

VARIABILITY OF BACKGROUND
MERCURY LEVELS AND CHARACTERIZATION OF
CONTAMINANT MERCURY SOURCES IN
ADIRONDACK LAKE SEDIMENT CORES

By

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ABSTRACT

Gagne (2006) analyzed sediment cores from eight Adirondack lakes and found “background” mercury concentrations ranging from 110 to 270 ppb. This study was initiated to investigate possible explanations for this variation. Percent organic matter and diatom silica content were measured on individual background sections of all eight cores.

The organic fraction of the sediment comprised ~30 to 50 % of the mass of background sections. Regression of organic matter content versus mercury concentration indicated that >90% of the total mercury was associated with this fraction. The diatom silica fraction comprised ~15 to 60% of the mass of the background samples and was assumed to contain negligible mercury. Data from soil cores was used to approximate a residual-mineral background concentration of 30 ppb which was consistent with analysis of a “diatom free” sediment core and representative of the Adirondack bedrock source.

The source of contaminant or “excess” mercury was characterized by analyzing for other trace metals including Pb, Zn, Cr and Sn. A major potential source of mercury to the Adirondack, atmospheric deposition of emissions from coal-fired power plants in the Ohio valley, has not been strongly associated with emissions of other trace metals, particularly lead. In five of the seven lakes excess mercury showed a strong correlation ($R^2 > 0.9$) with excess lead and a moderately strong correlation ($R^2 > 0.7$) was seen in all lakes. This would suggest a dominant “non-coal” source of mercury to the lakes. In addition, strong correlations were seen between Pb, Zn and Cu. Nearby mining and smelting operations are a potential source of the trace metals and warrants further investigation.