Sediment Quality And Toxic Inputs To The Gulf Of Mexico

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States bordering the Gulf of Mexico discharge hundreds of thousands of pounds of toxic pollutants into the Gulf waters each year. Most notable are Texas and Louisiana, with their massive petrochemical complexes that generate more toxic waste in total volume and on a per capita basis than any other state in the nation. Although Florida is an exception, the Gulf states also produce the most dangerous chemicals, those that cause either cancer, birth defects, or nerve damage.

Recognizing the importance of assessing the amounts, kinds, and potential impacts of toxic releases into Gulf estuaries, the Toxics and Pesticides Subcommittee of the Gulf of Mexico Program developed two important databases -- the Toxics Release Inventory (TRI) and the Contaminated Sediments Inventory. This paper provides an overview of the information contained in these databases and discusses briefly the results of preliminary evaluations designed to identify both chemicals and estuaries of concern of the Gulf coast.

The TRI identifies and quantifies point and non-point source inputs of toxic chemicals to the Gulf -- specifically, industrial and municipal discharges, pesticide inputs from agricultural activities, and produced waters. Data retrieval for industrial and municipal activities for the year 1989 came from EPA's Toxics Release Inventory System and Permit Compliance System. The information was evaluated based on chemical toxicity, volume of receiving water, and waste water treatment reductions at Publicly Owned Treatment Works. Data retrieval for agricultural activities for the years 1987 and 1989 came from NOAA's Resources for the Future Database. The information was evaluated for chemical toxicity, propensity for bioaccumulation, and soil half-life. Data on oil and gas activities came from a preliminary report published by Avanti, Inc. Because produced water discharges occur further offshore, this information was not evaluated by estuary.

Results of the TRI evaluation indicated that approximately 13 million pounds of toxic substances were discharged from industrial and municipal sites into the Gulf of Mexico in 1989. Calculated toxicity indices showed Galveston Bay to be the most susceptible, followed by Calcasieu Lake, Tampa Bay, Brazos River, Corpus Christi Bay, Sabine Lake, Escambia Bay, Mississippi Delta Region, Mobile Bay, and Atchafalaya/Vermilion Bay. The ten most toxic chemicals released to Gulf estuaries were ammonium sulfate, chlorine, ammonia, chromium, hydrazine, copper, zinc, cyanide compounds, ethylbenzene, and sulfuric acid.

Approximately ten million pounds of pesticides were applied to agricultural fields in Gulf coastal counties in 1987, and five million pounds were used in 1989. According to NOAA's rating index, potential contamination of the Laguna Madre estuary was greatest in 1987, followed by Tampa Bay and Charlotte Harbor. When the index was applied to the 1989 database, Laguna Madre again was depicted as having the greatest potential contamination, followed by Atchafalaya/Vermilion Bays and Matagorda Bay.

In 1991, produced water discharged from oil and gas platforms and coastal processing plants in near coastal waters of Louisiana and Texas contained approximately 28 million pounds of metals (minus calcium and magnesium) and 2.5 million pounds of organic pollution.

The Contaminated Sediments Inventory (CSI) contains coastal sediment chemistry and biological effects data collected by State, Federal, and academic sources for the past 13 years. The database, which contains almost 27,000 records, consists of detailed information on each sample collected, as well as QA/QC information, when available. Data consists largely of bulk sediment chemistry information, a large proportion of which utilizes detection limits above many threshold effects levels. Due to the nature of the CSI, Florida's draft sediment quality guidelines were used to evaluate the data to identify both chemicals and estuaries of concern.

It is noteworthy that evaluation of bulk sediment chemistry data on many chemicals, particularly pesticides, is difficult. In addition, characterization of Florida's coastal sediment was more complete than much of the rest of the Gulf coast. Therefore, it is likely that many areas not listed may be a concern, but data is limited at this time. Consequently, the information contained in this database should be used keeping these limitations in mind.

Analysis of the CSI showed that Tampa Bay ranked highest in potential ecological impact caused by contaminated sediments. Galveston Bay, Escambia Bay, Ten Thousand Islands, Choctawhatchee Bay, Calcasieu Lake, St. Andrew Bay, Apalachicola Bay, Perdido Bay, and Mobile Bay also ranked high as potential hot spots based on historical sediment quality data. Gulfwide contaminants of concern were also identified with chlordane leading the list, followed by phenanthrene, anthracene, mercury, silver, 2,4-DDD, chrysene, nickel, zinc, and 4,4-DDD.

A Gulf of Mexico Toxics Characterization Report integrating the results of the Toxics Release Inventory and Contaminated Sediments Inventory, including fish advisory information, also has been written. Information is presented on a Gulf-wide and estuary-specific basis.

To receive a copy of the three reports and data bases, please contact: Catherine Fox, (202) 260-1327