specific LCA includes utilizing site-specific effluent data using Policy and Procedure WRD-004 (MDEQ, 2011). Consistent with R 323.1103(6), permits with LCAs will include requirements to implement a PMP. A site specific PMP is developed by the facility and reviewed and approved by WRD staff. Quarterly monitoring of mercury in influent and effluent, and monitoring of sludge are included in annual reports submitted to WRD. Through the implementation of PMPs and associated monitoring, incremental progress towards reducing effluent mercury concentrations throughout the term of the variance will be accomplished.

Specific PMP requirements are outlined in R 323.1213 (d) of the Part 8 Rules and includes the following:

(i) An annual review and semiannual monitoring of potential sources of the toxic substance.

(ii) Quarterly monitoring for the toxic substance in the influent to the wastewater treatment system.

(iii) A commitment by the permittee that reasonable cost-effective control measures will be implemented when sources of the toxic substance are discovered. Factors to be considered shall include all of the following:

  (A) Significance of sources.

  (B) Economic considerations.

  (C) Technical and treatability considerations.

(iv) An annual status report. The report shall be sent to the department and shall include all of the following:

  (A) All minimization program monitoring results for the previous year.

  (B) A list of potential sources of the toxic substance.

(C) A summary of all actions taken to reduce or eliminate the identified sources of the toxic substance. The requirements of paragraphs (i) to (iv) of this subdivision may be modified by the department on a case-by-case basis.

The term of this WQS variance is five years consistent with requirements under 40 CFR 131 and 40 CFR 132. Source identification and mercury reduction programs can involve multiple permit cycles to address mercury reductions. While the time needed by each facility will vary, Michigan revaluates a facility's eligibility under the MDV at permit reissuance. As specified in Section 402(b)(1)(B) of the federal Clean Water Act, NPDES permits are for fixed terms not to exceed five years. Michigan has established an approach for scheduling permit reissuance known as the "5-Year Basin Plan" and established a timetable for reissuance of permits located in specific receiving waters. A receiving water is the river, stream or lake that "receives" a discharge. It is ideal to simultaneously evaluate all permits allowing discharge to a receiving water or watershed. Michigan has established a goal of reissuing NPDES permits every 5 years, with approximately 20% of the permits being reissued each year. The "5-Year Basin Plan" was established with the objective of establishing the most efficient plan for water quality monitoring and permit reissuance. Under the MDV, LCAs are revaluated at permit reissuance. If the WQBEL analysis determines the facility no longer has a reasonable potential to exceed the WQS for mercury, the permittee no longer meets the requirements for inclusion in the MDV, the LCA limit and PMP requirements are removed from the permit and quarterly monitoring is included in the reissued permit. If the WQBEL analysis determines the facility continues to show a reasonable potential to exceed the WQS for mercury, the LCA is recalculated and included in the reissued permit at the level achieved in the previous permit, or a lower LCA than the previous permit, with PMP requirements being retained in the permit. Continued implementation of the PMP leads to greater source reduction and will ensure that the facility is taking the steps necessary to achieve the HAC throughout the term of the variance.

Michigan's Rule R 323.1098, Antidegradation, of the Part 4 Rules, indicates that the antidegradation requirements apply to any action or activity pursuant to Part 31 that is anticipated to result in a new or increased loading of pollutants by any source to the surface waters of the state and where independent regulatory authority exists that requires compliance with a WQS. Michigan's Rule R 323.1103, Variances, of the Part 4 Rules, does not apply to new dischargers unless the proposed discharge is necessary to alleviate an imminent and substantial danger to the public health or welfare. Therefore, new dischargers are not eligible for coverage by the MDV. With regards to increased discharges of mercury, Michigan R 323.1098(2), Antidegradation, of the Part 4 Rules, specifies that there can be no lowering of water quality with respect to the pollutant causing the nonattainment when designated uses of the water body are not attained. Subrules 98(8) and 98(9) of R232.1098 describe actions that are not considered a lowering of water quality. A facility covered by the MDV requesting an increased discharge of mercury that meets the requirements of Subrules 98(8) or 98(9), would continue to be eligible for an MDV at an LCA no greater than the level achieved

under their current permit per Michigan's Rule R 323.1103(6)(a). A facility not covered by the MDV requesting an increased discharge of mercury that meets the requirements of Subrules 98(8) or 98(9), may apply for an individual variance. To date, the USEPA has not approved an individual mercury variance in the State of Michigan.

NPDES Effluent Data

Although technology is advancing, there is limited information on the long-term success of newer technologies at a wide range of facilities with varying influent concentrations and design flows, and no demonstration of the environmental benefits related to the cost of their implementation. Currently, continued implementation of PMPs is the only well documented successful strategy to reduce mercury effluent concentrations at NPDES permitted facilities in Michigan. The success of the PMP is documented by mercury effluent concentrations evaluated for this MDV.

As of July 31, 2018, there were 206 Individual NPDES permits throughout the state, including inland waters and Great Lakes and Connecting Channels, containing mercury limits. Of the 206 permits, 12 (6%) facilities had the water quality standard of 1.3 ng/L and 194 (94%) had an LCA.

From August 1, 2013 to July 31, 2018, there were 234 facilities that reported mercury data. While data indicates many facilities are trending downward in effluent concentrations due to source identification and reduction efforts under PMPs, there are still many facilities where effluent concentrations routinely exceed the mercury WQS. Data obtained from facility discharge monitoring reports (DMRs) for point source discharges, resulted in the review of 7,520 discreet mercury datapoints at 234 facilities. Of the 7,520 data points reviewed, 3,670 (48%) were above the mercury WQS of 1.3 ng/L. Many facilities have long-term mean mercury effluent concentrations below 1.3 ng/L. The majority of facilities have long-term mean mercury effluent concentrations under 5 ng/L (Figure 2). There are only six facilities that had calculated mean effluent concentrations greater than or equal to 10 ng/L. Two of the six facilities are Steel Manufactures; one a WTWP; two are paper plants; and one is a power plant that has not discharged since 2017.

Further analysis of data from August 1, 2013 to July 31, 2018 shows 55% of facilities with mercury limits or monitoring requirements have long-term arithmetic means above the WQS of 1.3 ng/L, while 45% of facilities long-term arithmetic mean mercury concentrations met the WQS of 1.3 ng/L (Figure 3).

Figure 4 represents long-term arithmetic mean mercury concentrations from August 1, 2013 to July 31, 2018 for various sectors. Long-term arithmetic mean mercury concentrations for steel manufacturing facilities were elevated as two backlogged permits still required use of EPA Method 245. In the analysis, the replacement of non-detects with the detection limit reported by the facility, resulted in higher mean mercury concentrations. Recently reissued, or in process permits for these two facilities require EPA Method 1631 with a lower detection level. Effluent mercury concentrations for power plants is higher than concentrations reported in the previous MDV due to one

facility with elevated mercury mean concentrations in the effluent. This power plant has not discharged since 2017. Effluent mercury concentrations for paper manufacturing facilities is also higher than concentrations reported in the previous MDV. The elevated mean is due to two facilities with higher mean effluent concentrations.

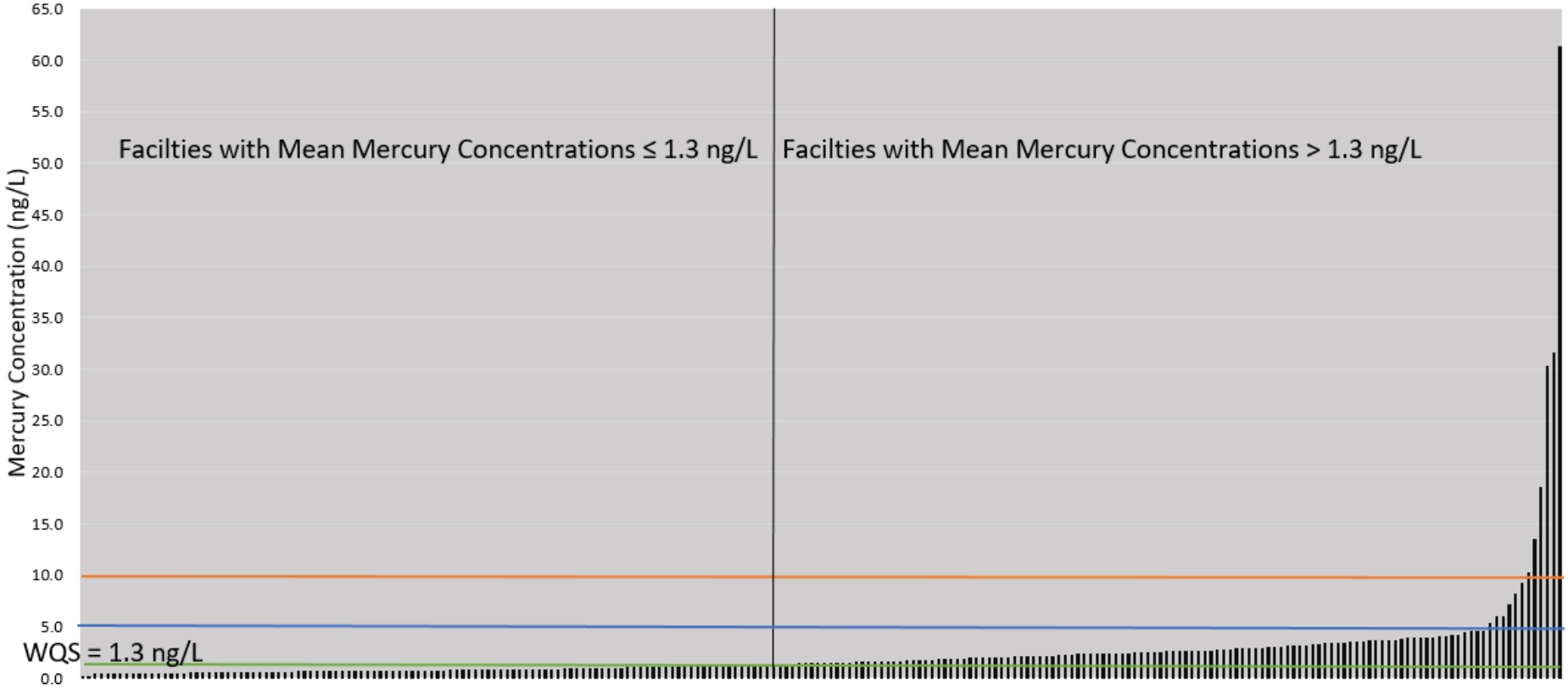

Figure 2: The bar graph shows long-term mean mercury effluent concentrations from August 2013 to July 2018 at NPDES permitted facilities. There are 103 facilities with long-term mean mercury effluent concentrations less than or equal to 1.3 ng/L and 129 facilities greater than 1.3 ng/L.

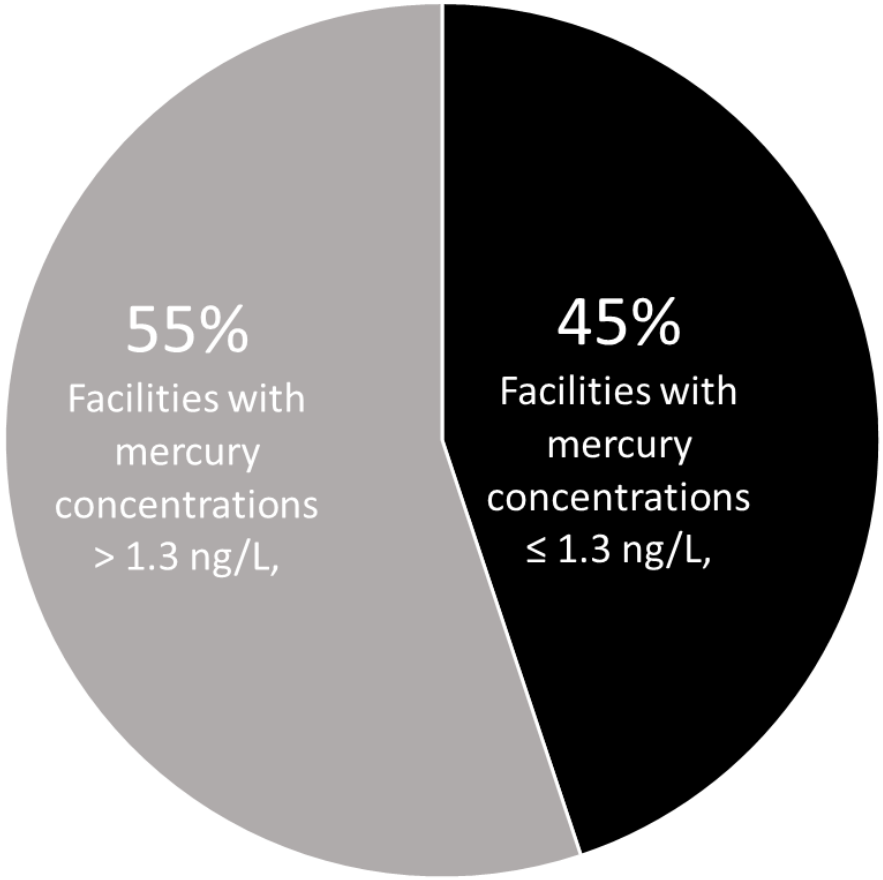

Figure 3: The pie graph shows the percentage of NPDES permitted facilities with long-term mean mercury effluent concentrations from August 2013 to July 2018. Of 232 facilities, 44.4% have long-term mean mercury effluent concentrations less than or equal to 1.3 ng/L and 55.6% are greater than 1.3 ng/L.

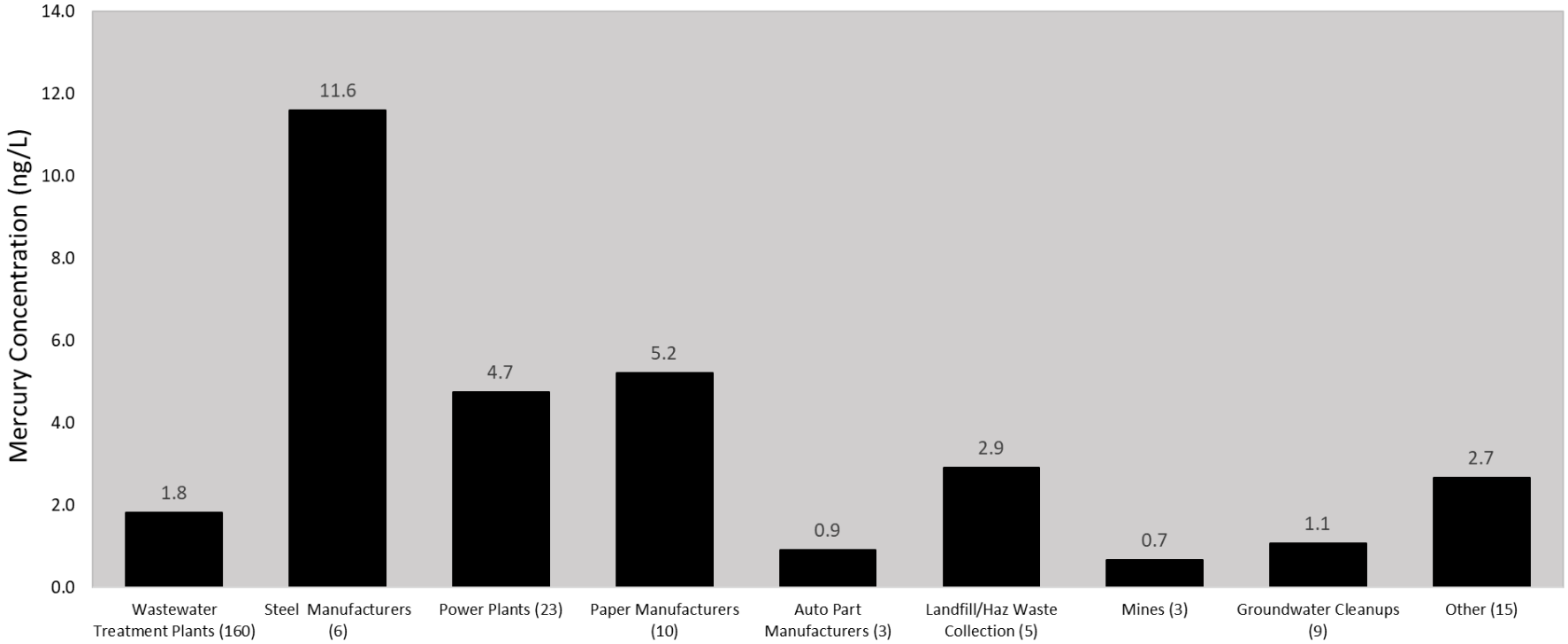

Figure 4: The bar graph shows long-term mean mercury effluent concentrations from August 2013 to July 2018 by sector. The sectors include WWTP, Steel Manufacturers, Power Plants, Paper Manufacturers, Auto Parts Manufactures, Landfill and Hazardous Water Collection, Mines, Groundwater Cleanups, Other Industrial Dischargers.

Overall, under the current variance, Michigan continues to see reductions in mercury discharges. The reduction of mercury in facility effluent data supports Michigan's approach to use pollution prevention, source control, and other waste minimization programs to move Michigan toward future compliance with the mercury WQS of 1.3 ng/L.

Date range	Facilities with mean effluent concentrations below 1.3 ng/L	Facilities with mean effluent concentrations below 5.0 ng/L
January 2005 to January 2009	19%	84%
July 2009 to April 2014	37%	91%
August 2013 to July 2018	45%	95%

While the NPDES program continues to make great efforts utilizing the MDV LCA limits, the non-attainment of the mercury standard in surface waters cannot be remedied by reductions in NPDES permits and requires reductions in air deposition of mercury.

As a result of the MDV and PMP requirements, Michigan NPDES facilities show an overall reduction in mercury concentrations and more facilities with long term effluent mercury concentration means approaching the WQS. The goal of the PMP is to maintain the effluent concentration of total mercury at or below 1.3 ng/l. The goal of 1.3 ng/L, developed to protect wildlife, will ensure this proposed MDV will not jeopardize the continued existence of endangered or threatened species listed under Section 4 of the Endangered Species Act. Template language used for including requirements for mercury in NPDES permits can be found in Attachment B.

Pollution Prevention and Reduction Efforts

A Michigan Statewide Mercury TMDL was approved by the USEPA in September 2018. The TMDL assumes that concentrations of mercury in the surface waters of the state will continue to decrease because of reductions in atmospheric mercury loads to Michigan waters, cleanup of legacy sources, voluntary activities, State and Federal regulatory activities, and the NPDES Program. Additional details on these reductions are included in the Michigan Statewide Mercury TMDL (MDEQ, 2018). EGLE is working with facilities and laboratories on increasing data accuracy and reporting with the Mercury Sampling and Reporting Guidance for NPDES Permit Compliance (Attachment C).

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Attachment A

R 323.1103 Variances.

Rule 103.

1) A variance may be granted from any water quality standard (WQS) that is the basis of a water quality-based effluent limitation in a national pollutant discharge elimination system (NPDES) permit, as restricted by the following provisions:

a) A WQS variance applies only to the permittee or permittees requesting the variance and only to the pollutant or pollutants specified in the variance. The variance does not modify the water quality standards for the water body as a whole.

b) A variance shall not apply to new dischargers unless the proposed discharge is necessary to alleviate an imminent and substantial danger to the public health or welfare.

c) A WQS variance shall not be granted that would likely jeopardize the continued existence of any endangered or threatened species listed under section 4 of the endangered species act or result in the destruction or adverse modification of the species' critical habitat.

d) A WQS variance shall not be granted if the standard in the receiving water will be attained by implementing the treatment technology requirements under the clean water act of 1972, as amended, 33 U.S.C.§§301(b) and 306, and by the discharger implementing cost-effective and reasonable best management practices for nonpoint sources over which the discharger has control within the vicinity of the facility.

e) The duration of a WQS variance shall not exceed the term of the NPDES permit. If the time frame of the variance is the same as the permit term, then the variance shall stay in effect until the permit is reissued or revoked.

2) A variance may be granted if the permittee demonstrates to the department that attaining the WQS is not feasible for any of the following reasons:

a) Naturally occurring pollutant concentrations prevent the attainment of the WQS.

b) Natural, ephemeral, intermittent, or low flow conditions or water levels prevent the attainment of the WQS.

c) Human-caused conditions or sources of pollution prevent the attainment of the WQS and cannot be remedied or more environmental damage would occur in correcting the conditions or sources of pollution than would occur by leaving the conditions or sources in place.

d) Dams, diversions, or other types of hydrologic modifications preclude the attainment of the WQS, and it is not feasible to restore the water body to its original condition or to operate the modification in a way that would result in the attainment of the WQS.

e) Physical conditions related to the natural features of the water body preclude attainment of WQS.

f) Controls more stringent than the treatment technology requirements in the clean water act of 1972, as amended, 33 U.S.C. §§301(b) and 306 would result in unreasonable economic effects on the discharger and affected communities.

3) In addition to the requirements of subrule (2) of this rule, a permittee shall do both of the following:

a) Show that the variance requested conforms to the antidegradation demonstration requirements of R 323.1098

b) Characterize the extent of any increased risk to human health and the environment associated with granting the variance compared with compliance with WQS without the variance in a way that enables the department to conclude that the increased risk is consistent with the protection of the public health, safety, and welfare.

4) A permittee may request a variance when a NPDES permit application is submitted or during permit development. A variance request may also be submitted with a request for a permit modification. The variance request to the department shall include the following information:

a) All relevant information which demonstrates that attaining the WQS is not feasible based on 1 or more of the conditions in subrule (2) of this rule.

b) All relevant information which demonstrates compliance with subrule (3) of this rule.

5) The variance request shall be available to the public for review during the public comment period on the draft NPDES permit. The preliminary decision regarding the variance shall be included in the public notice of the draft NPDES permit. The department will notify the other Great Lakes states of the preliminary variance decision.

6) If the department determines, based on the conditions of subrules (2) and (3) of this rule, that the variance request demonstrates that attaining the WQS is not feasible, then the department shall authorize the variance through issuance of the NPDES permit. The permit shall contain all conditions needed to implement the variance, including, at a minimum, all of the following conditions:

a) That compliance with an effluent limitation that, at the time the variance is granted, represents the level currently achievable by the permittee. For an existing discharge, the effluent limitation shall be no less stringent than that achieved under the previous permit.

b) That reasonable progress be made in effluent quality toward attaining the water quality standards. If the variance is approved for any BCC, a pollutant minimization program shall be conducted consistent with the provisions in paragraphs (i) through (iv) of R 323.1213(d). The department shall consider cost-effectiveness during the development and implementation of the pollutant minimization program.

c) That if the duration of a variance is shorter than the duration of a permit, then compliance with an effluent limitation that is sufficient to meet the underlying water quality standard shall be achieved when the variance expires.

7) The department shall deny a variance request through action on the NPDES permit if a permittee fails to make the demonstrations required under subrules (2) and (3) of this rule.

8) A variance may be renewed, subject to the requirements of subrules (1) through (7) of this rule. As part of any renewal application, a permittee shall again demonstrate

that attaining WQS is not feasible based on the requirements of subrules (2) and (3) of this rule. A permittee's application shall also contain information concerning the permittee's compliance with the conditions incorporated into the permittee's permit as part of the original variance pursuant to subrule (6) of this rule.

9) Notwithstanding the provision in subrule (1)(a) of this rule, the department may grant multiple discharger variances. If the department determines that a multiple discharger variance is necessary to address widespread WQS compliance issues, including the presence of ubiquitous pollutants or naturally high background levels of pollutants in a watershed, then the department may waive the variance demonstration requirements in subrules (2), (3), and (4) of this rule. A permittee that is included in the multiple discharger variance will be subject to the permit requirements of subrule (6) of this rule if it is determined under R 323.1211 that there is reasonable potential for the pollutant to exceed a permit limitation developed under to R 323.1209.

Attachment B

Michigan NPDES Mercury Permit Language

FOR FACILITIES THAT HAVE NEVER HAD A MERCURY PMP

Within 180 days of written notification by the Department or after the permittee notifies the Department that the final effluent concentration of total mercury has exceeded 5 ng/l, the permittee shall submit to the Department an approvable Pollutant Minimization Program for mercury designed to proceed toward the goal. (OR) On or before INSERT DATE, the permittee shall submit to the Department an approvable Pollutant Minimization Program for mercury designed to proceed toward the goal.

FOR FACILITIES WITH AN EXISTING LCA LIMIT AND MERCURY PMP

The permittee shall continue to implement the Pollutant Minimization Program and modifications thereto, to proceed toward the goal.

FOR ALL FACILITIES WITH MERCURY REQUIREMENTS

The Pollutant Minimization Program includes/shall include the following: a. an annual review and semi-annual monitoring of potential sources of mercury entering the wastewater collection system; b. a program for quarterly monitoring of influent and periodic monitoring of sludge for mercury; and c. implementation of reasonable cost-effective control measures when sources of mercury are discovered. Factors to be considered include significance of sources, economic considerations, and technical and treatability considerations.

On or before March 31 of each year following approval of the Pollutant Minimization Program, the permittee shall submit a status report for the previous calendar year to the Department that includes 1) the monitoring results for the previous year, 2) an updated list of potential mercury sources, and 3) a summary of all actions taken to reduce or eliminate identified sources of mercury.

Any information generated as a result of the Pollutant Minimization Program set forth in this permit may be used to support a request to modify the approved program or to demonstrate that the Pollutant Minimization Program requirement has been completed satisfactorily.

A request for modification of the approved program and supporting documentation shall be submitted in writing to the Department for review and approval. The Department may approve modifications to the approved program (approval of a program modification does not require a permit modification), including a reduction in the frequency of the requirements under items a. and b.

This permit may be modified in accordance with applicable laws and rules to include additional mercury conditions and/or limitations as necessary.

Attachment C

MERCURY SAMPLING AND REPORTING GUIDANCE

For National Pollutant Discharge Elimination System (NPDES) Permit Compliance

I. EXECUTIVE SUMMARY

The Water Resources Division (WRD) has determined that some contract labs were reporting analytical results to their clients (permitted facilities) that did not meet the quality control (QC) acceptance criteria for EPA Method 1631 Revision E (1631E) and EPA Method 1669. In order to ensure and verify that the reported mercury monitoring data is valid and acceptable, permittees with mercury monitoring in their NPDES permit will be required to provide the mercury QC data when they report their effluent data to us (on the daily sheets, also known as the Daily Discharge Monitoring Report [DMR]).

II. BACKGROUND

The WRD has identified a number of problems with how permittees and their contract labs collect, use, and report field duplicate, field blank, and trip blank data; much of which is inconsistent with the QC requirements of EPA Method 1631E and EPA Method 1669 as described in Title 40, Code of Federal Regulations, Part 136.

III. WHAT YOU NEED TO KNOW

1. EPA Method 1631E and EPA Method 1669 require that at least one field blank and at least one field duplicate be collected for each ten samples per sampling event at a given site.

a) A permittee collecting their **own** sample(s) needs to collect 1 field blank and 1 field duplicate (assuming they collect ten or less samples) **each date/time they collect a sample** regardless of the number of outfalls being collected at their facility/site.

b) A contract lab collecting mercury samples for multiple facilities/sites needs to collect one field blank and one field duplicate **at each facility/site** (assuming they collect ten or less samples at a single facility/site location).

2. A field duplicate is a second sample collected at the same time and place as the sample for QC purposes. The results of the field duplicate should be reported separately on the daily sheets and **NOT** averaged with the sample result for reporting purposes.

3. A field blank is reagent water that has been transported to the field and **treated as a sample in all respects**, including contact with the sampling devices and exposure to sampling site conditions, filtration, storage, preservation, and analytical procedures. The field blank is used to demonstrate that samples have not been contaminated by the sample collection and transport activities.

4. The Method 1631E acceptance criteria for field blanks is <0.5 ng/L or no greater than one-fifth (1/5) of the Hg in the associated sample(s), whichever is greater. If the field blank results exceed these criteria, the sample results cannot be reported for NPDES permit compliance purposes. We recommend that permittees take their mercury samples early in the month (or quarter if the permit only requires quarterly sampling) so they will have time to resample if the field blanks do not meet the Method 1631E acceptance criteria. A method blank is reagent water that is placed in a sample bottle in the lab and analyzed using reagents and procedures that are identical to those used to prepare and analyze the corresponding sample. The method blank is used to demonstrate that the analytical system is free of contamination. The Method 1631E acceptance criteria for method blanks is <0.5 ng/L. If the result for the method blank exceeds the acceptance criteria, the analytical system is out of control and the associated sample results cannot be reported. The laboratory must eliminate the contamination in the analytical system and reanalyze the samples. If the laboratory cannot reduce the contamination in the analytical system to acceptable levels before the DMR data must be submitted, the permittee should enter the code for analytical error on the DMR and contact their DEQ district office.

5. The results of the field blank, the field duplicate and method blank should be reported in the columns provided on the daily sheets (these columns will be available for the month of June 2014 forward).

6. A trip blank is reagent water with preservative that is placed in a bottle in the lab with a custody seal over the cap. The trip blank is transported to and from the sampling site with the sample and field blank bottles but is never opened or removed from its double zipper bags.

7. There is nothing in Method 1631E or Method 1669 that prohibits the use of trip blanks or any other type of blanks as additional QC measures, but they are **NOT** acceptable substitutes for field blanks and cannot be used for blank correction of sample results.

8. **Only** field blanks or method blanks may be used to report something lower than the actual sample analytical results (a blank correction). **Only one blank** (field or method) can be used for blank correction of a given sample result (not both), and only if they meet the acceptance criteria (see *Quality Control Guidance Information for the sampling and analysis of Low Level Mercury in Water following EPA Method 1631 Revision E August 2002*).

III. BLANK CORRECTION EXAMPLES

1. A permittee obtained the following analytical results: 12 ng/L in the sample and 10 ng/L in the corresponding field blank.

As stated above, acceptance criteria for field blanks is <0.5 ng/L or no greater than one-fifth (1/5) of the Hg in the associated sample(s), whichever is greater. In this example 1/5 of the sample value 1/5 X 12 ng/L is 2.4 ng/L. Since 2.4 ng/L (1/5 of the sample

value) is greater than 0.5 ng/L, the acceptance criteria for this sample is 1/5 of the sample value (2.4 ng/L). Because the field blank (10 ng/L) is greater than 1/5 of the Hg in the associated sample, the sample is invalid and may not be reported or otherwise used for regulatory compliance purposes. The permittee should resample to comply with NPDES permit monitoring requirements. The field blank result should be reported on the daily sheets, even though the sample result was invalid.

The permittee and/or lab should find the source of the field blank contamination and reduce it to acceptable levels before the next sampling event. The Method 1669 and Method 1631E guidance documents provide suggestions for reducing blank contamination. If the contamination cannot be reduced to this level, the permittee should retain a sampling team and/or lab capable of meeting acceptable QC requirements.

2. A permittee obtained the following analytical results: 5.6 ng/L in the sample, and 0.7 ng/L in the field blank.

Applying the same approach as above, first determine 1/5 of the Hg in the sample. 1/5 X 5.6 ng/L = 1.12 ng/L which is greater than 0.5 ng/L. Since the blank is ≤ 1/5 of the sample result, the sample result may be blank corrected and the result reported as 4.9 ng/L. The sample and field blank results should be reported on the daily sheets. Only the corrected sample result is reported on the DMR.

3. A permittee obtained the following analytical results: 1.5 ng/L in the sample and 0.4 ng/L in the field blank.

First determine 1/5 of the Hg in the sample. 1/5 X 1.5 ng/L = 0.3 ng/L. This is less than 0.5 ng/L. Since the blank is less than 0.5 ng/L the sample results may be blank corrected and reported as 1.1 ng/L. The sample and field blank results should be reported on the daily sheet. The corrected sample result is reported on the DMR.

4. A permittee got the following analytical results: 1.5 ng/L in the sample, 0.2 ng/L in the field blank and 0.4 ng/L in the method blank.

First determine 1/5 of the Hg in the sample. 1/5 X 1.5 ng/L = 0.3 ng/L. This is less than 0.5 ng/L. Since the blanks are less than 0.5 ng/L the sample results may be blank corrected using either the field blank result **or** the method blank result. I t is expected that most people would choose the larger correction and report the result as 1.1 ng/L. Both the sample and method blank results should be reported on the daily sheet. The corrected sample result is reported on the DMR.