



# Los Angeles Dental Mercury Program

## Los Angeles, California

### KEY FINDINGS

- The City of Los Angeles' publically owned treatment works processes wastewater for a 600 square mile service area.
- By implementing Best Management Practices and a permitting program, L.A. was able to significantly reduce mercury pollution.
- Between 2003 and 2013, mercury contamination in L.A.'s biosolids dropped 33 percent, and continues to decline.
- Today, over 1,500 dental offices participate in L.A.'s dental mercury program.



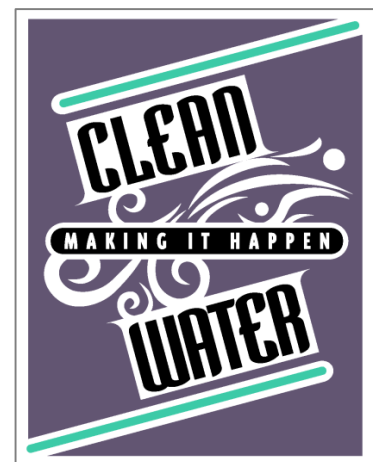
*Dental amalgam, a substance used to fill cavities, is made up of a mixture of mercury, silver, tin, copper and other trace metals. Photo from City of Los Angeles*

## Dentists Help Control Mercury Pollution With Best Management Practicess

Los Angeles, the second largest city in the U.S. by population, is home to more than 3.8 million people – and a lot of teeth. While the amount of mercury waste left over from filling one tiny tooth cavity may be small, when multiplied by a population of 3.8 million, even small problems can add up to big problems.

In 2003, the City of Los Angeles took action against pollution by targeting the nation's largest single source of mercury in wastewater: Dental offices. Dentists

often use a mercury-based product called dental amalgam to fill cavities, and when not disposed of properly, this mercury can make its way into waterways and harm wildlife. To reduce mercury pollution at the source, members of L.A.'s Industrial Waste Management Division (IWMD) partnered with the California Dental Association (CDA) to create and implement a program to teach 1,500 local dentists about safe disposal of mercury waste. The result? Between 2003 and 2013, mercury contamination



*A brochure called "Clean Water: Making it Happen" educates L.A. dentists on proper disposal of mercury.*

in L.A.'s biosolids (treated sewage sludge) dropped 33 percent, and continues to decline: a successful experiment in proper management of waste.

## Program Development

A 2002 study by the Association of Metropolitan Sewerage Agencies found that dental offices in the US were the number one source of mercury contamination in wastewater. In 2003, amidst growing national awareness and concern about mercury contamination, the City of Los Angeles decided to take action. "We weren't sure if the state or federal government was going to establish mercury regulations, but we wanted to be at the forefront," said Lonnie Ayers, who worked as project manager for the City of Los Angeles during the development of the dental mercury program. "We understood that mercury was an issue on a national level, so the driver behind the dental mercury program was the potential for national legislation."

Ayers' goal was to develop a program that would be effective without being overbearing. The City of Los Angeles settled on a Best Management Practice (BMP) and permit program, and partnered with the California Dental Association. Together, the City of Los Angeles and the CDA worked together to develop outreach and educational materials – a BMP brochure entitled "Clean water, making it happen" and a video called "Environmental Responsible Dentistry Amalgam Management", to raise awareness about proper storage, handling and disposal of dental mercury. The program also addressed other potentially hazardous wastes, such



*Preventing mercury pollution protects places like L.A.'s Santa Monica Bay. Photo from USGS.*

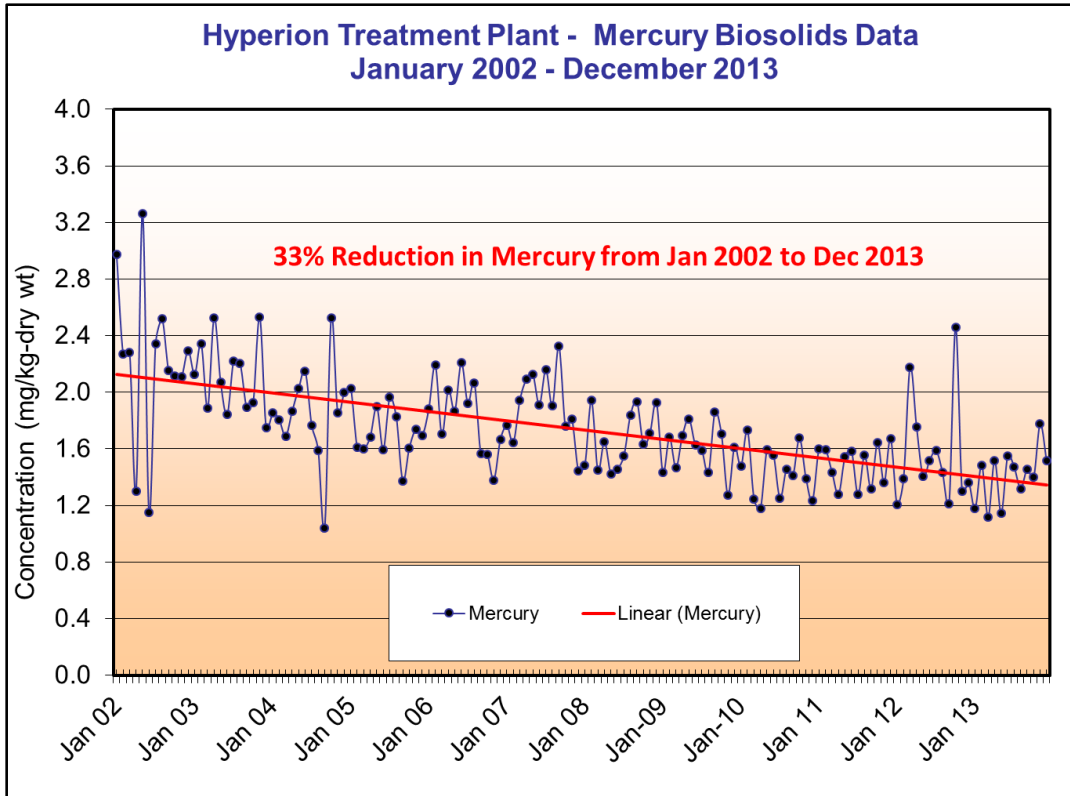
## Mercury, Dentists and the Environment

Mercury is a naturally occurring element in the environment, present in the earth's crust and released into the atmosphere and water bodies by volcanic eruptions or soil erosion. In normal concentrations, mercury is not considered an environmental hazard, but in large quantities, mercury acts as a persistent environmental toxin with harmful effects on humans and fish.

Mercury comes in several forms – elemental, inorganic and organic – and can change from one form to another, with varying levels of toxicity. Elemental mercury, the type of mercury used by dentists, is one of the least toxic forms of mercury. To fill a cavity, dentists drill away the decayed portion of a tooth and fill the hole with a putty that hardens into a solid filling. The least expensive and most durable type of filling putty is called "dental amalgam", and is made up of a blend of elemental mercury (50%), silver, tin, copper and other trace metals. Although dental amalgam has fallen out of favor in recent years because it releases low levels of mercury vapor, the U.S. Food and Drug Administration considers it safe for use by most adults.

How does amalgam become an environmental hazard? The problem begins when dentists clean up after a filling procedure, and wash leftover dental amalgam down the drain with their wastewater. Wastewater carries elemental mercury to rivers, lakes and streams, where it is eventually converted by anaerobic organisms into methylmercury. Methylmercury is a much more toxic form of mercury that *bioaccumulates*, passing up the food chain from bacteria to plankton, invertebrates, fish, birds and mammals (including humans) and reaching higher concentrations at each step.

In humans, methylmercury poisoning can result in loss of physical coordination, difficulty in speech, hearing impairment, blindness or even death. In wildlife, methylmercury poisoning can cause death, reduced fertility, slower growth and development, and can affect behavior and survival.



Mercury content in L.A.'s biosolids decreased 33% from Jan 2002 to Dec 2013.

as photographic, disinfectant and preservative wastes.

One major challenge that Ayers and his team faced when getting this program starting was in locating all of the dentists in the L.A. area. They obtained a list of licensed dentists from the California Department of Consumer Affairs, and then assembled a crew of 20 inspectors to canvass neighborhoods, zip-code by zip-code, until they thought they had reached all of the dentists in the L.A. area. Today, they work with over 1,500 dentist offices to control mercury.

### Program Results

L.A.'s dental mercury program has been extremely successful. L.A.'s biosolids, or treated sewage sludge, are processed at Hyperion and Terminal Island Treatment Plants and recycled into fertilizer and soil amendments for farm fields. Testing mercury levels in L.A.'s biosolids is the easiest way to measure change over

time; since the dental mercury program began in 2003, mercury levels in the city's biosolids have decreased at a steady rate of 33 percent, falling from approximately 2.1 mg/kg in 2003 to approximately 1.4 mg/kg in 2013.

Ayers does not expect the mercury level to decrease at this rate indefinitely, or to eventually hit zero. "Our mercury levels are not entirely due to dentists," said Ayers. "The rest comes from other sources, for example, industrial laundries, or from residents consuming fish." However, Ayers indicated that mercury levels could drop further if OSHA or the FDA were to prohibit use of mercury, and as dentists begin to use composite resins in place of mercury. Amalgam separators, which remove amalgam particles from dental office wastewater, can also be helpful, and have been used successfully in other places like the San Francisco Bay Area.

### Tips for Success

Ayers credits much of the success of L.A.'s dental mercury program to the city's partnership with the CDA. "It was really helpful to have the CDA involved, because it provided us with a forum to inform dentists and work with them at conferences and trainings," said Ayers. The CDA was able to incorporate mercury BMP trainings into conferences and workshops, and was also helpful in acting as an intermediary when enforcement of regulations was necessary. "I would always make sure that you get industry associations involved," said Ayers.

To encourage voluntary compliance from dental offices, the City made changes to their ordinance to reduce

regulatory fees, according to Ayers. If dentists were to show evidence of implementing BMPs and sign a certification statement, they qualified for reduced fees – from \$244 to \$50 per year, with an inspection every five years instead of every year.

Best of all, the cost to implement this program was minimal, according to Ayers. "For us, no additional staff was needed," Ayers said. "We just redirected resources within the division, and reassigned staff. Other cities might have to hire, but we didn't." Today, L.A.'s dental mercury program serves as a model that other cities could follow to successfully reduce mercury pollution.

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