"Lead-Free Wheels"

Ecology Center to Demonstrate Safer Substitutes for Major Auto Lead Use

By Ted Sylvester

The next time you're driving and conditions are right, mark off a 1.5-mile stretch of a familiar highway. Then imagine revisiting that same thoroughfare one year later and collecting the entire amount of debris left in the roadway. Amidst a small mountain of refuse you will find roughly 40 pounds of lead, one of the most toxic substances known to humans, especially children. More alarming still is the fact that the 40 pounds represents only half of what was originally deposited; the other half has been released into the environment.

A recent groundbreaking study of roadways in Albuquerque, New Mexico, produced some pretty startling results. The roads in the city, especially in the vicinity of businesses, side streets, and intersections, contained significant amounts of lead in the form of wheel weights that had fallen off of vehicles. At one major Albuquerque intersection, lead deposition ranged from 175 to 250 pounds per mile, per year, "a mass loading rate," according to the study, "that, if accumulated for a year, would exceed federal lead hazard guidelines more than 10,000 times." Further, the study noted, "half of the wheel weight lead deposited in the street was not visible after eight days."

A more recent study of Ann Arbor streets by the Ecology Center – on a much smaller scale – produced similar results. At the same time there has been growing global activity, including the European Union's End-Of-Life Vehicle (ELV) Directive, targeting the phase-out of lead and other persistent bioaccumulative toxins (PBTs) in many products including automobiles (see "European Union countries to get lead-free weights starting this year," page 14). The two studies and efforts by the European Union, coupled with the very serious public health threat of unabated lead exposure, have provided the impetus for the launching of the Ecology Center's "Automotive Lead Safer Substitutes Project" – dubbed "Lead-Free Wheels." The program is just getting underway and will run through March 2005. The project will focus on abating the problem of lead loading of urban streets by motor vehicle wheel weights.

"This lead loading of urban streets by motor vehicle wheel weights is continuous, significant, and widespread, and is potentially a major source of human lead exposure because the lead is concentrated along the outer curb where pedestrians are likely to step."

– Dr. Robert A. Root, *Environmental Health Perspectives*, Oct., 2000

About Lead

"Lead affects virtually every system in the body, especially the brain and nervous system of fetuses and young children. Some 890,000 children in the U.S. have blood lead levels high enough to cause adverse effects on their ability to learn, and 2.7 million children have increased dental cavities attributable to lead exposure. A highly significant association has been found between lead exposure and children's IQ, and there is no evidence of a threshold down to blood lead concentrations as low as 1 microgram per liter.

Virtually all children are at risk for lead poisoning, and the risk for lead exposure is disproportionately high for children living in large metropolitan areas. Lead-contaminated dusts and soils are one of the primary pathways of lead exposure for children, especially in urban populations."

From "Lead Loading of Urban Streets by Motor Vehicle Wheel Weights," Robert A. Root, Ph.D., *Environmental Health Perspectives*, Oct. 2000.

Lead loading

On average, cars and light trucks have 10 such wheel weights, one on the inner and outer rims of each tire including the spare (see photo, opposite page). The weights are necessary to improve tire balance and prevent vibration at high speeds. They are 95% lead and are attached to the rim with a steel clip. Wheel weights vary in size and weight, ranging from less than 1/2 inch to 6 inches in length and from 1/4 ounce to 4 ounces in weight. The problem is that most

vehicles no longer have all 10 wheel weights attached to their tires. The Ecology Center estimates that 13% of wheel weights fall off rims, and about 50% of vehicles on the road may be missing one or more of their wheel weights.

It may be hard to imagine how such little pieces of metal scattered on the roadway could pose a threat to human health. But with over 200 million automobiles and light trucks on U.S. streets and highways, each with an average of 4.5 ounces of wheel weights, for a total of 55 million pounds of rolling lead, the potential for significant amounts of lead deposits is put into perspective. Those little pieces of lead are actually very soft; once deposited in urban streets they are rapidly abraded and ground into pieces by vehicle traffic, scattered into the wind as dust, washed into the storm sewers and waterways, and picked up by shoes, animal paws, and bicycle tires.

On average, cars and light trucks have 10 lead wheel weights (encircled), attached to the inner and out rims of each tire including the spare. The problem is they fall off (see inset photos) and collect on roadways.

The Root study

Using figures derived from his study of lead wheel weight deposits on urban roads in Albuquerque, New Mexico, Dr. Robert A. Root estimates that 3.3 million pounds of lead per year is deposited on urban roads in the U.S. (*Environmental Health Perspectives*, October 2000). Dr. Root surveyed more than 13 miles of highways over a 46-week period, collecting, weighing, and documenting the amount of lead found, the rate of lead deposition, and the rate of lead abrasion. His findings are the first to dispute the long-standing opinion of the EPA that high lead levels in roadside soil are due to the prior use of leaded gasoline. "Motor vehicle wheel weights," Dr. Root writes, "which are 95% lead, are potentially a major source of lead exposure that heretofore has not been recognized."

"This lead loading of urban streets by motor vehicle wheel weights," concludes Dr. Root, "is continuous, significant, and widespread, and is potentially a major source of human lead exposure because the lead is concentrated along the outer curb where pedestrians are likely to step." Wheel weight lead makes its way into the environment and contact with humans when it is "dispersed as fugitive dust, flushed periodically by storm water into nearby waterways and aquatic ecosystems, or may adhere to the shoes of pedestrians and the feet of pets, where it can be tracked into homes" and businesses, according to the study.

The study also notes that the highest rate of lead deposition occurs in urban areas – 60% of vehicle-miles traveled are urban – posing a significant lead poisoning threat to poor and minority populations that are already overexposed to lead burdens.

Dr. Root calculated the lead loading of major Albuquerque thoroughfares to be 8,200 pounds per year: 5,830 pounds per year for principal arteries and 2,370 pounds per year for minor arteries. "Similar results," the study claims, "should be anticipated wherever lead weights are used to balance motor vehicle wheels." Lead wheel weights are used worldwide to balance vehicle tires, with an estimated 70,000 tons of lead consumed in their production.

Ann Arbor street survey

In the fall of 2001 the Ecology Center conducted its own survey of two Ann Arbor streets (Ryan Bodany, 2001 Unpublished Thesis). The study's time frame was much shorter (4 weeks) but the study area, a one-mile stretch of Division and Huron Streets, yielded similar findings. Forty-seven wheel weights were recovered in all, weighing an average of around 3/4 of

an ounce (virtually identical to the Root study). Dr. Root found 99% of wheel weights within 2 feet of the curb; in Ann Arbor 96% of weights were found in the same area.

Dr. Root's study found wheel weight deposition was more frequent in the vicinity of businesses, side streets, and intersections where motorists slow down or change momentum rapidly. Nearly 98% of wheel weights found in the Ann Arbor survey were within 25 feet of an intersection.

The number of vehicle weights lost per vehicle-mile, per year, was also a virtual match. Adjusted for differences in survey distance and traffic counts, Albuquerque roads yielded 97% as many wheel weights as Ann Arbor streets. The Ecology Center study concluded that these correlations were significant and suggest that the number of wheel weights lost per vehicle-mile per year is consistent nationwide.

Safe substitutes for lead

The "Lead-Free Wheels" demonstration project is being spearheaded by Ecology Center Auto Campaign Director Jeff Gearhart, co-author of the recently published "Getting the Lead Out," the first comprehensive examination of lead use in the auto industry (see "Ecology Center Lead Report Challenges Auto Industry," From the Ground Up, August/September 2003 or http://www.ecocenter.org/ftgu).

The "Lead-Free Wheels" program intends to demonstrate the commercial viability of a number of safer substitutes for lead-free wheel weights. Some of the potential alternatives to be demonstrated include tin, zinc, or steel clip-on external balancing weights, as well as lead-free internal balancing systems (a process where glass balancing beads are inserted into the tires). The project will achieve a direct reduction of 1,936 to 2,420 pounds of lead use on vehicles in Michigan and the Midwest, and the prevention of the release of nearly 300 pounds of lead into the environment. If successful, the regional program results will be used to encourage domestic production and use of lead-free wheel balancing technology on a national level.

Project partners

Current project partners include full-service repair shops, service stations with repair facilities, tire retailers, and portions of publicly owned vehicle fleets (the State of Minnesota is currently doing trials of several lead-free options). The final project will include additional independent tire retailers and municipal fleets.

In effect, the Ecology Center will act as an auto parts supplier to its project partners, covering the cost differential between lead and lead-free weights for up to 22,000 wheel balances (tin, for example, is around $.16 per weight or $.32 per wheel additional cost). Currently, lead-free wheel weights are being procured from manufacturers in other countries – primarily in the U.K, Japan, and Canada. In addition, the project will cover buy-down costs for 400 wheel balances using internal balancing systems.

The Ecology Center is planning a promotional campaign with its partners to highlight the environmental benefits of the services that the companies are providing. Promotional strategies will include co-branded newspaper advertising, store flyers, public service announcements, and web-based materials to promote the service and provide background on the project. For more information on the project go to the program's web page at: http://www.leadfreewheels.org.

Ted Sylvester is editor of *From the Ground Up*.

European Union countries to get lead-free weights this year

On September 18, 2000 the European Union (EU) approved an End-of-Life Vehicle Directive (end-of-life vehicles – ELVs – are cars destined for salvage yards). The Directive requires auto manufacturers to take responsibility for management of ELVs, sets increased recycling requirements, and mandates a phase out of most uses of four toxic metals in autos and auto components: lead, mercury, cadmium, and hexavalent chromium. The Directive requires all EU member countries to develop appropriate legislation and regulations by April 2002.

The EU Directive also declares that a phase-out of lead wheel weights is feasible and has established many phase-out requirements. Auto manufacturers and tire retailers, for example, are now required to use only lead-free balance weights on new model cars put on the market for the first time after July 1, 2003. Very few brand new models are introduced each year and the vast majority of vehicles in production or on the road will be required to comply with a later date. After July 1, 2005 all balance weights will be required to be lead free. There are currently no similar requirements in North America.