DRAFT Multiple Discharger Variance for Mercury
Fiscal Years 2010-2014
August 17, 2009

Introduction

The Mercury Permitting Strategy (Strategy) developed by the Michigan Department of Environmental Quality (MDEQ), Water Bureau, in February 2000 and updated in May 2004, established multiple discharger variances (MDVs) for mercury consistent with Rule 103 (R 323.1103), Variances, of the Part 4 rules, Water Quality Standards (WQS), promulgated under Part 31, Water Resources Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA) (Attachment 1). Rule 103 allows for a variance from a WQS that is the basis for a water quality-based effluent limit (WQBEL) in a National Pollutant Discharge Elimination System (NPDES) permit where various conditions prevent the attainment of WQS. The MDEQ is reapplying for an MDV for mercury for NPDES permits issued in Fiscal Years (FYs) 2010-2014.

Background

The need for a mercury variance became apparent when it was determined that the majority of ambient waters sampled for mercury, as well as most NPDES permitted discharges, were shown, through the implementation of a lower quantification level in 1999, to exceed the mercury WQS of 1.3 nanograms per liter (ng/L). The WQS of 1.3 ng/L, developed to protect wildlife, also ensures protection of human health and aquatic life. To address potential widespread noncompliance with the mercury WQS in NPDES permits, a mercury permitting strategy, including an MDV consistent with the requirements of the variance rule, R 323.1103(9), was developed.

Establishment of an MDV requires inclusion in the NPDES permit of an effluent limitation that represents a level currently achievable (LCA) by the permittee, consistent with R 323.1103(6), and implementation of a Pollutant Minimization Program (PMP) that furthers efforts to meet the mercury WQS of 1.3 ng/L. The February 2000 Strategy, effective through FY 2003, included a statewide LCA of 30 ng/L, based primarily on effluent data from the state of Maine. The May 2004 Strategy lowered the statewide LCA to 10 ng/L as it was determined that mercury concentrations in most Michigan NPDES permitted discharges were significantly less than 30 ng/L. As a result of a 2007 lawsuit, filed by the National Wildlife Federation on behalf of the Lone Tree Council, questioning the legality of the statewide 10 ng/L LCA, the MDEQ established a procedure for developing discharge-specific LCAs to be included in NPDES permits effective October 1, 2008, and phased out the statewide LCA.

The MDEQ is applying for a mercury variance for FYs 2010-2014. The goal is to continue to move NPDES permitted discharges towards meeting the mercury WQS of 1.3 ng/L. Current effluent data indicate that most point source discharges and many ambient waters do not meet the mercury WQS. The MDV will further the goal of attaining the mercury WQS through a discharge-specific LCA and continued implementation of PMPs.

The MDV was announced in the August 17, August 31, and September 14, 2009, MDEQ Calendars and was available on the MDEQ Web site for public comment. Notice that the MDV would be available for comment was mailed to all NPDES permittees with mercury limits and/or monitoring requirements, the parties to the lawsuit, stakeholder groups, and the other Great Lakes states' environmental agencies on August 12, 2009.

Overview of Point Source and Environmental Data for Mercury

There are at least 191 NPDES permits that contain mercury limits and/or low-level monitoring requirements. Low-level mercury analyses continue to indicate that the level of mercury in most point source discharges can be expected to routinely exceed the WQS of 1.3 ng/L. Data obtained from compliance monitoring for point source discharges indicate that 153 out of 191 facilities with mercury limits or monitoring requirements have arithmetic mean mercury concentrations that exceed the WQS of 1.3 ng/L (Figures 1 and 2). Figure 3 presents average mercury concentrations according to the following sectors: Wastewater Treatment Plants (WWTPs); electric power plants; paper mills; and industry and other sources.

Mercury concentrations were measured at six locations in three Great Lakes connecting channels (the Detroit, St. Clair, and St. Marys Rivers) from 2003-2007 (Roush, personal communication). Concentrations were measured at the head and mouth of each channel. Upstream and downstream geometric mean total mercury concentrations in the St. Marys and St. Clair Rivers were below WQS, at 0.34 and 0.39 ng/L, and 0.33 and 0.43 ng/L, respectively. Geometric mean concentrations in the Detroit River exceeded WQS with upstream and downstream concentrations of 3.1 and 1.9 ng/L, respectively.

Low-level mercury results from 60 Great Lakes tributary stations from 2003-2007 indicate that many Michigan inland waters exceed the WQS of 1.3 ng/L. Data range from less than the quantification level (i.e., < 0.5 ng/L) to 45.1 ng/L (Roush, personal communication). The number of samples for each station ranged from 4 to 60, with a median of 18. The geometric mean of total mercury data collected from 2003-2007 was calculated for each station. Results ranged 0.31-4.93 ng/L across all years, with the total mercury geometric mean exceeding the WQS at 37 of the 60 stations. Note that not all stations were sampled in every year. A trend analysis of mercury from 13 tributary sites during the period 1998-2005 showed an increase in mercury concentrations in 1 water body (Ontonagon River). No trends, either increasing or decreasing, were identified in the other 12 water bodies (Aiello, 2008).

Data collected from open water stations of Saginaw Bay and Grand Traverse Bay indicate these water bodies typically meet WQS for total mercury. The geometric mean calculated in Saginaw Bay was 0.51 ng/L (n=134), while the geometric mean in Grand Traverse Bay was 0.18 ng/L (n=16). No sampling in the time period 2003-2007 resulted in a mercury concentration greater than 0.34 ng/L in Grand Traverse Bay. In Saginaw Bay, mercury concentrations exceeded the WQS in only 8 of 134 samples (Roush, personal communication).

The MDEQ began a random, or probabilistic, study for water chemistry monitoring in 2005 to gain the ability to determine statewide attainment status with WQS and trends in water quality. This project includes 250 sites to be monitored over a 5-year period, resulting in sampling at 50 different sites per year. In the time period of 2005-2007, 149 of the 250 sites were sampled. Although a technical report is not yet available, preliminary analysis of sample results for mercury indicate a range from <0.5 ng/L to 37 ng/L across all years. The number of samples for each station ranged from 1 to 8. The geometric mean of total mercury data collected from 2005-2007 was calculated at each station and the WQS was exceeded at 68 of the 149 stations. Note that not all stations were sampled in every year.

Analysis of fish tissue data for fish collected primarily in 2006 and 2007 indicate mercury was quantified in every sample analyzed (Bohr and VanDusen, 2009). The highest concentrations were found in top predator species from inland lakes and impoundments.

Mercury concentrations were greater than or equal to the “restrict consumption” trigger level in 89 of 665 (13%) samples from 22 of 37 (59%) locations. A “restrict consumption” advisory is issued by the Michigan Department of Community Health for mercury fish tissue levels exceeding a 0.5 parts per million trigger level.

Fish tissue data indicate increasing trend in mercury concentrations in fish from the Great Lakes and connecting channels. While significant trends have been detected in only 9 of 19 of the Great Lakes datasets, 8 of the 9 trends indicate mercury concentrations are increasing. No discernible trends have been detected in fish from inland waters. A detailed discussion of the specifics of this analysis is included in Michigan’s Fish Contaminant Monitoring 2008 Annual Report (Bohr and VanDusen, 2009).

Michigan has a statewide fish consumption advisory, which was first issued by the Michigan Department of Community Health in 1988. The advisory applies to certain predator 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.

Wildlife data indicate an increasing trend in mercury concentrations in nesting bald eagles in Michigan from 1999-2003 and from 2004-2008. These increasing trends were observed for eagles nesting in inland and Great Lakes territories. The differences in mercury concentrations between these two time periods were statistically significant for Great Lakes birds and for birds nesting in inland territories in the Upper Peninsula (Wierda, 2009).

Basis for Variance

Rule 103(9) provides the conditions under which an MDV may be granted. Specifically, an MDV may be granted due to widespread WQS compliance issues, including the presence of ubiquitous pollutants or naturally high background levels of pollutant in a watershed.

Due to ubiquitous mercury concentrations in many of Michigan’s inland surface waters at levels exceeding WQS, as described above, many facilities will not be able to comply with the mercury WQS in a cost-effective manner. Michigan has concluded that, in general, end-of-pipe treatment for mercury is not the most cost-effective method to reduce mercury loadings to achieve WQS. Michigan supports the United States Environmental Protection Agency’s position that pollution prevention and waste minimization programs for mercury should be the first steps in restoring water quality before considering extraordinary treatment alternatives. R 323.1201 of the Part 8 Rules, WQBEL Development for Toxic Substances, of the NREPA, describes Michigan’s commitment to the use of pollution prevention, source control, and other waste minimization programs to achieve compliance with low WQBELs. As such, each NPDES permit that includes a variance for mercury contains a requirement to develop and implement a PMP for mercury.

Michigan has reviewed the available information regarding end-of-pipe treatment for mercury, including the effectiveness of the treatment and associated costs. Most of this information was contained in Ohio’s 1997 assessment of economic impacts for mercury treatment strategies (Ohio EPA, 1997). The Ohio analysis is applicable to Michigan since the analysis is treatment-specific, not state-specific. 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. A similar conclusion has been reached by the MDEQ, that end-of-pipe controls to meet the mercury WQS would cause substantial and widespread economic impact without guaranteeing removal sufficient to achieve the mercury WQS. The

MDEQ Mercury Strategy Workgroup Report (MDEQ, 2008) includes a discussion of mercury removal from municipal WWTP effluent, and current practices and technologies available for separation of mercury-containing dental amalgam from sanitary wastewater. A review of this discussion supports the Ohio analysis.

Conformance with Michigan's Antidegradation Requirements

Michigan Rule 98 (R 323.1098), 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 surface waters of the state and for which independent regulatory authority exists requiring compliance with WQS.

The variance rule, Rule 103, 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, a new discharger will be not be eligible for an MDV.

With regards to increased discharges of mercury, Rule 98(2) 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. Rules 98(8) and 98(9) describe actions that are not considered a lowering of water quality. A permittee with an MDV requesting an increased discharge of mercury that meets the requirements of Rules 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 R 323.1103((6)(a)). A permittee without an MDV requesting an increased discharge of mercury that meets the requirements of Rules 98(8) or 98(9) may apply for an individual variance.

Implementation of the MDV for Mercury

WQBELs for mercury are developed following provisions contained within the Part 8 rules. In summary, for each discharge for which mercury data is provided, a statistical analysis is conducted to determine if there is reasonable potential for the proposed discharge concentration to exceed WQS. If reasonable potential exists, and the facility is eligible for an MDV, a facility-specific LCA will be established in the permit as the WQBEL along with a requirement to develop a PMP per R 323.1103(6)(b). In addition, the permit will clearly state that the goal of the PMP is to maintain the effluent concentration of total mercury at or below the WQS of 1.3 ng/L.

The use of the MDV for mercury will not result in an increase of mercury levels in point source discharges. The LCA is a value that closely approximates current discharge concentrations, and Rule 103(6)(a) does not allow for discharge of a greater concentration than that achieved under a previous permit. In addition, implementation of an effective PMP will ensure that permittees move towards mercury source elimination. Finally, the PMP includes a goal to meet the WQS of 1.3 ng/L. The goal of 1.3 ng/L, which is based on the protection of wildlife in Michigan, 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.

References

Aiello, C., 2008. Michigan Water Chemistry Monitoring - Great Lakes Tributaries 1998-2005 Report. Michigan Department of Environmental Quality. MI/DEQ/WB-08/014.

Bohr, J. and J. VanDusen. 2009. Michigan Fish Contaminant Monitoring 2008 Annual Report. MI/DEQ/WB-09/044.

MDEQ. 2008. MDEQ Mercury Strategy Workgroup Report. MDEQ's Current Status and Recommended Future Activities Toward the Goal of Eliminating Anthropogenic Mercury Use and Releases in Michigan.

Ohio EPA. 1997. Assessing the Economic Impacts of the Proposed Ohio EPA Water Rules on the Ohio Economy.

Roush, D. 2009. Personal Communication.

Wierda, M.W. 2009. Using Bald Eagles to Track Spatial and Temporal Trends of Contaminants in Michigan's Aquatic Systems. Unpublished. Ph.D. Dissertation. Clemson University. Clemson, South Carolina.

Figure 1. Arithmetic Mean Effluent Mercury Concentration for NPDES Permitted Facilities
(January 2004 - June 2009)

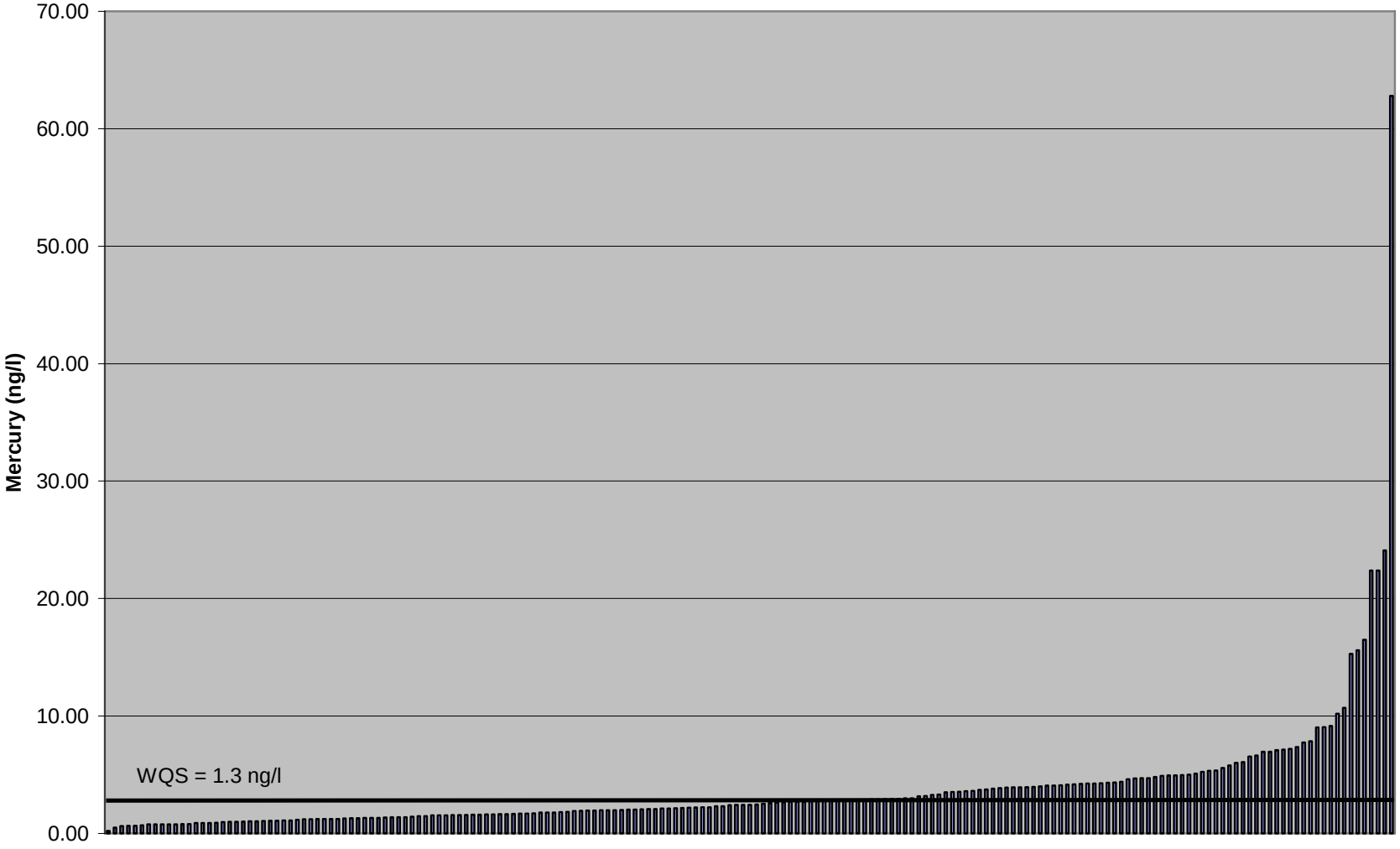


Figure 2. Comparison of NPDES Facilities Exceeding the Mercury Water Quality Standard

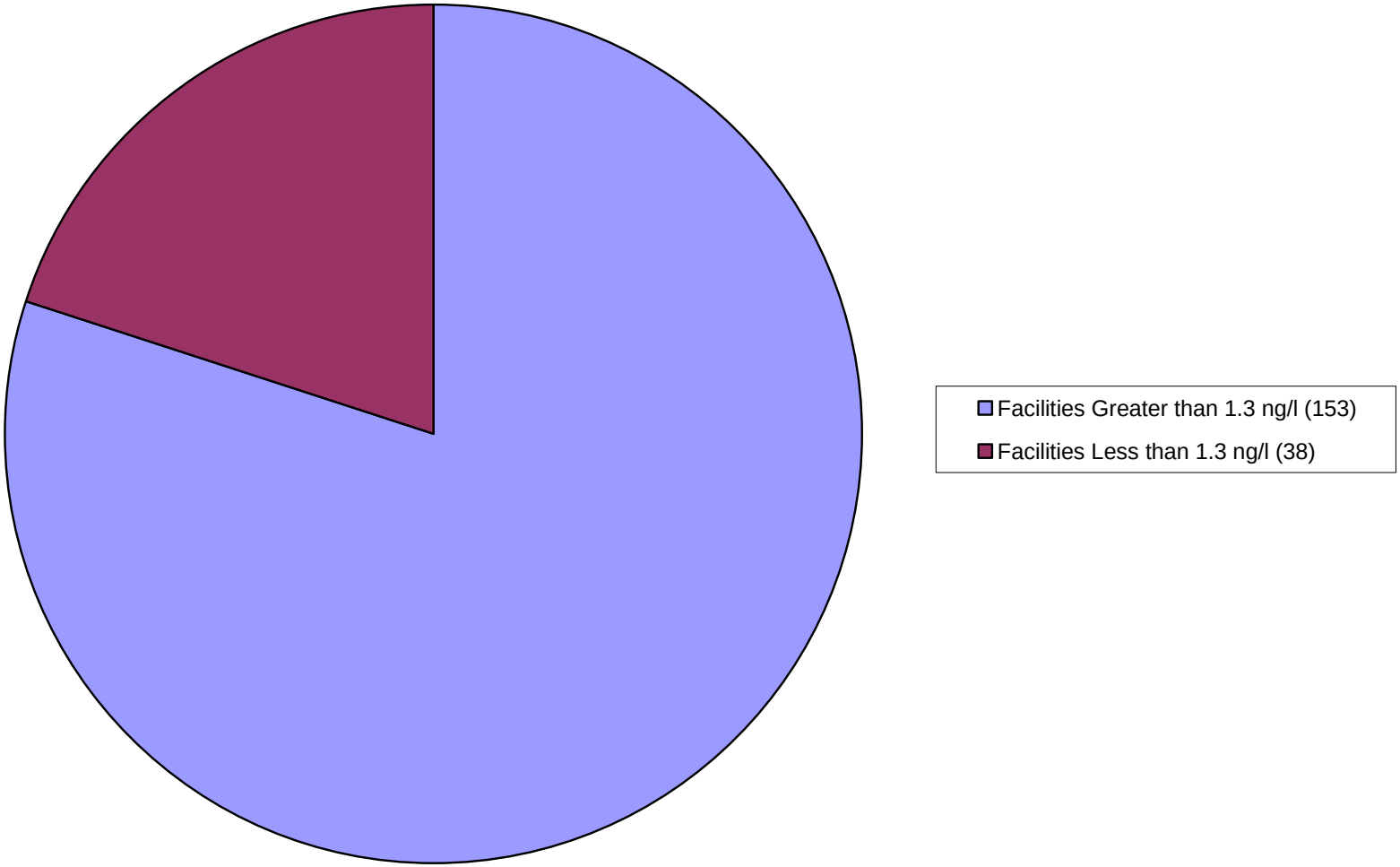
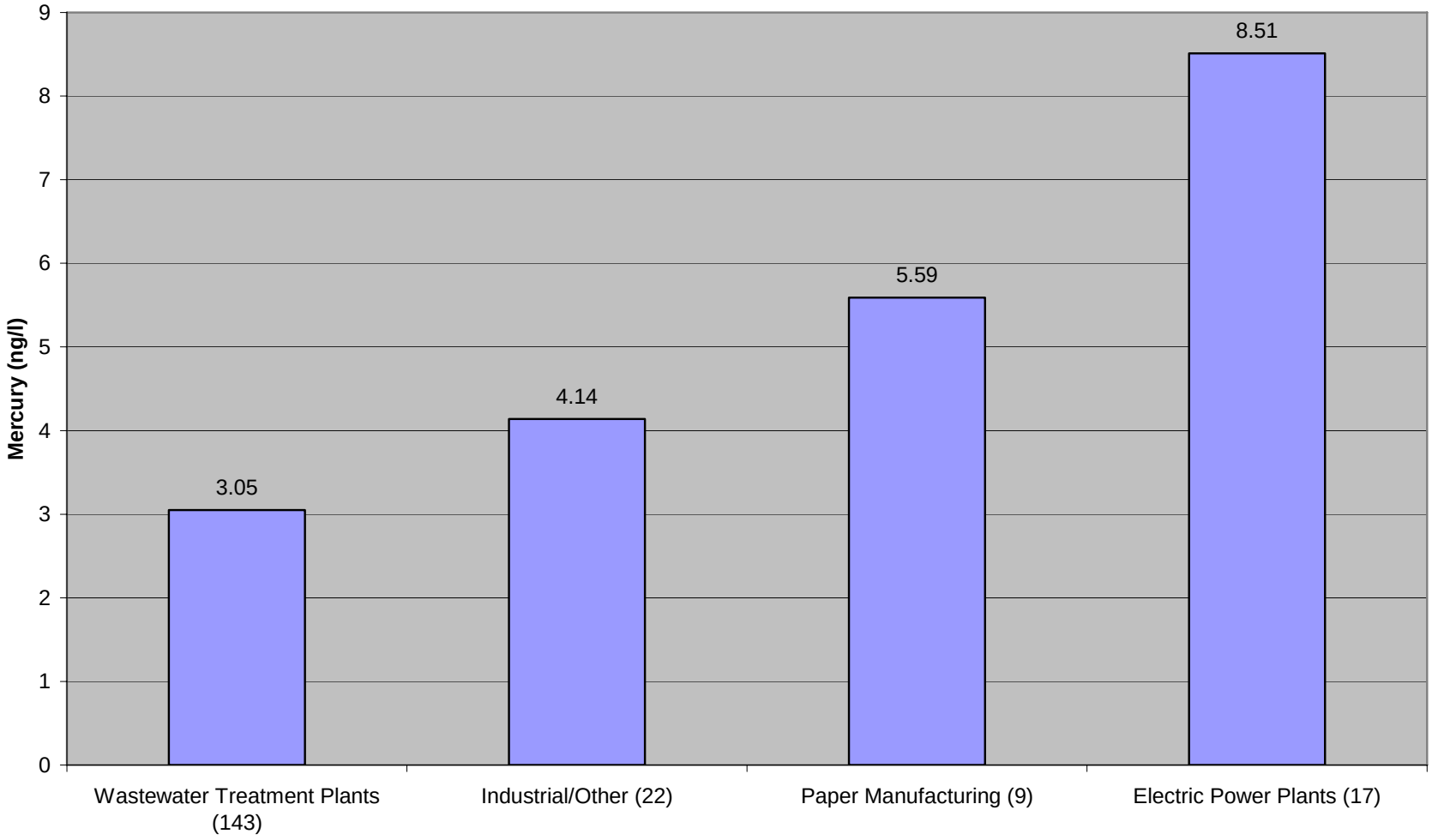


Figure 3. Average Mercury Concentrations by Sector
(January 2004 - June 2009)



Attachment 1

Michigan Water Quality Standards R 323.1103 – Variances

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.

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