

Mercury-Impaired Waters

Texas Commission on Environmental Quality

July 2009

Introduction

At the March 19, 2008, TCEQ Commission agenda meeting, the Commissioners directed the Executive Director to convene an open advisory group regarding the State's mercury surface waters impairments. The purpose of this work group was to provide advice to the Commissioners on the best course of action to address the state's surface water bodies that are listed as impaired because of elevated mercury in fish tissue. The group met four times between July 30, 2008 and April 16, 2009.

On June 26, 2009, the TCEQ Commission instructed the Executive Director to submit a report summarizing the results of the work group at a Commission agenda meeting prior to August 31, 2009. This report is submitted to the Commission in response to that directive. The report outlines the following:

- Overview;
- Mercury-Impaired Waters Advisory Group Activities;
- Communication with Group Members;
- Advisory Group Comments;
- Options; and
- Recommendation.

Based on the information gathered and discussed by the Mercury-Impaired Waters Advisory Group and input received from group members, it is clear that any state-only action on mercury impaired waters would have de minimum impacts on mercury levels in state waters. The TCEQ will continue to participate in national air and water programs and coordinate with other Gulf States on issues related to mercury impairments. Given that mercury transport is the major contributor to impairments in Texas, TCEQ urges both interstate and international cooperation to identify mercury sources and solutions for addressing air emissions. In the meantime, the state of Texas has implemented controls on mercury emissions and discharges from point sources that will continue to reduce our contribution.

Overview

- In April 2009, the USEPA proposed maximum achievable control technology (MACT) standards for the control of mercury emissions from Portland cement kilns and is expected to propose MACT standards for the control of mercury emissions from coal-fired power plants by the end of 2009.
- Control strategies related to the state's coal-fired power plants and cement kilns may not affect change in fish tissue concentrations of methyl mercury. It is important to note USEPA modeling estimates that, on average, over three-quarters (83 percent) of the mercury deposited in the US originates from international sources excluding Canada; the remaining 17 percent comes from US and Canadian sources. Also according to the USEPA, in general, the proximity of atmospheric mercury deposition to its original sources is a function of the species of mercury emitted and the local, prevailing meteorology. The USEPA states, "The mix of long-distance and local sources makes it difficult in some water bodies to achieve water quality standards for mercury."

- Gulf Coast lignite and subbituminous Powder River Basin (PRB) coal are both widely used in Texas for electricity generation. Texas emissions data from 2003 indicates approximately 67 percent of mercury from coal-fired power plants was emitted as elemental mercury, 32 percent was emitted as the divalent form, and one percent was emitted as particle-bound mercury (percentages can vary considerably on a source-specific basis). The content of mercury and other inorganic compounds (e.g., chlorine) varies among coal types and affects the efficiency of mercury controls. The elemental form of mercury dominates emissions from Texas power plants burning lignite and PRB coal and is more difficult to control. Divalent mercury tends to deposit close to its source, whereas elemental mercury tends to become part of the global pool of mercury that can travel great distances before it is deposited. Stringent mercury controls on lignite and PRB coal-fired power plants may require switching to bituminous coals, reducing the use of available coal reserves in Texas and increasing the use of natural gas and renewable fuels, or implementing mercury-specific control technologies.
- The Texas Parks and Wildlife Department is in the process of re-sampling approximately 40 East Texas water bodies. The same water bodies were sampled 10 years ago and the results of their study may provide information on changes in water parameters and fish tissue concentrations of methyl mercury.
- Other non-air deposition contributions, including sources such as soil erosion, tributaries, and waste streams, and factors influencing methylation of mercury to methyl mercury concentrations in fish tissue are not well understood.
- Recent total maximum daily loads (TMDLs) prepared by EPA under consent decrees address air deposition by deferring to MACT standards that are under development. The Toledo Bend TMDL for Mercury states, *“A combination of ongoing and future activities under the Clean Air Act is expected to achieve reductions in atmospheric deposition of mercury that will enable reductions in fish tissue mercury concentrations.”*
- TMDLs developed as a result of consent decrees are not proposing control actions or management measures sources of mercury from air deposition sources that would require action prior to the implementation of the MACT standards.

Mercury-Impaired Waters Advisory Group Activities

Background

At the March 19, 2008, Commission agenda meeting, the TCEQ Commissioners directed the TCEQ Executive Director to convene an open advisory group regarding the state’s mercury surface waters impairments. Attachment 1 is the invitation to participate in the group dated June 13, 2008. The group included a broad range of interested persons, with science and technology as critical drivers to provide advice to the Commissioners on the best course of action for surface water bodies in the state that are listed as impaired because of mercury in fish tissue; there are currently 17 water bodies that are impaired because of methyl mercury in fish tissue. Attachment 2 is a map showing the state’s 2008 mercury impairments.

Mercury-Impaired Waters Advisory Group Meetings

The first two meetings were designed to provide technical information and background information on the state's mercury impairments, the options for addressing the mercury impairments, and the complexities of mercury's behavior in the environment.

First Meeting, July 30, 2008:

The following presentations were given at the first meeting of the group:

- Introduction to the Issues, David C. Schanbacher, P.E., formerly of the TCEQ
- Mercury Fish Tissue Consumption Advisories, Kirk Wiles, Texas Department of State Health Services (TDSHS)
- Options for Mercury Impairments, Tom Weber, formerly of the TCEQ
- Mercury Overview, Minor Hibbs, P.E., TCEQ's Chief Engineer's Office.

Second Meeting, November 13, 2008:

The following presentations were given at the second meeting of the group:

- Welcome and Introduction to the TCEQ's Water Quality Planning Division (WQPD), Kelly Keel
- Monitoring and Assessment of Surface Water Bodies, Three Subtopics: Surface Water Quality Standards, Monitoring, and Assessment of Water Bodies, Debbie Miller, Pat Bohannon, Dr. Mike Honeycutt, and Dr. Jim Davenport from the TCEQ, Roxie Mills from the Texas Parks and Wildlife Department, and Mike Tennant, TSDHS
- Mercury Methylation in Water Bodies, Dr. Lynn Katz, University of Texas at Austin Professor Civil, Architectural and Environmental Engineering John A. Focht Centennial Teaching Fellow in Civil Engineering and Nate Johnson, University of Texas at Austin, Ph.D. Student in Environmental Engineering
- Mercury Sources, Transport, and Fate in the Atmosphere, Dr. Leonard Levin, Electric Power Research Institute (EPRI)

Third Meeting, January 22, 2009:

The purpose of the third meeting was to provide group members the opportunity to divide into two participatory groups to brainstorm and discuss options for addressing mercury-impaired water bodies. The first half of the meeting was devoted to presentations on TMDLs, the 5m strategy, and an update on the Gulf of Mexico Alliance (GOMA) efforts. The second half of the meeting included group member discussion. Ruth Chemerys, HQ EPA, participated via telephone as an expert resource on the 5m Strategy from HQ EPA.

The following presentations were given at the third meeting:

- Welcome and Purpose of the Meeting, David Schanbacher, P.E., formerly of the TCEQ
- Total Maximum Daily Loads (TMDLs): Description of Mercury TMDLs and Introduction to Breakout Group, Charles Maguire, TCEQ

- 5m Strategy: Description of 5m Strategy and Introduction to Breakout Group, Andrew Sullivan, TCEQ
- Gulf of Mexico: Description of the Gulf of Mexico Alliance (GOMA) Efforts, Allison Jenkins, TCEQ

Fourth Meeting, April 16, 2009 (webinar):

The purpose of the fourth meeting was to review and discuss all mercury comments submitted by the group's members and discuss the upcoming agenda schedule. This meeting was conducted via a webinar.

The following presentations were given at the fourth meeting:

- Welcome and Purpose of the Meeting, David Schanbacher, P.E., formerly of the TCEQ
- Mercury-Impaired Waters Advisory Group Schedule and Comments Received, Allison Jenkins, TCEQ

Communication with Group Members

- An invitation was sent out on June 13, 2008, to approximately 150 potential members to participate in the group.
- TCEQ website developed for group: <http://www.tceq.state.tx.us/implementation/water/planning/mercurygroup/>
- To facilitate participation, the three group meetings, held in July 2008, November 2008, and January 2009, were all webcast live with the assistance of TexasAdmin and TCEQ staff. Webcasts were archived.
- Staff members from across the TCEQ and Texas Department of State Health Services (TDSHS) and Texas Parks and Wildlife Department (TPWD) were involved in the group and provided technical expertise.
- A TCEQ email address, mercury@TCEQ.state.tx.us, was created for questions and comments regarding the group and was used during the meetings for questions and input provided by members participating via the webcast.
- The first two meetings were transcribed by KX and Associates; meeting transcriptions were uploaded to the group's web site.
- As of May 26, 2009, the GovDelivery email list developed specifically for the Mercury-Impaired Waters Advisory Group had 1,187 subscribers.

Advisory Group Comments

TCEQ staff requested that members submit comments by April 3, 2009. The following comments were submitted:

Six group members recommended no specific actions:

- Texas Oil and Gas Association
- Texas Association of Business
- American Coalition for Clean Coal Electricity

- Portland Cement Association
- Association of Electric Companies of Texas, Inc.
- Texas Chemical Council

One group member recommended action, but no regulatory recommendation:

- Texas Parks and Wildlife Department

Two group members commented on the Mercury Water Quality Criterion:

- Caddo Lake Institute
- EPA Region 6

One group member recommended regional TMDLs and other actions:

- Caddo Lake Institute

One group member relayed concerns regarding the Rio Grande River:

- Heather McMurray

Options

The following options were considered during the advisory group process:

Mercury Total Maximum Daily Loads or TMDLs

The Total Maximum Daily Load (TMDL) Program in Texas works to improve water quality in impaired or threatened water bodies. A TMDL is like a budget for pollution. It defines an environmental target by determining the extent to which a certain pollutant must be reduced in order to attain and maintain a use of surface water that is limited because of a pollutant or adverse condition.

Based on the environmental target in the TMDL, the state develops an implementation plan (IP) to mitigate sources of pollution within the watershed and restore full use of the water body. An IP usually puts the TMDL into action by outlining the steps necessary to reduce pollutant loads through regulatory and voluntary activities. In some instances, TMDLs are implemented through watershed protection plans (WPPs). The TMDL program is authorized by and created to fulfill the requirements of Section 303(d) of the federal Clean Water Act.

EPA guidance states water body-scale mercury TMDLs should include:

- Identification of specific water body and pollutant
- Identification of the pollutant sources (point and nonpoint)
- Source assessment (including mercury from air deposition and contribution from point and legacy sources)
- Linkage to 303(d) List of Impaired Waters/Integrated Report
- Identification of other assumptions (e.g., watershed area, land use/cover, population, future growth, distribution of sources and loadings, including air deposition, etc.)

EPA guidance states regional, statewide, and multi-state-scale mercury TMDLs should include/consider:

- Separating water bodies into groups according to differences in sources, loadings, or fish mercury levels.
- Treating areas with significantly higher mercury levels of local sources as a separate region with a separate TMDL calculation.
- Conducting a statistical analysis to support any assumptions that water bodies may be grouped and to ensure that there are not any groups of water bodies or individual water bodies that should be addressed separately from the water bodies due to significantly higher mercury levels and/or local sources that may be contributing to localized exceedances.

5m Strategy

- The EPA developed the 5m Strategy as a voluntary approach for listing waters impaired by mercury predominantly from atmospheric sources pursuant to Clean Water Act Section 303(d), also known as “subcategory 5m.”
- Water bodies placed in this category are still considered impaired; however, results of management strategies to address these impairments are anticipated to take many years to demonstrate measurable improvements.
- EPA’s requirements before placing waters in subcategory 5m:
 - A comprehensive mercury reduction program in place (specific legislation, regulations, or other programs that implement the recommended elements that have been formally adopted by the State, as opposed to being in the planning or development stage) before placing waters in subcategory 5m.
 - The comprehensive mercury reduction plan would include: identification of air sources of mercury; identification of other potential multi-media sources of mercury; adoption of statewide mercury reduction goals and targets, including percent reduction and dates of achievement, for air and other sources of mercury; multi-media mercury monitoring; public documentation of the mercury reduction program; and coordination across States, where possible.
 - Some initial progress in reducing in-state mercury sources before putting waters in subcategory 5m. A state mercury reduction program would be included in its Section 303(d) lists.
- The 5m subcategory does not remove the obligation to develop TMDLs for mercury-impaired waters if mercury reduction programs do not result in attainment of water quality standards.
- Existing Texas mercury control programs include mercury convenience switch recovery, household hazardous waste collection, agricultural waste pesticide collection, wastewater discharge permit limits, MACT for cement kilns and power plants, Resource Exchange Network for Eliminating Waste, Recycle Texas Online, National Partnership for Environmental Priorities, Take Care of Texas, and computer equipment recycling.
- Allows states to defer TMDL development beyond the 8-13 year timeframe provided in EPA guidance.

Watershed Protection Plans

- In Texas, watershed protection plans or WPPs are locally-developed, holistic plans that coordinate activities and resources to manage water quality.
- They facilitate the restoration of impaired water bodies and/or the protection of threatened waters before they become impaired.
- These stakeholder-driven plans give the decision-making power to the local groups most vested in the goals specified in the plans. Bringing groups of people together through watershed planning efforts combines scientific and regulatory water quality factors with social and economic considerations.

Gulf of Mexico TMDLs

- Texas participates in the Gulf of Mexico Alliance (GOMA) that includes the five US Gulf states and will in the future include the six Mexican Gulf states. Mercury is a focus of the Water Quality Priority Issue Team of GOMA.
- Florida has commissioned a preliminary screening model for mercury in the Gulf of Mexico (draft received April 3, 2009) in support of their marine waters mercury TMDL.
- A recently released EPA request for proposal includes funding for mercury research in the Gulf with the overall goal of quantifying the factors and inputs controlling the accumulation of mercury in the Gulf of Mexico ecosystem, quantifying methyl mercury inputs to Gulf waters from estuarine sources, and identifying food items in the Gulf of Mexico that are primary sources of mercury consumed by humans in the Gulf of Mexico region.

Fish Tissue Criterion

Concurrently, the TCEQ staff and the workgroup reviewed options for criteria for mercury in the Texas Surface Water Quality Standards. In the current water quality standards, all of the criteria for toxic pollutants to protect for human consumption of fish are expressed as a concentration in water.

EPA now recommends in published federal guidance that the criterion for mercury be expressed directly as a concentration in fish tissue, rather than as a concentration in water. Subsequently, the TCEQ has been considering a tissue-based standard for mercury in coordination with the TCEQ Water Quality Standards Advisory Workgroup. This approach has the advantages of (1) more directly addressing the specific concern of mercury contamination in fish, (2) being directly comparable to TDSHS criteria for fish consumption advisories and bans; and (3) allowing site-specific differences in bioaccumulation to be considered when addressing mercury in regulatory actions. In addition, many scientific organizations continue to research the correlation between mercury in the water column and fish tissue.

The TCEQ's current draft proposal is for a 0.7 ppm methyl mercury criterion in fish tissue. However, the EPA's national guidance criterion for methyl mercury in fish tissue is 0.3 ppm. The TCEQ-TSDHS and the EPA methylmercury criteria in fish tissue are calculated using different assumptions: the underlying toxicity value used to derive the criteria values are different (Agency for Toxic Substances and Disease Registry's Minimal Risk Level versus EPA's Reference Dose); Texas uses a higher fish consumption rate (0.03 kg/day versus 0.0175 kg/day); and EPA applies a relative source contribution to account for exposure to methylmercury through eating marine fish. EPA's relative source contribution accounts for exposures from all anticipated sources not just freshwater/estuarine fish and shellfish consumption alone. Thus, EPA attempts to control all exposure to mercury consumption by regulating one path of exposure.

Recommendation

The information gathered and discussed by the Mercury-Impaired Waters Advisory Group and input received from group members indicate that additional coordination and cooperation is needed to determine the most effective way to reduce mercury impairments in Texas. Information obtained from other states also makes it clear that most states are waiting before they pursue either the 5M or TMDL strategies. The TCEQ will continue to participate in national air and water programs and initiatives related to mercury and urge EPA to initiate international discussions on mercury control options. The TCEQ will continue to participate in the Gulf of Mexico Alliance (GOMA) working with other Gulf States to address mercury impairments in Gulf Coast marine waters. The TCEQ will also continue to consider a fish tissue criterion for mercury in conjunction with the ongoing revisions of the Texas Surface Water Quality Standards – in coordination with EPA and stakeholders.

References

Allen, et.al. 2007. Use of Markov Chain Monte Carlo Analysis with a Physiologically-Based Pharmacokinetic Model of Methyl mercury to Estimate Exposures in U.S. Women of Childbearing Age. *Risk Analysis*, Vol. 27, No. 4, 2007 DOI: 10.1111/j.1539-6924.2007.00934.x

Texas Department of State Health Services (TDSHS). 2005. Characterization of Potential Health Risks Associated with Consumption of Fish from Caddo Lake, Marion and Henderson Counties, Texas, April 2005. Available at: <http://www.dshs.state.tx.us/seafood/PDF2/Risk%20Characterization/Caddo%20Lake%20RC%202005.pdf>

Pollman, C.D., Harris, R., Morey, S., Dukhovskoy, D., and W.M. Landing. 2008. Preliminary Screening Model for Mercury in the Gulf of Mexico. Order No. DO1242670. April 3, 2009.

The United State Environmental Protection Agency (EPA). 2008. TMDLs Where Mercury Loadings are Predominantly from Air Deposition. Available at:
http://www.epa.gov/owow/tmdl/pdf/document_mercury_tmdl_elements.pdf

EPA. 2007. Listing Waters Impaired by Atmospheric Mercury Under Clean Water Act Section 303(d): Voluntary Subcategory 5m for States with Comprehensive Mercury Reduction Programs. March 8, 2007. Available at:
<http://www.epa.gov/owow/tmdl/mercury5m/Mercury5m.pdf>

Attachment 1

Buddy Garcia, *Chairman*
Larry R. Soward, *Commissioner*
Bryan W. Shaw, Ph.D., *Commissioner*
Glenn Shankle, *Executive Director*



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

June 13, 2008

INVITATION TO PARTICIPATE IN MERCURY IMPAIRED WATERS ADVISORY GROUP

To Whom It May Concern:

The Texas Commission on Environmental Quality (TCEQ) is inviting the participation of stakeholders to provide recommendations for mercury impaired water bodies in the state of Texas. You have received this advisory group invitation because of your prior interest in mercury issues in Texas.

Surface waters classified as mercury-impaired are placed on Texas' 303(d) list, as required by Section 303(d) of the federal Clean Water Act. The Texas 303(d) list is a list of water bodies in the state that do not meet state water quality standards. Some of these mercury impairments have been on the state's 303(d) list since 1996. Please see the enclosure for a listing of the 17 mercury impaired (based on mercury in fish tissue) surface water bodies in Texas.

At the March 19, 2008, Commission agenda meeting, the TCEQ Commissioners directed the TCEQ Executive Director to convene an advisory stakeholder group consisting of a broad range of interested persons, with science and technology as critical drivers, to advise the TCEQ on the best course of action for these water bodies.

The TCEQ anticipates the first stakeholder meeting will occur within six weeks. We are currently looking at July 30, 2008 for the first meeting. Following the initial meeting, several stakeholder meetings will be held over the next several months to examine the options for mercury impaired waters in Texas and to present those recommendations to the Commissioners and provide, if necessary, potential options for the Texas Legislature in the coming Legislative session.

The advisory group will be an open group representing a balanced cross-section of parties having an interest in mercury and mercury impaired water bodies and will solicit the ideas, insights, and options for those water bodies. We anticipate the group will include representatives from the regulated community, state agencies, environmental groups, academia, industry representatives, public interest groups, and individual citizens.

Invitation to Participate
Page 2 of 4
June 13, 2008

The TCEQ is requesting your response via a letter, email, or phone call indicating your interest to participate by June 27, 2008. All meetings held as part of this effort will be open to the public and held in Austin. A website will be developed to support the group, webcast the meetings, and make all meeting notices, meeting agenda, minutes, and supporting documents available to the public.

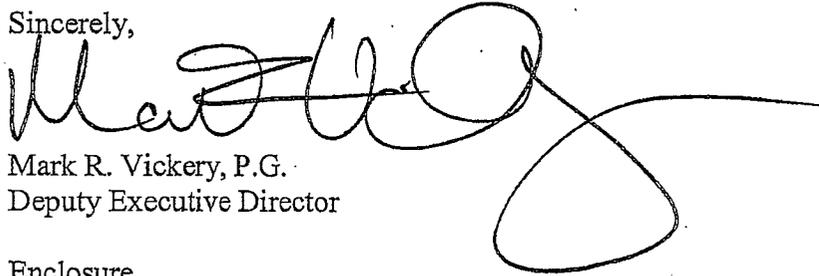
We hope you are interested in participating in this effort. If you know of an interested person or persons, please invite them to contact TCEQ staff.

Please contact Allison Jenkins or Holly Brightwell at AJenkins@tceq.state.tx.us, 512-239-0656, or HBrightw@tceq.state.tx.us, 512-239-4905, respectively. Or, send your response to:

Chief Engineer's Office
Texas Commission on Environmental Quality
PO Box 13087 MC 168
Austin, TX 78711-3087

Thank you and we look forward to working with you to discuss and address the mercury impairments in Texas waters.

Sincerely,


Mark R. Vickery, P.G.
Deputy Executive Director

Enclosure

Mercury Impaired Surface Water Bodies
on the
Texas Draft 2008 Index of Water Quality Impairments (303(d) List)
Based on Mercury in Fish Tissue

Segment ID	Segment	Category	Year First Listed
0102	Lake Meredith	5c	2002
0401	Caddo Lake	5c	1996
0402	Big Cypress Creek Below Lake O' the Pines	5c	1998
0402A	Black Cypress Bayou	5c	2000
0404N	Lake Daingerfield	5c	2006
0504	Toledo Bend Reservoir	5c	1998
0504E	Clear Lake	5c	2006
0505O	Hills Lake	5c	2006
0603	B.A. Steinhagen Lake	5c	1998
0604T	Lake Ratcliff	5c	2002
0608G	Lake Kimball	5c	2000
0610	Sam Rayburn Reservoir	5c	1996
0615	Angelina River/Sam Rayburn Reservoir	5c	2002
1805	Canyon Lake	5c	2006
2201	Arroyo Colorado Tidal	5c	2008
2202	Arroyo Colorado Above Tidal	5c	2008
2501	Gulf of Mexico	5c	1998

Invitation to Participate

Page 4 of 4

June 13, 2008

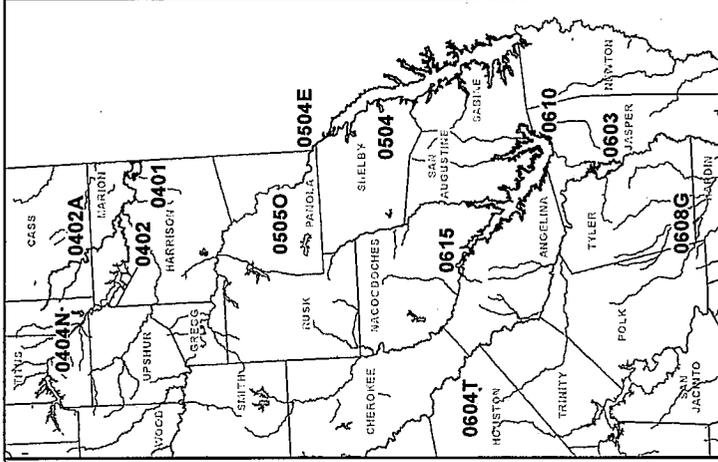
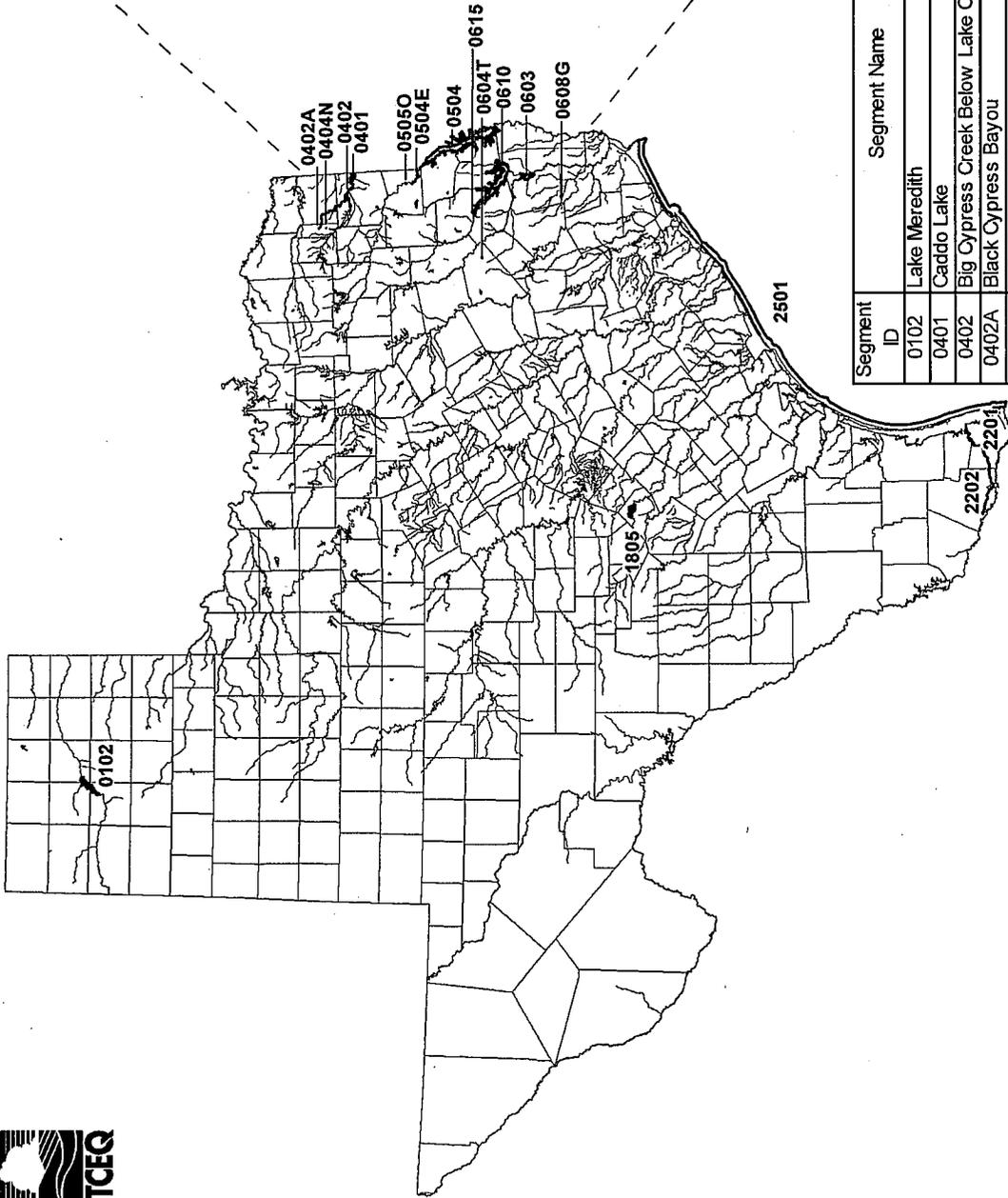
Notes:

Under section 303(d) of the 1972 Clean Water Act, states, territories, and authorized tribes are required to develop lists of impaired waters (the 303(d) list). These impaired waters do not meet water quality standards that states, territories, and authorized tribes have set for them, even after point sources of pollution have installed the minimum required levels of pollution control technology. The Texas 2008 draft 303(d) list has been approved by the TCEQ Commissioners and has been submitted to EPA Region 6 for its review and approval.

Segment ID – The segment ID is a unique identifier for each water body in the state. It can be one of two types of numbers. The first type is a classified segment (4 digits, e.g., 0218) as defined in the Texas Surface Water Quality Standards. The second type is an unclassified water body (0218A), not defined in the Standards, although associated with a classified water body because it is in the same watershed.

Category 5c – The water body does not meet applicable water quality standards or is threatened for one or more designated uses by one or more pollutants. A review of the water quality standards for water bodies designated as 5c will be conducted before a total maximum daily load (TMDL) is scheduled.

Attachment 2



Segment ID	Segment Name	Year Listed	Species Affected
0102	Lake Meredith	2002	walleye
0401	Caddo Lake	1996	largemouth bass, freshwater drum
0402	Big Cypress Creek Below Lake O' the Pines	1998	largemouth bass, freshwater drum
0402A	Black Cypress Bayou	2000	all species of fish
404N	Lake Daingerfield	2006	largemouth bass
0504	Toledo Bend Reservoir	1998	largemouth bass, freshwater drum
0504E	Clear Lake	2006	bowfin, freshwater drum, largemouth bass
0505O	Hillis Lake	2006	freshwater drum, largemouth bass
0603	B. A. Steinhagen Lake	1998	white bass, hybrid white/stiped bass
0604T	Lake Ratcliff	2002	largemouth bass
0608G	Lake Kimball	2000	all species of fish
0610	Sam Rayburn Reservoir	1996	largemouth bass, freshwater drum
0615	Angelina River/Sam Rayburn Reservoir	2002	largemouth bass, freshwater drum
1805	Canyon Lake	2006	striped bass, longnose gar
2201	Arroyo Colorado Tidal	2008	longnose gar
2202	Arroyo Colorado Above Tidal	2008	longnose gar
2501	Gulf of Mexico	1998	king mackerel

WATER BODIES IMPAIRED DUE TO MERCURY IN FISH, 2008



