MERCURY MINIMIZATION PROGRAM

for the

TOWN OF ROTTERDAM

1100 Sunrise Boulevard
Rotterdam, NY 12306

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TOWN OF ROTTERDAM
ROTTERDAM SEWER DISTRICT 2
MERCURY MINIMIZATION PROGRAM

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ROTTERDAM SEWER DISTRICT 2
MERCURY MINIMIZATION PLAN

MERCURY MINIMIZATION PROGRAM

The Schedule of Submittals in the recently issued SPDES Permit (NY0020141) for the Town of Rotterdam WWTP requires that a Mercury Minimization Program (MMP) be developed within 12 months of the effective date of the permit and reports on the progress be provided annually. To that end, this document includes the background and requirements for the MMP.

Section I: INTRODUCTION

Mercury and methylmercury

Mercury (Hg) is a naturally occurring metal found in the ore cinnabar (mercuric sulfide). Mercury exists in three forms: elemental, inorganic, and organic. Elemental mercury is a silvery liquid metal which can break into droplets and vaporize at room temperature. The vapor is colorless and odorless in nature. Elemental mercury is a neurotoxin which can cross the blood-brain barrier. Inorganic mercury containing salts are predominantly white in color apart from cinnabar which is red. The most commonly seen form of organic mercury in the environment is methylmercury. Methylmercury is a neurotoxin which can also cross the blood-brain barrier and with its bio- accumulative property, methylmercury poses a serious threat to the environment and the health of people.

Methylation of mercury is a process by which inorganic mercury is converted to organic methylmercury. This occurs either biologically in the presence of anaerobic microorganisms including sulfur reducing bacteria, iron reducing bacteria and methanogens or non-biologically under highly reduced environments. Microbial methylation is influenced by factors such as pH, temperature, redox potential, and presence of inorganic and organic complexing agents. Methylmercury is lipophilic and therefore can easily bioaccumulate through the food chain starting with small aquatic organisms. This can result in toxic methyl mercury concentration for human beings who are at the top of the food chain (Ullrich, Tanton, & Abdrashitova, 2001).

Human toxicity to mercury varies with dose, rate of exposure and the form of mercury. The main organ affected by inhaled mercury vapors is the brain. For elemental and other inorganic mercuric salts, the gut lining and kidneys are targeted. Lastly organic mercury (methylmercury) is distributed throughout the body. Mercury and methylmercury bind to sulfur containing proteins thereby altering the structure of protein and impairing protein function. Since mercury can also cross the placental barrier, mercury could accumulate in fetal brains and lead to neurogenerative disorders (Bernhoft, 2012)

Sources of mercury in wastewater

Mercury in wastewater can be present due to natural processes such as wet and atmospheric deposition as well as anthropogenic sources. The table below lists the possible industrial and residential sources of mercury. Though residential sources individually make up for only a fraction of mercury contamination in wastewater, cumulatively it might result in large quantities, thereby making their removal essential.

Dental facilities are the single largest source of mercury in treatment plants. This is due to the use of dental amalgam. Dental amalgam, also known as “silver filling,” is used to fill teeth with cavities. Dental amalgam is made of nearly equal parts of liquid mercury and a metal alloy powder (silver, tin, copper, zinc, and other trace metals). While, dental fillings can release minute concentration of mercury, FDA considers dental amalgam to be safe for adults and children ages six or greater. In 2001, CDC reported that there was little evidence that health of people having dental amalgam was compromised. Due to the large fraction of mercury (~ 50%) dental amalgam waste needs to be correctly disposed, else mercury can be released into the sewers or the air. On September 17, 2002 New York State enacted Chapter 506, Laws of 2002 which bans the use of non-encapsulated elemental mercury in dental offices and requires dental facilities to recycle any mercury or dental amalgam waste generated in their offices in accordance with regulations established by the New York State Department of Environmental Conservation (NYDEC, Guide for Dentists for Managing Mercury and Amalgam Wastes).

Apart from the point sources listed above, mercury can enter the wastewater due to runoff, sediment contamination and leaks and spills. Though the EPA-approved Total Maximum Daily Load for Mercury specifies that 98% of the mercury load to surface water is due to atmospheric deposition with the remaining 2% due to wastewater discharge (US EPA, 2007), it is important to control mercury concentration in wastewater due to its toxicity.

Table 1. Sources of mercury (NYDEC, 2007) (US EPA, Mercury in Consumer Products)

Industrial/Commercial	Residential
Municipal Waste combustion	Breakage / Incorrect disposal of mercury containing items such as: • Fluorescent light bulbs including CFLs • Thermometers and Thermostats • Batteries (button-cell) • Mercury switches in old household devices • Barometers • Latex paint • Antiques and jewelry • Measurement devices: sphygmomanometers, barometers, manometers, flow meters and hygrometers • HVAC Systems
Medical Waste combustion	
Fossil-fuel combustion	
Operation of fossil-fuel based boilers for thermal energy	
Portland cement manufacturing Chlor-Alkali Facilities	
Gold and mercury mining	
Dental clinics, hospitals, and other medical facilities	
Schools and Universities	
Auto recyclers	

Effluent Water Quality Standards for Mercury

Several water quality standards have been implemented to protect aquatic life and human health. The most stringent among them is the 0.7 ng/L (dissolved) standard developed for people who consume fish. The surface water quality standard for protection of wildlife in the Great Lakes Basin is 1.3 ng/L (total) while in other regions it is 2.6 ng/L (dissolved). The NYSDEC recognizes that the standards mentioned above are difficult to achieve with the currently used treatment technologies. Currently NYSDEC is in the process of issuing SPDES permits to wastewater treatment plants with the requirement of an MMP (Mercury Minimization Plan) to be eligible for the Multiple Discharge Variance (MDV) allowing treatment plants to discharge mercury up to a limit of 50 ng/L, known as the General Level Currently Achievable (GCLA) (NYSDEC, 2015).

Fate and Transport of Mercury in Conventional Wastewater Treatment Processes

Mercury entering a treatment plant can be in two forms- soluble and particulate. Both forms of mercury include the metal alone and metal-complexes with organic compounds. Mercury is predominantly found in particulate form with metal complexes >45µm in diameter (Hargreaves et. al., 2018). The different stages of a conventional WWTP are preliminary treatment for removal of large solids, primary settling for TSS and SS treatment, biological treatment for BOD removal, tertiary processes for nutrient removal and lastly advanced treatment (if any) followed by disinfection. In other words, primary treatment involves the removal of settleable and suspended organic whereas secondary treatment focusses on removing dissolved organic compounds. Since mercury is mostly found in particulate form bound to suspended solids, majority of the metal is removed from the water stream during primary treatment. It has been reported that mercury concentration has reduced by as much as 75% after primary treatment. This means mercury gets accumulated in the sludge generated by primary sedimentation.

During secondary treatment, the settling of sludge flocs and the availability of binding sites on the extracellular polymeric substances (EPS) secreted by the bacteria further facilitate removal of mercury (Hargreaves et al., 2018, 2016). But the common factor remains that mercury is removed from the liquid waste into the sludge stream. Therefore, when a mercury minimization plan is developed, it is important to look at both liquid and solid streams.

Treatment Processes for Mercury Removal

In the previous section it was demonstrated that mercury in wastewater is removed primarily due to treatment processes associated with solids removal since mercury is in particulate form in wastewater. Nowadays treatment processes are available for a more targeted approach to treat mercury and other heavy metals. Some of these techniques include adsorption by activated carbon or other organic adsorbents, microorganisms, or plants (phytoremediation).

Section II: SITE AND FACILITY DESCRIPTION

According to a document published in 2015 (NYSDEC, 2015) the Mohawk river basin had the greatest average mercury concentration among all the watersheds sampled in NY (40 samples) at 5.4 ng/L and a maximum of 94.8 ng/L. Though this data was collected between 1999 and 2001 and the exact concentrations of mercury would have changed, the published values show the persistence of mercury in the area.

The Town of Rotterdam has five (5) Sewer Districts (SD#2, 3, 4, 5A, 6A, 7) and SD#2 has 14 extensions with a population of approximately 30,000. Sewer District 2 serves approximately 2690 residential and 220 commercial users with Von Roll USA, Inc being a significant industrial user (SIU). The wastewater treatment facility, which is also located in sewer district 2, is designed for an average daily flow of 1.5MGD, though the average flow over the past three years has been 0.93 MGD. The treatment process consists of a bar screen and a grit separator as the preliminary treatment followed by primary settling tanks, trickling filters (in parallel), a dual train RBC (in series) and secondary clarifiers (in parallel). The wastewater then undergoes tertiary filtration and disinfection by chlorine before being discharged into the Mohawk River. The disinfection method was switched from UV disinfection to liquid sodium hypochlorite disinfection in March 2019.

Sludge from the primary and secondary clarifiers is pumped to the gravity thickener which also receives septage from local households and industries. Thickened sludge is then stored in the sludge holding tank before it is dewatered at a belt filter press. Dewatered sludge is then hauled to the City of Schenectady WRRF (distance of 5.4 miles). A process flow diagram of the treatment plant is provided in Exhibit A.

As mentioned earlier, dental, and medical clinics use several mercury-based measuring equipment as well as other items, particularly dental amalgam which can contribute to mercury concentration in the sewer collection system. Rotterdam has many more dental facilities compared to hospitals or other medical clinics. Given that there are a greater number of dental clinics the mercury minimization plan shall be more focused towards these places. Apart from the dental clinics, a veterinary hospital and two schools are the other potential sources of mercury. It should be noted that the above-mentioned description for Rotterdam only refers to Sewer district 2. No data is available for mercury in the effluent from these sources. Article VII in the Sewer Code of Rotterdam states that *No user shall discharge wastewater to the sanitary sewer system when any of the pollutant concentrations exceed the limits specified herein. These concentrations shall be applied to wastewater effluents at a point just prior to discharge into the Town's sewer system. With the express written consent of the Public Works Coordinator, users with multiple discharge outfalls may combine waste streams by calculation to report on wastewater characteristics.* The allowable mercury average daily and maximum instantaneous concentrations that follow this section of code are both 50,000 ng/L (0.05 mg/L).

Most treatment plants are not designed to treat mercury to obtain an effluent concentration of 50 ng/L since the concentration is extremely low and the implementation of processes to remove mercury would be expensive. Based on the techniques described previously to treat mercury and the treatment process employed in the Rotterdam WWTP it is evident that there is no specific process to treat mercury. Apart from the sludge disposed from the WWTP, Rotterdam also accepts septage.

Based on the quarterly samples taken by the Town in 2020, the average influent and effluent mercury concentrations are 10.45 ng/L and 3.15 ng/L respectively (Table 2.). The values show that the mercury concentration in the effluent which is discharged into the Mohawk river is significantly lower than the regulatory 50 ng/L limit. However, the existence of mercury requires a mercury minimization plan to be in place such that these low concentrations can be controlled and monitored.

Table 2. Influent and Effluent Quarterly monitoring results for 2020

Time Frame	Influent (ng/L)	Effluent (ng/L)
Q2 2020	0.5	3.4
Q3 2020	29.5	2.7
Q4 2020	<1.35	3.35

Von Roll USA, Inc is the only significant industrial user (SIU) in Sewer District 2. They manufacture insulation material for electrical rotating machinery specializing in high voltage insulation materials. Metals copper and zinc are required to be regulated within the SPDES permit for Von Roll, however mercury has also been measured during routine sampling. Over the past seven years, mercury has consistently been lower than the detection limit of 0.2 ng/L pertaining to the testing method EPA 245.1 except for two instances in 2014 in 2015 wherein mercury measured at 0.9 ng/L and 0.3 ng/l respectively. The effluent discharge limit for Von Roll for mercury is 0.05 mg/L; Von Roll has complied by this mercury effluent standard over the past years. Though Von Roll is a SIU in the Sewer District, it should be noted that Von Roll does not discharge its process water into the sewer system; only sanitary and non-contact cooling water is discharged into the system.

A Mercury Minimization Plan (MMP) is meant to ensure standards are satisfied and plan is implemented to reduce mercury generated at source in a cost-efficient manner and maintain the low concentration by following control and monitoring strategies. The town has commenced quarterly influent and effluent sampling as a part of the re-issued SPDES permit beginning June 01, 2020. Sludge does not need to be sampled for mercury as a part of this permit.

SECTION III: CONTROL STRATEGIES

Control of industrial effluent discharge

As previously discussed, the sectors which contribute the most mercury are medical (hospitals, clinics, nursing homes and veterinarians) as well as dental clinics. Specific control strategies mentioned below shall be incorporated for each of these sectors to ensure source reduction of mercury.

Dental Clinics

All dental clinics should adhere to the BMP for handling amalgam waste as published by the American Dental Association (Exhibit C). Effective March 16, 2003, New York State Law requires that all dentists recycle mercury and mercury amalgam waste generated in their practices. The law also requires that dentists use encapsulated mercury and prohibits, in the practice of dentistry, the use or possession of elemental mercury not in capsules. If the dental practice is still using dental amalgam, New York State Law requires the use of single use amalgam-capsules. Effective May 12, 2006, dental facilities are required to install amalgam separators that remove waste amalgam from the dental facilities' wastewater. Amalgam waste is also required to be recycled as per the laws in the state.

The control of waste dental amalgam includes proper management of the traps and filters in dental clinics. Due to the difficulty in completely removing amalgam particles in reusable amalgam traps, disposable traps are preferred. A larger mesh size for the traps is suggested to avoid frequent amalgam cleaning. The use of the correct amalgam trap should be coordinated with the local dental amalgam recycler.

The Town shall inspect each dental facility at least once every five years to verify compliance with the MMP including dental forms required by 6NYCRR Part 374.4.

Automobile shops

Auto-recycling shops are another potential source of mercury due to mercury-containing components such as switches, sensors, lights, and navigational systems which might be present in the automobiles. Based on the New York State law, which was enacted in August 2006, a slow phase out of mercury-containing components greater than 15 mg in automobiles is required by manufacturers. Mercury switches were also banned from January 2008 in New York State. Though this will guarantee mercury-free automobiles in the future, several older and existing automobiles may still have mercury within them. Automobile recyclers should ensure that mercury containing components are removed and appropriately disposed before the vehicles are shredded/crushed. Exhibit D within the plan answers common questions related to the recycling of

mercury switches and other mercury components in automobiles. The End of Life Vehicle Solutions Corporation (ELVS) provides vehicle dismantlers with free collection buckets (1 or 3 ½ gallon) and free services to manage these automotive switches once they are removed from the vehicles. These services cover all transportation and final disposal costs of any collected switches. It is recommended that all auto-recycling shops register for this service.

Medical facilities – hospitals, nursing homes, clinics, and veterinarians

All medical facilities should comply by standards set by the American Hospital Association to eliminate the use of mercury containing devices. In 1998 U.S EPA and the AHA signed a memorandum of understanding to committing to the virtual elimination of mercury containing devices by 2005. According to the AHA BMP's for reducing the number of mercury-containing devices, medical facilities should inventory their devices, and find alternatives to mercury containing devices identified in the inventory. Medical facilities should be made aware of the correct protocols to be followed in case of a mercury spill. Records should be maintained detailing the location and approximate quantity of mercury at the facility. An EPA document published in 2002 has been attached as Exhibit E to assist with inventorying. Exhibit F lists all the possible mercury-containing devices seen in medical facilities. This list can be used to make an inventory.

Apart from these industry specific control strategies enlisted to minimize mercury generation at the source, the Town of Rotterdam will enforce the mercury discharge limit of 50,000 ng/L (0.05mg/L) as given in the Sewer Code of Rotterdam to the industries mentioned in Section II. Records of their discharge permits shall be maintained. Compliance with BMPs shall be verified.

All new industrial users shall be inspected for mercury discharge before being allowed to discharge into the sewer system. The sewer code will be reviewed to see if a reduction in the discharge limit concentration of mercury is warranted. The Town shall conduct periodic inspections once every five years of the above stated commercial facilities. Alternatively, the Town may develop an outreach program to inform the facilities of their responsibilities towards the MMP.

Control of mercury at the treatment plant

Currently sampling of influent and effluent in a quarterly manner has commenced. This quarterly influent and effluent testing of mercury shall continue as required by the permit. Based on the mercury concentration in the influent and effluent, more sampling sites will be identified if required. The Rotterdam WWTP has its sludge hauled to the City of Schenectady WRRF. The sludge is not classified as hazardous, and the City does not require mercury testing to be performed on the sludge before it is accepted. Septage that is received at the Rotterdam treatment plant does not need to be tested since the septage is mixed with the sludge produced at the plant.

Mercury containing measurement and control devices may also be in use at the treatment facility such as thermometers, thermostats, barometers, mechanical tilt switches, float control switches and gauges and flow meters. The facility will check to see if mercury containing equipment is currently used and if found, an inventory will be created. Replacement with equipment that does not contain mercury will be identified, budgeted for, purchased, placed into use and the old mercury-containing items properly disposed. Apart from these instruments, the previously mentioned household mercury containing items may be in use such as CFL bulbs and fluorescent lamps. LCD monitors and screens have also been found to have mercury. To reduce mercury at the WWTP, all new electronic equipment purchased shall henceforth include a mercury evaluation and the one with lower mercury will be selected if economically and logistically favorable.

Chemicals stored at the treatment plant should be certified by the manufacturer that they contain less than 10 ppb (10 µg/L). All chemicals which are used at a rate of 1000 gal/year or more should be certified to have a mercury concentration less than 10 ppb. Sodium hypochlorite used for disinfection is utilized at a rate greater than 1000 gal/ year and therefore requires certification. Exhibit B includes the certification by the manufacturer for this chemical.

Control of Household products containing mercury

Schenectady county has a household hazardous waste program wherein mercury waste such as thermostats and thermometers are accepted. The program requires participants to purchase an annual permit of $20 for the County Compost Facility and Recycling Center. The permit must be purchased prior to the date of the collection event that is being attended. New York state has banned the sale of most mercury-containing products and requires that other products containing mercury be labelled to ensure correct disposal and recycling of mercury. Disposal of mercury-added products is not allowed

in the normal trash but must be managed by separate delivery to a solid waste management facility, recycling facility, authorized hazardous waste facility or at a municipally sponsored household hazardous waste collection program. A document published by New York State describing the state's laws governing mercury consumer products is enclosed as Exhibit G. Mercury thermostats are among the largest contributors of mercury in households due to the large amounts of mercury present within them – up to 5 grams. New York State Mercury Thermostat Collection Act of 2013 requires all mercury thermostats to be collected and managed in an environmentally acceptable manner. It is illegal to throw mercury thermostats in the trash since New York State has a disposal ban since 2005. Thermostat Recycling Corporation is a nonprofit organization which collects thermostats at several drop-off locations and recycles mercury. A list of drop-off locations close the Town of Rotterdam is listed in Exhibit H. If the treatment plant staff are approached by a member of the community, they can direct them to these services with the closest one being at Capital District Supply, 315 Green Street, Schenectady NY 12305. Contractors should ensure the safe disposal of mercury thermostats that have been removed from any HVAC system.

Spill management at household settings is another important element of control of mercury discharge at source- a spill management guideline for small spills is provided in Exhibit I. These guidelines/ links to the DEC guidelines for mercury spill cleanup will be posted on the Rotterdam Town website along with the DEC hotline number for mercury spills.

Control by Outreach

According to the Senate Bill 7399-B which took effect on September 4th, 2004 the use and purchase of elemental mercury is banned in primary and secondary schools. Outreach to the two schools in the sewer district 2, shall be initiated and maintained. The schools were contacted and due to no response, it is assumed that they do not have an inventory of items containing mercury or a strategy in place to reduce mercury containing devices. The two schools are recommended to initiate a mercury clean out plan based on the steps provided by DEC (Exhibit J). As a part of the plan, the schools will be asked to make an inventory of mercury containing devices/instruments (according to the format in Exhibit J) and encouraged to find replacements for these. Workshops can also be conducted if required.

Generic Control Strategies

Mercury containing equipment (MCE) is regarded as Universal Waste meaning it needs to be treated as hazardous waste but without the permits and regulations governing hazardous waste management. Universal waste is not counted towards generator status, the waste can be self-transported and universal waste can be consolidated at one location from satellite locations. Since universal waste can be consolidated at one location, schools can act as drop-off locations for MCE which will be self-transported to the nearest universal waste handling facility. Having the schools act as drop-off locations allows the surrounding community to utilize this service.

The disposal of elemental mercury or elemental mercury contaminated material, mercury compounds, mercury contaminated material due to spills and broken or crushed fluorescent lamps needs to be considered as hazardous waste and not universal waste. Most mercury based hazardous waste generators will fall under the criteria of Conditionally Exempt Small Quantity Generators (CESQG) also known as Very Small Quantity Generator (VSQG); they generate no more than 100 kilograms of hazardous waste in a month and less than 1 kilogram of acute hazardous waste (and store no more than 1,000 kilograms). Guidelines for CESQG are listed in Exhibit K. Schenectady County has a Small Business and Non-Profit Disposal Program specifically designed for Conditionally Exempt Small Quantity Generators. Upon registration and completion of paperwork for the program a quote will be sent to the waste generator based on the quantity and type of hazardous waste. Once the payment has been arranged, the hazardous waste will be accepted by the County at the County Composting and Recycling Facility at 24 Hetcheltown Road by appointment.

According to the SPDES permit, systems with CSO and Type II SSO outfalls should also be controlled. The Town does not have such outfalls and therefore these are not included in the plan.

SECTION IV: MONITORING STRATEGIES

The treatment plant staff will continue testing the influent and effluent for mercury. The test results will be used to monitor the influent and effluent concentrations according to the EPA standards provided in Table 5 below. Unless specified, all

samples collected will be grab samples by using EPA standard 1669. Frequency will be quarterly monitoring as required in the SPDES permit. The treatment plant will measure mercury in terms of total mercury.
Apart from continuous monitoring of mercury concentrations at the treatment facility, the implementation of control strategies will be monitored by verifying the use of BMPs. A file should be maintained for the MMP with associated documentation including dental forms required by 6NYCRR Part 374.4. These documents can be requested for review at any time without prior notice. A record of quantity of mercury collected at drop-off locations can be maintained, this would help in documenting the decreasing use and thereby disposal of mercury containing devices. Using the key sampling locations which will be identified, mercury will be semi-annually monitored. Monitoring of properly treated dental facility discharge is not required as per the SPDES permit.

SECTION V: ANNUAL REPORTING

Once the plan is approved by NYSDEC, the treatment plant staff are expected to take the responsibility to implement the plan. MMP annual reports are an important part of state approved plans and will be required to be submitted one year after the program goes into effect and annually thereafter. Exhibit L can be used as a reference style to submit the annual report. Reports will include the following sections at a minimum.

i. **Mercury monitoring results for the past year**: All mercury measurement data for the past year should be included in the annual report. This includes source monitoring as mentioned for sources mentioned in Table 3 as well as other point sources identified in the plan and industrial point sources (key sampling locations). All mercury test data should contain sampling dates, sampling method, method of analysis, laboratory name and appropriate units. According to the Water Quality Guidance for Great Lakes System influent measurements need to be made at least quarterly.
ii. **Potential mercury sources:** The report shall identify key sampling locations based on the collection system and the location of the above identified industries. These sites will be collectively known as key sampling locations. The status of MMP implementation with respect to identifying these sampling sites should be outlined as mentioned in (iii). Any new potential sources which were identified due to monitoring should also be included in the report.
iii. **Summary of actions taken to reduce mercury and upcoming actions:** This section will include any actions taken in response to monitoring results as well as the extent which the control strategies were implemented. Mercury reduction progress shall be incorporated for each of the sectors mentioned in the control strategies. If no actions were taken to address an identified source or sector, an explanation shall be provided. All previous mercury reduction activities shall be included for each sector/source to highlight all the activities executed by the municipality. This section will also include a plan of the mercury reduction activities according to the plan for the upcoming year. If no actions are required due to completion of all tasks mentioned in Table 4, it will be mentioned that only control and monitoring will continue.
iv. **Revision of plans:** Any proposed changes to the MMP to account for activities which could not be implemented as required in the plan will be included in this section. If due to certain circumstances, parts of the MMP cannot be performed, it shall be stated here along with reasons. Any additions to the MMP will be mentioned in this section. A revision of the plan will be required when:
    a. There are changes in the wastewater treatment process or within the collection system causing a potential for increase in mercury.
    b. Effluent concentration exceeds 50 ng/L
    c. A letter from NYS DEC requires permit modification or identifies inadequacies in the MMP.

Table 3. Monitoring guidelines for mercury in wastewater (taken from Mercury Pollutant Minimization Program Guidance US EPA, 2004) (US EPA, 2004)

Source	Typical Concentration	Method Options
POTW wastewater influent	50 – 500 ng/L	1631 (dilution) 1631 modified (245.7)
POTW wastewater effluent	1 – 20 ng/L	1631
POTW sludge or biosolids	0.2 – 30 mg/kg (dry weight)	SW 846 – 7471B
POTW collection system	50 – 1000 ng/L	1631 (dilution) 1631 modified (245.7) 1631 modified (CVAAS) 245.1 (optimized and dedicated instrument)
Industrial effluent- general	Variable	1631 1631 modified (245.7) 1631 modified (CVAAS)
Industrial effluent- mercury process or contaminated feedstock	Variable	1631 modified (245.7) 1631 modified (CVAAS) 1631 (dilution) 245.1
Surface water	0.2 – 10 ng/l	1631
Dental office discharge**	Episodic discharge ranging from 1000 – 12,000,000 ng/l	245.1 1631 modified (CVAAS) 1631 modified (245.7)

** Seattle Metro 1991; Massachusetts (MWRA) 1997; Barrucci (San Francisco) 1992, 1993; Pima County, AZ, 1991.

KB Group of NY, Inc. dba PRIME AE Group of NY (PRIME) will prepare the first annual report of the MMP which will be submitted one year after the MMP is implemented. Information to write the report will be provided by the staff from the treatment plant based on the timeline and tasks listed in Table 4. The annual report will be written to describe the progress made in implementing the tasks outlined in Table 4. Records will be maintained by the staff regarding the tasks completed and the pertaining documents which will be incorporated into the annual report. **All documents collected over the year for the MMP should be submitted to KB Group of NY, Inc. dba PRIME AE Group of NY 2 months prior to the annual report submission deadline.** The first annual report can be used as a template for further annual reports.

SECTION VI: STAFFING, RESOURCES AND A TIMELINE

The table below summarizes the control strategies enlisted in Section III in order of completion along with an estimated budget.

Table 4: Timeline and budget required for MMP

Task No.	Task Name	Time Needed	Estimated Labor Hours	Cost
1	i. Continue testing influent and effluent at the WWTP	i. Quarterly		$75/test for wastewater
2	i. Identification of mercury containing devices at the WWTP ii. Replacement of devices with non-mercury containing alternatives	i. Up to 3 months for identification ii. Depends on the number of items identified in (i)	i. 24 hours/year	
3	i. Enforce Sewer Code Standards for all industries. ii. Maintain copies of discharge permits for all dental and medical facilities. iii. Ensure BMP compliance for all industries, with periodic inspection once every five years. iv. Post Small Spill Cleanup on Town website (Exhibit I) v. Notify automobile recyclers to remove mercury switches and enroll in ELVS services. vi. Modify Sewer law to reduce mercury discharge limit. vii. Obtaining information on quantity of mercury collected monthly	i, ii. Up to 2 months to obtain initial discharge permits and enforce sewer code standards if in exceedance. iii. Can use checklists provided in Exhibit M to track progress and for periodic inspection. iv. 1-2 months to post spill cleanup guidelines on village websites. v. 6-8 months to draft and get the new sewer law approved. vii. 5 -6 months for all mercury collection services to be announced and utilized. Thereafter every month data will be collected	i., ii., iii. 24 hours/year	
4	Identification of key mercury sampling sites and sampling at these sites	i. 1-2 months for identification of key mercury sampling sites based on effluents from industries. ii. Once sites are identified, semi-annual.	i. 4 hours ii. 16 hours/year	$75/test
5	i. Schools will identify and inventory mercury containing devices ii. Schools will replace identified mercury containing devices iii. Schools will register for Small Business and Non-Profit Disposal Program offered by Schenectady County	i. Initial 2months for communications with school to obtain inventory of mercury containing devices ii. Check in progress once every five years using supplemental documents iii. 2 -3 months to complete registration and inform community about collection facility at school	i. 4 hours ii. 2 hours/year	

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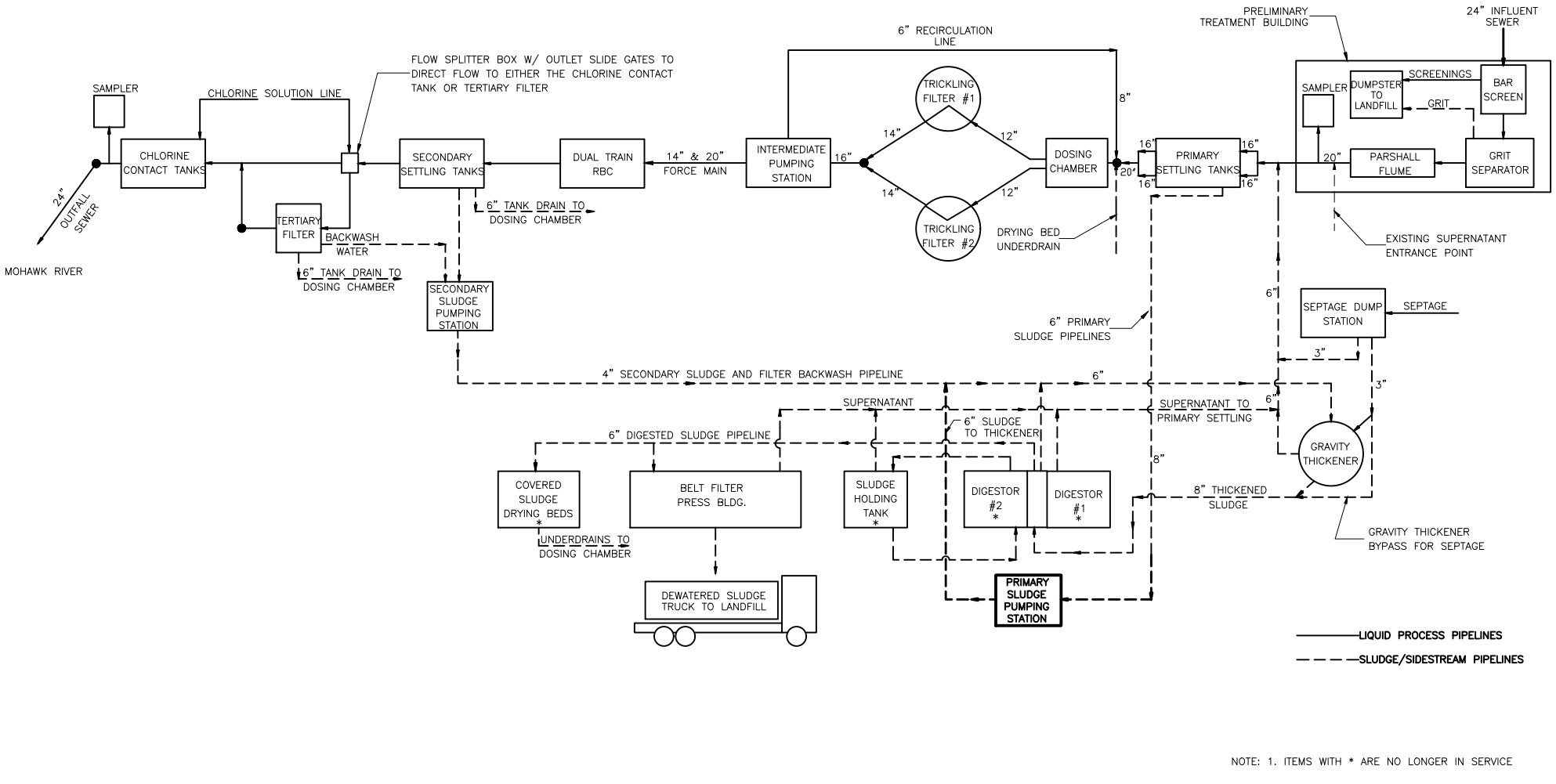
EXHIBIT A
PROCESS FLOW DIAGRAM AT WWTP



NOTE: 1. ITEMS WITH * ARE NO LONGER IN SERVICE

EXHIBIT B
MERCURY CERTIFICATION FOR SODIUM HYPOCHLORITE

SURPASS CHEMICAL COMPANY, INC.
INDUSTRIAL CHEMICALS WITH TECHNICAL SUPPORT
1254 Broadway, Albany, N.Y. 12204-0165 • TEL: 518-434-8101 • FAX: 518-434-2798 • Charlotte, N.C. • TEL: 800-289-8101

Karl Shafarzek
Town of Rotterdam 26 West
Campbell Road Rotterdam
Junction, N.Y. 12306

03/08/21

Karl,

Please accept this letter to answer your question regarding mercury levels in our sodium hypochlorite (Surchlor) product. We confirm that the level of mercury in our Surchlor is below 10 PPB. The analysis was completed by a third party analytical company, Underwriters Laboratories as part of our ANSI / NSF 60 Drinking Water certification.

Do not hesitate to reach out to me if you have any other questions regarding our products and services.

Sincerely,

Tim Clayton

Tim Clayton, Technical Sales Manager
Surpass Chemical Company, Inc.

EXHIBIT C
BMP FOR DENTAL CLINICS

Best Management Practices for Amalgam Waste

American Dental Association • October 2007

ADA American Dental Association®
America's leading advocate for oral health

The following information demonstrates how to manage and recycle dental amalgam waste to help protect the environment.

Glossary of Amalgam Waste Terms

- **Amalgam capture device** is an apparatus such as a chair side trap, vacuum pump filter or amalgam separator that collects amalgam particles.
- Amalgam sludge is a mixture of liquid and solid material that collects within vacuum pump filters, amalgam separators or other amalgam capture devices that may be used.
- **Contact amalgam** is amalgam that has been in contact with the patient. Examples are extracted teeth with amalgam restorations, carving scrap collected at chair side, and amalgam captured by chair side traps, filters, or screens.
- **Dental Best Management Practices** are a series of amalgam waste handling and disposal practices that include, but are not limited to, initiating bulk mercury collection programs, using chair side traps, amalgam separators compliant with ISO 11143[1] and vacuum collection, inspecting and cleaning traps, and recycling or using a commercial waste disposal service to dispose of the amalgam collected.
- **Empty amalgam capsules** are the individually dosed containers left over after mixing precapsulated dental amalgam.
- **Non-contact amalgam** (scrap) is excess mix leftover at the end of a dental procedure.

The ADA recommends against the use of bulk elemental mercury, also referred to as liquid or raw mercury, for use in the dental office. Since 1984, the ADA has recommended use of precapsulated amalgam alloy.

If you still have bulk elemental mercury in the office, you should recycle it. Check with a licensed recycler to determine whether they will accept bulk mercury. *Do not* pour bulk elemental mercury waste in the garbage, red bag or down the drain. You also should check with your state regulatory agency and municipality to find out if a bulk mercury collection program is available. Such bulk mercury collection programs provide an easy way to dispose of bulk mercury.

Steps for Recycling Amalgam Waste

1. Stock amalgam capsules in a variety of sizes to minimize the amount of amalgam waste generated.
2. Amalgam waste may be mixed with body fluids, such as saliva, or other potentially infectious material, so use personal protective equipment such as utility gloves, masks, and protective eyewear when handling it.
3. Contact an amalgam waste recycler about any special requirements that may exist in your area for collecting, storing and transporting amalgam waste.

   If you need to find a recycler, check with your city, county or local waste authority to see whether they have an amalgam waste recycling program.
4. Store amalgam waste in a covered plastic container labeled "Amalgam for Recycling" or as directed by your recycler. Your recycler may have its own requirements, so ask your recycler about containers and what may be placed in them.
5. Look for recyclers who comply with the ADA-ANSI standard. This standard is meant to encourage recycling.

Questions to Ask Your Amalgam Waste Recycler

Below is a list of questions you may want to ask your amalgam waste recycler. Note that not all recycling companies accept every type of amalgam waste, and the services offered by recyclers vary widely. The ADA recommends that you contact a recycler before recovering amalgam and ask about any specific handling instructions the recycler may have. Importantly, select a reputable company that complies with applicable federal and state law and provides adequate indemnification for its acts and omissions. Look for recyclers who comply with ANSI/ADA Specification 109: Procedures for Storing Dental Amalgam Waste and Requirements for Amalgam Waste Storage/Shipment Containers.[1] This standard is meant to encourage recycling.

Ask Your Recycler ...

- What kind of amalgam waste do you accept?
- Do your services include pick up of amalgam waste from dental offices? If not, can amalgam waste be shipped to you?
- Do you provide packaging for storage, pick up or shipping of amalgam waste?
- If packaging is not provided, how should the waste be packaged?
- What types of waste can be packaged together?
- Do you accept whole filters from the vacuum pump for recycling?
- Is disinfection required for amalgam waste?
- How much do your services cost?
- Do you pay for clean non-contact amalgam (scrap)?
- Do you accept extracted teeth with amalgam restorations?
- Does your company have an EPA or applicable state license?
- Does the company use the proper forms required by the EPA and state agencies?
- Do your procedures comply with ANSI/ADA Specification 109: Procedures for Storing Dental Amalgam Waste and Requirements for Amalgam Waste Storage/Shipment Containers?[2]

Best Management Practices for Amalgam Waste

DO	DON'T
Do use precapsulated alloys and stock a variety of capsule sizes	*Don't* use bulk mercury
Do recycle used disposable amalgam capsules	*Don't* put used disposable amalgam capsules in biohazard containers, infectious waste containers (red bags) or regular garbage
Do salvage, store and recycle non-contact amalgam (scrap amalgam)	*Don't* put non-contact amalgam waste in biohazard containers, infectious waste containers (red bags) or regular garbage
Do salvage (contact) amalgam pieces from restorations after removal and recycle the amalgam waste	*Don't* put contact amalgam waste in biohazard containers, infectious waste containers (red bags) or regular garbage
Do use chair-side traps, vacuum pump filters and amalgam separators to retain amalgam and recycle their contents.	*Don't* rinse devices containing amalgam over drains or sinks
Do recycle teeth that contain amalgam restorations. (Note: Ask your recycler whether or not extracted teeth with amalgam restorations require disinfection)	*Don't* dispose of extracted teeth that contain amalgam restorations in biohazard containers, infectious waste containers (red bags), sharps containers or regular garbage
Do manage amalgam waste through recycling as much as possible	*Don't* flush amalgam waste down the drain or toilet
Do use line cleaners that minimize dissolution of amalgam	*Don't* use bleach or chlorine-containing cleaners to flush wastewater lines

[1] International Standards Organization 11143:1999. Dental Equipment – Amalgam Separators.

[2] American Dental Association Council on Scientific Affairs. American National Standard/American Dental Association Specification No. 109. Procedures for storing dental amalgam waste and requirements for amalgam waste storage/shipment containers, 2006.

Practical Guide to Integrating BMPs Into Your Practice

Non-contact (scrap) amalgam

- Place non-contact, scrap amalgam in wide-mouthed, container that is marked "Non-contact Amalgam Waste for Recycling."
- Make sure the container lid is well sealed.
- When the container is full, send it to a recycler.

Amalgam capsules

- Stock amalgam capsules in a variety of sizes.
- After mixing amalgam, place the empty capsules in a wide-mouthed, airtight container that is marked "Amalgam Capsule Waste for Recycling."
- Capsules that cannot be emptied should likewise be placed in a wide-mouthed, airtight container that is marked "Amalgam Capsule Waste for Recycling."
- Make sure the container lid is well sealed.
- When the container is full, send it to a recycler.

Disposable chair-side traps

- Open the chair-side unit to expose the trap.
- Remove the trap and place it directly into a wide-mouthed, airtight container that is marked "Contact Amalgam Waste for Recycling."
- Make sure the container lid is well sealed.
- When the container is full, send it to a recycler.
- Traps from dental units dedicated strictly to hygiene may be placed in with the regular garbage.

Reusable chair-side traps

- Open the chair-side unit to expose the trap.
- Remove the trap and empty the contents into a wide-mouthed, airtight container that is marked "Contact Amalgam Waste for Recycling."
- Make sure the container lid is well sealed.
- When the container is full, send it to a recycler.
- Replace the trap into the chair-side unit (Do not rinse the trap under running water as this could introduce dental amalgam into the waste stream.

Vacuum pump filters

- Change the filter according to the manufacturer's recommended schedule. Note: The following instructions assume that your recycler will accept whole filters; some recyclers require different handling of this material, so check with your recycler first.
- Remove the filter.
- Put the lid on the filter and place the sealed container in the box in which it was originally shipped. When the box is full, the filters should be recycled.

Amalgam separators

- Select an amalgam separator that complies with ISO 11143.
- Follow the manufacturer's recommendations for maintenance and recycling procedures.

Line cleaners

- Use non-bleach, non-chlorine–containing line cleaners, which will minimize amalgam dissolution, such as those listed in the Additional Resources section of this document.

Additional Resources

The following articles published in the Journal of the American Dental Association are available through the ADA Division of Science and also are available to ADA members online.

For information on proper mercury hygiene practices see "Dental Mercury Hygiene Recommendations". 2003:134(11);1498-9.

For information on choosing line cleaners that minimize the dissolution of mercury from amalgam see: "The effect of disinfectants and line cleaners on the release of mercury from amalgam" 2006:137(10);1419-25.

For information on amalgam separators see:

- "Laboratory evaluation of amalgam separators" 2002:133;577-89.
- "Evaluating amalgam separators using an international standard" 2006:137;999-1005.
- "Purchasing, installing and operating dental amalgam separators: Practical issues" 2003 134: 1054-65.

EXHIBIT D

FAQ FOR RECYCLING MERCURY SWITCHED IN AUTOMOBILES

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

Fact Sheet - Mercury Switch Management Guidance for Vehicle Dismantlers

Why is mercury a problem in end-of-life vehicles?

Mercury auto switches were used to control convenience lighting and anti-lock brake systems (ABS) in many vehicles manufactured prior to model year 2003. The National Vehicle Mercury Switch Recovery Program (NVMSRP) estimates that 67 million of these switches are available for recovery nationwide.

Mercury is a toxin that affects the nervous system and the brain. It is particularly damaging to a developing fetus and young child. If switches are not removed prior to crushing or shredding a vehicle or before the steel melting process, the mercury may be emitted into the air where it eventually enters rivers and lakes and contaminates fish and wildlife. Eating mercury-contaminated fish is the primary route of exposure for most people and has resulted in the issuance of health warnings about fish consumption for New York State residents.

Are mercury switches prohibited in New York State?

New York State Environmental Conservation Law (ECL) Article 27, Title 21, Mercury-added Consumer Products, Section 27-2107(7) states: "On or after January first, two thousand eight, no person shall sell, offer for sale or distribute any mercury switch or mercury relay individually or as a product component" Cost effective, non-mercury replacement switches exist which use a ball bearing in place of liquid mercury to trigger the electrical connection.

Who must remove mercury-added equipment from vehicles?

Mercury switches and mercury-containing ABS modules must be removed from end-of-life vehicles by vehicle dismantlers or vehicle shredders prior to crushing or shredding according to New York State Environmental Conservation Law (ECL) Article 27, Title 23, Vehicle Dismantling Facilities, Section 27-2303(5).

Which motor vehicles contain mercury?

All vehicles did not contain mercury switches. In general, convenience lighting in domestic cars manufactured before model year 2003 and foreign cars manufactured before model year 1992 should be inspected for mercury switches and mercury-containing ABS modules.

Mercury light switches are often found in the car's hood and trunk convenience lighting. The light assembly contains a small steel canister or "pellet" that contains liquid mercury. For some assemblies, it is easier to leave the pellet in place and discard the entire assembly into a leakproof recycling container. A mercury-containing ABS module should be completely removed without prying it open to remove the pellet.

The End of Life Vehicle Solutions Corporation (ELVS) has an excellent website that lists specific makes and models of various vehicles containing mercury switches.

How do I recycle or dispose of mercury switches and mercury-containing ABS modules?

- Automobile manufacturers established the NVMSRP to facilitate collecting and recycling mercury switches and mercury-containing ABS modules. In support of the NVMSRP, ELVS provides vehicle dismantlers with free collection buckets (1 or 3 ½ gallon) and free services to manage these automotive switches once they are

removed from the vehicles. These services cover all transportation and final disposal costs of any collected switches.

- If you wish to participate in the NVMSRP, you must register with ELVS. You may register by going online at www.elvsolutions.org or by calling (877) 225-ELVS (3587). ELVS will send you a collection bucket, a list of vehicles that have the potential to contain mercury switches, removal instructions for mercury-containing ABS assemblies, a removal brochure, a removing/recycling DVD, and detailed shipping instructions for the switches.
- Mercury switches that have been removed intact (complete convenience lighting tilt switch assembly or a mercury-containing ABS assembly) and mercury "pellets" that are encased in metal and removed from switch units should be managed as "Universal Waste". "Universal Waste" is hazardous waste that can be managed with reduced regulation but with on-site requirements to meet. The following storage and shipping steps must be followed:
  - Use the bucket label that ELVS provides to identify the bucket's content as "Universal Waste - Mercury-Containing Equipment";
  - Store the bucket in a separate area for "Universal Waste" at your facility;
  - Store switches and/or assemblies in the bucket with the lid securely fastened until you have collected enough for shipment to Environmental Quality Company (EQ), the reclamation facility that ELVS has contracted with;
  - "Universal Waste" can be stored for up to one year from initial placement in a container at your facility. You must document the date on which you start to collect and store switches in each bucket. This is done by noting the date on the bucket label when you start collecting and storing the switches in that bucket.
  - When the bucket is full (3 ½ gallon bucket holds 450 pellets or 130 assemblies) or prior to the one year storage limitation, visit United Parcel Service (UPS) on the web at www.ups.com to order a shipping label and to arrange for a pick-up of the container. If you do not have access to the web, you may contact EQ at 1-800-839-3975 to arrange UPS pick-up. Shipping instructions and contact information are provided in all buckets sent to program participants.
- Vehicle dismantlers who **do not** participate in the **free** ELVS program **are still required by state law to remove these switches**. Switches, switch assemblies, other intact mercury-containing equipment, and mercury "pellets" must be stored in a secure heavy plastic or metal container with a tight lid. State law requires that you:
  - Label your container as "Universal Waste-Mercury-Containing Equipment" and store it safely as noted above for a maximum of one year;
  - Send mercury switches and other mercury-containing equipment directly to a facility that the NYS Department of Environmental Conservation has authorized to accept mercury wastes or to a facility located in another state that is authorized by that state to reclaim mercury. These recyclers usually accept various mercury wastes and they do charge a fee. Permitted hazardous waste transporters can be found in the yellow pages or by contacting DEC at (518) 402-8705.
- You may use a common carrier (such as United Parcel Service, Federal Express, or other shipping services) to transport the mercury switches provided you are transporting less than one pound of mercury. Transporting more than one pound of mercury requires United States Department of Transportation packaging, labeling, and vehicle placarding. Any one shipment must not be greater than 500 pounds.
- Mercury in most switches is encased in metal which is not susceptible to breaking and can be handled as "Universal Waste". In some Volvos made between model years 1975 and 1991, switches used for lights in engine and luggage compartments are encased in glass. Volvo also used glass-encased mercury switches for make-up mirror lights in model years 1986-1991. Glass-encased mercury switches were used in Audi engine compartment lights in model year 1992 and earlier vehicles.
- If you remove glass-encased mercury switches from the switch unit, the switch must be managed as "Hazardous Waste." You must dispose of a glass-encased mercury switch at a facility that is licensed to treat, store or dispose of hazardous waste, and you must use a licensed hazardous waste transporter for the

shipment. **Do not mix glass-encased mercury switches in the collection bucket with metal-encased mercury switches.** If you do, the glass may break and the entire bucket of switches will be contaminated. The bucket would then have to be managed as hazardous waste.

- If the total amount of hazardous waste generated by your business is less than 220 pounds per month, mercury-containing equipment may be managed for a fee through a local household hazardous waste program. You need to contact your municipality to see if a household hazardous waste program exists in your area.
- The amount of hazardous waste your facility generates determines the specific requirements you must follow. Contact the Waste Determination & Analysis Section, Division of Environmental Remediation, NYSDEC, 625 Broadway, 12th Floor, Albany, NY 12233, Phone: (518) 402-9543.
- General mercury switch removal program information may be obtained by contacting the Bureau of Solid Waste, Reduction and Recycling, NYSDEC, 625 Broadway, 9th Floor, Albany, NY 12233-7253, Phone (518) 402-8706, email: recycling@dec.ny.gov
- The Michigan Department of Environmental Quality offers a video on the removal of mercury switches in vehicles. This video may be viewed at http://www.michigan.gov/deq/0,1607,7-135-3307_29693_4175---,00.html

Do I have to declare this incentive as additional income?

ELVS will provide you with a W9 (Request for Taxpayer Identification Number and Certification) form to complete and return upon receipt of your first bucket. No payments will be made until ELVS is in receipt of the returned W9 form. Dismantlers who receive less than $600 in payments per year from ELVS do not have to declare this additional income. Dismantlers who receive more than $600 in payments per year need to declare the payments as income. ELVS will send a 1099 form (Form for Additional Income) to the dismantler at year end.

What laws apply to mercury-containing equipment in motor vehicles?

- Chapter 145 (Laws of 2004),effective July 12, 2005, requires the proper disposal of mercury-added consumer products.
- Chapter 611 (Laws of 2006) effective January 1, 2007, requires the phase-out of mercury-added components greater than 15 milligrams in motor vehicles. By calendar year 2011 (model year 2012 vehicles), no motor vehicles may contain these components except where necessary to comply with federal safety, state safety, health requirements, or for national security.
- Title 6 New York Codes of Rules and Regulations (6NYCRR) Subpart 374-3 (link leaves DEC's website) is the Standards for Universal Waste and provides for the management of the removed mercury-containing equipment.

EXHIBIT E

EPA PUBLICATION: MERCURY IN HOSPITALS

Eliminating Mercury in Hospitals

Environmental Best Practices for Health Care Facilities | November 2002

JCAHO Environment of Care Standards 1.3, 2.3, 4.0

How Pervasive and Harmful is Mercury in the Environment?

Mercury is a toxic pollutant and is listed as one of 12 priority chemicals by the EPA Persistent, Bioaccumulative, and Toxic (PBT) Chemical Program. Consuming fish from mercury-polluted water bodies can severely affect the central nervous system; impair hearing, speech and gait; and cause blindness, tremors, insomnia, emotional instability, paralysis, loss of muscular control, and even death.[1] Fish consumption advisories for mercury have been issued for thousands of water bodies nationwide, including all the Great Lakes and their connecting waters, more than 79,000 other lakes and more than 485,000 miles of rivers. In 2001, 49 states had issued mercury advisories for lakes, rivers, and other water bodies.[2]

Neonatal exposure to mercury has been linked to several serious birth defects and recent research suggests that prenatal effects occur at mercury intake levels 5 to 10 times lower than that of adults. Additionally, a National Academies of Science report from July 2000 showed that 60,000 children are born in the U.S. each year with neurological problems because of exposure to methylmercury in utero.[3]

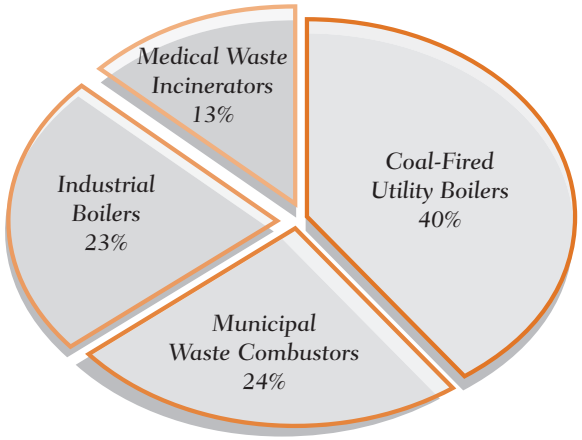
Numerous cases of mercury poisoning, primarily through inhalation, have been documented in the workplace. In a survey conducted by the National Institute for Occupational Safety and Health, researchers estimated that 70,000 American workers might be exposed to mercury vapors on the job, including nurses, lab technicians, and others working in health care facilities.[4] In addition, families of these workers were identified to be at risk of exposure from mercury-contaminated work clothes brought home by workers.[5]

Mercury Exposure Pathways

- *In utero*
- *Consuming mercury-contaminated fish*
- *Inhaling mercury vapors in the workplace*
- *Handling work clothes contaminated with mercury*

Atmospheric Mercury Contributions by Industry Sector

(1997, EPA)



What Are The Industrial Sources Of Mercury?

Although mercury is naturally occurring in volcanoes, natural deposits, and oceanic volatilization, human activities have substantially increased the amount of mercury cycling through the ecosystem. A 1997 EPA study[6] identifying industrial processes that contributed heavily to atmospheric mercury found that medical waste incinerators (MWI) contribute 13% (the fourth-largest source) of the anthropogenic mercury emissions to the environment. Additionally, hospitals contribute 4 to 5% of the total wastewater mercury load in some communities.[7] Many local wastewater treatment plants have identified hospitals as industrial pollution sources and have imposed strict wastewater limits for mercury (see Case Study 2). Eliminating or reducing mercury use not only lowers compliance costs, but also minimizes the potential for expensive spill cleanups. (For more information on mercury sources and health effects, see www.h2e-online.org/about/mercury.htm.)

continues

Why Commit to Being Mercury-Free?

Public Health—

Hospitals most frequently commit to becoming mercury-free based on an ethical motivation to protect human health and the environment. This desire often supports the hospitals' mission statements which commonly include a goal of "assessing and improving community health." As significant users of products containing mercury, hospitals have an opportunity to play a key role in protecting public health by minimizing the use and release of mercury into the environment.

Regulations—

Mercury waste is regulated under the Resource Conservation Recovery Act (RCRA), which requires all hazardous waste handlers to have specially trained staff and equipment on hand in case of a spill or release. Additionally, these facilities must meet special storage, handling, disposal, waste tracking, and reporting requirements. Failure to meet any of these requirements can result in fines up to $25,000 per day.

By August 2002, over 300 health care facilities nationwide had already taken the "Hospitals for a Healthy Environment Pledge."

For more information see www.h2e-online.org

Voluntary Agreements—

Because of health care's contribution of mercury to the environment, EPA and the American Hospital Association (AHA) signed a memorandum of understanding in 1998 committing to the virtual elimination of mercury from hospitals by 2005.[8]

The following sections of this fact sheet present information about mercury-containing devices and chemicals, alternatives to mercury-containing products, vendor information, and case studies of successful mercury elimination programs. This fact sheet also contains links to other important resources for completing a mercury inventory, setting up a mercury elimination program, and taking the steps necessary to eliminate mercury at your hospital.

[1] EPA Mercury White Paper. www.epa.gov/ttn/oarpg/t3/memoranda/whtpaper.pdf
[2] EPA Listing of Fish and Wildlife Advisories. May 2002. www.epa.gov/waterscience/fish/
[3] National Academies of Science, National Research Council. July 2000. "Toxicological Effects of Methylmercury."
[4] Anne Nadakavukaren. "Our Global Environment: A Health Perspective". 1995.
[5] Guy Williams. "Mercury Pollution Prevention in Healthcare." National Wildlife Federation. July 1997.
[6] EPA. EPA-452/R-97- 004. "Mercury Study Report to Congress, Volume II: An Inventory of Anthropogenic Mercury Emissions in the United States". December 1997.
[7] "Making Medicine Mercury-Free: A Resource Guide for Mercury-Free Medicine." Health Care without Harm. 2001.
[8] Health Care Without Harm, in partnership with the U.S. Environmental Protection Agency, the American Hospital Association and the American Nurses Association, has launched Hospitals for a Healthy Environment (H2E). www.h2e-online.org

Two recent independent studies[10, 11] have found significant accuracy problems associated with mercury thermometers:

- *25% of new mercury thermometers were inaccurate by at least ± 0.2 degrees C*
- *28% of mercury thermometers were inaccurate by at least ± 0.1 degree C*

[The ASTM standard for glass/mercury medical thermometers specifies a maximum allowable error of ± 0.1 C in the cited range.]

Mercury Thermometers: Prone To Inaccuracies

Mercury Sphygs: Worthy of Gold Standard Status?

A study[12] of 444 mercury sphygs found:

- *55% showed zero level between 10 and 20 mm Hg*
- *38% had dirty columns that obscured readings*
- *20% of the columns were not vertical*
- *5% had blocked air filters*
- *3 units had visible mercury droplets outside the mercury tube*

Where Is Mercury Found in Hospitals?

Although mercury is found in many places within hospitals, a mercury elimination plan should include a prioritized list of targets. For example, the California Department of Health Services (CA DHS)[9] conducted mercury inventories at six northern California hospitals in 1999 and found that sphygmomanometers and gastroenterology instruments accounted for 89 percent of the mercury in these hospitals.

Most mercury-containing equipment have a mercury-free alternative. Although some mercury-free alternatives may initially cost more, facilities often find that their initial capital costs are outweighed by the total costs associated with mercury cleanup equipment, spill costs and liabilities, and handling and disposal costs and liabilities (see Table 1, page 5).

Mercury can be found in many commonly-used hospital devices and materials including:

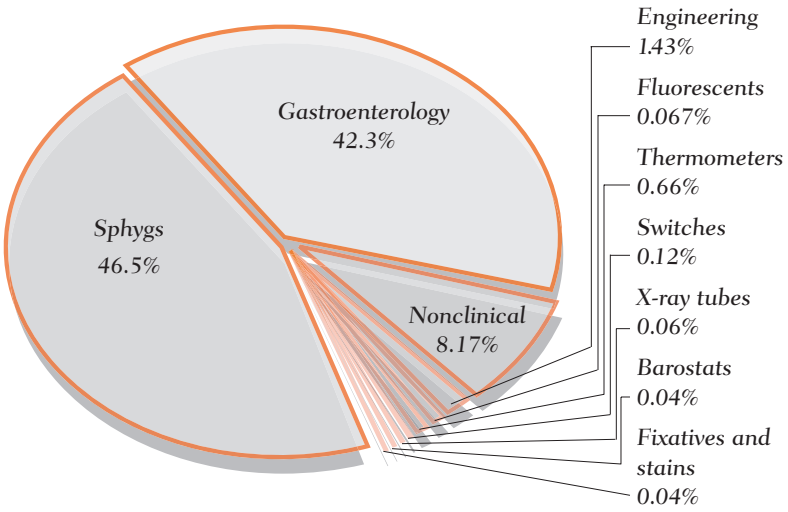
Thermometers

- Contain about 0.5 gram of mercury (laboratory thermometers contain 2 to 10 grams of mercury)
- Generally account for a small percentage of total mercury at hospitals

continues

- An important source of mercury contamination of nonhazardous waste streams because they are often disposed of improperly
- In contact with staff and patients more than any other medical device
- Broken thermometers inappropriately disposed of in red bags or sharps containers may be incinerated and release mercury into the environment
- A UCLA Medical Center study found that broken mercury thermometers were the most common sources of mercury spills—accounting for over 55% of incidents
- Alternatives are readily available (see thermometer inset that contains detailed data on the efficacy, cost, and features of both mercury and mercury-free fever thermometers)

Mercury Sources in Seven Northern California Hospitals
(California Department of Health Services, September, 2000)



Sphygmomanometers (blood pressure monitors)

- Contain 70 to 90 grams of mercury
- Typically located in heavily used areas including patient rooms, waiting areas, triage centers, and offices where the potential for patient or health care worker exposure to mercury is high
- The equipment at hospitals that often contain the largest amount of mercury
- Without regular maintenance, mercury sphygs can be inaccurate
- Alternatives are readily available (see sphyg insert that contains detailed data on the efficacy, cost, and features of both mercury and mercury-free sphygs)

Cantor and Miller Abbot tubes (also called esophageal bougies and Sengstaken-Blakemore tubes)—Used to clear gastrointestinal [GI] restrictions

- The equipment at hospitals that often contain the second largest concentration of mercury
- A single set of bougie tubes can contain up to 454 grams of mercury
- FDA device failure database shows 58 incidents from 1991 to 2000 in which GI tubes broke and released mercury inside patients[13]
- Alternatives are readily available; some substitutes are weighted with air or water while others are preweighted with tungsten; because the mercury in GI tubes functions as a weight, rather than a measurement device, the performance of alternatives is less questionable, and tungsten-weighted devices are considered just as effective
- Additionally, tungsten-weighted alternatives have the advantage of being opaque in X-rays, allowing detection of the dilator as it moves through the body

Non-Clinical Mercury Sources (sphyg repair kits, barometers, switches, etc.)

- Barometers contain about 800 grams of mercury and can be replaced with a 1-millibar precision aneroid for less than $250 or simply rely on a local airport or weather station for data
- Eliminating mercury sphygs renders a repair kit containing mercury obsolete

Other Sources

- Staining solutions and laboratory reagents (thimerosal, mercury chloride, immusal, and carbol-fuchin) Check the mercury content of your chemical at www1.netcasters.com/mercury/
- Tissue fixatives (Zenker's solution and B5)
- Thermostats
- Batteries
- Manometers on medical equipment
- Esophageal dilators (also called Maloney or Hurst bougies)
- Fluorescent and high-intensity lamps
- Cleaning solutions

continues

Taking the Leap....

How do you get a mercury reduction program rolling? Here's a step-by-step plan for making mercury reduction a priority at your hospital (also see Case Study 1, page 6):

Step 1 - Make A Commitment

Get support from the top. Talk to your hospital leadership, and get a signed statement to be mercury-free.

Establish a mercury-free team. Designate a program leader who will be enthusiastic and dedicated to the program and would identify a person in each department who has the authority to make departmental changes in order to build support.

Step 2 - Conduct A Mercury Inventory

Create a baseline inventory of mercury-containing products in your hospital against which progress can be measured.

Mercury inventory tools are widely available on the Internet. The Mercury Assessment Toolkit produced by the CA DHS is particularly comprehensive, easy to adapt to hospital-specific conditions, easy to use, and tracks reductions automatically.
See www.dhs.ca.gov/ps/ddwem/environmental/med_waste/medwasteindex.htm for additional information.

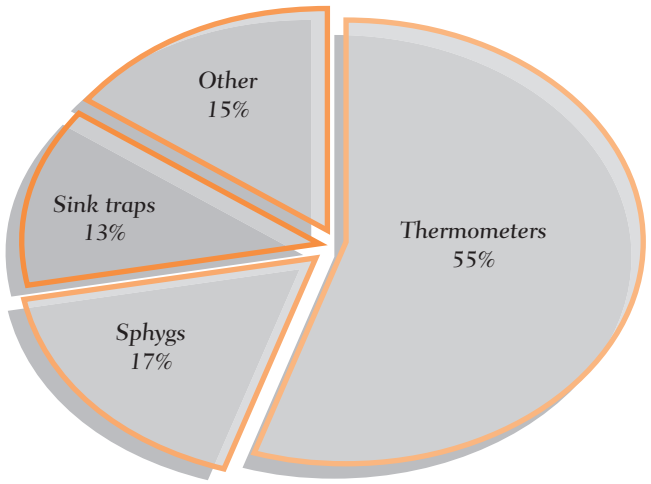
Step 3 - Evaluate Alternatives

Evaluate mercury-free alternatives in the context of your hospital.

- Is the performance comparable?
- What is the purchase cost for alternatives? For accessories? For maintenance?
- Are these costs offset by lower handling, disposal, and liability costs?

Contact the vendors listed at the end of this fact sheet for more information on mercury-free alternatives to common hospital devices, or check out these web sites: www.sustainablehospitals.org and abe.www.ecn.purdue.edu/~mercury/src/devicepage.htm

UCLA Mercury Spill Frequency (1997-1999)
(average of 18 mercury spills per year)



- Spill cleanup costs: Labor: approximately $10,000/year
  Disposal: approximately $34/pound
- 42% of the hazardous material unit incidents involved mercury
- Hazardous material unit spent 90 hours/year responding to mercury-related spills
- Hazardous material team cost $100 per hour resulting in a labor cost alone of $28,059 for the 3-year period

Step 4 - Establish Goals And Implementation Plans

Set short-term, measurable goals that match your hospital's resources. Reasonable goals, such as the elimination of mercury sphygmomanometers within 2 years, are easily measured and proposed as part of a hospital's business plan. Once attained, the goals can provide a springboard for new mercury reduction projects.

continues

Matching Mercury Replacement Strategies with Budgets

Targeted Device	Financially Strapped	Capital Budgets Allocated
Sphygmomanometers	Replace at servicing intervals	Replace as many as possible with available funding, then phase out remaining devices when broken
Gastrointestinal Tubes	Replace when expired	Replace immediately
Thermometers	Replace a set percentage each quarter or year targeting departments with high breakage first	Implement a one-time mass replacement

Step 5 - Institute Best Management Practices

- Educate staff regarding the hazards of mercury and proper handling and disposal.
- Eliminate mercury-containing equipment and products.
- Establish and monitor mercury-free purchasing policies.

Step 6 - Measure Success

Use your mercury inventory (from Step 2) to re-evaluate your facility. Identify your successes and modify your plan as necessary. Most importantly, get the message out to hospital staff members that they are making a difference!

Step 7 - Keep The Mercury Out

Work with your purchasing department to make sure that mercury products do not find their way back into the hospital. Require vendors to disclose the mercury content of products that you intend to purchase. See "Tools for Change" at www.sustainablehospitals.org for an example of a vendor product mercury-content disclosure agreement and mercury-free purchasing policy language.

(Table 1)

Mercury Spill Training and Equipment[13]

Training	Cost
Trainees (3 employees x 2 hrs x $15/hr)	$90 + loss of productivity
Trainer (2 hrs x $20/hr)	$40 + loss of productivity

Equipment	Cost
Spill Kit and Draeger Mercury Sniffer	$519

Total Cost: $649

Mercury Spills

Depending on the type and size of the spill and the facility, mercury cleanups at hospitals are sometimes handled by staff if they are trained and available, or otherwise addressed by cleanup contractors. While mercury spill data from a wide variety of health care facilities including large and small, urban and rural, emergency, research and clinical facilities are generally unavailable or incomplete, the best available data comes from a large hospital at the University of California, Los Angeles (UCLA) between 1997 and 1999 (see summary on previous page).

What Does It Cost To Prepare For and Clean Up Mercury Spills?

Because of health and safety considerations and the environmental impact of mercury, any hospital that stores and uses mercury-containing devices within its facility is required by federal regulations to be prepared to handle mercury spills. Table 1 shows costs for mercury spill training and equipment that a hospital *will incur*, and Table 2 lists liability costs that a hospital *might incur*. Actual cleanup costs for several spill scenarios are itemized in the sphyg and thermometer inserts.

(Table 2)

Human Health and Environmental Liability

Exposures, Workers' Compensation, Lost Time, and Lawsuits	*Case-specific*
Fines and Lawsuits for Improper Cleanups And Disposal	*Up to $75,000 + possible jail sentence*

[9] California Department of Health Services. 2000. A Guide to Mercury Assessment and Elimination in HealthCare Facilities. www.dhs.ca.gov/medicalwaste

[10] Leick-Rude, M.K. and Bloom, L.F. 1998. A Comparison of Temperature-Taking Methods in Neonates. Neonatal Network. Volume 17. Number 5. Pages 21-37.

[11] Mayfield, S. R. et al. 1984. Temperature Measurements in Term and Preterm Neonates. Journal of Pediatrics. Volume 104. Number 2. Pages 271-275 as cited in Leick-Rude, M.K. and Bloom, L.F. 1998.

[12] N.K. Markandu, F. Whitcher; A. Arnold and C. Carney. "The Mercury Sphygmomanometer Should Be abandoned Before it is Proscribed." Journal of Human Hypertension. Volume 14, pages 31 through 36. 2000.

[13] Holly J. Barron. HealthSystem Minnesota Mercury Reduction "MnTAP Intern Project Report." 2000.

continues

The following three case studies are summarized in terms of "Impetus," "Actions," and "Results" to help identify the challenges faced by hospitals and the solutions they employed to start eliminating mercury. While each hospital is unique, these case studies may help you anticipate hurdles and estimate costs associated with mercury elimination.

case study 01 | Mercury Costs Prompt Elimination Program in Rochester, NY

Impetus:

The 750-bed Strong Memorial Hospital (SMH) is the primary teaching hospital of the University of Rochester Medical School and is a regional trauma center. Since 1997, SMH has implemented a focused mercury reduction plan to eliminate the problems associated with spill response, disposal, and training.

Actions:

Executive involvement and support:

- SMH signed a memorandum of understanding with the Monroe County Health Department
- CEO assigned program personnel and resources

Staff training and involvement:

- Trained staff in program objectives and mercury awareness
- Multidisciplinary teams identified mercury-containing devices and mercury use
- Developed a mercury training poster for newly hired nurses
- Developed and distributed a mercury use and disposal pamphlet
- Added a mercury-specific training unit to the annual Resource Conservation Recovery Act (RCRA) training, including a "show-and-tell" for different mercury-containing items encountered during routine maintenance
- Included questions on Joint Commission on Accreditation of Healthcare Organization (JCAHO) safety surveys about proper mercury disposal and a check box noting the presence of mercury-filled sphygs
- Added a hazardous materials section (including mercury) to the project manager's renovation and construction manual

Mercury Collection:

- Developed and implemented procedures to improve staff use of mercury collection facilities including:
  - Placing specially-labeled collection containers for mercury thermometers within patient care units
  - Adding labels on or near sharps containers to remind staff members not to place thermometers in the medical waste containers
  - Establishing easy-to-access battery drop-off locations
  - Establishing a centralized collection point for used fluorescent lamps

Year	Thermometers	Sphygs
Pre-1997	*9,444*	*900*
1997	*7,706*	*500*
2001	*524*	*0*

Results:

- Replaced all mercury sphygs
- Reduced mercury thermometer use by over 90% – encountered difficulty replacing thermometers in the neonatal intensive care unit due to infection control concerns
- SMH's program cited as an example of a quality improvement initiative during the 1998 JCAHO survey
- Eliminated annual disposal of 45 pounds of mercury-filled GI tubing by purchasing only tungsten-filled GI tubing since the program began
- Histopathology and other clinical laboratories discontinued use of mercury compounds

case study 02 | Wastewater Violations Force Change in Boston, MA

Impetus:

Beth Israel Deaconess Hospital began its mercury reduction program in 1993 when the local sewer district lowered mercury limits in industrial wastewater to 1 part per billion (ppb) resulting in subsequent fines of $118,000 for exceedences. Beth Israel's wastewater contained approximately 360 ppb mercury.

Actions:

- Trained staff on mercury sources and proper disposal methods, posted wastewater data, and changed the collection process for mercury-laden chemicals including the fixatives B5 and Zenker's solution
- Infrastructure upgrades: cleaned traps and pipes
- End-of-pipe treatment: installed a sand filter ($40,000) and a dewatering unit ($60,000) both requiring minimal maintenance
- Instituted a wastewater sampling program to establish a baseline for measuring its progress

Results:

(Baseline Wastewater Mercury Content: 360 ppb mercury)

- Training, awareness and lab chemical replacement reduced mercury content to 100 ppb
- Trap and pipe cleaning reduced content to 4–8 ppb
- Improved wastewater treatment reduced content to < 1 ppb

case study 03 | Spills Prompt Mercury-Free Commitment in Grand Rapids, MI

Impetus:

Butterworth Hospital with 529 beds made a commitment to eliminate mercury after three separate mercury spills cost the hospital over $6,000. In 1995, the hospital estimated that there was 1.5 pounds of mercury per bed.

Actions:

- Replaced all existing sphygs and esophageal dilators containing mercury
- Instituted a policy banning the purchase of mercury-containing thermometers, sphygs, esophageal dilators, and batteries

Results:

- Removed 300 pounds of mercury
- No longer sends mercury-containing devices overseas as part of its humanitarian efforts

continues

Resources

Mercury-Free Thermometers

Alaris/IVAC
(800) 854-7128
www.alarismed.com

Braun
(800) 327-7226

Geratherm
(888) 596-9498
www.1thermometer.com

Medical Indicators
(888) 930-4599
www.medicalindicators.com

*Omron Healthcare**
www.omron.com/ohi

Welch Allyn
www.welchallyn.com

3M Healthcare
(800) 228-3957
www.3m.com/healthcare

Mercury-Free Sphygmomanometers

*Alco Classic**
(800) 323-4282

American Diagnostic Corporation
(631) 273-9600
www.adctoday.com/

*Omron Healthcare**
www.omron.com/ohi

Tips On Procurement
www.state.ma.us/ota/pubs/epp-march01.htm#/tips

Trimline
(800) 526-3538
www.trimlinemed.com

W.A. Baum
(888) 281-6061
(631)226-3940

*Welch Allyn**
www.welchallyn.com

Mercury-Free Gastrointestinal Devices

Miller Abbot Tubes

Anderson
(800) 523-1276, x 292

Bard Medical Services
(800) 227-3357

Rusch
(800) 553-5214
www.ruschinc.com

Bougie Tubes

Pilling
(800) 523-6507

Cantor Tubes

Anderson
(800) 523-1276, x 292

Mercury-Free Vital Signs Monitors

Alaris
(800) 854-7128
www.alarismed.com

Welch Allyn
www.welchallyn.com

Mercury-Free Laboratory Chemicals

For alternatives see the list at www.sustainablehosptals.org

Consider taking the "Hospitals for a Healthy Environment Pledge." Find out more at www.h2e-online.org

* Companies with a mercury exchange program to help defray the cost of replacing mercury-containing devices.

See www.state.ma.us/ota/pubs/eppmarch01.htm#tips for tips on procuring non-mercury sphygmomanometers.

Sphygmomanometer Cost Comparison[13]

Sphygmomanometer Cost Comparison

Costs Over 5-Year Period

	Mercury Unit	Aneroid Unit		Electronic Unit
		Wall Unit	Mobile Unit	Vital Signs Monitor
Purchase and Training				
Purchase Cost[14]	$129	$152	$264	$1,250 to $3,000
Batteries	NA	NA		$30
Training[15]	$20	$20		$80
Calibration				
Biomedical Engineer (15 minutes/calibration x $40/hour) = $10/calibration	$100[16] (every 6 months)	$100[16] (every 6 months)		$10 (every 5 years or if damaged)
Storage, Handling and Cleanup				
Shipping, Handling and Disposal[17]	$34 as hazardous waste	$0.03 as solid waste		$.017 as solid waste
Mercury Spill Training and Equipment (see table below)	$649	NA		
5-Year Usage Cost Totals	$932	$272	$384	$1,370 –$3,120

Mercury Sphygmomanometer Spill Cleanup Costs[18]

Hard Floor/Early Detection	Mercury Spill Kit	$325
	3 Hours of Staff Time	$45
	Disposal Of 5-gallon Bucket	$620
	Total	$990
Hard Floor/Late Detection	Mercury Spill Kit	$325
	10 Hours of Staff Time	$150
	Disposal Of 5-gallon Bucket	$620
	Total	$1,095
Carpeted/Early Detection	Mercury Spill Kit	$325
	10 Hours Staff Time	$150
	27 Sq. Ft. Carpet Replacement	$48
	Disposal Of 55-gallon Drum	$1,000
	Total	$1,523
Carpeted/Late Detection	Mercury Spill Kit	$325
	20 Hours Staff Time	$300
	90 Sq. Ft. Carpet Replacement	$160
	Disposal Of 55-gallon Drum	$1,000
	Total	$1,785
	Average Cost per Spill[18] =	$1,539

[13] Unless noted, costs are from Holly J. Barron. HealthSystem Minnesota Mercury Reduction "MnTAP Intern Project Report." 2000.

[14] Purchase costs are for mercury-free sphygs: Welch Allyn wall unit, Trimline mobile unit , and Alaris/IVAC vital signs monitor (4200 or 4400 Series)

[15] Trainee (4 employees x 0.25 hour x $15/hour); trainer (0.25 hour x $20/hour); 1 hour training for vital signs monitor

[16] Assumes one 15 minute calibration takes place every 6 months over the 5 year period (15 min/calibration x $40/hour x 2 calibrations/year x 5 years).

[17] Varies by region; hazardous waste ($34 per pound or $895 - $1,200 per 55 gallon drum); solid waste (approx. $0.03 per pound, or $68 per ton); see www.epa.gov/epaoswer/non-hw/recycle/recmeas/docs/guide_b.pdf)

[18] Average for 13 mercury sphygmomanometer spills

Sphygmomanometer Efficacy

	Mercury	Aneroid	Vital Signs Monitor
Accuracy	• +/- 3 mm Hg conforms to AAMI standards • Operator must understand and account for mercury meniscus • Oxidized mercury can make the column appear dirty and make readings difficult	• +/- 3 mm Hg conforms to AAMI standards • Includes a self-bleeding deflation valve for increased reading accuracy	• +/- 3 mm Hg conforms to AAMI standards • Digital display removes operator error and bias • Automatic deflation rate improves accuracy
Calibration	• Required every 6 months • Adjusted only at the zero point	• Required every 6 months • Requires specialized tools and technical skills to calibrate the mechanism at several pressure points, including zero	• Recommended every 5 years or if the device has been dropped • Usually provided at no cost by the manufacturer
Installation	• Mercury tube must be perfectly vertical in its unit and perpendicular to the ground	• No specific orientation required	• No specific orientation required
Use	• Requires excellent technique to read the meniscus of a mercury column	• Easier to read than mercury column	• Digital display standardize measurements • Automatic inflation and deflation improves staff efficiency
Maintenance	• Without proper maintenance, accuracy of the device could be considerably diminished • Frequent filter replacement needed to avoid mercury column "lag," a delay in mercury response, that contributes to inaccuracies	• Easy to see if aneroid needle is off zero when not in use • Calibration is harder than with mercury units	• Battery replacement as necessary (approximately every 350 uses)
View Window	• 0 to 300 mm Hg with no stop pin	• 0 to 300 mm Hg with no stop pin	NA
Measurement Technique	• Relies on the auscultatory technique	• Relies on the auscultatory technique	• Relies on oscillometric technique
Other Features	____	____	• Unit can also measure temperature, pulse rate, blood pressure

AAMI - Association for the Advancement of Medical Instruments
mm Hg = millimeter mercury column

Thermometer Cost Comparison

Fever Thermometer Cost Comparison[13]

Costs Over 5-Year Useful Life (estimate 35,000 uses; approximately 20/day)

	Mercury	Liquid-In-Glass	Digital	Tympanic	Dot Matrix/single use
Purchase/Training					
Purchase Cost[19]	$2.00	$13.75	$180	$296	$3,500
Probe Covers[20]	NA	NA	$1,960 ($28 per 500)	$2,100 ($30 per 500)	NA
Batteries ($5 x replaced every 5,000 uses)	NA	NA	$35	$35	NA
Training	NA	NA	$20[21]		NA
Calibration					
Biomedical Engineering (15 min/calibration x $40/hour)	NA	NA	$70[22]	NA	NA
Storage/Handling/ Cleanup					
Shipping, Handling and Disposal[17]	$45.00 as hazardous waste	<$0.01 as solid waste	$0.02 as solid waste	$70.02 as solid waste	$3.00 as solid waste
Mercury Spill Training and Equipment (see table below)	$649	NA			
5-Year Cost	$695	$13.76	$2,265	$2,511	$3,503

Mercury Thermometer Spill Cleanup Costs

Hard Floor/ Early Detection	Mercury Spill Kit	$195
	3 Hours of Staff Time	$45
	Disposal of 5-gallon Bucket	$620
	Total	$860
Hard Floor/ Late Detection	Mercury Spill Kit	$195
	10 Hours of Staff Time	$150
	Disposal of 5-gallon Bucket	$620
	Total	$965
Carpeted/ Early Detection	Mercury Spill Kit	$195
	10 Hours of Staff Time	$150
	27 Sq. Ft Carpet Replacement	$48
	Disposal of 55-gallon Drum	$1,000
	Total	$1,393
Carpeted/ Late Detection	Mercury Spill Kit	$195
	20 Hours of Staff Time	$300
	90 Sq. Ft Carpet Replacement	$160
	Disposal of 55-gallon Drum	$1,000
	Total	$1,655

Average Number of Breakages/Year[23] = 3.4 per 100 beds
Average Cost/Spill[24] = $270

[13] Unless noted, costs are from Holly J. Barron. HealthSystem Minnesota Mercury Reduction "MnTAP Intern Project Report." 2000.

[17] Varies by region; hazardous waste ($34 per pound or $895 to $1200 per 55-gallon drum); solid waste (approx. $0.03 per pound, or $68 per ton); see www.epa.gov/epaoswer/non-hw/recycle/recmeas/docs/guide_b.pdf)

[19] Purchase and disposal cost for mercury and liquid-in-glass thermometers is for five thermometers (replaced once per year); digital and tympanic thermometer is for one unit; dot matrix are single use and cost $10 per 100; liquid-in-glass thermometer purchase cost from Geratherm

[20] Average taken from various medical suppliers

[21] Trainee (4 employees x 0.25 hour x $15/hour); trainer (0.25 hour x $20/hour)

[22] Assumes one 15 minute calibration takes place every 9 months over the 5 year period (15 min/calibration x $40/hour x 6.66 calibrations/5 years).

[23] Average breakage data for four facilities.

[24] Average provided by major SF Bay Area Medical Center

Thermometer Efficacy

	Mercury	Liquid-in-Glass	Digital	Tympanic	Dot Matrix
Accuracy (see below for ASTM standards)	Requires some skill to account for meniscus in reading	Requires some skill to account for meniscus in reading	Digital display standardizes measurements, eliminating user error	Digital display standardizes measurements, eliminating user error	Easier to read than a mercury column
Time Required For Reading	Oral - 3 minutes Rectal - 3 minutes Axillary - 4 minutes	Oral - 3 minutes Rectal - 3 minutes Axillary - 4 minutes	Oral - 4 seconds Rectal - 15 seconds Axillary - 10 seconds	Ear - 1 second	Oral - 1 minute Axillary - 3 minutes
Calibration	NA	NA	NA	6 – 12 months	6 – 12 months
Temperature Range	94 to 108°F	94 to 108°F	84 to 108°F	Varies significantly	96 to 104.8°F
Battery	NA	NA	3 AA alkaline cells good for 5,000 to 6,000 readings	3-volt lithium or 9-volt alkaline good for 5,000 to 8,000 readings	NA
Other Considerations	• Often not left in place long enough to obtain accurate reading • Can be easily broken as a result of rectal perforation, especially for neonates and young children		• Quick, accurate readings • Minimally invasive - works well with children • Requires probe covers for hospital use		• Single use prevents cross-contamination • Single use increases waste generation • Ideal for isolation patients

Medical thermometers are tested to voluntary standards set by the American Society for Testing and Materials (ASTM) and shown in following table. There are non-mercury alternatives that meet these standards — ask your vendor whether the non-mercury alternative you choose for your facility meets the ASTM standards for its class.

Mercury in Glass – ASTM E667-86 Electronic – ASTM E-1112-86					
Range	< 96.4°F	96.4° to 98.0°F	98.0° to 102.0 °F	< 102.0° to 106.0°F	> 106°F
Max. error allowed:	±0.4°F	±0.3°F	±0.2°F	±0.3°F	±0.4°F
Max. error allowed:	±0.5°F	±0.3°F	±0.2°F	±0.3°F	±0.5°F

EXHIBIT F

LIST OF COMMON MERCURY CONTAINING EQUIPMENT FOR HOSPITALS/CLINICS

Checklist for mercury containing devices in hospitals and other medical facilities excluding dental

Item	No	Yes	Use?	How Many/ How Much?	Location?
Liquid mercury					
Mercury thermometers					
Mercury barometers					
Mercury vacuum gauges					
Mercury spectral tubes					
Mercury molecular motion device					
Center tubes					
Feeding tubes					
Mercury oxide					
Mercury (II) chloride					
Miller abbot tubes					
Mercury nitrate					
Mercury iodine					
Mercury fever thermometers					
Sphygmomanometers (blood pressure devices) - with silver liquid					
Laboratory ovens					
Mercuric batteries					
Fluorescent lamps (bulbs)					

Item	No	Yes	Use?	How Many/ How Much?	Location?
Mercury thermostats					
Various types of lamps (light bulbs: mercury vapor, metal halide, high-pressure vapor sodium, high intensity discharge (HID)					
Mercury gauges					
“Silent” light switches					
Mercury float control switches (e.g., on sump pumps)					
Flow meters with mercury					
Other equipment with					
Older fungicides and pesticides (manufactured prior to 1991)					
Latex paint (manufactured prior to 1992)					
Mercury cooking thermometer (kitchen)					

Item	No	Yes	Use?	How Many/ How Much?	Location?
True vermillion paint (contains mercuric sulfide)					
Mercury oxide/mercury zinc batteries (old alkaline type, prior to 1996 and button batteries)					
Other					

EXHIBIT G

STATE LAWS GOVERNING MERCURY CONSUMER PRODUCTS

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

Managing Mercury-Added Consumer Products in New York State

New York State bans the sale of most mercury containing products in New York State (NYS) and requires labeling and proper disposal or recycling of mercury-added consumer products. NYS law also prohibits primary and secondary schools from purchasing or using mercury.

Mercury-added products typically include items such as thermostats, thermometers, switches, medical or scientific instruments, electrical relays, lamps and batteries - excluding button batteries. Disposal of mercury-added products is not allowed in the normal trash but must be managed by separate delivery to a solid waste management facility, recycling facility, authorized hazardous waste facility or at a municipally sponsored household hazardous waste collection program.

Mercury is a toxic substance that accumulates in the environment. Mercury has been found in fish at levels of concern, resulting in fish consumption advisories throughout the State. Medical research has shown that exposure to unacceptable levels of mercury can cause neurological damage.

New York State, along with many other states, has adopted legislation that recognizes the environmental and public health consequences associated with the mismanagement of this highly toxic substance. The requirements for labeling and responsibly managing the waste from mercury-added consumer products are critical steps in identifying and limiting potential exposure to mercury.

The State's law requires the following:

- Purchase and use of elemental mercury by primary and secondary schools is prohibited after September 4, 2004.
- Prohibits the sale of mercury containing thermometers, thermostats, flame sensors, wetted reed relays, sphygmomanometers, switches and relays.
- Prohibits the sale of mercury fever thermometers.
- Prohibits the sale of toys or novelty products containing mercury. (A product is not a mercury-added novelty solely on the basis that it is a game with a light screen display containing mercury, or includes an easily removable battery containing mercury.)
- The sale of elemental mercury, except for specific research, dental and manufacturing uses is prohibited.
- All remaining mercury-added consumer products sold after July 12, 2005 must be labeled.
- Waste products containing mercury may not be incinerated.
- Waste products containing mercury must be managed separately from other solid waste. Fluorescent lamps from households and small businesses (100 or less employees and discarding 15 or less non-hazardous waste lamps per month) are exempt from these disposal restrictions. However, New York State's existing hazardous waste regulations still apply.
- The penalties for improper disposal of mercury-added products will be: first offense violators will be provided with a warning and education material; second, third and fourth offenses would receive a $50, $75 and $100 fine respectively. Penalties for all other violations will be $100 for the first offense and $500 for subsequent violations. Collected penalties will be deposited into the State's Environmental Protection Fund.
- Participation of New York State in the Interstate Mercury Education & Recycling Clearinghouse (IMERC) of the Northeast Waste Management Officials' Association (NEWMOA) is endorsed.

Additional information may be obtained by contacting the Bureau of Waste Reduction and Recycling at (518) 402-8706. Additional information about household waste disposal may be obtained by contacting the Bureau of Permitting and Planning at (518) 402-8678. For questions regarding the disposal of mercury-containing products by businesses, please contact the Training & Technical Support Section at (518) 402-9543.

More about Managing Mercury-Added Consumer Products in New York State:

Mercury-Added Consumer Products Law - Legislation was first adopted in New York State under Chapter 145, Laws of 2004, with revisions adopted under Chapter 676, Laws of 2005 and Chapter 20, Laws of 2011.

Mercury-Added Consumer Law and the Healthcare Industry - Information for the healthcare industry regarding the manufacture, sale, distribution and disposal of mercury-added consumer products, including fever thermometers in New York State.

Ban on Mercury Added Novelties Products - New York State's Mercury-Added Consumer Products Law bans the sale on Mercury-Added Novelties.

EXHIBIT H

DROP- OFF LOCATIONS FOR THERMOMETERS AND THERMOSTATS

Drop Off Locations Near 12303

Our location results are populated by active locations who have returned a recycling bin to us within the past 14 months. **We recommend calling ahead to ensure your location is still collecting.**

There are 15 drop-off locations in your area!

LOCATION	DISTANCE	MAP	LOCATION TYPE
Security Plumbing & Heating Supply 1721 State Street Schenectady, NY 12304 518-393-2171 (tel:518-393-2171)	2.15 miles	Google Maps (http://maps.google.com/?q=1721 State Street,Schenectady,NY%2012304+42.7838021+-73.9072567+(1721 State Street,%20Schenectady%2c%20NY%2012304))	Wholesaler
Burch Supply Co 760 State Street Schenectady, NY 12307 518-346-1293 (tel:518-346-1293)	3.71 miles	Google Maps (http://maps.google.com/?q=760 State Street,Schenectady,NY%2012307+42.8082815+-73.9359132+(760 State Street,%20Schenectady%2c%20NY%2012307))	Wholesaler
Capitol District Supply 315 Green St. Schenectady, NY 12305 518-374-2227 (tel:518-374-2227)	4.45 miles	Google Maps (http://maps.google.com/?q=315 Green St.,Schenectady,NY%2012305+42.8184814+-73.9410797+(315 Green St.,%20Schenectady%2c%20NY%2012305))	Wholesaler
Capitol District Supply 315 Green Street Schenectady, NY 12305 518-374-2227 (tel:518-374-2227)	4.45 miles	Google Maps (http://maps.google.com/?q=315 Green Street,Schenectady,NY%2012305+42.8184814+-73.9410797+(315 Green Street,%20Schenectady%2c%20NY%2012305))	Wholesaler
Sid Harvey Industries 8 JUPITER LANE ALBANY, NY 12205 518-869-3251 (tel:518-869-3251)	5.03 miles	Google Maps (http://maps.google.com/?q=8 JUPITER LANE,ALBANY,NY%2012205+42.7184734+-73.83874+(8 JUPITER LANE,%20ALBANY%2c%20NY%2012205))	Wholesaler
Village of Colonie 1 Thunder Rd. Colonie, NY 12205 518-869-6372 (tel:518-869-6372)	5.2 miles	Google Maps (http://maps.google.com/?q=1 Thunder Rd.,Colonie,NY%2012205+42.7209054+-73.8329788+(1 Thunder Rd.,%20Colonie%2c%20NY%2012205))	HHW
V.P. Supply 130 Railroad Ave. Albany, NY 12205 518-459-6000 (tel:518-459-6000)	5.98 miles	Google Maps (http://maps.google.com/?q=130 Railroad Ave.,Albany,NY%2012205+42.7037332+-73.8295004+(130 Railroad Ave.,%20Albany%2c%20NY%2012205))	Wholesaler
Capitol Winair Co. 71 Fuller Road 7 Albany, NY 12205 518-459-0299 (tel:518-459-0299)	6.34 miles	Google Maps (http://maps.google.com/?q=71 Fuller Road 7,Albany,NY%2012205+42.6994602+-73.8251811+(71 Fuller Road 7,%20Albany%2c%20NY%2012205))	Wholesaler

LOCATION	DISTANCE	MAP	LOCATION TYPE
R.E. Michel Company, Inc 13 AIRPORT ROAD (REAR) SCOTIA, NY 12302 518-399-1035 (tel:518-399-1035)	6.61 miles	Google Maps (http://maps.google.com/?q=13 AIRPORT ROAD (REAR),SCOTIA,NY%2012302+42.8502277+-73.9399316+(13 AIRPORT ROAD (REAR),%20SCOTIA%2c%20NY%2012302))	Wholesaler
Trane Hvac Parts & Supply 51 RAILROAD AVE ALBANY, NY 12205 518-785-6506 (tel:518-785-6506)	6.7 miles	Google Maps (http://maps.google.com/?q=51 RAILROAD AVE,ALBANY,NY%2012205+42.6955423+-73.8203168+(51 RAILROAD AVE,%20ALBANY%2c%20NY%2012205))	Wholesaler
Trane Parts Center 51 RAILROAD AVE ALBANY, NY 12205 518-785-6506 (tel:518-785-6506)	6.7 miles	Google Maps (http://maps.google.com/?q=51 RAILROAD AVE,ALBANY,NY%2012205+42.6955423+-73.8203168+(51 RAILROAD AVE,%20ALBANY%2c%20NY%2012205))	Wholesaler
Rj Murray Co 7 Northway Lane Latham, NY 12110 518-690-4455 (tel:518-690-4455)	6.7 miles	Google Maps (http://maps.google.com/?q=7 Northway Lane,Latham,NY%2012110+42.7352931+-73.7950354+(7 Northway Lane,%20Latham%2c%20NY%2012110))	Wholesaler
Homans Associates 10 Hemlock St. Latham, NY 12110 518-489-4027 (tel:518-489-4027)	6.73 miles	Google Maps (http://maps.google.com/?q=10 Hemlock St.,Latham,NY%2012110+42.7359917+-73.7942082+(10 Hemlock St.,%20Latham%2c%20NY%2012110))	Wholesaler
The Simons Company 40 RAILROAD AVENUE ALBANY, NY 12205 518-489-2905 (tel:518-489-2905)	6.84 miles	Google Maps (http://maps.google.com/?q=40 RAILROAD AVENUE,ALBANY,NY%2012205+42.6937561+-73.8186142+(40 RAILROAD AVENUE,%20ALBANY%2c%20NY%2012205))	Wholesaler
Bell Simons 40 Railroad Ave. Albany, NY 12205 518-489-2905 (tel:518-489-2905)	6.84 miles	Google Maps (http://maps.google.com/?q=40 Railroad Ave.,Albany,NY%2012205+42.6937561+-73.8186142+(40 Railroad Ave.,%20Albany%2c%20NY%2012205))	Wholesaler

We Can Use Your Help

Our location results are populated by active locations who have returned a recycling bin to us within the past 14 months. Sometimes locations move, close, or stop participating in our program without us knowing. Please use the form below to inform us of any location listing errors or updates you can provide to help improve our search results.

Name

Email

EXHIBIT I
SPILL MANAGEMENT GUIDELINES

INSTRUCTIONS FOR CLEANING UP "SMALL" LIQUID MERCURY SPILLS IN HOUSEHOLDS

Northeast Waste Management Officials' Association
April 2003

With input from the state environmental agencies of Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont, the Northeast Waste Management Officials' Association (NEWMOA) combined available spill clean-up instructions with the experience of individuals who have cleaned up mercury spills to create this document. It contains basic clean-up instructions for small liquid mercury spill.

It is impossible for this document to cover every type of spill situation; ultimately common sense must be used to determine the most effective clean-up approach. Individuals should always call for assistance whenever they are unsure about how to properly clean up a mercury spill.

Mercury is toxic to the human nervous system. The developing brains of fetuses and infants are especially sensitive to mercury's toxic effects. Because mercury vapors are readily absorbed through the lungs into the bloodstream, they are particularly hazardous. Exposure to mercury vapors can occur when mercury products (such as thermometers and fluorescent lamps) are broken. Even very small amounts of metallic mercury (several drops) may raise air concentrations to levels that may be harmful to human health. Mercury vapors are also heavier than air and may linger in higher concentrations at the site of the spill.

Know when to call for professional assistance

By federal law, manufacturing, educational and service facilities must report mercury spills greater than one pound (two tablespoons) to the proper authority. Therefore, a spill of this magnitude in a household should be considered very serious. Some states advise getting professional assistance on household spills that are greater than a few drops. If the mercury spill is on a porous surface such as a carpet, or if the mercury droplets are widely dispersed in a room, it would also be wise to call for professional assistance immediately. See Table 1 for a summary of northeast states' reporting requirements and assistance guidance for mercury spills.

Cleaning up Small Liquid Mercury Spills

1. EVACUATE THE SPILL AREA: If people were in the room when the spill occurred, be sure that their shoes, clothing, and other articles have not been splashed with mercury before they leave the room. If mercury has contaminated any clothing or articles, remove these items from the person and place them in a plastic bag. Keep everyone else, especially children and pets, out of the spill area to prevent tracking.

2. LOWER the TEMPERATURE by turning down the thermostat. The cooler the temperature, the less mercury vapors will be released into the air. Mercury vapors are odorless and colorless.

3. TURN OFF CENTRAL VENTILATING OR AIR CONDITIONING SYSTEMS that could circulate air from the spill area to other parts of the home or building.

4. CLOSE INTERIOR DOORS leading to other rooms, but VENTILATE THE ROOM WITH THE SPILL TO THE OUTDOORS by opening windows and any exterior doors. Place fans, facing out, in open windows or doors to speed up ventilation.

5. ASSEMBLE CLEAN-UP SUPPLIES: The following items may be helpful for safely cleaning up a small mercury spill. Assemble as many of them as you have. Remember that if the item comes in contact with mercury during the clean-up, it will have to be disposed of as hazardous waste.

Latex or rubber gloves
Goggles
Two small pieces of stiff paper or cardboard (not corrugated) with at least one straight edge, such as index cards or playing cards
Damp paper towels
Wide mouth plastic container with a lid
Airtight, sealable plastic bags
Garbage bags
Flashlight
Eyedropper
Tape – masking, duct, regular office – types & brands work differently, try many
Tweezers
Sulfur or zinc powder - these may be purchased from garden supply stores

6. DRESS APPROPRIATELY: Remove all jewelry from hands and wrists so the mercury does not bond to the metals. Change into old clothes and shoes that can be safely discarded if they become contaminated. Put on rubber gloves and goggles, if you have them.

7. CONTAIN THE SPILL: Keep the mercury from spreading into cracks, crevices, floor drains or onto sloped or porous surfaces, which are difficult to clean. If necessary, use masking tape or duct tape to make a vertical "fence" around the mercury droplets and confine them to a limited area for clean-up.

If you cannot find the spilled mercury, consider the entire room contaminated and call for professional assistance.

Never use a household or industrial vacuum cleaner to clean up mercury! These devices, even with filters, are not adequately filtered to remove mercury. Also they heat up and will spread mercury vapors. Once a vacuum has been contaminated with mercury, it will release mercury each time it is used; the only sure way to avoid spreading the contamination is to discard the vacuum cleaner.

Never use a broom on a mercury spill because it will contaminate the broom and only scatter the mercury droplets, making them harder to find and pick up.

Never pour mercury down the drain, or you will contaminate your plumbing, your septic system, or your local sewage treatment plant.

Never use household cleaning products because they may react violently with the mercury, releasing toxic gases.

8. PICK UP ALL VISIBLE MERCURY DROPLETS:

For cleaning mercury from smooth, hard surfaces:
If the mercury spill involves glass pieces, such as from a glass mercury thermometer or a glass ampoule from a mercury thermostat, use the tweezers to safely pick up any broken glass, placing the glass in the plastic container.

Use the 2 pieces of stiff paper to push the mercury beads together and then scoop them up. Place the beads in the plastic container. (Alternatively, you can use a rubber squeegee and dust pan to collect the mercury beads, but you must dispose of these contaminated items afterwards.)

Use an eyedropper to pick up the beads you can't get with the cardboard. Hold the eyedropper almost parallel with the floor, or it will not work very well. Clear the eyedropper by gently squeezing the contents onto a damp paper towel. If you do not have an eyedropper, press the sticky side of the wide tape to the remaining beads. (Note: Tape only works on small beads of mercury, not large droplets.)

When you think you've picked up all the mercury, shine a flashlight (at many different, low angles) on the area to find any remaining mercury beads or glass. Light will reflect off the mercury beads and glass helping you to locate them.

For cleaning mercury from a carpet, rug or fabric:

If the mercury spilled on a wall-to-wall carpet, call for assistance; see contact information in Table 1.

For small rugs and other pieces of fabric, fold or roll the surface so that the mercury contaminated area is trapped inside. Place the contaminated rug or fabric in a sealable, plastic bag. If a sealable bag is not available or feasible to use, double- or triple-wrap the contaminated fabric in plastic trash bags.

If the mercury spilled on a piece of fabric-covered furniture, call for assistance; see Table 1 for contacts.

If the spill went down the drain:

Mercury may get caught in your sink trap. Working over a tray a bucket or piece of plastic, remove the trap. Ideally you should place the trap and its contents in a sealable plastic container and replace the trap. Put the container inside two plastic bags (one inside the other). Dispose of the old trap and its contents as hazardous mercury waste. (If you do not replace the trap, pour the contents of the trap into the sealable plastic container and dispose of it as hazardous mercury waste.)

If the spill was in a sink of water:

Remove as much of the water as possible without disturbing the mercury beads. Use a turkey baster or a small disposable cup. The water that is removed will not be

contaminated as metallic mercury is not soluble in water. Recover the mercury beads with an eyedropper and place them in a non-breakable container. Once all the visible mercury has been recovered, drain the water to the sewer.

9. SPRINKLE "FLOWERS OF SULFUR" (ELEMENTAL SULFUR IN POWDER FORM) OR FINE POWDER ZINC, if available, ON THE SPILL SITE, if feasible, to bind any remaining mercury. These may be purchased from garden supply stores. Apply over hard-to-reach areas, such as cracks and crevices, to bind the mercury and halt the release of mercury vapors. Afterwards, collect the powder with a moist paper towel and dispose of as mercury waste. Take care not to inhale sulfur powder and beware that it may permanently stain carpeting, clothing and furniture.

10. PLACE THE BROKEN PRODUCT AND ALL MATERIALS USED TO CLEAN UP THE MERCURY IN SEALABLE PLASTIC CONTAINERS OR AIRTIGHT, SEALABLE BAGS. This includes the cards, paper towels, eyedroppers, tweezers, and other equipment used to clean up the spill. Place the plastic containers or bags inside a second plastic container or bag to provide additional containment protection. Seal each bag or tighten each lid securely so that liquid and vapors will be contained.

Consult Table 1 for disposal instructions in your state. If your state has a program for disposal of this type of waste, label the packages "Mercury Waste, Hazardous" and store in a secure place away from children and in a ventilated area if possible until proper disposal can be arranged.

AFTER YOU HAVE CLEANED UP THE SPILL:

1. CONTINUE VENTILATING the room or spill zone with outside air for a minimum of two days, if feasible. Fans to the outside will assist the ventilation. Now that the spill has been cleaned up, there is no longer a need to minimize vaporization by lowering the room temperature; warming the area during ventilation, if practical, will help dissipate any remaining mercury vapors more rapidly.

2. WASH HUMANS AND ANIMALS THAT CAME INTO CONTACT WITH MERCURY using soap and a paste of water and "flowers of sulfur," if available. Afterwards, thoroughly rinse the area. Dispose of all clothing that may have come in contact with the mercury as mercury waste. NEVER PLACE MERCURY-CONTAMINATED FABRICS IN A WASHING MACHINE or DRYER.

3. REPLACE THE BROKEN MERCURY DEVICE WITH A NON-MERCURY alternative.

4. Replace all remaining mercury devices in the home with non-mercury alternatives. The best way to protect yourself from mercury exposure is to prevent spills from occurring.

5. If you are uncertain about whether most of the spilled mercury was recovered and the room is frequented by small children or pregnant women, it may be wise to test for residual mercury in the air using a portable Jerome Meter or Lumex Mercury Analyzer. Some state environmental agencies have this capability. See Table 1 for state-specific contacts

Table 1: Reporting, Professional Assistance and Disposal Instructions for Household Liquid Mercury Spills in Each Northeast State

State	Liquid Mercury Spill Reporting Requirements	Advice on When and How to Seek Professional Assistance	Disposal Advice and Requirements for Mercury Spill Clean-up Material
CT	All spills should be reported to DEP's Oil and Chemical Spill Division at 860-424-3338.	For spill assistance, contact DEP's Oil and Chemical Spill Division at 860-424-3338. For questions regarding potential mercury poisoning, contact the Poison Control Center at the UCONN Health Center at 800-222-1222.	Bring the spill clean-up material to a household hazardous waste collection. The schedule is available on the DEP website http://www.dep.state.ct.us/ (search "household hazardous waste").
ME	Although spills of mercury used in household activity are not required to be reported, call the DEP for clean-up assistance if the spill involves more than a few drops of mercury.	If the spill is larger than a few drops, call DEP's Spill Response at 800-452-4664.	Spill clean-up waste should be kept out of the trash and stored for a household hazardous waste collection. Call your Town Office to find out if and when a HHW collection event will be held in your area.
MA	Any release of one pound or more of mercury in a 24 hour period must be reported to the DEP's 24-Hour Release/Spill Notification Line at (888) 304-1133.	If the spill is larger than one pound (two tablespoons), call DEP's 24-Hour Release/Spill Notification Line at (888) 304- 1133.	Contact the MA Mercury Hotline at 866-9MERCURY (866-963-7287) to see what mercury disposal options are offered in your community or consult www.CLEANUP.org (enter your zip code and look under "Household Hazardous Waste"). As a last resort, contact a commercial hazardous waste facility.
NH	No legal requirement to report on household spills but DES suggests reporting if any amount of mercury is spilled.	Contact DES, Special Investigations Section at 603-271-3899 in the event of a spill. For possible health risk questions, contact your physician or the DHHS at 800-852-3345x4664.	Bring the waste to a household hazardous waste collection day. Contact the HHW Coordinator at 603-271-2047 with questions. Alternately, contact a hazardous waste remediation firm.
NJ	If NJ lands or waters are not impacted by the spill, there is no legal requirement to report it. If lands or waters are impacted, contact the Environmental Incident Hotline 877-WARNDEP (1-877-927-6337)		Dispose of spill clean-up material with the regular household trash.

State	Liquid Mercury Spill Reporting Requirements	Advice on When and How to Seek Professional Assistance	Disposal Advice and Requirements for Mercury Spill Clean-up Material
NY	DEC requires reporting of spills greater than one pound (two tablespoons). Some counties require the reporting of all spills, no matter the amount.	If the spill is more than the contents of a fever thermometer (1 mL), contact the DEC Spills Hotline at 800-457-7362.	Do not place mercury waste in the regular trash. Contact your state environmental agency, local board of health or sanitation department for disposal instructions.
RI	No legal requirement to report on household spills, but DEM suggests reporting all spills to their Emergency Response Division (8:30am-4:00pm) at 401-222-1360 or after hours at 401-222-3070.	Contact DEM's Emergency Response Division (8:30am-4:00pm) at 401-222-1360 or after hours at 401-222-3070.	Do not place mercury waste in the regular trash. Contact the DEM for disposal instructions at) at 401-222-1360 (8:30am-4:00pm), or after hours at 401-222-3070, or call the RI Resource Recovery Corporation (ECO-DEPOT) at 401-942-1430 x241.
VT	Any spill amount that causes a threat to human health or the environment should be reported to DEC at 800-641-5005	For instructions or assistance for spills that are not reportable, call Tom Benoit at (802) 241-3472.	Dispose of mercury debris and products through your local Household Hazardous Waste (HHW) collection program or through a hazardous waste transporter. For information, contact Tom Benoit at (802) 241-3472.

For additional information:

Agency for Toxic Substances and Disease Registry, "Most Frequently Asked Health Questions About Mercury," http://www.atsdr.cdc.gov/tfacts46.html

Agency for Toxic Substances and Disease Registry, "Public Health Statement about Mercury," http://www.atsdr.cdc.gov/toxprofiles/phs46.html

Ceaser, A.V. "Mercury Spills Require Special Clean Up Methods, Protection," Environmental Solutions, January 1996, pp. 36-37.

Galuszka, Michael E. "Elemental Mercury Spills: Responses to Releases in Residential, Industrial and Public Buildings and Locations," (Serendipity Systems: 2001), http://home.thegrid.net/~i282158/infinite/mercexc3.htm

New Hampshire Department of Health and Human Services, "Elemental Mercury in Schools," http://www.dhhs.state.nh.us/DHHS/HLTHRISKASSESS/LIBRARY/Fact+Sheet/F6.htm

References used to prepare the first draft:

Connecticut Department of Environmental Protection, "Guidance for Managing Broken Mercury Fever Thermometers"

EPA, "Mercury – Emergency Spill & Release Facts"

Indiana Department of Environmental Management, "Mercury Spill Information and Clean Up Guidance"

Maine Department of Environmental Protection, "Spills and Broken Thermometers"

Massachusetts Department of Environmental Protection, "Mercury Spill Clean Up"

Michigan Department of Environmental Quality, "Cleaning Up Mercury Spills"

New Hampshire Department of Environmental Services, "Cleaning up Household Spills of Elemental Mercury"

New Jersey Department of Health and Senior Services, "Guidelines for the Safe Clean Up of Mercury Spilled at Home"

Vermont Department of Health, "Mercury" (includes spill clean up information)

A. Capri and YF Chen. Gaseous elemental mercury as an indoor air pollutant. Environmental Science Technology, Vol 35:4170-4173, 2001.

NEWMOA is a non-profit interstate governmental association involving the state waste management and pollution prevention Program Directors from the environmental agencies in Connecticut, Maine, Massachusetts, New Jersey, New Hampshire, New York, Rhode Island and Vermont. NEWMOA has been involved in regional mercury reduction efforts during the past four years. The Association developed this guidance under the direction and at the request of its member states. This report was primarily written by Karen Thomas.

EXHIBIT J
MERCURY CLEAN OUT PLANS FOR SCHOOLS

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

How To Initiate a Mercury Clean Out in Your School

Getting Started

Develop a team

This may include the science coordinator, science teachers, health & safety officers, school nurse, building & grounds personnel and school administrators.

Develop a plan

Decide how many and what type of schools will be participating? (i.e. secondary, middle, or elementary school, or all of them) Who will be in charge of compiling the mercury inventory? Will you use a hazardous waste recycler or can you use a local household hazardous waste collection event? Will there be a mercury collection pickup at each participating school, or will there be a centralized collection pick up stop? Who will collect and pack up the mercury-containing items? How will you get the appropriate packing containers? Where will the collected mercury-containing items and containers be stored? These are the kind of questions that your team will probably want to explore and develop into a plan of action.

Obtain approval from the administration

Direction and assistance from the "top" can motivate team members.

Training

Be sure that members of the team have training on proper handling of hazardous wastes and training on how to use a mercury spill clean up kit. You should have a mercury spill kit available before initiating your mercury clean out.

The Hazardous Waste Recycler

Schools often will hire a hazardous waste recycler to dispose/recycle their mercury. Shop around and see who can offer you the most competitive bid. Look out for hidden costs!! Are there extra costs for containers to pack the mercury into, or are they included in their cost quote? Are there different costs for different types of mercury - elemental mercury versus mercury compounds? The related web link in the right column entitled "Fluorescent and HID Lamp Recyclers" is for recyclers of fluorescent lamps (all fluorescent lamps do contain mercury). Most of the recyclers listed may also manage your other mercury wastes (elemental mercury[1], mercury compounds and mercury-containing equipment).

Recycling Containers

Five-gallon plastic buckets

a fiber drum container

Typically, the hazardous waste recycler will send five-gallon plastic, lidded buckets (15 inches high) to pack the mercury wastes into. For larger mercury-containing equipment, such as a barometer, you can arrange with the hazardous waste recycler for a fiber drum container.

New York State Requirements

Before commencing with your mercury clean out, schools should familiarize themselves with New York State Regulations.

Elemental mercury is no longer allowed to be purchased or used in schools, as of September 4, 2004, according to the Environmental Conservation Law, Article 27, Title 21.

The **Universal Waste Rule** was created to reduce the amount of hazardous waste entering the solid waste stream, to encourage recycling and proper disposal, and to ease the regulatory burden on generators. There are many advantages for using the Universal Waste Rule:

- Less paperwork (manifest and annual reports are not required)
- Universal wastes are not counted toward your generator status
- You may self transport or use a common carrier
- You can consolidate universal wastes for shipment at one location from satellite locations.

The Universal Waste Rule manages common hazardous waste such as batteries, certain pesticides, fluorescent lamps (whole lamps only) and mercury-containing equipment (MCE). Examples of MCE are thermometers, barometers, manometers, flow meters, mercury switches, mercury regulators, water treatment gauges, gas safety relays, sphygmomanometers (blood pressure cuffs) and thermostats. Equipment or other wastes contaminated with mercury are NOT regulated as universal waste and must be managed accordingly.

A **Universal Waste Handler** is anyone who generates, manages, receives, accumulates, or sends universal wastes to another universal waste handler or to a destination facility. A **Small Quantity Handler** (SQH) is a handler who accumulates less than 5,000 kilograms (11,000 pounds) of total universal waste onsite at anytime. A **Large Quantity Handler** (LQH) is a handler who accumulates 5,000 kilograms (11,000 pounds) or more of total universal waste onsite at any time.

Small Quantity Handler:
You must manage your universal waste in a way that prevents releases to the environment as follows:

- Contain any universal waste in containers or packages that are structurally sound, adequate to prevent leaks, spills or damage, and compatible with contents.
- Contain all releases of universal waste and other residues and determine whether any material resulting from the release is hazardous. If the materials is hazardous, it must be managed accordingly.
- Inform employees who handle or manage the waste of the proper handling and emergency procedures.
- May accumulate universal wastes for up to one year from when it became a waste. Label each waste or container as "Universal Waste Batteries/Lamps/MCE, etc." and the date it became waste.
- You are prohibited from sending universal wastes or taking it to a place other than another Universal Waste Handler or destination facility.
- May self transport universal wastes without a Part 364 hazardous waste transporters permit if less than 500 pounds of universal waste is on the same vehicle.
- Recordkeeping is not required, but is strongly recommended.

Large Quantity Handler:
Must meet all the requirements for SQH's and:

- Notify EPA in writing and receive an EPA identification number.
- Keep a record of all universal waste shipments received or sent off-site. You must retain those records for at least three years from the date of receipt or shipment.

Anyone who transports universal wastes offsite are Universal Waste Transporters!

In New York State, if you are transporting more than 500 pounds of universal waste in a vehicle, you must have a Part 364 transporter's permit, and all shipments must be in compliance with the New York State's Department of Transportation.

Mercury to be Managed as Hazardous Waste

The following must be managed and disposed of by standard hazardous waste regulations:

- Elemental mercury[1] not contained in equipment (see footnote)
- Mercury compounds
- Mercury spill clean up materials
- Broken or crushed fluorescent lamps (not already stored in UW containers)
- Items contaminated by elemental mercury (i.e. clothing, shoes, jewelry, backpacks, carpeting)

There are three kinds of hazardous waste generator categories:

Conditionally Exempt Small Quantity Generators (CESQG) - generates no more than 100 kilograms of hazardous waste in a month and less than 1 kilogram of acute hazardous waste (and stores no more than 1,000 kilograms)

Small Quantity Generators (SQG) - generates more than 100 kilograms but less than 1,000 kilograms of hazardous waste in a month and less than 1 kilogram of acute hazardous waste (and stores less than 6,000 kilograms)

Large Quantity Generators (LQG) - generates at least 1,000 kilograms of hazardous wastes in a month, and less than or at least 1 kilogram of acute hazardous waste

Most schools will probably fall into the CESQG category. If you are a CESQG you have to follow these guidelines:

- Consolidation points can receive hazardous waste from offsite, without permit, if wastes are only from CESQG's.
- CESQG's can self-transport up to 100 kilograms of their own hazardous wastes in one calendar month (otherwise, they must use a permitted transporter).
- There are no manifests, no EPA ID#, no required paperwork, although recordkeeping is strongly recommended.
- Hazardous wastes must be counted toward generator status.
- When transporting hazardous waste, you must also conform to United States Department of Transportation (USDOT) requirements for packaging, placarding and any other requirement for hazardous material.

For information on SQG and LQG guidelines, or for more in-depth information on New York State's Hazardous Waste Regulations, check out the DEC website by clicking the link in the right column entitled "Information on NYS Hazardous Waste Regulations. For USDOT information, call their Hotline at 1-800-467-4922 and ask for help with hazardous materials shipping requirements.

To determine your hazardous waste generator designation, you add up all the hazardous waste generated at your school from all sources, not just from mercury sources! (i.e. hazardous wastes from art rooms, labs,

maintenance shops, bus garages, etc.)

The Mercury Clean out Process:

Use a mercury inventory form

Mercury can be found in some, not so obvious, equipment like:
thermostats, switches, boilers, fluorescent lamps and fire alarm pull stations.

A mercury inventory form can help jog teachers' memories and helps keep track of the amount of mercury to be collected.

You can use the form developed by the DEC, in partnership with the New York State Department of Health. That web link is:
www.health.ny.gov/nysdoh/environ/hsees/hsees.htm (Go there by clicking on the link under Links Leaving DEC's Website in the right column).

Tip: Make sure that you include the size, as well as the number of the mercury-containing items collected on your mercury inventory form. This information will be vital when you get to the collection part of your mercury clean out. Make sure that you have the right size and number of containers on hand before you get to the collection.

The Mercury Collection

- **Get in the Door!!**
  If you are not part of building's and grounds staff, than you will want to coordinate ahead of time with the school custodians, the "keepers of the keys."

- **Coordinate with the Teachers.**
  Have them clearly mark locations for the mercury pick-up. Avoid the time-consuming frustration of having a "treasure hunt" for mercury items in science labs and classroom storage areas.
- **Confirm mercury items being collected with the items listed on the mercury inventory.**
  It is not uncommon to find an inventory mismatch.
- **Separate mercury compounds from containers of elemental mercury and mercury-containing items.** Mercury compounds need to be packed in a container separate from the elemental mercury and mercury-containing equipment (check with your recycler for details.)

- **Double bag, wherever possible.**
  Place the mercury-containing item either in two plastic bags, one inside the other, or in a plastic jar placed inside a plastic bag. Zip lock bags work well. Seal the jar, and/or bags with masking or duct tape).
- **Get prior notification about any broken mercury-containing equipment.**
  Broken items should be properly contained by double-bagging or by putting broken mercury-containing equipment into a plastic jar with the lid taped shut. We recommend that you have a mercury spill cleanup kit on hand, just in case.

Packing the Containers

Sometimes a school will contract with a recycler to pack up the containers, as well as dispose/recycle the mercury waste.

However, if your school decides to pack the containers, here are some tips:

- Usually, the hazardous waste recycler does not provide the packing material. You can use packing "peanuts," vermiculite, even plastic bags or newspaper. The idea is to pack the mercury-containing items so as not to have breakage in the containers.
- Don't over pack the container! However, you don't want to under pack the container, either. A hazardous waste recycler usually charges per bucket. Keep an "eye on costs" and maximize the use of each container.
- Label each container *"Contains Elemental Mercury and Mercury-Containing Items"* or *"Contains Mercury Compounds,"* as appropriate.

Storage

There usually is a time-lag from the time of the mercury collection to the time when the hazardous waste recycler comes to pick up the containers.

Store the marked containers in a locked cabinet or storage room until they are transported off-site to avoid unauthorized removal or handling of containers, especially by students.

Mercury Spill Guidance:

If you have a minor mercury spill, under two tablespoons, here are some steps that you should follow:

- Evaluate the room immediately
- Contain the spill. Tape works well.
- Open exterior windows; shut down interior ventilation; lower room temperature
- Keep potentially contaminated individuals in a separate area until they can clean up and change clothes. Treat contaminated items as hazardous waste.
- Put all mercury and contaminated materials into double containment and label it for proper disposal. It must be disposed of as a hazardous waste.

Never throw mercury down the drain.
Do not use a broom, mop or vacuum cleaner to clean up a mercury spill.

Heat from a vacuum cleaner will accelerate the vaporization of mercury and contaminate the vacuum cleaner, which must then be disposed of as hazardous waste. Using a mop or broom will only spread the mercury around the floor, contaminating the mop and broom, which must then be disposed of as hazardous waste.

Broken Fluorescent Lamp Clean Up:

- Wear gloves
- **Do not** vacuum or sweep up broken items
- Use a damp cloth to collect shards of glass and phosphor powder
- Place all spill clean up materials in a puncture-resistant, sealed plastic container or bag
- Do not place broken lamps and clean-up materials in trash. Broken fluorescent lamps should be disposed of as hazardous waste; they cannot be disposed of as universal waste.

If a fluorescent lamp breaks on a carpet, the contaminated section of the carpet must be cut out and disposed of appropriately as hazardous waste, or a professional mercury spill clean-up contractor may be called. They may have other safe, alternative methods to clean the carpet.

You are required to report a mercury spill of one pound (two tablespoons) or more to the New York State DEC Spill Hotline: 1-800-457-7362.

We hope it doesn't get to the point when you have to call in the professionals to clean up a significant mercury spill!

It's costly both in time and in money!!

When can a mercury spill lead to health problems??

Even a fever thermometer break, which contains one gram of mercury, can lead to symptoms if it is not cleaned up properly. Some people are more sensitive to mercury's toxic effects, and children, in particular, are more vulnerable to mercury's toxicity.

Mercury spills, which contain 100-200 grams or more of mercury, obviously have more potential to cause harm.

Most severe cases of mercury poisoning result from extended exposure.

- A person repeatedly playing with elemental mercury
- Elemental mercury spill not properly cleaned up, continuously "off-gassing" toxic mercury vapors.

Mercury spills involving heat can result in greater exposures, as mercury can readily vaporize at higher temperatures. Mercury vapor is particularly toxic to humans. 80 percent of mercury vapors inhaled goes directly to the brain and nervous system.

Mercury-Free Equipment:

Almost all mercury-containing equipment found in schools can be replaced by non-mercury substitutes of equal functionality!

The second component of our pilot project allowed for the purchase of mercury-free equipment to replace mercury-containing items that were disposed of by the participating schools in Rochester City and Albany County school districts.

Some Typical Examples of Mercury-free Equipment

Enviro-Safe Thermometers - feature biodegradable non-toxic (green-colored) fluid, certified calibration, white background. Ranges are -20 to +110 degrees C, -10 to +260C degrees C, and -20 to +150 degrees C.

Alcohol Thermometers - Methyl alcohol thermometers (red fluid). Drawback is that they are less accurate than the Enviro-Safe thermometers.

Digital Thermometers - are required for higher temperatures. Ranges are -58 to 1999 degrees F, and -50 to 1200 degrees C for the higher cost thermometer. Drawback with using digital is that it probably uses a button cell battery that contains mercury.

Eco-Celli Liquid Silicon Gas Barometers - uses a red, non-toxic silicon fluid and gas, an contains a methyl-alcohol thermometer. A sliding scale between two tubes compensates for thermal expansion of the silicon fluid due to changes in room temperature and allows for accurate measurement of air pressure.

Aneroid Sphygmomanometer - features Velcro cuffs, chrome air valves, and latex inflation systems. They include zippered vinyl pouches.

Out of the $50,000 grant, $39,767.66 was spent for 2,385 mercury-free pieces of equipment for the 48 schools that participated from the City of Rochester and Albany County school districts. Because the costs for the mercury clean out was so inexpensive, the bulk of the grant monies could be used for purchasing mercury-free equipment replacements.

Replacement costs will be much more expensive than the actual mercury clean out costs, but taken in balance with the costs for a mercury spill clean up, it still makes good "cents"!!

For more information on Reducing Mercury in Schools, please contact:

The Bureau of Waste Reduction & Recycling at (518) 402-8706.

Please send an email to let us know about your mercury clean out at your school. We are particularly interested in knowing how much mercury was disposed of and what types of mercury were cleaned out.

Other Links of Interest (see Links Leaving DEC's Website in the right column):
EPA's mercury website: www.epa.gov/mercury
DOH mercury spill brochure: www.health.ny.gov/nysdoh/environ/hsees/mercury_brochures

Don't wait until there is a mercury spill incident at your school to spur a mercury clean out! Close the book on "Mean, Mad, Mercury"!

[1]Elemental mercury that has not been used (such as surplus mercury removed from a laboratory's chemical supply inventory) is excluded from being a hazardous waste, as a commercial chemical product, destined for reclamation, pursuant to 6NYCRR371.1(c)(4)(iii)

More about How To Initiate a Mercury Clean Out in Your School:

Reducing Mercury in Schools - A Pilot Project - Reducing Mercury in Schools-A Pilot Project

EXHIBIT K
GUIDELINES FOR CESQG

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

Chapter 2: Generator Status, CESQG, SQG and LQG Regulatory Definitions

Chapter 2: Generator Status

A Generator's "status" is defined by the type of hazardous waste created and the quantity of waste that is generated and stored onsite. This chapter will discuss the different statuses and their associated regulatory requirements. There are three Generator statuses: Conditionally Exempt Small Quantity Generator (CESQG), Small Quantity Generator (SQG) and Large Quantity Generator (LQG).

Hazardous Waste Weight:

One criteria for determining a Generator's status is the weight of waste they create over time. It is important that container weight and Universal Waste weight is NOT included in this total.

CESQG: Conditionally Exempt Small Quantity Generator:

A generator is a CESQG if, in a calendar month:

- They generate no more than 220 pounds of hazardous waste, and
- They generate no more than 2.2 pounds of acute hazardous waste, and
- They generate no more than 220 pounds of material from the cleanup of a spillage of acute hazardous waste

AND, at anytime:

- They store no more than 2,200 pounds of hazardous waste, and
- They store no more than 2.2 pounds of acute hazardous waste.

A Generator that is a CESQG:

- Does not need to acquire an EPA RCRA ID Number,
- Does not need to use a Hazardous Waste Manifest form, and
- Does not need to submit an Annual Report.

While the rate of hazardous waste generation may not be controllable, the amount of hazardous waste stored onsite is controllable. Businesses should keep their waste shipments frequent enough to avoid accidentally becoming a more regulated status, due to the amount of hazardous waste stored onsite. A CESQG that stores more than 2,200 pounds of hazardous waste is now a Small Quantity Generator which requires the use of an EPA RCRA ID Number and Hazardous Waste Manifest form.

Should a CESQG get an EPA RCRA ID Number and use the Hazardous Waste Manifest form anyway?

While getting an EPA RCRA ID and using the Manifest form are not required by New York for a CESQG company, they may choose to use these items to more effectively track their hazardous waste shipments. Further, a Generator's business partners (Transporters and TSDFs) and States other than New York may require their use. If a Manifest form is used by a CESQG, they are not required to submit the form to NYS DEC.

Please see Part 371.1(f) (link leaves DEC's website) for the definition, regulatory requirements and regulatory exemptions for CESQG's.

SQG: Small Quantity Generator:

A generator is an SQG if, in a calendar month:

- They generate more than 220 pounds and less than 2,200 pounds of hazardous waste, and
- They generate no more than 2.2 pounds of acute hazardous waste

AND, at anytime:

- They store no more than 13,200 pounds of hazardous waste, and
- They store no more than 2.2 pounds of acute hazardous waste

An SQG may store non-acute hazardous waste on-site for 180 days or less without being subject to the permitting provisions of Part 373, Treatment, Storage and Disposal Facilities.

A Generator that is an SQG needs to acquire an EPA RCRA ID Number, needs to use a Hazardous Waste Manifest form and needs to submit a copy of the Manifest form to DEC. An SQG does not need to submit an Annual Report.

While the rate of hazardous waste generation may not be controllable, the amount of hazardous waste stored onsite is controllable. Businesses should keep their waste shipments frequent enough to avoid accidentally becoming a more regulated status, due to the amount of hazardous waste stored onsite. An SQG that stores more than 13,200 pounds of hazardous waste is now a Treatment, Storage and Disposal Facility which requires a permit issued by DEC.

LQG: Large Quantity Generator:

A generator is an LQG, if in a calendar month:

They generate more than 2,200 pounds of hazardous waste, or
They generate more than 2.2 pounds of acute hazardous waste

An LQG may store hazardous waste on-site for up to 90 days.

A Generator that is an LQG needs to acquire an EPA RCRA ID Number, needs to use a Hazardous Waste Manifest form, needs to submit a copy of the Manifest form to DEC and needs to submit an Annual Report. Further, an LQG needs to comply with the requirements for personnel training, preparedness and prevention, contingency plans and emergency procedures found in Part 373-3. (link leaves DEC's website)

Link Back to **Table of Contents for Hazardous Waste Manifesting Training**

EXHIBIT L
ANNUAL REPORT REFERENCE

Town of Rotterdam
Mercury Minimization Program Annual Report

This document is submitted to fulfill the requirements as set forth in the SPDES permit requiring the development of a mercury minimization program. The Annual Report serves both as a compliance monitoring tool for the NYSDEC, and as a revising process for the discharger to make necessary revisions to the MMPP where problems were discovered and where new areas need investigation.

Date: _____

Permit Number: _____

Additional Permits covered by this Annual Report: _____

Agency Interest Number: _____

Company Name: _____

Facility Name: _____

Contact Name: _____

Contact Phone: _____

1. Was the Mercury Minimization Program Plan as submitted to NYSDEC followed completely during the past year?

   ☐ Yes ☐ No

   If no, attach supporting documentation that clearly describes any and all deviations from the program. Include a list of all actions or conditions that lead to the variation as well as any interaction with NYSDEC in relation to the variation.

2. List any *confirmed* sources of mercury to the treatment system including an average annual loading to the treatment system (may be estimated) and method by which the source was identified.

3. List any *potential* sources of mercury to the treatment system including an average annual loading to the treatment system (may be estimated).

4. Attach all analytical results from all monitoring performed during the last year for mercury, including detection/quantification level, method used and location of sample (ex: influent, effluent, sludge, industrial users, etc..)

5. Attach a list of all actions taken to reduce or eliminate sources of mercury from the treatment system. Actions may include treatment, remediation, investigation, operation, management activities, public outreach, distribution of materials, implementation of BMP's, contact with industrial users, inspection of industrial users, etc. If no actions were taken to reduce or eliminate sources of mercury to the treatment system, please explain why.

6. Attach a list of all actions planned to further reduce or eliminate sources of mercury.

7. Provide additional comments or information on the treatment systems progress using the Mercury Minimization Program Plan to proceed toward achievement of the goal to reduce effluent concentrations of mercury.

EXHIBIT M
OTHER CHECKLISTS FOR MERCURY AUDITING

FORM 4A: Medical Facility Inventory[1]

Name	Address	City, State, Zip Code	Type of Facility	Contact	Phone

[1] List should include all hospitals, clinics and veterinary facilities with diagnostic laboratories (including laboratories contracted or managed independently of the medical facility).

FORM 4B: Medical Facility Mercury Checklist

Best Management Practices for Mercury are taken from the AHA/EPA "Making Medicine Mercury-Free" Criteria.

Compliance with these BMPs may be considered as compliance with the local sewer use ordinance limit for mercury; wastewater sampling and analysis may also be waived by the municipality. It is the intention of the Mercury Pollutant Minimization Program to encourage implementation of mercury BMPs. Report date BMP implemented, or if not implemented, date anticipated.

	Yes	No	Date	Best Management Practice
Policy				1. Has your facility established a mercury plan and timeline for the reduction and eventual elimination of mercury-containing equipment and chemicals?
				2. Has your facility implemented an Environmentally Preferable Purchasing (EPP) policy for mercury products and a process to regularly review mercury use reduction and elimination progress?
				3. Has your facility established mercury management protocols for safe handling, mercury spill clean up procedures, disposal procedures, and education and training of employees?
Mercury Products				4. Has your facility replaced patient mercury thermometers?
				5. Has your facility replaced all or majority (75%) of mercury sphygmomanometers?
				6. Has your facility replaced all or majority (75%) of mercury clinical devices (bougies, miller-abbott tubes, dilators, etc)?
				7. Has your facility inventoried and labeled all mercury-containing facility devices (switches, thermostats, etc.)? **
				8. Has your facility implemented a program to recycle fluorescent lamps? **
				9. Has your facility implemented battery collection programs? **
Lab				10. Has your facility replaced all or majority (75%) of mercury lab thermometers?
				11. Has your facility replaced B5/Zenkers stains with non-mercury substitute?
				12. Has your facility inventoried mercury-containing lab chemicals?

** May not affect wastewater

Wastewater Sampling and Analysis (Not required for facilities implementing or scheduled to implement all BMPs)

Sampling Location _____Mercury Effluent Concentration _____ Date _____

(Attach summary if multiple wastewater outfalls)

I have personally examined and am familiar with the information submitted in this document and attachments. Based upon my inquiry of the individuals immediately responsible for obtaining the information reported herein, I believe that the submitted information is true, accurate and complete.

Name of Facility Address Size of Facility (Number of beds, employees, or other)

Printed Name of Official Signature Title Phone Date

FORM 4C: Medical Facility Compliance and Outreach Summary

General Outreach to All Medical Facilities

Outreach Accomplished	Outreach Planned

Outreach may include newspaper articles or advertisements, mailings, workshops, speaking engagements, etc. Identify type and date.

Compliance and Specific Outreach to Individual Medical Facilities

Name of Facility	Implemented All WW BMPs	Scheduled All WW BMPs	Wastewater Analysis	Outreach Accomplished	Outreach Planned

Outreach may include a site visit, an inspection, sampling, etc. Identify type and date.

Sector Evaluation

_____ % Implemented All WW BMPs
_____ % Scheduled to Implement All WW BMPs
_____ % In Compliance with Local Wastewater Limits

_____ Total % Compliant (Medical Mercury PMP Score)

Enter on Form 10 under IA: Medical Sector Score

Notes:

FORM 5A: Dental Facility Inventory[1]

Name	Address	City, State, Zip Code	Type of Facility	Contact	Phone

[1] List should include all dental facilities that install or remove amalgam fillings. Dental facilities not working with amalgam do not need to be included.

FORM 5B: Dental Facility Mercury Checklist

Best Management Practices are those defined by the ADA and Installation of an Amalgam Separator meeting ISO 11143 Standards.

Compliance with the ADA recommended mercury management practices plus the installation and maintenance of an amalgam separator meeting ISO 11143 standards may be considered as compliance with the local sewer use ordinance limit for mercury; wastewater sampling and analysis may also be waived by the municipality. It is the intention of the Mercury Pollutant Minimization Program to encourage implementation of mercury BMPs. Report date BMP implemented, or if not implemented, date anticipated.
If you do not place or remove amalgam fillings, check here, sign and return form. _____

Yes	No	Date	Best Management Practice
			1. Has all bulk mercury been eliminated from your stock at your dental office?
			2. Does your dental office use precapsulated alloys?
			3. Does your dental office recycle disposable amalgam capsules?
			4. Does your dental office capture and recycle non-contact scrap amalgam?
			5. Does your dental office capture and recycle contact amalgam including the contents of chair-side traps?
			6. Does your dental office recycle contact amalgam retained by the vacuum pump filter?
			7. Does your dental office disinfect and recycle extracted teeth with amalgam fillings?
			8. Does your dental office use non-chlorine, non-bleach line cleaners that minimize the dissolution of amalgam?
			9. Does your dental office have and maintain an amalgam separator meeting ISO standards? Manufacturer: _____Model: _____

Name and address of vendor where amalgam is recycled: _____

Wastewater Sampling and Analysis (Not required for facilities scheduling or implementing best management practices as defined above.)

Sampling Location _____ Mercury Effluent Concentration _____ Date _____

(Attach summary if multiple wastewater outfalls)

I have personally examined and am familiar with the information submitted in this document and attachments. Based upon my inquiry of the individuals immediately responsible for obtaining the information reported herein, I believe that the submitted information is true, accurate and complete.

_____

Name of Facility Address Size of Facility (Number of chairs, employees, or other)

_____

Printed Name of Official Signature Title Phone Date

FORM 5C: Dental Facility Compliance and Outreach Summary

General Outreach to All Dental Facilities

Outreach Accomplished	Outreach Planned

Outreach may include newspaper articles or advertisements, mailings, workshops, speaking engagements, etc. Identify type and date.

Compliance and Specific Outreach for Individual Dental Facilities

Name of Facility	Implemented All BMPs	Scheduled All BMPs	Wastewater Analysis	Outreach Accomplished	Outreach Planned

Outreach may include a site visit, an inspection, sampling, etc. Identify type and date.

Sector Evaluation

_____ % Implemented All BMPs
_____ % Scheduled to Implement All BMPs
_____ % In Compliance with Local Wastewater Limits

_____ Total % Compliant (Dental Mercury PMP Score)

Enter on Form 10 under IB: Dental Sector Score

Notes:

FORM 6A: School and Educational Facility Inventory[1]

Name	Address	City, State, Zip Code	Type of Facility	Contact	Phone

[1] List should include all middle schools, high schools, technical schools, colleges, and universities.

FORM 6B: School Mercury Checklist

Best Management Practices for Mercury are taken from the WDNR's "Green and Healthy Schools" Criteria.

Compliance with these BMPs may be considered as compliance with the local sewer use ordinance limit for mercury; wastewater sampling and analysis may also be waived by the municipality. It is the intention of the Mercury Pollutant Minimization Program to encourage implementation of mercury BMPs. Report date BMP implemented, or if not implemented, date anticipated.

	Yes	No	Date	Best Management Practice
Policy				1. Has your school completed a mercury products inventory for the entire school?
				2. Does your school have an action plan in place to eliminate mercury-containing items that were found as a result of the inventory?
Mercury Products				3. Has all elemental mercury been eliminated from classrooms at your school?
				4. Have all mercury compounds been eliminated from classrooms and storerooms?
				5. Have all mercury lab thermometers been eliminated from the classrooms?
				6. Have all mercury lab barometers been eliminated from the classrooms?
				7. Have all mercury fever thermometers been eliminated from the nurse's office?
				8. Have all mercury blood-pressure cuffs been eliminated from the nurse's office?
				9. Are all mercury-containing items being stored in airtight, unbreakable containers?
				10. Has the danger of a mercury spill been mitigated by having a mercury spill kit and trained staffed to use the kit?
Optional				11. If your school has completed any of these activities, check below: ____ Classroom presentations on mercury ____ Recycling of fluorescent bulbs _____ Phase-out of mercury thermostats _____ Recycling of mercury batteries

Wastewater Sampling and Analysis (Not required for facilities implementing or scheduled to implement all BMPs)

Sampling Location _____ Mercury Effluent Concentration _____ Date _____

(Attach summary if multiple wastewater outfalls)

I have personally examined and am familiar with the information submitted in this document and attachments. Based upon my inquiry of the individuals immediately responsible for obtaining the information reported herein, I believe that the submitted information is true, accurate and complete.

Name of Facility Address Size of Facility (Number of students, employees, or other)

Printed Name of Official Signature Title Phone Date

FORM 6C: School and Educational Facility Compliance and Outreach Summary

General Outreach to All School and Educational Facilities

Outreach Accomplished	Outreach Planned

Outreach may include newspaper articles or advertisements, mailings, workshops, speaking engagements, etc. Identify type and date.

Compliance and Specific Outreach for Individual School and Educational Facilities

Name of Facility	Implemented All BMPs	Scheduled All BMPs	Wastewater Analysis	Outreach Accomplished	Outreach Planned

Outreach may include a site visit, an inspection, sampling, etc. Identify type and date.

Sector Evaluation

_____ % Implemented All BMPs
_____ % Scheduled to Implement All BMPs
_____ % In Compliance with Local Wastewater Limits

_____ Total % Compliant (School Mercury PMP Score)

Enter on Form 10 under IC: School Sector Score

Notes:

FORM 7A: Industry Inventory[1]

Name	Address	City, State, Zip Code	Type of Facility	Contact	Phone

[1] List should include all industries and businesses identified by the POTW as having potential for mercury wastewater contributions (see instructions).

FORM 7B: Industry Mercury Checklist

Best Management Practices for Mercury are Defined as Listed Below

Compliance with these BMPs may be considered as compliance with the local sewer use ordinance limit for mercury; wastewater sampling and analysis may also be waived by the municipality. It is the intention of the Mercury Pollutant Minimization Program to encourage implementation of mercury BMPs. Report date BMP implemented, or if not implemented, date anticipated.

	Yes	No	Date	Best Management Practice
Policy				1. Has your facility established a mercury policy statement that includes the reduction or virtual elimination of mercury?
				2. Has your facility developed a plan to phase-out mercury-containing devices?
				3. Has your facility implemented a chemical management program that includes pre-purchase review and approval?
				4. Has your facility established mercury management protocols for safe handling, mercury spill clean up procedures, disposal procedures, and education and training of employees about these protocols?
Devices				5. Has your facility inventoried all mercury-containing devices (such as switches, thermostats, etc)? **
				6. Has your facility labeled mercury-containing devices to recycle at the end of life? **
				7. Has your facility implemented a program to recycle fluorescent lamps? **
				8. Does your facility properly recover and recycle elemental mercury and mercury-containing products? **
Chemicals				9. Has your facility requested certificates of analysis for bulk chemicals known to have potential mercury contamination?
				10. Has your facility reduced the use of mercury-containing chemicals as much as feasible?
				11. If applicable, has your facility inventoried mercury-containing lab chemicals, thermometers and other devices with a plan for non-mercury product substitution?

** May not effect wastewater

Wastewater Sampling and Analysis (Not required for facilities implementing or scheduled to implement all BMPs.)

Sampling Location _____ Mercury Effluent Concentration _____ Date _____
(Attach summary if multiple wastewater outfalls)

I have personally examined and am familiar with the information submitted in this document and attachments. Based upon my inquiry of the individuals immediately responsible for obtaining the information reported herein, I believe that the submitted information is true, accurate and complete.

_____

Name of Facility Address Phone

_____

Printed Name of Official Signature Title Date

FORM 7C: Industry Compliance and Outreach Summary

General Outreach to All Industrial Facilities

Outreach Accomplished	Outreach Planned

Outreach may include newspaper articles or advertisements, mailings, workshops, speaking engagements, etc. Identify type and date.

Compliance and Specific Outreach for Individual Industrial Facilities

Name of Facility	Implemented All WW BMPs	Scheduled All WW BMPs	Wastewater Analysis	Outreach Accomplished	Outreach Planned

Outreach may include a site visit, an inspection, sampling, etc. Identify type and date. Add additional pages as necessary.

Sector Evaluation

Notes:

_____ % Implemented All WW BMPs
_____ % Scheduled to Implement All WW BMPs
_____ In Compliance with Local Wastewater Limits

_____ Total % Compliant (Industry Mercury PMP Score)

Enter on Form 10 under ID: Industry Sector Score

Form 8A: General Public Mercury Checklist and Outreach Summary

Best Management Practices for mercury are defined as reducing household use of new mercury-containing products and recycling (rather than discarding) old mercury-containing products.

List participation by households in reducing their use of new mercury containing products (i.e.: retail stores that no longer sell mercury fever thermometers) and participation by households in recycling their old mercury-containing products (i.e.: "CleanSweep" events for mercury thermometers). Include adoption of local ordinances that affect mercury product sale or recycling. *Note: Common household mercury products include fever and other thermometers, thermostats, "silent" light switches, and containers of liquid mercury.* Attach additional sheets as necessary.

Household Mercury Product	Discontinued Sale (Describe)	Recycled Products (Quantity)

Outreach activities to households (and retail stores). List date accomplished. Attach additional sheets as necessary.

Activity:	Website/Ads in Paper/Displays	Mailings/Surveys	Collection Events	Workshops/ Community Events	Site Visits/ Personal Contacts	Other: Describe
Date						
Date						
Date						
Date						
Date						

Sector Evaluation

The score for the General Public Sector is calculated based on a formula that uses POTW size and the number of outreach events. *The maximum value for the general public sector score is 100.*

# of outreach events x **facility factor** = **General Public Mercury PMP Score**

Enter on Form 10 under IIA: General Public Sector Score

Facility Size (MGD)	Facility Factor
1------4.9	10
5-----49.9	5
50----250	1

FORM 8B: HVAC (Thermostat) Mercury Checklist and Outreach Summary

Best Management Practices for mercury are defined as collecting and recycling mercury thermostats.

List HVAC wholesalers and contractors that collect and recycle mercury thermostats; include retail stores that offer this service. Attach additional sheets as necessary.

Name	Address	City/State Zip Code	Type of Facility

Estimated total number of HVAC wholesalers and contractors in service area: _____

Outreach activities to HVAC wholesalers and contractors. List date accomplished. Attach additional sheets as necessary.

Activity:	Website/Ads in Paper/Displays	Mailings/Surveys	Collection Events	Workshops/ Community Events	Site Visits/ Personal Contacts	Other: Describe
Date						
Date						
Date						
Date						
Date						

Sector Evaluation

Notes:

_____ **HVAC (Thermostat) Mercury PMP Score**
(% HVAC wholesalers and contractors collecting and recycling mercury thermostats in service area).

Enter on Form 10 under IIB: HVAC Sector Score

FORM 8C: Auto Switch Mercury Checklist and Outreach Summary

Best Management Practices for mercury are defined as removing and recycling auto mercury switches.

List auto-scrap yards that remove and recycle mercury hood and trunk switches; include dealerships that perform this same service. Attach additional sheets as necessary.

Name	Address	City/State/Zip Code	Type of Facility

Estimated total number of auto scrap yards and dealerships in service area: _____

Outreach activities to auto scrap yards and dealerships. List date accomplished. Attach additional sheets as necessary.

Activity:	Website/Ads in Paper/Displays	Mailings/Surveys	Collection Events	Workshops/ Community Events	Site Visits/ Personal Contacts	Other: Describe
Date						
Date						
Date						
Date						
Date						

Sector Evaluation

Notes:

_____ **Auto Switch Mercury PMP Score**
(% auto scrap yards and dealerships removing and recycling mercury hood and trunk switches in service area).

Enter on Form 10 under IIC: Auto Switch Sector Score

Form 8D: Fluorescent Bulb Mercury Checklist and Outreach Summary

Best Management Practices for mercury are defined as increasing business and household use of energy-efficient low-mercury fluorescent bulbs and recycling (rather than discarding) burned out fluorescent bulbs.

List participation by businesses and households in recycling their burned out fluorescent bulbs, including both continuous and one-time "CleanSweep" events. Include adoption of local ordinances that affect fluorescent bulb recycling. Attach additional pages as necessary.

Business Fluorescent Bulb Recycling (Quantity, %, or other measures)	**Household Fluorescent Bulb Recycling (Quantity, %, or other measures)**

Outreach activities to businesses, households (and retail stores) promoting fluorescent bulb recycling. List date accomplished. Attach additional pages as necessary.

Activity:	**Website/Ads in Paper/Displays**	**Mailings/Surveys**	**Collection Events**	**Workshops/ Community Events**	**Site Visits/ Personal Contacts**	**Other: Describe**
Date						
Date						
Date						
Date						
Date						

Sector Evaluation

The score for the Fluorescent Bulb Sector is calculated based on a formula that uses POTW size and the number of outreach events. *The maximum value for the fluorescent bulb sector score is 100.*

# of outreach events x **facility factor** = **Fluorescent Bulb Mercury PMP Score**

Enter on Form 10 under IID: Fluorescent Bulb Sector Score

Facility Size (MGD)	**Facility Factor**
1------4.9	10
5-----49.9	5
50----250	1

FORM 9A: Historical Mercury PMP Score

This form gives credit to your POTW for mercury reduction projects completed before implementing a Mercury PMP. The information on the form will not change from year to year. The form is divided into outreach aimed at wastewater sectors and outreach aimed at optional sectors (dairy manometer outreach refers to farms that have participated in replacing and recycling their milk house mercury manometers). For each outreach activity that your POTW has done in the past, put a check in the corresponding box. To calculate your Historical Mercury Score, count the total number of boxes checked and enter that number in the box on the bottom of the page and also on Form 10.

		OUTREACH ACTIVITIES						SECTOR ACCOMPLISHMENTS			
		Ads in Paper/ Displays/ Website	**Mailings/ Surveys**	**Collection Events**	**Workshops/ Community Events**	**Site Visits/ Personal Contacts**	**Other: Describe**	**Replaced Mercury Products**	**Recycled Mercury Products**	**Installed Mercury Treatment**	**Other - Describe**
Wastewater Sectors	*Medical*										
	Dental										
	School										
	Industry										
Other Community Sectors	*General Public*										
	HVAC										
	Auto Switch										
	Fluorescent Bulb										
	Dairy Manometer										
	Other - Define										

Sector Evaluation: *Notes:*

_____ **Number of Mercury Outreach Activities and Mercury Sector Accomplishments:** (Total boxes checked)

For Annual Report: Enter on Form 10 under IIIA: Historical Score

FORM 9B: Extra-jurisdictional Mercury PMP Score

This form gives credit for mercury projects your POTW has completed outside the treatment plant service area. For the initial plan, include all activities you have implemented. For the annual report, include all activities that have occurred only in the past 12 months. The form is divided into outreach aimed at wastewater sectors and outreach aimed at optional sectors. For each outreach activity or sector accomplishment, put a check in the corresponding box. To calculate your Extra-jurisdictional Mercury Score, count the total number of boxes checked and enter that number in the box on the bottom of the page and also on Form 10.

		OUTREACH ACTIVITIES						SECTOR ACCOMPLISHMENTS			
		Ads in Paper/ Displays/ Website	**Mailings/ Surveys**	**Collection Events**	**Workshops/ Community Events**	**Site Visits/ Personal Contacts**	**Other: Describe**	**Replaced Mercury Products**	**Recycled Mercury Products**	**Installed Mercury Treatment**	**Other - Describe**
Wastewater Sectors	*Medical*										
	Dental										
	School										
	Industry										
Other Community Sectors	*General Public*										
	HVAC										
	Auto Switch										
	Fluorescent Bulb										
	Dairy Manometer										
	Other - Define										

Sector Evaluation: *Notes:*

_____ **Number of Mercury Outreach Activities and Mercury Sector Accomplishments:** (Total boxes checked)

- ***Annual Report: Enter on Form 10 under IIIB: Extra-jurisdictional Score***