

FINAL REPORT

New York State Amendment to the RCRA Subtitle C Hazardous Waste Management Program Assistance Grant - Grant No. D00225204-0

Executive Summary:

To promote public awareness on the presence and public health issues concerning mercury in school environments, and to provide pollution prevention technical outreach to school professionals, the New York State Department of Environmental Conservation's (DEC) Pollution Prevention Unit (PPU) successfully conducted a pilot program to remove mercury from schools in the city of Rochester and the Albany County school districts.

Mercury Clean out at Rochester City Schools		
Participating Schools	Amount of Hg Removed	Recycling/Disposal Cost
9	225 lbs.	\$506.25

Mercury Clean out at Albany County School District		
Participating Schools	Amount of Hg Removed	Recycling/Disposal Cost
9 School Districts 39 Schools	376 lbs.	\$3,3303.25

Average Removal/Recycling Cost of Mercury Per School/School District	
Participating Schools	Average Costs
Rochester City Schools	\$56 per school
Albany County School	\$367 per school district

Cost of Mercury-free Replacement Equipment	
Participating Schools	Costs
Rochester City Schools	\$21,966.90
Albany County School District	\$14,552.41

Project Summary:

To promote public awareness on the presence and public health issues concerning mercury in school environments, and to provide pollution prevention technical outreach to school professionals, the New York State Department of Environmental Conservation's (DEC) Pollution Prevention Unit (PPU) successfully conducted a pilot program to remove mercury from schools in the city of Rochester and the Albany County school districts. This program built upon the foundation laid by the PPU's ongoing outreach efforts to provide informational workshops on mercury-free schools in New York State, of which representatives from the Rochester city school and Albany county school districts attended.

This project was initiated through a pre-proposal to The United States Environmental Protection Agency (EPA) in 2003. After discussions with EPA to identify a funding source, a full proposal was submitted on August 20, 2004, and a grant for \$50,000 was awarded on March 18, 2005. A No-Cost Time Extension requesting an extension through September, 30, 2006 was required, as the project could not be completed by the original projected end date of September 30, 2005. Schools in the city of Rochester were especially singled out for assistance due to environmental justice concerns, while those in Albany were selected because of their close proximity to staff resources. The \$50,000 grant received from EPA at the outset was decided by staff to be divided equally between the two pilot locations: \$25,000 to Rochester City Schools, \$25,000 to Albany County School Districts.

DEC's PPU staff contacted the schools and identified the necessary school contacts to develop an effective inventory, removal and replacement program. Staff assisted, and in some cases, actively participated in the inventorying, collection and disposal/recycling of elemental mercury and mercury-containing items from the participating schools. The Rochester and Albany County school districts each had unique organizational differences that had to be addressed to accomplish the aims of the mercury removal project.

Rochester City School District

Health and safety issues in the Rochester city school district are handled "in-house" by their department of education's health and safety officer, Suzanne Wheatcraft, who serves as a liaison with the school's science teaching staff and buildings and grounds personnel. DEC staff initiated contact with Ms. Wheatcraft in December, 2005, and enlisted her assistance in working toward's the reduction/elimination of mercury from the Rochester city schools.

Staff met Ms. Wheatcraft and Mr. Ed Awad, lead district science teacher and chemical hygiene officer from Marshall High School, on January 11, 2006, in Rochester. At this meeting, a mercury inventory was agreed to be initiated at high schools in the Rochester City school district. Mr. Awad and Ms Wheatcraft decided to not use the DEC mercury inventory form, stating that the lack of familiarity of the form would discourage participation in the inventory by the school's science teachers. Also at this meeting, DEC staff discussed the New York State's hazardous waste regulations. Mr. Awad conducted an informal tour of the science lab rooms at the John Marshall H.S., showing DEC staff various locations that mercury-containing items were located, such as wall barometers, spectral tubes and lab thermometers in bins, and in one case, a four ounce earthenware jug with a cork stopper containing elemental mercury.

Inventories from nine Rochester City high schools were sent to DEC staff in mid-February. Ms. Wheatcraft had a difficult time engaging science teacher's involvement in this program, mainly due to complaints of lack of time, no interest, and lack of direction and financial compensation from the superintendent's office.

The results from the inventories and list of schools that participated are as follows:

<u>Mercury Inventory Results</u> Rochester City Schools	
Schools Participating	Mercury Items Located
Edison Complex	Lab thermometers- 58 Spectral Tubes- 5 Hydrometer- 1 Sling Psychrometer- 2 Hg Gas Law Apparatus- 9 1 Container of Elemental Hg (5ml)
Wilson Magnet Commencement	3 (150 gram) plastic bottles of Elemental Hg Lab thermometers-12 Sling Psychrometer-1
Marshall HS	Barometer -1 (3ft.) Broken Hygrometer (20 ml of Hg) Lab thermometers - 10 3 containers of Elemental Hg (200-250 ml) 4 Spectral Tubes
Monroe HS	Metal Meat Thermometers- 8 Clinical Thermometers- 32
Franklin BioScience	Lab thermometer-1 Sling Psychrometer-3
East High	Barometers- 2 (3ft. & 1ft.) Lab thermometers-300 20 containers of Elemental Hg (1L)
School of the Arts	Lab thermometers-56 Spectral tubes-5
Charlotte	Lab Thermometers-50 Hydrometers-17 Sling Psychrometer-1 Weksler Glass (dual) thermometer Container of Elemental Hg (250ml)
Nathaniel Rochester Community School #3	Taylor Weather Station

DEC staff then made arrangements to travel to Rochester to assist Ms. Wheatcraft with the collection of the listed mercury-containing items from the participating schools on February 23 and 24, 2006.

The collection took twice as long as expected due to mis-communications by the science teachers with Ms. Wheatcraft on the location of the stored mercury items, missing inventory items and in some cases chasing down a key or custodian to open door to school lab storage areas. Sometimes there were broken and poorly stored mercury-containing items that had to be contained and re-wrapped. At one high school, many more mercury-items that were **not** listed on the inventory were recovered and packaged in the containers supplied by the recycler. These kind of snags, turned out to be typical types of occurrences that can happen at schools during mercury clean outs.

The custodial personnel were valuable in assisting our collection efforts. They provided the keys for locked rooms and muscle for hauling large mercury-containing items and unscrewing barometers from school room walls.

Earlier in February, DEC staff made arrangements with a New York State-contracted hazardous waste recycler, Onyx Environmental Services, Inc./Wesco. Distribution, Inc. to send the appropriate number and sized recycling containers to Ms. Wheatcraft, for the Rochester City school district. The collected mercury, which had been securely stored in a locked high school chemical storage area, was picked up by Onyx Environmental the last week in February, 2006. Because there was only one pickup location, costs for this part of the pilot program were considerably inexpensive.

Mercury Clean out at Rochester City Schools		
Participating Schools	Amount of Hg Removed	Recycling/Disposal Cost
9	225 lbs.	\$506.25

Albany County School Districts

Albany County school district was more challenging to coordinate with than the Rochester City School district. Staff had to coordinate with nine separate school districts, representing 39 schools, and also work with the Capital District-Board of Cooperative Educational Services (BOCES), who acted as a liaison to all participating school districts.

BOCES is a public organization that was created by the New York State Legislature in 1948, to provide shared educational programs and services to school districts. BOCES helps school districts save money by providing opportunities to pool resources and share costs. Sharing is a very economical way for districts to provide programs and services that they might not be able to afford otherwise.

The Capital District-BOCES turned out to be a valuable partner and asset to coordinating the logistics in implementing this pilot program. DEC's initial contact was to Barry Becker, from the Capital District-BOCES, in early January, 2006. Barry was an enthusiastic collaborator, offering to host meetings at the Capital District BOCES office facilities, and

generally acting as ombudsman for the school districts, nagging them to send in their inventories and assisting at the recycling pick ups.

DEC staff met with science teachers, building and grounds personnel and health and safety coordinators from the participating schools on January 18, 2006. Staff discussed how to inventory for mercury, handed out the DEC mercury inventory forms and information on the New York State hazardous waste regulations. It was agreed that a second meeting was needed to clarify and elaborate on the New York State hazardous waste regulations. It was also agreed that the mercury inventories would be completed by the end of February, 2006. The following types of mercury and mercury-containing items that were inventoried from these Albany County schools are as follows:

Mercury Inventory Results - Albany County School Districts

Schools	Mercury Items
Albany City Schools	60 Food Service Thermometers (3 1/2") 96 Lab Thermometers 2 Barometer (3 ft.) 1 jar (soda can size) Elemental 500 g. Mercuric Nitrate 4 oz. + 3/4 lb. + 2 lbs Mercurous Nitrate 1 lb. Mercuric Iodide 5 or 6 Blood Pressure Cuffs 2 Wall Thermostats (2"x3")
Bethlehem Central	2 (1 lb.) Bottles of Elemental Mercury 1 test tube (75 ml) of Elemental Mercury 195 lab thermometers 300 ml Elemental Mercury (in jars and tubes) 6 Spectral Tubes 30 ml Elemental Mercury (in coffee can) 1/4 lb. Mercury Nitrate 1 lb. Mercury Chloride 1 Barometer 1 Hydrometer 1 Soil Thermometer
BOCES-Albany	1 Blood Pressure Cuff 1 Molecular Motion Device (18") Thermometers
Cohoes	100 ml Reagent Bottle of Elemental 40 Fever Thermometers 1 Lab Thermometer (10")

Schools	Mercury Items
Green Island	12 Fever Thermometers (6") 17 Lab Thermometers (40 cm) 1 oz. Elemental Mercury plus 1 oz. Mercury Droplet 100 grams Mercuric Chloride 1 oz + 1/4 lb. Mercuric Oxide 1 oz Mercuric Nitrate
Guilderland	5 Lab Thermometers (12") 2 Sphygmometers (15")
Maplewood	1 Jar Elemental mercury (100 grams) 3 Lab Thermometers (12") 1 Fever Thermometer
Menands	8) Blood Pressure Cuff (30 C- 50C) Sling Psychrometers 2 L of Elemental mercury waste
North Colonie	40 Lab Thermometers 1 Barometer 2 Contaminated Mercury Spill Kits 74 Lab Thermometers 2 Hygrometers 1 Barometer 2 Blood Pressure Cuffs
Watervliet	125 g Waste Elemental Mercury 50 Lab Thermometers 3 Fever Thermometers 1 Blood Pressure Cuff 1 Barometer Test Tube Waste Broken Thermometer

A second meeting was held on March 2, 2006, at the Capital District-BOCES facility. The agenda for this meeting was as follows:

AGENDA

- 1:00 - 1:30 **Right-to-Know Training** - Barry Becker, Health/Safety/Risk Management Coordinator, Capital Region BOCES
- 1:30 - 2:15 **Presentation on Hazardous Waste Recycling** - Doris Farley, Director of Regulatory Affairs, AERC Recycling Solutions
- 2:15 - 2:30 **Break**
- 2:30 - 3:00 **Logistics for Mercury Collection and Pick-up** - Deborah Knight, Environmental Program Specialist, Carlos Montes, Research Scientist, New York State Department of Environmental Conservation, Pollution Prevention Unit
- 3:00-3:30 **Questions** - Deborah Knight, Carlos Montes, John Miccoli, Environmental Program Specialist (Division of Hazardous Substances and Materials), Allison Elliott, Environmental Engineer (Region 4)
New York State Department of Environmental Conservation
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At this second meeting, it was agreed that the collection and recycling pick up occur over the school's spring break on April 18, 2006. Due to liability issues and New York State hazardous waste transporter regulations, it was agreed that there be nine different locations for the mercury pick up by the recycler.

DEC staff did participate in some, but not all, of the Albany County's school district's mercury clean outs: Albany City, Green Island and Watervliet school districts.

The Bethlehem school district, originally declined to participate in the mercury clean out pilot, but at the eleventh hour requested to be included . They had "found" a significant stash of elemental mercury, mercury containing items and mercury compounds that they wished to dispose of. They did not participate in the April recycling pickup date, but a separate pickup was arranged in June, 2006

Ultimately, 376 pounds of elemental, mercury-containing items and mercury compounds were cleaned out from the Albany County schools. Because, there were multiple recycling pick up stop locations, the Albany County school's expenditures were significantly higher than the costs in Rochester City. In comparison with Rochester City schools, many of the Albany County schools also eliminated mercury compounds, incurring an additional expense (\$250 per 5 gallon plastic bucket). Mercury compounds, as it turned out, had to be sent by the recycler to another recycler to be retorted.

Please refer to the chart below to review the mercury recycling costs:

Mercury Clean out Expenditures:

Participating School Districts	Recycling/Disposal Costs	Pounds of Mercury Removed
ALBANY COUNTY SCHOOL DISTRICTS - 39 Schools		
Green Island	\$ 163.50 + \$250*	6
Maplewood	\$ 159.00	4
Menands	\$ 179.25	13
Cohoes	\$ 195.00	20
Guilderland	\$ 215.25	29
Albany City	\$ 285.00 + \$250*	59+11=70
North Colonie	\$ 352.50	90
Watervliet	\$ 296.25	65
Capital District BOCES	\$ 190.50	18
Bethlehem	\$ 267.00 + \$500*	52 + 9=61
Totals	\$3,303.25	376
ROCHESTER CITY SCHOOLS - 9 schools		
Edison HS, Wilson Magnet HS, Marshall HS, Monroe HS, Franklin HS, East HS, School of Arts, Charlotte HS, Nathaniel Rochester Community School #3	\$ 506.25	225

*Additional charge for mercury compounds from recycler from Port Washington, WI

One of chief aims of this pilot program is to illustrate to other schools in New York State that eliminating mercury from their schools is much more economical than the costs of cleaning up a mercury spill. The average costs range in the hundreds of dollars, rather than the thousands of dollars and lost of school time that is expended on a mercury spill remediation. This result, learned from this pilot program, has now been incorporated into our future mercury outreach workshop presentations being conducted throughout New York State. This presentation is labeled "The New York Experience - Eliminating Mercury from Schools" and will soon be posted to our DEC website as a reference tool.

Mercury-Free Replacements:

A second component to this pilot project grant from EPA provided for the replacement of mercury-containing items with viable mercury-free alternatives. Since the recycling costs were so modest, a generous amount of money remained to the Rochester City and Albany County school districts for mercury-free replacements.

DEC staff met with representatives from the Rochester City Schools on April 10, 2006, and with the Albany County school districts on May 9, 2006, to discuss the guidelines and process for ordering mercury-free alternatives for their schools. Typical items and quantities ordered were as follows:

Replacement Equipment	Number of items	Cost
Lab Thermometers	2,017	\$17,894.20
Psychrometers	94	\$4,733.82
Barometers	21	\$4,722.30
Child-sized Blood Pressure Cuffs	64	\$3,924.00
Thermometer racks	15	\$2,181.24
Check temperature probes	76	\$1,978.20
Boyle's Law Apparatus (Gas Law Apparatus)	16	\$1,545.26
Spectral Tubes	38	\$1,385.82
Weather center	8	\$520.20
Adult-sized Blood Pressure Cuffs	15	\$372.91
Hygrometers	18	\$319.81
Heat and Temperature Demonstration Set	3	\$189.90
Totals	2385	\$39,767.66 *

* Cost does not include shipping, handling and tax on certain out of state items.

Representatives from the Albany County Schools also requested mercury spill kits to be used in the unfortunate event of a mercury spill during the mercury clean outs, or in the event of a future mercury spill from an "hidden" source of mercury.

The costs of mercury-free replacements far exceed the costs for eliminating mercury-containing items from schools. The high cost of mercury-free replacements has been cited by several school representatives as a reason they have been slow to initiate a mercury clean out.

Conclusion:

The pilot project with the Rochester City and Albany County school districts will illustrate to other schools in New York State the economic viability of removing the potent neurotoxin, mercury, from their schools. Not only is it the “right thing to do”, but it is affordable to schools on a tight, fiscal budget. It is far better for schools to be pro-active and remove the mercury from their schools before having the expense and headache of dealing with a mercury spill clean up.

This pilot also highlights the process involved in a mercury clean out, the potential snags and practical advice to follow when collecting and disposing mercury. New York State schools can benefit from our experiences with the Rochester and Albany County school mercury clean outs. All this information will be posted on the DEC website for their reference.

Finally, this pilot demonstrates to schools in New York State that there are other, viable mercury-free alternatives that can be purchased. Although the costs of these replacements can “take a bite” out of their supplies budget, it is much cheaper than having to clean up a mercury spill which could cost from several thousand to millions of dollars and close a school for several weeks. Removing and replacing mercury, benefits the community the school and most importantly the students, the population most at risk to mercury’s toxic effects.