



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029
1/27/2004

Dr. Richard Eskin, Director
Technical and Regulatory Services Administration
Maryland Department of the Environment
1800 Washington Boulevard, Suite 540
Baltimore, Maryland 21230-1718

Dear Dr. Eskin:

The Environmental Protection Agency (EPA) Region III is pleased to approve the report, "Total Maximum Daily Load [TMDL] of Mercury for Tuckahoe Lake, Caroline County, Maryland." The TMDL report was submitted to EPA for final review on December 31, 2002. The TMDL was established and submitted in accordance with Section 303(d)(1)(c) and (2) of the Clean Water Act to address impairments of water quality as identified in Maryland's Section 303(d) list. Tuckahoe Creek is a part of the Choptank River watershed and was first identified on Maryland's 1996 Section 303(d) list for nutrients and suspended sediments. Tuckahoe Creek was additionally listed on Maryland's 2002 Section 303(d) list for biological impairments and methylmercury in fish tissue. The TMDLs described in this document were developed to address localized water quality impairments identified within the watershed, specifically mercury stressors in Tuckahoe Lake (an impoundment of Tuckahoe Creek). The suspended sediment, nutrient and biological impairments in the Tuckahoe Creek watershed will be addressed by Maryland in a separate document.

The TMDL analysis identifies the current loading, relates the current loading to the applicable water quality standard, and identifies the necessary reductions for a total maximum daily load that will achieve the applicable water quality standard. It also identifies individual waste load and load allocations to the maximum extent supported by the available data. As you know, EPA has undertaken efforts to revise and refine the analysis contained in the Liberty Reservoir mercury TMDL report, which was among the nine mercury TMDLs submitted to EPA in December 2002. We expect that this analysis will enable us to verify some of the assumptions used in the original TMDL computations, specifically with respect to source identification and air deposition to the water shed, to evaluate the impacts of local mercury air sources, and to provide rationale to support the reasonable assurance of TMDL implementation. Further, we expect that MDE will use the new information gained from this analysis, in conjunction with any new research information (e.g., mercury chemistry, fate and transport, bioaccumulation patterns, watershed pass-through, fish consumption studies, etc.), to refine and update the Tuckahoe Lake TMDL in the future. We look forward to continued work with MDE in these efforts. EPA's approval of the Tuckahoe Lake TMDL, which was based on readily available information at the time, will allow the Agencies more flexibility in addressing Maryland's mercury-impaired waters in the future.



In accordance with Federal regulations at 40 CFR §130.7, a TMDL must comply with the following requirements: (1) designed to attain and maintain the applicable water quality standards, (2) include a total allowable loading and as appropriate, wasteload allocations (WLAs) for point sources and load allocations for nonpoint sources, (3) consider the impacts of background pollutant contributions, (4) take critical stream conditions into account (the conditions when water quality is most likely to be violated), (5) consider seasonal variations, (6) include a margin of safety (which accounts for uncertainties in the relationship between pollutant loads and in-stream water quality), (7) consider reasonable assurance that the TMDL can be met, and (8) be subject to public participation. The enclosure to this letter describes how the mercury TMDL for Tuckahoe Lake satisfies each of these requirements.

Following the approval of this TMDL, Maryland shall incorporate the TMDL into the Water Quality Management Plan pursuant to 40 CFR § 130.7(d)(2). As you know, all new or revised National Pollutant Discharge Elimination System permits must be consistent with the TMDL Waste Load Allocation pursuant to 40 CFR §122.44 (d)(1)(vii)(B). Please submit all such permits to EPA for review as per EPA's letter dated October 1, 1998.

If you have any questions or comments concerning this letter, please don't hesitate to contact Ms. Susan Sciarratta at (215) 814-5733.

Sincerely,

/S/

Jon M. Capacasa, Director
Water Protection Division

Enclosure

cc: Jim George, MDE-TARSA
Thomas Snyder, Director, MDE Air Management Administration (letter only)



Decision Rationale

Total Maximum Daily Load of Mercury for Tuckahoe Lake, Caroline County, Maryland

I. Introduction

The Clean Water Act (CWA) requires a Total Maximum Daily Load (TMDL) to be developed for those water bodies identified as impaired by the state where technology-based and other controls will not provide for attainment of water quality standards. A TMDL is a determination of the amount of a pollutant from point, nonpoint, and natural background sources, including a margin of safety, that may be discharged to a water quality-limited water body.

This document sets forth the United States Environmental Protection Agency's (USEPA's) rationale for approving the TMDL for mercury in the Tuckahoe Lake watershed. EPA is approving this TMDL because the TMDL provides reliable information as to the current load, the relationship of the current load to the applicable water quality standard, the reductions necessary for a total maximum daily load that will achieve the applicable water quality standard, a breakdown of wasteload and load allocations to the maximum extent supported by the available data, and other information that satisfies the requirements of 40 C.F.R.. Part 130. It is EPA's understanding that the TMDL was developed using the best available information at the time, and with the expectation that additional information will become available to enable Maryland to refine its analysis in the future. Examples of this information include: atmospheric deposition modeling, additional monitoring data, local fish consumption surveys, and environmental chemistry information for mercury. EPA is approving this TMDL at this time with the understanding that this future information will be used to verify the assumptions used in the initial TMDL analysis, particularly with respect to source identification and the rate of air deposition to the watershed. It is EPA's expectation that additional information and a more refined analysis will lead to a more targeted and effective selection of implementation measures and followup monitoring for this TMDL.

The TMDL was established to address the impairment of water quality, caused by mercury, as identified in Maryland's 2002 Section 303(d) list for water quality-limited segments. The Maryland Department of the Environment (MDE) submitted the report, "Total Maximum Daily Load of Mercury for Tuckahoe Lake, Caroline County, Maryland," dated December 27, 2002, to USEPA for final review on December 31, 2002. This TMDL addresses one segment, Tuckahoe Creek (Impoundment), on Maryland's Section 303(d) list. The other identified impairments to Tuckahoe Creek: biological, sediments, and nutrients, will be addressed separately by MDE in future TMDLs.

USEPA's rationale is based on the TMDL Report, information contained in the Appendices to the report, and the Comment Response Document. USEPA's review determined

that the TMDL meets the following eight regulatory requirements pursuant to 40 CFR Part 130.

- 1) The TMDLs are designed to implement applicable water quality standards.
- 2) The TMDLs include a total allowable load as well as individual waste load allocations and load allocations.
- 3) The TMDLs consider the impacts of background pollutant contributions.
- 4) The TMDLs consider the critical environmental conditions.
- 5) The TMDLs consider seasonal environmental variations.
- 6) The TMDLs include a margin of safety.
- 7) There is reasonable assurance that the TMDLs can be met.
- 8) The TMDLs have been subject to public participation.

Table 1 summarizes the TMDL for Tuckahoe Lake as determined by MDE. The major allocation of the total load to the Load Allocation category indicates that nonpoint sources are dominant. In this case, the source of mercury to the watershed is considered to be atmospheric deposition. There are no point sources in the Tuckahoe Lake watershed. Thus, the portion of the total load attributed to the Future Allocation reflects a reserved load in the event that additional information indicates that it is necessary to provide an explicit allocation to point sources in the future.

Table 1 - Tuckahoe Lake Mercury TMDL Summary

Parameter	Rate	TMDL	Wasteload Allocation (WLA)	Load Allocation (LA)	Future Allocation	Margin Of Safety (MOS)
Mercury	g/yr	212.2	0.0	205.8	6.4	Implicit
	g/day ¹	0.58	0.0	0.56	0.018	Implicit

^{1,2} Although the expression of the TMDL as an annual mass loading rate is acceptable, for consistency, EPA has derived daily mass loadings by dividing the annual loadings by 365.

The TMDL is a written plan and analysis established to ensure that a waterbody will attain and maintain water quality standards. The TMDL is a scientifically-based strategy which considers current and foreseeable conditions, the best available data, and accounts for uncertainty with the inclusion of a “margin of safety” (MOS) value. Conditions, available data, and the understanding of the natural processes can change more than what was anticipated by the MOS. The option is always available to refine the TMDLs for re-submittal to USEPA for approval. Moreover, EPA expects this TMDL to be refined using additional information as it becomes available.

II. Summary

Tuckahoe Lake is an impoundment on Tuckahoe Creek (02-13-04-05), which lies in the Choptank River watershed. The impoundment is owned by the Maryland Department of Natural Resources and was created in 1975 for recreational purposes. Tuckahoe Lake lies within

Tuckahoe State Park. Inflow to the Lake is primarily via Tuckahoe Creek. The Tuckahoe Lake watershed land use is largely agricultural with significant amounts of forest / herbaceous and some developed land. There are no point sources in the watershed. The dominant source of mercury inputs to Tuckahoe Lake stem from atmospheric deposition of mercury to the Lake and its watershed from industrial sources. In Maryland, the primary source of mercury air emissions is power plants, followed by municipal waste combustors, medical waste incinerators, Portland Cement plants, and other industries. Additional information about Tuckahoe Lake and the watershed is included in Section 2.1 of the TMDL Report. Figures 1 through 3 of the TMDL report show the location of Tuckahoe Lake and land uses in the watershed.

Tuckahoe Lake was listed in Maryland's 2002 Section 303(d) list for water quality-limited segments (WQLS) as being impaired by mercury.¹ Maryland Department of Natural Resources and the University of Maryland Center for Environmental Sciences collected fish tissue and water column samples in 2000 and 2001, respectively. The fish tissue was analyzed for total and methylmercury, and the water samples were analyzed for total and dissolved mercury and methylmercury. Methylmercury is the bioaccumulative form of mercury and drives the associated health risks to humans and wildlife via the aquatic food chain.

The water quality impairments of Tuckahoe Lake consist of a violation of Maryland's general narrative standard applicable to the designated use of the water in Maryland's regulations. Maryland currently has numeric water quality criteria for mercury that address aquatic life impacts and drinking water consumption, but these criteria are not in exceedance.² The Surface Water Use Designation for Tuckahoe Lake is Use I: *water contact recreation and protection of aquatic life*. Under the Code of Maryland Regulations (COMAR), "all waters of this State shall, wherever attainable, be protected for the basic uses of water contact recreation, fishing, protection of aquatic life and wildlife, and agricultural and industrial water supply." Maryland currently has a statewide advisory for the consumption of fish due to mercury. The concentration of mercury in fish from Tuckahoe Lake is greater than the concentration considered by Maryland to be acceptable for the general population to consume at least four meals per month of any single common recreational fish species (i.e., a threshold value of 235 ug/kg of methylmercury in fish tissue). Thus, Maryland interprets this as not fully supporting the designated use of "fishing" and thus is a violation of the narrative water quality standard. This approach is consistent with EPA's guidance on making impairment determinations using data from fish advisories. Although Tuckahoe Lake is not designated for use as a drinking water source, it is worth noting that the water column concentrations of mercury are well below the levels of concern for drinking water.

¹ The TMDL Report for Tuckahoe Lake was intended to address only the mercury impairment in the Tuckahoe Lake watershed; Maryland will address the other impairments to Tuckahoe Lake and the other portions of the Patapsco River at a later date.

² Maryland is currently proposing a mercury/methylmercury criterion to protect accumulation in fish to levels that require fish consumption advisories.

The Clean Water Act (CWA) Section 303(d) and its implementing regulations require that TMDLs be developed for waterbodies identified as impaired by the state where technology-based and other required controls do not provide for attainment of the water quality standards. The TMDL submitted by MDE is designed to attain acceptable loadings of mercury into the reservoir in order to attain the narrative water quality criteria and support the Use I designation. Refer to Table 1 above for a summary of allowable loads.

III. Discussion of Regulatory Conditions

USEPA finds that MDE has provided sufficient information to meet all of the eight basic requirements for establishing a mercury TMDL for Tuckahoe Lake using the information available at the time. However, USEPA believes that additional information will become available in the future to enable a refined TMDL analysis. USEPA therefore approves this TMDL for mercury in Tuckahoe Lake with the expectation that the TMDL will be refined in the future using additional information as it becomes available. This approval is outlined below according to the eight regulatory requirements, with qualifications as appropriate.

1) *The TMDLs are designed to implement applicable water quality standards*

Water Quality Standards consist of three components: designated and existing uses; narrative and/or numerical water quality criteria necessary to support those uses; and an anti-degradation statement. Maryland does not currently have a numeric water quality criterion for mercury/methylmercury that would address accumulation in fish below levels that require fish consumption advisories. Maryland does have a general narrative standard, however, and levels of mercury in the water column in Tuckahoe Lake have led to violations of this standard. The bioaccumulation of mercury in the aquatic food chain and consequent risk to human health drives the determination of not fully supporting the designated use of fishing. The overall objective of the TMDL is to reduce mercury loadings in order to meet the narrative water quality standards that support the Use I designation.

Maryland interprets the “fishing” use as the ability for the general population to eat at least four meals per month of any single common recreational fish from the given waterbody. The upper threshold for fish tissue is 235 ug/kg methylmercury. This number was derived from a human health risk assessment, the details of which are presented in Appendix E of the Tuckahoe Lake TMDL Report. Additional discussion regarding Maryland’s methodology for determining designated use impairments based on fish tissue is presented in Appendix B of the TMDL report. Maryland then translates the fish tissue endpoint into an allowable water column concentration using the bioaccumulation factor, the details of which are presented in Section 4.3.2 of the TMDL report. EPA believes that this fish tissue endpoint is a reasonable and appropriate water quality goal and is consistent with Maryland’s water quality standards.

- 2) *The TMDLs include a total allowable load as well as individual waste load allocations and load allocations.*

Total Allowable Load

As described above, MDE used a fish tissue endpoint in order to determine a maximum allowable ambient water column concentration (AAWCC) of total mercury. This is achieved by incorporating a site-specific bioaccumulation factor for mercury, which is based upon the relationship between water column and fish tissue concentrations of mercury. Maryland uses the existing water column concentration and flow in order to determine the current load, which is considered equal to the sum of individual loads due to direct atmospheric deposition, point source contribution (if any), and watershed runoff. These individual loads are determined using a mass balance approach, as described in detail in Appendix I of the TMDL Report. The mass balance approach enables the calculation of the individual loads that would be necessary to produce the observed or future water column concentration. The AAWCC, which is corrected to total mercury from dissolved mercury, is then used to calculate the TMDL allowable load. The load contributions from direct atmospheric deposition and watershed runoff are adjusted downwards by the same relative proportion until the target load is achieved.

USEPA regulations at 40 CFR 130.2(i) state that the total allowable load shall be the sum of individual waste load allocations for point sources, load allocations for nonpoint sources, and natural background concentrations. The TMDL for mercury for Tuckahoe Lake is consistent with 40 CFR 130.2(i) because the total load provided by MDE equals the sum of the wasteload allocations for point sources and the land-based load allocations for nonpoint sources. Pursuant to 40 CFR 130.6 and 130.7(d)(2), this TMDL and supporting documentation should be incorporated into Maryland's current water quality management plan. See Table 1 for a summary of allowable loads.

Waste Load Allocations

The watershed that drains to Tuckahoe Lake contains no point sources and therefore, the TMDL provides a waste load allocation of zero. Maryland did, however, provide a future allocation in the TMDL to account for any potential future point source allocation. The future allocation comprises 3% of the TMDL. EPA concurs with Maryland's approach to establish a future allocation given the lack of information about potential existing and future point sources.

Load Allocations

Maryland provided adequate land use and loading data in the TMDL report, but did not distribute the total load allocation to specific land use or air source categories in the TMDL report. Maryland included a load allocation in the TMDL. This gross load allocation is presented in Table 1. Nonpoint source loading rates represent a cumulative impact from all sources,

including naturally occurring and human-induced sources. The TMDL analysis does distinguish loadings from direct air deposition to the reservoir (1.4% of the TMDL or 0.0082 g/day) from nonpoint source loadings due to watershed runoff (95.6% of the TMDL or 0.5556 g/day). Much of the watershed contribution is derived from atmospheric deposition of mercury to the watershed.

According to Federal regulations at 40 CFR 130.2(g), load allocations are best estimates of the loading, which may range from reasonably accurate estimates to gross allotments, depending on the availability of data and appropriate techniques for predicting the loading. Wherever possible, natural and nonpoint source loadings should be distinguished.

Allocations Scenarios

The TMDL calls for an overall 40.5% reduction in mercury loading to Tuckahoe Lake. This reduction assumes a linear relationship between loading and fish tissue concentration. This is a reasonable assumption given the uncertainty about the relationship between loading rates, water column concentrations, and bioaccumulation factors; further, recent research suggests that this relationship varies widely even among similar waterbodies.³ USEPA realizes that the TMDL breakouts of the total loads for mercury to a direct air deposition load, nonpoint source load from the watershed, and future allocation is one allocation scenario. As refinement of this TMDL and implementation of the TMDL proceeds, Maryland may find that other combinations of allocations are more feasible and/or cost effective. However, any subsequent changes in the TMDLs must conform to gross waste load and load allocations and must ensure that the biological, chemical, and physical integrity of the waterbody is preserved.

Federal regulations at 40 CFR 122.44(d)(1)(vii)(B) require that, for an NPDES permit for an individual point source, the effluent limitations must be consistent with the assumptions and requirements of any available wasteload allocation for the discharge prepared by the state and approved by USEPA. USEPA has authority to object to the issuance of an NPDES permit that is inconsistent with wasteload allocations established for that point source. To ensure consistency with these TMDLs, if an NPDES permit is issued for a point source that discharges one or more of the pollutants of concern in the Tuckahoe Lake watershed, any deviation from the wasteload allocation and future allocation established in the TMDL Report, and described herein for a point source must be documented in the permit Fact Sheet and made available for public review along with the proposed draft permit and the Notice of Tentative Decision. The documentation should: 1) demonstrate that the loading change is consistent with the goals of the TMDL and will implement the applicable water quality standards, 2) demonstrate that the changes embrace the assumptions and methodology of these TMDLs and Technical Memorandum, and, 3) describe that portion of the total allowable loading determined in the State's approved TMDL report that remains for any other point sources (and future growth where included in the original TMDL) not

³Mercury Study Report to Congress, Volume VII, EPA-452/R-97-009, December 1997 and personal communication with William Brumbaugh, USGS, Columbia, Maryland

yet issued a permit under the TMDL. It is also expected that Maryland will provide this Fact Sheet for review and comment to each point source included in the TMDL analysis as well as any local and State agency with jurisdiction over land uses for which load allocation changes may be impacted. It is also expected that MDE will require periodic monitoring of the point source(s) for mercury, through the NPDES permit process, in order to monitor and determine compliance with the TMDL wasteload and future allocations.

In addition, USEPA regulations and program guidance provides for effluent trading. Federal regulations at 40 CFR 130.2(i) state: “if Best Management Practices (BMPs) or other nonpoint source pollution controls make more stringent load allocations practicable, then wasteload allocations may be made less stringent. Thus, the TMDL process provides for nonpoint source control tradeoffs.” The state may trade between point sources and nonpoint sources identified in this TMDL as long as three general conditions are met: 1) the total allowable load to the waterbody is not exceeded; 2) the trading of loads from one source to another continues to properly implement the applicable water quality standards and embraces the assumptions and methodology of this TMDL; and, 3) the trading results in enforceable controls for each source. Final control plans and loads should be identified in a publicly available planning document, such as the state’s water quality management plan (see 40 CFR 130.6 and 130.7(d)(2)). These final plans must be consistent with the goals of the approved TMDL.

Based on the foregoing, USEPA has determined that the TMDL is consistent with the regulations and requirements of 40 CFR Section 130. Pursuant to 40 CFR 130.6 and 130.7(d)(2), this TMDL and the supporting documentation should be incorporated into Maryland’s current water quality management plan.

3) *The TMDLs consider the impacts of background pollutant contributions.*

Tuckahoe Lake’s background environment is known to have been impaired by deposition of mercury over time. Sources of mercury air emissions from beyond Maryland and even beyond the United States are believed to contribute, to some degree, to the mercury impairments in the Tuckahoe Lake watershed. It is expected that future refinement of this TMDL as data becomes available will enable a more refined analysis of the impacts of background concentrations of mercury to Tuckahoe Lake. The contributions of background pollutants have been incorporated in the TMDL through the water quality baseline developed by MDE’s 2001 water quality monitoring data. This would account for both natural and human-induced sources.

4) *The TMDLs consider critical environmental conditions.*

USEPA regulations at 40 CFR 130.7(c)(1) require TMDLs to account for critical conditions for stream flow, loading, and water quality parameters. The intent of the regulations is to ensure that 1) the TMDLs are protective of human health, and 2) the water quality of the waterbodies is protected during the times when they are most vulnerable.

Critical conditions are defined as those that violate applicable water quality criteria – in this case, the maximum allowable ambient water column concentration of mercury. The TMDL addresses the critical value for this parameter, which is 1.33 ng/l dissolved total mercury or 2.42 ng/l total mercury. It is expected that the critical condition for mercury water concentration occurs with times of highest precipitation. However, deposition within the water column, methylation rates, and predation rates and patterns will affect bioaccumulation of methylmercury in fish. Further, the average age of the fish used in this TMDL analysis was five years, so the TMDL accounts for environmental conditions over a long term and would incorporate any critical conditions occurring throughout that time. Since bioaccumulation occurs over a long period of time, a critical condition cannot be readily defined, nor would a critical environmental condition necessarily coincide with the highest bioaccumulation rates. Thus, this TMDL is designed to be protective of human health from fish consumption at all times, including any critical conditions.

5) *The TMDLs consider seasonal environmental variations.*

Seasonal variations involve changes in flow as a result of hydrologic and climatological patterns. In the continental United States, seasonally high flow normally occurs during the colder period of winter and in early spring due to snowmelt and spring rain, while seasonally low flow typically occurs during the warmer summer and early fall drought periods.⁴

The TMDL appropriately considers seasonal variations by estimating loading rates over a long term. This approach captures both dry weather loading rates and the wet-weather loading rates and other seasonal variations. Factors other than precipitation and flow may vary seasonally such as fish spawning and growth, predation rates, angling practices, and mercury methylation. The average age of the fish sampled for this TMDL analysis was five years; thus, the effects of seasonal variation on bioaccumulation of methylmercury in fish are averaged out over a long term process. The TMDL establishes an average annual allowable ambient water column concentration and average annual load, which is related to the fish tissue concentration by the bioaccumulation factor – which incorporates the long term accumulation of methylmercury in fish tissue. Since bioaccumulation is a long-term process, and the TMDL is expressed as an annual average, any seasonal environmental variations are accounted for in the TMDL.

6) *The TMDL includes a margin of safety*

The requirement for a margin of safety (MOS) is intended to add a level of conservatism to the modeling process in order to account for uncertainty. EPA realizes that there is still considerable uncertainty in the understanding of the environmental fate, transformation, and transport of mercury. Based on USEPA guidance, the MOS can be achieved through two approaches. One approach is to reserve a portion of the loading capacity as a separate term, and

⁴ USEPA, 1997. Technical Guidance Manual for Developing Total Maximum Daily Loads, Book 2, Part 1, Section 2.3.3 USEPA 823-B-97-002.

the other approach is to incorporate the MOS as part of the design conditions. MDE has adopted an implicit MOS for mercury in accordance with the second approach by incorporating conservative assumptions in the analysis.

The TMDL analysis conservatively assumes that only trophic level four fish are consumed, and thus the bioaccumulation factor is relatively high since level four fish have consistently higher concentrations of mercury than lower trophic level fish. Using a higher bioaccumulation factor results in a lower allowable ambient water column concentration (and a lower total maximum daily load). Also, Maryland uses a more conservative threshold for mercury in fish tissue than US EPA's recommended threshold (235 ug/kg versus 300 ug/kg), based on Maryland's risk analysis incorporating the more conservative assumption of a greater rate of fish consumption in Maryland than the general U.S. population. Also, the calculation of the allowable ambient water column concentration (as shown in Section 4.3.2 of the TMDL report) includes a factor that subtracts the relative source contribution due to saltwater fish consumption. The use of this factor effectively reduces the target maximum fish tissue concentration to approximately 172 ug/kg. Finally, any losses of mercury from the waterbody through reduction and volatilization are not accounted for in the TMDL analysis.

7) *There is reasonable assurance that the TMDL can be met.*

USEPA requires that there be a reasonable assurance that the TMDL can be implemented. Wasteload allocations, as applicable, will be implemented through the NPDES permit process. According to 40 CFR 122.44(d)(1)(vii)(B), the effluent limitations for an NPDES permit must be consistent with the assumptions and requirements of any available wasteload allocation for the discharge prepared by the state and approved by USEPA. Furthermore, USEPA has the authority to object to issuance of an NPDES permit that is inconsistent with wasteload allocations established for that point source.

For this TMDL, the dominant source of mercury to the Tuckahoe Lake watershed is nonpoint sources. These sources consist of air emission sources and would include industrial sources such as power plants, municipal waste combustors, medical waste incinerators, Portland cement plants, and other sources. These sources may originate in Maryland, the surrounding region, the United States, and/or globally. Local sources of mercury air emissions are expected to contribute a significant amount to the mercury air deposition within the Tuckahoe Lake watershed. As a result, the control and reduction of mercury air emissions is the primary method for implementation of this TMDL and implementation of the Clean Air Act (CAA) requirements is the primary vehicle. The following is a summary of the major existing CAA requirements:

- EPA issued final Maximum Achievable Control Technology (MACT) regulations for municipal waste combustors in 1995 that were expected, by 2000, to reduce mercury

emissions from these facilities by 90% from 1990 levels;⁵

- EPA issued MACT emission standards for medical waste incinerators in 1997 that were expected, by 2002, to reduce mercury emissions from these facilities by 94% from 1990 levels;
- EPA issued MACT emission standards for hazardous waste combustors in 1999 that, when fully implemented, are expected to reduce mercury emissions from these facilities by over 50% from 1990 levels;
- EPA has established National Emission Standards for Hazardous Air Pollutants (NESHAPs) for ore processing facilities, mercury cell chlor-alkali plants, and sewage sludge driers; and,
- EPA is currently engaged in a rulemaking process to set a standard for mercury emissions from power plants that would go into effect no sooner than 2007.

In addition, new air pollution legislation was first introduced to U.S. Congress in 2002 and reintroduced in February 27, 2003. Known as the Clear Skies Act of 2003, this emissions reduction program would utilize market-based emissions caps and trading to achieve reductions of certain pollutants including mercury. Clear Skies incorporates two phases of reductions, ultimately achieving 70% reductions in mercury from 2000 levels (i.e., 48 tons to 15 tons per year) at coal-fired utilities or power plants. In Maryland, mercury deposition is projected to decrease by up to 50%. Mercury emissions from power generators are projected to decrease by 85% in Maryland by the year 2020, relative to 2000. In the Mid-Atlantic region, this decrease is projected to be 81% from 2000 to 2020. The controls that are expected to be installed at these power plants include scrubbers and selective catalytic reduction units. If enacted, EPA expects decreases in mercury emissions over the next five years.⁶ These projections take into account future growth projections, electricity generation and demand, and economics including trading scenarios.

In the event that reductions currently required under the Clean Air Act, and projected under the Clear Skies Act, are not adequate for achieving the allowable loads under this TMDL, the State of Maryland (and other states) and local authorities still retain the authority under the Clean Air Act to require more stringent air controls at specific sources within those jurisdictions, as necessary to protect human health and the environment.

The other critical aspect to mercury reductions is source reduction of mercury. Section 5.0 of the TMDL report lists a number of recent and ongoing initiatives within Maryland, ranging from voluntary to regulatory, that involve the phase-out of mercury usage, industrial handling of mercury-containing products and wastes, and consumer recycling of mercury containing

⁵Although certain MACT requirements would have been implemented prior to time of data collection to determine the TMDL baseline loading rates, the effects of these source reductions would not have been fully reflected in the environmental data given the age of the fish, the timeframe for bioaccumulation, and potential sediment release of mercury to the water column.

⁶ Source: www.epa.gov/air/clearskies

products. The implementation of these practices within Maryland and elsewhere in the United States will serve to decrease the amount of mercury that does not enter the waste stream destined for incineration or landfills, with their associated air emissions. Also, the use of alternative fuels to coal or fossil fuels containing lower levels of mercury would also serve to reduce mercury air emissions in power plants and other utilities. Unfortunately, the extent to which the implementation of one or more of these efforts will result in reduced mercury emissions has yet to be quantified, and is therefore difficult to predict the impact upon water quality and fish tissue concentrations in Tuckahoe Lake.

In addition, there will be followup water quality and fish tissue monitoring within five years as part of Maryland's Watershed Cycling Strategy. Maryland also has adopted procedures to ensure that future evaluations are conducted for all established TMDLs. This followup monitoring will allow Maryland and USEPA to determine whether these TMDLs have been implemented successfully.

8) *The TMDL has been subject to public participation.*

MDE provided an opportunity for public review of and comment on the mercury TMDL for Tuckahoe Lake. The public review and comment period was open from November 22, 2002 to December 21, 2002. MDE received comments from the USEPA.

On March 26, 2002, EPA initiated informal consultation with the U.S. Fish and Wildlife Service (FWS) and National Marine Fisheries Service (NMFS) pursuant to Section 7(c) of the Endangered Species Act, regarding certain federal agency actions by EPA Region III regarding Maryland TMDLs. The Region forwarded a Biological Evaluation to the Services on May 3, 2002 and October 31, 2002 regarding our proposed action on Maryland TMDLs. On April 16, 2002, EPA received concurrence from the National Marine Fisheries Service that our action in approving this TMDL is not likely to adversely affect endangered species and their critical habitat. On December 21, 2002, EPA received concurrence from the U.S. Fish and Wildlife Service of no adverse effects on listed species for this TMDL, as there are no threatened or endangered species present.