Appendix H

Ecological Risk Evaluation Supporting Information

Development of Soil-Earthworm BAF for PCBs

A review of available published literature on earthworm accumulation of polychlorinated biphenyls (PCBs) from soil produced the list of studies shown below. The following criteria were used in selecting studies for developing the soil-earthworm BAF for PCBs:

- studies from the peer-reviewed literature were included;
- studies with terrestrial earthworms were included;
- studies that presented both soil and worm data, not just the BAFs; and,
- studies that presented "total" concentrations in soil and worm samples were included.

Studies presented in Sample et al (1998) were reviewed and included in this BAF calculation unless they did not meet the above criteria. Efroymson et al. (1996) and Jones et al. (1996) were the only two studies that were included in Sample et al. (1998) but not included in this BAF calculation. These studies were not included because they were not in peer-reviewed literature and PCB concentrations were not presented as total PCBs. Had those studies been included, a lower BAF would have resulted (this information can provided upon request). In addition, tabulation errors of the PCB concentrations in soil and worms for the Kreis et al. (1987) study were found in Sample et al., (1998). The values listed in Appendix B of Sample et al. (1998) for Kreis et al. (1987) were lower than reported by Kreis et al. (1987) by three orders of magnitude, which would have resulted in a lower BAF had those values been used.

The relevant data from Sample et al. (1998) and studies that we identified in the literature were compiled (see plot and table below) and a regression was computed of the form:

$$\log[biota] = B0 + B1 \times \log[soil]$$

where:

$\log[biota]$	=	base 10 log of the chemical concentration in plant, soil invertebrate, or aquatic prey tissue (dry weight)
$B0$ and $B1$	=	empirically derived, chemical specific constants
$\log[soil]$	=	base 10 log of the chemical concentration in soil (dry weight)

The final relationship developed was as follows:

$$\text{Wet weight worm concentration: } \log[biota] = 0.1352 + 1.0347 \times \log[soil]$$

Worms were assumed to have an average moisture content of 84 percent (from U.S. EPA 1993), resulting in the following dry weight-corrected equation:

Dry weight worm concentration: $6.25\ (\log[biota] = 0.1352 + 1.0347 \times \log[soil])$

Summary statistics of the regression are also shown below.

List of Studies

Wågman et al. (1999), Environ. Tox. Chem. 18:1157–1163

- Examined PCB levels in three household composts and in worms (*Eisenia foetida*) naturally occurring in the composts (i.e., worms had potentially different resident times).
- Worms depurated for 48 hours before analysis.
- Measured PCB concentrations on a congener-specific and total-PCB basis. Total PCB concentrations (compost = dry weight, worms = wet weight):
  - 32 ng/g in Compost 1; 23 ng/g in worms
  - 120 ng/g in Compost 2; 129 ng/g in worms
  - 444 ng/g in Compost 3; 291 ng/g in worms.
- On a lipid and organic matter normalized basis, worms contained approximately 23 times more PCBs than compost.
  - Bioaccumulation factors (BAFs) were reported for six congeners (52, 101, 118, 138, 153, 180). Values ranged between 8 and 24 on a lipid and organic matter normalized basis.

Belfroid et al. (1995), Environ. Tox. Chem. 14:605–612

- Examined PCB levels in topsoil from a household waste dump and in earthworms (*Eisenia andrei*) exposed to that soil for 5–120 days.
- Worms depurated for 24 hours before analysis.
- Analyzed seven PCB congeners (101, 118, 138, 153, 156, 167, 180). Concentrations in soil ranged from 19.8 to 629 μg/kg, dry weight. Concentrations in worms ranged from 5.6 to 197 μg/kg (not specified as wet or dry weight).
- Biota-sediment accumulation factor (BSAF) values were calculated for each congener and reported three ways:

  - BSAF (g soil/g worm) ranged from 0.26 to 0.37
  - BSAF (g organic matter/g lipid) ranged from 5.3 to 7.4 (note that these values are much lower than Wågman reported for the same congeners)
  - BSAF (g OC/g lipid) ranged from 3.1 to 4.3.
- Since total PCB data were not presented, data from this study were not used to develop BAF for total PCBs.

Hendriks et al. (1995), Arch. Environ. Contam. Toxicol. 29:115–127

- Measured PCBs in the floodplain soils at two sites in the Rhine-Delta and in earthworms (*Lumbriculus rubellus*) collected at the same sites. Shrews, *Sorex araneus*, were also trapped and analyzed.
- Worms depurated for 24 hours before analysis.
- Measured PCB concentrations on a congener-specific and total-PCB basis. Total PCB concentrations (soil = dry weight, worms = lipid normalized):
  - Ochten: 200 μg/kg in soil; 3,900 μg/kg in worms
  - Gelderse Port: 1,000 μg/kg in soil; 1,000 μg/kg in worms.
- PCB residues in fat were on average 0.76 times greater than levels in organic matter. For congeners 52, 101, 138, and 153, the BAFs range between 0.66 and 1.2 at one site and 0.34 and 0.59 at the other site when normalized to lipid and organic matter. (Note that these values are much lower still than values that Belfroid and Wågman reported for the same congeners in their studies.)

Larsen et al. (1992), Intern. J. Environ. Anal. Chem. 46:149–162

- Prepared Askarel-spiked soil (150 μg/g) and measured PCBs in earthworms (*Lumbriculus rubellus*) exposed to the soil for 48 hours and in worms subsequently exposed to low-contaminated soil (1.5 μg/g) for 60 days.
- Worms depurated for 48 hours before analysis.
- Study measured 17 PCB congeners in soils and worms, and calculated equilibrium soil-to-earthworm bioconcentration factors (BCFs) for each congener. The study reports that BCFs ranged from 4 to 20, but it is not clear

from the write-up or tables what basis was used for measuring PCB concentrations in soil or in worms (dry weight, wet weight, lipid-normalized). Therefore, this study was not used to develop BAF for total PCBs.

Beyer and Stafford (1993), Environ. Monitor. Assess. 24:151–165

- Collected 18 co-located soil and worm (multiple species) samples from nine Great Lakes confined disposal facilities.
- Worms were not depurated before analysis.
- Total PCBs, estimated as Aroclor 1254, were below detection limits (0.4–0.6 ppm, dry weight) in worms at 15 sites, and ranged from 0.66 to 1.8 ppm at the other three sites. For these three sites, the PCB accumulation factor was about 1.8–3.4 based on a simple worm:soil dry-weight ratio.

Diercxsens et al. (1985), Chemosphere 14:511–522

- Compared PCB concentrations in soil and worms at a nature reserve and a vineyard amended with compost. Total PCB concentrations estimated from a comparison of each sample to a standard composed of a mix of Aroclors.
- Worms depurated prior to analysis, gut contents analyzed separately.
- PCB concentrations in nature reserve soils ranged from 8 to 12.5 mg/kg, dry weight, and concentrations in worms ranged from 9.4 to 15.2 mg/kg, wet weight, giving accumulation factors of 1.2–1.7.
- PCB concentrations in vineyard soils ranged from 55 to 139 mg/kg, dry weight, and concentrations in worms ranged from 330 to 685 mg/kg, wet weight, giving accumulation factors of 2.3–11.5 (two depuration methods were used, producing slightly different final concentrations in worms).
- PCBs in the digestive tracts of worms from the vineyard were 2.9 to 8.1 times greater than concentrations in soil (dry weight:dry weight basis). The authors think this indicates that earthworms choose to ingest soil fractions with a high organic carbon content and thus higher PCB concentrations.

Kreis et al. (1987), Pedobiologia 30:379–388

- Compared PCB concentrations in soil and worms (*Nicodrilus caliginosus*) from two fields, one treated with liquid sewage sludge and one untreated, with five co-located samples per location.

- Worms were depurated 48 hours before analysis.
- Total PCB concentrations in surface soils at the untreated field ranged from 1 to 3 μg/kg and worm concentrations ranged from 11 to 31 μg/kg (all values dry weight), resulting in accumulation factors of 4.3–11.0.
- Total PCB concentrations in surface soils at the treated field ranged from 4 to 13 μg/kg and worm concentrations ranged from 22 to 174 μg/kg (all values dry weight), resulting in accumulation factors of 5.5–13.4.

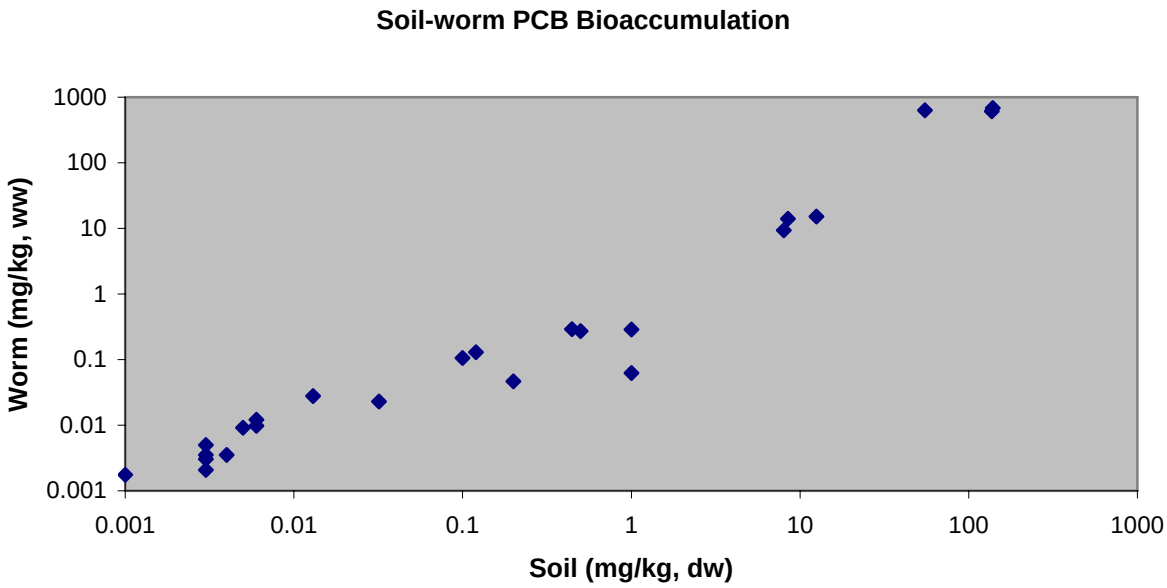


Table 1. Data Used to Develop the Soil-Worm PCB Bioaccumulation Model

Soil (mg/kg dry wt)	**Worm** (mg/kg wet wt)	**Worm** (mg/kg dry wt)	**Reference**
0.032	0.023	0.14375	Wagman et al. 1999
0.12	0.129	0.80625	Wagman et al. 1999
0.444	0.291	1.81875	Wagman et al. 1999
0.2	0.04641	0.2900625	Hendriks et al. 1995
1	0.06273	0.3920625	Hendriks et al. 1995
12.5	15.2	95	Diercxsens et al. 1985
8	9.4	58.75	Diercxsens et al. 1985
8.5	14	87.5	Diercxsens et al. 1985
55	632	3950	Diercxsens et al. 1985
137	609	3806.25	Diercxsens et al. 1985
139	685	4281.25	Diercxsens et al. 1985
0.001	0.00176	0.011	Kreis et al. 1987
0.003	0.00208	0.013	Kreis et al. 1987
0.003	0.00304	0.019	Kreis et al. 1987
0.003	0.00352	0.022	Kreis et al. 1987
0.003	0.00496	0.031	Kreis et al. 1987
0.004	0.00352	0.022	Kreis et al. 1987
0.005	0.00912	0.057	Kreis et al. 1987
0.006	0.00976	0.061	Kreis et al. 1987
0.006	0.01216	0.076	Kreis et al. 1987
0.013	0.02784	0.174	Kreis et al. 1987
0.1	0.1056	0.66	Beyer and Stafford 1993
0.5	0.272	1.7	Beyer and Stafford 1993
1	0.288	1.8	Beyer and Stafford 1993

**********Linear Regression Analysis Results**********

Variables: X = "Log_Soil", Y = "Log_worm"
Equation: Log_worm = 0.1352 + 1.0347*Log_Soil

Variable	N	Mean	Variance
Log_Soil	24	-0.8308	2.7054
Log_worm	24	-0.7244	3.1013

Regression Coefficient = 1.034725
Standard Error of B = 0.058650
Y-Intercept = 0.135222
R-Squared = 0.933983
Adjusted R-Squared = 0.930983
Standard Error of Estimate = 0.462652

The 95.0% confidence limits for the slope are: [0.913092, 1.15636]

Analysis of Variance Table

Source	DF	SS	MS	F	P
Linear	1	66.6219	66.6219	311.2500	1.801E-014
Deviation	22	4.7090	0.2140		
Total	23	71.3310	3.1013		

Goodness of Fit Statistics ...
Coefficient of Determination: 0.933983499
Correlation Coefficient: 0.966428217
Model Selection Criterion: 2.551183881

Parameter Statistics
95.00% Confidence Intervals
Parameter a: 0.135222295
StdDev: 0.106267794
Univariate ...
LOW: -0.085163621
HIGH: 0.355608210
Supporting Plane:
LOW: -0.143651486

```
**********Linear Regression Analysis Results**********
   HIGH: 0.414096076
 Parameter b: 1.034725187
 StdDev: 0.058650313
   Univariate ...
    LOW: 0.913091883
   HIGH: 1.156358490
 Supporting Plane:
    LOW: 0.880811816
   HIGH: 1.188638557
```

Site Photographs

Photograph 1. Factory 81 Area.

Photograph 2. Filled-in former wastewater aeration lagoon.

Photograph 3. Wastewater aeration lagoon.

Photograph 4. Vegetation at wastewater aeration lagoon.

Michigan Natural Features Inventory Data

MICHIGAN STATE UNIVERSITY EXTENSION

Enclosed is the data requested from Michigan Natural Features Inventory (MNFI). This information is a list of Element Occurrences (EO) at the section level. The sections contain the centroid of the EO. In some cases, the extent of an animal's range or a community type may extend past the section containing the centroid.

This information is the best available regarding elements tracked by MNFI. This list, however, is not a definitive statement on the presence, absence, or condition of the natural features in any given locality. Plant and animal populations and natural communities change with time. Also, not every site has been specifically surveyed. Therefore, the information provided should not be regarded as a complete statement on the occurrence of special natural features of the area in question.

The recipient(s) of the information services understand that state endangered and threatened species are protected under state law (Act 451 of 1994, the Natural Resources and Environmental Protection Act, Part 365, Endangered Species Protection). Any questions, observations, new findings, violations or clearance of project activities should be conducted with the Michigan Department of Natural Resources, Wildlife Division. Contact Lori Sargent or Pat Lederle at (517) 373-1263. The recipient(s) of the information services understand that federally endangered and threatened species are protected under federal law (Endangered Species Act of 1973). Any questions, observations, new findings, violations or clearance of project activities should be conducted with the U.S. Fish and Wildlife Service in East Lansing. Their phone number is (517) 351-2555. Recipients of the information are responsible for ensuring the protection of protected species and obtaining proper clearance before project activities begin.

This information is used to guide conservation and land management activities. Some of the element records are historical. While this information may not be important for regulatory purposes, it is important for management and restoration purposes and for scientific use.

The following codes are used for the Federal and State status:

Federal Status:

C = Candidate - species being considered for federal status
LE = Listed endangered
LT = Listed threatened
LELT = Listed endangered in part of the range, threatened in a different part.
PE = Proposed endangered
PT = Proposed threatened
PS = Partial status - status in only a portion of the range

State status:

E = Endangered (Legally protected)
T = Threatened (Legally protected)
SC = Special Concern (Rare or status uncertain; not legally protected)
X = Presumed extirpated (Legally threatened if rediscovered)

For questions about MNFI and the data, contact Ed Schools, MNFI, (517) 373-0798, or schoolse@michigan.gov

Michigan Natural Features Inventory

P.O. Box 30444
Lansing, MI
48909-7944

(517) 373-1552
FAX: (517) 373-9566

Scientific Name	State Common Name	Federal Status	State Status	Last Observation Date	Element Category	Town	Range	Section
Jeffersonia diphylla	Twinleaf		SC		Plant	08N	06E	36

Correspondence Regarding Former Aeration Lagoons

STATE OF MICHIGAN

JOHN ENGLER, Governor
DEPARTMENT OF ENVIRONMENTAL QUALITY
"Better Service for a Better Environment"
HOLLISTER BUILDING, PO BOX 30473, LANSING MI 48909-7973
INTERNET: www.deq.state.mi.us
RUSSELL J. HARDING, Director

October 2, 2001

Mr. David G. Marschall
Project Manager
Conestoga-Rovers and Associates
4915 S. Sherwood Forest Blvd.
Baton Rouge, LA 70816

Subject: Wastewater Aeration Lagoons
General Motors NAO Flint Operations Site
Flint, Michigan
Your reference No. 26744-00

Dear Mr. Marschall:

Thank you for your letter of September 13, 2001 concerning the status of wetlands associated with wastewater aeration Lagoons located at the General Motors NAO Flint Operations. We have reviewed the information submitted with your correspondence and consulted with Surface Water Quality Division concerning the lagoons existing NPDES permit. In consideration of this information and review of the regulatory status of the lagoons under Part 301 and Part 303 of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended we have determined that the lagoons and the wetland fringes fall outside of the regulatory provisions set forth in these Parts. Consequently no permits under Parts 301 or 303 are required to close these facilities.

Thank you for your interest in these issues and requesting our assessment prior to moving forward with your work. Should you have additional questions or concerns with this or similar matters please contact Mr. Dave Pingel at 571-625-4694.

Sincerely,

Barry J. Horney, Supervisor
Shiawassee District Office
Land and Water Manage Division
517-625-4639

cc: Ms. Kimberly Rice
Mr. Dave Pingel

CONESTOGA-ROVERS
& ASSOCIATES

4915 S. Sherwood Forest Blvd., Baton Rouge, LA 70816
Telephone: 225.292.9007 Facsimile: 225.292.3614
www.CRAworld.com

September 13, 2001 Reference No. 26744-00

Mr. Barry Horney
District Supervisor, Shiawassee District
Land and Water Management Division
Michigan Department of Environmental Quality
10650 Bennett Drive
Morrice, Michigan 48857

Re: Request for Jurisdictional Determination
Wastewater Aeration Lagoons
General Motors NAO Flint Operations Site
Flint, Michigan

Dear Mr. Horney:

On behalf of General Motors Corporation (GMC), Conestoga-Rovers & Associates (CRA) is providing the following information to assist your office in making a determination of jurisdiction by the State of Michigan over two wastewater aeration lagoons at the GMC NAO Flint Operations Site (Site) in Flint, Michigan. Current plans are to fill the lagoons with crushed concrete generated from demolition of Site buildings. One lagoon is being considered for future use as a stormwater retention pond. Both lagoons have been idle for several years and have developed stands of cattails and other emergent wetland vegetation. This request for a jurisdictional determination on behalf of GMC is made to confirm the status of the lagoons with respect to the Natural Resource and Environmental Protection Act, and is submitted pursuant to your conversation on August 10, 2001, with Messrs. David Marschall and Gary Klepper of CRA.

HISTORY OF THE LAGOONS

In the mid 1970s, GMC purchased portions of a former residential area east of the Site (see Figure 1, Vicinity Map). Residences were razed in the area as part of an urban renewal program, and two unlined lagoons were excavated out of the native clay soils on the purchased property. These lagoons provided BOD/COD aeration treatment of the Site industrial wastewater treatment plant (IWTP) effluent prior to discharge to the Flint River under an NPDES permit. The lagoons had a capacity of 6 million gallons each, and operated in series to provide approximately 8 days of retention. Six mechanical aerators were installed to help meet permit limits. With the onset of RCRA, the lagoons were included in GMC's permit applications because of non-production electroplating operations within the plant.

In the early 1980s, the City of Flint installed a sanitary sewer line near the lagoon discharge line. GMC negotiated an agreement with the City to discharge the effluent from the lagoons to the sanitary sewer system, and installed an effluent metering station in the southeast corner of the lagoon site. GMC maintained the NPDES permit allowing direct discharge to the Flint River under emergency conditions. Later the plant's RCRA permit prohibited the introduction of hazardous waste to the lagoons, and they were permanently taken out of service in 1988. The accumulated waste material in the lagoons was removed and disposed off site in the mid 1990s. Today the lagoons are fed only by precipitation.

To provide documentation of historical conditions, attached please find a copy of the 1976 Sanborn Fire Insurance map indicating residential land use in the area now occupied by the lagoons. Also attached is a copy of the original plan and profile drawing of the lagoon system prepared for the Buick Motor Division in 1976.

PHYSICAL AND BIOLOGICAL CHARACTERISTICS

The west lagoon is approximately 1.8 acres and the east lagoon is approximately 2.0 acres in water surface. Side slopes, which are 2:1, are covered with cobbles and coarse gravel in most places and with concrete in others. The area around the lagoons is landscaped with native and ornamental trees, and was previously maintained as a fenced enclosure with a mowed lawn. Water levels were maintained at a depth of nine feet in each lagoon, with the west lagoon water level and bottom elevation five feet higher than the east lagoon. The inlets to the west lagoon were three 10-inch pipes that flowed from a discharge pit on the west bank. The discharge pit was fed by a 12-inch force main from the IWTP. Two underflow concrete spillways allowed flow from the west lagoon to the east lagoon. The east lagoon outlet was on the east side at an overflow weir which discharged to an 18-inch pipe leading to the Flint River. The discharge weir structure included pumps to pump water from the lagoons back to the Site for possible reuse. Since original construction of the lagoon system, the effluent discharge has been routed to the City's sanitary sewer line, and I-475 has been constructed between the lagoons and the Flint River.

Wetlands are defined as "land characterized by the presence of water at a frequency and duration sufficient to support, and that under normal circumstances does support, wetland vegetation or aquatic life, and is commonly referred to as a bog, swamp, or marsh" (Natural Resources and Environmental Protection Act, Part 303, 1994, PA 451, as amended). The two diagnostic characteristics of wetlands are a predominance of hydrophytic vegetation and periodic soil saturation. CRA collected available data to assist with a determination of the presence of wetlands under the jurisdiction of the Michigan DEQ, and as determined by the Inland Lakes and Wetlands Unit.

CONESTOGA-ROVERS
& ASSOCIATES

The two lagoons have developed emergent wetland vegetation from the banks out approximately 15 feet. Side slopes support herbs, shrubs, and small trees growing out of the gravel and larger rip rap. This vegetation is a mix of species adapted for wetter conditions on the lower part of slopes and drier conditions on the upper part of the slopes. Attached are data sheets (Routine Wetland Determination Data Forms) identifying the species both in the water and on the side slopes, and providing the wetland indicator status of each. Fauna observed at the lagoons during a site inspection in May 2001 included mallards, Canada geese, red-wing blackbirds, centrarchid fishes, and unidentified tadpoles. There were signs of raccoon and possibly muskrat.

Attached are panoramic photographs of the lagoon system from May 2001.

JURISDICTIONAL CONSIDERATIONS

The two lagoons meet some of the criteria used by the State of Michigan for defining a wetland. There is permanent water and as a consequence, in the shallow periphery of each lagoon, there is saturated ground and there are wetland plants. And, the two lagoons do support aquatic life. The side slopes of each lagoon are generally too steep to allow water to stand, and there was no evidence of saturated soil more than a couple of feet above the water's edge.

The lagoons do not meet the definition of an inland lake or pond. According to "Definitions" [R 281.921, (e) (iii)], *"Inland lake or pond, a river or stream" means any of the following: A natural or permanent artificial pond that has permanent open water with a surface area that is more than 1 acre, but less than 5 acres. This does not include ponds constructed by excavating or diking dry land and maintained for the sole purpose of cooling or storing water and does not include lagoons used for treating polluted water.*

It is clear from historical sources that the lagoons were excavated in formerly dry land. The 1976 Sanborn Fire Insurance map and the USGS topographic map (Figure 1), "Flint North, Michigan," dated 1969, and photorevised in 1975 (based on 1975 aerial photography), show residential land where the two lagoons were subsequently excavated. Other than the probable occurrence of sheet flow, there were no creeks or other defined components of the surface tributary system of the Flint River in this location according to the USGS map. The lagoon system was constructed for the sole purpose of treating (aerating) industrial effluent. Today the lagoons remain isolated from the natural hydrologic system and receive only rainfall and snow.

CONCLUSIONS

Based on site observations, review of site history, and review of pertinent regulations, it is GMC's opinion that the two lagoons may be closed, filled, or converted to an alternative use without the necessity of obtaining a permit from the MDEQ Land and Water Management Division. However, on behalf of GMC and ENCORE, CRA respectfully requests that your office

CONESTOGA-ROVERS & ASSOCIATES

review the foregoing and attached information and provide an official opinion of jurisdiction. If you have questions or need additional information, please contact CRA at your convenience.

Sincerely,

CONESTOGA-ROVERS & ASSOCIATES

David G. Marschall

David G. Marschall
Project Manager

DGM:rdm

Attachments: Figure 1 - Vicinity Map
Exhibit 1 - Sanborn Fire Insurance Map
Exhibit 2 - "Waste Water Aeration Lagoons, Plot Plan and Typical Section"
Routine Wetland Determination Data Forms
Site Photographs

cc: Mr. Robert S. Metcalf, General Motors Corporation
Mr. Gary Klepper, CRA

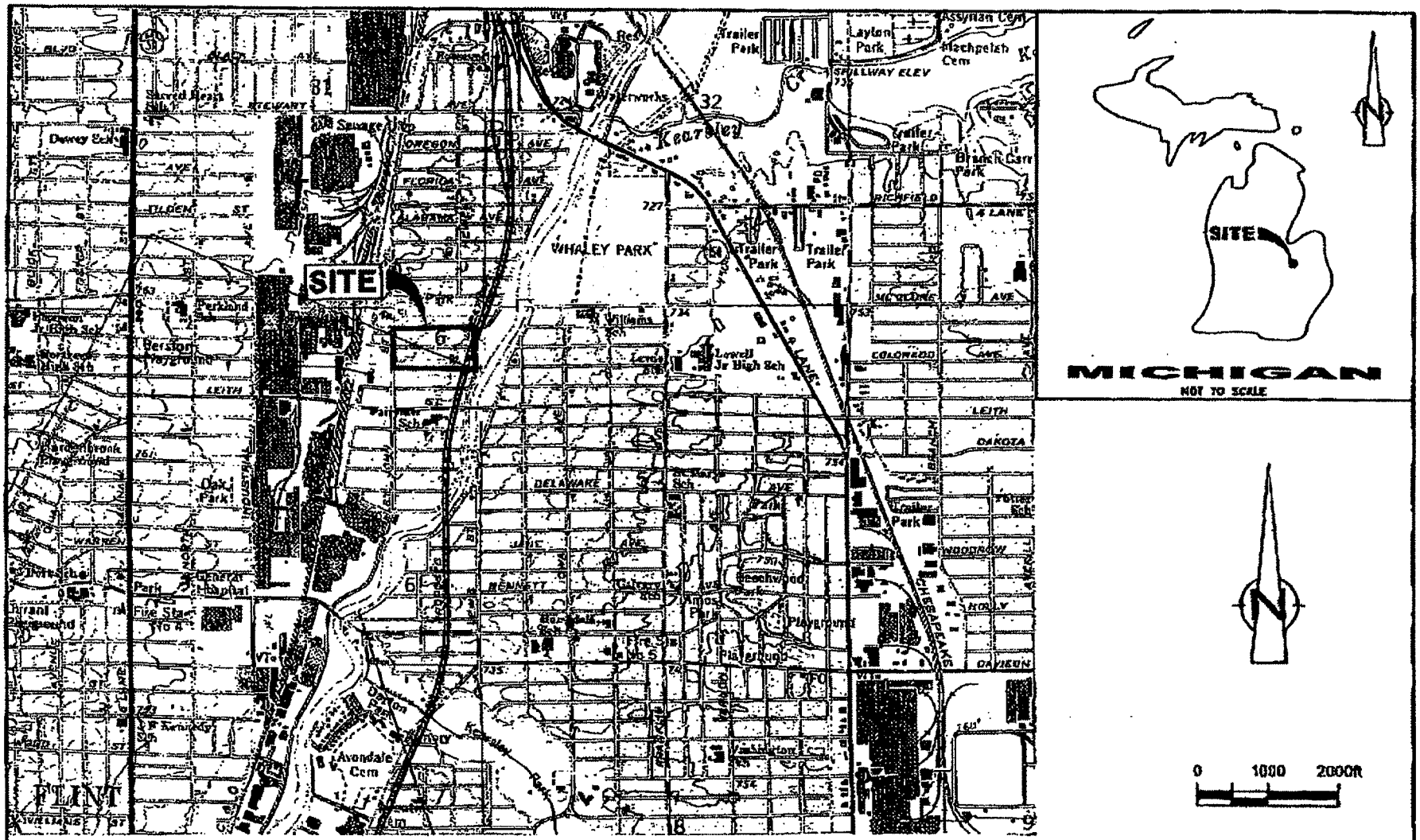
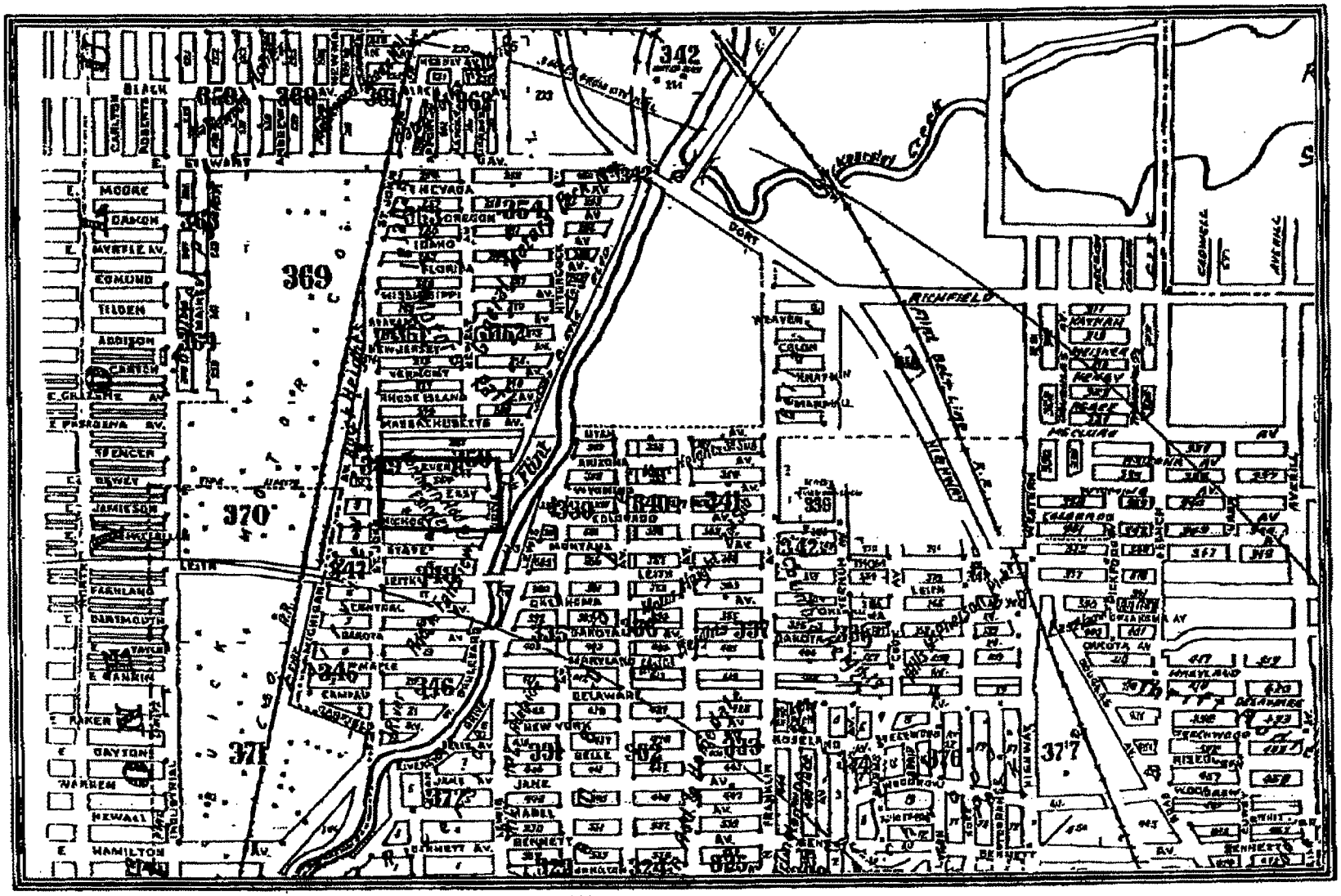


Figure 1

RE: U.S.G.S. 7.5-MINUTE SERIES TOPOGRAPHIC MAP, "FLINT NORTH, MICHIGAN," 1969, PHOTOREVISED 1975.

WETLAND DELINEATION
WASTEWATER TREATMENT IMPOUNDMENTS
BUICK CITY PLANT, FLINT, MICHIGAN
GENERAL MOTORS CORPORATION, DETROIT, MICHIGAN

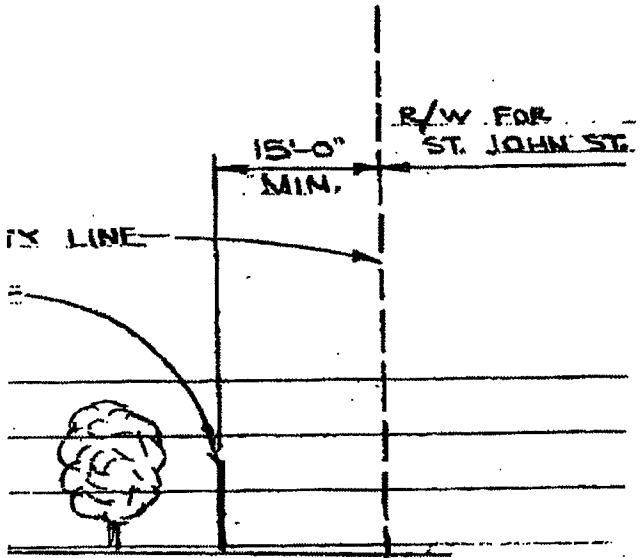
26744-00(POWE001A)GN-BR001 AUG 15/2001



Approximate Scale:
1" = 1,412'

Exhibit 1
Sanborn Fire Insurance Map

Source:
"Flint, Michigan, Vol. 3, Key Map"
Sanborn Map Company, Inc.
1962



MARK	DESCRIPTION	DATE	BY

CLASSIFICATION | REVISIONS | JOB NO.

BUICK MOTOR DIVISION

GENERAL MOTORS CORPORATION

WORKS ENGINEERS OFFICE

A BLDG. PLANT

WASTE WATER AERATION LAGOONS — PLOT PLAN & TYP. SECTION

DRAWN Jim Hanzek	CHECKED	APPROVED
O. K. FOR	ERH 5-19-76	EST. NO.
O. K.		G. W. O.
SCALE As Noted	DATE 2-6-76	DRWG. NO. B-46927 A

A FOR INDEX

A	C	E	M

Conestoga-Rovers & Associates

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)
SAMPLE LOCATION 1

Project/Site:	Wastewater Treatment Impoundments	Date:	5/10/01
Applicant/Owner:	General Motors Corporation	County:	Genesee
Investigator:	David G. Marschall	State:	Michigan
Do Normal Circumstances exist on the site?	(Yes) No	Community ID:	N/A
Is the site significantly disturbed (Atypical Situation)?	Yes (No)	Transect ID:	N/A
Is the area a potential Problem Area? (If needed, explain on reverse.)	Yes (No)	Sample Location:	1

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Typha latifolia*	H	OBL	9.		
2. *Typha domingensis*	H	NI	10.		
3. *Arundo donax*	H	FACW	11.		
4. *Itea virginica*	S	OBL	12.		
5. *Populus tremuloides*	S	NI	13.		
6. *Acer negundo*	T	FACW-	14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100

T = Tree, S = Shrub or Sapling, WV = Woody Vine, H = Herbaceous, NL = Not Listed, and NI = Non-Indicator

Remarks: Sample is representative of the permanently inundated pond edge.

HYDROLOGY

X Recorded Data (Describe in Remarks):

____ Stream, Lake, or Tide Gauge
____ Aerial Photographs
X Other

____ No Recorded Data Available

Field Observations:

Depth of Surface Water: ____ (in.)
Depth of Free Water in Pit: -- (in.)
Depth to Saturated Soil: 0 (in.)

Wetland Hydrology Indicators:

Primary Indicators:
Y Inundated
Y Saturated in Upper 12 inches
N Water Marks
N Drift Lines
N Sediment Deposits
N Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
N Oxidized Root Channels in Upper 12 inches
N Water-Stained Leaves
N Local Soil Survey Data
Y FAC-Neutral Test
____ Other (Explain in Remarks)

Remarks: Other = USGS topographical map.

Conestoga-Rovers & Associates

SOILS **SAMPLE LOCATION 1**

Map Unit Name (Series and Phase): N/A

Drainage Class: N/A

Field Observations Confirm Mapped Type? (Yes) No

Taxonomy (Subgroup): N/A

Profile Description:

Depth (Inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.

Hydric Soil Indicators:

N Histosol	N Concretions
N Histic Epipedon	N High Organic Content in Surface Layer in Sandy Soils
N Sulfidic	N Organic Streaking in Sandy Soils
N Aquic Moisture Regime	N Listed on Local Hydric Soils List
N Reducing Conditions	N Listed on National Hydric Soils List
N Gleyed or Low-Chroma Colors	Y Other (Explain in Remarks)

Remarks: Where all plant species are OBL or FACW and wetland hydrology is persistent, hydric soil conditions may be assumed to exist.

WETLAND DETERMINATION

	(Circle)			(Circle)
Hydrophytic Vegetation Present?	(Yes)	No		
Wetland Hydrology Present?	(Yes)	No		
Hydric Soils Present?	(Yes)	No	Is this Sampling Point Within a Wetland?	(Yes) No

Remarks:

Conestoga-Rovers & Associates

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)
SAMPLE LOCATION 2

Project/Site:	Wastewater Treatment Impoundments	Date:	5/10/01
Applicant/Owner:	General Motors Corporation	County:	Genesee
Investigator:	David G. Marschall	State:	Michigan

Do Normal Circumstances exist on the site?	(Yes)	No	Community ID:	N/A
Is the site significantly disturbed (Atypical Situation)?	Yes	(No)	Transect ID:	N/A
Is the area a potential Problem Area?	Yes	(No)	Sample Location:	2
(If needed, explain on reverse.)				

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Acer negundo*	T	FACW-	9. *Solidago canadensis*	H	FACU
2. *Fraxinus pennsylvanica*	T	FACW	10. *Equisetum arvense*	H	FAC
3. *Salix exigua*	T	FACW+	11.		
4. *Ulmus rubra*	T	FAC	12.		
5. *Elaeagnus umbellata*	S	NL	13.		
6. *Lonicera canadensis*	WV	FACU	14.		
7. *Desmodium canadensis*	WV	FAC-	15.		
8. *Vitis vulpina*	WV	FACW-	16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 67

T = Tree, S = Shrub or Sapling, WV = Woody Vine, H = Herbaceous, NL = Not Listed, and NI = Non-Indicator

Remarks: Sample is representative of the side slopes of the ponds.

HYDROLOGY

X Recorded Data (Describe in Remarks):

____ Stream, Lake, or Tide Gauge
____ Aerial Photographs
X Other

___ No Recorded Data Available

Field Observations:

Depth of Surface Water: N/A (in.)
Depth of Free Water in Pit: N/A (in.)
Depth to Saturated Soil: N/A (in.)

Wetland Hydrology Indicators:

Primary Indicators:
N Inundated
N Saturated in Upper 12 inches
N Water Marks
N Drift Lines
N Sediment Deposits
N Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
N Oxidized Root Channels in Upper 12 inches
N Water-Stained Leaves
N Local Soil Survey Data
Y FAC-Neutral Test
___ Other (Explain in Remarks)

Remarks: Other = USGS topographical map.

Conestoga-Rovers & Associates

SOILS **SAMPLE LOCATION 2**

Map Unit Name (Series and Phase): N/A

Drainage Class: N/A

Field Observations Confirm Mapped Type? (Yes) No

Taxonomy (Subgroup): N/A

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.

Hydric Soil Indicators:

- N Histosol
- N Histic Epipedon
- N Sulfidic
- N Aquic Moisture Regime
- N Reducing Conditions
- N Gleyed or Low-Chroma Colors
- N Concretions
- N High Organic Content in Surface Layer in Sandy Soils
- N Organic Streaking in Sandy Soils
- N Listed on Local Hydric Soils List
- N Listed on National Hydric Soils List
- N Other (Explain in Remarks)

Remarks: Soil is disturbed and consists of primarily of gravel and cobbles. Soil is not saturated above the water line.

WETLAND DETERMINATION

	(Circle)	
Hydrophytic Vegetation Present?	(Yes)	No
Wetland Hydrology Present?	Yes	(No)
Hydric Soils Present?	Yes	(No)

(Circle)

Is this Sampling Point Within a Wetland? Yes (No)

Remarks:

29744-00-Form001

CORRESPONDENCE FROM U.S. FISH AND WILDLIFE SERVICE

United States Department of the Interior

FISH AND WILDLIFE SERVICE
East Lansing Field Office (ES)
2651 Coolidge Road, Suite 101
East Lansing, Michigan 48823-6316

IN REPLY REFER TO:

May 4, 2004

Ms. Linda M. Ziccardi
Exponent
4940 Pearl East Circle
Suite 300
Boulder, CO 80301

Re: Endangered Species List Request, Ecological Assessment for RCRA Facility Investigation, General Motors Corporation North American Operations-Flint Operations Facility, 902 East Leith Street, Flint, Genesee County, Michigan

Dear Ms. Ziccardi:

Thank you for your April 8, 2004 request for information regarding federally listed and proposed threatened and endangered species, candidate species, or critical habitat near your proposed project. Your request and this response are made pursuant to section 7 of the Endangered Species Act of 1973, as amended (Act).

Our records do not indicate the presence of any federally listed and proposed threatened and endangered species, candidate species, or critical habitat in the action area. This precludes the need for further action on this project as required by section 7 of the Act.

If the project is modified or new information about the project becomes available that indicates listed species or critical habitat may be affected in a manner or to an extent not previously considered, you should reinitiate consultation with this office.

Since threatened and endangered species data changes continuously, we recommend you contact this office for an updated federal list of the species that may be present in the project area every six months during the remaining planning and building period.

We appreciate the opportunity to provide these comments. Please refer any questions to Tameka Dandridge of this office at (517) 351-8315 or the above address.

Sincerely,

for Craig A. Czarnecki
Field Supervisor

cc: Michigan Department of Natural Resources, Wildlife Division, Lansing, MI
(Attn: Lori Sargent)