

Rachel's Environment & Health News

#189 - Incinerator Ash -- Part 1: Lead Poisoning Epidemic In Children

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Lead is a soft, gray metal that humans have used for 4,000 years because it is easy to mine and easy to shape into useful objects. Unfortunately, lead is also toxic. It is now thought that the Roman empire collapsed partly because Roman nobility failed to appreciate the toxicity of lead; they drank wine from leadlined goblets, they caught rainwater in lead-lined cisterns, and they transported their drinking water through lead pipes. Examination of the remains of ancient Romans reveals damaging levels of lead in their bones. [1]

At very low levels, lead is poisonous to the central nervous system, causing mental retardation and learning disabilities. It causes sterility (which probably decimated Roman nobility), it stunts physical growth in children, it causes high blood pressure, it causes hearing loss, and it "probably" causes cancer, according to U.S. Environmental Protection Agency (EPA). In high enough concentrations, lead causes brain seizures and death, but such high exposures are rare. Lower, more insidious exposures are very common. Children are particularly susceptible to damage from lead.

Lead offers no dietary benefits to humans or animals. Therefore, the American Academy of Pediatrics recommends that the only desirable amount of lead in humans is zero. This is hard to achieve in a society that injects 44,000 tons of lead into the atmosphere each year. [2] It is now recognized that lead injected into the atmosphere settles out onto the soil and contact with soil is the chief means by which children ingest lead. Young children regularly put their hands in their mouths and whatever's on their hands ends up in their stomachs. If there's lead in soil anywhere near where children play, outdoor dust and indoor house dust become contaminated with lead and the children end up ingesting lead from their hands. This has now been confirmed and reconfirmed by medical studies.

Since the 1970s, awareness of lead contamination has been growing. As a result, in the 1970s, the federal government dramatically reduced the allowable use of lead in gasoline (from 2 grams per gallon to 0.1 grams per gallon) and outlawed lead entirely for use in indoor paint.

However, even these measures have not solved the lead problem because lead does not degrade or go away. Once lead is mined out of the earth and put into commercial use, it becomes a permanent part of the environment, until slow, natural forces of soil erosion bury it again. It has been estimated that the "half life" for lead in the environment is between 1000 and 2000 years. This means that lead introduced into the atmosphere, or buried in a shallow grave such as a landfill, today will remain accessible to humans for 10,000 to 20,000 years. For this reason, lead introduced into the environment is cumulative--the problem grows larger each year as the nation's soils become more contaminated.

According to the federal Centers for Disease Control (CDC) in Atlanta, the major source of lead in the environment used to be lead smelters and automobiles. Now these sources have been overshadowed by a new major contributor of lead to the environment: municipal solid waste incinerators. While Congress has put the brakes on lead in gasoline, the incinerator industry has been expanding; incinerators spew lead into the air in large quantities, and incinerator ash buried in the ground introduces additional massive amounts of lead into the nation's soils.

For example, a consultant funded by an incineration company recently estimated that, by the year 2000, the U.S. will be producing 17 million tons of incinerator ash each year. [3] Incinerator ash contains an average of about 3000 ppm [parts per million] of lead, so 17 million tons of ash contains 102 million pounds (51,000 tons) of lead. Note that 51,000 tons is greater than all the lead now being put into the atmosphere by all sources in America today (44,000 tons). This means that municipal solid waste incineration promises to more than double the amount of lead entering American soils each year.

How much is too much?

In the field of toxicology (the science of poisons), the traditional view says that all poisons have a threshold--some amount above which people get sick and below which people are not harmed. Now, however, a consensus has developed among medical specialists who have studied the effects of lead on children; these physicians now agree that there is no threshold for lead damage. Any amount of lead interferes with a child's normal patterns of growth (physical and mental). This recognition is turning the old way of setting standards on its ear.

Lead is measured in the bloodstream, usually as micrograms per deciliter (mcg/dl). [A microgram is one millionth of a gram, and there are 28 grams in one ounce; a deciliter is 100 milliliters, or a tenth of a liter; a liter is about a quart.]

Throughout the 1980s, the amount of lead in blood considered "safe" has declined steadily. Doctors used to define "lead poisoning" as 50 mcg/dl; then they dropped it to 30 mcg/dl. But starting in the late 1970s, medical study after medical study has revealed that infants with less than 10 mcg/dl show neurobehavioral abnormalities. Children with only 5 to 7 mcg/dl show hearing damage, damage to the central nervous system and stunted growth--they are shorter, lighter, and have smaller girth in the chest. Furthermore, these impairments in infants have been shown to be permanent. Once poisoned, the children's nervous systems never recover. Basically, their IQ has been reduced, and they will live with this disadvantage for the rest of their lives.

Reduced intelligence (a 5 to 10-point reduction in IQ, and other subtle damage) is measurable in young children with 10 mcg/dl to 15 mcg/dl lead in blood. The U.S. National Center for Health Statistics in 1984 revealed that 88% of American children under 6 years old have blood lead levels of 10 mcg/dl or higher. The average in American children under 6 years old today is 16 mcg/dl. As Dr. Ellen Silbergeld, a lead specialist with Environmental Defense Fund (EDF) has written, [4] "Clearly, an epidemic of excessive lead exposure exists in the United States." Under such circumstances, with lead levels in our children already dangerously and unacceptably high, and with soils known to be the most important source of the problem, it seems entirely inappropriate--morally wrong--to be doubling the amount of lead injected into the nation's soils via an expanded solid waste incineration industry. For the sake of our children's health, we should be going the other way, shutting down existing incinerators, even if taxpayers have to sacrifice to do it. Which is more important, our children's health or our pocketbooks? This seems an easy choice.

--Peter Montague

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[1] Much has been written on this subject. See, for example, S.C. Gilfillan, "Lead Poisoning and the Fall of Rome," JOURNAL OF OCCUPATIONAL MEDICINE, Vol. 8 (February, 1965), pgs. 53-60.

[2] J. F. Jaworski and others, "Group Report: Lead." In T.C. Hutchinson, ed., LEAD, MERCURY, CADMIUM, AND ARSENIC IN THE ENVIRONMENT (NY: John Wiley, 1987), pg. 9.

[3] Keith E. Forrester and Richard W. Goodwin, "Engineering Management of Msw Ashes: Field Empirical Observations of Concrete-like Characteristics." In Theodore G. Brna and Raymond Klicius, eds., Vol. I of PROCEEDINGS INTERNATIONAL CONFERENCE ON MUNICIPAL WASTE COMBUSTION, HOLLYWOOD, FL, APRIL 11-14, 1989, pg. 5b-16. Ottawa, Cn: Minister of Supply and Services Canada, 1989. Catalog No. En 40-11/14-1989e.

[4] Except as noted above in footnotes 1-3, all of our information is taken from a technical paper titled "Establishing a Health Based

Standard for Lead in Residential Soils," by Patrick L. Reagan and Ellen K. Silbergeld, Ph.D., to be published later this year as part of the annual series, TRACE SUBSTANCES IN ENVIRONMENTAL HEALTH, issued by the University of Missouri Press in Columbia, Mo. For \$16.00, we can mail you this 43-page manuscript.

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