

The Puzzle of Drastic Reduction of Point Source Emissions and Continuing High Deposition of Mercury in Florida

N.J. Themelis

Department of Earth and Environmental Engineering,
Earth Engineering Center, Columbia University
New York City, NY 10027 (njt1@columbia.edu)

ABSTRACT

This report shows that the combined emissions of mercury from major point sources of mercury in Florida decreased from about 4.8 short tons in 1994 to 1.3 tons in recent years. A similar reduction of mercury emissions was reported by Florida DEP for south Florida where the Everglades Park is located: Point sources of emissions decreased from a high of 3.4 short tons (3,100 kg) of mercury in 1991 to 0.22 tons (204 kg) in 2000. The Florida DEP study of the Everglades also showed that the mercury concentrations in largemouth bass and in great egret nestlings decreased by a factor of six between 1991 and 2000.

On the other hand, our analysis of 330 sets of weekly mercury deposition data, obtained by the Everglades station of the national Mercury Deposition Network (MDN) showed that the annual average deposition in the Everglades did not change significantly from December 1995 to January 2004. Two other interesting findings were that 73% of the total mercury deposition during those eight years occurred in the high precipitation season, between May and October; and that 40% of the weekly samples taken during this eight-year period represented only 3.8 % of the recorded total deposition of mercury.

This paper examines the reasons why the substantial decrease of local and regional point sources of mercury emission has not affected substantially the local deposition rates. A likely answer is that climatic conditions in Florida,

associated mainly with the warmer months and higher rates of precipitation and evaporation, have a large effect on a) re-emission of previously deposited mercury and b) co-precipitation of global mercury from the atmosphere. This may also explain why Florida, where the present annual rate of mercury emissions from coal-fired power plants (in kilograms per square kilometer) is one fifth that of Pennsylvania, has mercury deposition rates that are twice those reported by MDN for Pennsylvania.

The author: **Nickolas Themelis** is Stanley-Thompson Professor of Chemical Metallurgy and Director of the Earth Engineering Center of Columbia University. He is member of the National Academy of Engineering and of the Solid Wastes Processing Division of ASME. Prof. Themelis is Chair of the Waste-to-Energy Research and Technology Council (WTERT).

Introduction

As mercury emissions of waste-to-energy plants have decreased from nearly 90 tons in the eighties to less than one ton in 2003, mercury emissions from coal-fired boilers have attracted the attention of EPA. This subject is discussed in another paper in these Proceedings (Themelis and Anid, ref 1). In its arguments against the imposition of MACT regulations to the utilities, the Electric Power Research Institute (2) and others have focused their arguments on Florida and on the differences between mercury emissions of coal-fired and waste-to-energy power plants. It is interesting that Florida became the center of discussion on mercury emissions from coal-fired power plants