

Steve Skrabal: Mercury in the Environment

Background: Dr. Skrabal is a marine chemist with whose research interests include the chemistry of heavy metals in sediments and waters of estuaries and the ocean. He and his colleagues are completing a study funded by North Carolina Sea Grant to examine the distributions and behavior of the chemical forms of mercury in the Cape Fear estuarine system. Dr. Skrabal, his colleagues, and students have been studying mercury in this system for about five years. This statement represents Dr. Skrabal's scientific opinion regarding concerns about the proposed Titan Cement plant to be located near the Northeast Cape Fear River in Castle Hayne, NC.

Very low naturally occurring levels of mercury exist in air, soil, and water. Mercury can be introduced at concentrations greatly exceeding natural levels by a variety of processes, including electric power production, manufacturing and mining operations, and waste incineration. In particular, high temperature coal combustion (as in electric power plants) is a significant regional and global source of mercury. Other materials containing mercury (such as limestone used in the manufacturing of cement) will behave similarly when heated, and should be considered as a potentially significant point source of mercury into the environment.

When mercury is deposited in surface waters and sediments, some of the dissolved mercury can be transformed into the chemical form that is of the greatest concern for human health and water quality, methylmercury. Although methylmercury occurs in very low concentrations in many water bodies, it is scientifically well known that methylmercury accumulates in organisms upward into the food chain. This occurs because methylmercury is slowly excreted after ingestion by organisms, including fish and humans. Since methylmercury is a neurotoxin, accumulation of methylmercury in organisms such as fish which are later consumed by humans, is a significant environmental health concern.

In North Carolina, several watersheds have documented mercury contamination, including the Black and Lumber Rivers and Lake Waccamaw. State testing in these areas indicates elevated mercury levels in a number of fish species, presumably due to emissions from manufacturing plants and power plants. Elevated levels of mercury have been found in fish tissues at numerous stations throughout the Cape Fear watershed. Due to mercury contamination, fish consumption advisories exist for blackfish, bowfin, chain pickerel, and largemouth bass in all North Carolina waters and for king mackerel, shark, swordfish, and tilefish in the Atlantic Ocean from the North Carolina/South Carolina border to Cape Hatteras.

When high levels of mercury are introduced by point sources (such as manufacturing or cement plants) into environments such as the lower Cape Fear region, a significant amount of methylmercury may form. Much of the methylmercury that ultimately accumulates in fish is converted from mercury by naturally-occurring bacteria, which live mainly in estuarine sediments. The environmental conditions under which sulfate-reducing bacteria thrive exists throughout the estuarine systems of southeastern North Carolina, including the Black River, the mainstem Cape Fear, and the Northeast Cape

Fear. In our studies, we have found that the upper portion of the Cape Fear estuary has relatively high sediment concentrations of mercury (due to historical inputs from a mercury point source) and favorable conditions for the formation of methylmercury. We have also found that about half of the methylmercury that enters the Cape Fear estuary appears to remain within the system. As a result of the favorable conditions in the Cape Fear estuary to convert mercury to the more dangerous form of methylmercury, methylmercury produced in these regions has been and will very likely continue to enter the food chain and ultimately represent a significant threat to human health.

Finally, it is important to point out that NCDENR has significant concerns about the levels and risks of mercury in southeastern NC, due to the historic sources of mercury, and the important role that environmental conditions in southeastern NC estuaries plays in the potential formation of methylmercury.

In summary, there is a great deal of information regarding the role of industries such as Titan's proposed cement plant as potential sources of mercury contamination. In this region, there is also the added risk factor of very favorable environmental conditions to convert mercury into methylmercury. **This information, together with the well-recognized neurotoxic effects of methylmercury on humans, indicate that this region is a very poor choice for the siting of a cement manufacturing facility, both from ecosystem and human health perspectives.**

Also from Dr. Skrabal, a recent front page article from Wilmington's Star News paper about mercury in our coastal environment. The link to this article is:

<http://www.starnewsonline.com/article/20090307/ARTICLES/903061968/1004?Title=Titan-plant-project-Toxic-mercury-a-conundrum>