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Executive Summary of the Little Transverse Bay Cement Kiln Dust Release Site Mercury Flux Model Protocol

Site Name: Bay Harbor Cement Kiln Dust Site
Location: Bay Harbor, Michigan

Purpose

This document was prepared for the Bay Harbor Regional Stakeholders Group and represents an executive summary of the April 16, 2009 Mercury Flux Model Protocol for the Little Traverse Bay (LTB) Cement Kiln Dust (CKD) Release Site near Petoskey, Michigan.

Background

The LTB CKD Release Site Mercury Flux Model Protocol report (Hg Model Report) summarizes the protocol for modeling mercury (Hg) fluxes into Lake Michigan from both the East CKD Area (also known as East Park) and the West CKD Area, Seep 2 CKD Area, and Seep 1 CKD Area (referred to as the Development Area for this report) of the Little Traverse Bay CKD Release Site, near Petoskey, Michigan.

Protocol

The Hg Model Report protocol uses well and lake level data, combined with measurements of Hg concentrations in the well water, to estimate the amounts of mercury released to the lake from the Site (the East CKD Area and the Development Area).

Estimates of Hg flux are based on two factors: (1) the rate of water flow into the lake, and (2) the amount of Hg contained in the flowing water (i.e., Hg concentrations). Both factors are determined though well sampling. The Hg Model Report summarizes the specific field methods used in the collection of data, and describes how these data are used to calculate the total Hg flux.

The rate of water flow is governed by the *hydraulic conductivity*, which describes how readily the water can flow through the ground, the *hydraulic gradient*, which is the slope of the water table and represents the driving force for the flow, and the *area of flux boundary*, which is the area through which the water flows. The Hg Model Report summarizes the determination of estimates of these parameters as follows:

- ***Hydraulic conductivity****:* Results from mini-pump tests performed on all 50 shoreline wells using an approved EPA Work Plan (approved on April 7, 2007) are forwarded to EPA for

review. In individual wells where mini-pump tests are unsuccessful, a written proposal to develop a site-specific correction factor to adjust the hydraulic conductivity value using slug test data shall be submitted to EPA for review and acceptance.

- ***Hydraulic gradient****:* Hydraulic gradients associated with each well are defined as the differences in water table and lake elevations, divided by horizontal distance between the well and lake. An on-site stilling well installed at Village Harbor will be used to record lake elevations. To account for short-term fluctuations in lake and well water levels, the use of continuous 24-hour records establishes mean levels. However, such continuous 24-hour monitoring is not required for wells where the water table is more than 0.5 foot higher than the lake surface.

- ***Area of flux boundary****:* Cross-sectional areas for the water flow are established by the lateral spacing of wells and the vertical spacing of the well screens.

The rate of water flow is calculated though discrete areas, with parameters for each of these areas (i.e., hydraulic conductivity, hydraulic gradient and area of flux) defined based on the methodology described above. Flow rates are multiplied by the well water Hg concentrations measured in each discrete area to determine the Hg fluxes for each discrete area. These fluxes are then summed to derive the total Hg flux entering the lake. This discrete approach is needed because Hg concentrations and water flow rates vary spatially over the entire monitored area, which requires the large area to be broken down into smaller, discrete areas before being reaggregated to compute the total flux.