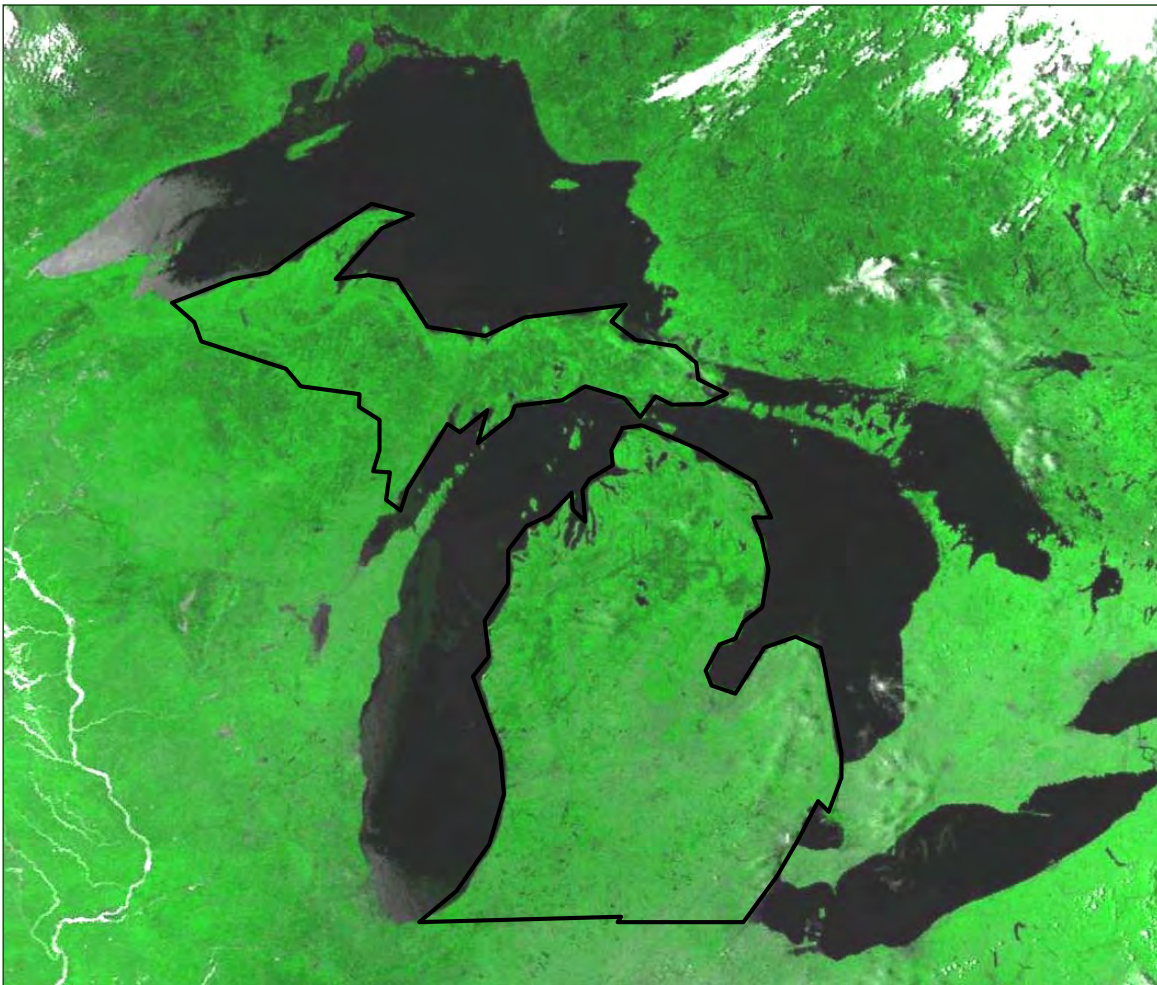


MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

MERCURY STRATEGY STAFF REPORT

**MDEQ'S CURRENT STATUS AND RECOMMENDED FUTURE ACTIVITIES
TOWARD THE GOAL OF ELIMINATING ANTHROPOGENIC MERCURY
USE AND RELEASES IN MICHIGAN**



STATE OF MICHIGAN • JENNIFER M. GRANHOLM, GOVERNOR
MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY • STEVEN E. CHESTER, DIRECTOR
PROTECTING MICHIGAN'S ENVIRONMENT, ENSURING MICHIGAN'S FUTURE
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JANUARY 3, 2008



STEVEN E. CHESTER
DIRECTOR



JENNIFER M. GRANHOLM
GOVERNOR

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

TO: Steven E. Chester, Director

FROM: Joy Taylor Morgan, Air Quality Division
Steve Kratzer, Environmental Science and Services Division
(Co-Chairs of MDEQ Mercury Strategy Workgroup)

DATE: January 3, 2008

SUBJECT: MDEQ Mercury Strategy Staff Report

In response to your request, we have developed the attached MDEQ Mercury Strategy Staff Report (Report) that provides a comprehensive framework to guide the MDEQ's efforts toward eliminating the use and release of anthropogenic mercury.

As highlighted in the Report, Michigan has made significant progress in reducing the use and release of anthropogenic mercury. The Report guides further multimedia efforts to eliminate mercury and ensure the protection of Michigan's citizens and wildlife from this persistent toxic pollutant. Included are 67 recommendations calling for specific activities to identify, monitor, and control mercury. The Mercury Strategy Workgroup identified 10 priority activities which, if implemented, would result in the most significant mercury reductions in Michigan. The Report also offers information and outreach efforts to further encourage elimination of mercury use, and includes specific steps for the adoption of comprehensive mercury legislation for Michigan.

Implementation of the specific activities identified requires ongoing collaboration and participation with Michigan stakeholders. We therefore recommend seeking input from stakeholders on this Report to assist in setting priorities for achievement, developing implementation plans, and encouraging partnerships.

Attachment

cc: Jim Sygo, Deputy Director
Carol Linteau, Legislative Liaison
Frank Ruswick, Special Assistant to the Director
Rich Powers, Water Bureau
George Bruchmann, Waste and Hazardous Materials Division
G. Vinson Hellwig, Air Quality Division
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ACKNOWLEDGMENTS

This report was prepared by the Michigan Department of Environmental Quality (MDEQ) Mercury Strategy Workgroup (MSWG). The MSWG is a team of staff representing multi-media programs in the MDEQ. MSWG participants include staff from the MDEQ's Air Quality Division (AQD), Environmental Science and Services Division (ESSD), Remediation and Redevelopment Division (RRD), Waste and Hazardous Material Division (WHMD), and Water Bureau (WB). The following lists the MSWG participants and their respective divisions:

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The MSWG wishes to acknowledge **Brendan Boyle**, Public Health Specialist, Michigan Department of Community Health (MDCH) as an important contributor to the workgroup, **Sheila Blais**, AQD Department Analyst, for her editorial contributions and expertise in finalizing this report, and **Leah Granke**, a former AQD employee. The MSWG also would like to acknowledge **Alexis Cain**, Environmental Scientist for the U.S. Environmental Protection Agency (EPA) Region 5, and **Tom Metzner**, Environmental Analyst with the Connecticut Department of Environmental Protection, as well as numerous MDEQ staff for their review and input to this Report.

After the members were selected by MDEQ Division Chiefs and the WB Chief, the MDEQ Director sent out an interoffice communication to his staff highlighting the importance of the mercury issue and sharing the charge of the MSWG on January 11, 2006 (see **Appendix B**). The MSWG was charged by the MDEQ Director with evaluating current sources, monitoring activities, rules and policies, and developing a strategy with specific recommendations toward a goal of eliminating anthropogenic mercury [use and] releases in Michigan within a specified time frame.

It is important to note that following convening of the MSWG and in addition to the finalization of this MDEQ Mercury Strategy Staff Report, MSWG participants were able to achieve numerous other mercury-related accomplishments concurrent with its deliberation as part of their daily responsibilities. These activities demonstrate the ongoing mercury reduction efforts in the state. More details regarding these accomplishments are included in **Appendix V**.

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Michigan Department of Environmental Quality

EXECUTIVE SUMMARY

The Michigan Department of Environmental Quality's (MDEQ's) Mercury Strategy Workgroup (MSWG) was convened in January of 2006 following a directive from MDEQ Director Steven E. Chester to develop "consistent priorities and goals related to mercury policies, regulations, legislation, monitoring, sources, and outreach efforts." (See **Appendix B** for the Director's memo.)

The MSWG is a team of MDEQ staff representing multi-media mercury programs that was given the charge to develop a comprehensive strategy to eliminate mercury contamination in Michigan's environment by identifying current sources, monitoring activities, policies and regulations and to make specific recommendations to meet the goal of eliminating anthropogenic mercury use and releases in Michigan within a specified time frame.

The specific charge from the MDEQ Director to the MSWG was to:

1. Establish an effective communication process to ensure that efficient cross-divisional communication on mercury issues occurs with the MDEQ (such as utilizing the Intranet Team Rooms).
2. Identify current MDEQ policy initiatives and activities related to mercury reduction, monitoring, and environmental release information from each participating division.
3. Evaluate how existing programs can be improved, including through cross-divisional cooperation.
4. Present priority policy initiatives and activities (current and anticipated) from each division.
5. Prioritize policy initiatives and activities (current and anticipated) for the MDEQ, emphasizing cross-divisional cooperation on actions and initiatives.
6. Draft recommendations to the MDEQ Director on future activities, programs, policies, legislation, or regulations to address mercury use and releases to the environment, and obtain feedback and guidance from the Director's office.
7. Develop a MDEQ Mercury Strategy that outlines these recommendations with appropriate timelines that pursue the overall goal of virtually eliminating anthropogenic mercury use and releases to the environment.

The MSWG established an effective means of cross-divisional communication by setting up an Intranet team room and utilizing the MDEQ's U drive to share documents. Meetings on a regularly scheduled basis (twice per month) allowed the MSWG to effectively communicate and discuss various issues related to mercury. From January 31, 2006 through August 2007 the MSWG had approximately 38 meetings. During these meetings the MSWG developed a charter that included identifying their purpose, goals, and action steps needed to develop a comprehensive, effective mercury strategy for the MDEQ.

A summary of current regulations, policies and monitoring activities is included in the strategy. An inventory of recent mercury (Hg) releases was compiled for 2002. **Figure ES-1** identifies in pounds per year (lbs/yr) estimated known mercury releases (references are identified in **Table ES-1**).

FIGURE ES-1: TOTAL MERCURY RELEASES



TABLE ES-1: ANTHROPOGENIC MERCURY RELEASES AND COLLECTION

SOURCE	AMOUNT	REFERENCE
MERCURY RELEASES		
Global Releases to Air	~ 5 Million lbs/yr (2,200 to 2,600 tons/yr)	Bergan et al., 1999; Mason and Sheu, 2002; Lamborg et al., 2002a; Seigneur et al., 2004
United States (U.S.) Releases	~ .0236 Million lbs/yr (110 tons/yr)	U.S. Environmental Protection Agency (EPA), 1997
Michigan Releases to Air	~ 7,000 lbs/yr	Granke, MDEQ Mercury Emissions Inventory 2002 (see Chapter 2)
Michigan Surface Water Releases	~ 490 lbs/yr	Toxics Release Inventory, 2002; Annual Waste Report, 2002 (<i>Note: Significant uncertainties exist for this data</i>)
Michigan Land (Waste) Releases	~ 900 lbs/yr	Waste Data System, U151 Mercury Waste Generated in Michigan. See Chapter 2.4.1 .
2002 Known Reported Mercury Spills	~ 50 lbs/yr (~ 100 lbs/yr for 1999-2006)	See Tables 2-20 and 2-21 in Chapter 2.6
COLLECTION OF MERCURY IN MICHIGAN		
Recycled Mercury from Clean Sweep Sites, 2003-2006	~ 1,156 lbs/yr (4,625 lbs total for 2003-2006)	Clean Sweep Annual Mercury Collection; Electronic Reports Submitted to MDEQ
School Collection Grants, 2004-2006	~ 980 lbs/yr *	MDEQ's Grant Information in Chapter 4.2.8

* Including elemental mercury and assuming all devices collected were laboratory thermometers containing ~3 grams of elemental mercury.

Following the finalization of the strategy and endorsement by the MDEQ Director, an implementation plan will be developed that includes creating appropriate baselines, specific recommendations or action items, and establishing a specific manager to track each action item, expected outcomes, and a specific deadline for completion of each task.

While the long-term goal is elimination of anthropogenic mercury use and releases to Michigan's environment, success of the strategy will be measured in various ways. Specifically, meeting designated water uses in the state, including water quality that will enable unrestricted fish consumption, is the primary means of measuring the success of the strategy. Other methods will include:

- ▶ tracking the overall emission reductions compared to a baseline,
- ▶ quantifying capture of mercury from products,
- ▶ meeting environmental guidelines or standards,
- ▶ measuring the decline of mercury spills and human exposure incidents, and
- ▶ documenting temporal or spatial trends of environmental indicators such as wet deposition and/or fish tissue data.

MSWG RECOMMENDATIONS

With input from MDEQ staff, the MSWG drafted recommendations that included 67 action steps (see **Chapter 9**) that if implemented, should successfully identify all known **mercury uses** and **mercury releases**, and identify solutions that involve inventory, regulations and enforcement, collaborations and partnerships, education and outreach, and environmental monitoring to reach the long-term goal of **eliminating** anthropogenic use and releases of mercury to Michigan's environment. Additionally, there are 12 recommendations in **Chapter 3.7** that outline specific steps for adoption of comprehensive mercury legislation for Michigan.

THE MSWG RECOGNIZES THAT FOR THIS STRATEGY IMPLEMENTATION TO SUCCEED, THE MDEQ NEEDS TO ENSURE THAT THE MERCURY STRATEGY IS A PRIORITY AND THAT SUFFICIENT RESOURCES ARE DEDICATED TO THIS IMPORTANT MULTI-MEDIA CONCERN. RESOURCES SHOULD BE DEDICATED TO FULLY FUND THE NECESSARY STAFF IN EACH DIVISION AND/OR BUREAU WITH RESPONSIBILITIES TO TRACK, IMPLEMENT, AND EVALUATE PROGRESS UNDER MERCURY POLLUTANT MINIMIZATION PROGRAMS, MERCURY EDUCATION AND OUTREACH PROGRAMS, AS WELL AS MERCURY MONITORING AND EVALUATION PROGRAMS.

MSWG members used the following four criteria to identify 10 priority activities that if implemented would result in the most significant mercury reductions in Michigan:

- 1) Overall environmental release (quantity of release or impact to media),
- 2) Public health risks,
- 3) Efforts currently underway by international, national, state, local, and other organizations,
- 4) Available substitutes for mercury-added products.

Utilizing the four criteria above with the 67 drafted recommended action steps (see **Chapter 9**), the MSWG's top 10 priority recommendations for the MDEQ are to:

- 1) **DEVELOP AND MAINTAIN A RELIABLE BASELINE TO TRACK ALL MERCURY RELEASES FOR MEASURING SUCCESS.**
- 2) **REDUCE COAL-FIRED UTILITY RELEASES AND PAST CONTAMINATION FROM MERCURY LEGACY SITES ASSOCIATED WITH COAL-FIRED UTILITY PLANTS.**
- 3) **REDUCE PORTLAND CEMENT PLANT RELEASES AND PAST CONTAMINATION FROM MERCURY LEGACY SITES ASSOCIATED WITH PORTLAND CEMENT PLANTS.**
- 4) **CONTINUE TO IMPLEMENT ACTIVITIES THAT PHASE OUT MERCURY-ADDED PRODUCTS WHERE VIABLE ALTERNATIVES EXIST.**
- 5) **ENSURE THERE ARE SUFFICIENT FUNDS TO CLEAN UP LEGACY SITES AND GROUNDWATER CONTAMINATED BY MERCURY.**
- 6) **EXPAND EDUCATION AND OUTREACH TO THE PUBLIC, THE REGULATED COMMUNITY, AND MDEQ STAFF ON EXPOSURE OF MERCURY, SPILL CLEAN-UP, CONTROL TECHNOLOGIES, ETC.**
- 7) **EXPAND THE NETWORK TO COLLECT AND MANAGE THE DISPOSAL OF MERCURY-CONTAINING PRODUCTS (SUCH AS FLOURESCENT LIGHTS, SWITCHES, THERMOMETERS, BAROMETERS, ETC.) AND ELEMENTAL MERCURY (I.E. CLEAN SWEEP PROGRAM) IN MICHIGAN.**
- 8) **INVESTIGATE AND EXPLORE THE DEVELOPMENT OF A MECHANISM TO ENSURE THAT MERCURY COLLECTED OR RECOVERED IN MICHIGAN IS USED ONLY FOR ESSENTIAL USES. EXPLORE THE CURRENT BARRIERS REGARDING EXPORTATION OF NONESSENTIAL MERCURY USES TO OTHER STATES OR COUNTRIES.**
- 9) **PROMOTE A COMPREHENSIVE MERCURY STUDY THAT IDENTIFIES THE PROCESSES AND ECOSYSTEM CHARACTERISTICS THAT GOVERN THE MOVEMENT OF MERCURY FROM THE ATMOSPHERE, THROUGH AQUATIC ECOSYSTEMS AND WITHIN THE FOOD CHAIN AND IDENTIFIES SOURCE CONTRIBUTIONS.**
- 10) **CONTINUE NATIONAL/REGIONAL COORDINATION WITH THE QUICKSILVER CAUCUS AND ASSIST IN THE DEVELOPMENT OF A REGIONAL MERCURY EMISSION REDUCTION INITIATIVE SIMILAR TO THE GREAT LAKES MERCURY IN PRODUCTS PHASE-DOWN STRATEGY.**

This MSWG report provides an overview of the problem, the benefits and costs, and an estimate of the sources that contribute to mercury contamination in the state. It outlines Michigan's regulations and policies that address mercury and gives a summary of various activities implemented in the state to prevent the use and release of mercury. Control technology and remediation techniques are also included in this report.

Michigan's goal is to eliminate anthropogenic mercury use and releases to the environment. The desired end results are the removal of mercury-driven fish consumption advisories now in place and attainment of water quality standards (WQS) for the protection of human health and wildlife. The picture at right is an example of how a predatory piscivore's consumption can lead to biomagnification in the food chain.

Therefore, the long-term goal of this strategy is to reduce the concern for the consumption of fish from Michigan's inland lakes, rivers and the Great Lakes as a result of mercury contamination and eliminate exposure to elemental mercury from spills, as well as to avoid impacting neighboring states and Canada from mercury transport and deposition.



Picture courtesy of the state of Alaska

9. RECOMMENDATIONS

The following is the MSWG's recommended list of 67 action steps for the MDEQ to achieve the goal of eliminating anthropogenic mercury use and releases. These recommendations have been divided into three specific goals that should be implemented in order to achieve success.

- ▶ Goal 1 is to develop a comprehensive baseline to track and measure all mercury releases to all Michigan media.
- ▶ Goal 2 includes various approaches and activities that will contribute to eliminating anthropogenic mercury use and releases in Michigan in order to meet designated water uses in the state, including fish consumption.
- ▶ Goal 3 is to create a mechanism to measure progress toward the goal of elimination of anthropogenic mercury use and releases to Michigan's environment, using defined baseline data.

(NOTE: THE BOLDED AND CAPPED ITEMS SHOWN IN THE FOLLOWING LIST FOR ALL OF THE MSWG'S RECOMMENDATIONS ARE THOSE THAT WOULD REQUIRE ADDITIONAL RESOURCES TO SUCCESSFULLY IMPLEMENT. ALSO, THE NUMBERED RECOMMENDATIONS UNDER EACH CHAPTER ARE PRESENTED IN ORDER OF IMPORTANCE.)

GOAL 1 – BASELINE DEVELOPMENT: IDENTIFY ALL ANTHROPOGENIC MERCURY USE AND RELEASES IN MICHIGAN; DEVELOP A DEFINED BASELINE TO MEASURE MERCURY RELEASES TO ALL MEDIA INCLUDING AIR, WATER, AND LAND; AND UTILIZE THIS BASELINE TO MEASURE REDUCTION PROGRESS.¹

ACTION STEPS:

- 1.1) Complete an updated speciated air toxics emissions inventory. The first speciated inventory was done for 2002, but subsequent speciated emission inventories should be completed every three years, at a minimum to evaluate progress. Recommend to the U.S. Environmental Protection Agency (EPA), the development of improved emission factors for certain source categories that emit mercury. (See **Chapter 2.1.2, Table 2-1 and Appendix G**)
- 1.2) **INVENTORY RELEASES OF MERCURY TO WATERS OF THE STATE AND MERCURY THAT ENTERS THE WASTE STREAM UTILIZING THE MERCURY FLOW MODEL THAT WAS USED TO INVENTORY MERCURY AIR RELEASES. THE MERCURY FLOW MODEL WAS UTILIZED FOR CALCULATED RELEASES TO THE AIR; HOWEVER, STAFF RESOURCES DID NOT ALLOW ESTIMATED RELEASES OF MERCURY TO THE WATER AND WASTE STREAM. (See Chapter 2.1.2)**
- 1.3) **INVENTORY RELEASES FROM WASTEWATER TREATMENT PLANTS (WWTPS), INDUSTRY, AND OTHER SOURCES OF MERCURY RELEASES TO WATER (BOTH SURFACE WATER AND GROUNDWATER). (THIS INCLUDES, BUT IS NOT LIMITED TO, GETTING A BETTER ESTIMATE ON MERCURY RELEASED FROM STAMP SANDS IN MICHIGAN'S UPPER PENINSULA, COLLECTING DATA ON THE MERCURY CONTENT IN SEPTAGE, AND REQUIRE REPORTING OF PART 201 FACILITY STATUS THAT INCLUDES DISCLOSURE OF MERCURY RELEASES TO GROUNDWATER AND/OR SURFACE WATER.) (See Chapter 2.3)**
- 1.4) **IDENTIFY SITES OF LEGACY MERCURY CONTAMINATION. DEVELOP UNIFORM EVALUATION REQUIREMENTS TO CONFIRM/ASSESS POTENTIAL MERCURY RELEASES AT SITES OF ENVIRONMENTAL CONTAMINATION. (COLLECT DATA FROM SITES OF ENVIRONMENTAL CONTAMINATION TO ESTABLISH BASELINE DETERMINATION). (See Chapter 2.3)**
- 1.5) **DEVELOP A MECHANISM TO CONFIRM THAT PAST MERCURY-CONTAINING PRODUCT MANUFACTURERS ARE NO LONGER USING MERCURY AND THAT NO LEGACY MERCURY SITUATIONS EXIST AT SUCH SITES. (See Chapter 2.3)**

¹ A defined baseline will be developed per source category dependent upon available data and will be part of the implementation plan.

- 1.6) Continue to track statewide variances for mercury discharges to surface waters. (See **Chapter 3.2.1**)
- 1.7) **WORK WITH MICHIGAN DEPARTMENT OF COMMUNITY HEALTH (MDCH) STAFF TO IDENTIFY AND QUANTIFY INDOOR MERCURY SPILLS REPORTED TO THE MDCH, MICHIGAN'S HAZARDOUS SUBSTANCES EMERGENCY EVENTS SURVEILLANCE (MI-HSEES), MDEQ'S POLLUTION EMERGENCY ALERTING SYSTEM (PEAS), POISON CONTROL CENTERS, NATIONAL RESPONSE CENTER (NRC), AND MDEQ STAFF. JOINTLY DETERMINE COMMON CAUSES OF RECENT (SMALL QUANTITY) INDOOR SPILLS OF MERCURY AT RESIDENTIAL AND COMMERCIAL FACILITIES. UTILIZE THIS INFORMATION IN BASELINE DETERMINATION AS ONE SOURCE OF DATA THAT CAN HELP ASSIST IN MEASURING PROGRESS. RECOMMEND HOSTING A MEETING WITH ALL PARTIES TO DISCUSS IMPROVED COMMUNICATION AND COLLABORATION ON MERCURY SPILL DATA TRACKING. (See Chapter 2.6)**
- 1.8) **DEVELOP A PROTOCOL FOR MASS BALANCE CALCULATIONS FOR ESTIMATING RELEASES OF MERCURY FROM SOURCES. THIS HAS BEEN CONDUCTED FOR THE TACONITE INDUSTRY IN MINNESOTA AND COULD BE UTILIZED IN MICHIGAN FOR OTHER SOURCE SECTORS. (See Appendix G).**
- 1.9) Summarize hazardous waste manifests with special focus to identify and track mercury-containing waste transferred in and out of Michigan annually. (See **Chapter 2.4.1**)
- 1.10) Compile mercury use and release information generated from the Toxics Release Inventory and Annual Wastewater Report and compare the data to the current baseline to address any inaccuracies. (See **Table ES-1, Table 2.8**)

GOAL 2 - ELIMINATION/REDUCTION ACTIVITIES: ELIMINATE ANTHROPOGENIC MERCURY USE AND RELEASES TO THE ENVIRONMENT IN MICHIGAN THROUGH VARIOUS APPROACHES IN ORDER TO MEET DESIGNATED WATER USES IN THE STATE, INCLUDING FISH CONSUMPTION.

To assist in measuring progress toward the final goal of elimination of anthropogenic mercury use and releases, the MSWG developed the following two interim goals after reviewing current reduction activities and recommended reductions from specific sectors in Michigan, as well as the Lake Superior Bi-National Strategy and the Northeast Governors and Eastern Canadian Premiers' Mercury Action Plan [further information is available in **Chapter 5.4**.]):

- ▶ **REDUCE ANTHROPOGENIC MERCURY USE AND RELEASES IN THE STATE BY 50% BY 2010;**
- ▶ **REDUCE ANTHROPOGENIC MERCURY USE AND RELEASES IN THE STATE BY 90% BY 2015.**

THE MSWG RECOGNIZES THAT FOR THIS STRATEGY IMPLEMENTATION TO SUCCEED, THE MDEQ NEEDS TO ENSURE THAT THE MERCURY STRATEGY IS A PRIORITY AND THAT SUFFICIENT RESOURCES ARE DEDICATED TO THIS IMPORTANT MULTI-MEDIA CONCERN. RESOURCES SHOULD BE DEDICATED TO FULLY FUND THE NECESSARY STAFF IN EACH DIVISION AND/OR BUREAU WITH RESPONSIBILITIES TO TRACK, IMPLEMENT, AND EVALUATE PROGRESS UNDER MERCURY POLLUTANT MINIMIZATION PROGRAMS, MERCURY EDUCATION AND OUTREACH PROGRAMS, AS WELL AS MERCURY MONITORING AND EVALUATION PROGRAMS.

The Goal 2 Elimination/Reduction Activities have been broken down into four separate categories with each category containing its own action steps. These following categories are: Regulatory Approaches, Collaboration/Partnerships, Education/Outreach, and Monitoring/Research.

REGULATORY APPROACHES

ACTION STEPS:

- RA-2.1) For new or modified air sources, develop a mercury impacts assessment guidance document that includes a recommendation for *de minimus* emission and/or deposition quantities allowed (clarification of NREPA Part 55, R 336.1228). Clarify how NREPA Part 55, R 336.1290 (permit to install exemptions) addresses mercury emissions.

- These *de minimus* amounts would not expect to cause or significantly contribute to exceedances of any health protective standards. If the *de minimus* amount is exceeded, this guidance document should also identify when a multipathway risk assessment is required and when a less vigorous screening evaluation may be sufficient, and recommend an approach for this assessment. (See **Chapter 3.1.2**)
- RA-2.2) **DEVELOP GENERAL AND/OR SOURCE SPECIFIC AIR QUALITY RULES FOR ATMOSPHERIC MERCURY RELEASES THAT APPLY TO NEW, MODIFIED, AND EXISTING SOURCES. THESE RULES SHOULD UTILIZE THE APPLICABLE RECOMMENDATIONS CONTAINED WITHIN THE MERCURY IMPACTS ASSESSMENT GUIDANCE DOCUMENT DESCRIBED IN RA-2.1. THE SOURCE CATEGORIES SHALL INCLUDE, BUT ARE NOT LIMITED TO:**
- ▶ **COAL-FIRED EGUS, REQUIRING 90% REDUCTION OF MERCURY BY 2015 OR AN ALTERNATIVE EMISSION LIMIT.** These rules are currently in development. (See **Chapter 2.1.2**)
 - ▶ **PORTLAND CEMENT PLANTS.**
 - ▶ **SEWAGE SLUDGE INCINERATORS.**
 - ▶ **MANUFACTURING FACILITIES THAT USE AND RELEASE MERCURY.**
- Examples from other states can be followed. (See **Chapter 3.1.2**)
- RA-2.3) Support the adoption of legislation that will phase out the sale of mercury-containing products in instances where viable mercury-free products exist, and require labeling for any remaining mercury-containing products based on the model legislation developed by NEWMOA. (See **Chapter 3.7.1**)
- RA-2.4) **ALL AIR EMISSION SOURCES EMITTING MERCURY SHALL REPORT THEIR EMISSIONS TO THE MDEQ EACH YEAR. A REPORTING THRESHOLD WILL BE ESTABLISHED AND A FEE REQUIRED FOR THE FACILITIES THAT EMIT OVER A CERTAIN AMOUNT OF MERCURY AS DETERMINED BY A STAKEHOLDER WORKGROUP. THIS REPORTING THRESHOLD SHALL BE NO GREATER THAN 5 POUNDS PER YEAR.** (See **Table 2-1**)
- RA-2.5) **DEVELOP AIR QUALITY RULES THAT REQUIRE STACK TESTING FOR MERCURY FOR ALL NEW OR MODIFIED MERCURY-EMITTING SOURCES. FOR CERTAIN SOURCES, REQUIRE SPECIATED STACK TESTING OR CONTINUOUS EMISSION MONITORS FOR ALL NEW OR MODIFIED MERCURY-EMITTING SOURCES.** (See **Chapter 6.1.5**)
- RA-2.6) **DEVELOP RULES FOR REMOVAL OF MERCURY-ADDED PRODUCTS FROM BUILDINGS PRIOR TO BEING DEMOLISHED.** (See **Chapter 3.1.2**)
- RA-2.7) **REVIEW AND EVALUATE VARIOUS MERCURY TOTAL MAXIMUM DAILY LOAD (TMDL) APPROACHES IN THE NATION AND DEVELOP MERCURY TMDLS IN MICHIGAN FOR IMPAIRED WATERBODIES BY 2011, UNLESS THE 5M APPROACH IS UTILIZED. IF THE 5M APPROACH IS SELECTED, SIGNIFICANT RESOURCES MUST BE DEDICATED FOR IMPLEMENTATION OF THIS STRATEGY.** (See **Chapter 3.2.1**)
- RA-2.8) **ASSURE COMPLIANCE/ENFORCEMENT OF CLEAN-UP OBLIGATIONS WITH EXISTING (AT THE FINAL DATE OF THIS REPORT) STANDARDS (SUCH AS DRINKING WATER AND DIRECT CONTACT STANDARDS) AT CURRENT LEGACY SITES.** (See **Chapters 2.3 and 3.3**)
- RA-2.9) **SUPPORT DEVELOPMENT OF A COMPREHENSIVE COLLECTION NETWORK IN MICHIGAN THAT ACCEPTS MERCURY-ADDED PRODUCTS, SUCH AS THERMOMETERS, BAROMETERS, THERMOSTATS, INCLUDING FLUORESCENT LIGHTS, ETC. PRIORITY SHOULD BE GIVEN TO AREAS WHERE MUNICIPAL WASTE IS INCINERATED. ONCE THIS COLLECTION NETWORK IS ESTABLISHED, SUPPORT THE ADOPTION OF FURTHER LEGISLATION THAT BANS DISPOSAL OF THESE MERCURY-ADDED PRODUCTS IN THE MUNICIPAL WASTE STREAMS.** (See **Chapter 3.7**) (*This recommendation is linked to **Action Step: E/O-2.1***). If Michigan adopts an energy efficiency program as recommended in the 21st Century Energy Plan, part of that program should be used to support collection of mercury-containing items. (See **Chapter 5.1**).

- RA-2.10) **RECOMMEND TO MUNICIPALITIES WITH MERCURY MINIMIZATION PROGRAMS THAT THEY REQUIRE CERTIFIED DENTAL AMALGAM SEPARATORS OR EQUIVALENT TECHNOLOGY AS APPROVED BY THE MDEQ BY 2009. FOR DENTAL OFFICES USING SEPTIC SYSTEMS, REQUIRE THE USE OF DEDICATED ISOLATED HOLDING TANKS FOR DENTAL MERCURY AMALGAM WASTE BY 2009. ADDITIONALLY, DENTAL PRACTICES SHOULD BE REQUIRED TO USE “BEST MANAGEMENT PRACTICES” FOR DENTAL AMALGAM MANAGEMENT WHICH INCLUDES PROPER OPERATION AND MAINTENANCE OF THIS EQUIPMENT, AS WELL AS PROVISIONS REQUIRING WASTE MANIFEST TRACKING OF DENTAL AMALGAM WASTE. (See *Chapters 4.4.2 and 5.2*)**
- RA-2.11) **REQUIRE ALL DENTAL PRACTICES IN MICHIGAN THAT PLACE OR REMOVE MERCURY AMALGAM FILLINGS TO INSTALL DENTAL AMALGAM SEPARATORS OR EQUIVALENT TECHNOLOGY AS APPROVED BY THE MDEQ BY 2011. ADDITIONALLY, DENTAL PRACTICES SHOULD BE REQUIRED TO USE “BEST MANAGEMENT PRACTICES” FOR DENTAL AMALGAM MANAGEMENT WHICH INCLUDES PROPER OPERATION AND MAINTENANCE OF THIS EQUIPMENT, AS WELL AS PROVISIONS REQUIRING WASTE MANIFEST TRACKING OF DENTAL AMALGAM WASTE. (See *Chapters 3.7, 4.4.2, and 7.5*)**
- RA-2.12) The MDEQ will continue to encourage removal of mercury switches from end-of-life vehicles through various measures, including participation in the National Mercury Vehicle Switch Recovery Program and incorporating mandatory switch removal requirements in air permits issued by the AQD for new or expanded steel manufacturing facilities and shredders. The AQD will continue to monitor compliance with the mercury switch removal requirement in the five existing air permits for shredders. (See *Chapter 7.1.8*)
- RA-2.13) By September 1, 2008, the MDEQ’s Water Bureau (WB) will write a letter to all auto recycling facilities covered by a Storm Water Discharge Permit, including salvage yards and shredders, strongly encouraging them to participate in the National Mercury Vehicle Switch Recovery Program. Notice of this request should also be communicated to the Automotive Recyclers of Michigan and the Michigan Chapter of the Institute of Scrap Recycling Industries. (See *Chapter 4.2.2 and Table 2-10*)
- RA-2.14) **THE MDEQ’S WB SHOULD DEVELOP A SECTOR SPECIFIC STORMWATER PERMIT FOR AUTO SALVAGE YARDS. INCLUDED IN THE PERMIT SHOULD BE A PROVISION REQUIRING THE REMOVAL OF MERCURY SWITCHES. BEFORE THE DEVELOPMENT AND ISSUANCE OF THIS PERMIT, THE WB NEEDS TO CONDUCT APPROPRIATE STORMWATER MONITORING AT REPRESENTATIVE FACILITIES. (See *Chapter 4.2.2*)**
- RA-2.15) Develop a general air permit that controls mercury released from fluorescent bulb drum crushers. (See *Chapter 6.1.1 and Appendix S*)
- RA-2.16) Utilize enforcement activities such as supplemental environmental projects (SEPs) to help implement MSWG recommendations including activities associated with the reduction, disposal, and/or recycling of mercury. Use the summary of successful SEPs utilized in Michigan to identify, monitor, or reduce mercury use and release in Michigan. (See *Chapter 4.2.10*). The MSWG should develop a list of recommended SEPs for future mercury project funding consideration.
- RA-2.17) Develop a moratorium on new medical and solid waste incinerators. (See *Chapter 3.1.2*)

COLLABORATION/PARTNERSHIPS

ACTION STEPS:

- C/P-2.1) Continue to have the Michigan MSWG coordinate multi-media policies/regulations/permits and educational material as it relates to mercury. Include contact information on the MDEQ website. (See *Chapter 8*)

- C/P-2.2) Collaborate with the other seven Great Lakes States to develop a regional mercury emission reduction initiative similar to the Great Lakes *Mercury in Products Phase-Down Strategy* (see **Chapters 4.3 and 5.4.4**) and the New England Governor/Eastern Canadian Premiers Mercury Action Plan. (See **Chapter 5.4.2**)
- C/P-2.3) **INVESTIGATE AND EXPLORE THE DEVELOPMENT OF A MECHANISM TO ENSURE THAT MERCURY COLLECTED OR RECOVERED IN MICHIGAN IS USED ONLY FOR ESSENTIAL USES. EXPLORE THE CURRENT BARRIERS REGARDING EXPORTATION OF NONESSENTIAL MERCURY USES TO OTHER STATES OR COUNTRIES.** (See **Chapter 2.5**)
- C/P-2.4) **CONTINUE PARTICIPATION AND COLLABORATION WITH QSC EFFORTS, THE EPA'S REGION 5 MERCURY WORKGROUP, THE REGIONAL MERCURY MONITORING WORKGROUP FACILITATED BY THE GREAT LAKES COMMISSION, EPA/ENVIRONMENT CANADA'S BI-NATIONAL TOXICS STRATEGY, THE ONTARIO MINISTRY OF THE ENVIRONMENT ON THE RENEWED EFFORT TO REDUCE MERCURY, EPA'S MERCURY ROADMAP, EPA/MDEQ CHILDREN'S HEALTH INITIATIVES, THE GREAT LAKES MERCURY IN PRODUCTS PHASE-DOWN STRATEGY WORKGROUP, THE LAKE-WIDE AREA MANAGEMENT PLANS REQUIRED UNDER THE GREAT LAKES WATER QUALITY AGREEMENT, ETC., TO SHARE RESOURCES AND KNOWLEDGE IN WORKING FOR COMMON REDUCTION GOALS.** (See **Chapter 5.4**)
- C/P-2.5) Continue ensuring the successful transition of the Michigan Mercury Switch Sweep Program into the National Vehicle Mercury Switch Recovery Program for mercury-containing auto switches, and report annually on its success. (See **Chapter 4.2.2**)
- C/P-2.6) Recommend mercury reductions in biosolids by focusing further efforts on reducing wastewater inputs with local communities, notably from the dental and health care sectors. (See **Chapters 4.4.1 and 4.4.2**).
- C/P-2.7) **CONTINUE TO WORK WITH VARIOUS STAKEHOLDERS ENSURING IMPLEMENTATION OF THE GOVERNOR'S 21ST CENTURY ENERGY PLAN, INCLUDING THE ADOPTION OF A RENEWABLE PORTFOLIO STANDARD TO INCREASE THE USE OF RENEWABLE RESOURCES AND IMPROVE CONSERVATION ENERGY EFFICIENCY PROGRAMS, THEREBY DECREASING MICHIGAN'S RELIANCE ON FOSSIL FUELS. INCENTIVES SHOULD ALSO BE PROVIDED FOR CLEAN ENERGY.** (See **Chapters 5.1 and 7.1.6**)
- C/P-2.8) **CONTINUE PARTICIPATION IN THE SCHOOLS CHEMICAL CLEANOUT CAMPAIGN FOR MERCURY.** (See **Chapter 4.2.8**).
- C/P-2.9) Continue to promote and support the "Catch the Fever" Michigan Mercury Thermometer Exchange program, partnering with the Michigan Association for Local Public Health (possibly through enhanced SEPs). (See **Chapter 4.2.5**)
- C/P-2.10) **SUPPORT THE QUICKSILVER CAUCUS RESOLUTION ON THE SEQUESTRATION OF ELEMENTAL MERCURY [Hg(0)]. DEDICATE RESOURCES AND SUPPORT MEASURES THAT RESTRICT THE EXPORTATION OF Hg(0) TO DEVELOPING COUNTRIES.** (See **Chapter 5.3**).
- C/P-2.11) **QUANTIFY COLLECTION OF Hg(0) WITHIN THE STATE AND DETERMINE ITS FATE.** (See **Chapter 4.2.7 and Table 4-1**)
- C/P-2.12) **JOIN THE INTERSTATE MERCURY EDUCATION AND REDUCTION CLEARINGHOUSE TO SUPPORT STATE EFFORTS THAT PHASE OUT THE SALE OF CERTAIN MERCURY PRODUCTS AND REQUIRE ALL OTHER PRODUCTS TO BE LABELED.** (See **Chapters 3.7.2 and 4.4.2**)
- C/P-2.13) Encourage manufacturers to choose mercury-free components when developing their products regardless of how small the amount of mercury (i.e., mercury in batteries, fluorescent lights, switches, etc.). (See **Chapter 2.5**).
- C/P-2.14) **ENSURE THOSE INVOLVED IN ADMINISTERING THE NEW "GREEN CHEMISTRY" INITIATIVE (ESTABLISHED BY GOVERNOR'S EXECUTIVE DIRECTIVE) INCORPORATE MEASURES CONSISTENT WITH THE GOALS OF THIS STRATEGY TO ELIMINATE MERCURY USE AND RELEASES.** (See **Chapter 4.2, Appendix P**).

- C/P-2.15) Encourage mercury reduction commitments through MDEQ's voluntary P2 programs and ensure that mercury P2 opportunities are incorporated into the Clean Corporate Citizen, Michigan Business Pollution Prevention Partnership, Environmental Management Systems, the Michigan Turfgrass Program, the Clean Marina's Initiative, and the Pulp and Paper P2 Partnership. (See **Chapter 1.4**)

EDUCATION/OUTREACH

ACTION STEPS:

- E/O-2.1) **CONDUCT OUTREACH TO MICHIGAN'S CITIZEN'S ABOUT EXISTING MERCURY COLLECTION DROP-OFF OPPORTUNITIES WITHIN THE STATE. (See Chapter 4.2.7)**
- E/O-2.2) **RECOMMEND TO MDCH TO RESTORE FUNDING FOR UPDATING AND PUBLISHING THE MICHIGAN FISH CONSUMPTION ADVISORY. INFORMATION SHOULD BE INCLUDED ON HEALTH RISKS AND BENEFITS OF FISH CONSUMPTION AS BOTH METHYLMERCURY AND OMEGA-3 FATTY ACID LEVELS IN FISH ARE HIGHLY VARIABLE. EXPAND DISTRIBUTION OF MATERIALS DEVELOPED FOR THE SAGINAW BAY WATERSHED REGARDING FISH CONSUMPTION EDUCATION. (See Chapter 1.3)**
- E/O-2.3) **ASSIST IN OUTREACH ON MERCURY EXPOSURE RISKS AND REDUCTION ACTIVITIES TARGETING LOCAL OUTREACH TO RURAL AREAS, URBAN CENTERS, AND TRIBES THAT POTENTIALLY COULD BE EXPOSED TO MORE MERCURY THAN THE GENERAL PUBLIC. (See Chapter 1.3).**
- E/O-2.4) Identify gaps and provide training for MDEQ staff with regard to emerging mercury issues. This training would include relevant information on any new mercury legislation and/or state policies. Technical training should also be developed for emerging and existing control technologies, such as fluorescent bulb crushers, mercury auto switch recovery, and combustion sources. (See **Chapter 8**)
- E/O-2.5) **EXPAND EDUCATION/OUTREACH TO THE PUBLIC. THIS INCLUDES DEVELOPING A COMPREHENSIVE MDEQ MERCURY WEB PAGE, UPDATING AND DISTRIBUTING THE SMALL MERCURY SPILLS FACT SHEET, PROMOTING THE INCREASED USE OF ENERGY EFFICIENT LAMPS SUCH AS COMPACT FLUORESCENT LIGHTS (CFL) AND ENCOURAGE THE RECYCLING OF CFLs. (See Chapters 2.5 and 2.6)**
- E/O-2.6) As necessary, advocate semi-annual mercury spill response and prevention training for County Health Departments/Fire Departments in collaboration with MDCH. (See **Chapter 2.6.3**)
- E/O-2.7) **CONDUCT OUTREACH TO MICHIGAN'S HEATING VENTILATION AND AIR CONDITIONING WHOLESALERS, HOME IMPROVEMENT STORES, AND CONTRACTORS TO INCREASE THE COLLECTION OF MERCURY-CONTAINING THERMOSTATS UTILIZING METHODS SUCH AS THE THERMOSTAT RECYCLING CORPORATION OR OTHER VOLUNTARY INITIATIVES, AND/OR WORKING WITH OTHER LOCAL GOVERNMENTAL AGENCIES. (See Chapter 4.4.3)**
- E/O-2.8) Work with insurance companies and employee unions to ensure cost coverage for non-mercury dental composites reimbursement that is equal to amalgams. (See **Chapter 4.2.6**)
- E/O-2.9) Continue outreach to schools to ensure compliance with Michigan's regulation prohibiting use of Hg(0) and mercury-containing instruments in Michigan's K-12 schools. Post a list of mercury-free schools on MDEQ website. (See **Chapter 4.2.8**)
- E/O-2.10) Educate insurance companies on the hazards of mercury in the home and ask them to consider offering incentives such as discounts on premiums for mercury-free homes (emphasis on mercury thermometers and thermostats). (See **Chapter 2.6**)
- E/O-2.11) Educate crematories on the hazards of mercury and encourage an environmentally preferred solution to decrease mercury emissions. (See **Chapter 2.1.2**)

- E/O-2.12) **WORK TOWARD BUILDING VOLUNTARY PARTNERSHIPS WITH “HOME IMPROVEMENT” STORES FOR EDUCATING CONSUMERS ABOUT MERCURY-FREE PRODUCTS AND TO COLLECT SPENT MERCURY-ADDED PRODUCTS SUCH AS LAMPS AND THERMOSTATS. (See *Chapter 4.4.3*)**

MONITORING/RESEARCH

ACTION STEPS:

- M/R-2.1) **RECOMMEND A COMPREHENSIVE MERCURY STUDY BE CONDUCTED THAT IDENTIFIES THE PROCESSES AND ECOSYSTEM CHARACTERISTICS THAT GOVERN THE MOVEMENT OF MERCURY FROM THE ATMOSPHERE, THROUGH AQUATIC ECOSYSTEMS AND WITHIN THE FOOD CHAIN AND IDENTIFIES SOURCE CONTRIBUTIONS. ALSO PROMOTE THE RECOMMENDATIONS PROVIDED IN THE REPORT BY THE GREAT LAKES STATES MERCURY DEPOSITION MONITORING DISCUSSION GROUP. (See *Chapter 6.1.2*).**
- M/R-2.2) **RECOMMEND A STUDY BE CONDUCTED ON NATIVE MICHIGAN POPULATIONS MOST AT RISK EXAMINING THEIR EXPOSURE AND RISKS TO MEHG VIA FISH CONSUMPTION. (See *Chapter 1.3.1*)**
- M/R-2.3) **MDEQ SHOULD REVIEW THE MERCURY WATER QUALITY STANDARD (WQS) IN COOPERATION WITH EPA AND STAKEHOLDER, IN LIGHT OF NEW SCIENCE TO DETERMINE WHETHER CHANGES TO THE WQS ARE NECESSARY AND FEASIBLE. (See *Chapter 3.2.1*)**
- M/R-2.4) **CONTINUE THE PARTNERSHIP WITH THE UNIVERSITY OF MICHIGAN’S AIR QUALITY LABORATORY TO ASSESS TEMPORAL AND SPATIAL TRENDS OF MERCURY DEPOSITION IN THE STATE AND TO IDENTIFY SOURCE REGIONS WITHIN THE STATE. (See *Chapter 6.1.2*).**
- M/R-2.5) Continue the partnership with Wisconsin and Minnesota for utilizing the mercury monitoring laboratory to assess atmospheric fugitive releases in the tri-state region. (See *Chapter 6.1.1*)
- M/R-2.6) Track MDCH reporting of mercury via surveillance system based on lab reporting requirement for arsenic, mercury, cadmium, and cholinesterase clinical tests. (See *Chapter 3.6*)
- M/R-2.7) Review current water and fish monitoring efforts, revise as necessary, and track spatial and temporal trends. (See *Chapters 1.3 and 6.2.5*)
- M/R-2.8) **ENCOURAGE RESEARCH ON CONTROL TECHNOLOGY FOR REMOVAL OF LOW-LEVEL MERCURY FROM MUNICIPAL OR INDUSTRIAL WASTEWATER, SUCH AS THE MESABI NUGGET MERCURY FILTER (PATENT PENDING). (See *Chapter 7.5*)**
- M/R-2.9) **RE-EVALUATE THE SOIL BACKGROUND MERCURY CRITERIA UNDER PART 201 FOLLOWING A COMPREHENSIVE LITERATURE REVIEW AND DISCUSSION WITH APPROPRIATE EXPERTS; IMPLEMENT ADDITIONAL MONITORING STUDIES AS RESOURCES ALLOW. (See *Chapter 1.5, Table 1-4*)**
- M/R-2.10) **RECOMMEND A PILOT STUDY ON THE BEST AVAILABLE CONTROL TECHNOLOGY TO CONTROL MERCURY EMISSIONS RELEASED FROM PORTLAND CEMENT PLANTS. (See *Chapter 2.1.2*)**
- M/R-2.11) Evaluate the efficacy of the mercury WQS for rivers and connecting channels as compared to lakes. (See *Chapter 3.2.1*)

GOAL 3 – MEASURING SUCCESS: CREATE A MECHANISM TO MEASURE PROGRESS TOWARD THE GOAL OF ELIMINATING ANTHROPOGENIC MERCURY USE AND RELEASES TO THE ENVIRONMENT IN MICHIGAN, USING DEFINED BASELINE DATA.

In order to evaluate the success of achieving the mercury use and release reductions, a baseline must be established in order to measure progress. The details of this baseline will be developed as part of the MSWG's implementation plan. Because there has been a significant reduction in certain sectors such as hospital medical infectious waste incinerators and municipal waste combustors as well as a reduction in product usage, it will be difficult to obtain additional reductions if a fairly recent baseline is used. Therefore, a baseline may be used that is similar to that set by the EPA Bi-National Strategy of 1990 to continue to work on achieving 90% reduction (which is beyond the Bi-National Strategy goals). For coal-fired EGUs, the baseline of 90% reduction by 2015 will mirror the baseline that will be a part of the regulations being developed for this sector as directed by Governor Granholm in her letter to MDEQ Director Chester (see **Appendix E**).

ACTION STEPS:

- 3.1) **ALLOCATE SUFFICIENT RESOURCES TO CREATE DETAILED SPECIATED MERCURY AIR EMISSIONS INVENTORIES AND INVENTORIES OF MERCURY RELEASES TO OTHER MEDIA, MONITOR, TRACK AND REPORT REDUCTIONS OVER TIME.**
- 3.2) **DEVELOP A TRACKING DATABASE TO EVALUATE AND REPORT THE PROGRESS FOR IMPLEMENTATION OF THE MDEQ MERCURY STRATEGY. A DETAILED BASELINE WILL BE DEVELOPED IN THE IMPLEMENTATION PLAN. SUMMARIZE AND REPORT ON PROGRESS IN 2011 AND 2016.**