

March 16, 2009

Dr. Stephen Moss
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Re: Letter Report of Dioxin Testing performed on the Brady Brook Bridge located near the intersection of Aikendale and Ravine Road, Town of Pawling, Dutchess County, New York
ESI File: MP06173.50

Dear Dr. Moss:

This Letter Report of Dioxin Testing (Letter Report) documents an environmental investigation conducted by Ecosystems Strategies, Inc. (ESI) to determine the presence or absence of dioxins in the material which composes the above-referenced bridge. Specifically, this Letter Report provides an overview of current knowledge pertaining to dioxins and their associated health effects, risks, and environmental concerns; provides a summary of ESI's sample collection methodology; documents the results of laboratory analysis; and provides conclusions based on the resulting analytical data.

Overview

The above-referenced bridge is constructed of solid wood beams treated with pentachlorophenol (PCP) as a wood preservative (i.e., antifungal agent). Chemicals known as dioxins and furans, which are known byproducts of the PCP production process, are typically found in PCP treated wood.

The term "dioxin" broadly refers to a family of chlorinated compounds that are categorized into three related chemical groups: polychlorinated dibenzo-p-dioxins (PCDDs), polychlorinated dibenzofurans (PCDFs), and polychlorinated biphenyls (PCBs). This investigation is concerned only with PCDDs and PCDFs as they pertain to PCP treated wood and are generally referred to hereafter as dioxins.

Dioxins, the most notable of which is 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD), have conclusively been linked with deleterious health effects in humans and animals, and are characterized by the United States Environmental Protection Agency (USEPA) as "likely" human carcinogens.

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In addition to cancer, dioxins are known reproductive toxins which have been linked to a myriad of developmental disorders, decreased fertility and sperm count, endometriosis, and lowered testosterone. Dioxins have also been linked with immune system suppression, skin disorders, lung problems, and diabetes, among many other things. A medical doctor/toxicologist will be more able to discuss the complete deleterious health effects of dioxins in humans.

Dioxins are not easily dissolved in water and are highly reactive with other organic compounds. As such, these compounds can travel great distances throughout the environment, and have a tendency toward bioaccumulation. Dioxins are extremely persistent, both within the body and throughout the environment, and may take years to be broken down or expelled, or otherwise dissipate from an area impacted by a release.

Sample Collection Methodology

Three composite wood samples were collected from the bridge by ESI personnel on January 29, 2009: sample B-1 was collected from the vertical post at the southwest corner of the bridge, B-2 was collected from the post at the northwest corner, and B-3 Comp was collected from the posts at the northeast and southeast corners. A Fieldwork Map depicting approximate sample locations is included as Attachment A.

All samples were collected by ESI in a manner consistent with acceptable collection and decontamination protocols. Field personnel wore dedicated, disposable gloves at all times during sample collection and each sample was collected using properly decontaminated 1-inch diameter spade drill bits. Samples were collected by drilling into the vertical beams at each end of the bridge, collecting the resulting wood shavings into decontaminated stainless steel bowls, and consolidating the material directly into glassware provided by the laboratory. All drill holes were filled and sealed with wood putty upon completion of sample collection.

All sample containers were placed in a cooler immediately after sample collection and maintained at cold temperatures (4°C) prior to transport to the testing laboratory. Samples were transported on February 2, 2009 to Test America Laboratories, Inc., a New York State Department of Health-certified laboratory (ELAP Certification Number 10602) for chemical analysis. Appropriate chain-of-custody procedures were followed.

Terminology

Action Level

An action level is the concentration of a particular dioxin compound above which action should be considered in order to minimize or prevent exposure. No specific action levels currently exist for dioxins in solids, such as wood; however, the Agency for Toxic Substances and Disease Registry (ATSDR) has established an action level of 1 part per billion (ppb) of TCDD for exposure to that compound in residential soils. That action level may be loosely used here as a means of assessing potential exposure issues associated with dioxins in wood.

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Toxicity Equivalent and Toxicity Equivalent Factors

The toxicity equivalent (TEQ) concentration of a dioxin compound is calculated by multiplying the detected concentration or exposure level of the compound by its toxicity equivalent factor (TEF), as determined by the ATSDR and presented in the Dioxin and Dioxin-Like Compounds in Soil, Part 1: ATSDR Interim Policy Guideline, dated August 21, 1997. The TEF system compares the relative toxicity of an individual dioxin compound to that of TCDD, the most toxic dioxin. The calculated TEQ concentration of each dioxin compound may be compared to the established TCDD action level of 1 ppb.

Sample Analysis and Results

Samples B-1, B-2, and B-3 Comp were submitted for analysis of dioxins utilizing USEPA Method 8290. The 8290 method provides a scan resulting in a total of 17 dioxin compounds, which are listed in Table 1, below.

Table 1: Dioxins Detected Utilizing USEPA Method 8290

2,3,7,8-Tetrachlorodibenzo-p-dioxin
2,3,7,8-Tetrachlorodibenzofuran
1,2,3,7,8-Pentachlorodibenzofuran
2,3,4,7,8-Pentachlorodibenzofuran
1,2,3,4,7,8-Hexachlorodibenzofuran
2,3,4,6,7,8-Hexachlorodibenzofuran
1,2,3,7,8,9-Hexachlorodibenzofuran
1,2,3,4,6,7,8-Heptachlorodibenzofuran
Octachlorodibenzofuran
1,2,3,7,8-Pentachlorodibenzo-p-dioxin
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin
Octachlorodibenzo-p-dioxin
1,2,3,6,7,8-Hexachlorodibenzofuran
1,2,3,4,7,8,9-Heptachlorodibenzofuran
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin

A summary of the results of that analysis is discussed below and provided in Table 2 of Attachment B. A copy of the laboratory data report is provided as Attachment C.

With the exception of TCDD, all dioxins were detected in each sample. Peak detected dioxin concentrations included octachlorodibenzo-p-dioxin in B-3 Comp at 25,000 ppb, octachlorodibenzodifuran in B-3 Com at 4,500 ppb and 1,2,3,4,6,7,8 heptachlorodibenzo-p-dioxin in B-3 Comp at 1,500 ppb.

All detected dioxin concentrations were used to calculate the resulting TEQ concentrations utilizing the ATSDR TEFs, and the results are presented in Table 3 of Attachment B. When compared to the action level of TCDD (1 ppb), elevated TEQ concentrations of

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octachlorodibenzofuran (OCDF) and octachlorodibenzo-p-dioxin (OCDD) were evident in all samples (peak OCDF concentration: 4.5 ppb in B-3 Comp, average OCDF concentration: 2.6 ppb, peak OCDD concentration: 25 in B-3 Comp, average OCDD concentration: 17 ppb).

Conclusions

With the exception of TCDD, all dioxins were detected in each sample with peak total dioxin concentrations of over 26,500 parts per billion present at B-3. Documents reviewed by this office confirm that dioxin concentrations at this level may represent a threat to public health and the environment.

When the calculated TEQ concentrations were compared to the TCDD action level, exceedances of OCDF and OCDD were evident in each sample. Given the known toxicity of dioxins and furans, ESI concludes that the presence of these compounds in the wood used at this bridge presents a potential threat to human health and the environment. Furthermore, the existence of calculated TEQ concentrations that exceed the action level for TCDD, the most toxic dioxin, suggest the need for action to limit exposure to those dioxin compounds.

The potential exists for dioxins and furans to be introduced into the streambed, into fish and, under defined circumstances, into humans as a result of these compounds being present in such elevated levels in the bridge. Such introduction may have already occurred, resulting in chronic exposure of dioxins to aquatic life. Removal of the bridge will, in the opinion of this office, substantially reduce this potentiality. It will not however, undo any impacts from past releases.

Please review this [Letter Report](#) and contact me at (845) 452-1658 should you have any questions.

Sincerely,

ECOSYSTEMS STRATEGIES, INC.



Paul H. Ciminello
President

PHC:al:cpr:ndc

Attachments:

- A – Fieldwork Map
- B – Data Tables
- C – Laboratory Results

cc: M. Pascazi, Esq.
File