

October 2001
(June 2002 revision)

Greenpoint – Tittabawassee River Dioxin Study Area
Phase I Sampling Study
Report

Summary

Soil samples collected as part of a wetland mitigation project identified elevated levels of dioxin and dibenzofuran compounds (collectively referred to as dioxin) in a farm field located in the Tittabawassee River floodplain near its confluence with the Saginaw River. The samples, collected during April 2000, identified concentrations of dioxin as high as 2,199 parts per trillion (ppt) toxic equivalent units (TEQ). The dioxin concentrations were almost 25 times the residential direct contact criteria of 90 ppt established under the provisions of Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (Part 201).

Concern over the public health and environmental implications of the sample results prompted the Department of Environmental Quality - Environmental Response Division (ERD) to develop and implement a phased soil sampling and assessment program in the Tittabawassee River floodplain. During the period from December 2000 through June 2001, the ERD collected soil samples from five locations in the Tittabawassee River floodplain between the Center Road Bridge in Saginaw Township, Saginaw County, and the Saginaw River confluence. A total of thirty-four (34) soil samples were collected at depths ranging from surface samples to fifteen (15) inches below the surface. Analytical results identified concentrations ranging from 39 to 7,261 ppt TEQ. Only five of the thirty-four samples contained TEQ concentrations less than the Part 201 residential direct contact criteria (RDCC) of 90 ppt TEQ. Based on the Phase I sampling results, and the significant residential and recreational use within the Tittabawassee River floodplain area, the ERD is proceeding with preparation and implementation of a Phase II sampling program focusing on selected areas upstream of the Phase I sampling program.

Discussion

During April 2000, soil samples were collected to ensure that the proposed location of a wetland mitigation project did not contain contaminant concentrations that would pose an unacceptable risk to terrestrial and aquatic organisms that would be expected to inhabit the new wetland resource. A sampling grid was established over the entire sample area and surface soil was composited from nine (9) locations located from within each grid area. Two of the composite samples randomly selected for dioxin analysis identified concentrations of 1,474 and 2,199 ppt TEQ were identified (Table 1).

Although agreement was eventually reached on the management of the dioxin impacted soil such that environmental and human direct contact risks were adequately addressed, concerns remained regarding the source for the dioxin and the potential for other locations within the Tittabawassee River floodplain area to be similarly contaminated. In response, the ERD developed a Phase I soil sampling program that would achieve the following:

- Confirm the wetland mitigation site sampling results.
- Identify whether other areas of the Tittabawassee River floodplain in the vicinity of the wetland mitigation site contain dioxin above Part 201 residential direct contact criteria.
- Generate sufficient information to make determinations regarding the necessity of implementing a Phase II soil investigation within the Tittabawassee River floodplain.

During December 2000, ERD staff collected and analyzed five discrete surface soil samples from within the wetland mitigation site. Concentrations of dioxin ranged from 338 to 7,261 ppt TEQ confirming the original sample results. Based on these results, upstream locations were selected to assess whether other areas of the Tittabawassee River floodplain contained dioxin above the RDCC. Soil samples were eventually collected from the following locations:

- The Former National Plate Glass site of environmental contamination (NPG Facility), located one mile upstream along the north shore of the river. Soil samples were collected and analyzed during December 2000.
- A forested area within the Shiawassee National Wildlife Refuge, located one and one-half miles upstream along the south bank of the river (Refuge-Forest). Soil samples were collected and analyzed during May 2001.
- An open field area within the Shiawassee National Wildlife Refuge, located slightly less than one and one-half miles upstream along the south bank of the river (Refuge-Field). Soil samples were collected and analyzed during June 2001.

The results of the soil sampling are listed in Table 1 of this report.

Four discrete surface soil samples were collected near the NPG Facility. Two were collected upstream of the NPG Facility from an adjacent farm field and two downstream from an adjacent golf course. Dioxin concentrations above the RDCC were identified, with concentrations ranging from 180 to 424 ppt TEQ upstream, and 2,529 to 2,588 ppt TEQ downstream.

Five locations were sampled at two depths from within the Refuge-Forest area. Soil samples were collected from the 3-6 inch strata and the 8-12 inch strata at each sample location, resulting in a total of ten soil samples that were analyzed for the presence of dioxin. Five of the ten samples contained dioxin concentrations above the RDCC. Sample results for the 3-6 inch strata ranged from 35 to 134 ppt TEQ, and for the 8-12 inch strata ranged from 58 to 1,055 ppt TEQ.

Five locations were sampled at three depths from within the Refuge-Field area. Soil samples were collected from the 0-3 inch, 3-6 inch, and 12-15 inch strata, resulting in a

total of fifteen soil samples that were analyzed for the presence of dioxin. Thirteen soil samples contained dioxin concentrations above the RDCC. Sample results for the 0-3 inch strata ranged from 386 to 765 ppt TEQ, for the 3-6 inch strata from 424 to 663 ppt TEQ, and for the 12-15 inch strata from 58 to 275 ppt TEQ.

Recommendations

The Phase I sampling program has identified that elevated levels of dioxin are consistently found above the Part 201 RDCC within the lower Tittabawassee River floodplain near the river's confluence with the Saginaw River. Dioxin concentrations, and have been identified as high as 80 times the RDCC. Upstream of the Phase I sample area human use of the floodplain increases. Residential properties are located within the floodplain, the majority located within James, Thomas and Saginaw Townships (Saginaw County). Agricultural operations and public park lands are also located within the floodplain.

It is important to ensure that the public health is being properly protected for the human activities occurring within the floodplain. Therefore, it is recommended that the ERD proceed with initiation of a Phase II sampling program within the floodplain. The objectives of the Phase II sampling program are the following:

- Identify whether dioxin has come to be located throughout the Tittabawassee River floodplain.
- Identify whether dioxin contamination in floodplain soil throughout the Tittabawassee River floodplain is consistently above Part 201 RDCC criteria.
- Identify if dioxin contamination found in floodplain soil varies between upstream and downstream locations.
- Begin to make determinations regarding the source(s) for the observed dioxin concentrations.
- Make determinations regarding the need to implement a Phase III property specific soil sampling and assessment program.

Phase II soil samples would be collected from selected public properties located along the fifteen mile stretch of the Tittabawassee River extending from the Midland County line downstream to Center Road in Saginaw Township.

Updated by the ERD June 2002

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Table 1

Samples were analyzed by Triangle Laboratory, Durham, N.C. using EPA Method 8290
All sample results reported in pg/g (ppt) TEQ using EPA TEF 1989

GM farm field (GM collected composite surface soil samples from the farm field) April 2000	
E3A	1474 ppt TEQ
C1A	2199 ppt TEQ

GM farm field (ERD collected discrete surface soil samples from farm field to verify April 2000 results) December 2000	
DX#1	393 ppt TEQ
DX#2	7261 ppt TEQ
DX#3	6256 ppt TEQ
DX#4	3607 ppt TEQ
DX#5	338 ppt TEQ

LA Davidson (ERD collected discrete surface soil samples) May 2001	
From the farm field west of the LA Davidson site	
DX1 west	424 ppt TEQ
DX2 west	180 ppt TEQ
From the golf course east of the LA Davidson site	
DX3 east	2588 ppt TEQ
DX4 east	2529 ppt TEQ

USFWS Shiawassee Wildlife Refuge (ERD collected discrete soil samples from wooded area) May 2001			
approximately < 6"		approximately < 12"	
GP1-6	39 ppt TEQ	GP1-12	58 ppt TEQ
GP2-6	129 ppt TEQ	GP2-12	356 ppt TEQ
GP3-6	59 ppt TEQ	GP3-12	57 ppt TEQ
GP4-6	35 ppt TEQ	GP4-12	164 ppt TEQ
GP5-6	134 ppt TEQ	GP5-12	1055 ppt TEQ

USFWS Shiawassee Wildlife Refuge (ERD collected discrete soil samples from upland, open area) June 2001					
0 - 3"		3 - 6"		12 - 15"	
SS1-3	386 ppt TEQ	SS1-6	589 ppt TEQ	SS1-12	58 ppt TEQ
SS2-3	765 ppt TEQ	SS2-6	424 ppt TEQ	SS2-12	275 ppt TEQ
SS5-3	392 ppt TEQ	SS5-6	539 ppt TEQ	SS5-12	245 ppt TEQ
SS6-3	586 ppt TEQ	SS6-6	552 ppt TEQ	SS6-12	113 ppt TEQ
SS7-3	485 ppt TEQ	SS7-6	663 ppt TEQ	SS7-12	68 ppt TEQ

DEQ residential direct contact criteria = 90 ppt (expressed as an equivalent concentration of 2,3,7,8-TCDD (TEQ))

Prepared by Bay City ERD staff, October 9, 2001

