Illinois Department of
Public Health

George H. Ryan, Governor • John R. Lumpkin, M.D., M.P.H., Director

245 West Roosevelt Road • Building 5 • West Chicago, Illinois 60185-4803

Case #: 704230201

August 8, 2002

Ms. Audrea Murphy, Principal
St. Gerard Catholic School
9320 S 55th Ct.
Oak Lawn, IL 60453

Dear Ms. Murphy:

On April 23, 2002, Ms. Kathy Marshall, Environmental Toxicologist, Springfield, contacted Mr. Thomas Baughman, Ph.D., Environmental Toxicologist, West Chicago Regional Office, about a mercury spill in the basement lunch room/gym of St. Gerard Catholic School (St. Gerard). Dr. Baughman then contacted you. You were uncertain how much mercury was spilled, but thought that it was a small amount. The spill was discovered on Sunday, April 21, at the end of a Cub Scout Pinewood Derby event. A possibility was that mercury had been used to weight one of the Pinewood Derby cars. The mercury was discovered after the floor was swept, and the sweeping likely dispersed the contamination. Dr. Baughman recommended having the hazardous waste firm who cleaned up the spill take the broom, which would be contaminated. The spill was near a pop machine, but the beverage company said that their machines do not contain mercury. You and the janitor scooped up beads with paper and gave them to the fire department. You had been ventilating the spill room for two days and had been keeping it locked. Dr. Baughman told you to keep people out of the spill room until he could check it and to close all windows at least overnight before his testing. He also recommended placing potentially contaminated shoes, clothing, and Pinewood Derby cars in plastic bags for mercury testing. Subsequently, Dr. Baughman learned from Mr. Larry Cohen, Cub Scouts, that about 200 people from an athletic club had used the basement lunch room/gym during the evening of Saturday, April 20, the evening before the Pinewood Derby event.

On April 24, 2002, Dr. Baughman visited your school, and you, Mr. Dan Hamilton, Cub Master, Mr. Terry Finn, Assistant Weblos Leader, and Mr. Don Ostrowski, St. Gerard Catholic School, maintenance, were also present. Dr. Baughman gave you the names and phone numbers of some occupational physicians specialized in the effects of chemical exposure, should anyone wish medical follow-up. These doctor and doctor groups included:

- Toxikon Consortium - A consortium of occupational physicians of the University of Illinois-Chicago Medical Center, Cook County Hospital, and Rush Presbyterian Medical Center, 312-633-7037
- Dr. Linda Morgan, Naperville, 630-904-1220
- Dr. Leiken, Glenbrook, 847-657-1700

Dr. Baughman measured airborne mercury concentrations in your school with a Lumex Mercury Vapor Analyzer (see the attached figure). All measurements were near floor level, using at least two readings per location to verify readings. Scattered beads of mercury were on the floor in front of the pop machines and in the aisle between tables immediately in front of the pop machines. The two highest airborne mercury measurements occurred immediately above visible beads of mercury on the floor.

Dr. Baughman also took readings with our Lumex in the hallway with the statue of Jesus, from the statue toward the basement cafeteria (about 100 feet). In this hallway, the readings were less than our 1,000 nanograms per cubic meter (ng/m^3) clearance level.

Dr. Baughman used our Lumex to test bagged items for contamination. This is a very sensitive method of detecting contamination, and it does not represent the airborne concentration that a contaminated item will produce if placed in a room. Background concentrations were elevated because of the proximity of bags with contaminated items.

Bagged Item	**Airborne Mercury Concentration (ng/m^3)**
Background	1,163, 1,178
Clothes and shoes	10,270, 10,640
Clothes and shoes	39,320, 39,680
Clothes and shoes	10,330, 12,130
Clothes and shoes	9,919, 8,544
Clothes and shoes	25,610, 29,660
Clothes and shoes	27,710, 37,930
Background	1,622, 2,472
Pinewood Derby Car	25,450, 6,796
Clothes and shoes from Saturday, April 21	745, 718
Shoes from Saturday	1,337, 2,005
Pinewood Derby Car	16,780, 5,773
Pinewood Derby Car	2,450, 1645

ng/m^3 = Nanograms per cubic meter.

Bagged Item	Airborne Mercury Concentration (ng/m³)
Pinewood Derby Car	18,730, 2,675
Background	832, 626, 663
Pinewood Derby Car	13,360, 3,093
Pinewood Derby Car	8,479, 3,770
Pinewood Derby Car	16,480, 3,710
Pinewood Derby Car	1,920, 4,269
Pinewood Derby Car	10,270
Pinewood Derby Car	866
Pinewood Derby Car	1,526
Pinewood Derby Car	2,932
Pinewood Derby Car	1,297
Pinewood Derby Car	1,664
Pinewood Derby Car	1,633, 1,147
Pinewood Derby Car	6,033
Pinewood Derby Car	2,033
Pinewood Derby Car	3,853
Pinewood Derby Car	1,639
Pinewood Derby Car	3,397
Pinewood Derby Car	2,214
Pinewood Derby Car	2,132
Pinewood Derby Car	1,524
Pinewood Derby Car	1,846
Pinewood Derby Car	929
Pinewood Derby Car	1,160
Pinewood Derby Car	3,328
Pinewood Derby Car	1,582
Pinewood Derby Car (retest)	3,597
Pinewood Derby Car	26,330
Clothes and Shoes of Gym Teacher (there Sunday, before Pinewood Derby Race)	3,314
Shoes	2,189
Shoes	16,840

ng/m^3 = Nanograms per cubic meter.

Bagged Item	Airborne Mercury Concentration (ng/m³)
Shoes	26,960
Pinewood Derby Car	3,132

ng/m^3 = Nanograms per cubic meter.

Dr. Baughman tested all the Pinewood Derby cars for mercury contamination because they were a suspected source. If one of the cars had been a source of the mercury, it would have produced an off-scale reading (greater than 40,000 ng/m^3) when placed in a plastic bag. This did not occur. Consequently, none of the cars were a source of the mercury. They probably became contaminated from Cub Scouts playing with the cars on the floor.

Given the amount of mercury spilled (probably in the neighborhood of one to two teaspoons) and the airborne mercury concentrations that we found in the school, the spill probably occurred during the weekend of April 21-22. If the spill had occurred during the school week, significant amounts of mercury probably would have been tracked upstairs. The shoes and clothes of one person who was in the spill room on Saturday, April 21 were not contaminated. However, that person may not have stepped in the mercury. It is unknown whether any of the other approximately 200 people in the spill room on Saturday, April 21 had contaminated shoes. Dr. Baughman recommended having them tested, but to our knowledge, that was never done. The clothes and shoes of the gym teacher had some mercury contamination. She was in the spill room before the Pinewood Derby event and left just as the event was being set up. Consequently, the mercury spill had occurred at least by that time. Given this information, our department cannot establish whether the spill occurred on Saturday, April 21 or Sunday, April 22. It is also uncertain when the initial spill became dispersed in the lunch room/gym. Although people (shoes, Pinewood Derby cars, and Cub Scout clothing) and sweeping may have dispersed the mercury on April 22, people and sweeping also may have dispersed the mercury on April 21, had the mercury spill already occurred.

Significant amounts of mercury were not tracked upstairs in the school. From previous experience, tracking should not have resulted in significant contamination of homes. However, whoever brought the mercury also may have spilled mercury at home, potentially causing harmful airborne concentrations. Unfortunately, the source of the mercury is unknown.

You hired Clean Harbors, a hazardous waste cleanup firm, to clean up the spill, at a cost of about $28,000. We shared our monitoring data with them, and they also performed air monitoring. They began their monitoring and cleanup on April 25, 2002. On April 29, 2002, Mr. Shaddow Mirkef, an industrial hygienist hired by the Archdiocese of Chicago, said that Clean Harbors had finished the cleanup. On April 29, 2002, you had a meeting to discuss the cleanup with concerned parents, but invited neither Clean Harbors nor our department. This resulted in our department receiving many calls from concerned parents. Should such an event occur in the future, we recommend inviting both the cleanup firm and our department to the meeting. One

parent said that a broken thermometer was postulated as a source of the mercury. The amount spilled was considerably more than the amount (about 1 gram) contained in a fever thermometer and probably was the equivalent of spilling about 70 to 130 fever thermometers.

After several requests, on August 6, 2002, our department received the results from the undated clearance sampling by Clean Harbors. Their clearance sampling with a Lumex found airborne mercury concentrations less than 1,000 ng/m^3 in the spill room, church chapel, stairs from the basement, top of the stairs by the basement, hallway (several locations), and rooms 101, 115, 117, and 119.

Inhalation is the main route of concern because 80% of inhaled mercury is absorbed. Absorption of mercury after ingestion is low. Some exposure through skin can occur, especially if cuts are present. Because the body slowly eliminates mercury, cumulative exposure is important. After a large mercury spill, the hazard can persist for a long time.

At the temperatures normally encountered indoors, airborne mercury concentrations are usually not high enough to produce symptoms after short-term exposure. Generally, symptoms require exposure of a month or more. Long-term exposure to low levels of mercury can permanently damage the brain and kidneys, and decrease fetal survival. Neurological symptoms of chronic mercury exposure include decreased nerve conduction, decreased psychomotor skills (e.g., finger tapping and hand-eye coordination), irritability, poor concentration, shyness, tremors (initially affecting the hands, and sometimes spreading to other parts of the body), and short-term memory deficits. The motor system disturbances may be reversible after exposure ends, but cognitive impairments, primarily memory deficits, may be permanent.

Other symptoms may include abdominal cramps, nausea, diarrhea, eye irritation, skin rashes, and weight loss. IDPH had one case where a child lost his spleen, but that was unusual. Children may experience acrodynia, which is characterized by pink-colored palms and soles of the feet, excessive sweating, flushing, itching, joint pain, rashes, swelling, weakness, worry, irritability, and difficulty sleeping.

Children are more sensitive to mercury than adults. The reasons include four contributing factors:

- Mercury vapors are heavy and settle, making concentrations higher at floor level, where young children play;
- The blood-brain barrier of children is less able to keep mercury out of the brain;
- The respiration rate of children is higher than adults, so children inhale more mercury than adults at a given concentration; and
- The brains of children are still developing.

One study associated residential exposure for several months to 10,000 to 40,000 ng/m^3 with neurological effects in children, but the threshold for effects is uncertain. In workers, one study

associated exposure for many years to an average concentration of 26,000 ng/m^3 with neurological effects. However, some studies reported no neurological effects at slightly higher concentrations

In consultation with the U.S. Agency for Toxic Substances and Disease Registry (ATSDR) and the U.S. Environmental Protection Agency (USEPA), IDPH has adopted a home airborne clearance level of 1,000 ng/m^3 and a home evacuation level is 10,000 ng/m^3 in a living area. At St. Gerard, only the spill room exceeded our evacuation level.

Because of the short exposure duration, we do not expect any adverse health effects from the past exposure of Cub Scouts, students or teachers in the school. After the cleanup, the airborne mercury concentrations were below levels of concern. As communicated to you previously by letter on April 24, for items marginally contaminated with mercury, it is our experience that some may be salvageable by either cleaning them with a mercury spill kit (Lab Safety Supply, 800-356-0783, can send overnight) or airing out the item for 2 weeks during warm weather. Our experience from past spills is that if items are placed in a plastic bag and tested in a meter, items initially giving readings of:

- less than 10,000 ng/m^3 will usually become uncontaminated if aired out for 2 weeks during warm weather.
- between 10,000 and 20,000 ng/m^3 will usually become uncontaminated if aired out for 2 weeks during warm weather only for hard-surfaced items (e.g., plastic, metal, wood with a good finish). Porous items such as clothing, leather, and unfinished wood usually remain contaminated. Contaminated shoes are difficult to clean, probably because of cracks in the soles; however, we have seen rubber-soled shoes contaminated to around 30,000 ng/m^3 successfully cleaned with a mercury spill kit.
- greater than 20,000 ng/m^3 usually remain contaminated even if aired out for months. However, hard-surfaced items usually are cleanable with a mercury spill kit, even if contaminated to greater than 20,000 ng/m^3 when placed in a plastic bag.

Please feel free to contact Thomas A. Baughman, Ph.D., Environmental Toxicologist, at our West Chicago Regional Office, 630-293-6800 or tbaughma@idph.state.il.us if you have any questions.

Sincerely,

S. Lee Wohlwend, PE
Senior Public Service Administrator

cc: IDPH Toxicology Section, Springfield
West Chicago Regional office
Cook County Health Department

Airborne Mercury Concentrations, Basement, St. Gerard School (ng/m^3)