

MEMORANDUM

To: Bill Holman, Secretary, Department of Environment and Natural Resources

From: George Lucier, Ph.D.
Chairman, Scientific Advisory Board on Toxic Air Pollutants

Re: Scientific Advisory Board review of Mercury

Date: December 5, 2000

In April of 1998, the Scientific Advisory Board (SAB) on Toxic Air Pollutants was directed to review the acceptable ambient level (AAL) guidelines for mercury. That request was clarified in February of 1999 to include all relevant routes of exposure for mercury, including non-inhalation routes of exposure. Consumption of contaminated fish is the primary means of environmental exposure to mercury. Release of mercury emissions to the air may contribute to these exposures through atmospheric loadings to sensitive waters.

During this evaluation we systematically evaluated such interrelated topics as the toxicological effects of mercury, human exposures to methylmercury (MeHg) through fish consumption, atmospheric and aquatic fate and transport of mercury, and efforts to predict the environmental impact of mercury emissions to the air. Whenever possible, we focused on information specific to North Carolina. With the contributions made by over a dozen guest speakers, we were able to make many meaningful conclusions on this important environmental health issue. For example, our evaluation of several recent epidemiological studies led us to the conclusion that a safe human exposure level for MeHg is approximately 0.167 $\mu\text{g}/\text{kg}/\text{day}$.

However, at this time we are unable to fulfill the request to develop an AAL based on indirect routes of exposure. This is due to several factors including a lack of critical data on North Carolina freshwater systems and uncertainties concerning emission factors and appropriate atmospheric models. Accurate prediction of mercury fate and transport will rely on better characterization of local ecosystem conditions and further development of transport and deposition models such as those currently being developed under the EPA's Total Maximum Daily Load (TMDL) pilot program. Without these advancements the establishment of a quantitative link between air emissions and indirect exposures to mercury cannot be made.

Despite this, the Board members and I feel that exposure to mercury is a critical issue for North Carolinians. We believe several important topics merit your attention:

- Mercury that is emitted to the air from man-made sources in North Carolina will undergo both long-range atmospheric transport as well as local or regional-scale

deposition. Emissions of reactive gas mercury (RGM) or particulate mercury are believed to contribute to local mercury deposition and thus are likely to contribute to the bioaccumulation of MeHg in fish from local waterways. Reductions in RGM and particulate mercury emissions are predicted to result in slow but substantial improvements in local and regional fish MeHg levels. We believe North Carolina will benefit greatly from local and national efforts to reduce mercury emissions to the air.

- The black water systems of North Carolina's eastern coastal plain are very sensitive to atmospheric inputs of mercury. This is clearly evidenced through an examination of fish MeHg levels across the state. Special attention should be paid to reducing mercury emissions and MeHg exposures in these areas of the state.
- A recent National Research Council (NRC) report concluded that EPA's MeHg reference dose, 0.1 µg/kg/day, is "a scientifically appropriate level for the protection of public health." The NRC also reaffirmed that developing fetuses and children are especially sensitive to the neurotoxic effects of MeHg. Our SAB reviewed many of the same studies cited by the NRC and arrived at very similar final estimates of risk. While the majority of North Carolina's population is not at risk for adverse effects given current MeHg exposures, human exposure data from southeastern North Carolina include some of the highest levels documented in the United States. This is a critical issue for subsistence fishermen and their families and sensitive populations such as women of childbearing age and children. Because fish is a beneficial source of protein, an emphasis should be placed on reducing MeHg levels rather than replacing fish in the diet. Steps should be taken to reduce the impact of mercury emissions on North Carolina's waterways and to heighten awareness of safe fish consumption habits.
- A better understanding of the quantitative relationship between atmospheric mercury emissions and water quality and the potential impact of emission regulations will rely on a detailed survey of mercury levels and relevant ecosystem characteristics in North Carolina waters. Pursuing this information may also help to identify areas that should be targeted for exposure mitigation. We believe these efforts should be supported.

You will find several attached documents providing much greater detail on the aforementioned elements of our mercury review. We hope this information is helpful to you and your agency in dealing with future actions related to atmospheric mercury emissions. We have enjoyed this opportunity to work with staff of the Divisions of Air and Water Quality and the NC Department of Health and Human Services on this important issue. On behalf of all the members of the SAB, I thank you for providing us this opportunity to contribute to public health protection in North Carolina.

Cc: Alan Klimek, Director, Division of Air Quality
Kerr T. Stevens, Director, Division of Water Quality
Marion Deerhake, Chair, Air Quality Committee