



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

FEB 21 2007

REPLY TO THE ATTENTION OF:
(AR-18J)

Richard Nelson, Field Supervisor
Rock Island Illinois Field Office
United States Fish and Wildlife Service
4469 48th Avenue Court
Rock Island, Illinois 61201

Dear Mr. Nelson:

The United States Environmental Protection Agency (U.S. EPA) is transmitting the attached memorandum dated January 29, 2007, from Stephen Zemba of Cambridge Environmental Inc. to Timothy Weible of Lafarge Midwest, Inc. The U.S. EPA would like to include this document as an addendum to our Biological Evaluation for the Lafarge Midwest, Inc. Joppa Cement Plant dated October 12, 2006. The attached document provides an analysis of the decrease in mercury emissions that will result from the planned project. The U.S. EPA's conclusion that the proposed construction and operation of this facility may affect, but is not likely to adversely affect, any of the threatened and endangered species remains unchanged. The U.S. EPA respectfully requests United States Fish and Wildlife Service concurrence on this determination.

Sincerely yours,

A handwritten signature in black ink that reads "Pamela Blakley".

Pamela Blakley, Chief
Air Permits Section

Attachment

cc: Laurel Kroak, IEPA

MEMORANDUM

To: Timothy Weible
From: Stephen Zemba, Ph.D., P.E.
Subject: Supplemental mercury modeling
Date: January 29, 2007

I write to provide estimates of the worst-case concentrations of mercury in environmental media due to emissions from Lafarge's Joppa facility. I have done analyses for the facility in both its existing and proposed configurations, building upon the modeling study described in my previous memorandum to you dated November 29, 2006. As you know, the proposed changes to the facility will decrease mercury emissions overall. These supplemental calculations are designed to (1) estimate the anticipated reductions in environmental mercury impacts due to changes in Lafarge's emissions and (2) compare "before and after" increments to existing background conditions and ecological benchmark levels.

Table 1 summarizes my additional calculations. Mercury emissions are expected to decrease by a bit more than 40% from present conditions, but the projected decrease in the worst-case incremental mercury concentration in air at ground level is expected to be even greater—an 88% reduction relative to the present facility's emissions.¹ The estimated worst-case incremental concentration in air for future facility emissions (0.043 ng/m³) represents 2½% of the existing U.S. EPA estimate of the background concentration of mercury (1.7 ng/m³).

The expected decrease in incremental mercury concentration in soil at the worst-case location (Max. pt., Table 1) scales with the anticipated change in emissions. Compared with the typical background concentration of mercury in soil (0.05 mg/kg), the soil model predicts that a present worst-case increment larger than background (0.23 mg/kg) will decrease to a future increment smaller than background (0.027 mg/kg). The larger mercury increments to soil than to air (relative to background levels) is probably related to the nature of the soil model, which conservatively assumes that mercury deposits readily into a shallow soil layer where it remains and accumulates over time. I also note that the mercury increments to both air and soil are made at the location at which the highest facility-related impacts are anticipated. If these increments are averaged over area a larger area around the facility, they are considerably smaller, as indicated in the soil estimates in Table 1 labeled "< 2 km" and "< 10 km", which represent area averages over 2 and 10 km (on a side) square areas centered around the facility.

¹ The percentage change in the worst-case ground-level concentration is larger than the change in emissions because the modified facility will have higher stacks, allowing emissions to decrease to a greater degree before reaching ground-level.

Table 1 Estimated increments of environmental mercury due to Lafarge facility emissions

Environmental Medium		Background (a)	Present facility emissions	Future facility emissions (with proposed modifications)	Ecological Benchmark Concentration (b)
Emissions (tons/year)		—	0.60	0.35	—
Air (ng/m ³) (c)		1.7	0.36	0.043	—
Surface water (ng/l) (d)		6.6 total 1.5 dissolved	0.22	0.13	1.3
Soil (mg/kg) (e)	Max. pt.	0.05	0.23	0.027	0.1
	< 2 km		0.030	0.0014	
	< 10 km		0.024	0.0040	
Sediment (mg/kg) (d)		0.1	0.0015	0.00087	0.174

- Notes:
- (a) Background level in air from the U.S. EPA's 1999 National Air Toxics Assessment (<http://www.epa.gov/ttn/atw/nata1999/>). See Table 2 for surface water background (note the dissolved background value in water reflects the detection limit for most samples). Soil background typical for rural Illinois soil (<http://www.ilga.gov/commission/jcar/admincode/035/03500742ZZ9996agR.html>). Sediment background provided by U.S. EPA Region 5 (Rachel Rineheart, personal communication).
 - (b) See Table 3.
 - (c) Modeled values reflect the highest mercury concentrations in air predicted at any location beyond the facility fence line.
 - (d) The surface water and sediment models assume that all facility emissions enter and mix into the Ohio River, as described in my November 29, 2006 memorandum.
 - (e) The soil model, described more fully in my November 29, 2006 memorandum, assumes that mercury deposits into (and remains within) a shallow (1 cm) soil layer continuously over a 30-year period.

The modeled facility-related increments to surface water and sediment concentrations reflect the same degree of reduction anticipated for facility emissions, as the screening-level model conservatively assumes that all emissions mix into the Ohio River. The projected incremental mercury concentrations are significantly smaller than representative background levels in surface water and sediment for both the existing and anticipated future cases.

Comparisons to potentially relevant ecological benchmark concentrations for surface water, soil, and sediment provide several insights. If traditional U.S. EPA risk assessment methods are followed in which the facility-related increments alone are compared to benchmarks, then all predicted concentrations based on *future* facility emissions are smaller than benchmarks. For *present* facility emissions, the worst-case modeled mercury increment to soil (0.23 mg/kg) exceeds its benchmark concentration (0.1 mg/kg). If the projected facility increments are

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summed with background and compared to benchmarks, surface water is the only media for which the future case indicates an exceedance of a benchmark, and the exceedance is predominantly the result of the existing background concentration in surface water. The benchmark concentration of 1.3 ng/l was developed by the state of Michigan as a water quality standard designed to protect wildlife. The background mercury concentration in the Ohio River of 6.6 ng/l is roughly five times the benchmark concentration. The projected increment of 0.13 ng/l due to future emissions from the Lafarge facility – derived under the absolute worst-case assumption that all emissions enter the river – represents a 2% potential increase to the existing background.

This memo documents the essential elements of my analyses, and I realize that many details have not been provided. Consequently, please do not hesitate to write or call with if additional information would be of use in your review of this material.

Table 2 Mercury concentrations measured in Ohio River water near Paducah, KY
(Lock and Dam 52, river mile 938.4)
Source: <http://www.orsanco.org/rivinfo/pubs/qualitymonitor.asp>

Date	Mercury concentrations (ng/l)	
	Dissolved	Total
9/20/2005	<1.5	1.6
7/12/2005	<1.5	<1.5
5/24/2005	<1.5	5.5
3/21/2005	<1.5	5.2
1/27/2005	<1.5	7.3
11/16/2004	<1.5	9.2
9/8/2004	<1.5	<1.5
7/6/2004	<1.5	2.6
5/24/2004	<1.5	5.6
3/8/2004	<1.5	13.9
1/27/2004	<1.5	12.7
11/24/2003	<1.5	5.7
9/22/2003	<1.5	7.1
7/14/2003	<1.5	7.9
5/13/2003	<1.5	4.6
3/10/2003	1.9	9.4
1/13/2003	<1.5	12.7
11/19/2002	<1.5	5.6
Average (non-detects at detection limit)	1.5	6.6

Table 3 Potentially Relevant Ecological Benchmarks for Mercury

Environmental Medium	Ecological Benchmark Concentrations	References and Notes
Surface water	1.3 ng/l	Based on wildlife protection Region 5 Ecological Screening Level (a) and Illinois Water Quality Criteria (b)
Soil	0.1 mg/kg	Region 5 Ecological Screening Level (a) Based on invertebrates (earthworms)
Sediment	0.174 mg/kg	Region 5 Ecological Screening Level (a)

Notes: (a) <http://www.epa.gov/reg5rcra/ca/edql.htm>
(b) <http://www.ipcb.state.il.us/documents/dsweb/Get/Document-33354/>