New Jersey Mercury Reduction Action Plan

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Prepared by the New Jersey Department of Environmental Protection Mercury Workgroup

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A. Background

Mercury is a persistent, bio-accumulative toxin with a complex environmental behavior in air, water, and soil. It can be found in solid, liquid, or vapor form. Mercury can cause a variety of harmful health effects including damage to the brain, central nervous system, and kidneys and is particularly harmful to children, prenatal life and infants through the toxin's exposure to both pregnant and nursing women. Mercury is used in a wide variety of household products, is found naturally in some forms of coal, can be discharged into waterways, and is emitted into the air through a variety of industrial processes. When mercury enters lakes and waterways it undergoes a natural chemical process and is converted to a more toxic form – methylmercury. The methylmercury builds up in the tissue of fish and animals, increasing its concentration as it moves up through the food chain, which results in high levels of mercury in some of the foods we eat.

Since 1982, when research began to show elevated levels of potentially harmful contaminants in certain fish and crabs in some New Jersey waters, fish consumption advisories have been adopted to guide citizens on safe consumption practices. Fish consumption advisories are developed through a scientific process that includes collecting samples of fish from waters throughout the state and analyzing them for various chemical contaminants, such as dioxin, PCBs and mercury. The current fish advisories for New Jersey waterways are available at http://www.state.nj.us/dep/dsr/fishadvisories/2009FishAdvisoryBrochure.pdf.

New Jersey began working to reduce mercury releases to the environment in 1992 with the formation of a Mercury Task Force. That Task Force examined the many routes and sources of mercury exposure and found air emissions to be the number one source of mercury contamination in New Jersey. The Task Force identified the largest source of mercury air emissions in New Jersey as municipal solid waste (MSW) incinerators. The Task Force recommended a statewide mercury emission standard for MSW incinerators, which was implemented in 1996. In addition to the MSW incinerator standards, New Jersey passed the "Dry Cell Battery Management Act" in 1992, banning the use of mercury in certain batteries. These two efforts reduced MSW incinerator mercury emissions by 97% between 1992 and 2006.

In 1998, New Jersey convened a second Mercury Task Force. The second Task Force consisted of representatives from government, emission sources, public interest groups, academia, and fishing organizations. This Task Force was charged with reviewing the current science on mercury impacts on human health and ecosystems, inventorying and assessing mercury sources, and developing a comprehensive mercury reduction plan for New Jersey. The "New Jersey Mercury Task Force Report" published in December 2001 established a goal of the virtual elimination of anthropogenic, or man-made, sources of mercury and provided recommendations and targets for further reducing mercury emissions in New Jersey. The 2001 Task Force Report is available at http://www.nj.gov/dep/dsr/mercury_task_force.htm and a summary of the recommendations of the Task Force are included in Appendix I.

In 2007 the New Jersey Department of Environmental Protection's (Department's or NJDEP's) Mercury Workgroup evaluated New Jersey's progress towards meeting the goals and recommendations of the Task Force. Following a presentation to former Commissioner Lisa Jackson on October 30, 2007, the Mercury Workgroup was charged with putting together a Mercury Reduction Plan to identify the necessary next steps to continue to reduce mercury emissions in New Jersey.

During the preparation of the Mercury Reduction Action Plan, the Department began developing a statewide Total Maximum Daily Load (TMDL) for impaired assessment units where mercury fish tissue concentrations are likely to be caused by mercury from air deposition. Portions of this Reduction Plan were utilized in the TMDL. The TMDL was noticed in the New Jersey Register on June 15, 2009 and is available on-line at
http://www.nj.gov/dep/watershedmgt/DOCS/TMDL/tmdl_mercury_061509.pdf

B. Goals, Milestones, and Targets

The 2001 Task Force Report established a target of a 75% reduction in mercury from air emissions below the estimated 1990 levels by 2006 and an 85% reduction by 2011 (see chart in Appendix II). Based on the emissions data available to the Department, a reduction of 67% was achieved by 2006. This percentage calculation is based on actual emissions data for 2006, and on estimated emissions from sources for which emissions data were not available. These mercury data, with additional explanations, are reported in a table in Appendix III and charts in Appendices IV and V.

Quantities of estimated anthropogenic releases of mercury to water and land have been revised since the Task Force report was completed. The Task Force estimated mercury releases to surface water by calculating mercury concentrations in wastewater by analyzing NJDEP Discharge Monitoring Reports and assuming that non-detect values represented concentrations of mercury of one half the detection limits. This analysis resulted in an estimated total mercury load in wastewater discharges of approximately 820 pounds per year. Recent measurements of mercury concentrations in wastewater and estimations based on mercury content in treatment plant sludge suggest that mercury concentrations in wastewater plant effluent are in the range of 30 nanograms per liter (ng/l), with influent perhaps in the range of 150 ng/l. Since the daily effluent flow from New Jersey wastewater plants is approximately 1.1 billion gallons, this concentration leads to an estimated quantity of mercury in wastewater plant effluent of approximately 100 pounds per year. This quantity would be augmented by the discharges of wastewater to soil and groundwater from on-site septic systems. The Task Force estimated that approximately 15% of the State's population discharges their wastewater through septic systems. This latter flow could be expected to have a mercury concentration similar to wastewater plant influent. It is unknown what part of the mercury would be transferred to the treatment plants, when septic tanks are pumped, and what part would be released to the land.

This Reduction Plan provides the actions needed to further reduce mercury emissions and to meet the 85% reduction goal by 2011.

C. Progress Summary

Since the publication of the 2001 Mercury Task Force Report, New Jersey has implemented the following recommendations.

1) Air Sources

New Jersey adopted regulations on December 6, 2004 to establish new requirements on the emission of mercury for various categories of facilities. These regulations have resulted in decreased mercury emissions as shown in the table in Appendix VII. All of the regulations are located at http://www.state.nj.us/dep/aqm/Sub27-120604.pdf. The following categories were included in the rule adoptions:

a) Coal-fired boilers - New Jersey's power plant mercury regulations apply to all coal-fired boilers in the State. At the time of this report, there were ten coal-fired boilers operating in New Jersey. These electric-generating units emitted approximately 700 pounds of mercury per year from the late 1990s to 2001, causing this industry to be the second largest source category of mercury emissions in New Jersey. The source of the emissions is from the mercury contained in the coal. Since December 2007, New Jersey power plants have been required to prevent 90% of the mercury contained in coal from being emitted into the air or meet a strict regulatory emission limit of 3 milligrams of mercury per megawatt hour. New Jersey believes that these two options will result in comparable reductions. The Department adopted this combination standard to base the mercury emission limit on the median level of mercury in coal and the percent reduction standard on the highest mercury levels in coal. This ensures that significant reductions occur for coal containing the median level of mercury, and coal containing higher levels of mercury can still be burned with good air pollution control.

   Final compliance with the New Jersey rule is required by December 2012, for companies implementing a multi-pollutant control strategy. A company that commits to substantially reducing air pollution that causes smog, soot and acid rain, as well as mercury, has an additional five years to comply from December 2007 to December 2012, if mercury emission reductions are phased in with concurrent reductions of particulates, sulfur dioxide and nitrogen oxides. The Department expects this rule to result in a reduction in mercury emissions from coal-fired boilers of greater than 400 pounds per year by the end of 2012. (The actual emissions reduction is not 90% because existing control systems already control mercury to some degree, with four units already achieving over 90% control.)

   Recent mercury stack test data with carbon injection control on coal fired boilers indicate compliance with the New Jersey standard is achievable as shown below:

Stack test results at New Jersey coal-fired boilers

Plant Name	**Mercury Control**	**Test Results**	**Removal Efficiency (%)**	**NJ Standard**
Mercer Unit 1 Unit 2	Carbon and Electrostatic precipitator for particulate control (ESP)	1.64 mg/MW-hr (gross) 2.00 mg/MW-hr (gross)	**	3 mg/MW-hr or 90% removal
BL England Unit 2	Carbon, ESP, and scrubber	1.24 mg/MW-hr (gross)	96.8	Same as above
Deepwater	None added*	1.51 mg/MW-hr (net)	**	Same as above
Carneys Point Generating Plant Unit 1 Unit 2	None added*	1.5 mg/MW-hr 2.6 mg/MW-hr	** **	Same as above
Logan	None added*	1.15 mg/MW-hr	> 96	Same as above

* No mercury specific control. These electric generating units have low NOx burners and baghouses (which provide a substrate for capturing the mercury).
** Not tested. 3 mg/MWhr is about 90% control for median mercury content coal.

Note: These results are for the seven units that already comply with the New Jersey mercury standard. The remaining three units (BL England-Unit 1, Vineland Electric Utility Facility, and Hudson Generating Station) are due to comply between 2010 and 2013, consistent with enforcement agreements.

b) Iron and steel melters – This rule also requires the addition of carbon adsorption systems with baghouse control on iron and steel melters. The Department provided iron and steel melters three years to reduce mercury contamination of scrap metal through elimination and separation measures. The Mercury Switch Removal Act, described in greater detail under the Mult-Media Sources section of this Plan, has reduced mercury emissions, but not sufficiently. If the source reduction measures do not achieve sufficient emission reduction, the rule requires the installation and operation of mercury air pollution control to achieve the mercury standard of 35 milligrams per ton (mg/ton) starting January 2010.

In New Jersey, there have been six iron and steel melting facilities in operation. Since New Jersey took measures to reduce mercury emissions from municipal solid waste incinerators, iron and steel melters became the largest mercury emitting source category in the state. Past stack tests conducted, pursuant to permit conditions, at five of the facilities indicated that total mercury emissions were in the range of 1000 pounds per year. Mercury emission concentrations for iron and steel production are in the range of 10 to 100 micrograms per dry standard cubic meter (µg/dscm). The performance standard

for iron and steel melters is designed to reduce mercury emissions through a combination of pollution prevention, source separation, and emission controls.

The Department expected a reduction in mercury emissions of approximately 700 pounds per year upon implementation of the rules for this industry. Actual reductions have been higher because of plant shutdowns and the implementation of control measures, most notably carbon adsorption, which achieved greater than 75% mercury reductions. Based on stack tests of the operating units, mercury emissions are now about 75 pounds per year.

The rules also include work practice standards for iron and steel melters similar to the Federal Maximum Achievable Control Technology (MACT) rules applicable to the iron and steel industry. The owner or operator of iron or steel melters submits to the Department for approval a written certified mercury minimization or source separation plan to minimize the amount of mercury in scrap processed at the facility. The rules require iron and steel melters to implement a plan for inspecting incoming scrap to assure that only mercury-minimized scrap is purchased. The rules require each facility to maintain on site copies of the mercury minimization and source separation plan, records reflecting the results of visual inspections, and a copy of the procedures that each supplier uses to remove mercury from scrap provided to the facility.

The two New Jersey melters operating at the time this Plan was issued, Atlantic States Iron and Steel Foundry and Gerdaua Ameristeel, have taken significant steps to comply with the rules, including both source separation and add-on controls. In 2006, Atlantic States installed an activated carbon injection system and a baghouse. Mercury emission test results at this plant show greater than 90% mercury control and less than three mg/ton mercury emissions. The mercury emissions are well below both of the New Jersey mercury rule limits. Gerdau Ameristeel, with existing fabric filter control on an electric arc furnace, has also installed a carbon injection system. Stack tests conducted in 2008 show greater than 90% mercury control and less than three mg/ton mercury emissions.

c) Hospital/medical/infectious waste (HMIW) incinerators: The NJDEP adopted a mercury emission limit of 55 µg/dscm for HMIW incinerators, which is more stringent than the United States Environmental Protection Agency's (EPA's) 550 µg/dscm standard. This emission level is consistent with the New England Governors/Eastern Canadian Premiers' Mercury Action Plan and standards adopted by several northeast states. Also, stack test results show that the 55 µg/dscm limit was being achieved at all HMIW incinerators.

Medical waste, which includes infectious and non-infectious waste from medical and veterinary offices, clinics, and hospitals, was incinerated at three facilities in New Jersey, including hospitals and research facilities. Stack tests carried out pursuant to NJDEP permits indicate that the total emissions from these facilities were very low, in the range of 2 pounds per year. Pollution prevention measures, including source reduction, re-use, and separation prior to incineration had been effective at controlling mercury from these

facilities. These practices are still being employed to a large degree, and this is a major reason emissions from this sector were so low in New Jersey. Mercury sources in medical waste could include batteries, fluorescent lamps, thermometers, plastic pigments, antiseptics, diuretics, infectious waste bag pigments and CAT scan paper. Also, all hospital waste incinerators have shut down, with the last in 2008.

d) Municipal solid waste (MSW) incinerators: The December 2004 rules require MSW incinerators to further reduce their mercury emissions. The 1994 New Jersey rules required an emission standard of 28 μg/dscm or an 80 percent emission reduction. Testing has demonstrated that carbon injection on MSW incinerators can consistently achieve over 95 percent mercury reduction with baghouse particulate collection. Based on the demonstrated success of carbon injection, the Department in 2004 amended the State's air pollution control regulation to further reduce mercury emissions.

   The 2004 amendments allow two alternatives for compliance. One alternative requires implementation in two phases. The first phase began January 3, 2006, and the second phase begins January 3, 2012. In the first phase, at an incinerator with annual average mercury emissions exceeding 28 μg/dscm, the air pollution control apparatus must achieve an annual average of 85% reduction efficiency in mercury emissions. In the second phase, at an incinerator with annual average mercury emissions exceeding 28 μg/dscm, the air pollution control apparatus must achieve an annual average of 95% reduction efficiency in mercury emissions. In both cases, if a MSW incinerator's annual average mercury emissions are below 28 μg/dscm no further action is required.

   Under the second alternative the MSW incinerator's mercury emissions could not exceed 14 μg/dscm, averaged over three years. The three-year averaging period would make it less likely that isolated spikes in mercury emissions would cause an exceedance of the stricter 14 μg/dscm standard. The Department estimated that this option would provide an emission reduction comparable to what the first alternative's second phase would achieve. Appendix VI illustrates the trend in mercury emissions from five MSW facilities from 1992 to 2008. Recent stack test results show that MSW incinerators have achieved greater than 96% control of mercury emissions.

e) Sewage Sludge Incinerators: Industrial pre-treatment programs have reduced emissions of mercury from sewage sludge incinerators and emissions will be further reduced as new dental amalgam rules are implemented.

   Domestic treatment works are the recipients of mercury from residential, commercial, and industrial source activities. Sewage sludge typically contains mercury in the low parts per million range. In 2006, the New Jersey median was 1.28 ppm. It is estimated that the 100 μg/dscm emission standard recommended by the New England Governors and Eastern Canadian Premiers is met if the mercury content of sewage sludge is less than 2 ppm. Using existing authority, domestic treatment works can help reduce influent mercury by limiting concentrations in incoming wastewater streams through the establishment of technically based local pretreatment limits, which they can impose on non-domestic users to achieve compliance with applicable environmental endpoints.

The median mercury concentration in New Jersey's sewage sludge has dropped 70% in the past 20 years. Although data are not readily available to pinpoint all reasons for this decline, the following actions have played a significant role:

- The Industrial Pretreatment Program has reduced the amount of mercury and other pollutants allowed to be discharged from permitted industries to domestic treatment works.
- The Pollution Prevention Program has provided industries with incentives to reduce the amounts of regulated waste produced through process changes and/or substitution.
- Mercury has been removed from household products (e.g., latex paint) that often found their way into domestic treatment works collection/treatment systems.
- Other products and/or technologies have gradually been substituted for historically mercury-based products, e.g., electronic thermometers, blood pressure measuring instruments, etc.

Additionally, the Department adopted rules, which became effective on October 1, 2007, to curtail the release of mercury from dental facilities into the environment. Dental facilities are estimated to contribute 35 to 45% of the mercury entering New Jersey's domestic treatment works. This large contribution is attributable to the use of dental amalgam as a direct filling material for restoring teeth. Dental amalgam is approximately 50% mercury by weight. Amalgam wastes are often rinsed down the drain in dental facilities, usually to a municipal sewer system and then to the domestic treatment works.

New Jersey's 2007 rules, under most circumstances, exempt a dental facility from the requirement to obtain an individual permit for its discharge to a domestic treatment works, if it (i) implements best management practices (BMPs) for the handling of dental amalgam waste, and (ii) installs and properly operates an amalgam separator. These measures are expected to prevent 95% or more of the dental mercury wastes from being sent to the domestic treatment works. Each facility had one year from the effective date of the rule to implement the BMPs, and two years (October 1, 2009) to install the separator.

In New Jersey, sewage sludge incinerators released an estimated 127 pounds of mercury in 2008, as compared to approximately 220 pounds in 2002 based on stack testing and monthly sludge quality assurance testing. Appendix VIII shows the calculated mercury emission data from sewage sludge incinerators. The emissions were back calculated based on the mercury content of sludges incinerated.

f) Hazardous Waste Sites: Due to the use of mercury and its compounds in a number of industrial and manufacturing processes, both elemental mercury and its compounds have been found at a number of known hazardous waste sites.

Elemental mercury is or has been used, and has on occasion been observed to be discharged, at the following types of facilities in New Jersey:

- Chlor-alkali plants,
- Facilities that manufactured pressure measuring devices and thermometers,
- Ordnance manufacturing facilities,
- Scientific glass vessel manufacturing facilities,

- Mercury purification facilities (electronic use, etc.), and
- Paint manufacturing facilities.

Liquid mercury has been observed at some of these sites at the surface, near subsurface, and in fresh and marine water bodies proximate to the site.

Liquid mercury vaporizes into a toxic, colorless, odorless gas and warm temperatures enhance vaporization. At the immediate locus of the discharged liquid, especially in confined areas, the vapor can be acutely toxic. EPA has established a Reference Concentration of 0.3 micrograms per meter cubed ($\mu g/m^3$), with a chronic minimal risk level of $0.2\mu g/m^3$. Visible mercury also presents a tracking hazard via potential trespassers at abandoned sites.

In addition to the acute hazards imposed by standing liquid mercury, vaporization certainly contributes to the regional and global flux of mercury to the atmosphere. Prior to the remediation of these sites, the mercury source contribution to the atmosphere from these types of sites is at present time an unknown entity. Mercury vapor concentrations drop off quickly with distance from the spilled liquid. Improved instrumentation now permits the detection of mercury vapor at low concentrations, and thus may help the Department to estimate the contribution to the regional atmospheric budget these sites yield.

2) Water Sources

As previously mentioned, the Department adopted new rules that became effective on October 1, 2007 to curtail the release of mercury from dental facilities into the environment. The new rules, under most circumstances, exempt a dental facility from the requirement to obtain an individual permit for its discharge to a Publicly Owned Treatment Works (POTW), if it implements best management practices (BMPs) for the handling of dental amalgam waste and installs and properly operates an amalgam separator. Dental facilities were required to implement the BMPs by October 1, 2008, and must install and operate an amalgam separator by October 1, 2009. These measures are expected to prevent at least 95 percent of the mercury wastes from being sent to the POTW and result in approximately 2,550 pounds of mercury removed from the environment each year.

One hundred POTWs in New Jersey submitted baseline data on mercury concentrations in their treatment plant effluent. These samples were analyzed using the most sensitive analytical method for mercury in wastewater, Method 1631E. This baseline data will be used to determine the effectiveness of the implementation of the dental BMPs and the installation of the amalgam separators. These POTWs are required to conduct additional mercury sampling and analyses, using the same analytical method, after the amalgam separator installation due date (Oct. 1, 2009) has passed.

3) Multi-media Sources

a) Legislation banning the sale of mercury fever thermometers was passed in April 2005. This law applies to basal, oral, and rectal mercury thermometers. The ban does not apply to thermometers used in research and development, health care purposes, or for industrial, manufacturing, or commercial purposes.

b) The New Jersey Legislature passed the Mercury Switch Removal Act of 2005 requiring automobile recycling facilities to remove mercury auto switches from vehicles prior to sending the vehicles for recycling. Automobile recyclers located in New Jersey were required to begin removing mercury auto switches in May 2006. The switches are sent to a mercury recycler contracted by the automobile manufacturers for proper disposal/recycling and the manufacturers reimburse the automobile recyclers $2.00 for each switch recovered. To date 23,298 mercury switches have been collected resulting in 51.26 pounds of mercury removed from the environment. As of June 12, 2009, the Bureau of Hazardous Waste Enforcement has conducted 322 inspections on a total universe of 228 facilities. The initial inspections focused on compliance assistance resulting in a high level of compliance. To date 19 Notices of Violation (NOVs) have been issued and one Notice of Civil Administrative Penalty Assessment (NOCAPA) has been settled and paid.

c) Pursuant to the requirements of the Pollution Prevention Act and implementing regulations, certain facilities in New Jersey are required to prepare five-year Pollution Prevention (P2) Plans and submit P2 Plan Summaries and P2 Progress Reports to the NJDEP. A P2 Plan is a comprehensive audit of a facility's operations with an emphasis on quantifying hazardous substance use and generation as a waste (referred to as non-product output or NPO) and on identifying measures to reduce or eliminate the use and generation as NPO of hazardous substances. As the name implies, the P2 Plan Summary summarizes the Plan findings and is also the mechanism for facilities to report their goals for reducing the use and generation as NPO of hazardous substances. The P2 Progress Report is the means for a facility to report their progress on achieving their stated goals.

   Mercury and mercury compounds are hazardous substances regulated by the P2 regulations. Facilities in New Jersey have been reporting their mercury use and generation as NPO since 1993, although the threshold for reporting was lowered from 10,000 pounds to 10 pounds in 2000.

   The chart presented in Appendix IX shows changes in mercury use and generation of waste containing mercury as NPO, as well as releases to the air from stack emissions from reporting year 2001 (the first year of reporting after the threshold was lowered) through reporting year 2007 (the latest year for which data is available for this report). The use of mercury and mercury compounds reported by covered industrial facilities in New Jersey was reduced from 22,867 pounds in 2001 to 8,986 pounds in 2007, a 61% reduction. The amount of NPO of mercury and mercury compounds reported went from 8,951 pounds in 2001 to 2,583 pounds in 2007, a 71% reduction. Reported air releases, however, remained fairly constant at around 750 pounds per year.

d) Mercury containing equipment was included in New Jersey's Universal Waste Rule June 17, 2002. The classification of mercury containing equipment as universal waste will assist companies in properly disposing or recycling mercury equipment that might otherwise be disposed as solid waste.

e) On January 12, 2009 the "Electronic Waste Recycling Act" P.L. 2008, c.130 was signed into law. The Electronic Waste Recycling Act establishes a recycling system for the safe and environmentally sound management of end-of-life electronic devices and components. More specifically, the law requires original equipment manufacturers (OEMs) to pay a registration fee to the NJDEP and establish a collection, transportation and recycling system, either independently or jointly, for the recovery of computers and televisions. The disposal of electronic waste (e-waste) as solid waste is banned as of January 1, 2011. E-waste contains various toxic metals including mercury. The mercury is contained in the fluorescent bulbs used to backlight flat screen monitors and notebook computers and may also be contained in some of the batteries used in the electronics. The legislation also requires manufacturers to comply with most of the European Reduction of Hazardous Substances (RoHS) Directive including a ban on the sale of electronic equipment that contains more than the agreed upon levels of mercury, lead, cadmium, and hexavalent chromium. This legislation will result in a reduction of mercury emissions after the disposal ban goes into effect.

4) Monitoring

a) Fish Monitoring

1) A Routine Fish Monitoring Program for Toxics in Fish was developed and implemented in 2002. This comprehensive program divides the State's waters into five regions that are sampled on a rotating basis for contaminants in fish and other species (e.g., crabs). The first three regions have been sampled (Passaic, Marine/Estuarine, and Raritan regions). The program has not been institutionalized (i.e., no regular source of funding identified) and requires annual justification. Completion of the first complete cycle of sampling is contingent on funding approval. The limited trend data showed no consistent increase or decrease in mercury concentrations in fish tissue over time.

b) Air Monitoring

1) The Department's Air Program is collecting speciated ambient mercury concentration data from several Tekran units that can be used to estimate dry deposition. To date, over two years' data from units at two locations, Elizabeth and New Brunswick, have been QA/QCd and are in the process of being evaluated.

2) The Department currently supports the operation of a site in New Burnswick that collects wet deposition of mercury as part of the national Mercury Deposition Network, which is part of the National Atmospheric Deposition Program (see

http://nadp.sws.uiuc.edu/mdn/). Operation of this site is funded through March 2010, but a stable source of funds for long-term operation of this site is necessary to continue this important monitoring of the effectiveness of mercury reduction efforts.

c) Surface Water Monitoring

1) Water monitoring data collected by NJDEP/USGS in the Ambient and Supplemental Surface Water Networks show that of the 1,752 results since 1997, nearly 67% had concentrations less than the detection levels. None of the total mercury values exceeded the current acute freshwater aquatic life criterion for dissolved mercury of 1.4 microgram per liter (µg/L) or the chronic criterion of 0.77 µg/L, but 3% of the samples exceeded the human health criterion of 0.050 µg/L. Other mercury studies and projects by NJDEP and USGS over the years show similar results; the majority of mercury concentrations are below detection levels. Although detection levels have improved since 1997 from between 0.04 and 0.1 µg/L to between 0.01 and 0.02 µg/L in 2004, the application of a low level mercury detection method is needed to understand how low mercury levels in the water column can bioaccumulate and magnify in the food chain.

2) In response to the need for lower detection limits for mercury, the Department initiated a preliminary study of low level mercury occurrence in surface waters. Using EPA's method 1631E, the project consisted of 33 filtered samples with accompanying field blanks at 23 unique stations across the state. The detection level at the Wisconsin laboratory being used was 0.04 ppt. Results did not exceed any of the existing surface water quality criteria. Mercury concentrations did not appear to be influenced by land use, but did appear to increase with stream flow. The findings suggest that air deposition is a major influence on in-stream mercury concentrations. In 2007, the Department conducted a follow-up study to determine seasonal variability in total and methyl mercury concentrations at seven small undeveloped watersheds with no known sources of mercury contamination other than air deposition. Although total mercury showed no seasonal patterns, methyl mercury had elevated levels during the summer due to higher methylation rates during the warmer months. In addition, the project verified streamlined sampling protocols that allow one person (instead of 2 people) to conduct low level mercury sampling, thereby reducing resource requirements allowing this sampling to be incorporated into an ambient or routine program.

d) Ground Water Monitoring

1) A 150 well, statewide, shallow Ground Water Quality Monitoring Network, stratified as a function of land use, has been established and is sampled on a five year cycle for mercury and other contaminants. During the first five year sampling cycle from 1999 to 2004, mercury concentrations were found to range from <0.01 to 1.7 µg/L in ground water from 148 wells with only five of those being detectable above the laboratory reporting limits. In addition, other groundwater data has been collected under the Private Well Testing Act that requires private wells in nine southern New

Jersey counties to test for mercury. A total of 25,270 wells were tested with a concentration range of non-detect to 114.2 µg/L. Approximately 1% had concentrations above the drinking water maximum contaminate level (MCL) of 2 µg/L. An analysis of the data showed no obvious geographic or land use patterns for the elevated mercury results.

D. Mercury Reduction Action Items

1) Adopt legislation that reflects the provisions of the Mercury Education and Reduction Model Act prepared by the Northeast Waste Management Officials' Association (NEWMOA), as part of the New England Governors' Mercury Action Plan. This plan addresses mercury-containing products and limits the sale of mercury for approved purposes. Provisions of the model legislation have been adopted by 16 states, including all of the New England states.

2) Develop long-term water quality information for on-going monitoring of mercury in environmental media, as specified below. Follow-up monitoring is essential for determining the effectiveness of the mercury Total Maximum Daily Load (TMDL).

   a) A primary monitoring strategy for measuring the levels of mercury and calculating trends is the previously mentioned Routine Fish Monitoring Program for Toxics in Fish. This comprehensive program divides the State's waters into five regions that are sampled on a rotating basis for contaminants in fish. Since mercury is persistent in the environment, accumulates in biological tissue, and biomagnifies in the food chain, adverse impacts to non-aquatic, piscivorous (fish eating) organisms may arise from very low surface water concentrations. Fish tissue sampling provides a cost-effective measure to understanding the effects of mercury in the food chain and the environment.

   b) A mercury water-monitoring program is needed to monitor the effect of the reduction strategies outlined in this Action Plan and to associate water column data to aquatic organism data. The program's objective to understand the extent and magnitude of the State's mercury contamination, and its effect on aquatic organisms must have a comprehensive scope and long-term sampling period. Recent mercury studies from USGS have suggested the use of screening tools to target areas where elevated concentrations of mercury may occur. These studies have suggested looking at the presence of wetlands within watersheds, dissolved organic carbon and suspended sediment concentrations, and stream flow. High dissolved oxygen content (DOC) and suspended sediment concentrations, increased stream flow, and larger wetland areas may point to elevated mercury concentrations. The sampling requirements should consist of total and methyl mercury in the water column as well as methyl mercury in fish tissue. The locations should extend to all regions of the state such as the Pinelands, Northern New Jersey, Delaware Estuary, and Atlantic Estuary. Each region should have at least five randomized sampling locations as well as a reference site, small-undeveloped watersheds with no known sources of mercury contamination other than air deposition. This sampling is not needed on a yearly basis, but quarterly sampling once every 2-5 years is appropriate. An ongoing project, that is targeting local air source reduction by

sampling for mercury in fish, water column, and leaves at four locations from 2007 to 2013, is expected to impact the development of the statewide mercury monitoring program by refining sampling frequencies, protocols, and objectives.

c) Follow-up monitoring for the dental amalgam rule is needed in addition to the second round of POTW discharge sampling. Monitoring to evaluate effectiveness of the dental amalgam rule would target locations upstream and downstream of the POTW discharge. The monitoring sites will be sampled semi-annually to evaluate ambient water quality after the rule's implementation to observe the significance of the reductions. Currently, only one site has been targeted. This project needs to expand by selecting suitable locations based on the review of POTW effluent data.

d) Air sampling under the National Mercury Monitoring Deposition Network is required to continue to monitor long-term loadings and trends from atmospheric deposition. This program currently has only one site in the New Brunswick area. Additional sites in southern and northern portions of the state this network are needed to improve knowledge of depositional rates for different regions of the state and assist in tracking down the sources of atmospheric deposition.

3) Currently, the Department is developing a statewide Total Maximum Daily Load (TMDL) for 122 impaired assessment units (HUC14s) where mercury concentrations in fish tissue is predominantly caused by mercury from air deposition. Air deposition of mercury in New Jersey was modeled using a REMSAD model. REMSAD is a three-dimensional grid model simulating total (wet and dry) annual mercury deposition from air (originating from anthropogenic and natural sources). The TMDL is based on the linear relationship between mercury levels in the air and water and that a Bioaccumulation Factor can relate fish tissue concentration to water column concentration.

The TMDL was calculated to reduce mercury concentration in fish tissue based on the 90th percentile concentration for top trophic level fish. The TMDL demonstrates that if the top trophic level fish tissue concentrations of mercury are acceptable, the water column mercury concentration levels and lower trophic level fish will also have acceptable concentrations. The species used as top trophic level fish is the largemouth bass, *Micropterus salmoides*.

Since New Jersey does not have a standard for mercury concentration in fish tissue, state fish consumption advisories were used to develop two reduction requirements for different fish tissue concentrations.

a) New Jersey's Fish Consumption Advisory for the general population recommends unlimited consumption if total mercury concentration in fish tissue is 0.34 microgram per gram (µg/g) or less. To achieve a fish tissue concentration of 0.34 µg/g, a total mercury reduction of 70.4 % (from natural and anthropogenic sources) or 82.6 % from global anthropogenic sources would be required.

b) New Jersey's Fish Consumption Advisory for the high-risk population (children, women of childbearing years, and pregnant or nursing mothers) recommends one meal per week

for mercury concentration between 0.08 µg/g and 0.18 µg/g. To achieve a total mercury concentration of 0.18 µg/g or less in fish tissue, a total reduction of 84.3 % (from natural and anthropogenic sources) or 98.9 % from global anthropogenic sources would be required.

According to the REMSAD model, New Jersey contributes only 12.5% to the state mercury deposition; 52% is background deposition (natural and anthropogenic) and the remaining percentage comes from surrounding states, Mexico, and Canada. Reductions required in this TMDL can not be achieved from the New Jersey anthropogenic air sources alone. Mercury reductions on the national and global scales are necessary to meet the TMDL targets.

4) The Department plans to update its mercury water quality criteria based upon the EPA recommended Clean Water Act Section 304(a) water quality criterion for methyl mercury in fish tissue. This criterion requires the development of regional bioaccumulation factors (BAFs) to address differences in the rate of methylation based on other water quality parameters such as pH and dissolved organic carbon. While the EPA's recommended Clean Water Act Section 304(a) water quality criterion is based on a methyl mercury fish tissue concentration value of 0.3 micrograms per kilogram (µg/g), New Jersey plans to develop criteria based upon a methyl mercury fish tissue concentration of 0.18 µg/g which is based upon one meal per week for high risk individuals. Updating the mercury criteria based on EPA's recommendation will require calculating BAFs for New Jersey that involves additional surface water and fish tissue sampling. This information will also be used to reevaluate the previously proposed wildlife mercury criteria using updated regional BAFs. The revised mercury criteria will be used to develop TMDLs for areas of the State not covered by the Total Maximum Daily Load for Mercury Impairments Based on Concentration in Fish Tissue Caused Mainly by Air Deposition. In calculating an updated, revised mercury surface water quality standard (SWQS) for human health and wildlife, the Department will divide the state into four regional waters: Pinelands, Non-Pinelands, Delaware Estuary tidal waters, and Atlantic tidal waters. Surface water and fish tissue data will be collected and used to develop new BAFs for each region of the state. The data results will then be applied in calculating the mercury criteria for each region. In 2009, the Department expects to begin data collection in the Pinelands region with plans to continue collection in Non-Pinelands water the following year. The next action is to collect data for the Delaware Estuary and Atlantic tidal waters.

5) Reporting of field observations at mercury contaminated sites needs to be centralized so areas of immediate environmental concern can be identified and the sites' contributions to regional atmospheric mercury levels can be determined.

6) The Department's existing regulations concerning mercury must continue to be implemented, enforced, and evaluated for effectiveness. This includes the regulations on mercury emissions from air sources, the removal of automobile mercury switches and the dental amalgam regulations.

Appendices

Appendix I

2001 Mercury Task Force Report Key Recommendations

MERCURY TASK FORCE REPORT KEY RECOMMENDATIONS

A. Participate in and support regional, national, and global efforts to reduce mercury uses, releases, and exposures.

This is important to New Jersey because a significant portion of mercury in the State's environment originates from emissions elsewhere. Examples of efforts include the following: the Conference of the New England Governors' and Eastern Canadian Premiers, Northeast States for Consolidated Air Use Management (NESCAUM), Environmental Council of the States (ECOS) and U.S. Environmental Protection Agency (U.S. EPA) Mercury Action Plan.

B. Remove mercury from products and phase out sales of mercury-containing products for which there are reasonably available alternatives. In order to accomplish this, New Jersey should:

1. Adopt legislation that reflects the provisions of the Mercury Education and Reduction Model Act prepared by the Northeast Waste Management Officials' Association (NEWMOA), as part of the New England Governors' Mercury Action Plan. This plan addresses mercury-containing products, such as thermometers, thermostats, switches (including those in motor vehicles and appliances), and fluorescent lights, and limits the sale of mercury to approved purposes.

2. Develop effective outreach and education on the importance of removing mercury from products. County household hazardous waste programs should play a key role in this effort.

3. Encourage phasing out the use of mercury-containing amalgams to the extent compatible with good dental practices, to further limit mercury releases to the environment.

4. Use state purchasing and service contracts to reduce the purchase and use of products containing mercury, including motor vehicles containing mercury switches.

5. Ensure that substitutes for mercury are not more hazardous than the mercury itself.

6. Work with interstate organizations to assist in the development of federal legislation that minimizes the use of mercury in products.

C. Reduce emissions of mercury from the production of electricity consumed in New Jersey, including electricity generated by out-of-state sources. To accomplish this, New Jersey should:

1. Promote energy efficiency with measures consistent with the NJDEP Greenhouse Gas

Sustainability Action Plan.

2. Promote the increased use of electric power from certified green sources including renewable sources and sources with low or zero mercury emissions.

3. Require environmental information disclosure of mercury emissions per kilowatt-hour from all providers selling electricity in New Jersey consistent with The New Jersey Electric Discount and Energy Competition Act (EDECA) of 1999 (N.J.S.A. 48: 38).

D. Significantly reduce air emissions from coal combustion. To accomplish this, New Jersey should:

1. Urge the U.S. EPA to rapidly develop and implement stringent limits on mercury emissions from coal combustion. These standards should include output-based performance limits (mg/MW-hr), which are applied to individual coal-fired power plants, in addition to national caps (tons/year), which are applied to the electric generation source category as a whole.

2. Adopt State standards if, by December 2003, U.S. EPA does not proceed to promulgate and implement effective mercury limits on coal combustion.

3. Work with interstate organizations to assist in the development of federal multipollutant legislation that limits mercury emissions as well as other pollutants.

E. Significantly reduce air emissions from iron and steel and other secondary smelting industries. To accomplish this, New Jersey should:

1. Urge the federal government to require the rapid phase out of the use of mercury-containing products in new vehicles. Following the lead of other states, New Jersey should consider banning the sale of vehicles containing mercury products.

2. Implement a phased strategy to reduce mercury contamination of scrap through elimination and separation measures. If, after a 3-year period, the source reduction measures do not achieve emission reduction goals, require the installation of air pollution control.

3. Ensure that measures to reduce mercury contamination of scrap are developed through a cooperative process involving government agencies and affected industries, including automobile manufacturers, automobile recyclers, and those who crush, shred, or otherwise process scrap metal.

4. Determine the amount of mercury emitted from secondary aluminum smelting and require reduction if significant.

F. Ensure the minimization of mercury emissions from other sources. To accomplish this, New Jersey should:

1. **Medical Waste Incinerators** - Adopt the NEGA/ECP (New England Governors and

Eastern Canadian Premiers) recommended emission limit for medical waste incinerators. All New Jersey medical waste incinerators already have achieved this level with pollution prevention measures. Adopting a limit will prevent backsliding and help provide an example to other jurisdictions.

2. **Sewage Sludge Incinerators -** Revise the State's sewage sludge mercury rules to reflect a phased reduction in mercury levels to meet the Task Force's goal of 2 ppm within 10 years. Consider a stack emission standard such as the New England Governors Association's recommended emission standard for sludge incineration facilities as an alternative to the final sludge concentration goal.

3. **Municipal Solid Waste Incinerators –** Consider revising the State's air pollution control regulation governing Municipal Solid Waste Incinerator (MSWI) emissions to include U.S. EPA's higher efficiency requirement for post-combustion emissions controls, thereby changing New Jersey's alternative limit based on efficiency from 80% to 85%. The 28µg/dscm primary requirement would remain the same.
4. **Other -** Develop methods to appropriately regulate and otherwise manage the disposal of discarded mercury-containing products, including fluorescent bulbs, dental amalgam waste, thermostats and switches.

G. Expand and institutionalize routine monitoring for mercury in fish from New Jersey waters through State-level programs.

H. Actively encourage the federal government to initiate and maintain comprehensive monitoring and surveillance for mercury in commercial fish and to require that information regarding the mercury content of fish be made readily available. If the federal government does not initiate nation-wide evaluation of commercial fish, New Jersey should, with other states in the region, monitor mercury in commercial fish.

I. Expand and periodically evaluate the effectiveness of current outreach, advisories and education efforts to reduce exposures to mercury of sensitive populations, subsistence fishermen, and others who consume large quantities of fish. To accomplish this, New Jersey should:

1. Increase public awareness of the public health concerns regarding mercury in fish and the need to reduce the emissions and releases to the State's waterbodies.

2. Expand outreach on fish advisories, particularly for sensitive populations, subsistence fishers, and others who consume large quantities of fish.

J. Reduce exposures from cultural uses of mercury. To accomplish this, New Jersey should:

1. Complete research and evaluate available data on cultural uses and associated exposures.

2. Provide outreach and education materials to communities and health professionals.

3. Develop and implement appropriate legislation and regulations that limit the sale of

elemental mercury, except for medical and other approved uses, reflecting the NEWMOA model legislation.

K. Develop comprehensive mercury budgets for New Jersey watersheds that include inputs from air deposition, in order to develop appropriate total maximum daily loads (TMDLs). To do this, New Jersey should:

1. Utilize the most recent information developed through the U.S. EPA's pilot mercury TMDL development projects.

2. Determine the relative mercury contribution to aquatic systems from various sources and from repositories in environmental media.

L. Maintain and enhance a long-term air deposition monitoring system that incorporates state-of-the-art detection limits and speciation to document temporal and spatial trends in mercury deposition.

M. Address critical information gaps concerning the quantities and chemical species of mercury emissions and releases, the fate and transport of mercury in the environment, and the exposure pathways. To accomplish this, New Jersey should:

1. Upgrade procedures used in all monitoring programs to include state-of-the-art analytical methods to provide lower detection limits for mercury and mercury speciation.

2. Employ a state-level, long-range dispersion model for mercury using the up-to-date emissions inventories including the inventory developed by the Mercury Task Force.

3. Encourage federal agencies to expand existing national research on the ecological effects of mercury, particularly on piscivorous (fish-eating) fish, birds and mammals (particularly marine mammals).

4. Identify demographic characteristics and exposure patterns of population groups in New Jersey that consume large quantities of fish.

5. Consider establishing the mercury-contaminated sites in the Berry's Creek area as an Environmental Research Park, patterned on the National Environmental Research Park system. This could serve as a resource for studies and monitoring of the complex processes governing the fate and transport of mercury in both the terrestrial and estuarine environment.

N. Support the development of effective methods of retiring and sequestering mercury so that the chances of the eventual release of mercury to the environment are minimized.

O. Develop improved environmental indicators of the impact of mercury on New Jersey's environment. To accomplish this, New Jersey should:

1. Expand and maintain a statewide ground water monitoring program for mercury.

2. Develop and apply indicators of trends of mercury in environmental media, including air deposition, mercury concentrations in surface water, mercury entry into aquatic food chains, mercury levels in fish tissue, mercury levels in human tissue in the New Jersey population, and mercury levels in feathers of piscivorous birds nesting in New Jersey.

P. To provide for the implementation of the recommendations in this report, New Jersey should:

1. Form within the New Jersey government, a multi-agency committee, including the Department of Environmental Protection, Department of Health and Senior Services, Department of Transportation and the Board of Public Utilities, to advocate the implementation of the recommendations and to report periodically to the Legislature and the Commissioner of the NJDEP on progress toward achieving the mercury milestones.

2. Establish the position of an environmental mercury coordinator in the NJDEP as has been done in other states.

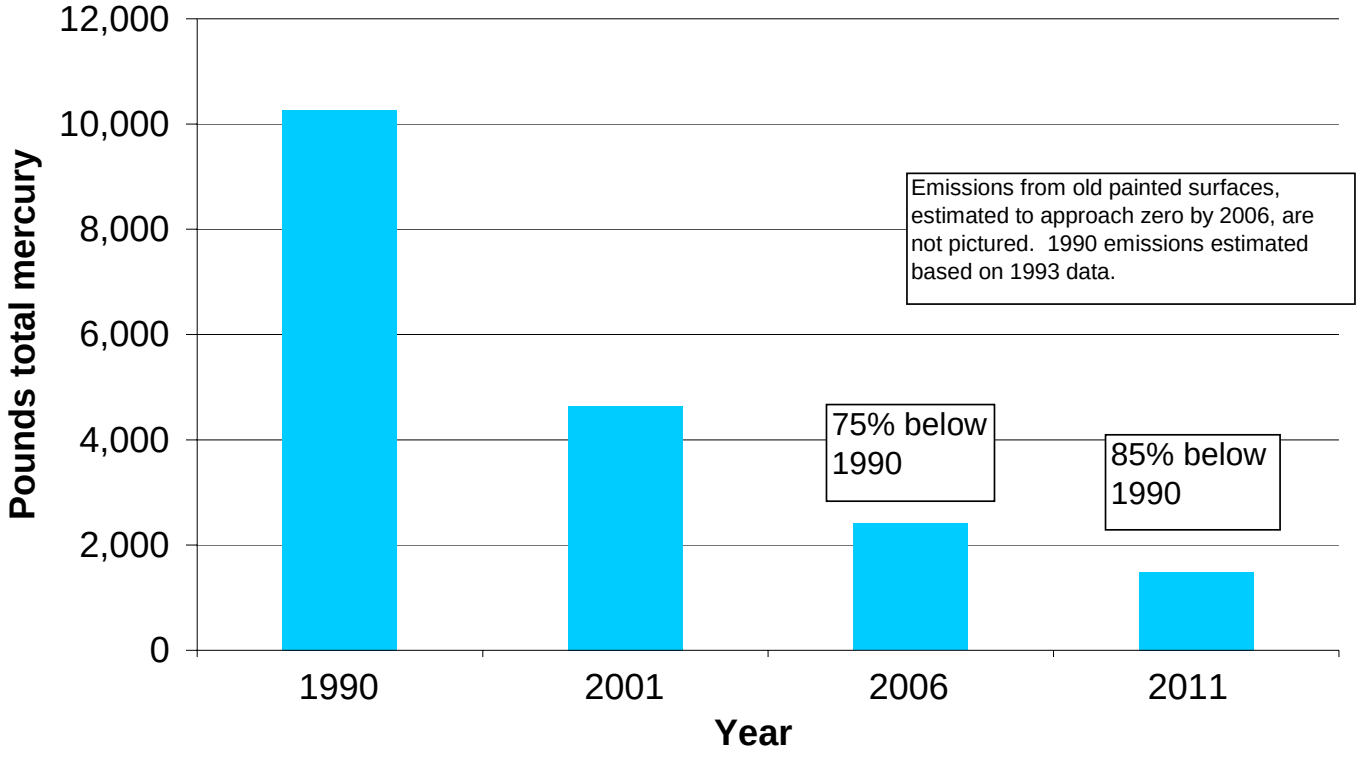
Q. Reduce mercury levels in fish and other biota. Mercury concentrations in freshwater and estuarine fish in New Jersey should, at a minimum, be in compliance with the EPA's recent Surface Water Criterion of 0.3 μg/g methylmercury in tissue. This guidance value, aimed at protecting human health, may not be adequate to protect the health of the fish. Therefore mercury levels in surface water and fish tissue should achieve levels protective of aquatic life and of wildlife (the criterion for which is currently under development). Assessing this criterion requires the use of improved analytic methodologies that lower detection levels by at least an order of magnitude.

Appendix II

Mercury Air Emissions Goals in New Jersey (Figure 1.5 from 2001 Mercury Task Force Report)

Mercury Air Emissions Goals in NJ:

Projected overall reduction of 75% from 1990 to 2006 and 85% from 1990 to 2011



Appendix III

Emissions to Air from New Jersey Sources

Emissions to Air from New Jersey Sources

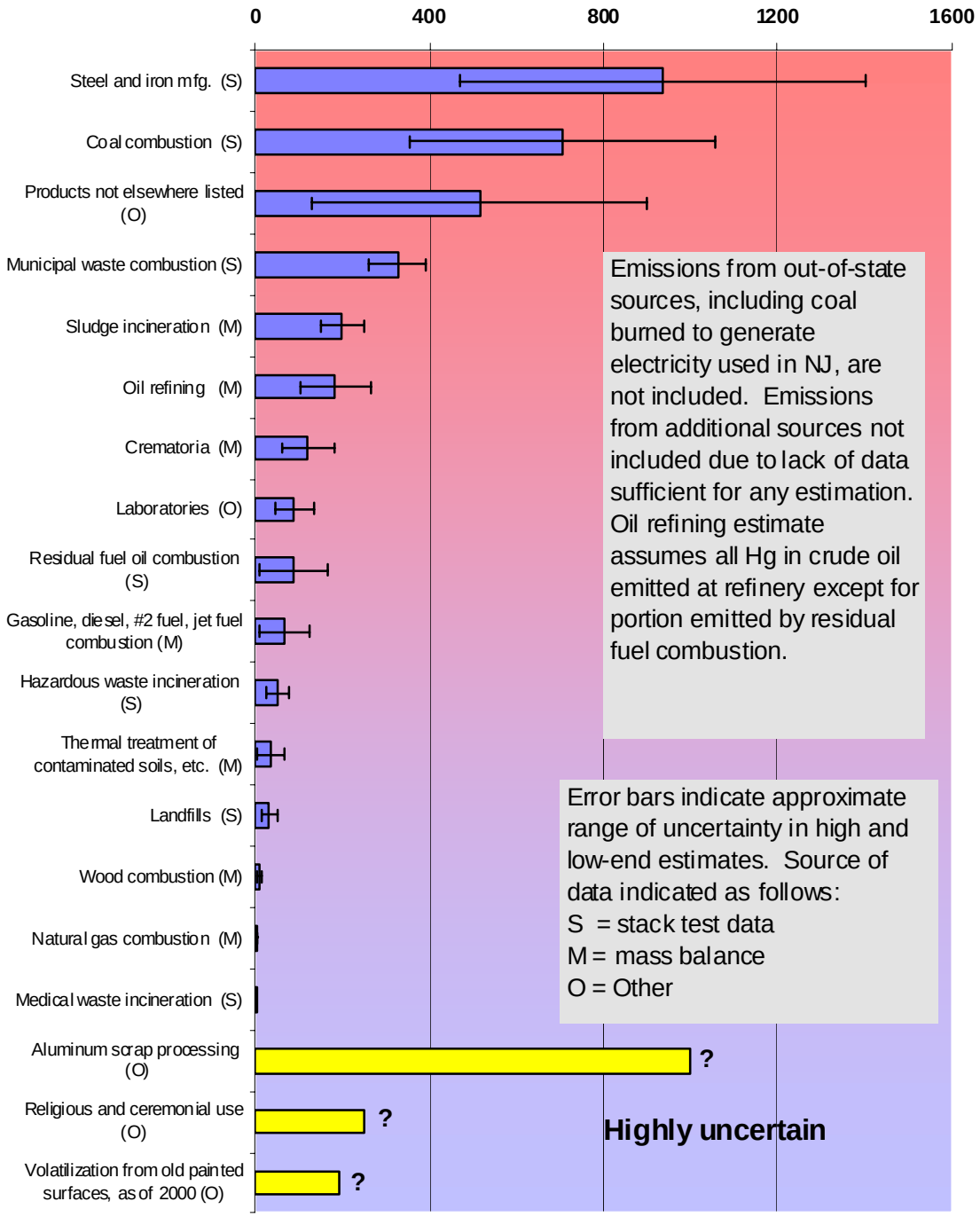
Year	1990	1993	2001	2006 (Goal)	2006 (Estimated)		2011 (Goal)	Reason for change or lack of change in estimated emission
Source Category			Mercury Emissions (pounds/year)					
Coal combustion (electricity prod.)	705	705	705	528.75	514	*	132	Actual measurement for 2006
Crematoria	95	105	125	159	114		189	Increase in cremations (24,000 in 2006), new estimate of 2.16 g/corpse from lit.
Fluorescent tubes	430	430	215	75	115		54	Hg content of fluor. tubes ~50% lower, now some CFLs in waste stream
Laboratories	89	89	89	67	89		45	No known reason for any change since 2001
Medical Waste incineration	742	742	2	2	2		2	Continuation of existing programs
MSW incineration	4542	4542	349	200	117	*	200	Actual measurement for 2006
Oil refining	184	184	184	156.4	184		156	No known reason for any change since 2001
Other	127	127	127	95.25	127		64	No known reason for any change since 2001
Painted surfaces			194	19	194		2	No reason for any change since 2001
Products in general use	600	600	300	225	255		150	There has been ~15% decline, based on Hg conc. in MSW estimates
Refined fuels combustion	156	156	156	132.6	161		133	No reason for reductions, actual 3% increase in energy use since 2001
Cultural and ritualistic uses	250	250	250	125	250		63	Highly uncertain; no known reason for any change since 2001
Sludge incineration	400	308	200	170	147	*	115	Actual measurement for 2006
Iron & steel manufacturing	935	935	935	234	778	*	94	Actual measurement for 2006
Non-ferrous & aluminum processing								Always highly uncertain, appears not a significant source in NJ
Total	**9255**	**9174**	**3832**	**2189**	**3047**		**1397**	
					* Quantities marked with asterisk represent measurements (stack tests or sludge concentration)			

Appendix IV

Mercury Source Categories published in 2001 Mercury Task Force Report

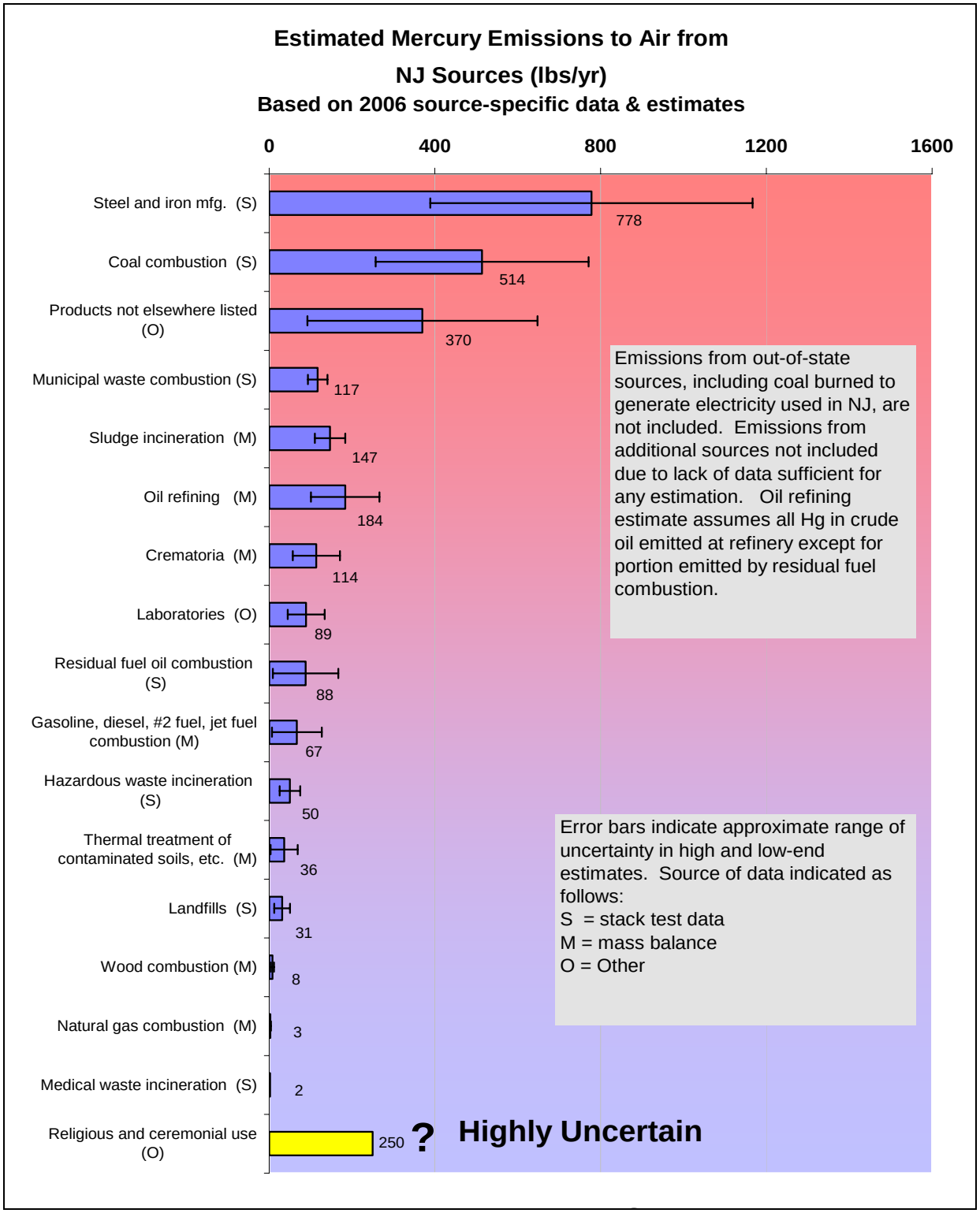
Estimated Mercury Emissions to Air; NJ Sources, lbs/yr

Based on most recent source-specific data; late 90s to 2001



Appendix V

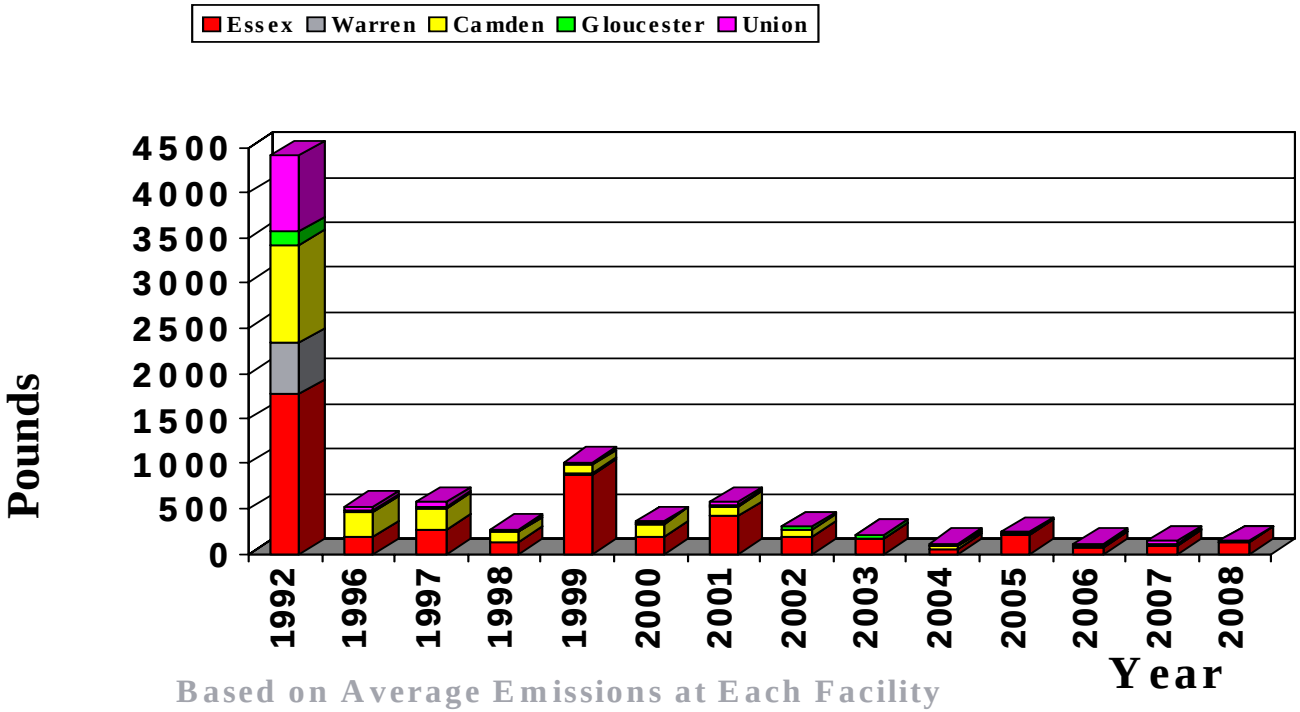
Revised Mercury Source Categories prepared in 2007


Estimated Mercury Emissions to Air from
NJ Sources (lbs/yr)
Based on 2006 source-specific data & estimates
0
400
800
1200
1600
Steel and iron mfg. (S)
778
Coal combustion (S)
514
Products not elsewhere listed (O)
370
Municipal waste combustion (S)
117
Sludge incineration (M)
147
Oil refining (M)
184
Crematoria (M)
114
Laboratories (O)
89
Residual fuel oil combustion (S)
88
Gasoline, diesel, #2 fuel, jet fuel combustion (M)
67
Hazardous waste incineration (S)
50
Thermal treatment of contaminated soils, etc. (M)
36
Landfills (S)
31
Wood combustion (M)
8
Natural gas combustion (M)
3
Medical waste incineration (S)
2
Religious and ceremonial use (O)
250
?
Highly Uncertain
Emissions from out-of-state sources, including coal burned to generate electricity used in NJ, are not included. Emissions from additional sources not included due to lack of data sufficient for any estimation. Oil refining estimate assumes all Hg in crude oil emitted at refinery except for portion emitted by residual fuel combustion.
Error bars indicate approximate range of uncertainty in high and low-end estimates. Source of data indicated as follows:
S = stack test data
M = mass balance
O = Other

Appendix VI

Emissions to Air from Municipal Solid Waste Incinerators

Trend of Mercury Emissions from 5 Municipal Waste Incinerator Facilities in N.J.



Based on Average Emissions at Each Facility

Over 97% reduction in actual mercury emissions

Over 99% reduction based on mercury in Waste

Appendix VII

SUMMARY OF REDUCTION PROGRESS FROM STATIONARY SOURCES OF MERCURY EMISSIONS TO THE AIR

SUMMARY OF REDUCTION PROGRESS FROM STATIONARY SOURCES OF MERCURY EMISSIONS TO THE AIR

Source Category	1990 Mercury Emissions (pounds/year)	2008 Mercury Emissions (pounds/year)	Percent Reduction	Projected 2013 (pounds/year)	Percent Reduction
Municipal solid waste incinerators	4410	152	97	150	97
Iron and steel melters	1000	75	93	70	93
Hospital/medical/infectious waste (HMIW) incinerators	5	0	100	0	0
Coal-fired boilers	700 ± 300	406	59	128	87
Sewage Sludge Incinerators	800	125	84	75	91

Appendix VIII

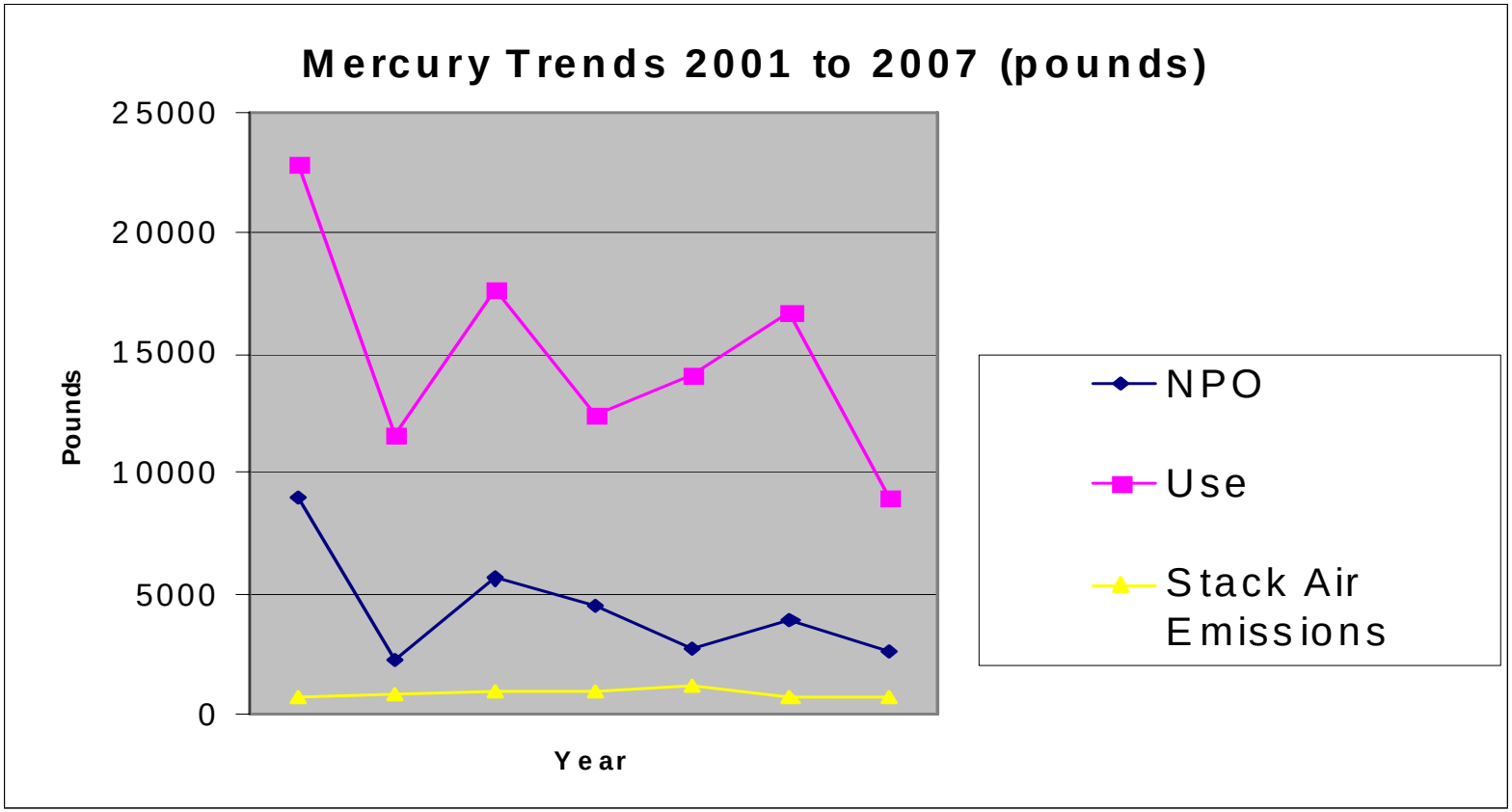
Sewage Sludge Incinerator Emissions Based on Mercury Contents in Sludge

Sewage Sludge Incinerator Emissions Based on Mercury Contents in Sludge

Facility	2001		2002		2003		2004		2005		2006		2007		2008	
	Dry Tons	Mercury (lb)	Dry Tons	Mercury (lb)	Dry Tons	Mercury (lb)	Dry Tons	Mercury (lb)	Dry Tons	Mercury (lb)	Dry Tons	Mercury (lb)	Dry Tons	Mercury (lb)	Dry Tons	Mercury (lb)
Atlantic Co. Util. Auth.	12662	2.9	14053	36.1	14007	35.2	13980.0	28.4	14361	28.8	14070	25	14423	25	14500	19.5
Bayshore Reg. Sewg. Auth.	1761	9.3	2089	7.9	2173	6.6	2222	13.5	2309	5.3	2468	5.7	2312	9	2341	6.9
Glouster Co. Util. Auth.	14903	43.9	12483	42.2	11513	28.2	14563	24.8	13683	17.1	11662	21.2	9894	17.9	8524	20.4
NW Bergen Co. UA	2126	13.3	2617	21.9	2482	8.5	2852	15.2	2693	14.2	2887	16.2	3153	12.3	2766	9.6
Parsipany Troy Hills	4862	23.1	5345	27.8	5527	18.1	5655	16.8	3874	11.3	1355	5.2	0	0	0	0
Two Bridges Sewage Auth.	5361	29	4264	14.9	3921	12.8	4292	10	6378	21	6854	24.8	8430	29.8	8113	29.9
Somerset Raritan Valley SA	4440	19.7	4580	20.7	4233	18.5	5348	22.2	5680	22.9	5077	18.5	4438	18	4075	13.2
Stony Brook Regional SA	8324	30.8	8397	44.1	8407	26.4	10004	16.4	9433	22.1	8457	28	8544	24.2	8403	24.5
Wayne Twp. Mountains View STP	1519	4.5	1445	2.9	1660	4.5	1701	2.3	1620	2.2	1739	2.4	1395	2.2	2212	2.9
TOTAL	55958	176.5	55273	218.5	53923	158.8	60617	149.6	60031	144.9	54569	147	52589	138.4	50934	126.9

Appendix IX

Pollution Prevention Trend Chart


Mercury Trends 2001 to 2007 (pounds)
25000
20000
15000
10000
5000
0
Pounds
Year
NPO
Use
Stack Air Emissions