

Researchers find high levels of mercury in California's coastal fog

Christopher Stolz, Ventura County Star, 12-10-11

A research team at UC Santa Cruz that this year for the first time tested coastal fog in California for mercury found raised levels of the element.

The team, led by chemist Peter Weiss-Penzias, reported finding "very high" levels of mercury, a neurotoxin, in the fog, according to a paper presented Thursday to a geophysical science conference in San Francisco on Thursday.

"These are unheard of levels for methylmercury," said Weiss-Penzias. "People have measured methylmercury downstream from old mercury mines, where the bugs [microbes] have to convert inorganic mercury in sediment into methylmercury, and the highest levels they found were four parts per trillion. Well, our highest levels were 10 parts per trillion."

Mercury is a naturally occurring element, but it can become toxic as it builds up in the environment, especially in fish, which can become hazardous to eat.

The toxin can cause a wide range of neurological problems, especially in young children, and is considered one of the most dangerous of all pollutants.

The fog is still safe to breathe, Weiss-Penzias stressed, but could be transporting the toxin from deep in the ocean to inland areas, where it could accumulate over time.

Recent surveys of hundreds of California lakes by state water agencies found that about one out of five lakes in California, including Lake Piru, have high levels of mercury. Of the lakes sampled in a 2009 report, 74 percent had levels of mercury high enough that fish were unhealthy to eat three or more times a week. About 26 percent had even higher levels, leading the state Office of Environmental Health Hazard Assessment to warn against consumption of fish from such waters by children or pregnant women. Advisories have been issued on consuming fish from many popular California waters, including Lake Nacimiento, Clear Lake, and San Francisco Bay.

Some of these mercury-laden lakes are near areas of gold mining, where mercury was used to enhance the recovery of gold in the 19th century, or near abandoned mercury mines, but the contaminated lakes in Southern California are far from known mining sites. Searching for the source of this mercury, Weiss-Penzias and his team first collected samples of rain water, but when the Moss Landing Marine Laboratories tested the samples, they found low levels of mercury — about .1 percent per trillion.

Knowing that sediments on the ocean floor can have high levels of mercury left by atmospheric deposition, from both volcanoes and the burning of fossil fuels, and that these deposits are brought to the surface by strong upwelling currents during the spring and summer, Weiss-Penzias and his team looked for other means the neurotoxin could be transferred from the ocean inland.

"The upwelling begins in March and goes through July or August," Weiss-Penzias explained. "The rain ends in April, so there's not an overlap there. So what about the fog, because it rolls in throughout the summer, and it has closer contact with the ocean?"

The researchers found far more mercury than they expected.

"We found the typical amount of mercury and methylmercury that one usually finds in rain," explained Christopher Conaway, one of the researchers. "The surprise is that methylmercury is so much higher in coastal fog."

The researchers found an average of about 3 parts per trillion in fog, roughly 20 times the amount in rain, with big spikes of methylmercury, the organic form of the material. The source is not known, although deposits in the ocean are suspected, because no human sources for mercury between Monterey and Big Sur have been identified.

"This is a preliminary result that's very surprising," said Mark Stephenson, at the Moss Landing Marine Laboratories, where water samples are sent for mercury testing from around the state. "We don't know the significance of the finding yet, but I think it will open up a whole new area of research."