Article 6

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Cars Are Leading Source of Metal Loads in California

Metals can follow many pathways before they become entrained in urban stormwater run off. A recent California study sponsored by the Santa Clara Valley Nonpoint Source Program suggests that cars are the dominant loading source for many metals of concern, such as cadmium, chromium, copper, lead, mercury, and zinc.

Researchers examined the significance of various metal pathways into the Lower San Francisco Bay. Specifically, the comparative loading potential of five urban source areas were studied using a mass balance approach. The sources were atmospheric deposition, automotive leaks and wear, runoff from industrial and residential sites, and water supply.

Cars and other vehicles were found to produce over 50% of the total load of three metals: copper, cadmium and zinc. This number was generated even without accounting for tailpipe emissions that produce further atmospheric deposition of metals. For example, 50% of the total copper load to the Bay was attributed solely to brakepad wear.

Atmospheric deposition accounted for an additional 25% of the total copper load, much of which came from mobile emission sources, such as cars. Copper consistently ranks as a metal of great concern because it can be acutely toxic to aquatic species even at low concentrations.

Another major metal loading pathway was the wear and tear of automobile tires. The authors conclude that tire wear alone could account for at least half of the total cadmium and zinc loads delivered to the Bay each year. Since both brakepads and tires wear directly onto impervious surfaces, it is likely that the delivery of the metals into the storm drain system is almost 100%.

The authors note that the most effective, and perhaps the only, technique to reduce copper, cadmium, and zinc loads would be to get the automotive industry to reduce the metal content of tires and brakepads. This "pollution prevention" approach has historically worked in such cases as unleaded gas and engine coolants.

Atmospheric deposition, however, remains the primary loading pathway for lead. The chief culprit appears to be exhaust from diesel-fueled vehicles. Diesel fuel exhaust also factored as a significant source for chromium, silver, mercury, copper, and zinc. Again, a pollutant prevention strategy that focused on cleaner fuels or reducing vehicle emissions was recommended.

The authors made an attempt to calculate metal loadings from leaks of motor oil, gasoline, and coolant leaks from cars, as well as illegal disposal from oil and coolant changes. The data on leak and illegal disposal rates is extremely sketchy. For example leak rates of 0.3, 0.01, and 1.2 % of all cars were cited for gasoline, motor oil and coolant, respectively. The rate of illegal disposal of motor oil was estimated to be 15%.

Based on these rates, leaks and illegal disposal were not believed to be a major pathway for metals into stormwater drains (about eight and 2% of the copper and zinc load, respectively).

The metal load contained in stormwater runoff from industrial sources could not be calculated due to a lack of data. However, the authors ranked the potential importance of different industrial source areas to contributing metal loads. The industrial categories with the highest risk for metal loading included mining activities, metal plating and galvanizing operations, metal scrap processing, boat building/repair, and automotive repair. Automotive repair was by far the most prevalent "industrial" activity in the basin.

—TRS

Reference

Santa Clara Valley Nonpoint Source Control Program. 1992. *Source Identification and Control Report.* Woodward Clyde Consultants. 96 pp.