TITLE: The distribution of mercury in a forest floor transect

LOCATION: North Central, North East, and Interior West FIA Regions

DURATION: Year 1 of 2-year project **FUNDING SOURCE:** Fire Plan

PROJECT LEADER:
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PROJECT OBJECTIVES:

A spatial model of the mass of forest floor mercury will be constructed along a transect spanning the northern coterminous United States.

JUSTIFICATION:

a. Linkage to FHM Detection Monitoring-- the need for the project should arise from an analysis of FHM survey data and/or Forest Inventory and Analysis (FIA) plot data relative to fire issues stated above or found in the National Fire Plan.

Support from the Evaluation Monitoring (EM) component of Forest Health Monitoring (FHM) is needed because current FIA Phase 3 sampling of soils does not include analysis for mercury.

b. Significance in terms of the geographic scale;

A transect across the northern coterminous United States was selected for two major regions. 1) the investigators have relatively easy access to data in these data; the two soils Indicator Advisors are located in the North Central and Interior West regions. 2) Much of the deposition of mercury is believed to be related to industrial emissions which generally flow into the Northeastern region. The Interior West region should be relatively unaffected and the North Central Region should provide a transition.

c. Biological impact and/or political importance of the issue related to fire;

Forest fires release mercury into the atmosphere when the forest floor is consumed while mercury concentration in the mineral soil may be unaffected (Amirbahman and others 2004). As industrial emissions come under increasing regulation, the contribution of forest fire to the mercury budget is an increasingly significant unknown.

d. Feasibility or probability that the project will be successfully completed within 1-3 years, with some immediate products in the first year and each year thereafter.

New data collection is not required. Forest floor samples are collected as part of the Phase 3 sampling scheme. This project will fund additional analysis of archived forest floor samples and presentation of the results at national meetings.

DESCRIPTION:
a. Background:

Upland soils are sinks for mercury (Grigal and others 2000; Kolka and others 2001); some of these sink properties may be due to storage or volatilization (Grigal and others 2000; Kolka and others 2001). Climatic factors influencing microbial activity may also increase retention (Fleck and others 1999).

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b. Methods:

Samples of the forest floor are collected as part of Phase 3 sampling in the FIA program.

These samples are analyzed for a suite of nutrients and other properties (e.g., total carbon, nitrogen, soil pH). Once the laboratory analysis is complete, the forest floor samples are stabilized and archived in the Grand Rapids lab.

We propose to use a remove a small part of the archived sample (approximately 0.1 g) and determine the mercury concentration. This concentration data will be combined with the total mass and depth of the forest floor to estimate the mass of mercury stored in the forest floor.

c. Products:

The major product will be a spatial model and map of forest floor mercury for a transect across the northern coterminous United States.

d. Schedule of Activities:

Fall & Winter 2004-05	Obtain samples
Spring, Summer, Fall, Winter 2005-06	Laboratory analysis for mercury
Winter & Spring 2006	Create spatial models of mercury storage
Spring & Summer 2006	Prepare posters and publications

e. Progress/Accomplishments:

Cooperative funding has been secured by the US Geological Survey.

COSTS:

The budget included below is for the entire project duration.

	Item	Requested FHM EM Funding	Other-Source Funding	Source
YEAR				
Administration	Salary	0	0	
	Overhead	0	0	
	Travel	4 000	0	
Procurements	Contracting	19 000	4 000	USGS
	Equipment	0	0	
	Supplies	0	0	
Total		23 000	4 000	

REFERENCES:

Amirbahman A, Ruck PL, Fernandez IJ, Haines TA, Kahl JS. 2004. The effect of fire on mercury cycling in the soils of forested watersheds: Acadia National Park, Maine, U.S.A. Water, Air, and Soil Pollution 152(1-4):313-331.

Fleck JA, Grigal DF, Nater EA. 1999. Mercury uptake by trees: an observational experiment. Water, Air, and Soil Pollution 115(1-4):513-523.

Grigal DF, Kolka RK, Fleck JA, Nater EA. 2000. Mercury budget of an upland-peatland watershed. Biogeochemistry 50(1):95-109.

Kolka RK, Grigal DF, Nater EA, Verry ES. 2001. Hydrologic cycling of mercury and organic carbon in a forested upland-bog watershed. Soil Science Society of America Journal 65(3):897-905.