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BUILDING A SCIENTIFIC FOUNDATION FOR SOUND ENVIRONMENTAL DECISIONS

ECOLOGICAL
RESEARCH PROGRAM

EPA SCIENTISTS USE MODELS TO MONITOR MERCURY REDUCTION

Issue:

The U.S. Environmental Protection Agency issued the 2005 Clean Air Mercury Rule to reduce mercury emissions from coal-fired power plants, making the United States the first country to regulate mercury emissions from utilities.

The health effects depend on many factors, including the form of mercury, amount and manner of exposure, and age of the individual. Mercury can cause impaired neurological problems in fetuses, infants, and children.

Science Objective:

Scientists in the U.S. Environmental Protection Agency's Office of Research and Development have developed a series of mathematical models that allow us to understand the way mercury is transported and how long it remains in the environment. These models are being used to monitor mercury reduction efforts and gauge how the interventions are affecting potential human exposure. Each ecosystem responds to the presence of mercury differently. For that reason, different models are needed to assess and monitor mercury reduction efforts.

Application and Impact:

Mercury models developed by EPA scientists are being used to gauge the effectiveness of efforts to reduce mercury emissions. The models are being applied in numerous case studies including a research project at Lee Dam, along the Cheyenne River Basin in central South Dakota. Several different models were employed at this site to produce a comprehensive mercury analysis.

For example, using one type of model, researchers predicted future mercury levels for a species of fish, the Northern Pike. Using another type of model, scientists predicted mercury levels in lake water at the site under various scenarios. This model is able to account for changes in water flow, mercury chemistry, burial and release of mercury within the sediments, and a reduction in nearby industrial output of mercury.

References:

Knightes, C. D. and Ambrose, R. B., Jr. Development of an Ecological Risk Assessment Methodology for Assessing Wildlife Exposure Risk Associated with Mercury-Contaminated Sediments in Lake and River Systems. U.S. Environmental Protection Agency, EPA/600/R-06/073, 2006.

Regulatory Impact Analysis for the Clean Air Mercury Rule. Chapter 3: Ecosystem Scale Modeling for Mercury Benefits Analysis, Appendix A., U.S. Environmental Protection Agency, EPA/452/R-05/003, 2005.

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