

ABSTRACT

The objectives of this project were to evaluate the extent and most probable sources of contamination of sediments by selected heavy metals and butyl tin residues, in the Chaguaramas peninsula of northwestern Trinidad. Methods of analysis of chromium, copper, lead, nickel, zinc, mercury, tributyl tin, dibutyl tin and monobutyl tin were optimized, validated and quality-controlled, using certified reference materials and a local sediment sample. A preliminary study in 1999-2000 revealed that sediments from Chaguaramas and Almooring Bays, where a range of industries operate at water's edge with little environmental control, contained significantly higher ($p < 0.05$) concentrations of heavy metals than those of adjacent bays used mainly for recreational purposes.

A follow-up study in 2001 in Chaguaramas and Almooring Bays showed the highest concentration of heavy metals and butyltin compounds in the vicinity of a floating dock in western Chaguaramas Bay, followed by those near boat repair facilities in Almooring Bay to the east. Wet season sediment samples contained consistently higher concentrations of all analytes monitored, suggestive of runoff from terrestrial sources. Terrestrial samples collected near boat repair facilities and three paints used in boat repair also contained similar metals and butyltin compounds. Similarly, the lowest monobutyl tin:Σtri-,di- and monobutyl tin ratios were found in sediments near the floating dock and the boat repair facilities (0.04 to 0.05) and in one paint sample (0.09), indicative of fresh deposition, compared to those of sites further away (0.10-0.20).

Mathematical models of heavy metal and butyltin concentrations clearly indicate movement from their sources of generation, into the wider Gulf of Paria. This has serious implications for the health of food chain organisms and humans, since fish, crabs and shellfish are harvested daily from the Gulf for human consumption. Urgent action is required to minimize further inputs of these and other contaminants into the marine environment, where long-term impacts are likely to be felt. To our knowledge, this is the first report on the detection of butyltin species in sediments from Chaguaramas Bay.

Key Words: Heavy metals; butyltin; sediments; quality control; ship and boat repair; environmental contamination; mathematical modeling