Resource Conservation and Recovery Act Facility Investigation Phase II Report

Volume III of III

General Motors Corporation
NAO Flint Operations Site
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Appendix F

Transport and Fate of PCBs in NAO Flint Storm Sewers

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Transport and Fate of PCBs in NAO Flint Storm Sewers

Introduction

The General Motors Corporation's (GM's) North American Operations (NAO) site, located in Flint, Michigan (the Site), is currently the focus of a Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI). Among other tasks, the RFI includes an assessment of the underground storm sewer systems at the Site. These sewers convey storm water to the Flint River and discharge through NPDES permitted outfalls. The Outfall 003, 004, and 005 sewer systems, including manhole locations, are shown in Figures 1, 2, and 3, respectively. All outfalls are sampled biannually to detect any hazardous constituents that might discharge to the river. Investigations of the presence of hazardous constituents present within the storm sewer system took place in 1997 and more recently in 2002, and have been documented in Appendix I of this RFI Phase II report. Low levels of polychlorinated biphenyls (PCBs) were detected in some water samples collected from manholes in the Outfall 003 and 004 storm sewers, and in a single outfall monitoring event. This memorandum includes a review of relevant historical data on PCBs in the sewers and the Flint River, a discussion of planned source control measures, and an analysis of the significance of the sewers as a hazardous constituent migration pathway to the Flint River.

History of Sewer and Outfall Sampling for PCBs

Water samples from all outfalls are analyzed for PCBs annually in the spring and fall as part of the NPDES monitoring program. All available data from 1996 to 2003 are summarized in Table 1. No PCBs were detected in the outfall discharges in 1996 or 1997.

In February 1997, sediment samples were collected from 21 sewer manholes and analyzed for total PCBs. Two detections were reported, both in the Outfall 003 storm sewer:

- 24 mg/kg at manhole 3-22-2
- 50 and 3.66 mg/kg (duplicate samples) at manhole 3-31-6.

These portions of the Outfall 003 storm sewer were cleaned in early 1997 just after these samples were collected, removing the contaminated sediment. On September 9, 2004, sediments from manholes 3-22-2 and 3-31-6 were sampled. Aroclor® 1242 was detected at manhole 3-22-2 at 4.5 mg/kg and at 3-31-6 at 3.4 mg/kg. Aroclor® 1260 was also detected at manhole 3-31-6 at 2.5 mg/kg. More details concerning this sampling event and resulting data are included in Attachment 1.

During spring 1998 NPDES monitoring, PCBs were detected in effluent from Outfalls 001, 002, and 003, all at detection limit levels (see Table 1). No PCBs were detected in the fall 1998 outfall sampling, nor have there been any outfall detections since.

During the sewer investigation in 2002, water samples were collected from manholes in the storm sewers leading to Outfalls 003, 004, and 005, during three separate events in June and July 2002, and analyzed for PCBs. Two rounds of sampling were conducted under dry weather flow conditions (June 27/28 and July 9) and one under wet weather conditions (July 29). PCBs were detected at a low frequency in manhole samples from the Outfall 003 sewer system during all three sampling events (see Table 2). PCBs were also detected in a single manhole sample from the Outfall 004 sewer system (see Table 2). No PCBs were detected in the Outfall 005 sewer. The PCB detection frequencies in the three sampling rounds were 3 of 15, 2 of 13, and 1 of 15 samples analyzed. The highest detection was 3 µg/L Aroclor® 1242 during the July 29 dry flow event at manhole 3-22-1 (Figure 1). Storm sewer sediments were not collected in 2002.

The underground storm sewers do not support any natural aquatic communities and do not represent significant ecological habitat or natural resources. The presence of PCBs in the storm sewers is of potential concern only in that PCBs could discharge to the Flint River.

PCBs in Flint River Sediments

In aquatic systems, PCBs selectively partition into sediment and biota. Sediment and fish data for the Flint River were evaluated to determine whether there is reason to believe that the above releases have resulted in measurable increases in PCB concentrations in these media.

Historical PCB data from Flint River sediments have been reviewed from all available sources, including data from the 1992 General Motors—BOC Flint Operations investigation (WW Engineering & Science 1992) and other data supplied by the Michigan Department of Environmental Quality (MDEQ, Taylor 1993) (see Figure 4). These samples were collected by various means, including dredge, coring tube, and bucket auger. Maximum sample depths ranged from 30 in. to 7 ft 10 in. All samples targeted fine sediments. Locations sampled include stations immediately upstream, offshore, and downstream of the Site. All detections downstream from the Site from the 1992 investigation were below 0.10 mg/kg dry weight (Figure 4).

In addition, in April 2005 MDEQ, accompanied by U.S. EPA, conducted sediment sampling in the Flint River at locations upstream, adjacent to, and downstream of the GM facility. Samples were analyzed for inorganics, PCBs, semivolatile organic compounds (SVOCs), and volatile organic compounds (VOCs). Split samples were collected at a subset of locations on behalf of GM. The results of the 2005 MDEQ Flint River sediment sampling and the GM split sample results provided in Attachment 2, along with the historical data on PCBs, provide evidence supporting a position that the GM facility is not a discernable source of PCBs to the Flint River. The maximum detected concentration of PCBs in 2005 was 560 µg/kg, for Aroclor® 1242 (estimated in MDEQ sample OFC0051 0-6, taken in the vicinity of GM Outfall 005).

These data suggest that sediment PCB concentrations in the vicinity of the Site have historically been consistent with levels throughout the Flint River system. Additionally, these levels are typical of those found in urban river sediments. For example, Wong et al. (2000) generated summary statistics for PCBs (and other substances) for different land-use categories nationwide. For urban sites, the data consisted of samples obtained from 44 sites in large metropolitan areas

(e.g. Dallas, Denver, Atlanta, Indianapolis, Portland, Milwaukee, and New York City) and some smaller urban areas such as Albany, N.Y. and Raleigh, N.C. Approximately 50 percent of the PCBs detected in sediment samples from these urban sites ranged from 0.1 to 0.2 mg/kg dry weight. The remaining half of the samples ranged from 0.2 to 0.6 mg/kg dry weight. Thus, sediment concentrations of PCBs that are less than one part per million (mg/kg) are common in urban areas, and occur throughout the Flint River system, including areas upstream, adjacent to, and downstream of the GM facility, as evidenced by the historical data for the Flint River. Nevertheless, discussions between USEPA and GM concerning the need for further investigation of the Flint River are ongoing, and will continue beyond the submission of this report.

PCBs in Flint River Fish

The State of Michigan periodically samples fish in watersheds throughout Michigan, including the Flint River, for contaminant body burdens. Like most urban waterways, fish from the Flint River have measurable body burdens of organic contaminants, including PCBs. Fish tissue concentrations from samples collected in urban waterways were also summarized by Wong et al. (2000): 75 percent of fish samples at urban sites had concentrations greater than 200 µg/kg wet weight, and more than 25 percent of the samples were greater than 500 µg/kg wet weight. Concentrations of PCBs in fish collected from the Flint River downstream of the NAO Flint site were comparable to those observed by Wong et al. (2000) in other urban areas.

The State of Michigan sampling stations are located well above and below the City of Flint (Figure 5). Carp collected below Flint consistently have the highest PCB body burdens of Flint River fish tested. There is no consumption advisory for the general population, except for very large carp, which should not be eaten. There is a limited consumption advisory for children and women of childbearing age below the City of Flint due to PCBs that recommends no more than one meal of smallmouth bass per week and no more than one meal of carp per month. Advisories for these fish species are typical for urban rivers and lakes in the state of Michigan.

More than 75 water bodies in the state have an advisory for carp and more than 25 have an advisory for smallmouth bass. The 2003 Michigan Family Fish Consumption Guide[1] states that children and women of childbearing age should exercise special caution when eating fish caught anywhere in the state.

Fish PCB data provided by MDEQ and the Michigan Department of Community Health are shown in Table 3. PCB levels in most fish sampled throughout the river are modest, with relatively few values exceeding 2 ppm, the default federal Food and Drug Administration consumption advisory level.

Flint River Aquatic Community

Fish and benthic community ecological assessments for the Flint River have been periodically conducted by MDEQ in recent years (MDEQ 1997, 2001a,b). Fish and benthic communities have been consistently judged by MDEQ to be somewhat degraded by pollutants at stations downstream of Flint relative to those upstream. These effects, however, are due to the net impacts of all point and non-point sources associated with the Greater Flint urban area and are not attributed to any particular source or chemical.

Historical PCB Source Control Measures

The following source control measures have been performed to date to address the potential migration of Site-related constituents from Site storm sewers to the Flint River:

- An oil/water separator was installed in November 1991 immediately east of Buildings 70B and 73 along the Storm Sewer 003 discharge to the Flint River. This oil/water separator is equipped with an overflow weir, an underflow weir, and a skimming system. Oils and debris that accumulate on

[1] http://www.michigan.gov/documents/FishAdvisory03_67354_7.pdf

the upstream side of the underflow weir are skimmed and pumped into a 500-gal aboveground storage tank and disposed of as needed.

- An additional oil/water separator system was installed in 1994 east of the coal yard adjacent to Building 07. This system consists of a subsurface vault within the main storm sewer branch (approximately 9 ft wide by 9 ft long by 6 ft deep) containing two pumps (approximately 200 gallons per minute [gpm] total capacity) that pump storm water during low-flow periods to an aboveground oil/water separator system. This system includes a debris screen, an 8,000-gal settling tank, and two parallel 200 gpm-capacity oil/water separators. Recovered oil is collected in a 275-gal tote that is periodically emptied.

- Storm sewer cleaning and videotaping was performed between April 23, 1997, and June 12, 1997. A total of approximately 2,600 linear feet of storm sewer pipeline were cleaned, resulting in the removal of approximately 26 cubic yards of sediments/debris materials from select portions of the storm sewer systems for Outfalls 002, 003, and 010.

- Floating oil and sheens trapped by floating booms at Outfalls 002, 003, 004, 005, and 006 is periodically pumped by vacuum truck and disposed offsite.

- Portions of the Outfall 006 storm sewer system were cleaned and plugged as a result of a release of oil from a hydraulic cylinder for an elevator (October 2002).

Several additional source control measures are being designed to address oil sheens observed in some portions of the Site's storm sewers and at select outfalls. Investigation activities are ongoing to obtain information needed for the design of these measures. These activities are discussed in Sections 4.7, 5.3.8, and Appendix I of this RFI Phase II report. Also refer to RFI Figures 2-4 and 2-5.

Summary and Recommendations

The potential for PCBs present in the Site storm sewers to migrate to and adversely impact the Flint River is judged to be low. There does not appear to be any significant historical effect, and the potential for future effects will be further reduced by ongoing source control measures implemented as part of the RCRA Corrective Action.

The historical presence of PCBs at some manhole locations raises the possibility that storm sewer outfalls may have historically been a minor source of PCBs to the Flint River. However, the data reviewed above suggest that little if any ecologically significant PCB loading to the Flint River from outfall discharges has occurred. The best recent evidence of this comes from the biannual NPDES outfall monitoring data. PCBs were only detected in storm sewer effluent in the spring of 1998, at detection limit levels. There were no detections prior to or since the spring of 1998. MDEQ studies of Flint River sediments and fish tissue do not indicate significant elevations in PCB levels in the vicinity of the Site outfalls. The available aquatic community survey data are less useful for assessment of local impacts from the Site because of the sample locations. Collectively, the available data do not indicate significant ecological impacts in the River as a result of Site discharges of PCBs.

Ongoing source control measures will further reduce any potential for Site outfall discharges to adversely impact the Flint River. These source control measures include a range of activities such as pipe lining, improving the efficiency of existing oil interceptors, and plugging unnecessary portions of the storm sewer system.

Nevertheless, discussions between USEPA and GM concerning the need for further investigation of the Flint River are ongoing, and will continue beyond the submission of this report.

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Tables

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Table 1. Storm sewer outfall total PCB monitoring (1996–2003)

	Sampling Event (μg/L)														
	1996		1997		1998		1999		2000		2001		2002		2003
Outfall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Winter
001	ND (0.1)	ND (0.1)	ND (1.0)	ND (0.1)	0.1 (0.1)	ND (0.1)	ND (0.1)	ND	ND	--	ND (0.1)	--	ND (0.1)	--	--
002	ND (0.2)	ND (0.1)	ND (0.1)	ND (0.1)	0.1 (0.1)	ND (0.1)	ND (0.1)	ND	ND	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.11)	ND (0.1)	ND (0.2)
003	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	0.2 (0.1)	ND (0.1)	ND (0.1)	ND	ND	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.2)
004	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)		ND	ND (0.11)	ND (0.1)	ND (0.11)	ND (0.11)	--	--
005	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)		ND	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.11)	ND (0.1)	--
006	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (1.0)	ND (0.1)		ND	ND (0.11)	ND (0.1)	ND (0.11)	ND (0.1)	ND (0.11)	ND (0.2)
007	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)		ND	--	ND (0.1)	--	ND (0.1)	ND (0.1)	--
008	ND (0.1)	ND (0.1)	--	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)		ND	--	ND (0.1)	--	ND (0.1)	ND (0.1)	--
009	ND (0.1)	--	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)		ND	--	ND (0.1)	--	ND (0.1)	--	--
010	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)		ND	--	ND (0.1)	--	ND (0.1)	ND (0.1)	--
011	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)		ND	--	ND (0.1)	--	ND (0.1)	ND (0.11)	--
012	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)		ND	--	ND (0.1)	--	ND (0.1)	--	--
013	--	--	--	--	--	--	--		ND	--	ND (0.1)	--	ND (0.1)	ND (0.1)	--
100	ND (3.0)	ND (0.1)	ND (0.1)	ND (1.0)	ND (1.0)	ND (0.1)	ND (0.1)		ND	--	ND (0.11)	--	--	--	--

Note: ND - not detected; detection limit not reported
ND (0.1) - not detected at detection limit shown in parentheses
-- - no data available

TABLE 2

GENERAL MOTORS CORPORATION
NAO FLINT OPERATIONS SITE - FLINT, MICHIGAN

STORM SEWER PCB ANALYTICAL DATA
(results presented in μg/L)

Sample ID	Date Collected	Aroclor-1242	Aroclor-1248	Aroclor-1260
MH 3-15	06/27/02	ND(0.10)	0.18	ND(0.10)
MH 3-15	07/09/02	ND(0.10)	ND(0.10)	ND(0.10)
MH 3-15	07/29/02	ND(0.10)	ND(0.10)	ND(0.10)
MH 3-20	06/27/02	ND(0.10)	ND(0.10)	ND(0.10)
MH 3-20	07/09/02	ND(0.10)	ND(0.10)	ND(0.10)
MH 3-20	07/29/02	ND(0.10)	ND(0.10)	ND(0.10)
MH 3-22-1	06/27/02	ND(0.10)	2.4	ND(0.10)
MH 3-22-1	07/09/02	ND(0.10)	0.17	ND(0.10)
MH 3-22-1	07/29/02	3.0	ND(0.10)	ND(0.10)
MH 3-23	06/27/02	ND(0.10)	ND(0.10)	ND(0.10)
MH 3-23	07/09/02	ND(0.10)	ND(0.10)	ND(0.10)
MH 3-23	07/29/02	ND(0.10)	ND(0.10)	ND(0.10)
MH 3-26	06/27/02	ND(0.10)	ND(0.10)	ND(0.10)
MH 3-26	07/09/02	ND(0.10)	ND(0.10)	ND(0.10)
MH 3-26	07/29/02	ND(0.10)	ND(0.10)	ND(0.10)
MH 3-65	07/09/02	R	R	1.0 J
MH 3-65	07/29/02	ND(0.10)	ND(0.10)	ND(0.10)
MH 3-69	07/29/02	ND(0.10)	ND(0.10)	ND(0.10)
MH 3-76-8	06/28/02	ND(0.10)	ND(0.10)	ND(0.10)
MH 3-76-8	07/29/02	ND(0.10)	ND(0.10)	ND(0.10)
MH 4-8	06/27/02	ND(0.11)	ND(0.11)	ND(0.11)
MH 4-8	07/09/02	ND(0.10)	ND(0.10)	ND(0.10)
MH 4-13	06/27/02	ND(0.11)	ND(0.11)	ND(0.11)
MH 4-13	07/09/02	ND(0.10)	ND(0.10)	ND(0.10)
MH 4-13	07/29/02	ND(0.10)	ND(0.10)	ND(0.10)
MH 4-17	06/27/02	ND(0.10)	ND(0.10)	ND(0.10)
MH 4-17	07/29/02	ND(0.10)	ND(0.10)	ND(0.10)
MH 4-20	06/27/02	ND(0.10)	ND(0.10)	1.1
MH 4-23	06/27/02	ND(0.10)	ND(0.10)	ND(0.10)
MH 4-23	07/09/02	ND(0.10)	ND(0.10)	ND(0.10)
MH 4-23	07/29/02	ND(0.10)	ND(0.10)	ND(0.10)
MH 5-4	06/27/02	ND(0.11)	ND(0.11)	ND(0.11)
MH 5-4	07/09/02	ND(0.10)	ND(0.10)	ND(0.10)
MH 5-4	07/29/02	ND(0.10)	ND(0.10)	ND(0.10)
MH 5-5	06/27/02	ND(0.10)	ND(0.10)	ND(0.10)
MH 5-5	07/09/02	ND(0.10)	ND(0.10)	ND(0.10)
MH 5-5	07/29/02	ND(0.11)	ND(0.11)	ND(0.11)
MH 5-10	06/27/02	ND(0.10)	ND(0.10)	ND(0.10)
MH 5-10	07/09/02	ND(0.10)	ND(0.10)	ND(0.10)
MH 5-10	07/29/02	ND(0.10)	ND(0.10)	ND(0.10)
MH 5-13A	06/27/02	ND(0.10)	ND(0.10)	ND(0.10)
MH 5-13A	07/09/02	ND(0.10)	ND(0.10)	ND(0.10)
MH 5-13A	07/29/02	ND(0.10)	ND(0.10)	ND(0.10)

Notes:

ND = Not detected. The value in parentheses represents the associated detection limit.

J = The compound/constituent was positively identified; however, the associated numerical value is an estimated concentration only.

R = Indicates that the previously reported detection limit or sample result has been rejected due to a major deficiency in the data generation procedure. The data shall not be used for any qualitative or quantitative purposes.

Table 3. State of Michigan total PCB data for fish from the Flint River

Station	Sample Location	Collection Date	Sex	Species	Sample Type	Length (in.)	Weight (lbs)	Lipid (ppm)	Total PCBs (ppm)	Comments
127	Below Flint	08/30/93	F	Carp	Fs	18.9	3.5	3.4	0.199	
127	Below Flint	08/30/93		Carp	Fs	19.3	3.4	4.9	1.18	
127	Below Flint	08/30/93		Carp	Fs	21.3	5.1	7.95	1.84	
127	Below Flint	08/30/93		Carp	Fs	18.9	3.7	5.4	0.642	
127	Below Flint	08/30/93		Carp	Fs	18.9	3.7	2.95	0.292	
127	Below Flint	08/30/93	F	Carp	Fs	20.9	5.2	4.05	0.498	
127	Below Flint	08/30/93	M	Carp	Fs	23.6	5.3	1.1	0.149	
127	Below Flint	08/30/93	M	Carp	Fs	24.0	7.9	5.95	0.541	
127	Below Flint	08/30/93	F	Carp	Fs	27.2	9.9	14.1	9.14	
127	Below Flint	10/08/98	F	Smallmouth bass	F	11.6	0.8	1.1	0.122	
127	Below Flint	10/08/98	M	Smallmouth bass	F	12.4	1.2	0.95	0.101	
127	Below Flint	10/08/98	M	Smallmouth bass	F	13.3	1.4	0.85	0.117	
127	Below Flint	10/08/98	M	Smallmouth bass	F	12.9	1.2	0.9	0.171	
127	Below Flint	10/08/98	M	Smallmouth bass	F	13.3	1.3	1.65	0.264	
127	Below Flint	10/08/98	F	Smallmouth bass	F	13.3	1.4	1.25	0.155	
127	Below Flint	10/08/98	F	Smallmouth bass	F	13.4	1.5	0.9	0.11	
127	Below Flint	10/08/98	F	Smallmouth bass	F	14.4	1.9	1.35	0.138	
127	Below Flint	10/08/98	F	Smallmouth bass	F	13.9	1.6	0.8	0.082	
127	Below Flint	10/08/98	M	Smallmouth bass	F	14.8	1.9	0.8	0.12	
127	Below Flint	10/08/98	F	Carp	Fs	19.6	4.2	3.6	0.912	
127	Below Flint	10/08/98	F	Carp	Fs	19.5	5.2	8.65	1.193	
127	Below Flint	10/08/98	M	Carp	Fs	20.4	4.4	1.45	0.108	
127	Below Flint	10/08/98	M	Carp	Fs	22.4	5.2	4.55	0.537	
127	Below Flint	10/08/98	M	Carp	Fs	22.1	5.5	2.85	0.339	
127	Below Flint	10/08/98	F	Carp	Fs	23.1	6.6	3.15	0.682	
127	Below Flint	10/08/98	F	Carp	Fs	25.9	9.4	7.35	1.064	
127	Below Flint	10/08/98	F	Carp	Fs	26.7	11.1	10	1.316	
127	Below Flint	10/08/98	F	Carp	Fs	27.9	13.2	3.85	0.265	
127	Below Flint	10/08/98		Carp	Fs	28.6	14.2	27.5	7.611	
128	Holloway Reservoir	05/18/89		Black crappie	F	9.1	0.4	0.9	0.025 *K*	
128	Holloway Reservoir	05/18/89		Black crappie	F	9.3	0.4	1.3	0.025 *K*	
128	Holloway Reservoir	05/18/89		Black crappie	F	9.3	0.5	1.1	0.025 *K*	
128	Holloway Reservoir	05/18/89		Black crappie	F	10.4	0.6	0.8	0.025 *K*	
128	Holloway Reservoir	05/18/89		Black crappie	F	10.0	0.6	0.65	0.025 *K*	
128	Holloway Reservoir	05/18/89		Black crappie	F	10.0	0.6	0.8	0.025 *K*	
128	Holloway Reservoir	05/18/89		Black crappie	F	9.8	0.6	0.55	0.025 *K*	
128	Holloway Reservoir	05/18/89		Black crappie	F	11.4	0.8	0.7	0.025 *K*	
128	Holloway Reservoir	05/18/89		Black crappie	F	11.0	0.9	1.55	0.025 *K*	
128	Holloway Reservoir	05/18/89		Smallmouth bass	F	12.2	0.8	0.45	0.025 *K*	
128	Holloway Reservoir	05/18/89		Smallmouth bass	F	12.2	0.9	1	0.025 *K*	
128	Holloway Reservoir	05/18/89		Smallmouth bass	F	13.8	1.4	1.2	0.025	

Table 3. (cont.)

	Sample Location	Collection Date	Sex	Species	Sample Type	Length (in.)	Weight (lbs)	Lipid (ppm)	Total PCBs (ppm)	Comments
128	Holloway Reservoir	05/18/89		Smallmouth bass	F	12.6	1.3	0.6	0.025 *K*	
128	Holloway Reservoir	05/18/89		Smallmouth bass	F	14.0	1.5	1.1	0.025 *K*	
128	Holloway Reservoir	05/18/89		Smallmouth bass	F	16.1	2.3	1.6	0.033	
128	Holloway Reservoir	05/18/89		Smallmouth bass	F	16.3	2.6	2.3	0.057	
128	Holloway Reservoir	05/18/89		Channel catfish	Fs	15.0	1.1	6.6	0.148	
128	Holloway Reservoir	05/18/89		Channel catfish	Fs	16.1	1.3	4.7	0.173	
128	Holloway Reservoir	05/18/89		Channel catfish	Fs	15.6	1.0	2.6	0.138	
128	Holloway Reservoir	05/18/89		Channel catfish	Fs	15.4	1.3	4.2	0.347	
128	Holloway Reservoir	05/18/89		Channel catfish	Fs	16.7	1.6	8.1	0.201	
128	Holloway Reservoir	05/18/89		Channel catfish	Fs	16.9	1.7	8.8	0.31	
128	Holloway Reservoir	05/18/89		Channel catfish	Fs	16.9	1.7	3.8	0.11	
128	Holloway Reservoir	05/18/89		Channel catfish	Fs	17.3	2.1	5	0.65	
128	Holloway Reservoir	05/18/89		Channel catfish	Fs	18.1	2.2	8	0.256	
128	Holloway Reservoir	05/18/89		Channel catfish	Fs	18.1	2.4	3	0.133	
129	Mott Reservoir	04/16/96		Walleye	F	18.9	2.1	0.85	0.025 *K*	
129	Mott Reservoir	04/16/96		Walleye	F	22.8	3.8	0.45	0.025 *K*	
129	Mott Reservoir	04/16/96		Walleye	F	24.4	5.5	0.65	0.025 *K*	
129	Mott Reservoir	04/16/96		Walleye	F	16.9	1.9	0.85	0.025 *K*	
129	Mott Reservoir	04/16/96		Walleye	F	15.9	1.2	1.3	0.025 *K*	
129	Mott Reservoir	04/16/96		Walleye	F	16.5	1.5	1	0.025 *K*	
129	Mott Reservoir	04/16/96		Walleye	F	15.4	1.3	1.35	0.025 *K*	
129	Mott Reservoir	04/16/96		Walleye	F	17.3	2.1	2.45	0.045	
129	Mott Reservoir	04/16/96	F	Carp	Fs	18.1	1.1	11.7	0.121	
129	Mott Reservoir	04/16/96	F	Carp	Fs	18.9	1.2	1.25	0.031	
129	Mott Reservoir	04/16/96	F	Carp	Fs	19.3	1.5	1.4	0.025 *K*	
129	Mott Reservoir	04/16/96		Carp	Fs	18.9	1.3	2.35	0.057	
129	Mott Reservoir	04/16/96	F	Carp	Fs	20.5	1.7	0.55	0.025 *K*	
129	Mott Reservoir	04/16/96	F	Carp	Fs	23.0	6.0	1.6	0.036	
129	Mott Reservoir	04/16/96	M	Carp	Fs	24.0	5.1	0.65	0.025	
129	Mott Reservoir	04/16/96	M	Carp	Fs	24.8	5.9	0.35	0.025 *K*	
129	Mott Reservoir	04/16/96	M	Carp	Fs	23.2	4.6	0.55	0.025 *K*	
129	Mott Reservoir	04/16/96		Carp	Fs	24.4	6.0	0.75	0.025 *K*	
126	Saginaw Co., river mouth	08/02/88		Channel catfish	W	6.7	0.1	6.6	0.094	Caged fish study; composite of 3 fish collected after 4 days.
126	Saginaw Co., river mouth	08/02/88		Channel catfish	W	6.5	0.1	6.6	0.094	Caged fish study; composite of 3 fish collected after 4 days.
126	Saginaw Co., river mouth	08/02/88		Channel catfish	W	6.3	0.1	6.6	0.094	Caged fish study; composite of 3 fish collected after 4 days.
126	Saginaw Co., river mouth	08/02/88		Channel catfish	W	6.1	0.1	6.3	0.099	Caged fish study; composite of 3 fish collected after 8 days.
126	Saginaw Co., river mouth	08/02/88		Channel catfish	W	6.7	0.1	6.3	0.099	Caged fish study; composite of 3 fish collected after 8 days.
126	Saginaw Co., river mouth	08/02/88		Channel catfish	W	6.3	0.1	6.3	0.099	Caged fish study; composite of 3 fish collected after 8 days.
126	Saginaw Co., river mouth	08/02/88		Channel catfish	W	6.5	0.1	5.6	0.115	Caged fish study; composite of 3 fish collected after 16 days.
126	Saginaw Co., river mouth	08/02/88		Channel catfish	W	6.1	0.1	5.6	0.115	Caged fish study; composite of 3 fish collected after 16 days.
126	Saginaw Co., river mouth	08/02/88		Channel catfish	W	6.3	0.1	5.6	0.115	Caged fish study; composite of 3 fish collected after 16 days.

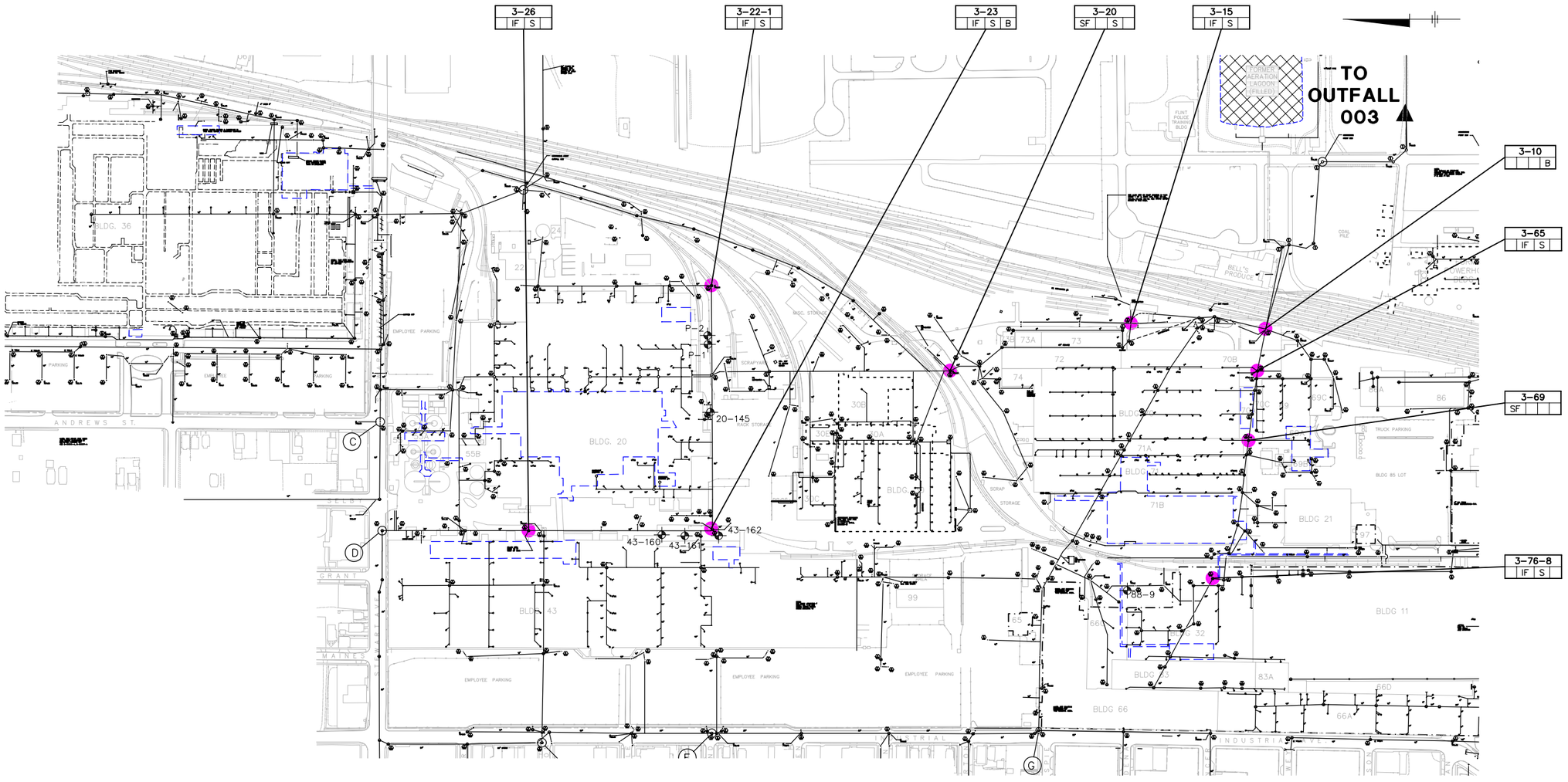
Table 3. (cont.)

	Sample Location	Collection Date	Sex	Species	Sample Type	Length (in.)	Weight (lbs)	Lipid (ppm)	Total PCBs (ppm)	Comments
126	Saginaw Co., river mouth	08/02/88		Channel catfish	W	6.3	0.1	5	0.133	Caged fish study; composite of 4 fish collected after 29 days.
126	Saginaw Co., river mouth	08/02/88		Channel catfish	W	6.6	0.1	5	0.133	Caged fish study; composite of 4 fish collected after 29 days.
126	Saginaw Co., river mouth	08/02/88		Channel catfish	W	6.7	0.1	5	0.133	Caged fish study; composite of 4 fish collected after 29 days.
126	Saginaw Co., river mouth	08/02/88		Channel catfish	W	6.5	0.1	5	0.133	Caged fish study; composite of 4 fish collected after 29 days.
126	Saginaw Co., river mouth	08/02/88		Channel catfish	W	5.9	0.0	4.6	0.136	Caged fish study; composite of 4 fish collected after 29 days.
126	Saginaw Co., river mouth	08/02/88		Channel catfish	W	5.9	0.1	4.6	0.136	Caged fish study; composite of 4 fish collected after 29 days.
126	Saginaw Co., river mouth	08/02/88		Channel catfish	W	5.7	0.0	4.6	0.136	Caged fish study; composite of 4 fish collected after 29 days.

Note: F fillet skin-on
Fs fillet skin-off
K unknown laboratory qualifier, suspected to be undetected
W whole-body

Figures

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engineers & scientists



LEGEND:

- EXISTING MONITORING WELL
- SAMPLE LOCATION
- STORM SEWER LINE

KEY:

LOCATION ID. (SF | IF | S | B)

- LOCATION ID.
- B = LNAPL INSPECT BOOM
- S = SAMPLE
- IF = INSTANT FLOW
- SF = SYSTEM FLOW

NOTE:

1. BASE MAP INFORMATION FROM A SURVEY BY BMJ, INC. DATED APRIL 2001, AT A SCALE OF 1:100.

0 200' 400'
APPROXIMATE GRAPHIC SCALE

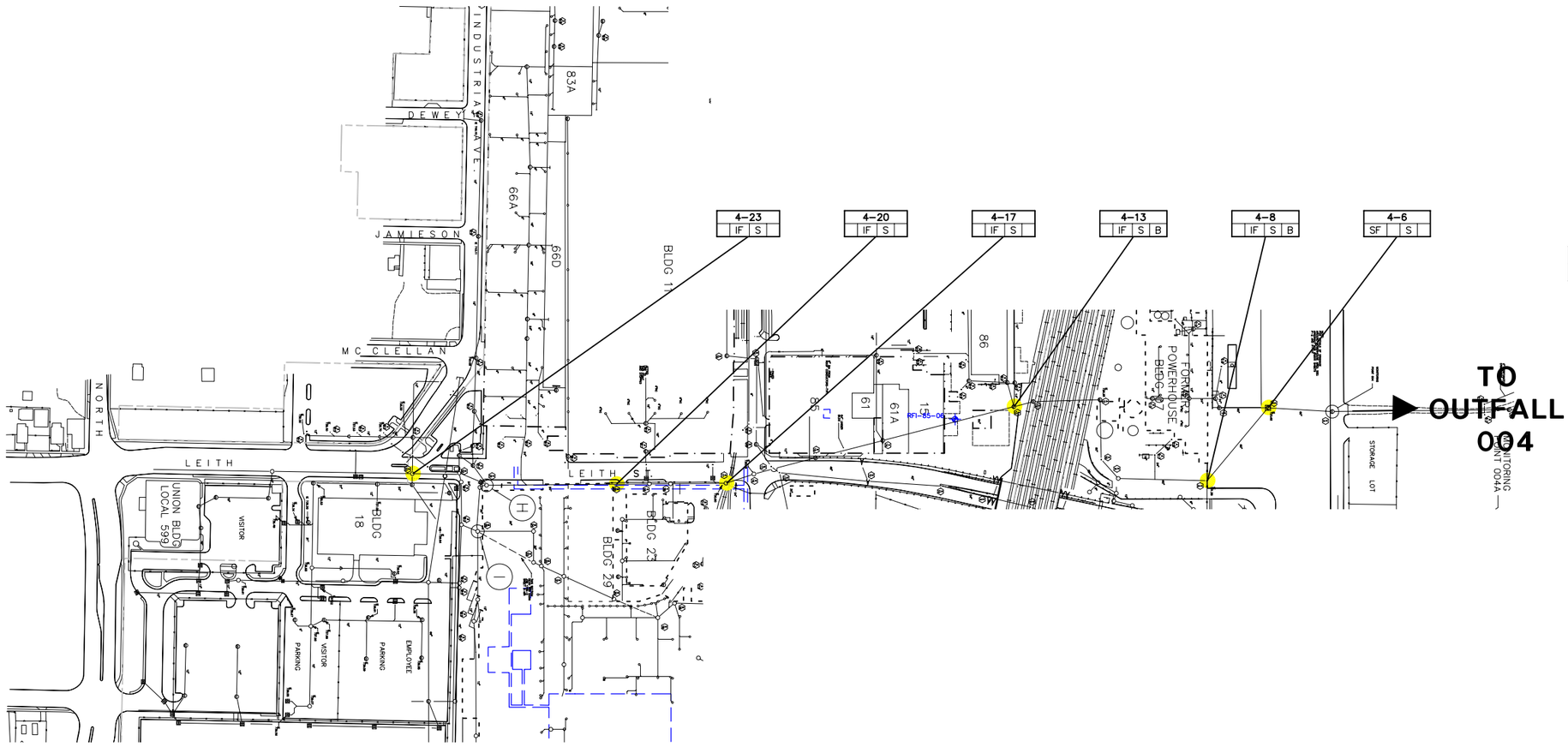
GENERAL MOTORS CORPORATION
NAO FLINT OPERATIONS SITE
FLINT, MICHIGAN

OUTFALL 003 STORM SEWER SYSTEM

BLASLAND, BOUCK & LEE, INC.
engineers, scientists, economists

FIGURE 1

X: 64410X01.DWG, 64410X07.DWG
L: ON=*, OFF=*REF* ISHD-BUILDING
P: PAGESET/PLT-DL
3/16/04 SYR-85-NES SDL GMS
64410132/64410B01.DWG



LEGEND:

- EXISTING MONITORING WELL
- PROPOSED SAMPLE LOCATION
- STORM SEWER LINE

KEY:

LOCATION ID.			
SF	IF	S	B

- LOCATION ID.
- B = LNAPL INSPECT BOOM
- S = SAMPLE
- IF = INSTANT FLOW
- SF = SYSTEM FLOW

NOTES:

1. BASE MAP INFORMATION FROM A SURVEY BY BMJ, INC. DATED APRIL 2001, AT A SCALE OF 1:100.

0 300' 600'

APPROXIMATE GRAPHIC SCALE

X: 64410X01.DWG, 64410X05.DWG, 64410X07.DWG
L: ON=*, OFF=*REF*,*SHD-BUILDING,*SUB*,*BASEMENTLINE
P: PAGESET/PLT-DL
3/16/04 SYR-54-NES SDL GMS
64410132/SEWER/64410B05.DWG

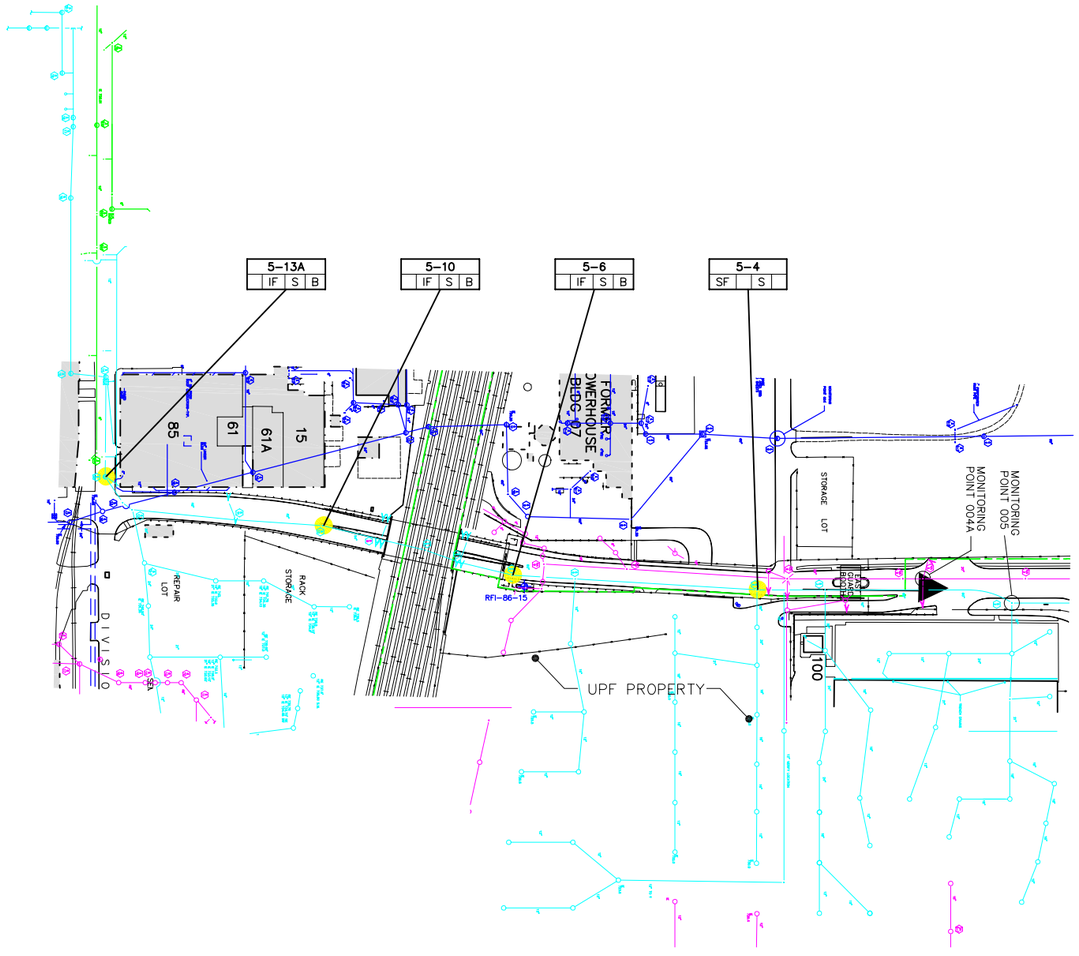
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GENERAL MOTORS CORPORATION
NAO FLINT OPERATIONS SITE
FLINT, MICHIGAN

OUTFALL 004 STORM SEWER SYSTEM

BBL BLASLAND, BOUCK & LEE, INC. engineers, scientists, economists

FIGURE 2



TO OUTFALL 005

LEGEND:

- EXISTING MONITORING WELL
- PROPOSED SAMPLE LOCATION
- STORM SEWER LINE

KEY:

LOCATION ID.			
SF	IF	S	B

- LOCATION ID.
- B = LNAPL INSPECT BOOM
- S = SAMPLE
- IF = INSTANT FLOW
- SF = SYSTEM FLOW

NOTES:

1. BASE MAP INFORMATION FROM A SURVEY BY BMJ, INC. DATED APRIL 2001, AT A SCALE OF 1:100.

0 300' 600'

APPROXIMATE GRAPHIC SCALE

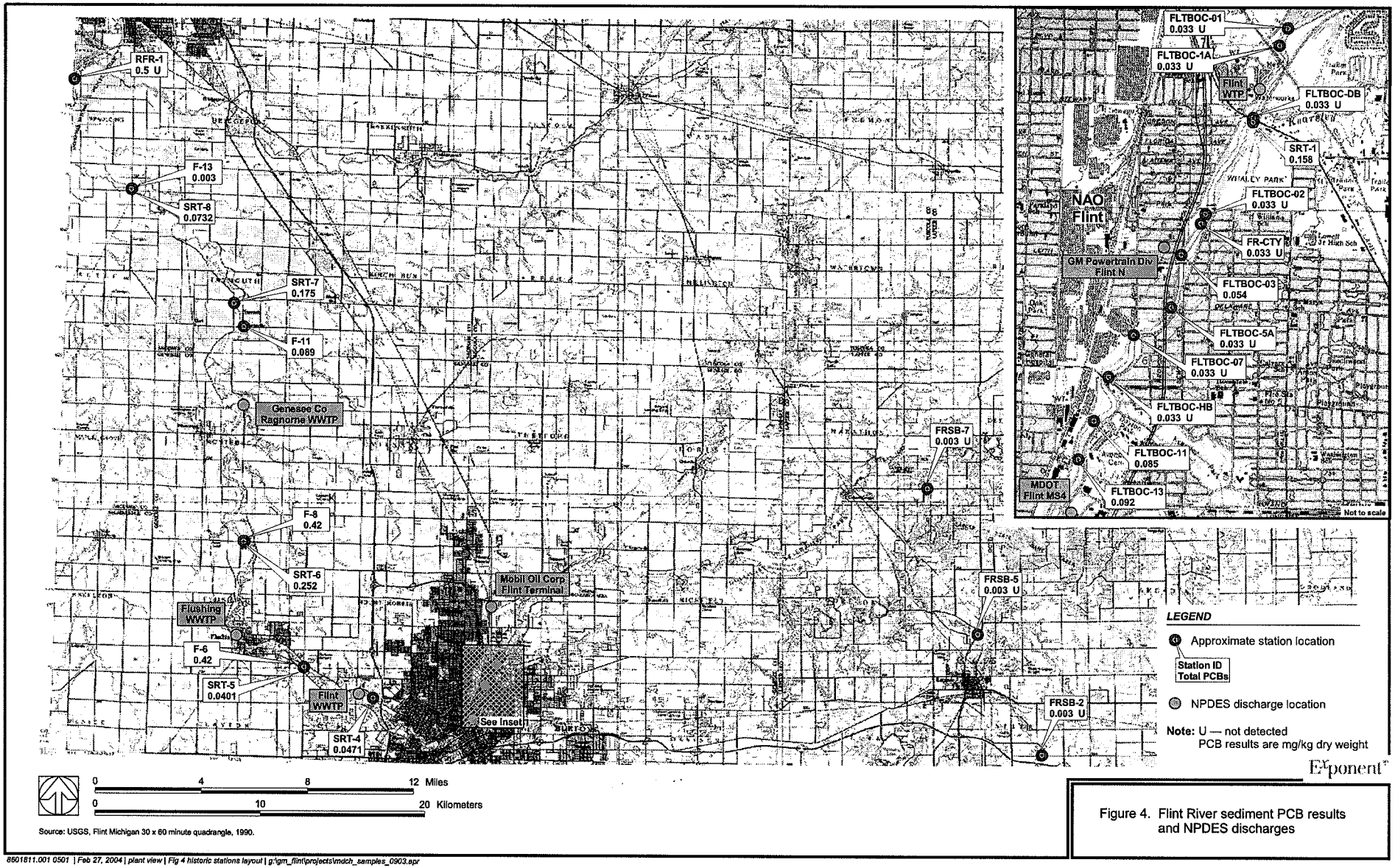
X: 64410X01.DWG, 64410X05.DWG, 64410X07.DWG
L: ON=*, OFF=*REF*,*SHD-BUILDING, *SUB*, *BASEMENTLINE
P: PAGESET/PLT-DL
3/16/04 SYR-54-NES SDL GMS
64410132/SEWER/64410B07.DWG

GENERAL MOTORS CORPORATION
NAO FLINT OPERATIONS SITE
FLINT, MICHIGAN

OUTFALL 005 STORM SEWER SYSTEM

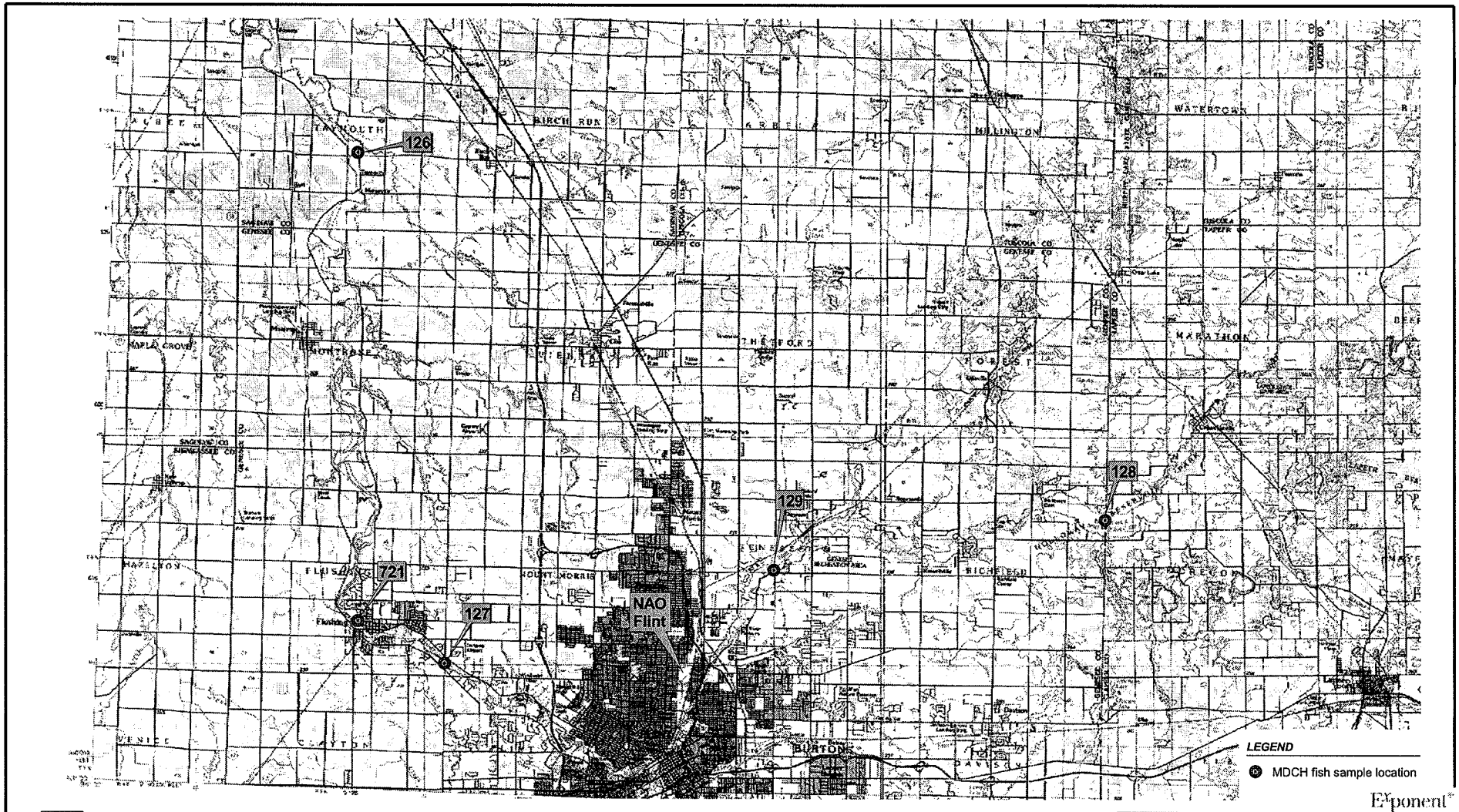
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FIGURE
3



Source: USGS, Flint Michigan 30 x 60 minute quadrangle, 1990.

Figure 4. Flint River sediment PCB results and NPDES discharges



Source: Robert Day, Michigan Department of Community Health.
USGS, Flint Michigan 30 x 60 minute quadrangle, 1990.

Exponent

Figure 5. State of Michigan fish sample locations

8601811.001 0101 | Feb 27, 2004 | MDCH sample view | Fig 5 MDCH fish layout | g:\gm_flint\projects\mdch_samples_0903.apr

Attachment 1

FILE 6440 #5

MEMORANDUM

BBL®
BLASLAND, BOUCK & LEE, INC.
engineers, scientists, economists

To: Randy Brown **Date:** March 18, 2005

From: Brian Loomis **cc:** Mark Lovejoy

Re: GM NAO Flint – Outfall 003 Catchbasin Sediment Sampling

Randy-

The following summarizes the activities associated with the collection of the sediment samples from two of the General Motors Corporation (GM) North American Operations, Flint Engine North Site (the Site). The Site storm sewer catch basins that were sampled are a part of the outfall 003 storm sewer system. Sediment from these catch basins was sampled by Brian Loomis of Blasland, Bouck, & Lee on September 9, 2004 for polychlorinated biphenyl (PCB) analysis. This work was performed as a part of the ongoing Outfall 003 investigation activities.

The catch basins sampled included MH 3-22-2 and MH 3-31-6, located near the site waste water treatment plant Sediment had been cleaned from these manholes in the late 1990's that had detectable levels of PCB's. Sediment was collected from the ground surface using a disposable scoop. Sediment was transferred into a sample container and shipped via courier to Merit Laboratory for PCB analysis. The samples were shipped under a BBL Chain of Custody # 1446. Sample identification for MH 3-22-2 and MH 3-31-6 are 3-22-2(090804) and 3-31-6(090804) respectively. Upon disturbance of the sediment during collection of the samples, a sheen appeared in each of the manholes. The sediment collected consisted mainly of fine dark brown to black sand, with trace silt and clay.

The samples collected were analyzed by Merit Laboratory on September 21, 2004 and a summary of the results are as follows:

3-22-2(090804) - Lab ID S18736.01
78 % solid
PCB 1242 4,500 ug/kg

3-31-6(090804) – Lab ID S18736.02
23.5 % solid
PCB 1242 3,400 ug/kg
PCB 1260 2,500 ug/kg

These results are recorded in lab report S18736.01 (01) that was generated on 09/22/2004.
BTL/btl

Analytical Laboratory Report

Report ID: S18736.01(01)
Generated on 09/22/2004

Report to

Attention: Mr. Mark Lovejoy
Blasland, Bouck & Lee, Inc.
1920 Opdyke Ct.
Auburn Hills, MI 48326

Phone: 248-377-9162 FAX: 248-377-9413

Report produced by

Merit Laboratories
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Report Summary

Lab Sample ID(s): S18736.01-S18736.02
Project: 64410/ GM NAO Flint Storm Sewers
Submitted Date/Time: 09/08/2004 16:00
Sampled by: B. Loomis
P.O. #:

Report Notes

Results relate only to items tested.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
"Not detected" indicates that parameter was not found at a level equal to or greater than the RDL.
Report shall not be reproduced except in full, without the written approval of Merit Laboratories.

Violetta F. Murshak

Violetta F. Murshak
Laboratory Director

Analytical Laboratory Report

Lab Sample ID: S18736.01
Sample Tag: 3-22-2 (090804)
Collected Date/Time: 09/08/2004 11:30
Matrix: Soil
COC Reference: 1446

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	8oz. Glass	None	Yes	8	3

Analysis	Results	Units	RDL	Method	Run Date/Time	Analyst	CAS #	Flag
Extraction / Prep.								
Extraction, PCB	Completed			3550B	09/17/04 17:28	BGD		
Inorganics								
Total Solids	78	%	1	160.3	09/20/04 19:30	LBR		
Organics								
PCB List								
PCB-1016	Not detected	ug/kg	500	8082	09/21/04 11:49	JANB	12674-11-2	
PCB-1242	4,500	ug/kg	500	8082	09/21/04 11:49	JANB	53469-21-9	
PCB-1221	Not detected	ug/kg	500	8082	09/21/04 11:49	JANB	11104-28-2	
PCB-1232	Not detected	ug/kg	500	8082	09/21/04 11:49	JANB	11141-16-5	
PCB-1248	Not detected	ug/kg	500	8082	09/21/04 11:49	JANB	12672-29-6	
PCB-1254	Not detected	ug/kg	500	8082	09/21/04 11:49	JANB	11097-69-1	
PCB-1260	Not detected	ug/kg	500	8082	09/21/04 11:49	JANB	11096-82-5	

Y-Elevated reporting limit due to high target concentration

Analytical Laboratory Report

Lab Sample ID: S18736.02
Sample Tag: 3-31-6 (090804)
Collected Date/Time: 09/08/2004 12:00
Matrix: Soil
COC Reference: 1446

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	8oz. Glass	None	Yes	8	3

Analysis	Results	Units	RDL	Method	Run Date/Time	Analyst	CAS #	Flag
Extraction / Prep.								
Extraction, PCB	Completed			3550B	09/17/04 17:28	BGD		
Inorganics								
Total Solids	23.5	%	1	160.3	09/10/04 13:00	LBR		
Organics								
PCB List								
PCB-1016	Not detected	ug/kg	1,000	8082	09/21/04 12:07	JANB	12674-11-2	
PCB-1242	3,400	ug/kg	1,000	8082	09/21/04 12:07	JANB	53469-21-9	
PCB-1221	Not detected	ug/kg	1,000	8082	09/21/04 12:07	JANB	11104-28-2	
PCB-1232	Not detected	ug/kg	1,000	8082	09/21/04 12:07	JANB	11141-16-5	
PCB-1248	Not detected	ug/kg	1,000	8082	09/21/04 12:07	JANB	12672-29-6	
PCB-1254	Not detected	ug/kg	1,000	8082	09/21/04 12:07	JANB	11097-69-1	
PCB-1260	2,500	ug/kg	1,000	8082	09/21/04 12:07	JANB	11096-82-5	

BBL
BLASLAND, BOUCK & LEE, INC.
engineers, scientists, economists

ID#: 1446

CHAIN OF CUSTODY & LABORATORY ANALYSIS REQUEST FORM

Page 1 of 1

Lab Work Order #:

Send Results to:

Contact & Company Name: MARK LOVEJOY-BBL	Telephone: 248 377 9162
Address: 1920 OPPYKE CT	Fax: 248 377 9413
City: AUBURN HILLS State: MI Zip:	e-mail address:
Proj. Name/Location (City/State): GM NAO FLINT	Project #: 64410.135
Sampler's Printed Name: B. COOMIS	Sampler's Signature:

Preservative	4°C							
Filtered (Y)	N							
# of Containers	2							
Container Information	B							

PARAMETER ANALYSIS & METHOD

Keys

Preservation Key: A. H_2SO_4 B. HCL C. HNO_3 D. NaOH E. None F. Other: _____ G. Other: _____ H. Other: _____

Container Information Key: 1. 40 ml Vial 2. 1 L Amber 3. 250 ml Plastic 4. 500 ml Plastic 5. Encore 6. 2 oz Glass 7. 4 oz Glass 8. 8 oz Glass 9. Other: _____ 10. Other: _____

Matrix Key: SO - Soil SE - Sediment NL - NAPL/Oil W - Water SL - Sludge SW - Sample Wipe T - Tissue A - Air Other: _____

Sample ID	Collection Date	Collection Time	Type (✓) Comp	Type (✓) Grab	Matrix	PCB	REMARKS
3-22-2 (090804)	9/8/04	1130		X	SOIL	X	
3-31-6 (090804)	9/8/04	1200		X	SOIL	X	

ANALYZE SEDIMENT ONLY

Special Instructions/Comments:

☐ Special QA/QC Instructions (✓):

Laboratory Information and Receipt		Relinquished By	Received By	Relinquished By	Laboratory Received By
Lab Name: Merit	Cooler Custody Seal (✓): ☐ Intact ☐ Not Intact	Printed Name: Brian Loomis	Printed Name: Chris Gauthier	Printed Name: Chris Gauthier	Printed Name: Paula Straw
☑ Cooler packed with ice (✓)		Signature:	Signature:	Signature:	Signature: Paula Straw
Specify Turnaround Requirements: STANDARD	Sample Receipt: Condition/Cooler Temp:	Firm: BBL	Firm/Courier: Merit	Firm/Courier: Merit	Firm: Merit
Shipping Tracking #: COURIER		Date/Time: 9/8/04	Date/Time: 9-8-04 1500	Date/Time: 9-8-04 1600	Date/Time: 9-8-04 1600

MEMORANDUM

BBL®
BLASLAND, BOUCK & LEE, INC.
engineers, scientists, economists

To: Kurt Blizzard, GM
Jean Caufield, GM

From: Derek C. Kaiding

Date: September 2, 2005

cc: Pieter Booth, Exponent
C.Y. Jeng, ENVIRON
Mark Brown, BBL
Mike Scoville , BBL

Re: Results of April 28, 2005 Flint River Sediment Split Sampling Event

At your request, on April 28, 2005, Blasland, Bouck & Lee, Inc. (BBL) observed sediment sampling being performed by the Michigan Department of Environmental Quality (MDEQ) along the Flint River, adjacent to the General Motors Corporation (GM) North America Operations (NAO) Flint Operations Site (GM facility). These observations were performed for the purposes of splitting sediment samples with MDEQ for separate laboratory analysis on behalf of GM.

The MDEQ sampling program included the collection of a total of nine samples from six general locations along the river upstream of, adjacent to, and downstream of the GM facility, with a particular focus on outfalls associated with the GM facility. MDEQ specifically sampled the following locations: Mott Lake, Utah Dam area, and Outfalls 003, 005, 011, and 013. Figure 1 provides an illustration of these areas.

Per MDEQ, the purpose of its sampling program was to establish a base line data set for this segment of the Flint River. All sediment samples collected by MDEQ were to be analyzed for volatile organic compounds (VOCs), and semi-volatile organic compounds (SVOCs), with the majority also slated for analysis of dioxins, Michigan 10 metals, and arochlor- and congener-specific polychlorinated biphenyls (PCBs).

All of the sediment samples were collected by Mr. Art Ostaszewski of MDEQ, with Gary Cygan and Tammy Moore, both of the United States Environmental Protection Agency (USEPA), also observing the entire sampling program.

GM was notified only on April 26, 2005 of the sampling event, not leaving enough time for GM to properly coordinate split sampling and program observation. As such, Brian Loomis of BBL, split a total of only three sediment samples on behalf of GM, and observed only about one-half of the MDEQ program, on behalf of GM.

MDEQ used a "Ponar Dredge" to collect grab samples at most of the locations in order to collect sufficient quantities of material to split samples. MDEQ used a "Peat Borer" to collect cores at some of the locations in an effort to visually inspect an 18-inch core of the sediment along the rivers edge, as well as to sample in 6-inch intervals to depth.

MDEQ decontaminated their equipment between each sampling location by scrubbing and rinsing the equipment in the Flint River, followed by a dionized water rinse. MDEQ released all

rinsate and solids from decontaminating equipment into the Flint River at each location where samples had been collected.

Prior to BBL's arrival, MDEQ and USEPA had already collected samples from three of the locations: Mott Lake, the Utah Dam area, and Outfall 003. BBL split sediment samples from the remaining three sampling locations: Outfall 005, Outfall 011, and Outfall 013.

These split samples collected by BBL were submitted to Merit Laboratories, Inc. (Merit) in East Lansing, Michigan, under proper chain of custody, and were sampled for arochlor- and congener-specific PCBs, Project Analyte List (PAL) VOCs, PAL SVOCs, and Michigan 10 metals (arsenic, barium, cadmium, chromium total, copper, lead, mercury, selenium, silver, and zinc).

A copy of GM's split sample laboratory analytical data report is included in Appendix A. A summary of GM's split sample analytical results are presented in Table 1.

As shown on Table 1, PCBs (arochlor 1254 only) were detected at all three split sample locations, however only at estimated concentrations less than 0.1 parts per billion (ppb). The following SVOCs were detected at levels above the reporting limit (up to 1,600 ppb): benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, bis(2-Ethylhexyl)phthalate, chrysene, fluoranthene, phenanthrene, and pyrene. Methylene chloride is the only VOC detected above the reporting limit (up to 800 ppb). Similar results were observed in samples from all three sampling locations. The highest concentrations of analytes were recorded near Outfall 013

Sediment at all of the locations consisted of silt with some sand, and appeared to contain a high organic content based on visual observations. Dark staining was present in several samples.

MDEQ recorded the location of four of the sampling points using a hand held Global Positioning System (GPS) unit. The remaining two locations were not recorded due to equipment failure.

Appendix B provides a summary of the specific samples collected by MDEQ and the corresponding laboratory analyses that MDEQ indicated would be conducted.

DCK/

TABLE 1
SUMMARY OF ANALYTICAL DATA - FLINT RIVER SPLIT SEDIMENT SAMPLES

GENERAL MOTORS CORPORATION
NAO FLINT OPERATIONS SITE
FLINT, MICHIGAN

Sample ID: / Date Collected:	Units	Outfall 005 04/28/05	Outfall 011 04/28/05	Outfall 013 04/28/05
Inorganic				
Arsenic	mg/kg	10	4.6	7.8
Barium	mg/kg	170	70	140
Cadmium	mg/kg	1.2	1.7	1.9
Chromium Total	mg/kg	17	15	20
Copper	mg/kg	48	58	67
Lead	mg/kg	76	67	110
Mercury	mg/kg	0.11	0.070	0.12
Selenium	mg/kg	0.68	0.42	0.81
Silver	mg/kg	0.24	0.26	0.25
Zinc	mg/kg	240	150	270
Miscellaneous				
Total Solids	%	32	49	32
PCB				
Aroclor-1016 (PCB-1016)	ug/kg	330 U	330 U	330 U
Aroclor-1221 (PCB-1221)	ug/kg	330 U	330 U	330 U
Aroclor-1232 (PCB-1232)	ug/kg	330 U	330 U	330 U
Aroclor-1242 (PCB-1242)	ug/kg	330 U	330 U	330 U
Aroclor-1248 (PCB-1248)	ug/kg	330 U	330 U	330 U
Aroclor-1254 (PCB-1254)	ug/kg	40 J	50 J	20 J
Aroclor-1260 (PCB-1260)	ug/kg	330 U	330 U	330 U
SVOC				
2,2'-oxybis(1-Chloropropane) (bis(2-chloroisopropyl) ether)	ug/kg	500 U	300 U	500 U
2,4,5-Trichlorophenol	ug/kg	500 U	300 U	500 U
2,4,6-Trichlorophenol	ug/kg	500 U	300 U	500 U
2,4-Dichlorophenol	ug/kg	500 U	300 U	500 U
2,4-Dimethylphenol	ug/kg	500 U	300 U	500 U
2,4-Dinitrophenol	ug/kg	500 UJ	700 UJ	500 UJ
2,4-Dinitrotoluene	ug/kg	500 U	300 U	500 U
2,6-Dinitrotoluene	ug/kg	500 U	300 U	500 U
2-Chloronaphthalene	ug/kg	500 U	300 U	500 U
2-Chlorophenol	ug/kg	500 U	300 U	500 U
2-Methylnaphthalene	ug/kg	500 U	300 U	500 U
2-Methylphenol	ug/kg	500 U	300 U	500 U
2-Nitroaniline	ug/kg	500 U	700 U	500 U
2-Nitrophenol	ug/kg	500 U	300 U	500 U
3,3'-Dichlorobenzidine	ug/kg	500 U	700 U	500 U
3-Methylphenol	ug/kg	500 U	300 U	500 U
3-Nitroaniline	ug/kg	500 U	700 U	500 U
4,6-Dinitro-2-methylphenol	ug/kg	500 U	700 U	500 U
4-Bromophenyl phenyl ether	ug/kg	500 U	300 U	500 U
4-Chloro-3-methylphenol	ug/kg	500 U	300 U	500 U
4-Chloroaniline	ug/kg	500 UJ	700 UJ	500 UJ
4-Chlorophenyl phenyl ether	ug/kg	500 U	300 U	500 U
4-Nitroaniline	ug/kg	500 U	700 U	500 U
4-Nitrophenol	ug/kg	500 U	700 U	500 U
Acenaphthene	ug/kg	500 U	300 U	500 U
Acenaphthylene	ug/kg	500 U	300 U	500 U
Acetophenone	ug/kg	500 U	300 U	500 U
Anthracene	ug/kg	100 J	70 J	100 J
Atrazine	ug/kg	500 U	300 U	500 U
Benzaldehyde	ug/kg	500 U	300 U	500 U
Benzo(a)anthracene	ug/kg	700	400	900

TABLE 1
SUMMARY OF ANALYTICAL DATA - FLINT RIVER SPLIT SEDIMENT SAMPLES

GENERAL MOTORS CORPORATION
NAO FLINT OPERATIONS SITE
FLINT, MICHIGAN

Sample ID: / Date Collected:	Units	Outfall 005 04/28/05	Outfall 011 04/28/05	Outfall 013 04/28/05
SVOC Cont.				
Benzo(a)pyrene	ug/kg	800	500	1,000
Benzo(b)fluoranthene	ug/kg	800	500	1,100
Benzo(g,h,i)perylene	ug/kg	500 UJ	300 UJ	400 J
Benzo(k)fluoranthene	ug/kg	600	400	800
Biphenyl	ug/kg	500 U	300 U	500 U
bis(2-Chloroethoxy)methane	ug/kg	500 U	300 U	500 U
bis(2-Chloroethyl)ether	ug/kg	500 U	300 U	500 U
bis(2-Ethylhexyl)phthalate	ug/kg	600	300	700
Butyl benzylphthalate	ug/kg	500 U	400	500 U
Caprolactam	ug/kg	500 U	300 U	500 U
Carbazole	ug/kg	100 J	70 J	200 J
Chrysene	ug/kg	900	600	1,200
Di-n-butylphthalate	ug/kg	500 U	300	500 U
Di-n-octyl phthalate	ug/kg	500 U	300 U	500 U
Dibenz(a,h)anthracene	ug/kg	500 UJ	300 U	500 UJ
Dibenzofuran	ug/kg	500 U	300 U	500 U
Diethyl phthalate	ug/kg	500 U	300 U	500 U
Dimethyl phthalate	ug/kg	500 U	300 U	500 U
Fluoranthene	ug/kg	1,600	300 U	2,000
Fluorene	ug/kg	500 U	300 U	500 U
Hexachlorobenzene	ug/kg	500 U	300 U	500 U
Hexachlorobutadiene	ug/kg	500 U	300 U	500 U
Hexachlorocyclopentadiene	ug/kg	R	300 U	500 UJ
Hexachloroethane	ug/kg	500 UJ	300 U	500 U
Indeno(1,2,3-cd)pyrene	ug/kg	1,200 J	300 U	1,500
Isophorone	ug/kg	500 U	300 U	500 U
N-Nitrosodi-n-propylamine	ug/kg	500 U	300 U	500 U
N-Nitrosodiphenylamine	ug/kg	500 U	300 U	500 U
Naphthalene	ug/kg	500 U	300 U	500 U
Nitrobenzene	ug/kg	500 U	200 U	500 U
Pentachlorophenol	ug/kg	500 U	700 U	500 U
Phenanthrene	ug/kg	700	500	800
Phenol	ug/kg	500 U	300 U	500 U
Pyrene	ug/kg	1,300	800	1,600
VOC				
1,1,1-Trichloroethane	ug/kg	200 U	100 U	200 U
1,1,2,2-Tetrachloroethane	ug/kg	200 U	100 U	200 U
1,1,2-Trichloroethane	ug/kg	200 U	100 U	200 U
1,1-Dichloroethane	ug/kg	200 U	100 U	200 U
1,1-Dichloroethene	ug/kg	200 U	100 U	200 U
1,2,4-Trichlorobenzene	ug/kg	300 UJ	200 UJ	300 UJ
1,2-Dibromo-3-chloropropane (DBCP)	ug/kg	200 UJ	100 UJ	200 UJ
1,2-Dibromoethane (Ethylene Dibromide)	ug/kg	200 U	100 U	200 U
1,2-Dichlorobenzene	ug/kg	200 U	100 U	200 U
1,2-Dichloroethane	ug/kg	200 U	100 U	200 U
1,2-Dichloropropane	ug/kg	200 U	100 U	200 U
1,3-Dichlorobenzene	ug/kg	200 U	100 U	200 U
1,4-Dichlorobenzene	ug/kg	200 U	100 U	200 U
2-Butanone (Methyl Ethyl Ketone)	ug/kg	2,000 U	2,000 U	2,000 U
2-Hexanone	ug/kg	8,000 U	5,000 U	8,000 U
4-Methyl-2-Pentanone (Methyl Isobutyl Ketone)	ug/kg	8,000 U	5,000 U	8,000 U
Acetone	ug/kg	2,000 U	2,000 U	2,000 U

TABLE 1
SUMMARY OF ANALYTICAL DATA - FLINT RIVER SPLIT SEDIMENT SAMPLES

GENERAL MOTORS CORPORATION
NAO FLINT OPERATIONS SITE
FLINT, MICHIGAN

Sample ID: / Date Collected:	Units	Outfall 005 04/28/05	Outfall 011 04/28/05	Outfall 013 04/28/05
VOC cont.				
Benzene	ug/kg	200 U	100 U	200 U
Bromodichloromethane	ug/kg	200 U	100 U	200 U
Bromoform	ug/kg	200 UJ	100 UJ	200 UJ
Bromomethane (Methyl Bromide)	ug/kg	800 U	500 U	800 U
Carbon disulfide	ug/kg	800 U	500 U	800 U
Carbon tetrachloride	ug/kg	200 U	100 U	200 U
Chlorobenzene	ug/kg	200 U	100 U	200 U
Chloroethane	ug/kg	800 U	500 U	800 U
Chloroform (Trichloromethane)	ug/kg	200 U	100 U	200 U
Chloromethane (Methyl Chloride)	ug/kg	800 U	500 U	800 U
cis-1,2-Dichloroethene	ug/kg	200 U	100 U	200 U
cis-1,3-Dichloropropene	ug/kg	200 U	100 U	200 U
Cyclohexane	ug/kg	200 UJ	100 UJ	200 UJ
Dibromochloromethane	ug/kg	200 U	100 U	200 U
Dichlorodifluoromethane (CFC-12)	ug/kg	200 U	100 U	200 U
Ethylbenzene	ug/kg	200 U	100 U	200 U
Isopropylbenzene	ug/kg	200 U	100 U	200 U
m&p-Xylene	ug/kg	200 U	100 U	200 U
Methyl acetate	ug/kg	800 J	5,000 U	400 J
Methyl cyclohexane	ug/kg	200 U	100 U	200 U
Methyl Tert Butyl Ether	ug/kg	800 U	500 U	800 U
Methylene chloride	ug/kg	800	500	800
o-Xylene	ug/kg	200 U	100 U	200 U
Styrene	ug/kg	200 U	100 U	200 U
Tetrachloroethene	ug/kg	200 U	100 U	200 U
Toluene	ug/kg	40 J	100 U	200 U
trans-1,2-Dichloroethene	ug/kg	200 U	100 U	200 U
trans-1,3-Dichloropropene	ug/kg	200 U	100 U	200 U
Trichloroethene	ug/kg	200 U	100 U	200 U
Trichlorofluoromethane (CFC-11)	ug/kg	300 U	200 U	300 U
Trifluorotrichloroethane (Freon 113)	ug/kg	300 U	200 U	300 U
Vinyl chloride	ug/kg	300 U	200 U	300 U

Note:
J = The compound was positively identified; however, the associated numerical value is an estimated concentration only.
R = Sample results were rejected.
U = The compound was not identified.
UJ = The compound was analyzed but not detected. The associated value is the compound reporting limit.


C.S. MOTT LAKE DAM
OUTFALL 001
GM SITE
UTAH DAM
OUTFALL 002
OUTFALL 100 FROM LAGOONS VALVE CLOSED
OUTFALL 003 HICKORY ST
OUTFALL 004 STATE ST
OUTFALL 004A
OUTFALL 005 S. LEITH ST
OUTFALL 005A
OUTFALL 005B
OUTFALL 006 CAMPAU ST
OUTFALL 007
OUTFALL 007A
OUTFALL 008
OUTFALL 010 HAMILTON AVE
OUTFALL 012 N. DUPONT
OUTFALL 011 S. DUPONT
OUTFALL 013 WOOD ST
HAMILTON DAM
LEGEND:
OUTFALL
NOTE:
1. AERIAL PHOTOS OBTAINED FROM: THE STATE OF MICHIGAN'S CENTER FOR GEOGRAPHIC INFORMATION, DEPARTMENT OF INFORMATION TECHNOLOGY, http://www.michigan.gov/cgi/
0
1,600
3,200
Feet
GENERAL MOTORS CORPORATION
NORTH AMERICAN OPERATIONS
FLINT OPERATIONS SITE - FLINT, MICHIGAN
DESCRIPTION OF FLINT RIVER STUDY AREA
FLINT RIVER STUDY AREA AND
GM STORM SEWER OUTFALL LOCATIONS
BBL
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engineers, scientists, economists
FIGURE
1
5/4/05 SYR 85 EAB
GM Flint
Q:\GeneralMotors\CCR_Report\mxd\GMSite.mxd

APPENDIX A

ANALYTICAL LABORATORY REPORT – GM FLINT RIVER SEDIMENT SPLIT SAMPLES, APRIL 28, 2005

BBL®
BLASLAND, BOUCK & LEE, INC.
engineers, scientists, economists

Analytical Laboratory Report

Report ID: S22025.01(01)
Generated on 05/19/2005

Report to

Attention: Mr. Mark Lovejoy/Randy Brown
Blasland, Bouck & Lee, Inc.
6723 Towpath Rd.
Syracuse, NY 13214

Phone: 315-446-2570 FAX: 315--449-0025

Report produced by

Merit Laboratories
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Report Summary

Lab Sample ID(s): S22025.01-S22025.03
Project: 64410/ NAO Flint North
Submitted Date/Time: 05/02/2005 08:00
Sampled by: Brian Loomis
P.O. #:

Report Notes

Results relate only to items tested.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
"Not detected" indicates that parameter was not found at a level equal to or greater than the RDL.
Report shall not be reproduced except in full, without the written approval of Merit Laboratories.

Violetta F. Murshak
Violetta F. Murshak
Laboratory Director

Merit Laboratories, Inc.

Analytical Laboratory Report

Lab Sample ID: S22025.01
Sample Tag: Outfall 005 (042805)
Collected Date/Time: 04/28/2005 11:20
Matrix: Sludge
COC Reference: 02504

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	8oz. Glass	None	Yes	4	3

Analysis	Results	Units	RDL	Method	Run Date/Time	Analyst	CAS #	Flags
Extraction / Prep.								
BNA Extraction	Completed			3550B	05/05/05 14:41	PL		
Extraction, PCB	Completed			3550B	05/03/05 14:43	EMR		
Mercury Digestion	Completed			7471A	05/10/05 12:00	JRT		
Metal Digestion	Completed			3050B	05/17/05 09:30	MSH		
Inorganics								
Total Solids	32.3	%	1	160.3	05/05/05 08:15	VJH		
Metals								
Arsenic	10.4	mg/kg	0.10	6020	05/17/05 17:08	SLS	7440-38-2	
Barium	172	mg/kg	1.0	6020	05/17/05 17:08	SLS	7440-39-3	
Cadmium	1.20	mg/kg	0.05	6020	05/17/05 17:08	SLS	7440-43-9	
Chromium	17.2	mg/kg	0.50	6020	05/17/05 17:08	SLS	7440-47-3	
Copper	48.0	mg/kg	1.0	6020	05/17/05 17:08	SLS	7440-50-8	
Lead	75.5	mg/kg	1.0	6020	05/17/05 17:08	SLS	7439-92-1	
Mercury	0.11	mg/kg	0.05	245.1M	05/10/05 15:55	JRT	7439-97-6	
Selenium	0.68	mg/kg	0.20	6020	05/17/05 17:08	SLS	7782-49-2	
Silver	0.24	mg/kg	0.10	6020	05/17/05 17:08	SLS	7440-22-4	
Zinc	235	mg/kg	1.0	6020	05/17/05 17:08	SLS	7440-66-6	
Organics - PCBs/Pesticides								
TCL PCB List (Column 1)								
PCB-1016	Not detected	ug/kg	330	8082	05/06/05 11:31	JANB	12674-11-2	
PCB-1242	Not detected	ug/kg	330	8082	05/06/05 11:31	JANB	53469-21-9	
PCB-1221	Not detected	ug/kg	330	8082	05/06/05 11:31	JANB	11104-28-2	
PCB-1232	Not detected	ug/kg	330	8082	05/06/05 11:31	JANB	11141-16-5	
PCB-1248	Not detected	ug/kg	330	8082	05/06/05 11:31	JANB	12672-29-6	
PCB-1254	30	ug/kg	330	8082	05/06/05 11:31	JANB	11097-69-1	J
PCB-1260	Not detected	ug/kg	330	8082	05/06/05 11:31	JANB	11096-82-5	
TCL PCB List (Column 2)								
PCB-1016	Not detected	ug/kg	330	8082	05/06/05 11:31	JANB	12674-11-2	
PCB-1242	Not detected	ug/kg	330	8082	05/06/05 11:31	JANB	53469-21-9	
PCB-1221	Not detected	ug/kg	330	8082	05/06/05 11:31	JANB	11104-28-2	
PCB-1232	Not detected	ug/kg	330	8082	05/06/05 11:31	JANB	11141-16-5	
PCB-1248	Not detected	ug/kg	330	8082	05/06/05 11:31	JANB	12672-29-6	
PCB-1254	40	ug/kg	330	8082	05/06/05 11:31	JANB	11097-69-1	J
PCB-1260	Not detected	ug/kg	330	8082	05/06/05 11:31	JANB	11096-82-5	
Organics - Semi-Volatiles								
TCL Semi-Volatile Organics								
Acenaphthene	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	83-32-9	1

J-Estimated value less than reporting limit, but greater than MDL
1-ELEVATED DETECTION LIMITS DUE TO LOW TOTAL SOLIDS

Merit Laboratories, Inc.

Analytical Laboratory Report

Lab Sample ID: S22025.01 (continued)
Sample Tag: Outfall 005 (042805)

Analysis	Results	Units	RDL	Method	Run Date/Time	Analyst	CAS #	Flags
Organics - Semi-Volatiles (continued)								
TCL Semi-Volatile Organics (continued)								
Acenaphthylene	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	208-96-8	1
Acetophenone	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	98-86-2	1
Anthracene	100	ug/kg	500	8270C	05/12/05 14:19	ARH	120-12-7	J1
Atrazine	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	1912-24-9	1
1,1'-Biphenyl	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	92-52-4	1
4-Bromophenyl phenyl ether	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	101-55-3	1
di-n-Butyl phthalate	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	84-74-2	1
Benzaldehyde	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	100-52-7	1
Benzo(a)anthracene	700	ug/kg	500	8270C	05/12/05 14:19	ARH	56-55-3	1
Benzo(a)pyrene	800	ug/kg	500	8270C	05/12/05 14:19	ARH	50-32-8	1
Benzo(b)fluoranthene	800	ug/kg	500	8270C	05/12/05 14:19	ARH	205-99-2	1
Benzo(ghi)perylene	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	191-24-2	1
Benzo(k)fluoranthene	600	ug/kg	500	8270C	05/12/05 14:19	ARH	207-08-9	1
Butyl benzyl phthalate	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	85-68-7	1
2-Chloronaphthalene	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	91-58-7	1
2-Chlorophenol	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	95-57-8	1
4-Chloro-3-methylphenol	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	59-50-7	1
4-Chloroaniline	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	106-47-8	1
4-Chlorophenyl phenyl ether	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	7005-72-3	1
Caprolactam	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	105-60-2	1
Carbazole	100	ug/kg	500	8270C	05/12/05 14:19	ARH	86-74-8	J1
bis(2-Chloroethoxy)methane	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	111-91-1	1
bis(2-Chloroethyl)ether	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	111-44-4	1
bis(2-Chloroisopropyl)ether	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	108-60-1	1
Chrysene	900	ug/kg	500	8270C	05/12/05 14:19	ARH	218-01-9	1
2,4-Dichlorophenol	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	120-83-2	1
2,4-Dimethylphenol	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	105-67-9	1
2,4-Dinitrophenol	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	51-28-5	1
2,4-Dinitrotoluene	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	121-14-2	1
2,6-Dinitrotoluene	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	606-20-2	1
3,3'-Dichlorobenzidine	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	91-94-1	1
4,6-Dinitro-2-methylphenol	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	534-52-1	1
Dibenzo(ah)anthracene	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	53-70-3	1
Dibenzofuran	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	132-64-9	1
Diethyl phthalate	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	84-66-2	1
Dimethyl phthalate	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	131-11-3	1
bis(2-Ethylhexyl)phthalate	600	ug/kg	500	8270C	05/12/05 14:19	ARH	117-81-7	1
Fluoranthene	1,600	ug/kg	500	8270C	05/12/05 14:19	ARH	206-44-0	1
Fluorene	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	86-73-7	1
Hexachlorobenzene	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	118-74-1	1
Hexachlorobutadiene	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	87-68-3	1
Hexachlorocyclopentadiene	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	77-47-4	1
Hexachloroethane	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	67-72-1	1
Indeno(1,2,3-cd)pyrene	1,200	ug/kg	500	8270C	05/12/05 14:19	ARH	193-39-5	1
Isophorone	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	78-59-1	1
2-Methylnaphthalene	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	91-57-6	1
2-Methylphenol	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	95-48-7	1

1-ELEVATED DETECTION LIMITS DUE TO LOW TOTAL SOLIDS
J-Estimated value less than reporting limit, but greater than MDL

Lab Sample ID: S22025.01 (continued)
Sample Tag: Outfall 005 (042805)

Analysis	Results	Units	RDL	Method	Run Date/Time	Analyst	CAS #	Flags
Organics - Semi-Volatiles (continued)								
TCL Semi-Volatile Organics (continued)								
3-, 4-Methylphenol	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	108-39-4	1
2-Nitroaniline	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	88-74-4	1
2-Nitrophenol	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	88-75-5	1
3-Nitroaniline	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	99-09-2	1
4-Nitroaniline	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	100-01-6	1
4-Nitrophenol	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	100-02-7	1
N-Nitrosodi-n-propylamine	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	621-64-7	1
N-Nitrosodiphenylamine	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	86-30-6	1
Naphthalene	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	91-20-3	1
Nitrobenzene	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	98-95-3	1
di-n-Octyl phthalate	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	117-84-0	1
Pentachlorophenol	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	87-86-5	1
Phenanthrene	700	ug/kg	500	8270C	05/12/05 14:19	ARH	85-01-8	1
Phenol	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	108-95-2	1
Pyrene	1,300	ug/kg	500	8270C	05/12/05 14:19	ARH	129-00-0	1
2,4,5-Trichlorophenol	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	95-95-4	1
2,4,6-Trichlorophenol	Not detected	ug/kg	500	8270C	05/12/05 14:19	ARH	88-06-2	1
Organics - Volatiles								
TCL Volatile Organics 5035/8260								
Acetone	Not detected	ug/kg	2,000	5035/8260B	05/12/05 15:08	JGH	67-64-1	
2-Butanone (MEK)	Not detected	ug/kg	2,000	5035/8260B	05/12/05 15:08	JGH	78-93-3	
Benzene	Not detected	ug/kg	200	5035/8260B	05/12/05 15:08	JGH	71-43-2	
Bromodichloromethane	Not detected	ug/kg	200	5035/8260B	05/12/05 15:08	JGH	75-27-4	
Bromoform	Not detected	ug/kg	200	5035/8260B	05/12/05 15:08	JGH	75-25-2	
Bromomethane	Not detected	ug/kg	800	5035/8260B	05/12/05 15:08	JGH	74-83-9	
Carbon disulfide	Not detected	ug/kg	800	5035/8260B	05/12/05 15:08	JGH	75-15-0	
Carbon tetrachloride	Not detected	ug/kg	200	5035/8260B	05/12/05 15:08	JGH	56-23-5	
Chlorobenzene	Not detected	ug/kg	200	5035/8260B	05/12/05 15:08	JGH	108-90-7	
Chloroethane	Not detected	ug/kg	800	5035/8260B	05/12/05 15:08	JGH	75-00-3	
Chloroform	Not detected	ug/kg	200	5035/8260B	05/12/05 15:08	JGH	67-66-3	
Chloromethane	Not detected	ug/kg	800	5035/8260B	05/12/05 15:08	JGH	74-87-3	
Cyclohexane	Not detected	ug/kg	200	5035/8260B	05/12/05 15:08	JGH	110-82-7	
1,1-Dichloroethane	Not detected	ug/kg	200	5035/8260B	05/12/05 15:08	JGH	75-34-3	
1,1-Dichloroethene	Not detected	ug/kg	200	5035/8260B	05/12/05 15:08	JGH	75-35-4	
1,2-Dibromo-3-chloropropane	Not detected	ug/kg	200	5035/8260B	05/12/05 15:08	JGH	96-12-8	
1,2-Dibromoethane	Not detected	ug/kg	200	5035/8260B	05/12/05 15:08	JGH	106-93-4	
1,2-Dichlorobenzene	Not detected	ug/kg	200	5035/8260B	05/12/05 15:08	JGH	95-50-1	
1,2-Dichloroethane	Not detected	ug/kg	200	5035/8260B	05/12/05 15:08	JGH	107-06-2	
1,2-Dichloropropane	Not detected	ug/kg	200	5035/8260B	05/12/05 15:08	JGH	78-87-5	
1,3-Dichlorobenzene	Not detected	ug/kg	200	5035/8260B	05/12/05 15:08	JGH	541-73-1	
1,4-Dichlorobenzene	Not detected	ug/kg	200	5035/8260B	05/12/05 15:08	JGH	106-46-7	
cis-1,2-Dichloroethene	Not detected	ug/kg	200	5035/8260B	05/12/05 15:08	JGH	156-59-2	
cis-1,3-Dichloropropene	Not detected	ug/kg	200	5035/8260B	05/12/05 15:08	JGH	10061-01-5	
Dibromochloromethane	Not detected	ug/kg	200	5035/8260B	05/12/05 15:08	JGH	124-48-1	
Dichlorodifluoromethane	Not detected	ug/kg	200	5035/8260B	05/12/05 15:08	JGH	75-71-8	
trans-1,2-Dichloroethene	Not detected	ug/kg	200	5035/8260B	05/12/05 15:08	JGH	156-60-5	
trans-1,3-Dichloropropene	Not detected	ug/kg	200	5035/8260B	05/12/05 15:08	JGH	10061-02-6	

1-ELEVATED DETECTION LIMITS DUE TO LOW TOTAL SOLIDS

Lab Sample ID: S22025.01 (continued)
Sample Tag: Outfall 005 (042805)

Analysis	Results	Units	RDL	Method	Run Date/Time	Analyst	CAS #	Flags
Organics - Volatiles (continued)								
TCL Volatile Organics 5035/8260 (continued)								
Ethylbenzene	Not detected	ug/kg	200	5035/8260B	05/12/05 15:08	JGH	100-41-4	
2-Hexanone	Not detected	ug/kg	8,000	5035/8260B	05/12/05 15:08	JGH	591-78-6	
Isopropylbenzene	Not detected	ug/kg	200	5035/8260B	05/12/05 15:08	JGH	98-82-8	
Methyl Acetate	800	ug/kg	8,000	5035/8260B	05/12/05 15:08	JGH	79-20-9	J
4-Methyl-2-pentanone (MIBK)	Not detected	ug/kg	8,000	5035/8260B	05/12/05 15:08	JGH	108-10-1	
tert-Methyl butyl ether (MTBE)	Not detected	ug/kg	800	5035/8260B	05/12/05 15:08	JGH	1634-04-4	
Methyl cyclohexane	Not detected	ug/kg	200	5035/8260B	05/12/05 15:08	JGH	108-87-2	
Methylene chloride	70	ug/kg	800	5035/8260B	05/12/05 15:08	JGH	75-09-2	BJ
Styrene	Not detected	ug/kg	200	5035/8260B	05/12/05 15:08	JGH	100-42-5	
1,1,1-Trichloroethane	Not detected	ug/kg	200	5035/8260B	05/12/05 15:08	JGH	71-55-6	
1,1,2,2-Tetrachloroethane	Not detected	ug/kg	200	5035/8260B	05/12/05 15:08	JGH	79-34-5	
1,1,2-Trichloro-1,2,2-trifluoroethane	Not detected	ug/kg	300	5035/8260B	05/12/05 15:08	JGH	76-13-1	
1,1,2-Trichloroethane	Not detected	ug/kg	200	5035/8260B	05/12/05 15:08	JGH	79-00-5	
1,2,4-Trichlorobenzene	Not detected	ug/kg	300	5035/8260B	05/12/05 15:08	JGH	120-82-1	
Tetrachloroethene	Not detected	ug/kg	200	5035/8260B	05/12/05 15:08	JGH	127-18-4	
Toluene	40	ug/kg	200	5035/8260B	05/12/05 15:08	JGH	108-88-3	J
Trichloroethene	Not detected	ug/kg	200	5035/8260B	05/12/05 15:08	JGH	79-01-6	
Trichlorofluoromethane	Not detected	ug/kg	300	5035/8260B	05/12/05 15:08	JGH	75-69-4	
Vinyl chloride	Not detected	ug/kg	300	5035/8260B	05/12/05 15:08	JGH	75-01-4	
o-Xylene	Not detected	ug/kg	200	5035/8260B	05/12/05 15:08	JGH	95-47-6	
p,m-Xylene	Not detected	ug/kg	200	5035/8260B	05/12/05 15:08	JGH		

J-Estimated value less than reporting limit, but greater than MDL
B-Compound also found in associated method blank

Merit Laboratories, Inc.

Analytical Laboratory Report

Lab Sample ID: S22025.02
Sample Tag: Outfall 011 (042805)
Collected Date/Time: 04/28/2005 11:56
Matrix: Sludge
COC Reference: 02504

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	8oz. Glass	None	Yes	4	3

Analysis	Results	Units	RDL	Method	Run Date/Time	Analyst	CAS #	Flags
Extraction / Prep.								
BNA Extraction	Completed			3550B	05/06/05 14:41	PL		
Extraction, PCB	Completed			3550B	05/03/05 14:43	EMR		
Mercury Digestion	Completed			7471A	05/10/05 12:00	JRT		
Metal Digestion	Completed			3050B	05/17/05 09:30	MSH		
Inorganics								
Total Solids	49.4	%	1	160.3	05/05/05 08:15	VJH		
Metals								
Arsenic	4.82	mg/kg	0.10	6020	05/17/05 17:12	SLS	7440-38-2	
Barium	70.4	mg/kg	1.0	6020	05/17/05 17:12	SLS	7440-39-3	
Cadmium	1.74	mg/kg	0.05	6020	05/17/05 17:12	SLS	7440-43-9	
Chromium	15.2	mg/kg	0.50	6020	05/17/05 17:12	SLS	7440-47-3	
Copper	58.0	mg/kg	1.0	6020	05/17/05 17:12	SLS	7440-50-8	
Lead	67.1	mg/kg	1.0	6020	05/17/05 17:12	SLS	7439-92-1	
Mercury	0.07	mg/kg	0.05	245.1M	05/10/05 15:57	JRT	7439-97-6	
Selenium	0.42	mg/kg	0.20	6020	05/17/05 17:12	SLS	7782-49-2	
Silver	0.26	mg/kg	0.10	6020	05/17/05 17:12	SLS	7440-22-4	
Zinc	148	mg/kg	1.0	6020	05/17/05 17:12	SLS	7440-66-6	
Organics - PCBs/Pesticides								
TCL PCB List (Column 1)								
PCB-1016	Not detected	ug/kg	330	8082	05/06/05 11:48	JANB	12674-11-2	
PCB-1242	Not detected	ug/kg	330	8082	05/06/05 11:48	JANB	53469-21-9	
PCB-1221	Not detected	ug/kg	330	8082	05/06/05 11:48	JANB	11104-28-2	
PCB-1232	Not detected	ug/kg	330	8082	05/06/05 11:48	JANB	11141-16-5	
PCB-1248	Not detected	ug/kg	330	8082	05/06/05 11:48	JANB	12672-29-6	
PCB-1254	50	ug/kg	330	8082	05/06/05 11:48	JANB	11097-69-1	J
PCB-1260	Not detected	ug/kg	330	8082	05/06/05 11:48	JANB	11096-82-5	
TCL PCB List (Column 2)								
PCB-1016	Not detected	ug/kg	330	8082	05/06/05 11:48	JANB	12674-11-2	
PCB-1242	Not detected	ug/kg	330	8082	05/06/05 11:48	JANB	53469-21-9	
PCB-1221	Not detected	ug/kg	330	8082	05/06/05 11:48	JANB	11104-28-2	
PCB-1232	Not detected	ug/kg	330	8082	05/06/05 11:48	JANB	11141-16-5	
PCB-1248	Not detected	ug/kg	330	8082	05/06/05 11:48	JANB	12672-29-6	
PCB-1254	50	ug/kg	330	8082	05/06/05 11:48	JANB	11097-69-1	J
PCB-1260	Not detected	ug/kg	330	8082	05/06/05 11:48	JANB	11096-82-5	
Organics - Semi-Volatiles								
TCL Semi-Volatile Organics								
Acenaphthene	Not detected	ug/kg	300	8270C	05/12/05 16:02	ARH	83-32-9	

J-Estimated value less than reporting limit, but greater than MDL

Merit Laboratories, Inc.

Analytical Laboratory Report

Lab Sample ID: S22025.02 (continued)
Sample Tag: Outfall 011 (042805)

Analysis	Results	Units	RDL	Method	Run Date/Time	Analyst	CAS #	Flags
Organics - Semi-Volatiles (continued)								
TCL Semi-Volatile Organics (continued)								
Acenaphthylene	Not detected	ug/kg	300	8270C	05/12/05 16:02	ARH	208-96-8	
Acetophenone	Not detected	ug/kg	300	8270C	05/12/05 16:02	ARH	98-86-2	
Anthracene	70	ug/kg	300	8270C	05/12/05 16:02	ARH	120-12-7	J
Atrazine	Not detected	ug/kg	300	8270C	05/12/05 16:02	ARH	1912-24-9	
1,1'-Biphenyl	Not detected	ug/kg	300	8270C	05/12/05 16:02	ARH	92-52-4	
4-Bromophenyl phenyl ether	Not detected	ug/kg	300	8270C	05/12/05 16:02	ARH	101-55-3	
di-n-Butyl phthalate	70	ug/kg	300	8270C	05/12/05 16:02	ARH	84-74-2	BJ
Benzaldehyde	Not detected	ug/kg	300	8270C	05/12/05 16:02	ARH	100-52-7	
Benzo(a)anthracene	400	ug/kg	300	8270C	05/12/05 16:02	ARH	56-55-3	
Benzo(a)pyrene	500	ug/kg	300	8270C	05/12/05 16:02	ARH	50-32-8	
Benzo(b)fluoranthene	500	ug/kg	300	8270C	05/12/05 16:02	ARH	205-99-2	
Benzo(ghi)perylene	Not detected	ug/kg	300	8270C	05/12/05 16:02	ARH	191-24-2	
Benzo(k)fluoranthene	400	ug/kg	300	8270C	05/12/05 16:02	ARH	207-08-9	
Butyl benzyl phthalate	400	ug/kg	300	8270C	05/12/05 16:02	ARH	85-68-7	
2-Chloronaphthalene	Not detected	ug/kg	300	8270C	05/12/05 16:02	ARH	91-58-7	
2-Chlorophenol	Not detected	ug/kg	300	8270C	05/12/05 16:02	ARH	95-57-8	
4-Chloro-3-methylphenol	Not detected	ug/kg	300	8270C	05/12/05 16:02	ARH	59-50-7	
4-Chloroaniline	Not detected	ug/kg	700	8270C	05/12/05 16:02	ARH	106-47-8	
4-Chlorophenyl phenyl ether	Not detected	ug/kg	300	8270C	05/12/05 16:02	ARH	7005-72-3	
Caprolactam	Not detected	ug/kg	300	8270C	05/12/05 16:02	ARH	105-60-2	
Carbazole	70	ug/kg	300	8270C	05/12/05 16:02	ARH	86-74-8	J
bis(2-Chloroethoxy)methane	Not detected	ug/kg	300	8270C	05/12/05 16:02	ARH	111-91-1	
bis(2-Chloroethyl)ether	Not detected	ug/kg	300	8270C	05/12/05 16:02	ARH	111-44-4	
bis(2-Chloroisopropyl)ether	Not detected	ug/kg	300	8270C	05/12/05 16:02	ARH	108-60-1	
Chrysene	600	ug/kg	300	8270C	05/12/05 16:02	ARH	218-01-9	
2,4-Dichlorophenol	Not detected	ug/kg	300	8270C	05/12/05 16:02	ARH	120-83-2	
2,4-Dimethylphenol	Not detected	ug/kg	300	8270C	05/12/05 16:02	ARH	105-67-9	
2,4-Dinitrophenol	Not detected	ug/kg	700	8270C	05/12/05 16:02	ARH	51-28-5	
2,4-Dinitrotoluene	Not detected	ug/kg	300	8270C	05/12/05 16:02	ARH	121-14-2	
2,6-Dinitrotoluene	Not detected	ug/kg	300	8270C	05/12/05 16:02	ARH	606-20-2	
3,3'-Dichlorobenzidine	Not detected	ug/kg	700	8270C	05/12/05 16:02	ARH	91-94-1	
4,6-Dinitro-2-methylphenol	Not detected	ug/kg	700	8270C	05/12/05 16:02	ARH	534-52-1	
Dibenzo(ah)anthracene	Not detected	ug/kg	300	8270C	05/12/05 16:02	ARH	53-70-3	
Dibenzofuran	Not detected	ug/kg	300	8270C	05/12/05 16:02	ARH	132-64-9	
Diethyl phthalate	Not detected	ug/kg	300	8270C	05/12/05 16:02	ARH	84-66-2	
Dimethyl phthalate	Not detected	ug/kg	300	8270C	05/12/05 16:02	ARH	131-11-3	
bis(2-Ethylhexyl)phthalate	300	ug/kg	300	8270C	05/12/05 16:02	ARH	117-81-7	
Fluoranthene	Not detected	ug/kg	300	8270C	05/12/05 16:02	ARH	206-44-0	
Fluorene	Not detected	ug/kg	300	8270C	05/12/05 16:02	ARH	86-73-7	
Hexachlorobenzene	Not detected	ug/kg	300	8270C	05/12/05 16:02	ARH	118-74-1	
Hexachlorobutadiene	Not detected	ug/kg	300	8270C	05/12/05 16:02	ARH	87-68-3	
Hexachlorocyclopentadiene	Not detected	ug/kg	300	8270C	05/12/05 16:02	ARH	77-47-4	
Hexachloroethane	Not detected	ug/kg	300	8270C	05/12/05 16:02	ARH	67-72-1	
Indeno(1,2,3-cd)pyrene	Not detected	ug/kg	300	8270C	05/12/05 16:02	ARH	193-39-5	
Isophorone	Not detected	ug/kg	300	8270C	05/12/05 16:02	ARH	78-59-1	
2-Methylnaphthalene	Not detected	ug/kg	300	8270C	05/12/05 16:02	ARH	91-57-6	
2-Methylphenol	Not detected	ug/kg	300	8270C	05/12/05 16:02	ARH	95-48-7	

J-Estimated value less than reporting limit, but greater than MDL
B-Compound also found in associated method blank

Lab Sample ID: S22025.02 (continued)
Sample Tag: Outfall 011 (042805)

Analysis	Results	Units	RDL	Method	Run Date/Time	Analyst	CAS #	Flags
Organics - Semi-Volatiles (continued)								
TCL Semi-Volatile Organics (continued)								
3-, 4-Methylphenol	Not detected	ug/kg	300	8270C	05/12/05 16:02	ARH	106-39-4	
2-Nitroaniline	Not detected	ug/kg	700	8270C	05/12/05 16:02	ARH	88-74-4	
2-Nitrophenol	Not detected	ug/kg	300	8270C	05/12/05 16:02	ARH	88-75-5	
3-Nitroaniline	Not detected	ug/kg	700	8270C	05/12/05 16:02	ARH	99-09-2	
4-Nitroaniline	Not detected	ug/kg	700	8270C	05/12/05 16:02	ARH	100-01-6	
4-Nitrophenol	Not detected	ug/kg	700	8270C	05/12/05 16:02	ARH	100-02-7	
N-Nitrosodi-n-propylamine	Not detected	ug/kg	300	8270C	05/12/05 16:02	ARH	621-64-7	
N-Nitrosodiphenylamine	Not detected	ug/kg	300	8270C	05/12/05 16:02	ARH	86-30-6	
Naphthalene	Not detected	ug/kg	300	8270C	05/12/05 16:02	ARH	91-20-3	
Nitrobenzene	Not detected	ug/kg	200	8270C	05/12/05 16:02	ARH	98-95-3	
di-n-Octyl phthalate	Not detected	ug/kg	300	8270C	05/12/05 16:02	ARH	117-84-0	
Pentachlorophenol	Not detected	ug/kg	700	8270C	05/12/05 16:02	ARH	87-86-5	
Phenanthrene	500	ug/kg	300	8270C	05/12/05 16:02	ARH	85-01-8	
Phenol	Not detected	ug/kg	300	8270C	05/12/05 16:02	ARH	108-95-2	
Pyrene	800	ug/kg	300	8270C	05/12/05 16:02	ARH	129-00-0	
2,4,5-Trichlorophenol	Not detected	ug/kg	300	8270C	05/12/05 16:02	ARH	95-95-4	
2,4,6-Trichlorophenol	Not detected	ug/kg	300	8270C	05/12/05 16:02	ARH	88-06-2	
Organics - Volatiles								
TCL Volatile Organics 5035/8260								
Acetone	Not detected	ug/kg	2,000	5035/8260B	05/12/05 15:42	JGH	67-64-1	
2-Butanone (MEK)	Not detected	ug/kg	2,000	5035/8260B	05/12/05 15:42	JGH	78-93-3	
Benzene	Not detected	ug/kg	100	5035/8260B	05/12/05 15:42	JGH	71-43-2	
Bromodichloromethane	Not detected	ug/kg	100	5035/8260B	05/12/05 15:42	JGH	75-27-4	
Bromoform	Not detected	ug/kg	100	5035/8260B	05/12/05 15:42	JGH	75-25-2	
Bromomethane	Not detected	ug/kg	500	5035/8260B	05/12/05 15:42	JGH	74-83-9	
Carbon disulfide	Not detected	ug/kg	500	5035/8260B	05/12/05 15:42	JGH	75-15-0	
Carbon tetrachloride	Not detected	ug/kg	100	5035/8260B	05/12/05 15:42	JGH	56-23-5	
Chlorobenzene	Not detected	ug/kg	100	5035/8260B	05/12/05 15:42	JGH	108-90-7	
Chloroethane	Not detected	ug/kg	500	5035/8260B	05/12/05 15:42	JGH	75-00-3	
Chloroform	Not detected	ug/kg	100	5035/8260B	05/12/05 15:42	JGH	67-66-3	
Chloromethane	Not detected	ug/kg	500	5035/8260B	05/12/05 15:42	JGH	74-87-3	
Cyclohexane	Not detected	ug/kg	100	5035/8260B	05/12/05 15:42	JGH	110-82-7	
1,1-Dichloroethane	Not detected	ug/kg	100	5035/8260B	05/12/05 15:42	JGH	75-34-3	
1,1-Dichloroethene	Not detected	ug/kg	100	5035/8260B	05/12/05 15:42	JGH	75-35-4	
1,2-Dibromo-3-chloropropane	Not detected	ug/kg	100	5035/8260B	05/12/05 15:42	JGH	96-12-8	
1,2-Dibromoethane	Not detected	ug/kg	100	5035/8260B	05/12/05 15:42	JGH	106-93-4	
1,2-Dichlorobenzene	Not detected	ug/kg	100	5035/8260B	05/12/05 15:42	JGH	95-50-1	
1,2-Dichloroethane	Not detected	ug/kg	100	5035/8260B	05/12/05 15:42	JGH	107-06-2	
1,2-Dichloropropane	Not detected	ug/kg	100	5035/8260B	05/12/05 15:42	JGH	78-87-5	
1,3-Dichlorobenzene	Not detected	ug/kg	100	5035/8260B	05/12/05 15:42	JGH	541-73-1	
1,4-Dichlorobenzene	Not detected	ug/kg	100	5035/8260B	05/12/05 15:42	JGH	106-46-7	
cis-1,2-Dichloroethene	Not detected	ug/kg	100	5035/8260B	05/12/05 15:42	JGH	156-59-2	
cis-1,3-Dichloropropene	Not detected	ug/kg	100	5035/8260B	05/12/05 15:42	JGH	10061-01-5	
Dibromochloromethane	Not detected	ug/kg	100	5035/8260B	05/12/05 15:42	JGH	124-48-1	
Dichlorodifluoromethane	Not detected	ug/kg	100	5035/8260B	05/12/05 15:42	JGH	75-71-8	
trans-1,2-Dichloroethene	Not detected	ug/kg	100	5035/8260B	05/12/05 15:42	JGH	156-60-5	
trans-1,3-Dichloropropene	Not detected	ug/kg	100	5035/8260B	05/12/05 15:42	JGH	10061-02-6	
Ethylbenzene	Not detected	ug/kg	100	5035/8260B	05/12/05 15:42	JGH	100-41-4	

Lab Sample ID: S22025.02 (continued)
Sample Tag: Outfall 011 (042805)

Analysis	Results	Units	RDL	Method	Run Date/Time	Analyst	CAS #	Flags
Organics - Volatiles (continued)								
TCL Volatile Organics 5035/8260 (continued)								
2-Hexanone	Not detected	ug/kg	5,000	5035/8260B	05/12/05 15:42	JGH	591-78-6	
Isopropylbenzene	Not detected	ug/kg	100	5035/8260B	05/12/05 15:42	JGH	98-82-8	
Methyl Acetate	Not detected	ug/kg	5,000	5035/8260B	05/12/05 15:42	JGH	79-20-9	
4-Methyl-2-pentanone (MIBK)	Not detected	ug/kg	5,000	5035/8260B	05/12/05 15:42	JGH	108-10-1	
tert-Methyl butyl ether (MTBE)	Not detected	ug/kg	500	5035/8260B	05/12/05 15:42	JGH	1634-04-4	
Methyl cyclohexane	Not detected	ug/kg	100	5035/8260B	05/12/05 15:42	JGH	108-87-2	
Methylene chloride	30	ug/kg	500	5035/8260B	05/12/05 15:42	JGH	75-09-2	BJ
Styrene	Not detected	ug/kg	100	5035/8260B	05/12/05 15:42	JGH	100-42-5	
1,1,1-Trichloroethane	Not detected	ug/kg	100	5035/8260B	05/12/05 15:42	JGH	71-55-6	
1,1,2,2-Tetrachloroethane	Not detected	ug/kg	100	5035/8260B	05/12/05 15:42	JGH	79-34-5	
1,1,2-Trichloro-1,2,2-trifluoroethane	Not detected	ug/kg	200	5035/8260B	05/12/05 15:42	JGH	76-13-1	
1,1,2-Trichloroethane	Not detected	ug/kg	100	5035/8260B	05/12/05 15:42	JGH	79-00-5	
1,2,4-Trichlorobenzene	Not detected	ug/kg	200	5035/8260B	05/12/05 15:42	JGH	120-82-1	
Tetrachloroethene	Not detected	ug/kg	100	5035/8260B	05/12/05 15:42	JGH	127-18-4	
Toluene	Not detected	ug/kg	100	5035/8260B	05/12/05 15:42	JGH	108-88-3	
Trichloroethene	Not detected	ug/kg	100	5035/8260B	05/12/05 15:42	JGH	79-01-6	
Trichlorofluoromethane	Not detected	ug/kg	200	5035/8260B	05/12/05 15:42	JGH	75-69-4	
Vinyl chloride	Not detected	ug/kg	200	5035/8260B	05/12/05 15:42	JGH	75-01-4	
o-Xylene	Not detected	ug/kg	100	5035/8260B	05/12/05 15:42	JGH	95-47-6	
p,m-Xylene	Not detected	ug/kg	100	5035/8260B	05/12/05 15:42	JGH		

B-Compound also found in associated method blank J-Estimated value less than reporting limit, but greater than MDL

Merit Laboratories, Inc.

Analytical Laboratory Report

Lab Sample ID: S22025.03
Sample Tag: Outfall 013 (042805)
Collected Date/Time: 04/28/2005 12:48
Matrix: Sludge
COC Reference: 02504

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	8oz. Glass	None	Yes	4	3

Analysis	Results	Units	RDL	Method	Run Date/Time	Analyst	CAS #	Flags
Extraction / Prep.								
BNA Extraction	Completed			3550B	05/05/05 14:41	PL		
Extraction, PCB	Completed			3550B	05/03/05 14:43	EMR		
Mercury Digestion	Completed			7471A	05/10/05 12:00	JRT		
Metal Digestion	Completed			3050B	05/17/05 09:30	MSH		
Inorganics								
Total Solids	31.8	%	1	160.3	05/05/05 08:15	VJH		
Metals								
Arsenic	7.83	mg/kg	0.10	6020	05/17/05 17:15	SLS	7440-38-2	
Barium	144	mg/kg	1.0	6020	05/17/05 17:15	SLS	7440-39-3	
Cadmium	1.90	mg/kg	0.05	6020	05/17/05 17:15	SLS	7440-43-9	
Chromium	20.3	mg/kg	0.50	6020	05/17/05 17:15	SLS	7440-47-3	
Copper	67.1	mg/kg	1.0	6020	05/17/05 17:15	SLS	7440-50-8	
Lead	108	mg/kg	1.0	6020	05/17/05 17:15	SLS	7439-92-1	
Mercury	0.12	mg/kg	0.05	245.1M	05/10/05 15:59	JRT	7439-97-6	
Selenium	0.81	mg/kg	0.20	6020	05/17/05 17:15	SLS	7782-49-2	
Silver	0.25	mg/kg	0.10	6020	05/17/05 17:15	SLS	7440-22-4	
Zinc	273	mg/kg	1.0	6020	05/17/05 17:15	SLS	7440-66-6	
Organics - PCBs/Pesticides								
TCL PCB List (Column 1)								
PCB-1016	Not detected	ug/kg	330	8082	05/05/05 14:29	JANB	12674-11-2	
PCB-1242	Not detected	ug/kg	330	8082	05/05/05 14:29	JANB	53469-21-9	
PCB-1221	Not detected	ug/kg	330	8082	05/05/05 14:29	JANB	11104-28-2	
PCB-1232	Not detected	ug/kg	330	8082	05/05/05 14:29	JANB	11141-16-5	
PCB-1248	Not detected	ug/kg	330	8082	05/05/05 14:29	JANB	12672-29-6	
PCB-1254	20	ug/kg	330	8082	05/05/05 14:29	JANB	11097-69-1	J
PCB-1260	Not detected	ug/kg	330	8082	05/05/05 14:29	JANB	11096-82-5	
TCL PCB List (Column 2)								
PCB-1016	Not detected	ug/kg	330	8082	05/05/05 14:30	JANB	12674-11-2	
PCB-1242	Not detected	ug/kg	330	8082	05/05/05 14:30	JANB	53469-21-9	
PCB-1221	Not detected	ug/kg	330	8082	05/05/05 14:30	JANB	11104-28-2	
PCB-1232	Not detected	ug/kg	330	8082	05/05/05 14:30	JANB	11141-16-5	
PCB-1248	Not detected	ug/kg	330	8082	05/05/05 14:30	JANB	12672-29-6	
PCB-1254	20	ug/kg	330	8082	05/05/05 14:30	JANB	11097-69-1	J
PCB-1260	Not detected	ug/kg	330	8082	05/05/05 14:30	JANB	11096-82-5	
Organics - Semi-Volatiles								
TCL Semi-Volatile Organics								
Acenaphthene	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	83-32-9	1

J-Estimated value less than reporting limit, but greater than MDL
1-ELEVATED DETECTION LIMITS DUE TO LOW TOTAL SOLIDS

Merit Laboratories, Inc.

Analytical Laboratory Report

Lab Sample ID: S22025.03 (continued)
Sample Tag: Outfall 013 (042805)

Analysis	Results	Units	RDL	Method	Run Date/Time	Analyst	CAS #	Flags
Organics - Semi-Volatiles (continued)								
TCL Semi-Volatile Organics (continued)								
Acenaphthylene	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	208-96-8	1
Acetophenone	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	98-86-2	1
Anthracene	100	ug/kg	500	8270C	05/12/05 16:36	ARH	120-12-7	J1
Atrazine	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	1912-24-9	1
1,1'-Biphenyl	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	92-52-4	1
4-Bromophenyl phenyl ether	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	101-55-3	1
di-n-Butyl phthalate	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	84-74-2	1
Benzaldehyde	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	100-52-7	1
Benzo(a)anthracene	900	ug/kg	500	8270C	05/12/05 16:36	ARH	56-55-3	1
Benzo(a)pyrene	1,000	ug/kg	500	8270C	05/12/05 16:36	ARH	50-32-8	1
Benzo(b)fluoranthene	1,100	ug/kg	500	8270C	05/12/05 16:36	ARH	205-99-2	1
Benzo(ghi)perylene	400	ug/kg	500	8270C	05/12/05 16:36	ARH	191-24-2	J1
Benzo(k)fluoranthene	800	ug/kg	500	8270C	05/12/05 16:36	ARH	207-08-9	1
Butyl benzyl phthalate	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	85-68-7	1
2-Chloronaphthalene	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	91-58-7	1
2-Chlorophenol	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	95-57-8	1
4-Chloro-3-methylphenol	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	59-50-7	1
4-Chloroaniline	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	106-47-8	1
4-Chlorophenyl phenyl ether	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	7005-72-3	1
Caprolactam	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	105-60-2	1
Carbazole	200	ug/kg	500	8270C	05/12/05 16:36	ARH	86-74-8	J1
bis(2-Chloroethoxy)methane	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	111-91-1	1
bis(2-Chloroethyl)ether	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	111-44-4	1
bis(2-Chloroisopropyl)ether	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	108-60-1	1
Chrysene	1,200	ug/kg	500	8270C	05/12/05 16:36	ARH	218-01-9	1
2,4-Dichlorophenol	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	120-83-2	1
2,4-Dimethylphenol	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	105-67-9	1
2,4-Dinitrophenol	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	51-28-5	1
2,4-Dinitrotoluene	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	121-14-2	1
2,6-Dinitrotoluene	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	606-20-2	1
3,3'-Dichlorobenzidine	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	91-94-1	1
4,6-Dinitro-2-methylphenol	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	534-52-1	1
Dibenzo(ah)anthracene	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	53-70-3	1
Dibenzofuran	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	132-64-9	1
Diethyl phthalate	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	84-66-2	1
Dimethyl phthalate	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	131-11-3	1
bis(2-Ethylhexyl)phthalate	700	ug/kg	500	8270C	05/12/05 16:36	ARH	117-81-7	1
Fluoranthene	2,000	ug/kg	500	8270C	05/12/05 16:36	ARH	206-44-0	1
Fluorene	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	86-73-7	1
Hexachlorobenzene	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	118-74-1	1
Hexachlorobutadiene	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	87-68-3	1
Hexachlorocyclopentadiene	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	77-47-4	1
Hexachloroethane	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	67-72-1	1
Indeno(1,2,3-cd)pyrene	1,500	ug/kg	500	8270C	05/12/05 16:36	ARH	193-39-5	1
Isophorone	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	78-59-1	1
2-Methylnaphthalene	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	91-57-6	1
2-Methylphenol	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	95-48-7	1

1-ELEVATED DETECTION LIMITS DUE TO LOW TOTAL SOLIDS
J-Estimated value less than reporting limit, but greater than MDL

Analytical Laboratory Report

Lab Sample ID: S22025.03 (continued)
Sample Tag: Outfall 013 (042805)

Analysis	Results	Units	RDL	Method	Run Date/Time	Analyst	CAS #	Flags
Organics - Semi-Volatiles (continued)								
TCL Semi-Volatile Organics (continued)								
3-, 4-Methylphenol	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	108-39-4	1
2-Nitroaniline	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	88-74-4	1
2-Nitrophenol	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	88-75-5	1
3-Nitroaniline	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	99-09-2	1
4-Nitroaniline	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	100-01-6	1
4-Nitrophenol	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	100-02-7	1
N-Nitrosodi-n-propylamine	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	621-64-7	1
N-Nitrosodiphenylamine	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	86-30-6	1
Naphthalene	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	91-20-3	1
Nitrobenzene	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	98-95-3	1
di-n-Octyl phthalate	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	117-84-0	1
Pentachlorophenol	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	87-86-5	1
Phenanthrene	800	ug/kg	500	8270C	05/12/05 16:36	ARH	85-01-8	1
Phenol	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	108-95-2	1
Pyrene	1,600	ug/kg	500	8270C	05/12/05 16:36	ARH	129-00-0	1
2,4,5-Trichlorophenol	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	95-95-4	1
2,4,6-Trichlorophenol	Not detected	ug/kg	500	8270C	05/12/05 16:36	ARH	88-06-2	1
Organics - Volatiles								
TCL Volatile Organics 5035/8260								
Acetone	Not detected	ug/kg	2,000	5035/8260B	05/12/05 16:16	JGH	67-64-1	
2-Butanone (MEK)	Not detected	ug/kg	2,000	5035/8260B	05/12/05 16:16	JGH	78-93-3	
Benzene	Not detected	ug/kg	200	5035/8260B	05/12/05 16:16	JGH	71-43-2	
Bromodichloromethane	Not detected	ug/kg	200	5035/8260B	05/12/05 16:16	JGH	75-27-4	
Bromoform	Not detected	ug/kg	200	5035/8260B	05/12/05 16:16	JGH	75-25-2	
Bromomethane	Not detected	ug/kg	800	5035/8260B	05/12/05 16:16	JGH	74-83-9	
Carbon disulfide	Not detected	ug/kg	800	5035/8260B	05/12/05 16:16	JGH	75-15-0	
Carbon tetrachloride	Not detected	ug/kg	200	5035/8260B	05/12/05 16:16	JGH	56-23-5	
Chlorobenzene	Not detected	ug/kg	200	5035/8260B	05/12/05 16:16	JGH	108-90-7	
Chloroethane	Not detected	ug/kg	800	5035/8260B	05/12/05 16:16	JGH	75-00-3	
Chloroform	Not detected	ug/kg	200	5035/8260B	05/12/05 16:16	JGH	67-66-3	
Chloromethane	Not detected	ug/kg	800	5035/8260B	05/12/05 16:16	JGH	74-87-3	
Cyclohexane	Not detected	ug/kg	200	5035/8260B	05/12/05 16:16	JGH	110-82-7	
1,1-Dichloroethane	Not detected	ug/kg	200	5035/8260B	05/12/05 16:16	JGH	75-34-3	
1,1-Dichloroethene	Not detected	ug/kg	200	5035/8260B	05/12/05 16:16	JGH	75-35-4	
1,2-Dibromo-3-chloropropane	Not detected	ug/kg	200	5035/8260B	05/12/05 16:16	JGH	96-12-8	
1,2-Dibromoethane	Not detected	ug/kg	200	5035/8260B	05/12/05 16:16	JGH	106-93-4	
1,2-Dichlorobenzene	Not detected	ug/kg	200	5035/8260B	05/12/05 16:16	JGH	95-50-1	
1,2-Dichloroethane	Not detected	ug/kg	200	5035/8260B	05/12/05 16:16	JGH	107-06-2	
1,2-Dichloropropane	Not detected	ug/kg	200	5035/8260B	05/12/05 16:16	JGH	78-87-5	
1,3-Dichlorobenzene	Not detected	ug/kg	200	5035/8260B	05/12/05 16:16	JGH	541-73-1	
1,4-Dichlorobenzene	Not detected	ug/kg	200	5035/8260B	05/12/05 16:16	JGH	106-46-7	
cis-1,2-Dichloroethene	Not detected	ug/kg	200	5035/8260B	05/12/05 16:16	JGH	156-59-2	
cis-1,3-Dichloropropene	Not detected	ug/kg	200	5035/8260B	05/12/05 16:16	JGH	10061-01-5	
Dibromochloromethane	Not detected	ug/kg	200	5035/8260B	05/12/05 16:16	JGH	124-48-1	
Dichlorodifluoromethane	Not detected	ug/kg	200	5035/8260B	05/12/05 16:16	JGH	75-71-8	
trans-1,2-Dichloroethene	Not detected	ug/kg	200	5035/8260B	05/12/05 16:16	JGH	156-60-5	
trans-1,3-Dichloropropene	Not detected	ug/kg	200	5035/8260B	05/12/05 16:16	JGH	10061-02-6	

1-ELEVATED DETECTION LIMITS DUE TO LOW TOTAL SOLIDS

Lab Sample ID: S22025.03 (continued)
Sample Tag: Outfall 013 (042805)

Analysis	Results	Units	RDL	Method	Run Date/Time	Analyst	CAS #	Flags
Organics - Volatiles (continued)								
TCL Volatile Organics 5035/8260 (continued)								
Ethylbenzene	Not detected	ug/kg	200	5035/8260B	05/12/05 16:16	JGH	100-41-4	
2-Hexanone	Not detected	ug/kg	8,000	5035/8260B	05/12/05 16:16	JGH	591-78-6	
Isopropylbenzene	Not detected	ug/kg	200	5035/8260B	05/12/05 16:16	JGH	98-82-8	
Methyl Acetate	400	ug/kg	8,000	5035/8260B	05/12/05 16:16	JGH	79-20-9	J
4-Methyl-2-pentanone (MIBK)	Not detected	ug/kg	8,000	5035/8260B	05/12/05 16:16	JGH	108-10-1	
tert-Methyl butyl ether (MTBE)	Not detected	ug/kg	800	5035/8260B	05/12/05 16:16	JGH	1634-04-4	
Methyl cyclohexane	Not detected	ug/kg	200	5035/8260B	05/12/05 16:16	JGH	108-87-2	
Methylene chloride	50	ug/kg	800	5035/8260B	05/12/05 16:16	JGH	75-09-2	BJ
Styrene	Not detected	ug/kg	200	5035/8260B	05/12/05 16:16	JGH	100-42-5	
1,1,1-Trichloroethane	Not detected	ug/kg	200	5035/8260B	05/12/05 16:16	JGH	71-55-6	
1,1,2,2-Tetrachloroethane	Not detected	ug/kg	200	5035/8260B	05/12/05 16:16	JGH	79-34-5	
1,1,2-Trichloro-1,2,2-trifluoroethane	Not detected	ug/kg	300	5035/8260B	05/12/05 16:16	JGH	76-13-1	
1,1,2-Trichloroethane	Not detected	ug/kg	200	5035/8260B	05/12/05 16:16	JGH	79-00-5	
1,2,4-Trichlorobenzene	Not detected	ug/kg	300	5035/8260B	05/12/05 16:16	JGH	120-82-1	
Tetrachloroethene	Not detected	ug/kg	200	5035/8260B	05/12/05 16:16	JGH	127-18-4	
Toluene	Not detected	ug/kg	200	5035/8260B	05/12/05 16:16	JGH	108-88-3	
Trichloroethene	Not detected	ug/kg	200	5035/8260B	05/12/05 16:16	JGH	79-01-6	
Trichlorofluoromethane	Not detected	ug/kg	300	5035/8260B	05/12/05 16:16	JGH	75-69-4	
Vinyl chloride	Not detected	ug/kg	300	5035/8260B	05/12/05 16:16	JGH	75-01-4	
o-Xylene	Not detected	ug/kg	200	5035/8260B	05/12/05 16:16	JGH	95-47-6	
p,m-Xylene	Not detected	ug/kg	200	5035/8260B	05/12/05 16:16	JGH		

J-Estimated value less than reporting limit, but greater than MDL
B-Compound also found in associated method blank

APPENDIX B

SUMMARY OF MDEQ SEDIMENT SAMPLING AND ANALYSIS- FLINT RIVER, APRIL 28, 2005

BBL®
BLASLAND, BOUCK & LEE, INC.
engineers, scientists, economists

Summary of MDEQ Sampling and Analysis Activities
Flint River Investigation on April 28, 2005

Mott Lake
The MDEQ sample identification for this location is MLC 2, and the sediment was sampled for polychlorinated dibenzodioxins (dioxins), VOCs and SVOCs, and PCBs. The sample at this location was collected using a Peat Borer. The readings from MDEQ's handheld GPS were N 43.8133 and W 83.6518.

Utah Dam
The MDEQ sample identification for this location is UDP 1, and the sediment was sampled for dioxins, VOCs and SVOCs, and PCBs. The sample at this location was collected using a Ponar Dredge. The readings from MDEQ's handheld GPS were N 43.04175 and W 83.6735.

Outfall 003
The MDEQ sample identification for this location is OFP 003, and the sediment was sampled for dioxins, VOCs and SVOCs, metals (Michigan 10), and PCBs. The sample at this location was collected using a Ponar Dredge. The readings from MDEQ's handheld GPS were N 43.04402 and W 83.67541.

Outfall 005
This sampling location is approximately 30 feet south of the GM Outfall 005 located approximately 10 feet from the west bank of the Flint River. The readings from MDEQ's handheld GPS were N 43.04403 and W 86.6735. The MDEQ collected two samples at this location, one via Peat Borer with sample identification 0051 and the second with a Ponar Dredge with sample identification OFP 005. The sample collected with the Peat Borer was sampled for VOCs and SVOCs from a depth of 0 to 6 inches and from 6 to 12 inches below the surface of the sediment bed. The sample collected with the Ponar Dredge was sampled for metals (Michigan 10), VOCs and SVOCs, dioxins, and PCBs.

Outfall 011
This sampling location is approximately 200 feet south of the GM Outfall 011, approximately 12 to 15 feet from the west bank of the Flint River about 25 feet south of a cattail outcrop. Equipment failure with MDEQ's handheld GPS prevented collection of coordinates for this location. The MDEQ collected one sample at this location using a Ponar Dredge, with sample identification OFP 011. The sample collected with the Ponar dredge was sampled for metals (Michigan 10), VOCs and SVOCs, dioxins, and PCBs.

Outfall 013
This sampling location is south of the GM Outfall 013, and directly east of park benches overlooking the river. The samples were collected approximately 10 to 12 feet from the west bank of the Flint River. Equipment failure with MDEQ's handheld GPS prevented collection of coordinates for this location. The MDEQ collected two samples at this location, one using a Peat Borer with sample identification OFC 13 and the second with a Ponar Dredge with sample identification OFP 013. The sample collected with the Peat Borer was sampled for VOCs and SVOCs and metals from 0 to 6 inches, from 6 to 13 inches, and from 13 to 17 inches below the sediment surface. The sample collected with the Ponar Dredge was sampled for metals (Michigan 10), VOCs and SVOCs, dioxins, and PCBs.

From: <Moore.Tammy@epamail.epa.gov>
To: DEREK KAIDING <DCK@bbl-inc.com>, <kurt.blizzard@gm.com>
Date: Tue, Jun 14, 2005 4:01 PM
Subject: Draft MDEQ Flint River Sediments Results - Low PAH / PCB hits below 1ppm

Here is the draft Flint River sediment sampling results. All PCB results are qualified due to degradation. There were PCB detects, but all concentrations are below 1ppm. We are interested in seeing the results of the split samples that GM shared with MDEQ when they are available.

(See attached file: Flint River Draft.PDF)

Tammy Moore
Environmental Scientist-Project Manager
Corrective Action Section
Enforcement & Compliance Assurance Branch
U.S. EPA- Region 5
Ph# 312 886-6181

CC: <sundar.bhooma@epamail.epa.gov>, <boothp@exponent.com>, "C.Y. Jeng" <CJeng@environcorp.com>, <framacciotti@environcorp.com>, <Cygan.Gary@epamail.epa.gov>, <Phillips.Gerald@epamail.epa.gov>, <jean.e.caufield@gm.com>, LISA COFFEY <LAR@bbl-inc.com>, Linda Ziccardi <lziccardi@exponent.com>, MICHAEL SCOVILLE <MDS@bbl-inc.com>, MARK BROWN <MPB@bbl-inc.com>, <Fonseca.Priscilla@epamail.epa.gov>, Peter Quackenbush <quackenp@michigan.gov>, "ROBERT J. ANDERSON" <RJA@bbl-inc.com>, <SSong@environcorp.com>, <yocumw@michigan.gov>

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FAX: (517) 335-9600

Division: WHMD
Report to: ART OSTASZEWSKI
MDEQ-WHMD-LANSING
CONSTITUTION HALL
525 W. ALLEGAN, LANSING, MI 48909

Total: $5,725.54

Lab Work Order # : 50400391
Work Site ID : LB040161
Site Name : FLINT RIVER SEDIMENTS
Received: 04/29/2005
Reported: 06/03/2005
Collected By: ART OSTASZEWSKI

Samples Received :

No:	Sample ID	Sample Description	Matrix:	Collection Date
01	AA53407	MLC2 0-6	SEDIMENT	04/28/2005
02	AA53408	MLC2 6-14	SEDIMENT	04/28/2005
03	AA53409	UDP1	SEDIMENT	04/28/2005
04	AA53410	OFC0051 0-6	SEDIMENT	04/28/2005
05	AA53411	OFC0052 6-12	SEDIMENT	04/28/2005
06	AA53412	OFP0052	SEDIMENT	04/28/2005
07	AA53413	OFP0052D	SEDIMENT	04/28/2005
08	AA53414	OFP013	SEDIMENT	04/28/2005
09	AA53415	OFC013 0-6	SEDIMENT	04/28/2005
10	AA53416	OFC013 6-13	SEDIMENT	04/28/2005
11	AA53417	OFC013 13-17	SEDIMENT	04/28/2005
2	AA53418	OFP003	SEDIMENT	04/28/2005
13	AA53419	DOFP	SEDIMENT	04/28/2005

Sample Comments :

AA53407	SEE COMENTS ON BACK OF COC
AA53408	SEE COMENTS ON BACK OF COC
AA53409	SEE COMENTS ON BACK OF COC
AA53410	SEE COMENTS ON BACK OF COC
AA53411	SEE COMENTS ON BACK OF COC
AA53412	SEE COMENTS ON BACK OF COC
AA53413	SEE COMENTS ON BACK OF COC
AA53414	SEE COMENTS ON BACK OF COC
AA53415	SEE COMENTS ON BACK OF COC
AA53416	SEE COMENTS ON BACK OF COC
AA53417	SEE COMENTS ON BACK OF COC
AA53418	SEE COMENTS ON BACK OF COC
AA53419	SEE COMENTS ON BACK OF COC

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I certify that the analysis performed by the MDEQ Environmental Laboratory are accurate and that the laboratory tests were conducted by methods approved by the U.S. Environmental Protection Agency and other appropriate regulatory agencies.

Bob Avery, Laboratory Director

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

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Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

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Sample Number: AA53407 MLC2 0-6

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 05/18/2005 **Analyst:** SMH
Extraction Method: 3545 **Extraction Date:** 05/03/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
SURROGATE	#2 - Fluorobiphenyl#	70.8			
SURROGATE	#2,4,6-Tribromophenol#	77.3			
SURROGATE	#2-Fluorophenol#	72.6			
SURROGATE	#Nitrobenzene - D5#	67.6			
SURROGATE	#Phenol - D5#	72.3			
SURROGATE	#p-Terphenyl-d14#	84.8			
120-82-1	1,2,4-Trichlorobenzene	Not Detected	260		1.0
95-50-1	1,2-Dichlorobenzene	Not Detected	130		1.0
541-73-1	1,3-Dichlorobenzene	Not Detected	130		1.0
106-46-7	1,4-Dichlorobenzene	Not Detected	130		1.0
95-95-4	2,4,5-Trichlorophenol	Not Detected	430		1.0
88-06-2	2,4,6-Trichlorophenol	Not Detected	430		1.0
120-83-2	2,4-Dichlorophenol	Not Detected	430		1.0
105-67-9	2,4-Dimethylphenol	Not Detected	430		1.0
51-28-5	2,4-Dinitrophenol	Not Detected	2200		1.0
14-2	2,4-Dinitrotoluene	Not Detected	430		1.0
20-2	2,6-Dinitrotoluene	Not Detected	430		1.0
91-58-7	2-Chloronaphthalene	Not Detected	260		1.0
95-57-8	2-Chlorophenol	Not Detected	430		1.0
534-52-1	2-Methyl-4,6-dinitrophenol	Not Detected	2200		1.0
91-57-6	2-Methylnaphthalene	Not Detected	320		1.0
95-48-7	2-Methylphenol (o-Cresol)	Not Detected	430		1.0
88-74-4	2-Nitroaniline	Not Detected	2200		1.0
88-75-5	2-Nitrophenol	Not Detected	430		1.0
108394,106445	3 & 4-Methylphenol	Not Detected	850		1.0
99-09-2	3-Nitroaniline	Not Detected	2200		1.0
101-55-3	4-Bromophenyl phenyl ether	Not Detected	260		1.0
59-50-7	4-Chloro-3-methyl-phenol	Not Detected	430		1.0
7005-72-3	4-Chlorodiphenylether	Not Detected	130		1.0
100-01-6	4-Nitroaniline	Not Detected	2200		1.0
100-02-7	4-Nitrophenol	Not Detected	2200		1.0
83-32-9	Acenaphthene	Not Detected	130		1.0
208-96-8	Acenaphthylene	Not Detected	130		1.0
120-12-7	Anthracene	Not Detected	130		1.0
103-33-3	Azobenzene	Not Detected	260		1.0
56-55-3	Benz[a]anthracene	Not Detected	130		1.0
50-32-8	Benzo[a]pyrene	Not Detected	260		1.0
205-99-2	Benzo[b]fluoranthene	Not Detected	260		1.0
191-24-2	Benzo[g,h,i]perylene	Not Detected	260		1.0
207-08-9	Benzo[k]fluoranthene	Not Detected	260		1.0
111-91-1	Bis(2-chloroethoxy)methane	Not Detected	260		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
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Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

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FAX: (517) 335-9600

Sample Number: AA53407 MLC2 0-6

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 05/18/2005 **Analyst:** SMH
Extraction Method: 3545 **Extraction Date:** 05/03/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
111-44-4	Bis(2-chloroethyl)ether	Not Detected	130		1.0
108-60-1	Bis(2-chloroisopropyl)ether	Not Detected	130		1.0
117-81-7	Bis(2-ethylhexyl)phthalate	Not Detected	260		1.0
85-68-7	Butyl benzyl phthalate	Not Detected	130		1.0
86-74-8	Carbazole	Not Detected	430		1.0
218-01-9	Chrysene	Not Detected	130		1.0
53-70-3	Dibenz[a,h]anthracene	Not Detected	260		1.0
132-64-9	Dibenzofuran	Not Detected	430		1.0
84-66-2	Diethylphthalate	410	130	M=200	1.0
131-11-3	Dimethyl phthalate	Not Detected	260		1.0
84-74-2	Di-n-butyl phthalate	Not Detected	130		1.0
117-84-0	Di-n-octyl phthalate	Not Detected	260		1.0
86-73-7	Fluorene	Not Detected	130		1.0
206-44-0	Fluoroanthene	Not Detected	130		1.0
118-74-1	Hexachlorobenzene	Not Detected	260		1.0
8-3	Hexachlorobutadiene	Not Detected	260		1.0
47-4	Hexachlorocyclopentadiene	Not Detected	2600		1.0
67-72-1	Hexachloroethane	Not Detected	130		1.0
193-39-5	Indeno(1,2,3-c,d)pyrene	Not Detected	260		1.0
78-59-1	Isophorone	Not Detected	130		1.0
91-20-3	Naphthalene	Not Detected	130		1.0
98-95-3	Nitrobenzene	Not Detected	260		1.0
67-75-9	N-Nitrosodimethylamine	Not Detected	430		1.0
621-64-7	N-Nitrosodi-n-propylamine	Not Detected	260		1.0
156-10-5	N-Nitrosodiphenylamine	Not Detected	260		1.0
87-86-5	Pentachlorophenol	Not Detected	4400		1.0
85-01-8	Phenanthrene	Not Detected	130		1.0
108-95-2	Phenol	Not Detected	430		1.0
129-00-0	Pyrene	Not Detected	130		1.0

PCBs as Aroclors

Analytical Method: 8082 **Date Tested:** 05/10/2005 **Analyst:** MF
Extraction Method: 3545 **Extraction Date:** 05/05/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
SURROGATE	#Decachlorobiphenyl#	92.9			
SURROGATE	#Tetrachloro-m-xylene#	62.3			
12674-11-2	Aroclor 1016	Not Detected	130		1.0
11104-28-2	Aroclor 1221	Not Detected	130		1.0
11141-16-5	Aroclor 1232	Not Detected	130		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

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Sample Number: AA53407 MLC2 0-6

PCBs as Aroclors

Analytical Method: 8082 **Date Tested:** 05/10/2005 **Analyst:** MF
Extraction Method: 3545 **Extraction Date:** 05/05/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
53469-21-9	Aroclor 1242	Not Detected	130		1.0
12672-29-6	Aroclor 1248	Not Detected	130		1.0
11097-69-1	Aroclor 1254	Not Detected	130		1.0
11096-82-5	Aroclor 1260	Not Detected	130		1.0
37324-23-5	Aroclor 1262	Not Detected	130		1.0
11100-14-4	Aroclor 1268	Not Detected	130		1.0

Sample Number AA53407 MLC2 0-6

CAS#	Analyte Name	Result	Unit	RL	Qualifier	Date Tested	Method	Analyst
	% Total Solids	77.6	%	0.1		05/05/2005		DB

CAS# : Chemical Abstract Service Registry Number
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Sample Number: AA53408 MLC2 6-14

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 05/18/2005 **Analyst:** SMH
Extraction Method: 3545 **Extraction Date:** 05/03/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
SURROGATE	#2 - Fluorobiphenyl#	70.9			
SURROGATE	#2,4,6-Tribromophenol#	78.0			
SURROGATE	#2-Fluorophenol#	66.7			
SURROGATE	#Nitrobenzene - D5#	70.2			
SURROGATE	#Phenol - D5#	67.4			
SURROGATE	#p-Terphenyl-d14#	99.4			
120-82-1	1,2,4-Trichlorobenzene	Not Detected	250		1.0
95-50-1	1,2-Dichlorobenzene	Not Detected	120		1.0
541-73-1	1,3-Dichlorobenzene	Not Detected	120		1.0
106-46-7	1,4-Dichlorobenzene	Not Detected	120		1.0
95-95-4	2,4,5-Trichlorophenol	Not Detected	410		1.0
88-06-2	2,4,6-Trichlorophenol	Not Detected	410		1.0
120-83-2	2,4-Dichlorophenol	Not Detected	410		1.0
105-67-9	2,4-Dimethylphenol	Not Detected	410		1.0
51-28-5	2,4-Dinitrophenol	Not Detected	2100		1.0
'-14-2	2,4-Dinitrotoluene	Not Detected	410		1.0
20-2	2,6-Dinitrotoluene	Not Detected	410		1.0
91-58-7	2-Chloronaphthalene	Not Detected	250		1.0
95-57-8	2-Chlorophenol	Not Detected	410		1.0
534-52-1	2-Methyl-4,6-dinitrophenol	Not Detected	2100		1.0
91-57-6	2-Methylnaphthalene	Not Detected	310		1.0
95-48-7	2-Methylphenol (o-Cresol)	Not Detected	410		1.0
88-74-4	2-Nitroaniline	Not Detected	2100		1.0
88-75-5	2-Nitrophenol	Not Detected	410		1.0
108394,106445	3 & 4-Methylphenol	Not Detected	810		1.0
99-09-2	3-Nitroaniline	Not Detected	2100		1.0
101-55-3	4-Bromophenyl phenyl ether	Not Detected	250		1.0
59-50-7	4-Chloro-3-methyl-phenol	Not Detected	410		1.0
7005-72-3	4-Chlorodiphenylether	Not Detected	120		1.0
100-01-6	4-Nitroaniline	Not Detected	2100		1.0
100-02-7	4-Nitrophenol	Not Detected	2100		1.0
83-32-9	Acenaphthene	Not Detected	120		1.0
208-96-8	Acenaphthylene	Not Detected	120		1.0
120-12-7	Anthracene	Not Detected	120		1.0
103-33-3	Azobenzene	Not Detected	250		1.0
56-55-3	Benz[a]anthracene	Not Detected	120		1.0
50-32-8	Benzo[a]pyrene	Not Detected	250		1.0
205-99-2	Benzo[b]fluoranthene	Not Detected	250		1.0
191-24-2	Benzo[g,h,i]perylene	Not Detected	250		1.0
207-08-9	Benzo[k]fluoranthene	Not Detected	250		1.0
111-91-1	Bis(2-chloroethoxy)methane	Not Detected	250		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
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ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
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Sample Number: AA53408 MLC2 6-14

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 05/18/2005 **Analyst:** SMH
Extraction Method: 3545 **Extraction Date:** 05/03/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
111-44-4	Bis(2-chloroethyl)ether	Not Detected	120		1.0
108-60-1	Bis(2-chloroisopropyl)ether	Not Detected	120		1.0
117-81-7	Bis(2-ethylhexyl)phthalate	Not Detected	250		1.0
85-68-7	Butyl benzyl phthalate	Not Detected	120		1.0
86-74-8	Carbazole	Not Detected	410		1.0
218-01-9	Chrysene	Not Detected	120		1.0
53-70-3	Dibenz[a,h]anthracene	Not Detected	250		1.0
132-64-9	Dibenzofuran	Not Detected	410		1.0
84-66-2	Diethylphthalate	400	120	M=200	1.0
131-11-3	Dimethyl phthalate	Not Detected	250		1.0
84-74-2	Di-n-butyl phthalate	Not Detected	120		1.0
117-84-0	Di-n-octyl phthalate	Not Detected	250		1.0
86-73-7	Fluorene	Not Detected	120		1.0
206-44-0	Fluoroanthene	Not Detected	120		1.0
118-74-1	Hexachlorobenzene	Not Detected	250		1.0
8-3	Hexachlorobutadiene	Not Detected	250		1.0
47-4	Hexachlorocyclopentadiene	Not Detected	2500		1.0
67-72-1	Hexachloroethane	Not Detected	120		1.0
193-39-5	Indeno(1,2,3-c,d)pyrene	Not Detected	250		1.0
78-59-1	Isophorone	Not Detected	120		1.0
91-20-3	Naphthalene	Not Detected	120		1.0
98-95-3	Nitrobenzene	Not Detected	250		1.0
67-75-9	N-Nitrosodimethylamine	Not Detected	410		1.0
621-64-7	N-Nitrosodi-n-propylamine	Not Detected	250		1.0
156-10-5	N-Nitrosodiphenylamine	Not Detected	250		1.0
87-86-5	Pentachlorophenol	Not Detected	4200		1.0
85-01-8	Phenanthrene	Not Detected	120		1.0
108-95-2	Phenol	Not Detected	410		1.0
129-00-0	Pyrene	Not Detected	120		1.0

PCBs as Aroclors

Analytical Method: 8082 **Date Tested:** 05/10/2005 **Analyst:** MF
Extraction Method: 3545 **Extraction Date:** 05/05/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
SURROGATE	#Decachlorobiphenyl#	85.8			
SURROGATE	#Tetrachloro-m-xylene#	59.6			
12674-11-2	Aroclor 1016	Not Detected	120		1.0
11104-28-2	Aroclor 1221	Not Detected	120		1.0
11141-16-5	Aroclor 1232	Not Detected	120		1.0

CAS# : Chemical Abstract Service Registry Number
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Sample Number: AA53408 MLC2 6-14

PCBs as Aroclors

Analytical Method: 8082 **Date Tested:** 05/10/2005 **Analyst:** MF
Extraction Method: 3545 **Extraction Date:** 05/05/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
53469-21-9	Aroclor 1242	Not Detected	120		1.0
12672-29-6	Aroclor 1248	Not Detected	120		1.0
11097-69-1	Aroclor 1254	Not Detected	120		1.0
11096-82-5	Aroclor 1260	Not Detected	120		1.0
37324-23-5	Aroclor 1262	Not Detected	120		1.0
11100-14-4	Aroclor 1268	Not Detected	120		1.0

Sample Number AA53408 MLC2 6-14

CAS#	Analyte Name	Result	Unit	RL	Qualifier	Date Tested	Method	Analyst
7440-38-2	Arsenic - Sediment	1.8	mg/Kg dry	0.5		05/19/2005	7060	LAV
7782-49-2	Selenium - Sediment	ND	mg/Kg dry	0.5		05/12/2005	7740	LAV
7440-22-4	Silver - Sediment	ND	mg/Kg dry	0.25		05/13/2005	7761	LAV
	Digest Mercury - Sediment	Completed				05/09/2005	7471	RK
[illegible]9-97-6	Mercury - Sediment	ND	mg/Kg dry	0.05		05/26/2005	7471	TS
[illegible]-39-3	Barium - Sediment	14	mg/Kg dry	1		05/23/2005	6010	MJ
7440-43-9	Cadmium - Sediment	ND	mg/Kg dry	2.0		05/23/2005	6010	MJ
7440-47-3	Chromium - Sediment	4.8	mg/Kg dry	2		05/23/2005	6010	MJ
7440-50-8	Copper - Sediment	2.5	mg/Kg dry	2		05/23/2005	6010	MJ
	Digest Metals - Sediment	Completed				05/09/2005	3050	TK
7439-92-1	Lead - Sediment	ND	mg/Kg dry	5		05/23/2005	6010	MJ
7440-66-6	Zinc - Sediment	11	mg/Kg dry	5		05/23/2005	6010	MJ
	% Total Solids	81.3	%	0.1		05/05/2005		DB
	Drying and Grinding - Sediment	Completed				05/06/2005		RK

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Sandy Gregg
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

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FAX: (517) 335-9600

Sample Number: AA53409 UDP1

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 05/18/2005 **Analyst:** SMH
Extraction Method: 3545 **Extraction Date:** 05/03/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
SURROGATE	#2 - Fluorobiphenyl#	50.6			
SURROGATE	#2,4,6-Tribromophenol#	63.6			
SURROGATE	#2-Fluorophenol#	43.4			
SURROGATE	#Nitrobenzene - D5#	46.2			
SURROGATE	#Phenol - D5#	50.1			
SURROGATE	#p-Terphenyl-d14#	76.0			
120-82-1	1,2,4-Trichlorobenzene	Not Detected	550		1.0
95-50-1	1,2-Dichlorobenzene	Not Detected	270		1.0
541-73-1	1,3-Dichlorobenzene	Not Detected	270		1.0
106-46-7	1,4-Dichlorobenzene	Not Detected	270		1.0
95-95-4	2,4,5-Trichlorophenol	Not Detected	900		1.0
88-06-2	2,4,6-Trichlorophenol	Not Detected	900		1.0
120-83-2	2,4-Dichlorophenol	Not Detected	900		1.0
105-67-9	2,4-Dimethylphenol	Not Detected	900		1.0
51-28-5	2,4-Dinitrophenol	Not Detected	4600		1.0
[illegible]14-2	2,4-Dinitrotoluene	Not Detected	900		1.0
[illegible]6-20-2	2,6-Dinitrotoluene	Not Detected	900		1.0
91-58-7	2-Chloronaphthalene	Not Detected	550		1.0
95-57-8	2-Chlorophenol	Not Detected	900		1.0
534-52-1	2-Methyl-4,6-dinitrophenol	Not Detected	4600		1.0
91-57-6	2-Methylnaphthalene	Not Detected	680		1.0
95-48-7	2-Methylphenol (o-Cresol)	Not Detected	900		1.0
88-74-4	2-Nitroaniline	Not Detected	4600		1.0
88-75-5	2-Nitrophenol	Not Detected	900		1.0
108394,106445	3 & 4-Methylphenol	Not Detected	1800		1.0
99-09-2	3-Nitroaniline	Not Detected	4600		1.0
101-55-3	4-Bromophenyl phenyl ether	Not Detected	550		1.0
59-50-7	4-Chloro-3-methyl-phenol	Not Detected	900		1.0
7005-72-3	4-Chlorodiphenylether	Not Detected	270		1.0
100-01-6	4-Nitroaniline	Not Detected	4600		1.0
100-02-7	4-Nitrophenol	Not Detected	4600		1.0
83-32-9	Acenaphthene	Not Detected	270		1.0
208-96-8	Acenaphthylene	Not Detected	270		1.0
120-12-7	Anthracene	Not Detected	270		1.0
103-33-3	Azobenzene	Not Detected	550		1.0
56-55-3	Benz[a]anthracene	Not Detected	270		1.0
50-32-8	Benzo[a]pyrene	Not Detected	550		1.0
205-99-2	Benzo[b]fluoranthene	Not Detected	550		1.0
191-24-2	Benzo[g,h,i]perylene	Not Detected	550		1.0
207-08-9	Benzo[k]fluoranthene	Not Detected	550		1.0
111-91-1	Bis(2-chloroethoxy)methane	Not Detected	550		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

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Sample Number: AA53409 UDP1

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 05/18/2005 **Analyst:** SMH
Extraction Method: 3545 **Extraction Date:** 05/03/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
111-44-4	Bis(2-chloroethyl)ether	Not Detected	270		1.0
108-60-1	Bis(2-chloroisopropyl)ether	Not Detected	270		1.0
117-81-7	Bis(2-ethylhexyl)phthalate	Not Detected	550		1.0
85-68-7	Butyl benzyl phthalate	Not Detected	270		1.0
86-74-8	Carbazole	Not Detected	900		1.0
218-01-9	Chrysene	Not Detected	270		1.0
53-70-3	Dibenz[a,h]anthracene	Not Detected	550		1.0
132-64-9	Dibenzofuran	Not Detected	900		1.0
84-66-2	Diethylphthalate	860	270	M=200	1.0
131-11-3	Dimethyl phthalate	Not Detected	550		1.0
84-74-2	Di-n-butyl phthalate	Not Detected	270		1.0
117-84-0	Di-n-octyl phthalate	Not Detected	550		1.0
86-73-7	Fluorene	Not Detected	270		1.0
206-44-0	Fluoroanthene	320	270		1.0
118-74-1	Hexachlorobenzene	Not Detected	550		1.0
[illegible]8-3	Hexachlorobutadiene	Not Detected	550		1.0
[illegible]7-4	Hexachlorocyclopentadiene	Not Detected	5500		1.0
67-72-1	Hexachloroethane	Not Detected	270		1.0
193-39-5	Indeno(1,2,3-c,d)pyrene	Not Detected	550		1.0
78-59-1	Isophorone	Not Detected	270		1.0
91-20-3	Naphthalene	Not Detected	270		1.0
98-95-3	Nitrobenzene	Not Detected	550		1.0
62-75-9	N-Nitrosodimethylamine	Not Detected	900		1.0
621-64-7	N-Nitrosodi-n-propylamine	Not Detected	550		1.0
156-10-5	N-Nitrosodiphenylamine	Not Detected	550		1.0
87-86-5	Pentachlorophenol	Not Detected	9300		1.0
85-01-8	Phenanthrene	Not Detected	270		1.0
108-95-2	Phenol	Not Detected	900		1.0
129-00-0	Pyrene	Not Detected	270		1.0

PCBs as Aroclors

Analytical Method: 8082 **Date Tested:** 05/10/2005 **Analyst:** MF
Extraction Method: 3545 **Extraction Date:** 05/05/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
SURROGATE	#Decachlorobiphenyl#	90.1			
SURROGATE	#Tetrachloro-m-xylene#	69.8			
12674-11-2	Aroclor 1016	Not Detected	270		1.0
11104-28-2	Aroclor 1221	Not Detected	270		1.0
11141-16-5	Aroclor 1232	Not Detected	270		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

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Sample Number: AA53409 UDP1

PCBs as Aroclors

Analytical Method: 8082 **Date Tested:** 05/10/2005 **Analyst:** MF
Extraction Method: 3545 **Extraction Date:** 05/05/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
53469-21-9	Aroclor 1242	Not Detected	270		1.0
12672-29-6	Aroclor 1248	Not Detected	270		1.0
11097-69-1	Aroclor 1254	Not Detected	270		1.0
11096-82-5	Aroclor 1260	Not Detected	270		1.0
37324-23-5	Aroclor 1262	Not Detected	270		1.0
11100-14-4	Aroclor 1268	Not Detected	270		1.0

Sample Number AA53409 UDP1

CAS#	Analyte Name	Result	Unit	RL	Qualifier	Date Tested	Method	Analyst
7440-38-2	Arsenic - Sediment	15.1	mg/Kg dry	0.5		05/19/2005	7060	LAV
7782-49-2	Selenium - Sediment	0.7	mg/Kg dry	0.5		05/12/2005	7740	LAV
7440-22-4	Silver - Sediment	ND	mg/Kg dry	0.25		05/13/2005	7761	LAV
	Digest Mercury - Sediment	Completed				05/09/2005	7471	RK
7439-97-6	Mercury - Sediment	ND	mg/Kg dry	0.05		05/26/2005	7471	TS
	RL= 1.5 mg/Kg due to low percent total solids.							
7440-39-3	Barium - Sediment	170	mg/Kg dry	1		05/23/2005	6010	MJ
7440-43-9	Cadmium - Sediment	ND	mg/Kg dry	2.0		05/23/2005	6010	MJ
7440-47-3	Chromium - Sediment	24	mg/Kg dry	2		05/23/2005	6010	MJ
7440-50-8	Copper - Sediment	44	mg/Kg dry	2		05/23/2005	6010	MJ
	Digest Metals - Sediment	Completed				05/09/2005	3050	TK
7439-92-1	Lead - Sediment	45	mg/Kg dry	5		05/23/2005	6010	MJ
7440-66-6	Zinc - Sediment	160	mg/Kg dry	5		05/23/2005	6010	MJ
	% Total Solids	36.6	%	0.1		05/05/2005		DB
	Drying and Grinding - Sediment	Completed				05/06/2005		RK

CAS# : Chemical Abstract Service Registry Number
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ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

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Sample Number: AA53410 OFC0051 0-6

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 05/18/2005 **Analyst:** SMH
Extraction Method: 3545 **Extraction Date:** 05/03/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
SURROGATE	#2 - Fluorobiphenyl#	70.0			
SURROGATE	#2,4,6-Tribromophenol#	80.0			
SURROGATE	#2-Fluorophenol#	57.9			
SURROGATE	#Nitrobenzene - D5#	61.1			
SURROGATE	#Phenol - D5#	63.6			
SURROGATE	#p-Terphenyl-d14#	110			
120-82-1	1,2,4-Trichlorobenzene	Not Detected	310		1.0
95-50-1	1,2-Dichlorobenzene	Not Detected	160		1.0
541-73-1	1,3-Dichlorobenzene	Not Detected	160		1.0
106-46-7	1,4-Dichlorobenzene	Not Detected	160		1.0
95-95-4	2,4,5-Trichlorophenol	Not Detected	510		1.0
88-06-2	2,4,6-Trichlorophenol	Not Detected	510		1.0
120-83-2	2,4-Dichlorophenol	Not Detected	510		1.0
105-67-9	2,4-Dimethylphenol	Not Detected	510		1.0
51-28-5	2,4-Dinitrophenol	Not Detected	2600		1.0
14-2	2,4-Dinitrotoluene	Not Detected	510		1.0
-20-2	2,6-Dinitrotoluene	Not Detected	510		1.0
91-58-7	2-Chloronaphthalene	Not Detected	310		1.0
95-57-8	2-Chlorophenol	Not Detected	510		1.0
534-52-1	2-Methyl-4,6-dinitrophenol	Not Detected	2600		1.0
91-57-6	2-Methylnaphthalene	Not Detected	390		1.0
95-48-7	2-Methylphenol (o-Cresol)	Not Detected	510		1.0
88-74-4	2-Nitroaniline	Not Detected	2600		1.0
88-75-5	2-Nitrophenol	Not Detected	510		1.0
108394,106445	3 & 4-Methylphenol	Not Detected	1000		1.0
99-09-2	3-Nitroaniline	Not Detected	2600		1.0
101-55-3	4-Bromophenyl phenyl ether	Not Detected	310		1.0
59-50-7	4-Chloro-3-methyl-phenol	Not Detected	510		1.0
7005-72-3	4-Chlorodiphenylether	Not Detected	160		1.0
100-01-6	4-Nitroaniline	Not Detected	2600		1.0
100-02-7	4-Nitrophenol	Not Detected	2600		1.0
83-32-9	Acenaphthene	Not Detected	160		1.0
208-96-8	Acenaphthylene	Not Detected	160		1.0
120-12-7	Anthracene	Not Detected	160		1.0
103-33-3	Azobenzene	Not Detected	310		1.0
56-55-3	Benz[a]anthracene	270	160		1.0
50-32-8	Benzo[a]pyrene	Not Detected	310		1.0
205-99-2	Benzo[b]fluoranthene	430	310		1.0
191-24-2	Benzo[g,h,i]perylene	Not Detected	310		1.0
207-08-9	Benzo[k]fluoranthene	Not Detected	310		1.0
111-91-1	Bis(2-chloroethoxy)methane	Not Detected	310		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

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Sample Number: AA53410 OFC0051 0-6

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 05/18/2005 **Analyst:** SMH
Extraction Method: 3545 **Extraction Date:** 05/03/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
111-44-4	Bis(2-chloroethyl)ether	Not Detected	160		1.0
108-60-1	Bis(2-chloroisopropyl)ether	Not Detected	160		1.0
117-81-7	Bis(2-ethylhexyl)phthalate	Not Detected	310		1.0
85-68-7	Butyl benzyl phthalate	Not Detected	160		1.0
86-74-8	Carbazole	Not Detected	510		1.0
218-01-9	Chrysene	Not Detected	160		1.0
53-70-3	Dibenz[a,h]anthracene	Not Detected	310		1.0
132-64-9	Dibenzofuran	Not Detected	510		1.0
84-66-2	Diethylphthalate	490	160	M=200	1.0
131-11-3	Dimethyl phthalate	Not Detected	310		1.0
84-74-2	Di-n-butyl phthalate	Not Detected	160		1.0
117-84-0	Di-n-octyl phthalate	Not Detected	310		1.0
86-73-7	Fluorene	Not Detected	160		1.0
206-44-0	Fluoroanthene	740	160		1.0
118-74-1	Hexachlorobenzene	Not Detected	310		1.0
58-3	Hexachlorobutadiene	Not Detected	310		1.0
47-4	Hexachlorocyclopentadiene	Not Detected	3100		1.0
67-72-1	Hexachloroethane	Not Detected	160		1.0
193-39-5	Indeno(1,2,3-c,d)pyrene	Not Detected	310		1.0
78-59-1	Isophorone	Not Detected	160		1.0
91-20-3	Naphthalene	Not Detected	160		1.0
98-95-3	Nitrobenzene	Not Detected	310		1.0
62-75-9	N-Nitrosodimethylamine	Not Detected	510		1.0
621-64-7	N-Nitrosodi-n-propylamine	Not Detected	310		1.0
156-10-5	N-Nitrosodiphenylamine	Not Detected	310		1.0
87-86-5	Pentachlorophenol	Not Detected	5300		1.0
85-01-8	Phenanthrene	370	160		1.0
108-95-2	Phenol	Not Detected	510		1.0
129-00-0	Pyrene	770	160		1.0

Probable petroleum product(s) present.

PCBs as Aroclors

Analytical Method: 8082 **Date Tested:** 05/10/2005 **Analyst:** MF
Extraction Method: 3545 **Extraction Date:** 05/05/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
SURROGATE	#Decachlorobiphenyl#	69.2			
SURROGATE	#Tetrachloro-m-xylene#	64.5			
12674-11-2	Aroclor 1016	Not Detected	160		1.0
11104-28-2	Aroclor 1221	Not Detected	160		1.0
11141-16-5	Aroclor 1232	Not Detected	160		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

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Sample Number: AA53410 OFC0051 0-6

PCBs as Aroclors

Analytical Method: 8082 **Date Tested:** 05/10/2005 **Analyst:** MF
Extraction Method: 3545 **Extraction Date:** 05/05/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
53469-21-9	Aroclor 1242	Not Detected	160		1.0
12672-29-6	Aroclor 1248	Not Detected	160		1.0
11097-69-1	Aroclor 1254	180	160		1.0
11096-82-5	Aroclor 1260	Not Detected	160		1.0
37324-23-5	Aroclor 1262	Not Detected	160		1.0
11100-14-4	Aroclor 1268	Not Detected	160		1.0

Sample Number AA53410 OFC0051 0-6

CAS#	Analyte Name	Result	Unit	RL	Qualifier	Date Tested	Method	Analyst
	% Total Solids	64.5	%	0.1		05/05/2005		DB

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

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Sample Number: AA53411 OFC0052 6-12

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 05/18/2005 **Analyst:** SMH
Extraction Method: 3545 **Extraction Date:** 05/03/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
SURROGATE	#2 - Fluorobiphenyl#	75.3			
SURROGATE	#2,4,6-Tribromophenol#	80.1			
SURROGATE	#2-Fluorophenol#	57.9			
SURROGATE	#Nitrobenzene - D5#	57.8			
SURROGATE	#Phenol - D5#	62.4			
SURROGATE	#p-Terphenyl-d14#	101			
120-82-1	1,2,4-Trichlorobenzene	Not Detected	250		1.0
95-50-1	1,2-Dichlorobenzene	Not Detected	120		1.0
541-73-1	1,3-Dichlorobenzene	Not Detected	120		1.0
106-46-7	1,4-Dichlorobenzene	Not Detected	120		1.0
95-95-4	2,4,5-Trichlorophenol	Not Detected	410		1.0
88-06-2	2,4,6-Trichlorophenol	Not Detected	410		1.0
120-83-2	2,4-Dichlorophenol	Not Detected	410		1.0
105-67-9	2,4-Dimethylphenol	Not Detected	410		1.0
51-28-5	2,4-Dinitrophenol	Not Detected	2100		1.0
14-2	2,4-Dinitrotoluene	Not Detected	410		1.0
-20-2	2,6-Dinitrotoluene	Not Detected	410		1.0
91-58-7	2-Chloronaphthalene	Not Detected	250		1.0
95-57-8	2-Chlorophenol	Not Detected	410		1.0
534-52-1	2-Methyl-4,6-dinitrophenol	Not Detected	2100		1.0
91-57-6	2-Methylnaphthalene	Not Detected	310		1.0
95-48-7	2-Methylphenol (o-Cresol)	Not Detected	410		1.0
88-74-4	2-Nitroaniline	Not Detected	2100		1.0
88-75-5	2-Nitrophenol	Not Detected	410		1.0
108394,106445	3 & 4-Methylphenol	Not Detected	820		1.0
99-09-2	3-Nitroaniline	Not Detected	2100		1.0
101-55-3	4-Bromophenyl phenyl ether	Not Detected	250		1.0
59-50-7	4-Chloro-3-methyl-phenol	Not Detected	410		1.0
7005-72-3	4-Chlorodiphenylether	Not Detected	120		1.0
100-01-6	4-Nitroaniline	Not Detected	2100		1.0
100-02-7	4-Nitrophenol	Not Detected	2100		1.0
83-32-9	Acenaphthene	Not Detected	120		1.0
208-96-8	Acenaphthylene	Not Detected	120		1.0
120-12-7	Anthracene	Not Detected	120		1.0
103-33-3	Azobenzene	Not Detected	250		1.0
56-55-3	Benz[a]anthracene	240	120		1.0
50-32-8	Benzo[a]pyrene	260	250		1.0
205-99-2	Benzo[b]fluoranthene	370	250		1.0
191-24-2	Benzo[g,h,i]perylene	Not Detected	250		1.0
207-08-9	Benzo[k]fluoranthene	Not Detected	250		1.0
111-91-1	Bis(2-chloroethoxy)methane	Not Detected	250		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Sandy Gregg
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

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FAX: (517) 335-9600

Sample Number: AA53411 OFC0052 6-12

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 05/18/2005 **Analyst:** SMH
Extraction Method: 3545 **Extraction Date:** 05/03/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
111-44-4	Bis(2-chloroethyl)ether	Not Detected	120		1.0
108-60-1	Bis(2-chloroisopropyl)ether	Not Detected	120		1.0
117-81-7	Bis(2-ethylhexyl)phthalate	Not Detected	250		1.0
85-68-7	Butyl benzyl phthalate	Not Detected	120		1.0
86-74-8	Carbazole	Not Detected	410		1.0
218-01-9	Chrysene	Not Detected	120		1.0
53-70-3	Dibenz[a,h]anthracene	Not Detected	250		1.0
132-64-9	Dibenzofuran	Not Detected	410		1.0
84-66-2	Diethylphthalate	340	120	M=200	1.0
131-11-3	Dimethyl phthalate	Not Detected	250		1.0
84-74-2	Di-n-butyl phthalate	Not Detected	120		1.0
117-84-0	Di-n-octyl phthalate	Not Detected	250		1.0
86-73-7	Fluorene	Not Detected	120		1.0
206-44-0	Fluoroanthene	540	120		1.0
118-74-1	Hexachlorobenzene	Not Detected	250		1.0
58-3	Hexachlorobutadiene	Not Detected	250		1.0
7-4	Hexachlorocyclopentadiene	Not Detected	2500		1.0
67-72-1	Hexachloroethane	Not Detected	120		1.0
193-39-5	Indeno(1,2,3-c,d)pyrene	Not Detected	250		1.0
78-59-1	Isophorone	Not Detected	120		1.0
91-20-3	Naphthalene	Not Detected	120		1.0
98-95-3	Nitrobenzene	Not Detected	250		1.0
62-75-9	N-Nitrosodimethylamine	Not Detected	410		1.0
621-64-7	N-Nitrosodi-n-propylamine	Not Detected	250		1.0
156-10-5	N-Nitrosodiphenylamine	Not Detected	250		1.0
87-86-5	Pentachlorophenol	Not Detected	4200		1.0
85-01-8	Phenanthrene	290	120		1.0
108-95-2	Phenol	Not Detected	410		1.0
129-00-0	Pyrene	500	120		1.0

Probable petroleum product(s) present.

PCBs as Aroclors

Analytical Method: 8082 **Date Tested:** 05/10/2005 **Analyst:** MF
Extraction Method: 3545 **Extraction Date:** 05/05/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
SURROGATE	#Decachlorobiphenyl#	77.4			
SURROGATE	#Tetrachloro-m-xylene#	67.3			
12674-11-2	Aroclor 1016	Not Detected	120		1.0
11104-28-2	Aroclor 1221	Not Detected	120		1.0
11141-16-5	Aroclor 1232	Not Detected	120		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
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Sample Number: AA53411 OFC0052 6-12

PCBs as Aroclors

Analytical Method: 8082 **Date Tested:** 05/10/2005 **Analyst:** MF
Extraction Method: 3545 **Extraction Date:** 05/05/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
53469-21-9	Aroclor 1242	Not Detected	120		1.0
12672-29-6	Aroclor 1248	Not Detected	120		1.0
11097-69-1	Aroclor 1254	Not Detected	120		1.0
11096-82-5	Aroclor 1260	Not Detected	120		1.0
37324-23-5	Aroclor 1262	Not Detected	120		1.0
11100-14-4	Aroclor 1268	Not Detected	120		1.0

Sample Number AA53411 OFC0052 6-12

CAS#	Analyte Name	Result	Unit	RL	Qualifier	Date Tested	Method	Analyst
	% Total Solids	80.7	%	0.1		05/05/2005		DB

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

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ug / Kg : microgram / kilogram (ppb)
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Sample Number: AA53412 OFP0052

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 05/23/2005 **Analyst:** SMH
Extraction Method: 3545 **Extraction Date:** 05/03/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
SURROGATE	#2 - Fluorobiphenyl#	67.0			
SURROGATE	#2,4,6-Tribromophenol#	73.1			
SURROGATE	#2-Fluorophenol#	53.4			
SURROGATE	#Nitrobenzene - D5#	54.6			
SURROGATE	#Phenol - D5#	57.2			
SURROGATE	#p-Terphenyl-d14#	104			
120-82-1	1,2,4-Trichlorobenzene	Not Detected	470		1.0
95-50-1	1,2-Dichlorobenzene	Not Detected	230		1.0
541-73-1	1,3-Dichlorobenzene	Not Detected	230		1.0
106-46-7	1,4-Dichlorobenzene	Not Detected	230		1.0
95-95-4	2,4,5-Trichlorophenol	Not Detected	770		1.0
88-06-2	2,4,6-Trichlorophenol	Not Detected	770		1.0
120-83-2	2,4-Dichlorophenol	Not Detected	770		1.0
105-67-9	2,4-Dimethylphenol	Not Detected	770		1.0
51-28-5	2,4-Dinitrophenol	Not Detected	4000		1.0
14-2	2,4-Dinitrotoluene	Not Detected	770		1.0
-20-2	2,6-Dinitrotoluene	Not Detected	770		1.0
91-58-7	2-Chloronaphthalene	Not Detected	470		1.0
95-57-8	2-Chlorophenol	Not Detected	770		1.0
534-52-1	2-Methyl-4,6-dinitrophenol	Not Detected	4000		1.0
91-57-6	2-Methylnaphthalene	Not Detected	580		1.0
95-48-7	2-Methylphenol (o-Cresol)	Not Detected	770		1.0
88-74-4	2-Nitroaniline	Not Detected	4000		1.0
88-75-5	2-Nitrophenol	Not Detected	770		1.0
108394,106445	3 & 4-Methylphenol	Not Detected	1500		1.0
99-09-2	3-Nitroaniline	Not Detected	4000		1.0
101-55-3	4-Bromophenyl phenyl ether	Not Detected	470		1.0
59-50-7	4-Chloro-3-methyl-phenol	Not Detected	770		1.0
7005-72-3	4-Chlorodiphenylether	Not Detected	230		1.0
100-01-6	4-Nitroaniline	Not Detected	4000		1.0
100-02-7	4-Nitrophenol	Not Detected	4000		1.0
83-32-9	Acenaphthene	Not Detected	230		1.0
208-96-8	Acenaphthylene	Not Detected	230		1.0
120-12-7	Anthracene	Not Detected	230		1.0
103-33-3	Azobenzene	Not Detected	470		1.0
56-55-3	Benz[a]anthracene	590	230		1.0
50-32-8	Benzo[a]pyrene	720	470		1.0
205-99-2	Benzo[b]fluoranthene	1200	470		1.0
191-24-2	Benzo[g,h,i]perylene	590	470		1.0
207-08-9	Benzo[k]fluoranthene	Not Detected	470		1.0
111-91-1	Bis(2-chloroethoxy)methane	Not Detected	470		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
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Sample Number: AA53412 OFP0052

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 05/23/2005 **Analyst:** SMH
Extraction Method: 3545 **Extraction Date:** 05/03/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
111-44-4	Bis(2-chloroethyl)ether	Not Detected	230		1.0
108-60-1	Bis(2-chloroisopropyl)ether	Not Detected	230		1.0
117-81-7	Bis(2-ethylhexyl)phthalate	760	470		1.0
85-68-7	Butyl benzyl phthalate	Not Detected	230		1.0
86-74-8	Carbazole	Not Detected	770		1.0
218-01-9	Chrysene	860	230		1.0
53-70-3	Dibenz[a,h]anthracene	Not Detected	470		1.0
132-64-9	Dibenzofuran	Not Detected	770		1.0
84-66-2	Diethylphthalate	680	230	M=200	1.0
131-11-3	Dimethyl phthalate	Not Detected	470		1.0
84-74-2	Di-n-butyl phthalate	Not Detected	230		1.0
117-84-0	Di-n-octyl phthalate	Not Detected	470		1.0
86-73-7	Fluorene	Not Detected	230		1.0
206-44-0	Fluoroanthene	1900	230		1.0
118-74-1	Hexachlorobenzene	Not Detected	470		1.0
58-3	Hexachlorobutadiene	Not Detected	470		1.0
47-4	Hexachlorocyclopentadiene	Not Detected	4700	5	1.0
67-72-1	Hexachloroethane	Not Detected	230		1.0
193-39-5	Indeno(1,2,3-c,d)pyrene	530	470		1.0
78-59-1	Isophorone	Not Detected	230		1.0
91-20-3	Naphthalene	Not Detected	230		1.0
98-95-3	Nitrobenzene	Not Detected	470		1.0
67-75-9	N-Nitrosodimethylamine	Not Detected	770		1.0
621-64-7	N-Nitrosodi-n-propylamine	Not Detected	470		1.0
156-10-5	N-Nitrosodiphenylamine	Not Detected	470		1.0
87-86-5	Pentachlorophenol	Not Detected	7900		1.0
85-01-8	Phenanthrene	800	230		1.0
108-95-2	Phenol	Not Detected	770		1.0
129-00-0	Pyrene	2000	230		1.0

Probable petroleum product(s) present.

PCBs as Aroclors

Analytical Method: 8082 **Date Tested:** 05/10/2005 **Analyst:** MF
Extraction Method: 3545 **Extraction Date:** 05/05/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
SURROGATE	#Decachlorobiphenyl#	64.1			
SURROGATE	#Tetrachloro-m-xylene#	57.3			
12674-11-2	Aroclor 1016	Not Detected	230		1.0
11104-28-2	Aroclor 1221	Not Detected	230		1.0
11141-16-5	Aroclor 1232	Not Detected	230		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

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Sample Number: AA53412 OFP0052

PCBs as Aroclors

Analytical Method: 8082 **Date Tested:** 05/10/2005 **Analyst:** MF
Extraction Method: 3545 **Extraction Date:** 05/05/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
53469-21-9	Aroclor 1242	Not Detected	230		1.0
12672-29-6	Aroclor 1248	Not Detected	230		1.0
11097-69-1	Aroclor 1254	Not Detected	230		1.0
11096-82-5	Aroclor 1260	Not Detected	230		1.0
37324-23-5	Aroclor 1262	Not Detected	230		1.0
11100-14-4	Aroclor 1268	Not Detected	230		1.0

Sample Number AA53412 OFP0052

CAS#	Analyte Name	Result	Unit	RL	Qualifier	Date Tested	Method	Analyst
7440-38-2	Arsenic - Sediment	12.8	mg/Kg dry	0.5		05/19/2005	7060	LAV
7782-49-2	Selenium - Sediment	0.7	mg/Kg dry	0.5		05/12/2005	7740	LAV
7440-22-4	Silver - Sediment	ND	mg/Kg dry	0.25		05/13/2005	7761	LAV
	Digest Mercury - Sediment	Completed				05/09/2005	7471	RK
7439-97-6	Mercury - Sediment	ND	mg/Kg dry	0.05		05/26/2005	7471	TS
	RL= 1.5 mg/Kg due to low percent total solids.							
7440-39-3	Barium - Sediment	130	mg/Kg dry	1		05/23/2005	6010	MJ
7440-43-9	Cadmium - Sediment	ND	mg/Kg dry	2.0		05/23/2005	6010	MJ
7440-47-3	Chromium - Sediment	26	mg/Kg dry	2		05/23/2005	6010	MJ
7440-50-8	Copper - Sediment	52	mg/Kg dry	2		05/23/2005	6010	MJ
	Digest Metals - Sediment	Completed				05/09/2005	3050	TK
7439-92-1	Lead - Sediment	72	mg/Kg dry	5		05/23/2005	6010	MJ
7440-66-6	Zinc - Sediment	230	mg/Kg dry	5		05/23/2005	6010	MJ
	% Total Solids	43.0	%	0.1		05/05/2005		DB
	Drying and Grinding - Sediment	Completed				05/06/2005		RK

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Sample Number: AA53413 OFP0052D

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 05/23/2005 **Analyst:** SMH
Extraction Method: 3545 **Extraction Date:** 05/03/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
SURROGATE	#2 - Fluorobiphenyl#	68.5			
SURROGATE	#2,4,6-Tribromophenol#	68.3			
SURROGATE	#2-Fluorophenol#	50.5			
SURROGATE	#Nitrobenzene - D5#	49.4			
SURROGATE	#Phenol - D5#	51.5			
SURROGATE	#p-Terphenyl-d14#	101			
120-82-1	1,2,4-Trichlorobenzene	Not Detected	460		1.0
95-50-1	1,2-Dichlorobenzene	Not Detected	230		1.0
541-73-1	1,3-Dichlorobenzene	Not Detected	230		1.0
106-46-7	1,4-Dichlorobenzene	Not Detected	230		1.0
95-95-4	2,4,5-Trichlorophenol	Not Detected	760		1.0
88-06-2	2,4,6-Trichlorophenol	Not Detected	760		1.0
120-83-2	2,4-Dichlorophenol	Not Detected	760		1.0
105-67-9	2,4-Dimethylphenol	Not Detected	760		1.0
51-28-5	2,4-Dinitrophenol	Not Detected	3900		1.0
-14-2	2,4-Dinitrotoluene	Not Detected	760		1.0
-20-2	2,6-Dinitrotoluene	Not Detected	760		1.0
91-58-7	2-Chloronaphthalene	Not Detected	460		1.0
95-57-8	2-Chlorophenol	Not Detected	760		1.0
534-52-1	2-Methyl-4,6-dinitrophenol	Not Detected	3900		1.0
91-57-6	2-Methylnaphthalene	Not Detected	580		1.0
95-48-7	2-Methylphenol (o-Cresol)	Not Detected	760		1.0
88-74-4	2-Nitroaniline	Not Detected	3900		1.0
88-75-5	2-Nitrophenol	Not Detected	760		1.0
108394,106445	3 & 4-Methylphenol	Not Detected	1500		1.0
99-09-2	3-Nitroaniline	Not Detected	3900		1.0
101-55-3	4-Bromophenyl phenyl ether	Not Detected	460		1.0
59-50-7	4-Chloro-3-methyl-phenol	Not Detected	760		1.0
7005-72-3	4-Chlorodiphenylether	Not Detected	230		1.0
100-01-6	4-Nitroaniline	Not Detected	3900		1.0
100-02-7	4-Nitrophenol	Not Detected	3900		1.0
83-32-9	Acenaphthene	Not Detected	230		1.0
208-96-8	Acenaphthylene	Not Detected	230		1.0
120-12-7	Anthracene	Not Detected	230		1.0
103-33-3	Azobenzene	Not Detected	460		1.0
56-55-3	Benz[a]anthracene	650	230		1.0
50-32-8	Benzo[a]pyrene	750	460		1.0
205-99-2	Benzo[b]fluoranthene	1200	460		1.0
191-24-2	Benzo[g,h,i]perylene	700	460		1.0
207-08-9	Benzo[k]fluoranthene	Not Detected	460		1.0
111-91-1	Bis(2-chloroethoxy)methane	Not Detected	460		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
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Sample Number: AA53413 OFP0052D

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 05/23/2005 **Analyst:** SMH
Extraction Method: 3545 **Extraction Date:** 05/03/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
111-44-4	Bis(2-chloroethyl)ether	Not Detected	230		1.0
108-60-1	Bis(2-chloroisopropyl)ether	Not Detected	230		1.0
117-81-7	Bis(2-ethylhexyl)phthalate	590	460		1.0
85-68-7	Butyl benzyl phthalate	Not Detected	230		1.0
86-74-8	Carbazole	Not Detected	760		1.0
218-01-9	Chrysene	930	230		1.0
53-70-3	Dibenz[a,h]anthracene	Not Detected	460		1.0
132-64-9	Dibenzofuran	Not Detected	760		1.0
84-66-2	Diethylphthalate	760	230	M=200	1.0
131-11-3	Dimethyl phthalate	Not Detected	460		1.0
84-74-2	Di-n-butyl phthalate	Not Detected	230		1.0
117-84-0	Di-n-octyl phthalate	Not Detected	460		1.0
86-73-7	Fluorene	Not Detected	230		1.0
206-44-0	Fluoroanthene	2000	230		1.0
118-74-1	Hexachlorobenzene	Not Detected	460		1.0
68-3	Hexachlorobutadiene	Not Detected	460		1.0
47-4	Hexachlorocyclopentadiene	Not Detected	4600	5	1.0
67-72-1	Hexachloroethane	Not Detected	230		1.0
193-39-5	Indeno(1,2,3-c,d)pyrene	620	460		1.0
78-59-1	Isophorone	Not Detected	230		1.0
91-20-3	Naphthalene	Not Detected	230		1.0
98-95-3	Nitrobenzene	Not Detected	460		1.0
67-75-9	N-Nitrosodimethylamine	Not Detected	760		1.0
621-64-7	N-Nitrosodi-n-propylamine	Not Detected	460		1.0
156-10-5	N-Nitrosodiphenylamine	Not Detected	460		1.0
87-86-5	Pentachlorophenol	Not Detected	7900		1.0
85-01-8	Phenanthrene	870	230		1.0
108-95-2	Phenol	Not Detected	760		1.0
129-00-0	Pyrene	2200	230		1.0

Probable petroleum product(s) present.

PCBs as Aroclors

Analytical Method: 8082 **Date Tested:** 05/10/2005 **Analyst:** MF
Extraction Method: 3545 **Extraction Date:** 05/05/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
SURROGATE	#Decachlorobiphenyl#	79.3			
SURROGATE	#Tetrachloro-m-xylene#	71.2			
12674-11-2	Aroclor 1016	Not Detected	230		1.0
11104-28-2	Aroclor 1221	Not Detected	230		1.0
11141-16-5	Aroclor 1232	Not Detected	230		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
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ug / Kg : microgram / kilogram (ppb)
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TEL: (517) 335-9800
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Sample Number: AA53413 OFP0052D

PCBs as Aroclors

Analytical Method: 8082 **Date Tested:** 05/10/2005 **Analyst:** MF
Extraction Method: 3545 **Extraction Date:** 05/05/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
53469-21-9	Aroclor 1242	Not Detected	230		1.0
12672-29-6	Aroclor 1248	Not Detected	230		1.0
11097-69-1	Aroclor 1254	Not Detected	230		1.0
11096-82-5	Aroclor 1260	Not Detected	230		1.0
37324-23-5	Aroclor 1262	Not Detected	230		1.0
11100-14-4	Aroclor 1268	Not Detected	230		1.0

Sample Number AA53413 OFP0052D

CAS#	Analyte Name	Result	Unit	RL	Qualifier	Date Tested	Method	Analyst
7440-38-2	Arsenic - Sediment	12.8	mg/Kg dry	0.5		05/19/2005	7060	LAV
7782-49-2	Selenium - Sediment	ND	mg/Kg dry	0.5		05/12/2005	7740	LAV
7440-22-4	Silver - Sediment	ND	mg/Kg dry	0.25		05/13/2005	7761	LAV
	Digest Mercury - Sediment	Completed				05/09/2005	7471	RK
7439-97-6	Mercury - Sediment	.12	mg/Kg dry	0.05		05/26/2005	7471	TS
7440-39-3	Barium - Sediment	130	mg/Kg dry	1		05/23/2005	6010	MJ
7440-43-9	Cadmium - Sediment	ND	mg/Kg dry	2.0		05/23/2005	6010	MJ
7440-47-3	Chromium - Sediment	25	mg/Kg dry	2		05/23/2005	6010	MJ
7440-50-8	Copper - Sediment	57	mg/Kg dry	2		05/23/2005	6010	MJ
	Digest Metals - Sediment	Completed				05/09/2005	3050	TK
7439-92-1	Lead - Sediment	66	mg/Kg dry	5		05/23/2005	6010	MJ
7440-66-6	Zinc - Sediment	230	mg/Kg dry	5		05/23/2005	6010	MJ
	% Total Solids	43.3	%	0.1		05/05/2005		DB
	Drying and Grinding - Sediment	Completed				05/06/2005		RK

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Sandy Gregg
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

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Sample Number: AA53414 OFP013

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 05/23/2005 **Analyst:** SMH
Extraction Method: 3545 **Extraction Date:** 05/03/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
SURROGATE	#2 - Fluorobiphenyl#	69.7			
SURROGATE	#2,4,6-Tribromophenol#	71.8			
SURROGATE	#2-Fluorophenol#	52.1			
SURROGATE	#Nitrobenzene - D5#	55.3			
SURROGATE	#Phenol - D5#	56.5			
SURROGATE	#p-Terphenyl-d14#	99.5			
120-82-1	1,2,4-Trichlorobenzene	Not Detected	490		1.0
95-50-1	1,2-Dichlorobenzene	Not Detected	250		1.0
541-73-1	1,3-Dichlorobenzene	Not Detected	250		1.0
106-46-7	1,4-Dichlorobenzene	Not Detected	250		1.0
95-95-4	2,4,5-Trichlorophenol	Not Detected	810		1.0
88-06-2	2,4,6-Trichlorophenol	Not Detected	810		1.0
120-83-2	2,4-Dichlorophenol	Not Detected	810		1.0
105-67-9	2,4-Dimethylphenol	Not Detected	810		1.0
51-28-5	2,4-Dinitrophenol	Not Detected	4200		1.0
-14-2	2,4-Dinitrotoluene	Not Detected	810		1.0
-20-2	2,6-Dinitrotoluene	Not Detected	810		1.0
91-58-7	2-Chloronaphthalene	Not Detected	490		1.0
95-57-8	2-Chlorophenol	Not Detected	810		1.0
534-52-1	2-Methyl-4,6-dinitrophenol	Not Detected	4200		1.0
91-57-6	2-Methylnaphthalene	Not Detected	620		1.0
95-48-7	2-Methylphenol (o-Cresol)	Not Detected	810		1.0
88-74-4	2-Nitroaniline	Not Detected	4200		1.0
88-75-5	2-Nitrophenol	Not Detected	810		1.0
108394,106445	3 & 4-Methylphenol	Not Detected	1600		1.0
99-09-2	3-Nitroaniline	Not Detected	4200		1.0
101-55-3	4-Bromophenyl phenyl ether	Not Detected	490		1.0
59-50-7	4-Chloro-3-methyl-phenol	Not Detected	810		1.0
7005-72-3	4-Chlorodiphenylether	Not Detected	250		1.0
100-01-6	4-Nitroaniline	Not Detected	4200		1.0
100-02-7	4-Nitrophenol	Not Detected	4200		1.0
83-32-9	Acenaphthene	Not Detected	250		1.0
208-96-8	Acenaphthylene	Not Detected	250		1.0
120-12-7	Anthracene	Not Detected	250		1.0
103-33-3	Azobenzene	Not Detected	490		1.0
56-55-3	Benz[a]anthracene	550	250		1.0
50-32-8	Benzo[a]pyrene	700	490		1.0
205-99-2	Benzo[b]fluoranthene	1200	490		1.0
191-24-2	Benzo[g,h,i]perylene	700	490		1.0
207-08-9	Benzo[k]fluoranthene	Not Detected	490		1.0
111-91-1	Bis(2-chloroethoxy)methane	Not Detected	490		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

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Sample Number: AA53414 OFP013

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 05/23/2005 **Analyst:** SMH
Extraction Method: 3545 **Extraction Date:** 05/03/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
111-44-4	Bis(2-chloroethyl)ether	Not Detected	250		1.0
108-60-1	Bis(2-chloroisopropyl)ether	Not Detected	250		1.0
117-81-7	Bis(2-ethylhexyl)phthalate	Not Detected	490		1.0
85-68-7	Butyl benzyl phthalate	Not Detected	250		1.0
86-74-8	Carbazole	Not Detected	810		1.0
218-01-9	Chrysene	850	250		1.0
53-70-3	Dibenz[a,h]anthracene	Not Detected	490		1.0
132-64-9	Dibenzofuran	Not Detected	810		1.0
84-66-2	Diethylphthalate	730	250	M=200	1.0
131-11-3	Dimethyl phthalate	Not Detected	490		1.0
84-74-2	Di-n-butyl phthalate	Not Detected	250		1.0
117-84-0	Di-n-octyl phthalate	Not Detected	490		1.0
86-73-7	Fluorene	Not Detected	250		1.0
206-44-0	Fluoroanthene	1800	250		1.0
118-74-1	Hexachlorobenzene	Not Detected	490		1.0
[illegible]8-3	Hexachlorobutadiene	Not Detected	490		1.0
[illegible]7-4	Hexachlorocyclopentadiene	Not Detected	4900	5	1.0
67-72-1	Hexachloroethane	Not Detected	250		1.0
193-39-5	Indeno(1,2,3-c,d)pyrene	570	490		1.0
78-59-1	Isophorone	Not Detected	250		1.0
91-20-3	Naphthalene	Not Detected	250		1.0
98-95-3	Nitrobenzene	Not Detected	490		1.0
67-75-9	N-Nitrosodimethylamine	Not Detected	810		1.0
621-64-7	N-Nitrosodi-n-propylamine	Not Detected	490		1.0
156-10-5	N-Nitrosodiphenylamine	Not Detected	490		1.0
87-86-5	Pentachlorophenol	Not Detected	8400		1.0
85-01-8	Phenanthrene	700	250		1.0
108-95-2	Phenol	Not Detected	810		1.0
129-00-0	Pyrene	1900	250		1.0

Probable petroleum product(s) present.

PCBs as Aroclors

Analytical Method: 8082 **Date Tested:** 05/10/2005 **Analyst:** MF
Extraction Method: 3545 **Extraction Date:** 05/05/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
SURROGATE	#Decachlorobiphenyl#	65.2			
SURROGATE	#Tetrachloro-m-xylene#	59.9			
12674-11-2	Aroclor 1016	Not Detected	250		1.0
11104-28-2	Aroclor 1221	Not Detected	250		1.0
11141-16-5	Aroclor 1232	Not Detected	250		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

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Sample Number: AA53414 OFP013

PCBs as Aroclors

Analytical Method: 8082 **Date Tested:** 05/10/2005 **Analyst:** MF
Extraction Method: 3545 **Extraction Date:** 05/05/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
53469-21-9	Aroclor 1242	Not Detected	250		1.0
12672-29-6	Aroclor 1248	Not Detected	250		1.0
11097-69-1	Aroclor 1254	Not Detected	250		1.0
11096-82-5	Aroclor 1260	Not Detected	250		1.0
37324-23-5	Aroclor 1262	Not Detected	250		1.0
11100-14-4	Aroclor 1268	Not Detected	250		1.0

Sample Number AA53414 OFP013

CAS#	Analyte Name	Result	Unit	RL	Qualifier	Date Tested	Method	Analyst
7440-38-2	Arsenic - Sediment	12.2	mg/Kg dry	0.5		05/19/2005	7060	LAV
7782-49-2	Selenium - Sediment	0.7	mg/Kg dry	0.5		05/12/2005	7740	LAV
7440-22-4	Silver - Sediment	ND	mg/Kg dry	0.25		05/13/2005	7761	LAV
	Digest Mercury - Sediment	Completed				05/09/2005	7471	RK
[illegible]39-97-6	Mercury - Sediment	.15	mg/Kg dry	0.05		05/26/2005	7471	TS
[illegible]-39-3	Barium - Sediment	110	mg/Kg dry	1		05/23/2005	6010	MJ
7440-43-9	Cadmium - Sediment	ND	mg/Kg dry	2.0		05/23/2005	6010	MJ
7440-47-3	Chromium - Sediment	26	mg/Kg dry	2		05/23/2005	6010	MJ
7440-50-8	Copper - Sediment	56	mg/Kg dry	2		05/23/2005	6010	MJ
	Digest Metals - Sediment	Completed				05/09/2005	3050	TK
7439-92-1	Lead - Sediment	80	mg/Kg dry	5		05/23/2005	6010	MJ
7440-66-6	Zinc - Sediment	230	mg/Kg dry	5		05/23/2005	6010	MJ
	% Total Solids	40.5	%	0.1		05/05/2005		DB
	Drying and Grinding - Sediment	Completed				05/06/2005		RK

CAS# : Chemical Abstract Service Registry Number
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ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
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Sample Number: AA53415 OFC013 0-6

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 05/18/2005 **Analyst:** SMH
Extraction Method: 3545 **Extraction Date:** 05/03/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
SURROGATE	#2 - Fluorobiphenyl#	82.3			
SURROGATE	#2,4,6-Tribromophenol#	77.9			
SURROGATE	#2-Fluorophenol#	66.4			
SURROGATE	#Nitrobenzene - D5#	63.3			
SURROGATE	#Phenol - D5#	71.8			
SURROGATE	#p-Terphenyl-d14#	119			
120-82-1	1,2,4-Trichlorobenzene	Not Detected	380		1.0
95-50-1	1,2-Dichlorobenzene	Not Detected	190		1.0
541-73-1	1,3-Dichlorobenzene	Not Detected	190		1.0
106-46-7	1,4-Dichlorobenzene	Not Detected	190		1.0
95-95-4	2,4,5-Trichlorophenol	Not Detected	620		1.0
88-06-2	2,4,6-Trichlorophenol	Not Detected	620		1.0
120-83-2	2,4-Dichlorophenol	Not Detected	620		1.0
105-67-9	2,4-Dimethylphenol	Not Detected	620		1.0
51-28-5	2,4-Dinitrophenol	Not Detected	3200		1.0
[illegible]14-2	2,4-Dinitrotoluene	Not Detected	620		1.0
[illegible]-20-2	2,6-Dinitrotoluene	Not Detected	620		1.0
91-58-7	2-Chloronaphthalene	Not Detected	380		1.0
95-57-8	2-Chlorophenol	Not Detected	620		1.0
534-52-1	2-Methyl-4,6-dinitrophenol	Not Detected	3200		1.0
91-57-6	2-Methylnaphthalene	Not Detected	470		1.0
95-48-7	2-Methylphenol (o-Cresol)	Not Detected	620		1.0
88-74-4	2-Nitroaniline	Not Detected	3200		1.0
88-75-5	2-Nitrophenol	Not Detected	620		1.0
108394,106445	3 & 4-Methylphenol	Not Detected	1200		1.0
99-09-2	3-Nitroaniline	Not Detected	3200		1.0
101-55-3	4-Bromophenyl phenyl ether	Not Detected	380		1.0
59-50-7	4-Chloro-3-methyl-phenol	Not Detected	620		1.0
7005-72-3	4-Chlorodiphenylether	Not Detected	190		1.0
100-01-6	4-Nitroaniline	Not Detected	3200		1.0
100-02-7	4-Nitrophenol	Not Detected	3200		1.0
83-32-9	Acenaphthene	Not Detected	190		1.0
208-96-8	Acenaphthylene	Not Detected	190		1.0
120-12-7	Anthracene	Not Detected	190		1.0
103-33-3	Azobenzene	Not Detected	380		1.0
56-55-3	Benz[a]anthracene	Not Detected	190		1.0
50-32-8	Benzo[a]pyrene	Not Detected	380		1.0
205-99-2	Benzo[b]fluoranthene	Not Detected	380		1.0
191-24-2	Benzo[g,h,i]perylene	Not Detected	380		1.0
207-08-9	Benzo[k]fluoranthene	Not Detected	380		1.0
111-91-1	Bis(2-chloroethoxy)methane	Not Detected	380		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

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Sample Number: AA53415 OFC013 0-6

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 05/18/2005 **Analyst:** SMH
Extraction Method: 3545 **Extraction Date:** 05/03/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
111-44-4	Bis(2-chloroethyl)ether	Not Detected	190		1.0
108-60-1	Bis(2-chloroisopropyl)ether	Not Detected	190		1.0
117-81-7	Bis(2-ethylhexyl)phthalate	Not Detected	380		1.0
85-68-7	Butyl benzyl phthalate	Not Detected	190		1.0
86-74-8	Carbazole	Not Detected	620		1.0
218-01-9	Chrysene	220	190		1.0
53-70-3	Dibenz[a,h]anthracene	Not Detected	380		1.0
132-64-9	Dibenzofuran	Not Detected	620		1.0
84-66-2	Diethylphthalate	410	190	M=200	1.0
131-11-3	Dimethyl phthalate	Not Detected	380		1.0
84-74-2	Di-n-butyl phthalate	Not Detected	190		1.0
117-84-0	Di-n-octyl phthalate	Not Detected	380		1.0
86-73-7	Fluorene	Not Detected	190		1.0
206-44-0	Fluoroanthene	Not Detected	190		1.0
118-74-1	Hexachlorobenzene	Not Detected	380		1.0
58-3	Hexachlorobutadiene	Not Detected	380		1.0
47-4	Hexachlorocyclopentadiene	Not Detected	3800		1.0
67-72-1	Hexachloroethane	Not Detected	190		1.0
193-39-5	Indeno(1,2,3-c,d)pyrene	Not Detected	380		1.0
78-59-1	Isophorone	Not Detected	190		1.0
91-20-3	Naphthalene	Not Detected	190		1.0
98-95-3	Nitrobenzene	Not Detected	380		1.0
67-75-9	N-Nitrosodimethylamine	Not Detected	620		1.0
621-64-7	N-Nitrosodi-n-propylamine	Not Detected	380		1.0
156-10-5	N-Nitrosodiphenylamine	Not Detected	380		1.0
87-86-5	Pentachlorophenol	Not Detected	6400		1.0
85-01-8	Phenanthrene	470	190		1.0
108-95-2	Phenol	Not Detected	620		1.0
129-00-0	Pyrene	Not Detected	190		1.0

Probable petroleum product(s) present.

PCBs as Aroclors

Analytical Method: 8082 **Date Tested:** 05/10/2005 **Analyst:** MF
Extraction Method: 3545 **Extraction Date:** 05/05/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
SURROGATE	#Decachlorobiphenyl#	67.4			
SURROGATE	#Tetrachloro-m-xylene#	66.5			
12674-11-2	Aroclor 1016	Not Detected	380	K	2.0
11104-28-2	Aroclor 1221	Not Detected	380	K	2.0
11141-16-5	Aroclor 1232	Not Detected	380	K	2.0

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mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
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Sample Number: AA53415 OFC013 0-6

PCBs as Aroclors

Analytical Method: 8082 **Date Tested:** 05/10/2005 **Analyst:** MF
Extraction Method: 3545 **Extraction Date:** 05/05/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
53469-21-9	Aroclor 1242	Not Detected	380	K	2.0
12672-29-6	Aroclor 1248	Not Detected	380	K	2.0
11097-69-1	Aroclor 1254	340	190	6	1.0
11096-82-5	Aroclor 1260	Not Detected	190		1.0
37324-23-5	Aroclor 1262	Not Detected	190		1.0
11100-14-4	Aroclor 1268	Not Detected	190		1.0

Sample Number AA53415 OFC013 0-6

CAS#	Analyte Name	Result	Unit	RL	Qualifier	Date Tested	Method	Analyst
7440-38-2	Arsenic - Sediment	7.2	mg/Kg dry	0.5		05/19/2005	7060	LAV
7782-49-2	Selenium - Sediment	1.2	mg/Kg dry	0.5		05/12/2005	7740	LAV
7440-22-4	Silver - Sediment	0.7	mg/Kg dry	0.25		05/13/2005	7761	LAV
	Digest Mercury - Sediment	Completed				05/09/2005	7471	RK
7439-97-6	Mercury - Sediment	.18	mg/Kg dry	0.05		05/10/2005	7471	TS
7440-39-3	Barium - Sediment	140	mg/Kg dry	1		05/23/2005	6010	MJ
7440-43-9	Cadmium - Sediment	2.1	mg/Kg dry	2.0		05/23/2005	6010	MJ
7440-47-3	Chromium - Sediment	60	mg/Kg dry	2		05/23/2005	6010	MJ
7440-50-8	Copper - Sediment	90	mg/Kg dry	2		05/23/2005	6010	MJ
	Digest Metals - Sediment	Completed				05/09/2005	3050	TK
7439-92-1	Lead - Sediment	110	mg/Kg dry	5		05/23/2005	6010	MJ
7440-66-6	Zinc - Sediment	210	mg/Kg dry	5		05/23/2005	6010	MJ
	% Total Solids	52.9	%	0.1		05/05/2005		DB
	Drying and Grinding - Sediment	Completed				05/06/2005		RK

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
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Sample Number: AA53416 OFC013 6-13

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 05/19/2005 **Analyst:** SMH
Extraction Method: 3545 **Extraction Date:** 05/03/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
SURROGATE	#2 - Fluorobiphenyl#	66.9			
SURROGATE	#2,4,6-Tribromophenol#	64.6			
SURROGATE	#2-Fluorophenol#	52.7			
SURROGATE	#Nitrobenzene - D5#	49.2			
SURROGATE	#Phenol - D5#	53.5			
SURROGATE	#p-Terphenyl-d14#	92.8			
120-82-1	1,2,4-Trichlorobenzene	Not Detected	370		1.0
95-50-1	1,2-Dichlorobenzene	Not Detected	190		1.0
541-73-1	1,3-Dichlorobenzene	Not Detected	190		1.0
106-46-7	1,4-Dichlorobenzene	Not Detected	190		1.0
95-95-4	2,4,5-Trichlorophenol	Not Detected	610		1.0
88-06-2	2,4,6-Trichlorophenol	Not Detected	610		1.0
120-83-2	2,4-Dichlorophenol	Not Detected	610		1.0
105-67-9	2,4-Dimethylphenol	Not Detected	610		1.0
51-28-5	2,4-Dinitrophenol	Not Detected	3100		1.0
-14-2	2,4-Dinitrotoluene	Not Detected	610		1.0
-20-2	2,6-Dinitrotoluene	Not Detected	610		1.0
91-58-7	2-Chloronaphthalene	Not Detected	370		1.0
95-57-8	2-Chlorophenol	Not Detected	610		1.0
534-52-1	2-Methyl-4,6-dinitrophenol	Not Detected	3100		1.0
91-57-6	2-Methylnaphthalene	Not Detected	460		1.0
95-48-7	2-Methylphenol (o-Cresol)	Not Detected	610		1.0
88-74-4	2-Nitroaniline	Not Detected	3100		1.0
88-75-5	2-Nitrophenol	Not Detected	610		1.0
108394,106445	3 & 4-Methylphenol	Not Detected	1200		1.0
99-09-2	3-Nitroaniline	Not Detected	3100		1.0
101-55-3	4-Bromophenyl phenyl ether	Not Detected	370		1.0
59-50-7	4-Chloro-3-methyl-phenol	Not Detected	610		1.0
7005-72-3	4-Chlorodiphenylether	Not Detected	190		1.0
100-01-6	4-Nitroaniline	Not Detected	3100		1.0
100-02-7	4-Nitrophenol	Not Detected	3100		1.0
83-32-9	Acenaphthene	Not Detected	190		1.0
208-96-8	Acenaphthylene	Not Detected	190		1.0
120-12-7	Anthracene	Not Detected	190		1.0
103-33-3	Azobenzene	Not Detected	370		1.0
56-55-3	Benz[a]anthracene	Not Detected	190		1.0
50-32-8	Benzo[a]pyrene	590	370		1.0
205-99-2	Benzo[b]fluoranthene	Not Detected	370		1.0
191-24-2	Benzo[g,h,i]perylene	Not Detected	370		1.0
207-08-9	Benzo[k]fluoranthene	Not Detected	370		1.0
111-91-1	Bis(2-chloroethoxy)methane	Not Detected	370		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Sandy Gregg
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

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Sample Number: AA53416 OFC013 6-13

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 05/19/2005 **Analyst:** SMH
Extraction Method: 3545 **Extraction Date:** 05/03/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
111-44-4	Bis(2-chloroethyl)ether	Not Detected	190		1.0
108-60-1	Bis(2-chloroisopropyl)ether	Not Detected	190		1.0
117-81-7	Bis(2-ethylhexyl)phthalate	Not Detected	370		1.0
85-68-7	Butyl benzyl phthalate	Not Detected	190		1.0
86-74-8	Carbazole	Not Detected	610		1.0
218-01-9	Chrysene	Not Detected	190		1.0
53-70-3	Dibenz[a,h]anthracene	Not Detected	370		1.0
132-64-9	Dibenzofuran	Not Detected	610		1.0
84-66-2	Diethylphthalate	330	190	M=200	1.0
131-11-3	Dimethyl phthalate	Not Detected	370		1.0
84-74-2	Di-n-butyl phthalate	Not Detected	190		1.0
117-84-0	Di-n-octyl phthalate	Not Detected	370		1.0
86-73-7	Fluorene	Not Detected	190		1.0
206-44-0	Fluoroanthene	Not Detected	190		1.0
118-74-1	Hexachlorobenzene	Not Detected	370		1.0
58-3	Hexachlorobutadiene	Not Detected	370		1.0
47-4	Hexachlorocyclopentadiene	Not Detected	3700		1.0
67-72-1	Hexachloroethane	Not Detected	190		1.0
193-39-5	Indeno(1,2,3-c,d)pyrene	Not Detected	370		1.0
78-59-1	Isophorone	Not Detected	190		1.0
91-20-3	Naphthalene	Not Detected	190		1.0
98-95-3	Nitrobenzene	Not Detected	370		1.0
67-75-9	N-Nitrosodimethylamine	Not Detected	610		1.0
621-64-7	N-Nitrosodi-n-propylamine	Not Detected	370		1.0
156-10-5	N-Nitrosodiphenylamine	Not Detected	370		1.0
87-86-5	Pentachlorophenol	Not Detected	6300		1.0
85-01-8	Phenanthrene	390	190		1.0
108-95-2	Phenol	Not Detected	610		1.0
129-00-0	Pyrene	Not Detected	190		1.0

Probable petroleum product(s) present.

PCBs as Aroclors

Analytical Method: 8082 **Date Tested:** 05/10/2005 **Analyst:** MF
Extraction Method: 3545 **Extraction Date:** 05/05/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
SURROGATE	#Decachlorobiphenyl#	41.7			
SURROGATE	#Tetrachloro-m-xylene#	59.5			
12674-11-2	Aroclor 1016	Not Detected	650	K	3.5
11104-28-2	Aroclor 1221	Not Detected	650	K	3.5
11141-16-5	Aroclor 1232	630	190	6	1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

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Sample Number: AA53416 OFC013 6-13

PCBs as Aroclors

Analytical Method: 8082 **Date Tested:** 05/10/2005 **Analyst:** MF
Extraction Method: 3545 **Extraction Date:** 05/05/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
53469-21-9	Aroclor 1242	Not Detected	650	K	3.5
12672-29-6	Aroclor 1248	Not Detected	650	K	3.5
11097-69-1	Aroclor 1254	Not Detected	190		1.0
11096-82-5	Aroclor 1260	Not Detected	190		1.0
37324-23-5	Aroclor 1262	Not Detected	190		1.0
11100-14-4	Aroclor 1268	Not Detected	190		1.0

Sample Number AA53416 OFC013 6-13

CAS#	Analyte Name	Result	Unit	RL	Qualifier	Date Tested	Method	Analyst
7440-38-2	Arsenic - Sediment	13.1	mg/Kg dry	0.5		05/19/2005	7060	LAV
7782-49-2	Selenium - Sediment	1.1	mg/Kg dry	0.5		05/12/2005	7740	LAV
7440-22-4	Silver - Sediment	29	mg/Kg dry	0.25	D	05/13/2005	7761	LAV
	Digest Mercury - Sediment	Completed				05/09/2005	7471	RK
39-97-6	Mercury - Sediment	.28	mg/Kg dry	0.05		05/10/2005	7471	TS
0-39-3	Barium - Sediment	220	mg/Kg dry	1		05/23/2005	6010	MJ
7440-43-9	Cadmium - Sediment	31	mg/Kg dry	2.0		05/23/2005	6010	MJ
7440-47-3	Chromium - Sediment	190	mg/Kg dry	2		05/23/2005	6010	MJ
7440-50-8	Copper - Sediment	210	mg/Kg dry	2		05/23/2005	6010	MJ
	Digest Metals - Sediment	Completed				05/09/2005	3050	TK
7439-92-1	Lead - Sediment	190	mg/Kg dry	5		05/23/2005	6010	MJ
7440-66-6	Zinc - Sediment	340	mg/Kg dry	5		05/23/2005	6010	MJ
	% Total Solids	54.0	%	0.1		05/05/2005		DB
	Drying and Grinding - Sediment	Completed				05/06/2005		RK

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

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Sample Number: AA53417 OFC013 13-17

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 05/19/2005 **Analyst:** SMH
Extraction Method: 3545 **Extraction Date:** 05/03/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
SURROGATE	#2 - Fluorobiphenyl#	73.8			
SURROGATE	#2,4,6-Tribromophenol#	77.0			
SURROGATE	#2-Fluorophenol#	52.8			
SURROGATE	#Nitrobenzene - D5#	52.9			
SURROGATE	#Phenol - D5#	61.9			
SURROGATE	#p-Terphenyl-d14#	103			
120-82-1	1,2,4-Trichlorobenzene	Not Detected	370		1.0
95-50-1	1,2-Dichlorobenzene	Not Detected	190		1.0
541-73-1	1,3-Dichlorobenzene	Not Detected	190		1.0
106-46-7	1,4-Dichlorobenzene	Not Detected	190		1.0
95-95-4	2,4,5-Trichlorophenol	Not Detected	620		1.0
88-06-2	2,4,6-Trichlorophenol	Not Detected	620		1.0
120-83-2	2,4-Dichlorophenol	Not Detected	620		1.0
105-67-9	2,4-Dimethylphenol	Not Detected	620		1.0
51-28-5	2,4-Dinitrophenol	Not Detected	3200		1.0
14-2	2,4-Dinitrotoluene	Not Detected	620		1.0
-20-2	2,6-Dinitrotoluene	Not Detected	620		1.0
91-58-7	2-Chloronaphthalene	Not Detected	370		1.0
95-57-8	2-Chlorophenol	Not Detected	620		1.0
534-52-1	2-Methyl-4,6-dinitrophenol	Not Detected	3200		1.0
91-57-6	2-Methylnaphthalene	Not Detected	470		1.0
95-48-7	2-Methylphenol (o-Cresol)	Not Detected	620		1.0
88-74-4	2-Nitroaniline	Not Detected	3200		1.0
88-75-5	2-Nitrophenol	Not Detected	620		1.0
108394,106445	3 & 4-Methylphenol	Not Detected	1200		1.0
99-09-2	3-Nitroaniline	Not Detected	3200		1.0
101-55-3	4-Bromophenyl phenyl ether	Not Detected	370		1.0
59-50-7	4-Chloro-3-methyl-phenol	Not Detected	620		1.0
7005-72-3	4-Chlorodiphenylether	Not Detected	190		1.0
100-01-6	4-Nitroaniline	Not Detected	3200		1.0
100-02-7	4-Nitrophenol	Not Detected	3200		1.0
83-32-9	Acenaphthene	Not Detected	190		1.0
208-96-8	Acenaphthylene	Not Detected	190		1.0
120-12-7	Anthracene	Not Detected	190		1.0
103-33-3	Azobenzene	Not Detected	370		1.0
56-55-3	Benz[a]anthracene	Not Detected	190		1.0
50-32-8	Benzo[a]pyrene	610	370		1.0
205-99-2	Benzo[b]fluoranthene	Not Detected	370		1.0
191-24-2	Benzo[g,h,i]perylene	Not Detected	370		1.0
207-08-9	Benzo[k]fluoranthene	Not Detected	370		1.0
111-91-1	Bis(2-chloroethoxy)methane	Not Detected	370		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

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Sample Number: AA53417 OFC013 13-17

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 05/19/2005 **Analyst:** SMH
Extraction Method: 3545 **Extraction Date:** 05/03/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
111-44-4	Bis(2-chloroethyl)ether	Not Detected	190		1.0
108-60-1	Bis(2-chloroisopropyl)ether	Not Detected	190		1.0
117-81-7	Bis(2-ethylhexyl)phthalate	Not Detected	370		1.0
85-68-7	Butyl benzyl phthalate	Not Detected	190		1.0
86-74-8	Carbazole	Not Detected	620		1.0
218-01-9	Chrysene	Not Detected	190		1.0
53-70-3	Dibenz[a,h]anthracene	Not Detected	370		1.0
132-64-9	Dibenzofuran	Not Detected	620		1.0
84-66-2	Diethylphthalate	560	190	M=200	1.0
131-11-3	Dimethyl phthalate	Not Detected	370		1.0
84-74-2	Di-n-butyl phthalate	Not Detected	190		1.0
117-84-0	Di-n-octyl phthalate	Not Detected	370		1.0
86-73-7	Fluorene	Not Detected	190		1.0
206-44-0	Fluoroanthene	Not Detected	190		1.0
118-74-1	Hexachlorobenzene	Not Detected	370		1.0
8-3	Hexachlorobutadiene	Not Detected	370		1.0
47-4	Hexachlorocyclopentadiene	Not Detected	3700		1.0
67-72-1	Hexachloroethane	Not Detected	190		1.0
193-39-5	Indeno(1,2,3-c,d)pyrene	Not Detected	370		1.0
78-59-1	Isophorone	Not Detected	190		1.0
91-20-3	Naphthalene	230	190		1.0
98-95-3	Nitrobenzene	Not Detected	370		1.0
67-75-9	N-Nitrosodimethylamine	Not Detected	620		1.0
621-64-7	N-Nitrosodi-n-propylamine	Not Detected	370		1.0
156-10-5	N-Nitrosodiphenylamine	Not Detected	370		1.0
87-86-5	Pentachlorophenol	Not Detected	6400		1.0
85-01-8	Phenanthrene	Not Detected	190		1.0
108-95-2	Phenol	Not Detected	620		1.0
129-00-0	Pyrene	Not Detected	190		1.0

Probable petroleum product(s) present.

PCBs as Aroclors

Analytical Method: 8082 **Date Tested:** 05/10/2005 **Analyst:** MF
Extraction Method: 3545 **Extraction Date:** 05/05/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
SURROGATE	#Decachlorobiphenyl#	18.4			
SURROGATE	#Tetrachloro-m-xylene#	61.1			
12674-11-2	Aroclor 1016	Not Detected	390	K	2.1
11104-28-2	Aroclor 1221	Not Detected	390	K	2.1
11141-16-5	Aroclor 1232	Not Detected	390	K	2.1

CAS# : Chemical Abstract Service Registry Number
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mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

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Sample Number: AA53417 OFC013 13-17

PCBs as Aroclors

Analytical Method: 8082 **Date Tested:** 05/10/2005 **Analyst:** MF
Extraction Method: 3545 **Extraction Date:** 05/05/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
53469-21-9	Aroclor 1242	Not Detected	390	K	2.1
12672-29-6	Aroclor 1248	Not Detected	390	K	2.1
11097-69-1	Aroclor 1254	Not Detected	190		1.0
11096-82-5	Aroclor 1260	Not Detected	190		1.0
37324-23-5	Aroclor 1262	Not Detected	190		1.0
11100-14-4	Aroclor 1268	Not Detected	190		1.0

Sample Number AA53417 OFC013 13-17

CAS#	Analyte Name	Result	Unit	RL	Qualifier	Date Tested	Method	Analyst
7440-38-2	Arsenic - Sediment	16.7	mg/Kg dry	0.5		05/19/2005	7060	LAV
7782-49-2	Selenium - Sediment	0.7	mg/Kg dry	0.5		05/12/2005	7740	LAV
7440-22-4	Silver - Sediment	5.7	mg/Kg dry	0.25	D	05/13/2005	7761	LAV
	Digest Mercury - Sediment	Completed				05/09/2005	7471	RK
7439-97-6	Mercury - Sediment	.39	mg/Kg dry	0.05		05/10/2005	7471	TS
7440-39-3	Barium - Sediment	320	mg/Kg dry	1		05/23/2005	6010	MJ
7440-43-9	Cadmium - Sediment	36	mg/Kg dry	2.0		05/23/2005	6010	MJ
7440-47-3	Chromium - Sediment	130	mg/Kg dry	2		05/23/2005	6010	MJ
7440-50-8	Copper - Sediment	150	mg/Kg dry	2		05/23/2005	6010	MJ
	Digest Metals - Sediment	Completed				05/09/2005	3050	TK
7439-92-1	Lead - Sediment	180	mg/Kg dry	5		05/23/2005	6010	MJ
7440-66-6	Zinc - Sediment	340	mg/Kg dry	5		05/23/2005	6010	MJ
	% Total Solids	53.5	%	0.1		05/05/2005		DB
	Drying and Grinding - Sediment	Completed				05/06/2005		RK

CAS# : Chemical Abstract Service Registry Number
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Sample Number: AA53418 OFP003

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 05/19/2005 **Analyst:** SMH
Extraction Method: 3545 **Extraction Date:** 05/03/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
SURROGATE	#2 - Fluorobiphenyl#	Not Applicable		V	
SURROGATE	#2,4,6-Tribromophenol#	Not Applicable		V	
SURROGATE	#2-Fluorophenol#	Not Applicable		V	
SURROGATE	#Nitrobenzene - D5#	Not Applicable		V	
SURROGATE	#Phenol - D5#	Not Applicable		V	
SURROGATE	#p-Terphenyl-d14#	Not Applicable		V	
120-82-1	1,2,4-Trichlorobenzene	Not Detected	4400		10
95-50-1	1,2-Dichlorobenzene	Not Detected	2200		10
541-73-1	1,3-Dichlorobenzene	Not Detected	2200		10
106-46-7	1,4-Dichlorobenzene	Not Detected	2200		10
95-95-4	2,4,5-Trichlorophenol	Not Detected	7300		10
88-06-2	2,4,6-Trichlorophenol	Not Detected	7300		10
120-83-2	2,4-Dichlorophenol	Not Detected	7300		10
105-67-9	2,4-Dimethylphenol	Not Detected	7300		10
51-28-5	2,4-Dinitrophenol	Not Detected	38000		10
-14-2	2,4-Dinitrotoluene	Not Detected	7300		10
20-2	2,6-Dinitrotoluene	Not Detected	7300		10
91-58-7	2-Chloronaphthalene	Not Detected	4400		10
95-57-8	2-Chlorophenol	Not Detected	7300		10
534-52-1	2-Methyl-4,6-dinitrophenol	Not Detected	38000		10
91-57-6	2-Methylnaphthalene	Not Detected	5600		10
95-48-7	2-Methylphenol (o-Cresol)	Not Detected	7300		10
88-74-4	2-Nitroaniline	Not Detected	38000		10
88-75-5	2-Nitrophenol	Not Detected	7300		10
108394,106445	3 & 4-Methylphenol	Not Detected	15000		10
99-09-2	3-Nitroaniline	Not Detected	38000		10
101-55-3	4-Bromophenyl phenyl ether	Not Detected	4400		10
59-50-7	4-Chloro-3-methyl-phenol	Not Detected	7300		10
7005-72-3	4-Chlorodiphenylether	Not Detected	2200		10
100-01-6	4-Nitroaniline	Not Detected	38000		10
100-02-7	4-Nitrophenol	Not Detected	38000		10
83-32-9	Acenaphthene	Not Detected	2200		10
208-96-8	Acenaphthylene	Not Detected	2200		10
120-12-7	Anthracene	Not Detected	2200		10
103-33-3	Azobenzene	Not Detected	4400		10
56-55-3	Benz[a]anthracene	Not Detected	2200		10
50-32-8	Benzo[a]pyrene	Not Detected	4400		10
205-99-2	Benzo[b]fluoranthene	Not Detected	4400		10
191-24-2	Benzo[g,h,i]perylene	Not Detected	4400		10
207-08-9	Benzo[k]fluoranthene	Not Detected	4400		10
111-91-1	Bis(2-chloroethoxy)methane	Not Detected	4400		10

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

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Sample Number: AA53418 OFP003

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 05/19/2005 **Analyst:** SMH
Extraction Method: 3545 **Extraction Date:** 05/03/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
111-44-4	Bis(2-chloroethyl)ether	Not Detected	2200		10
108-60-1	Bis(2-chloroisopropyl)ether	Not Detected	2200		10
117-81-7	Bis(2-ethylhexyl)phthalate	Not Detected	4400		10
85-68-7	Butyl benzyl phthalate	Not Detected	2200		10
86-74-8	Carbazole	Not Detected	7300		10
218-01-9	Chrysene	2600	2200		10
53-70-3	Dibenz[a,h]anthracene	Not Detected	4400		10
132-64-9	Dibenzofuran	Not Detected	7300		10
84-66-2	Diethylphthalate	Not Detected	2200		10
131-11-3	Dimethyl phthalate	Not Detected	4400		10
84-74-2	Di-n-butyl phthalate	Not Detected	2200		10
117-84-0	Di-n-octyl phthalate	Not Detected	4400		10
86-73-7	Fluorene	Not Detected	2200		10
206-44-0	Fluoroanthene	5500	2200		10
118-74-1	Hexachlorobenzene	Not Detected	4400		10
8-3	Hexachlorobutadiene	Not Detected	4400		10
47-4	Hexachlorocyclopentadiene	Not Detected	44000		10
67-72-1	Hexachloroethane	Not Detected	2200		10
193-39-5	Indeno(1,2,3-c,d)pyrene	Not Detected	4400		10
78-59-1	Isophorone	Not Detected	2200		10
91-20-3	Naphthalene	Not Detected	2200		10
98-95-3	Nitrobenzene	Not Detected	4400		10
67-75-9	N-Nitrosodimethylamine	Not Detected	7300		10
621-64-7	N-Nitrosodi-n-propylamine	Not Detected	4400		10
156-10-5	N-Nitrosodiphenylamine	Not Detected	4400		10
87-86-5	Pentachlorophenol	Not Detected	76000		10
85-01-8	Phenanthrene	2700	2200		10
108-95-2	Phenol	Not Detected	7300		10
129-00-0	Pyrene	4800	2200		10

Probable petroleum product(s) present.
RLs raised due to matrix interference.

PCBs as Aroclors

Analytical Method: 8082 **Date Tested:** 05/10/2005 **Analyst:** MF
Extraction Method: 3545 **Extraction Date:** 05/05/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
SURROGATE	#Decachlorobiphenyl#	60.6			
SURROGATE	#Tetrachloro-m-xylene#	56.0			
12674-11-2	Aroclor 1016	Not Detected	360	K	1.6
11104-28-2	Aroclor 1221	Not Detected	360	K	1.6

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

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Sample Number: AA53418 OFP003

PCBs as Aroclors

Analytical Method: 8082 **Date Tested:** 05/10/2005 **Analyst:** MF
Extraction Method: 3545 **Extraction Date:** 05/05/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
11141-16-5	Aroclor 1232	Not Detected	360	K	1.6
53469-21-9	Aroclor 1242	340	220	JD 6	1.0
12672-29-6	Aroclor 1248	Not Detected	360	K	1.6
11097-69-1	Aroclor 1254	310	220	JD 6	1.0
11096-82-5	Aroclor 1260	Not Detected	220		1.0
37324-23-5	Aroclor 1262	Not Detected	220		1.0
11100-14-4	Aroclor 1268	Not Detected	220		1.0

Sample Number AA53418 OFP003

CAS#	Analyte Name	Result	Unit	RL	Qualifier	Date Tested	Method	Analyst
7440-38-2	Arsenic - Sediment	11.7	mg/Kg dry	0.5		05/19/2005	7060	LAV
7782-49-2	Selenium - Sediment	0.8	mg/Kg dry	0.5		05/12/2005	7740	LAV
7440-22-4	Silver - Sediment	0.5	mg/Kg dry	0.25		05/13/2005	7761	LAV
	Digest Mercury - Sediment	Completed				05/09/2005	7471	RK
9-97-6	Mercury - Sediment	.15	mg/Kg dry	0.05		05/26/2005	7471	TS
7440-39-3	Barium - Sediment	120	mg/Kg dry	1		05/23/2005	6010	MJ
7440-43-9	Cadmium - Sediment	2.4	mg/Kg dry	2.0		05/23/2005	6010	MJ
7440-47-3	Chromium - Sediment	41	mg/Kg dry	2		05/23/2005	6010	MJ
7440-50-8	Copper - Sediment	69	mg/Kg dry	2		05/23/2005	6010	MJ
	Digest Metals - Sediment	Completed				05/09/2005	3050	TK
7439-92-1	Lead - Sediment	150	mg/Kg dry	5		05/23/2005	6010	MJ
7440-66-6	Zinc - Sediment	450	mg/Kg dry	5		05/23/2005	6010	MJ
	% Total Solids	45.0	%	0.1		05/05/2005		DB
	Drying and Grinding - Sediment	Completed				05/06/2005		RK

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

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Sample Number: AA53419 DOFP

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 05/19/2005 **Analyst:** SMH
Extraction Method: 3545 **Extraction Date:** 05/03/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
SURROGATE	#2 - Fluorobiphenyl#	Not Applicable		V	
SURROGATE	#2,4,6-Tribromophenol#	Not Applicable		V	
SURROGATE	#2-Fluorophenol#	Not Applicable		V	
SURROGATE	#Nitrobenzene - D5#	Not Applicable		V	
SURROGATE	#Phenol - D5#	Not Applicable		V	
SURROGATE	#p-Terphenyl-d14#	Not Applicable		V	
120-82-1	1,2,4-Trichlorobenzene	Not Detected	3700		10
95-50-1	1,2-Dichlorobenzene	Not Detected	1800		10
541-73-1	1,3-Dichlorobenzene	Not Detected	1800		10
106-46-7	1,4-Dichlorobenzene	Not Detected	1800		10
95-95-4	2,4,5-Trichlorophenol	Not Detected	6000		10
88-06-2	2,4,6-Trichlorophenol	Not Detected	6000		10
120-83-2	2,4-Dichlorophenol	Not Detected	6000		10
105-67-9	2,4-Dimethylphenol	Not Detected	6000		10
51-28-5	2,4-Dinitrophenol	Not Detected	31000		10
-14-2	2,4-Dinitrotoluene	Not Detected	6000		10
-20-2	2,6-Dinitrotoluene	Not Detected	6000		10
91-58-7	2-Chloronaphthalene	Not Detected	3700		10
95-57-8	2-Chlorophenol	Not Detected	6000		10
534-52-1	2-Methyl-4,6-dinitrophenol	Not Detected	31000		10
91-57-6	2-Methylnaphthalene	Not Detected	4600		10
95-48-7	2-Methylphenol (o-Cresol)	Not Detected	6000		10
88-74-4	2-Nitroaniline	Not Detected	31000		10
88-75-5	2-Nitrophenol	Not Detected	6000		10
108394,106445	3 & 4-Methylphenol	Not Detected	12000		10
99-09-2	3-Nitroaniline	Not Detected	31000		10
101-55-3	4-Bromophenyl phenyl ether	Not Detected	3700		10
59-50-7	4-Chloro-3-methyl-phenol	Not Detected	6000		10
7005-72-3	4-Chlorodiphenylether	Not Detected	1800		10
100-01-6	4-Nitroaniline	Not Detected	31000		10
100-02-7	4-Nitrophenol	Not Detected	31000		10
83-32-9	Acenaphthene	Not Detected	1800		10
208-96-8	Acenaphthylene	Not Detected	1800		10
120-12-7	Anthracene	Not Detected	1800		10
103-33-3	Azobenzene	Not Detected	3700		10
56-55-3	Benz[a]anthracene	Not Detected	1800		10
50-32-8	Benzo[a]pyrene	Not Detected	3700		10
205-99-2	Benzo[b]fluoranthene	Not Detected	3700		10
191-24-2	Benzo[g,h,i]perylene	Not Detected	3700		10
207-08-9	Benzo[k]fluoranthene	Not Detected	3700		10
111-91-1	Bis(2-chloroethoxy)methane	Not Detected	3700		10

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

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Sample Number: AA53419 DOFP

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 05/19/2005 **Analyst:** SMH
Extraction Method: 3545 **Extraction Date:** 05/03/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
111-44-4	Bis(2-chloroethyl)ether	Not Detected	1800		10
108-60-1	Bis(2-chloroisopropyl)ether	Not Detected	1800		10
117-81-7	Bis(2-ethylhexyl)phthalate	Not Detected	3700		10
85-68-7	Butyl benzyl phthalate	Not Detected	1800		10
86-74-8	Carbazole	Not Detected	6000		10
218-01-9	Chrysene	Not Detected	1800		10
53-70-3	Dibenz[a,h]anthracene	Not Detected	3700		10
132-64-9	Dibenzofuran	Not Detected	6000		10
84-66-2	Diethylphthalate	Not Detected	1800		10
131-11-3	Dimethyl phthalate	Not Detected	3700		10
84-74-2	Di-n-butyl phthalate	Not Detected	1800		10
117-84-0	Di-n-octyl phthalate	Not Detected	3700		10
86-73-7	Fluorene	Not Detected	1800		10
206-44-0	Fluoroanthene	2800	1800		10
118-74-1	Hexachlorobenzene	Not Detected	3700		10
8-3	Hexachlorobutadiene	Not Detected	3700		10
+7-4	Hexachlorocyclopentadiene	Not Detected	37000		10
67-72-1	Hexachloroethane	Not Detected	1800		10
193-39-5	Indeno(1,2,3-c,d)pyrene	Not Detected	3700		10
78-59-1	Isophorone	Not Detected	1800		10
91-20-3	Naphthalene	Not Detected	1800		10
98-95-3	Nitrobenzene	Not Detected	3700		10
67-75-9	N-Nitrosodimethylamine	Not Detected	6000		10
621-64-7	N-Nitrosodi-n-propylamine	Not Detected	3700		10
156-10-5	N-Nitrosodiphenylamine	Not Detected	3700		10
87-86-5	Pentachlorophenol	Not Detected	62000		10
85-01-8	Phenanthrene	Not Detected	1800		10
108-95-2	Phenol	Not Detected	6000		10
129-00-0	Pyrene	2400	1800		10

Probable petroleum product(s) present.
RLs raised due to matrix interference.

PCBs as Aroclors

Analytical Method: 8082 **Date Tested:** 05/10/2005 **Analyst:** MF
Extraction Method: 3545 **Extraction Date:** 05/05/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
SURROGATE	#Decachlorobiphenyl#	67.8			
SURROGATE	#Tetrachloro-m-xylene#	61.0			
12674-11-2	Aroclor 1016	Not Detected	570	K	3.1
11104-28-2	Aroclor 1221	Not Detected	570	K	3.1

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
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Sample Number: AA53419 DOFP

PCBs as Aroclors

Analytical Method: 8082 **Date Tested:** 05/10/2005 **Analyst:** MF
Extraction Method: 3545 **Extraction Date:** 05/05/2005 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
11141-16-5	Aroclor 1232	Not Detected	570	K	3.1
53469-21-9	Aroclor 1242	560	180	JD 6	1.0
12672-29-6	Aroclor 1248	Not Detected	570	K	3.1
11097-69-1	Aroclor 1254	290	180	JD 6	1.0
11096-82-5	Aroclor 1260	Not Detected	180		1.0
37324-23-5	Aroclor 1262	Not Detected	180		1.0
11100-14-4	Aroclor 1268	Not Detected	180		1.0

Sample Number AA53419 DOFP

CAS#	Analyte Name	Result	Unit	RL	Qualifier	Date Tested	Method	Analyst
7440-38-2	Arsenic - Sediment	6.3	mg/Kg dry	0.5		05/19/2005	7060	LAV
7782-49-2	Selenium - Sediment	ND	mg/Kg dry	0.5		05/12/2005	7740	LAV
7440-22-4	Silver - Sediment	0.3	mg/Kg dry	0.25		05/13/2005	7761	LAV
	Digest Mercury - Sediment	Completed				05/09/2005	7471	RK
)-97-6	Mercury - Sediment	.24	mg/Kg dry	0.05		05/26/2005	7471	TS
7440-39-3	Barium - Sediment	64	mg/Kg dry	1		05/23/2005	6010	MJ
7440-43-9	Cadmium - Sediment	ND	mg/Kg dry	2.0		05/23/2005	6010	MJ
7440-47-3	Chromium - Sediment	20	mg/Kg dry	2		05/23/2005	6010	MJ
7440-50-8	Copper - Sediment	43	mg/Kg dry	2		05/23/2005	6010	MJ
	Digest Metals - Sediment	Completed				05/09/2005	3050	TK
7439-92-1	Lead - Sediment	61	mg/Kg dry	5		05/23/2005	6010	MJ
7440-66-6	Zinc - Sediment	140	mg/Kg dry	5		05/23/2005	6010	MJ
	% Total Solids	54.6	%	0.1		05/05/2005		DB
	Drying and Grinding - Sediment	Completed				05/06/2005		RK

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
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Qualifier Code	Qualifier Description
1	Result(s) and RL(s) are estimated due to low surrogate recovery.
2	Result is estimated due to high surrogate recovery.
3	Result(s) and RL(s) are estimated due to low matrix spike recovery.
4	Result is estimated due to high matrix spike recovery.
5	Result and RL are estimated due to low continuing calibration standard criteria failure.
6	Result is estimated due to high continuing calibration standard criteria failure.
7	Result(s) and RL(s) are estimated due to poor precision.
8	Result(s) and RL(s) are estimated due to low recovery of batch QC.
9	Result outside QC acceptance criteria.
A	Value reported is the mean of two or more determinations.
C	Value calculated from other independent parameters.
D	Analyte value quantified from a dilution(s); reporting limit (RL) raised.
E	Result is estimated due to high recovery of batch QC.
F	Free cyanide was not analyzed due to low level of total cyanide.
G	Result and RL are estimated due to initial calibration standard criteria failure.
H	Recommended laboratory holding time was exceeded.
I	Dilution required due to matrix interference; reporting limit (RL) raised.
J	Analyte was positively identified. Value is an estimate.
JA	Result is estimated due to multiple Aroclors present.
JC	Result is estimated since confirmation analysis did not meet acceptance criteria
JD	Due to severe degradation, specific Aroclor identification is difficult and quantitation is estimated.
K	RL(s) raised due to matrix interferences.
KR	RL(s) raised due to low sample volume submitted.
KS	RL(s) raised due to low total solids.
KW	RL(s) raised due to light sample weight.
LB	Reported library search compounds are tentative identifications with estimated concentrations.
M	The level of the method preparation blank (MPB) is reported in the qualifier column.
N	Non-homogeneous sample made analysis of sample questionable.
O	Result and RL estimated due to analysis from an open vial.
P	Recommended sample collection/preservation technique not used; reported result(s) is an estimate.
Q	Quantity of sample insufficient to perform analyses requested.
R	Result confirmed by re-extraction and analysis.
S	Supernatant analyzed.
T	Reported value is less than the reporting limit (RL). Result is estimated.
V	Value not available due to dilution.
W	Reported value is less than the method detection limit (MDL).
X	Methods 8260 & 624 are used to analyze volatile organics that have boiling points below 200°C. 2-Methylnaphthalene & naphthalene have boiling points above 200°C and are better suited to analysis by methods 8270 or 625 as semivolatile organics.
PI	Possible interference may have affected the accuracy of the laboratory result
Z	Result reported below the RL to meet the TDL in RRD Op Memo 2 (10/22/04) multiplied by applicable dilution factor.

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

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Appendix G

Human Health Risk Evaluation Supporting Information and Calculations

APPENDIX G

HUMAN HEALTH RISK ASSESSMENT
SUPPORTING INFORMATION AND CALCULATIONS

CONTENTS

G1 INTRODUCTION 1
G2 ROUTINE WORKERS 1
G2.1 Contact with Outdoor Soil 1
G2.2 Vapor Intrusion 6
G2.2.1 Current On-Site Workers 6
G2.2.2 Off-Site Workers and Future On-Site Workers 9
G3 MAINTENANCE WORKERS 10
G3.1 Contact with Soil 10
G3.2 Contact with Groundwater 10
G3.3 Contact with LNAPL and Smear Zone Soil 11
G4 TRESPASSERS 14
G5 REDEVELOPMENT CONSTRUCTION WORKERS 14
G5.1 Contact with Soil 14
G5.2 Contact with Groundwater 15
G5.3 Contact with LNAPL and Smear Zone Soil 15
G6 RESIDENTS 15
G6.1 Contact with Soil 16
G6.2 Vapor Intrusion 16
G7 RECREATIONAL USERS 17

Attachments

Attachment G0 Chemical Properties, Toxicity Information, and Exposure Factors
Attachment G1 Exposure of Routine Workers to Outdoor Soil
Attachment G2 Exposure of Routine Workers via Vapor Intrusion from Soil, Groundwater, and LNAPL
Attachment G3 Exposure of Maintenance Workers to Soil
Attachment G4 Exposure of Maintenance Workers to Groundwater
Attachment G5 Exposure of Maintenance Workers to LNAPL and Smear Zone Soil

Attachment G6 Exposure of Redevelopment Construction Workers to Soil
Attachment G7 Exposure of Redevelopment Construction Workers to Groundwater
Attachment G8 Exposure of Redevelopment Construction Workers to LNAPL and Smear Zone Soil
Attachment G9 Exposure of Residents to Outdoor Soil
Attachment G10 Exposure of Residents via Vapor Intrusion from Soil, Groundwater, and LNAPL
Attachment G11 Exposure of Recreational Users to Surface Water
Attachment G12 Incremental Risk and HQ Summary
Attachment G13 Point-by-Point Risk Estimates at the Southend
Attachment G14 Area-Weighted Risk Estimates at the Southend
Attachment G15 Supplemental Evaluation of Arsenic Groundwater Data

G1 INTRODUCTION

This appendix to the RFI Phase II Report for the General Motors Corporation's (GM's) North American Operations (NAO) Flint Operations Site located at 902 East Leith Street in Flint, Michigan (revised, BBL June 2006) provides information and calculations that support the discussion of the human health risk assessment in Section 6 of the Revised RFI Phase II Report. The information in this appendix is organized in Sections G2 through G7 which correspond to the exposure scenarios for the following potentially exposed populations evaluated in the risk assessment:

- Routine Workers
- Maintenance Workers
- Trespassers
- Redevelopment Construction Workers
- Recreational Users
- Residents

The references cited in this appendix are included in Section 9 of the Revised RFI Phase II Report. Physical and chemical information and toxicity values are provided in Attachment G0. Detailed calculation sheets supporting the discussion in Sections G2 through G7 are provided in the Attachments to this Appendix.

G2 ROUTINE WORKERS

As discussed in Section 6.3 of the Revised RFI Phase II Report, the risk assessment evaluated potential exposure of on-site routine workers via contact with outdoor soil and via vapor intrusion from soil, groundwater, and light non-aqueous phase liquid (LNAPL) below buildings. The computation of risk estimates associated with exposure via contact with outdoor soil is discussed in Section G2.1, and the computation of risk estimates associated with exposure via vapor intrusion is discussed in Section G2.2.

G2.1 Contact with Outdoor Soil

For the ingestion and dermal exposure routes, estimates of cancer risk and noncancer hazard quotients (HQ) are calculated as discussed in Section 6.5.1 of the Revised RFI Phase II Report:

$$Risk = LADD \cdot SF$$

$$HQ = \frac{ADD}{RfD}$$

where *LADD* is the lifetime average daily dose, *SF* is the cancer slope factor, *ADD* is the average daily dose, and *RfD* is the reference dose.

For the inhalation route, the inhalation cancer risk and noncancer HQ are calculated using the chemical concentration in air (C_{air}), as follows:

$$Risk = C_{air} \cdot URF \cdot \frac{EF \cdot ED}{AT}$$

$$HQ = \frac{C_{air}}{RfC} \cdot \frac{EF \cdot ED}{AT}$$

where URF is the inhalation unit risk factor for a carcinogenic chemical, RfC is the reference concentration for a non-carcinogenic chemical, EF is the exposure frequency, ED is the exposure duration, and AT is the averaging time.

In this risk assessment, estimates of cancer risk and HQ were calculated using the following equivalent forms of these equations, which made use of risk-based criteria (RBC) that were calculated separately in advance of the risk calculations. For example, the risk equations for the ingestion and dermal routes can be re-written as follows:

$$Risk = \frac{C \cdot LADD^* \cdot SF}{TR} \cdot TR = \frac{C}{RBC} \cdot TR$$

$$HQ = \frac{C \cdot ADD}{RfD \cdot THQ} \cdot THQ = \frac{C}{RBC} \cdot THQ$$

where C is the exposure concentration, LADD* and ADD* are doses that are normalized to unit concentration (e.g., 1 mg/kg), and TR and THQ are the target cancer risk and target HQ used in calculating the RBCs.

For the soil ingestion and dermal routes of exposure, soil RBCs can then be expressed as follows:

$$Cancer\ RBC = \frac{TR}{LADD^* \cdot SF}$$

$$Noncancer\ RBC = \frac{THQ \cdot RfD}{ADD^*}$$

In this risk assessment, RBCs were calculated by setting TR and THQ equal to 10^{-5} and 1 for single chemical, respectively. The LADD* and ADD* were calculated using the exposure factors discussed in Section 6.3.5 of the Revised RFI Phase II Report.

Similarly for the inhalation route, soil RBCs were calculated as follows:

$$Cancer\ RBC = \frac{TR \cdot AT_c}{URF \cdot ET \cdot EF \cdot ED}\left(J \cdot C / Q\right)^{-1}$$

$$Noncancer\ RBC = \frac{THQ \cdot RfC \cdot AT_{nc}}{ET \cdot EF \cdot ED}\left(J \cdot C / Q\right)^{-1}$$

where the product $J \cdot C/Q$ is an air concentration that is normalized to unit concentration in soil. The J term is the normalized average vapor or particulate flux, and the C/Q term is a normalized air concentration.

The normalized average vapor flux J_v of a chemical from unsaturated soil is conservatively estimated using an unsteady-state model derived by Jury et al. (1983) that USEPA has adapted for screening-level analysis (USEPA 1996). This model conservatively assumes that volatile chemicals are present in the soil to an infinite depth. The equation for J_v is given by:

$$J_v = 2\, C_{s,0}\, \rho_b \sqrt{\frac{D_E}{\pi\, T}}$$

$$D_E = \frac{D_G\, H + D_L}{\rho_b\, K_d + \theta_w + \theta_a\, H}$$

$$D_G = D_{air} \cdot \frac{\theta_a^{10/3}}{n^2}$$

$$D_L = D_{water} \cdot \frac{\theta_w^{10/3}}{n^2}$$

Derivation of this equation and definition of the equation parameters can be found in the Jury et al. 1983 journal article and in USEPA guidance (1996), and therefore, is not repeated here. The values for chemical-specific parameters and default soil parameters for "loamy sand" recommended in the USEPA guidance (2004a) are used in calculating J_v.

The normalized, average particulate flux $J_{10,w}$ of a chemical from surface soil is conservatively estimated using the "unlimited reservoir" model that USEPA has adapted for screening-level analysis of particulate emissions from soil (USEPA 1996). This model assumes that particulate emissions are created by wind erosion. The details of this model can be found in USEPA guidance (1996), and therefore, are not repeated here.

The C/Q term for routine worker inhalation exposures is USEPA's default value for a generic 0.5 acre square source (USEPA 2002b).

The RBCs for each route of exposure (ingestion, dermal contact, and inhalation) were then conservatively combined to give cancer and noncancer criteria that are based on the combination of all three exposure routes, as follows:

$$RBC = \left(\sum_i RBC_i^{-1} \right)^{-1}$$

The combined RBCs based on cancer risk and those based on noncancer effects for exposures of routine workers to outdoor soil are summarized in Attachment G1.

In the human health risk assessment, the cancer risk and HQ for each chemical was estimated using its concentration in soil C_s and RBC, as follows:

$$Risk = \frac{C_s}{RBC} \cdot TR$$

$$HQ = \frac{C_s}{RBC} \cdot THQ$$

The cumulative cancer risk and noncancer HI for exposure to a combination of constituents were conservatively estimated according to USEPA guidance (1989), as follows:

$$Cumulative\ Risk = \sum_i Risk_i$$

$$Hazard\ Index = \sum_i HQ_i$$

In this risk assessment, bounding estimates of cumulative cancer risk and HI were calculated using the highest detected concentration of each constituent at each AOI (Table 6-2). The computation of the incremental risk and HQ estimates which were summed to determine the cumulative cancer risk and HI estimates is shown in Attachment G12.

To evaluate the need for remedial actions in the Southend of the Site, which is expected to be available for future redevelopment, bounding estimates of cumulative cancer risk and HI were calculated using the highest detected concentration of each constituent in soil at each of the 184 boring locations in Parcels 1, 2, and 3 where the bounding risk estimates for one or more of the areas are greater than USEPA's cumulative cancer risk of 10^{-4} or HI limit of 1 (Table 6-2). The procedure for ensuring conservative estimation of the highest concentrations in soil at each boring location, and the association of each location with a sub-area of the Site using Thiessen polygons is described in Attachment G13. The results of risk calculations for each of the 184 soil boring locations are shown Attachment G13 along with the details of the risk calculations for boring locations RFI-84-12 and RFI-09-48 as an example of the risk calculations.

For locations with unacceptable bounding risk estimates, area-weighted estimates of cumulative cancer risk and/or HI for a half-acre area around these locations were calculated to provide more realistic but still highly conservative risk estimates. The area-weighted estimates were based on a hypothetical square ½ acre lot centered on the polygon or polygons with

unacceptable bounding risk (adjusted if necessary to ensure the lot is within the site boundaries). The area-weighted cumulative cancer risk and HI estimates for the ½ acre lot were calculated using the following equations:

$$area-weighted\ risk = \frac{\sum_i Risk_i \cdot A_i}{\sum_i A_i}$$

$$area-weighted\ HI = \frac{\sum_i HI_i \cdot A_i}{\sum_i A_i}$$

where $Risk_i$ and HI_i are the cumulative cancer risk and HI of polygon i, and A_i is the area of polygon i that falls within the hypothetical ½ acre lot (Table 6-4). The details of the area-weighted risk calculations around these locations are shown in Attachment G14.

G2.2 Vapor Intrusion

G2.2.1 Current On-Site Workers

Currently, on-site routine workers perform daily activities in buildings that are governed by Occupational Safety and Health Administration (OSHA) regulations. The conservative screening criteria for indoor air inhalation in industrial buildings are calculated based on occupational inhalation exposure limits. The occupational inhalation exposure limits are exposure limits for air contaminants as established in the Michigan Occupational Health Standards (MICIS 2001), permissible exposure limits (PELs) established by OSHA (NIOSH 1997), and threshold limit values (TLVs) recommended by the American Conference of Government Industrial Hygienists (ACGIH 2005) for chemicals without Michigan exposure limits or OSHA PELs. These inhalation benchmarks for constituents detected in soil, groundwater, and LNAPL are shown in Attachment G2.

The indoor air concentrations are estimated using the following relationships described by Johnson and Ettinger (1991):

$$C_{building} = \alpha\, C_{source}$$

where $C_{building}$ is the indoor air concentration, C_{source} is the source vapor concentration, and α is an attenuation coefficient that is given by the following equation:

$$\alpha = \frac{\left[\frac{D_T^{eff} A_B}{Q_{building} L_T}\right] \exp\left(\frac{Q_{soil} L_{crack}}{D^{crack} A_{crack}}\right)}{\exp\left(\frac{Q_{soil} L_{crack}}{D^{crack} A_{crack}}\right) + \left[\frac{D_T^{eff} A_B}{Q_{building} L_T}\right] + \left[\frac{D_T^{eff} A_B}{Q_{soil} L_T}\right]\left[\exp\left(\frac{Q_{soil} L_{crack}}{D^{crack} A_{crack}}\right) - 1\right]}$$

Derivation of this equation and definition of the equation parameters can be found in Johnson and Ettinger's 1991 journal article, and therefore, are not repeated here.

The effective diffusion coefficient term D_T^{eff} in the equation for the attenuation coefficient α is calculated based on "loamy sand" soil type, which is representative of the vadose zone soil at the Site. The soil-water profile in the vadose zone is estimated using the van Genuchten soil-water retention equation curve with, and default water retention parameters appropriate for, loamy sand (USEPA 2004a). These parameters are shown in Attachment G2.

The distance between contaminated soil and a building foundation L_T is assumed to be only 0.15 m, which is a default value used by the Michigan Department of Environmental Quality (MDEQ 2002) in deriving the Michigan Part 201 generic vapor intrusion criteria for soil. The distance between on-site groundwater and a building foundation is estimated to be approximately 1.8 m, which is a conservative estimate of the average depth to groundwater at the Site and is less than the MDEQ default value of 3 m.

The remaining parameters in the equation for the attenuation coefficient α, which relate to building characteristics, are based on default values that MDEQ (2002) used in deriving the Michigan Part 201 generic vapor intrusion criteria for commercial/industrial sites. These values are shown in Attachment G2; their bases are discussed in MDEQ guidance (1998).

Site-specific volatilization to indoor air criteria for soil and groundwater are derived using the following equation:

$$Vapor\ \ Intrusion\ Criteria = \frac{Occupational\ \ Air\ \ Standards}{C_{bldg}}$$

where the occupation inhalation standards are the MICIS criteria, OSHA PEL, or ACGIH TLVs as discussed above, and C_{bldg} is the model-predicted indoor air concentration per unit concentration in soil or in groundwater.

The source vapor concentration C_{source} for a constituent in soil is calculated from the constituent's concentration in soil C_{soil}, as follows:

$$C_{source} = C_{soil}\left(\frac{K_d}{H} + \frac{\theta_w}{\rho_b H} + \frac{\theta_a}{\rho_b}\right)^{-1}\left(\frac{10^3 L}{m^3}\right)$$

where K_d is the equilibrium-partitioning coefficient, H is the Henry's law constant, θ_w is the water-filled soil porosity, ρ_b is the soil bulk density, and θ_a is the air-filled soil porosity.

The source vapor concentration for a constituent in groundwater is calculated from the constituent's concentration in groundwater C_{gw}, as follows:

$$C_{source} = H \cdot C_{gw}\left(\frac{10^3 L}{m^3}\right)$$

Attachment G2 shows the site-specific volatilization to indoor air criteria that are based on occupational air standards for soil and groundwater and the ratios of soil and groundwater concentrations to the respective criteria. To ensure that estimated indoor air concentrations from assumed vapor intrusion do not contribute materially to total indoor air concentrations in existing buildings at the Site (which would include contributions from indoor occupational sources), the ratios of soil and groundwater concentrations to the site-specific vapor intrusion criteria were summed for each AOI (Table 6-7). In this evaluation, the ratios are used as equivalent ratios of indoor air concentrations from assumed vapor intrusion to the inhalation exposure limits. These results are presented in Attachment G2 and discussed in Section 6.5.2.1.

At AOIs where LNAPL was sampled, conservative estimates of indoor air concentrations resulting from potential volatilization and migration of LNAPL constituents through cracks in building foundations is calculated using the mathematical modeling approach discussed below.

The source vapor concentrations C_{source} for constituents in LNAPL are calculated using Raoult's law, as follows:

$$C_{source} = \frac{VP \cdot MW_{LNAPL}}{R \cdot T} C_{LNAPL}$$

where C_{source} is the vapor concentration of the constituent, VP is its vapor pressure, MW_{LNAPL} is the molecular weight of LNAPL, R is the gas constant (0.062361 mm Hg m^3/mole/K), T is the absolute temperature, and C_{LNAPL} is the constituent's concentration in LNAPL.

The estimated indoor air concentrations resulting from potential volatilization and migration of LNAPL constituents through cracks in building foundations are compared to the same occupational inhalation limits discussed above for constituents in soil and groundwater (Table 6-8). The estimated indoor air concentrations and the ratios of these concentrations to the occupational inhalation limits are shown in Attachment G12.

G2.2.2 Off-Site Workers and Future On-Site Workers

As noted in Section 6.5, site-specific vapor intrusion criteria are used in calculating estimates of cumulative cancer risk and HI for hypothetical exposure of routine workers via assumed vapor intrusion from soil, groundwater, and LNAPL at the Site, and from groundwater off-site. The cancer risk and HQ estimates for vapor intrusion from soil in this scenario are calculated using equivalent forms of the inhalation risk equations that make use of site-specific risk-based criteria (RBC) for soil, in the same way as discussed in Section G2.1:

$$Risk = C_{building} \cdot URF \cdot \frac{ET \cdot EF \cdot ED}{AT \cdot TR} \cdot TR = \frac{C_{soil}}{RBC} \cdot TR$$

$$HQ = \frac{C_{building}}{RfC} \cdot \frac{ET \cdot EF \cdot ED}{AT \cdot THQ} \cdot THQ = \frac{C_{soil}}{RBC} \cdot THQ$$

where $C_{building}$ is concentration in indoor air, C_{soil} is concentration in soil, *URF* is unit risk factor, *RfC* is reference concentration, *ET* is a normalized exposure time, *EF* is exposure frequency, and *ED* is exposure duration. The equations for vapor intrusion from constituents in groundwater are the same as the above equations except C_{soil} is replaced with the concentration in groundwater C_{gw}. The risk-based criteria (*RBC*) for soil and groundwater in the above equations are based on the same modeling approach and input parameter values discussed in Section G2.2.1.

Similarly, conservative estimates of indoor air concentrations resulting from potential volatilization and migration of LNAPL constituents through cracks in building foundations are calculated using the mathematical modeling approach discussed in Section G2.2.1.

The estimates of cumulative cancer risk and HI for potential volatilization and migration through cracks in building foundations were calculated for soil, groundwater, and LNAPL at the Site and for groundwater off-site by AOI (Tables 6-7 and 6-9). The computation of the incremental risk and HQ estimates which were summed to determine the cumulative cancer risk and HI estimates for potential indoor air exposures for soil, groundwater, and LNAPL are included in Attachment G12.

G3 MAINTENANCE WORKERS

As discussed in Section 6.3 of the Revised RFI Phase II Report, risk estimates for maintenance workers are calculated for potential exposures to soil, groundwater, and LNAPL (including smear zone soil). The computation of these risk estimates are discussed in Sections G3.1, G3.2, and G3.3 respectively.

G3.1 Contact with Soil

The computation of risk estimates for worker exposure to soil via incidental ingestion, dermal contact, and inhalation of vapors and particulates during small-scale maintenance excavations is analogous to the computations discussed in Section G2.1, except for the soil exposure factors for maintenance workers discussed in Section 6.3.5.2 and the estimation of air and airborne dust concentrations discussed in Section 6.3.4.1.

The soil RBCs for maintenance workers are summarized in Attachment G3. These RBCs were used to calculate upper-bound estimates of cumulative cancer risk and HI for exposure to the highest concentrations in soil at each AOI (Table 6-2). The computation of incremental risk and HQ estimates which were summed to determine these cumulative cancer risk and HI estimates is shown in Attachment G12.

G3.2 Contact with Groundwater

As discussed in Section 6.3 of the Revised RFI Phase II Report, maintenance workers could be exposed to groundwater via incidental ingestion, dermal contact, and inhalation of vapors during excavations that extend to the water table or maintenance work in the flooded basement, tunnel areas, and in storm water sewers. The cancer risk and HQ estimates for these exposure routes are calculated using risk-based criteria in a manner analogous to the method discussed in Section G2.1, except for the groundwater exposure factors for maintenance workers discussed in Section 6.3.5.2 and the estimation of air concentrations discussed in Section 6.3.4.1. In addition, the risk-based criteria for the inhalation route are calculated analogous to those discussed for maintenance worker exposure to soil via vapor inhalation in Section G3.1 with the exception of the normalized vapor flux.

The normalized vapor flux J of a chemical is estimated using an overall mass transfer coefficient that is recommended by USEPA (1995c):

$$K_L = \left(\frac{1}{k_l} + \frac{1}{H\, k_g} \right)^{-1} \left(\frac{m}{10^2\, cm} \right) \left(\frac{10^3\, L}{m^3} \right)$$

where H is the Henry's law constant, and k_l and k_g are the liquid-phase and gas-phase mass transfer coefficients (in cm/s) given by the following:

$$k_l = \left(\frac{MW_o}{MW} \right)^{0.5} \left(\frac{T}{298K} \right) k_{l,o}$$

$$k_g = \left(\frac{MW_w}{MW} \right)^{0.335} \left(\frac{T}{298K} \right)^{1.005} k_{g,w}$$

where MW, MW_o, and MW_w are the molecular weights of the chemical, oxygen, and water, T is the water's absolute temperature, $k_{l,o}$ is the liquid-phase mass transfer coefficient for oxygen (0.002 cm/s), and $k_{g,w}$ is the gas-phase mass transfer coefficient for water vapor (0.833 cm/s).

The groundwater RBCs for maintenance workers are summarized in Attachment G4. These RBCs were used to calculate upper-bound estimates of cumulative cancer risk and HI for exposure to the highest concentrations in groundwater at each AOI (Tables 6-10 and 6-12). The computation of incremental risk and HQ estimates which were summed to determine these cumulative cancer risk and HI estimates is shown in Attachment G12.

G3.3 Contact with LNAPL and Smear Zone Soil

As discussed in Section 6.3 of the Revised RFI Phase II Report, maintenance workers conducting excavations that extend to the smear zone at AOIs containing LNAPL, as well as maintenance activities at storm sewers and Outfall 004, could be exposed to LNAPL and/or smear zone soil. Their most potentially significant exposure to LNAPL would be via dermal contact and inhalation of vapors. Potential routes of exposure to smear zone soil could include incidental ingestion, dermal contact, and inhalation of vapors. The cancer risk and HQ estimates for these potential exposures are calculated using the typical risk equations discussed in Section 6.5.1 of the Revised RFI Phase II Report.

The LNAPL constituent concentrations used in the computations are the maximum concentrations measured in LNAPL at each AOI. Smear zone soil samples are difficult to collect and were not collected during the RFI. However, the concentrations of LNAPL constituents in the smear zone are conservatively estimated in the risk assessment by assuming that the 20% of the pore volume in the smear zone soil is filled with LNAPL.

The concentration of a LNAPL constituent in the smear zone soil is estimated as follows:

$$C_{soil} = C_{NAPL} \cdot \rho_{NAPL} \cdot S \cdot \frac{n}{\rho_{soil}}$$

where C_{NAPL} is the concentration of the chemical in LNAPL, ρ_{NAPL} is the density of the LNAPL (approximately 0.88 kg/L), S is the pore saturation of LNAPL (20%), n is the total porosity of the soil (assumed to be 0.43), and ρ_{soil} is the dry bulk density of the soil (assumed to be 1.5 kg/L). The assumed soil porosity and bulk density are the default values USEPA recommended in the Soil Screening Guidance (USEPA 1996) and MDEQ used in derivation of the Act 451, Part 201 generic soil cleanup criteria, and are considered representative of the typical soil types found at the Site. The assumption of 20% LNAPL saturation is reasonably conservative since typical LNAPL residual saturation does not typically exceed 10% to 20% in unsaturated soil (Mercer and Cohen 1990), depending on the type of LNAPL and soil.

The LNAPL concentrations and the estimated smear zone soil concentrations are shown in Attachment G5. The estimated smear zone soil concentration is used to calculate dermal contact and ingestion exposures analogous to other soil exposures, as discussed in Section G2.1. Inhalation exposure from smear zone soil is calculated using the air dispersion factors discussed in Section 6.3.4.1 and the Jury model discussed in Section G2.1 for concentrations below the soil saturation limit. The soil saturation limit is the concentration above which the constituent may be present in free phase. For constituent concentrations above the soil saturation limit, the desaturation-front model is used since the Jury model ignores the saturation limit and would over-predict the vapor flux for soil concentrations above the saturation limit. This extension to the Jury model is based on diffusion of the constituent through an unsaturated zone that expands downward over time as the excess mass in the saturated zone is depleted. The vapor flux for the desaturation-front model is calculated as follows:

$$J_{av} = \rho_b \sqrt{\frac{2 D_E \cdot C_{sat} \cdot \left(C_i - \frac{1}{2} C_{sat}\right)}{T}}$$

where J_{av} is the average vapor flux over the averaging time, C_i is the initial concentration in soil that is assumed to be the same down to an infinite depth, and C_{sat} is the concentration in soil at the saturation limit, and the definition of the other equation parameters are the same as those in the Jury model.

The vapor concentration of LNAPL constituents in the air as a result of emission from LNAPL that is exposed in an open excavation pit is estimated using the "oil film surface emission model" (USEPA 1987), which is given by:

$$C_{air} = C_{NAPL} \cdot K\, e^{-K\,t/L} \cdot (C/Q)$$

where *K* is the chemical's overall mass transfer coefficient given by the following equation, L is thickness of the LNAPL film, and *C/Q* is a normalized air concentration as discussed in Section 6.3.4.1:

$$K = k_g \cdot K_{eq}$$

In this expression for *K*, k_g is the gas-phase mass transfer coefficient and K_{eq} is the equilibrium coefficient between a chemical's concentrations in air and in the LNAPL. These coefficients are defined as follows:

$$k_g = 0.00482\, u^{0.78} Sc_g^{\ -0.67} d_e^{\ -0.11}$$

$$K_{eq} = \frac{p\ \rho_{air}\ MW_{NAPL}}{p_O\ \rho_{NAPL}\ MW_{air}}$$

where *u* is wind speed (m/s), Sc_g is the chemical's gas-phase Schmidt number, d_e is effective diameter of the LNAPL film surface area (m), *p* is the chemical's vapor pressure, p_o is total pressure, ρ_{air} and ρ_{NAPL} are densities of air and LNAPL, and MW_{air} and MW_{NAPL} are molecular weights of air and LNAPL.

As shown in the above equation for C_{air}, the model can account for depletion of constituents in the LNAPL over time as they volatilize. However, this risk assessment conservatively assumes that the constituent in the exposed LNAPL layer do not deplete. This assumption is conservatively used to account for the possibility that exposed LNAPL in the pit could be

refreshed by "fresh" LNAPL that drains into the pit, such as when workers attempt to "dewater" the pit.

The computation of the incremental risk and HQ estimates which were summed to determine the cumulative cancer risk and HI estimates for this scenario (Table 6-11) are shown in Attachment G12.

G4 TRESPASSERS

As discussed in Section 6.3.3 of the Revised RFI Phase II Report, potential exposures of trespassers to soil are evaluated indirectly in the risk assessment by using risk estimates for exposures of routine workers to soil (Table 6-2). These estimates are discussed in Section G2.1.

G5 REDEVELOPMENT CONSTRUCTION WORKERS

As discussed in Section 6.3 of the Revised RFI Phase II Report, risk estimates for redevelopment construction workers are calculated for potential exposures to soil, groundwater, and LNAPL (including smear zone soil). The computation of these risk estimates are discussed in Sections G5.1, G5.2, and G5.3 respectively.

G5.1 Contact with Soil

The computation of risk estimates for worker exposure to soil via incidental ingestion, dermal contact, and inhalation of vapors and particulates during large-scale redevelopment excavations is analogous to the computations discussed in Section G2.1, except for the soil exposure factors for redevelopment construction workers discussed in Section 6.3.5.2 and the estimation of air and airborne dust concentrations discussed in Section 6.3.4.1.

The soil RBCs for redevelopment construction workers are summarized in Attachment G6. These RBCs were used to calculate upper-bound estimates of cumulative cancer risk and HI for the Southend of the Site by area and by location (Tables 6-13 and 6-14). The computation of these cumulative cancer risk and HI estimates is shown in Attachments G12 and G13. For locations where upper-bound point estimates of cumulative cancer risk or HI exceeded USEPA limits, area-weighted cancer risk and HI estimates were calculated similar to the calculations discussed in section G2.1. For redevelopment construction workers, the area-weighting exposure area is defined as the Thiessen polygon (or adjacent polygons) with unacceptable bounding risk, together with all adjacent polygons because redevelopment activities are likely to extend over a larger area of the site than a half-acre area used for routine workers. This

exposure area extends up to 2.5 acres, which is still conservative for large-scale redevelopment construction work. All area-weighted calculations are shown in Attachment G14.

G5.2 Contact with Groundwater

As discussed in Section 6.3 of the Revised RFI Phase II Report, redevelopment construction workers could be exposed to groundwater via incidental ingestion, dermal contact, and inhalation of vapors during excavations that extend to the water table. Risk estimates for redevelopment construction worker exposure to groundwater are calculated analogous to those for maintenance workers as discussed above in Section G3.2, except for the groundwater exposure factors for redevelopment construction workers discussed in Section 6.3.5.2.

The groundwater RBCs for redevelopment construction workers are summarized in Attachment G7. These RBCs were used to calculate upper-bound estimates of cumulative cancer risk and HI for the Southend of the Site (Table 6-15). The computation of incremental risk and HQ estimates which were summed to determine these cumulative cancer risk and HI estimates is shown in Attachment G12.

G5.3 Contact with LNAPL and Smear Zone Soil

As discussed in Section 6.3 of the Revised RFI Phase II Report, redevelopment construction workers conducting excavations that extend to the smear zone at AOIs containing LNAPL could be exposed to LNAPL and/or smear zone soil. Risk estimates for redevelopment construction worker exposure to LNAPL and/or smear zone soil are calculated analogous to those for maintenance workers as discussed above in Section G2.3, except for the exposure factors for redevelopment construction workers discussed in Section 6.3.5.2.

The computation of the incremental risk and HQ estimates which were summed to determine the cumulative cancer risk and HI estimates for this scenario (Table 6-16) is shown in Attachment G12.

G6 RESIDENTS

As discussed in Section 6.3 of the Revised RFI Phase II Report, the risk assessment evaluated potential exposure of residents via contact with outdoor soil and via vapor intrusion from soil, groundwater, and light non-aqueous phase liquid (LNAPL) below future buildings. The computation of risk estimates associated with exposure via contact with outdoor soil is discussed in Section G6.1, and the computation of risk estimates associated with exposure via vapor intrusion is discussed in Section G6.2.

G6.1 Contact with Soil

The computation of risk estimates for residential exposure to soil via incidental ingestion, dermal contact, and inhalation of vapors and particulates is analogous to the computations discussed in Section G2.1, except for the exposure factors for residents discussed in Section 6.3.5.2.

The RBCs for residential soil contact are summarized in Attachment G9. These RBCs were used to calculate upper-bound estimates of cumulative cancer risk and HI for the Southend of the Site by area and by location (Tables 6-13 and 6-17). The computation of these cumulative cancer risk and HI estimates is shown in Attachments G12 and G13. For locations where upper-bound point estimates of cumulative cancer risk or HI exceeded USEPA limits, area-weighted cancer risk and HI estimates were calculated using a hypothetical ½ acre lot similar to the calculation discussed in section G2.1.

Additionally, the area-weighted lead concentration was estimated in one location (RFI-40-09) with lead above the residential screening limit of 400 mg/kg using the following equation:

$$area - weighted\ C_{lead} = \frac{\sum_i C_{lead,i} \cdot A_i}{\sum_i A_i}$$

where $C_{lead,i}$ is the lead concentration in polygon i, and A_i is the area of polygon i that falls within the hypothetical ½ acre lot.

All area-weighted calculations are shown in Attachment G14.

G6.2 Vapor Intrusion

Residents could be exposed to vapors from soil, groundwater, and LNAPL via volatilization and vapor intrusion through building foundations. The computation of risk estimates for residential exposure to vapors that could migrate into indoor air are analogous to the computations for routine workers discussed in Section G2.2, except for the exposure factors for residents discussed in Section 6.3.5.2 and the use of MDEQ default parameters for residential buildings with basements (MDEQ 2002), rather than those for industrial buildings.

The soil and groundwater RBCs for the residential vapor intrusion pathway are summarized in Attachment G10. These RBCs were used to calculate upper-bound estimates of cumulative cancer risk and HI for the Southend of the Site (Tables 6-19 and 6-20). The estimates of incremental risk and HQ estimates which were summed to determine the cumulative cancer

risk and HI for potential residential indoor air exposures for soil, groundwater, and LNAPL are included in Attachment G12.

G7 RECREATIONAL USERS

As discussed in Section 6.3 of the Revised RFI Phase II Report, potential off-site recreational users could be exposed to constituents in groundwater and/or storm sewer water via contact with nearby downgradient surface water in the Flint River. Surface water concentrations are estimated using the mass balance approach discussed below.

The concentration of a constituent in the surface water that results from groundwater entering the Flint River is calculated as follows:

$$C_{sw,1} = \frac{C_{gw} \cdot Q_{gw}}{Q_{gw} + (Q_{sw} \cdot Mixing\ Zone\ Factor)}$$

The flow rate of surface water in the Flint River, Q_{sw}, used in the calculations, 3.09 x 10^7 ft^3/day, is measured at the USGS Station 04148500 Flint River near Flint, MI. The mixing zone factor, 0.25, is from MDEQ Water Quality Standards (Part 4 R 323.1082(2)). The highest detected constituent concentrations among the monitoring wells nearest the Flint River (i.e., those selected for Groundwater Surface Water Interface (GSI) evaluation) are conservatively used as the concentrations in groundwater (C_{gw}) in the mass loading calculation.

The flow rate of groundwater into the river is calculated as follows:

$$Q_{gw} = K(h) \cdot i \cdot A$$

where the horizontal hydraulic conductivity, *K(h)*, is 6 ft/day based on specific-capacity tests for shallow monitoring wells installed during the RFI in the sandy fill and silty sand soil units, and the hydraulic gradient, *i*, is 0.02 based on the high end value of historical groundwater level measurements for areas near the Flint River. The area of discharge into the Flint River, *A*, is calculated as:

$$A = (\text{Distance Along River}) \cdot (d_{GW/SW})$$

The distance along river, 2900 ft, is measured as the linear distance between the northernmost and southernmost monitoring wells selected for comparison against the GSI criteria and is

conservatively used for all constituents even though most constituents were not detected in all the monitoring wells. The height of the groundwater/surface water interface, $d_{gw/sw}$, is conservatively assumed to be 9 ft, as depths of the Flint River at USGS gauging stations in the Flint area typically range from 4 to 9 ft.

The surface water concentration resulting from storm sewer outfall discharging to the Flint River is calculated as follows:

$$C_{sw,2} = \frac{M_{outfall}}{Q_{sw} \cdot \text{Mixing Zone Factor}}$$

The $M_{outfall}$ term (mass of constituents in storm sewer effluent) is estimated using data collected for the Site's NPDES permits and at various locations along the sewer networks during summer 2002 for PCBs and VOCs, respectively. The data collected as part of the NPDES permits are summarized in Table 1 of Appendix F.

The estimated surface water concentration resulting from groundwater and storm sewer discharging to the Flint River, C_{sw}, is calculated as follows:

$$C_{sw} = C_{sw,1} + C_{sw,2}$$

Attachment G11 presents the estimates of surface water concentrations in the above equations shown on Table 6-22.

Attachment G0
Chemical Properties and Toxicity Information

Attachment G0: Toxicity Values
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	Carc Class			SF_{oral} $(mg/kg/d)^{-1}$			RfD_{oral} (mg/kg/d)				SF_{derm} $(mg/kg/d)^{-1}$			RfD_{derm} (mg/kg/d)				$SRfD_{derm}$ (mg/kg/d)				SRfC (mg/m^3)			
			Class	Ref	Notes	Value	Ref	Notes	Value	UF	Ref	Note	Value	Ref	Note	Value	UF	Ref	Notes	Value	UF	Ref	Notes	Value	UF	Ref	Notes
VOC	Acetone	67-64-1	ID	1					9.00E-01	1000	1					9.00E-01	1000	125	104	1.00E+00	100	125	104	3.50E+00	100	2	4, 44
VOC	Benzene	71-43-2	A	1		5.50E-02	1	68	4.00E-03	300	1		5.50E-02	125	104	4.00E-03	300	125	104	4.00E-03	300	125	104	6.00E-02	100	94	50,69
VOC	Bromodichloromethane	75-27-4	B2	1		6.20E-02	1		2.00E-02	1000	1		6.20E-02	125	104	2.00E-02	1000	125	104	2.00E-02	1000	125	104	7.00E-02	1000	2	2, 4, 44
VOC	Bromoform	75-25-2	B2	1		7.90E-03	1		2.00E-02	1000	1		7.90E-03	125	104	2.00E-02	1000	125	104	2.00E-01	100	125	104			2	90, 62
VOC	Bromomethane	74-83-9	D	1					1.40E-03	1000	1					1.40E-03	1000	125	104	5.00E-03	300	125	104	2.00E-01	30	24	
VOC	2-Butanone	78-93-3	ID	1					6.00E-01	1000	1					6.00E-01	1000	125	104	2.00E+00	1000	125	104	5.00E+00	300	1	62
VOC	Carbon Disulfide	75-15-0							1.00E-01	100	1					1.00E-01	100	125	104	1.00E-01	100	125	104	7.00E-01	30	2	2
VOC	Carbon Tetrachloride	56-23-5	B2	1		1.30E-01	1		7.00E-04	1000	1		1.30E-01	125	104	7.00E-04	1000	125	104	7.00E-03	100	125	104				
VOC	Chlorobenzene	108-90-7	D	1					2.00E-02	1000	1					2.00E-02	1000	125	104	2.00E-02	1000	125	104	6.00E-02	1000	103	62
VOC	Chloroethane	75-00-3				2.90E-03	3		4.00E-01		3		2.90E-03	125	104	4.00E-01		125	104	4.00E-01		125	104	1.00E+01	300	2	2
VOC	Chloroform	67-66-3	B2	1					1.00E-02	1000	1					1.00E-02	1000	125	104	1.00E-02	1000	125	104	5.00E-02	100	117	
VOC	Chloromethane	74-87-3	D	1																				9.00E-02	1000	1	62
VOC	Cumene	98-82-8	D	1					1.00E-01	1000	1					1.00E-01	1000	125	104	4.00E-01	300	125	104	4.00E-01	1000	1	62
VOC	Cyclohexane	110-82-7	ID	1																				6.00E+00	300	1	62
VOC	1,2-Dibromo-3-chloropropane	96-12-8	B2	2		1.40E+00	2						1.40E+00	125	104									2.00E-04	1000	1	62
VOC	Dibromochloromethane	124-48-1	C	1		8.40E-02	1		2.00E-02	1000	1		8.40E-02	125	104	2.00E-02	1000	125	104	2.00E-01	100	125	104	7.00E-01	100	2	4, 44
VOC	1,2-Dibromoethane	106-93-4	LC	1		2.00E+00	1		9.00E-03	3000	1		2.00E+00	125	104	9.00E-03	3000	125	104	9.00E-03	3000	125	104	9.00E-03	300	1	62
VOC	1,2-Dichlorobenzene	95-50-1	D	1					9.00E-02	1000	1					9.00E-02	1000	125	104	9.00E-02	1000	125	104	2.00E+00	100	2	3
VOC	1,3-Dichlorobenzene	541-73-1	D	1					9.00E-02	1000	1	10				9.00E-02	1000	125	104	9.00E-02	1000	125	104	1.40E-01	1000	2	3, 10, 44, 62
VOC	1,4-Dichlorobenzene	106-46-7	C	2		2.40E-02	2	6	3.00E-02		3		2.40E-02	125	104	3.00E-02		125	104	3.00E-02		125	104	2.50E+00	30	2	
VOC	Dichlorodifluoromethane	75-71-8							2.00E-01	100	1					2.00E-01	100	125	104	9.00E-01	100	125	104	2.00E+00	1000	2	
VOC	1,1-Dichloroethane	75-34-3	C	1					1.00E-01	1000	2	26,6				1.00E-01	1000	125	104	1.00E+00	100	125	104	5.00E+00	100	2	3
VOC	1,2-Dichloroethane	107-06-2	B2	1		9.10E-02	1		2.00E-02		3		9.10E-02	125	104	2.00E-02		125	104	2.00E-02		125	104	5.00E-03	3000	102	92, 62
VOC	1,1-Dichloroethene	75-35-4	C	1					5.00E-02	100	1					5.00E-02	100	125	104	5.00E-02	100	125	104	2.00E-01	30	1	62
VOC	1,2-Dichloroethene (total)	540-59-0							9.00E-03	1000	2					9.00E-03	1000	125	104	9.00E-03	1000	125	104	3.15E-02	1000	2	4, 44
VOC	cis-1,2-Dichloroethene	156-59-2	D	1					1.00E-02	3000	126					1.00E-02	3000	125	104	1.00E-01	300	125	104	3.50E-01	300	126	4, 44
VOC	trans-1,2-Dichloroethene	156-60-5							2.00E-02	1000	1					2.00E-02	1000	125	104	2.00E-01	100	125	104	5.95E-02		3	44, 62
VOC	1,2-Dichloropropane	78-87-5	B2	2		6.80E-02	2	6					6.80E-02	125	104									1.30E-02	100	2	
VOC	1,3-Dichloropropene (total)	542-75-6	B2	1		1.00E-01	1	77	3.00E-02	100	1		1.00E-01	125	104	3.00E-02	100	125	104	3.00E-02	100	125	104	2.00E-02	30	2	2
VOC	cis-1,3-Dichloropropene	10061-01-5				1.00E-01	1	77, 11	3.00E-02	100	1	11	1.00E-01	125	104	3.00E-02	100	125	104	3.00E-02	100	125	104	2.00E-02	30	2	2, 11
VOC	trans-1,3-Dichloropropene	10061-02-6																									
VOC	Ethyl Benzene	100-41-4	D	1					1.00E-01	1000	1					1.00E-01	1000	125	104	1.00E-01	1000	125	104	1.00E+00	300	126	
VOC	2-Hexanone	591-78-6							4.00E-02	10000	40					4.00E-02	10000	125	104	4.00E-02	10000	125	104	5.00E-03	10000	108	62
VOC	Methyl Acetate	79-20-9							1.00E+00	1000	2					1.00E+00	1000	125	104	1.00E+01	100	125	104	3.50E+01	100	2	4, 44
VOC	Methyl tert-butyl ether	1634-04-4																						3.00E+00	100	1	62
VOC	4-Methyl-2-pentanone	108-10-1	ID	1							1	90						125	104			125	104	3.00E+00	300	1	62
VOC	Methylcyclohexane	108-87-2																						3.00E+00	100	2	
VOC	Methylene Chloride	75-09-2	B2	1		7.50E-03	1		6.00E-02	100	1		7.50E-03	125	104	6.00E-02	100	125	104	6.00E-02	100	125	104	3.00E+00	100	2	
VOC	Styrene	100-42-5							2.00E-01	1000	1	6				2.00E-01	1000	125	104	2.00E-01	1000	125	104	3.00E+00	10	2	
VOC	1,1,2,2-Tetrachloroethane	79-34-5	C	1		2.00E-01	1		6.00E-02	300	101		2.00E-01	125	104	6.00E-02	300	125	104	6.00E-02	300	125	104			88	90, 62
VOC	Tetrachloroethene	127-18-4	C-B2	77		5.20E-02	77		1.00E-02	1000	1		5.20E-02	125	104	1.00E-02	1000	125	104	1.00E-01	100	125	104	4.00E-01	300	109	94, 62
VOC	Toluene	108-88-3	D	1					8.00E-02	3000	1					8.00E-02	3000	125	104	8.00E-01	300	125	104	5.00E+00	10	1	
VOC	1,2,4-Trichlorobenzene	120-82-1	D	1					1.00E-02	1000	1					1.00E-02	1000	125	104	1.00E-02	1000	125	104	2.00E+00	100	2	
VOC	1,1,1-Trichloroethane	71-55-6	D	1					2.80E-01		3					2.80E-01		125	104	2.80E-01		125	104	2.20E+01	90	126	
VOC	1,1,2-Trichloroethane	79-00-5	C	1		5.70E-02	1		4.00E-03	1000	1		5.70E-02	125	104	4.00E-03	1000	125	104	4.00E-02	100	125	104				
VOC	Trichloroethene	79-01-6	C-B2	49	18	1.10E-02	49		6.00E-03	3000	46	6, 97	1.10E-02	125	104	6.00E-03	3000	125	104	6.00E-03	3000	125	104				
VOC	Trichlorofluoromethane	75-69-4							3.00E-01	1000	1					3.00E-01	1000	125	104	7.00E-01	1000	125	104	7.00E+00	1000	2	3
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1							3.00E+01	10	1					3.00E+01	10	125	104	3.00E+01	10	125	104	3.00E+01	100	2	

Attachment G0: Toxicity Values
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	Carc Class			SF_{oral} $(mg/kg/d)^{-1}$			RfD_{oral} (mg/kg/d)				SF_{derm} $(mg/kg/d)^{-1}$			RfD_{derm} (mg/kg/d)				$SRfD_{derm}$ (mg/kg/d)				SRfC (mg/m^3)			
			Class	Ref	Notes	Value	Ref	Notes	Value	UF	Ref	Note	Value	Ref	Note	Value	UF	Ref	Notes	Value	UF	Ref	Notes	Value	UF	Ref	Notes
VOC	1,2,4-Trimethylbenzene	95-63-6	ID	126					5.00E-02	3000	126					5.00E-02	3000	125	104	5.00E-01	300	125	104	6.00E-02	300	126	109
VOC	1,3,5-Trimethylbenzene	108-67-8	ID	126					5.00E-02	3000	126					5.00E-02	3000	125	104	5.00E-01	300	125	104	6.00E-02	300	126	
VOC	Vinyl Chloride	75-01-4	A	1		1.40E+00	1	78	3.00E-03	30	1		1.40E+00	125	104	3.00E-03	30	125	104	3.00E-03	30	125	104	1.00E-01	30	1	62
VOC	Xylenes (total)	1330-20-7	ID	1					2.00E-01	1000	1					2.00E-01	1000	125	104	4.00E-01	1000	125	104	1.00E-01	300	1	62
SVOC	Acenaphthene	83-32-9							6.00E-02	3000	1					6.00E-02	3000	125	104	6.00E-01	300	125	104	2.10E+00	300	2	4, 44
SVOC	Acenaphthylene	208-96-8	D	1					3.00E-02	3000	1	20				3.00E-02	3000	125	104	3.00E-01	300	125	104	1.05E+00	300	2	20, 4, 44
SVOC	Acetophenone	98-86-2	D	1					1.00E-01	3000	1					1.00E-01	3000	125	104	1.00E+00	300	125	104	3.50E+00	300	2	4, 44
SVOC	Anthracene	120-12-7	D	1					3.00E-01	3000	1					3.00E-01	3000	125	104	3.00E+00	300	125	104			2	90, 62
SVOC	Atrazine	1912-24-9	C	2		2.22E-01	2		3.50E-02	100	1		2.22E-01	125	104	3.50E-02	100	125	104	3.50E-02	100	125	104	1.23E-01	100	1	62, 4, 44
SVOC	Benzaldehyde	100-52-7							1.00E-01	1000	1					1.00E-01	1000	125	104	1.00E-01	1000	125	104	3.50E-01	1000	1	62, 4, 44
SVOC	Benzo(a)anthracene	56-55-3	B2	1		7.30E-01	10	5					7.30E-01	125	104												
SVOC	Benzo(a)pyrene	50-32-8	B2	1		7.30E+00	1						7.30E+00	125	104												
SVOC	Benzo(b)fluoranthene	205-99-2	B2	1		7.30E-01	10	5					7.30E-01	125	104												
SVOC	Benzo(g,h,i)perylene	191-24-2	D	1					3.00E-02	3000	1	20				3.00E-02	3000	125	104	3.00E-01	300	125	104	1.05E+00	300	2	20, 4, 44
SVOC	Benzo(k)fluoranthene	207-08-9	B2	1		7.30E-02	10	5					7.30E-02	125	104												
SVOC	Biphenyl	92-52-4	D	1					5.00E-02	1000	1					5.00E-02	1000	125	104	5.00E-02	1000	125	104	1.75E-01	1000	1	62, 4, 44
SVOC	bis(2-Chloroethoxy)methane	111-91-1	D	1																							
SVOC	bis(2-Chloroethyl) ether	111-44-4	B2	1		1.10E+00	1						1.10E+00	125	104												
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2	1		1.40E-02	1		2.00E-02	1000	1		1.40E-02	125	104	2.00E-02	1000	125	104	2.00E-02	1000	125	104	2.00E-01	100	16	
SVOC	4-Bromophenyl-phenyl ether	101-55-3	D	1																							
SVOC	Butylbenzylphthalate	85-68-7	C	1		1.90E-03	3		2.00E-01	1000	1		1.90E-03	125	104	2.00E-01	1000	125	104	2.00E+00	100	125	104	7.00E+00	100	2	4, 44
SVOC	Caprolactam	105-60-2							5.00E-01	100	1					5.00E-01	100	125	104	5.00E-01	100	125	104	1.75E+00	100	2	4, 44
SVOC	Carbazole	86-74-8	B2	2		2.00E-02	2						2.00E-02	125	104												
SVOC	4-Chloro-3-methylphenol	59-50-7																		2.00E+00	100	125	104	7.00E+00	100	2	4, 44
SVOC	4-Chloroaniline	106-47-8				5.40E-02	3		4.00E-03	3000	1		5.40E-02	125	104	4.00E-03	3000	125	104	4.00E-03	3000	125	104	1.40E-02	3000	2	2, 4, 44
SVOC	2-Chloronaphthalene	91-58-7							8.00E-02	3000	1					8.00E-02	3000	125	104	8.00E-02	3000	125	104	2.80E-01	3000	1	62, 4, 44
SVOC	2-Chlorophenol	95-57-8							5.00E-03	1000	1					5.00E-03	1000	125	104	5.00E-02	100	125	104	1.75E-01	100	2	4, 44
SVOC	4-Chlorophenyl-phenyl ether	7005-72-3																									
SVOC	Chrysene	218-01-9	B2	1		7.30E-03	10	5					7.30E-03	125	104												
SVOC	Dibenz(a,h)anthracene	53-70-3	B2	1		7.30E+00	10	5					7.30E+00	125	104												
SVOC	Dibenzofuran	132-64-9	D	1					2.00E-03		3					2.00E-03		125	104	2.00E-03		125	104	7.00E-03		3	62, 4, 44
SVOC	3,3'-Dichlorobenzidine	91-94-1	B2	1		4.50E-01	1						4.50E-01	125	104												
SVOC	2,4-Dichlorophenol	120-83-2							3.00E-03	100	1					3.00E-03	100	125	104	3.00E-03	100	125	104	1.05E-02	100	2	2, 4, 44
SVOC	Diethylphthalate	84-66-2	D	1					8.00E-01	1000	1					8.00E-01	1000	125	104	8.00E+00	100	125	104	2.80E+01	100	2	4, 44
SVOC	2,4-Dimethylphenol	105-67-9							2.00E-02	3000	1					2.00E-02	3000	125	104	2.00E-01	300	125	104	7.00E-01	300	2	4, 44
SVOC	Dimethylphthalate	131-11-3	D	1						100	2	90					100	125	104	1.00E+01	100	125	104			2	90, 62
SVOC	Di-n-butylphthalate	84-74-2	D	1					1.00E-01	1000	1	6				1.00E-01	1000	125	104	1.00E+00	100	125	104			1	90, 62
SVOC	4,6-Dinitro-2-methylphenol	534-52-1							1.00E-04		3					1.00E-04		125	104	1.00E-04		125	104	3.50E-04		3	62, 4, 44
SVOC	2,4-Dinitrophenol	51-28-5							2.00E-03	1000	1					2.00E-03	1000	125	104	2.00E-03	1000	125	104			2	90, 62
SVOC	2,4-Dinitrotoluene	121-14-2	B2	1	28	6.80E-01	1	28	2.00E-03	100	1		6.80E-01	125	104	2.00E-03	100	125	104	2.00E-03	100	125	104			2	90, 62
SVOC	2,6-Dinitrotoluene	606-20-2	B2	1	28	6.80E-01	1	28	1.00E-03	3000	2	6	6.80E-01	125	104	1.00E-03	3000	125	104	1.00E-02	300	125	104	3.50E-02	300	2	4, 44
SVOC	Di-n-octylphthalate	117-84-0							4.00E-02	1000	126					4.00E-02	1000	125	104	4.00E-01	100	125	104			126	90
SVOC	Fluoranthene	206-44-0	D	1					4.00E-02	3000	1					4.00E-02	3000	125	104	4.00E-01	300	125	104	1.40E+00	300	2	4, 44
SVOC	Fluorene	86-73-7	D	1					4.00E-02	3000	1					4.00E-02	3000	125	104	4.00E-01	300	125	104	1.40E+00	300	2	4, 44
SVOC	Formaldehyde	50-00-0	B1	1					2.00E-01	100	1					2.00E-01	100	125	104	2.00E-01	100	125	104				
SVOC	Hexachlorobenzene	118-74-1	B2	1		1.60E+00	1		8.00E-04	100	1		1.60E+00	125	104	8.00E-04	100	125	104	8.00E-04	100	125	104			1	90, 62
SVOC	Hexachlorobutadiene	87-68-3	C	1		7.80E-02	1		2.00E-04	1000	2	6	7.80E-02	125	104	2.00E-04	1000	125	104	7.00E-04	300	125	104				
SVOC	Hexachlorocyclopentadiene	77-47-4	E	1					6.00E-03	1000	1					6.00E-03	1000	125	104	7.00E-02	100	125	104	7.00E-04	100	2	

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GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	Carc Class			SF_{oral} $(mg/kg/d)^{-1}$			RfD_{oral} (mg/kg/d)				SF_{derm} $(mg/kg/d)^{-1}$			RfD_{derm} (mg/kg/d)				$SRfD_{derm}$ (mg/kg/d)				SRfC (mg/m^3)			
			Class	Ref	Notes	Value	Ref	Notes	Value	UF	Ref	Note	Value	Ref	Note	Value	UF	Ref	Notes	Value	UF	Ref	Notes	Value	UF	Ref	Notes
SVOC	Hexachloroethane	67-72-1	C	1		1.40E-02	1		1.00E-03	1000	1		1.40E-02	125	104	1.00E-03	1000	125	104	1.00E-02	100	125	104				
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	B2	1		7.30E-01	10	5					7.30E-01	125	104												
SVOC	Isophorone	78-59-1	C	1		9.50E-04	1		2.00E-01	1000	1		9.50E-04	125	104	2.00E-01	1000	125	104	2.00E+00	100	125	104			2	90, 62
SVOC	2-Methylnaphthalene	91-57-6	ID	1					4.00E-03	1000	1					4.00E-03	1000	125	104	4.00E-03	1000	125	104	3.00E-03	3000	1	61, 62
SVOC	Methylphenol (total)	1319-77-3							5.00E-02		1	99				5.00E-02		125	104	5.00E-01		125	104			1	90, 99
SVOC	2-Methylphenol	95-48-7	C	1					5.00E-02	1000	1					5.00E-02	1000	125	104	5.00E-01	100	125	104			1	90, 62
SVOC	4-Methylphenol	106-44-5	C	1					5.00E-03	1000	2	6				5.00E-03	1000	125	104	5.00E-03	1000	125	104			42	90,92, 62
SVOC	Naphthalene	91-20-3	C	1					2.00E-02	3000	1					2.00E-02	3000	125	104	2.00E-01	300	125	104	3.00E-03	3000	1	62
SVOC	2-Nitroaniline	88-74-4							3.00E-03		3					3.00E-03		125	104	3.00E-03		125	104	2.00E-03	1000	2	
SVOC	3-Nitroaniline	99-09-2	C	112		2.10E-02	112		3.00E-04	1000	110		2.10E-02	125	104	3.00E-04	1000	125	104	3.00E-04	1000	125	104	1.00E-03	3000	111	62
SVOC	4-Nitroaniline	100-01-6	C	115		2.10E-02	115		3.00E-03	100	113		2.10E-02	125	104	3.00E-03	100	125	104	3.00E-03	100	125	104	4.00E-03	1000	114	62
SVOC	Nitrobenzene	98-95-3	D	1					5.00E-04	10000	1	6				5.00E-04	10000	125	104	5.00E-03	1000	125	104	2.00E-02	1000	2	3
SVOC	2-Nitrophenol	88-75-5																									
SVOC	4-Nitrophenol	100-02-7																									
SVOC	N-Nitrosodiphenylamine	86-30-6	B2	1		4.90E-03	1		2.00E-02	3000	126		4.90E-03	125	104	2.00E-02	3000	125	104	2.00E-02	3000	125	104			126	90,98
SVOC	N-Nitroso-di-n-propylamine	621-64-7	B2	1		7.00E+00	1						7.00E+00	125	104												
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	C	2		7.00E-02	2		4.00E-02		1		7.00E-02	125	104	4.00E-02		125	104	4.00E-02		125	104				
SVOC	Pentachlorophenol	87-86-5	B2	1		1.20E-01	1		3.00E-02	100	1		1.20E-01	125	104	3.00E-02	100	125	104	3.00E-02	100	125	104	1.05E-01	100	2	4, 44
SVOC	Phenanthrene	85-01-8	D	1					3.00E-02	3000	1	20				3.00E-02	3000	125	104	3.00E-01	300	125	104	1.05E+00	300	2	20, 4, 44
SVOC	Phenol	108-95-2	ID	1					3.00E-01	300	1					3.00E-01	300	125	104	3.00E-01	300	125	104			1	90,98, 62
SVOC	Pyrene	129-00-0	D	1					3.00E-02	3000	1					3.00E-02	3000	125	104	3.00E-01	300	125	104	1.05E+00	300	2	4, 44
SVOC	2,4,5-Trichlorophenol	95-95-4							1.00E-01	1000	1					1.00E-01	1000	125	104	1.00E+00	100	125	104			2	90, 62
SVOC	2,4,6-Trichlorophenol	88-06-2	B2	1		1.10E-02	1		1.00E-04		4		1.10E-02	125	104	1.00E-04		125	104	1.00E-04		125	104			2	90, 62
PCB	PCBs (total)	1336-36-3	B2	1		2.00E+00	1	30,32	2.00E-05	300	1	72	2.00E+00	125	104	2.00E-05	300	125	104	5.00E-05	100	125	104				
INORG	Antimony	7440-36-0							4.00E-04	1000	1					6.00E-05	1000	125	104	6.00E-05	1000	125	104	1.40E-03	1000	1	62, 4, 44
INORG	Arsenic	7440-38-2	A	1		1.50E+00	1		3.00E-04	3	1		1.50E+00	125	104	3.00E-04	3	125	104	5.00E-03	10	125	104				
INORG	Barium	7440-39-3	D	1					7.00E-02	3	1					4.90E-03	3	125	104	4.90E-03	3	125	104			1	90, 62
INORG	Beryllium	7440-41-7	B1	1					2.00E-03	300	1					1.40E-05	300	125	104	1.40E-05	300	125	104	2.00E-05	10	1	62
INORG	Cadmium	7440-43-9	B1	1					1.00E-03	10	1	95				2.50E-05	10	125	104	2.50E-05	10	125	104	9.00E-04		122	102
INORG	Chromium (total)	7440-47-3							3.00E-03	900	1	8				7.50E-05	900	125	104	5.00E-04	100	125	104	1.00E-04	300	1	59, 8, 62
INORG	Chromium III	16065-83-1	D	1					1.50E+00	1000	1					1.95E-02	1000	125	104	1.95E-02	1000	125	104	5.25E+00	1000	1	62, 4, 44
INORG	Chromium VI	18540-29-9	A	1					3.00E-03	900	1					7.50E-05	900	125	104	5.00E-04	100	125	104	1.00E-04	300	1	59, 62
INORG	Cobalt	7440-48-4	B1	126					2.00E-02	10	126					2.00E-02	10	125	104	2.00E-02	10	125	104	2.00E-05	100	126	62
INORG	Copper	7440-50-8	D	1					4.00E-02	2	50	49				4.00E-02	2	125	104	4.00E-02	2	125	104	1.40E-01	2	50	49, 62, 4, 44
INORG	Cyanide (total)	57-12-5	D	1					2.00E-02	500	1					2.00E-02	500	125	104	2.00E-02	500	125	104	7.00E-02	500	2	2, 4, 44
INORG	Fluoride	16984-48-8																									
INORG	Lead	7439-92-1	B2	1																							
INORG	Manganese	7439-96-5	D	1					1.40E-01	1	1					8.40E-03	1	125	104	8.40E-03	1	125	104	5.00E-05	1000	1	62
INORG	Mercury	7439-97-6	D	1					3.00E-04	1000	1	51				3.00E-04	1000	125	104	3.00E-04	1000	125	104	3.00E-04	30	2	
INORG	Nickel	7440-02-0	A	1					2.00E-02	300	1					8.00E-04	300	125	104	8.00E-04	300	125	104				
INORG	Selenium	7782-49-2	D	1					5.00E-03	3	1					5.00E-03	3	125	104	5.00E-03	3	125	104	1.75E-02	3	2	2, 4, 44
INORG	Silver	7440-22-4	D	1					5.00E-03	3	1					2.00E-04	3	125	104	2.00E-04	3	125	104	1.00E-05	1000	83	62
INORG	Thallium	7440-28-0							7.00E-05	3000	52	49				7.00E-05	3000	125	104	7.00E-05	3000	125	104	2.45E-04	3000	52	49, 62, 4, 44
INORG	Vanadium	7440-62-2							7.00E-03	100	2	6				1.82E-04	100	125	104	1.82E-04	100	125	104	2.45E-02	100	2	4, 44
INORG	Zinc	7440-66-6	D	1					3.00E-01	3	1					3.00E-01	3	125	104	3.00E-01	3	125	104	1.05E+00	3	2	2, 4, 44

Attachment G0: Toxicity Values Notes and References
GMC: NAO Flint Operations Site, Flint, Michigan

Notes:	
2	USEPA adopted chronic value as subchronic value.
3	HEAST Alternate Method.
4	ENVIRON obtained value by route-to-route extrapolation.
6	Under review, according to IRIS.
8	ENVIRON used Chromium VI [CASRN 18540-29-9] value from IRIS (reference 1) as a surrogate.
10	ENVIRON used 1,2-Dichlorobenzene [CASRN 95-50-1] value from the indicated reference as a surrogate.
11	ENVIRON used 1,3-Dichloropropene (total) [CASRN 542-75-6] value from the indicated reference as a surrogate.
18	Not verifiable, according to IRIS.
20	ENVIRON used Pyrene [CASRN 129-00-0] value from IRIS (reference 1) as a surrogate.
26	USEPA obtained value by route-to-route extrapolation.
28	USEPA used 2,4-,2,6-Dinitrotolunene mixture value from IRIS (reference 1) as a surrogate.
30	Upper-bound slope factor.
32	High risk & persistence tier for: food chain exposure; sediment/soil ingestion; dust/aerosol inhalation; dermal exposure, if an absorption factor is applied; presence of dioxin-like, tumor-promoting/persistent congeners; and all early life exposures.
34	Lowest risk & persistence tier. Criteria for use: congener or isomer analyses verify that congeners with more than 4 chlorines comprise less than 1/2 % of total PCBs.
44	ENVIRON derived inhalation RfC from inhalation RfD value presented in the indicated reference, using standard USEPA methodology presented in HEAST.
45	ENVIRON derived inhalation URF from Inhalation Slope Factor value presented in the indicated reference, using standard USEPA methodology presented in HEAST.
49	ENVIRON derived oral RfD from adverse health effect level value presented in the indicated reference.
50	Personal communication with NCEA indicated the supporting paper had been retired.
51	ENVIRON used Mercuric Chloride [CASRN 7487-94-7] value from the indicated reference as a surrogate.
52	ENVIRON derived inhalation Slope Factor from inhalation URF value presented in the indicated reference, using standard USEPA methodology presented in HEAST.
59	This RfD is for particulates. The RfD for chromic acid mists and dissolved Chromium VI aerosols is 0.000008 mg/m3.
60	IRIS provides a range of 2.2E-6 to 7.8E-6 (ug/m3)-1 as the inhalation URF for Benzene.
61	ENVIRON used Naphthalene [CASRN 91-20-3] value from indicated reference as a surrogate.
62	ENVIRON used chronic value as a surrogate for the subchronic value.
63	ENVIRON derived inhalation RfD from inhalation RfC published in the indicated reference, using standard USEPA methodology presented in HEAST.
64	ENVIRON removed uncertainty factor used by USEPA to convert from subchronic to chronic exposure.
68	IRIS provides a range of 1.5E-2 to 5.5E-2 (mg/kg/d)-1 as the oral Slope Factor for Benzene.
69	Personal communication with NCEA indicated the retired paper should be used until a new value is published in IRIS.
72	ENVIRON used Aroclor 1254 [CASRN 11097-69-1] value from the indicated reference as a surrogate for PCBs [CASRN 1336-36-3].
77	IRIS provides an alternate slope factor of 5E-2; however, EPA does not recommend its use, due to the higher uncertainty in the delivered dose in the supporting study.
78	IRIS recommends an oral Slope Factor for Vinyl Chloride of 7.2E-1 (mg/kg/d)-1 to account for continuous lifetime exposure during adulthood; a twofold increase to 1.4 (mg/kg/d)-1 is recommended to account for continuous exposure from birth.
79	IRIS recommends an inhalation URF for Vinyl Chloride of 4.4E-6 (ug/m3)-1 to account for continuous lifetime exposure during adulthood; a twofold increase to 8.8E-6 (ug/m3)-1 is recommended to account for continuous exposure from birth.
83	ENVIRON used PCBs (total) [CASRN 1336-36-3] value as a surrogate.
90	Inadequate data exist to derive a toxicity value, according to the indicated reference.
92	NCEA directed ENVIRON to use outdated value.

Attachment G0: Toxicity Values Notes and References
GMC: NAO Flint Operations Site, Flint, Michigan

93	Personal communication with NCEA indicated the HEAST LOAEL of 1000 mg and the subchronic RfD of 7E-1mg/kg-day both appear to be incorrect and recommended using the IRIS RfD of 3E-1 as the subchronic RfD.
94	Two provisional RfC values are presented in the indicated reference (4E-1 and 6E-1 mg/m3). Personal communication with NCEA indicated that either RfC is acceptable and the RfC should be chosen on a case-by-case basis.
95	This RfD is for dietary exposure. The RfD for drinking water exposure is 0.0005 mg/kg/day.
97	ENVIRON used withdrawn source.
98	Route-to-route extrapolation is not appropriate, according to the indicated reference.
99	ENVIRON used 3-Methylphenol [CASRN 108-39-4] values from the indicated reference as a surrogate.
102	A dose equivalency factor of 4.5 was applied to the chronic RfC to derive the subchronic RfC.
104	Dermal toxicity value is extrapolated from oral toxicity value in accordance with the referenced EPA guidance.
105	Adjustment for gastrointestinal absorption efficiencies should not be applied according to the indicated reference.
106	This ABSGI is for dietary exposure. The ABSGI for drinking water exposure is 0.050.
107	Per Exhibit 4-1 in the indicated reference, the ABSGI value ranges from 30 to 80 percent.
109	ENVIRON used 1,3,5-Trimethylbenzene [CASRN 108-67-8] values from the indicated reference as a surrogate.
References:	
1	USEPA. Integrated Risk Information System (IRIS). On-line database.
2	USEPA. 1997. Health Effects Assessment Summary Tables (HEAST). FY-1997 Update. EPA 540/R-97-036. July.
3	USEPA. Region III. 2005. Risk-Based Concentration Table. April.
4	USEPA. Region IX. 2004. Preliminary Remediation Goal Table. December.
10	USEPA. 1993. Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons. EPA/600/2-93/089. July.
16	USEPA. NCEA. 1993. Provisional Subchronic RfC for Di(2-ethylhexyl)phthalate [CASRN 117-81-7]. August 25.
24	USEPA. NCEA. 1992. Derivation of a Provisional Subchronic Inhalation RfC for Bromomethane [CASRN 74-83-9]. October 22.
25	USEPA. NCEA. 1994. Derivation of a Provisional Subchronic Oral RfD for Bromomethane [CASRN 74-83-9]. May 9.
26	USEPA. NCEA. 1994. Derivation of a Provisional Subchronic Oral RfD for Hexachlorobutadiene [CASRN 87-68-3]. January 24.
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40	USEPA. NCEA. 1993. Risk Assessment Issue paper for: Derivation of a Provisional RfD for 2-Hexanone (Methyl-n-butyl ketone) [CASRN 591-78-6]. June 24.
42	USEPA. NCEA. 1994. Risk Assessment Issue paper for: Evaluation of Systemic Toxicity after Inhalation Exposure to 4-Methylphenol (p-cresol) [CASRN 106-44-5]. May 5.
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49	USEPA. NCEA. 1995. Risk Assessment Issue paper for: Carcinogenicity Information for Trichloroethylene (TCE) [CASRN 79-01-6]. September 6.
50	USEPA. 56 FR 26460, June 7, 1991. Maximum Contaminant Level Goals and National Primary Drinking Water Regulations for Lead and Copper. Final Rule.
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64	USEPA. NCEA. 1994. Risk Assessment Issue Paper for: Derivation of the Subchronic Oral Reference Dose for Mixed Xylenes [CASRN 1330-20-7]. September 30.
77	USEPA. NCEA. 2001. Risk Assessment Issue Paper for Carcinogenicity Information for Tetrachloroethylene (perchloroethylene, PERC) [CASRN 127-18-4]. December 20.
78	USEPA. NCEA. 1999. Risk Assessment Paper for: The Derivation of a Provisional Oral Subchronic RfD for Carbon Tetrachloride [CASRN 56-23-5]. June 14.

Attachment G0: Toxicity Values Notes and References GMC: NAO Flint Operations Site, Flint, Michigan	
79	USEPA. NCEA. 1999. Risk Assessment Paper for: The Derivation of a Provisional Oral Subchronic RfC for Carbon Tetrachloride [CASRN 56-23-5]. June 14.
83	USEPA. NCEA. 1994. Risk Assessment Issue Paper for: Derivation of a Provisional RfC for Silver [CASRN 7440-22-4]. June 30.
88	USEPA. NCEA. 2002. Risk Assessment Issue paper for: Derivation of a Provisional RfC for 1,1,2,2-Tetrachloroethane[CASRN 79-34-5]. January 15.
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125	USEPA. 2004. Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. July.
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Attachment G0: Physical and Chemical Information
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	MW (g/mole)			Log Kow (unitless)			Koc (L/kg)			Kd (L/kg)			H (unitless)			s (mg/L)			VP (mm Hg)			Dair (m^2/d)			Dwater (m^2/d)		
			Value	Ref	Notes	Value	Ref	Notes	Value	Ref	Notes				Value	Ref	Notes	Value	Ref	Notes	Value	Ref	Notes	Value	Ref	Notes	Value	Ref	Notes
VOC	Acetone	67-64-1	5.81E+01	50		-2.40E-01	44		5.81E-01	44	82				1.59E-03	44		1.00E+06	44		2.30E+02	50	92	1.07E+00	44		9.85E-05	44	
VOC	Benzene	71-43-2	7.81E+01	50		2.13E+00	44		5.82E+01	44	111				2.28E-01	44		1.75E+03	44		9.50E+01	50	92	7.60E-01	44		8.47E-05	44	
VOC	Bromodichloromethane	75-27-4	1.64E+02	50		2.10E+00	44		5.51E+01	44	111				6.56E-02	44		6.74E+03	44		5.00E+01	50	92	2.57E-01	44		9.16E-05	44	
VOC	Bromoform	75-25-2	2.53E+02	50		2.35E+00	44		8.70E+01	44	111				2.19E-02	44		3.10E+03	44		5.51E+00	50	92	1.29E-01	44		8.90E-05	44	
VOC	Bromomethane	74-83-9	9.49E+01	50		1.19E+00	44		1.05E+01	44	111				2.56E-01	44		1.52E+04	44		1.62E+03	50	92	6.29E-01	44		1.05E-04	44	
VOC	2-Butanone	78-93-3	7.21E+01	50		2.80E-01	69		2.00E+00	69	111				2.28E-03	50	92	2.75E+05	69		9.53E+01	50	92	6.98E-01	69		8.47E-05	69	
VOC	Carbon Disulfide	75-15-0	7.61E+01	50		2.00E+00	44		4.59E+01	44	111				1.24E+00	44		1.19E+03	44		3.59E+02	50	92	8.99E-01	44		8.64E-05	44	
VOC	Carbon Tetrachloride	56-23-5	1.54E+02	50		2.73E+00	44		1.74E+02	44	111				1.25E+00	44		7.93E+02	44		1.15E+02	50	92	6.74E-01	44		7.60E-05	44	
VOC	Chlorobenzene	108-90-7	1.13E+02	50		2.86E+00	44		2.20E+02	44	111				1.52E-01	44		4.72E+02	44		1.20E+01	50	92	6.31E-01	44		7.52E-05	44	
VOC	Chloroethane	75-00-3	6.45E+01	50		1.43E+00	69		1.62E+01	69	111				3.60E-01	50	92	5.68E+03	50	92	1.01E+03	50	92	2.34E+00	69		9.94E-05	69	
VOC	Chloroform	67-66-3	1.19E+02	50		1.92E+00	44		3.97E+01	44	111				1.50E-01	44		7.92E+03	44		1.97E+02	50	92	8.99E-01	44		8.64E-05	44	
VOC	Chloromethane	74-87-3	5.05E+01	50		1.92E+00	69		3.97E+01	69	111				3.60E-01	50	92	5.33E+03	50	92	4.30E+03	50	92	1.09E+00	69		5.62E-05	69	
VOC	Cumene	98-82-8	1.20E+02	50		3.50E+00	69		7.05E+02	69	111				5.32E-01	69		6.13E+01	50	92	4.50E+00	50	92	5.62E-01	69		6.13E-05	69	
VOC	Cyclohexane	110-82-7	8.42E+01	50		3.44E+00	39		6.35E+02	39	111				7.97E+00	50	92	5.50E+01	50	92	9.69E+01	50	92	7.25E-01	69		7.86E-05	69	
VOC	1,2-Dibromo-3-chloropropane	96-12-8	2.36E+02	50		2.63E+00	1		1.45E+02	1	111				6.01E-03	50	92	1.23E+03	50	92	5.80E-01	50	92	6.91E-01	40		6.91E-05	40	
VOC	Dibromochloromethane	124-48-1	2.08E+02	50		2.17E+00	44		6.26E+01	44	111				3.21E-02	44		2.60E+03	44		4.90E+00	50	92	1.69E-01	44		9.07E-05	44	
VOC	1,2-Dibromoethane	106-93-4	1.88E+02	50		1.60E+00	1		2.22E+01	1	111				3.04E-02	50	92	4.18E+03	50	92	1.33E+01	50	92	6.91E-01	40		6.91E-05	40	
VOC	1,2-Dichlorobenzene	95-50-1	1.47E+02	50		3.43E+00	44		6.23E+02	44	111				7.79E-02	44		1.56E+02	44		1.36E+00	50	92	5.96E-01	44		6.83E-05	44	
VOC	1,3-Dichlorobenzene	541-73-1	1.47E+02	50		3.38E+00	69		5.69E+02	69	111				1.27E-01	50	92	1.33E+02	50	93	2.15E+00	50	92	5.98E-01	69		6.79E-05	69	
VOC	1,4-Dichlorobenzene	106-46-7	1.47E+02	50		3.42E+00	44		6.12E+02	44	111				9.96E-02	44		7.38E+01	44		1.00E+00	50	92	5.96E-01	44		6.83E-05	44	
VOC	Dichlorodifluoromethane	75-71-8	1.21E+02	50		2.16E+00	1		6.15E+01	1	111				1.40E+01	50	92	2.80E+02	50	92	4.85E+03	50	92	6.91E-01	40		6.91E-05	40	
VOC	1,1-Dichloroethane	75-34-3	9.90E+01	50		1.79E+00	44		3.13E+01	44	111				2.30E-01	44		5.06E+03	44		2.27E+02	50	92	6.41E-01	44		9.07E-05	44	
VOC	1,2-Dichloroethane	107-06-2	9.90E+01	50		1.47E+00	44		1.75E+01	44	111				4.01E-02	44		8.52E+03	44		7.89E+01	50	92	8.99E-01	44		8.55E-05	44	
VOC	1,1-Dichloroethene	75-35-4	9.69E+01	50		2.13E+00	44		5.82E+01	44	111				1.07E+00	44		2.25E+03	44		6.00E+02	50	92	7.78E-01	44		8.99E-05	44	
VOC	1,2-Dichloroethene (total)	540-59-0	9.69E+01	50	81	1.86E+00	62		3.56E+01	62	111				3.85E-01	44	81	6.30E+03	44	81	3.33E+02	50	92, 81	6.11E-01	44	81	1.03E-04	44	81
VOC	cis-1,2-Dichloroethene	156-59-2	9.69E+01	50		1.86E+00	44		3.56E+01	44	111				1.67E-01	44		3.50E+03	44		2.03E+02	50	92	6.36E-01	44		9.76E-05	44	
VOC	trans-1,2-Dichloroethene	156-60-5	9.69E+01	50		2.07E+00	44		5.22E+01	44	111				3.85E-01	44		6.30E+03	44		3.33E+02	50	92	6.11E-01	44		1.03E-04	44	
VOC	1,2-Dichloropropane	78-87-5	1.13E+02	50		1.97E+00	44		4.35E+01	44	111				1.15E-01	44		2.80E+03	44		5.20E+01	50	92	6.76E-01	44		7.54E-05	44	
VOC	1,3-Dichloropropene (total)	542-75-6	1.11E+02	50		2.00E+00	44		4.59E+01	44	111				7.26E-01	44		2.80E+03	44		3.40E+01	50	92	5.41E-01	44		8.64E-05	44	
VOC	cis-1,3-Dichloropropene	10061-01-5	1.11E+02	50		1.41E+00	1		1.57E+01	1	111				1.45E-01	1	55	2.72E+03	50	90	3.28E+01	50	90	6.91E-01	40		6.91E-05	40	
VOC	trans-1,3-Dichloropropene	10061-02-6	1.11E+02	50		1.98E+00	69		4.43E+01	69	111				6.54E-02	40		2.72E+03	50	90	2.33E+01	50	90	5.41E-01	69		8.64E-05	69	
VOC	Ethyl Benzene	100-41-4	1.06E+02	50		3.14E+00	44		3.67E+02	44	111				3.23E-01	44		1.69E+02	44		9.60E+00	50	92	6.48E-01	44		6.74E-05	44	
VOC	2-Hexanone	591-78-6	1.00E+02	50		1.38E+00	39		1.48E+01	39	111				7.15E-02	1		1.75E+04	39		1.16E+01	50	92						
VOC	Methyl Acetate	79-20-9	7.41E+01	55		1.80E-01	39		1.66E+00	39	111				3.71E-03	69		2.44E+05	39		2.16E+02	39		8.27E-01	69		9.50E-05	69	
VOC	Methyl tert-butyl ether	1634-04-4	8.82E+01	1		1.24E+00	39		1.15E+01	39	111				2.40E-02	69		5.10E+04	69		2.50E+02	69		7.42E-01	69		8.73E-05	69	
VOC	4-Methyl-2-pentanone	108-10-1	1.00E+02	50		1.19E+00	62		1.05E+01	62	111				5.64E-03	50	92	1.90E+04	39		1.99E+01	50	92	6.48E-01	40		6.74E-05	40	
VOC	Methylcyclohexane	108-87-2	9.82E+01	55		2.96E+00	69		2.66E+02	69	111				1.76E+01	69		1.40E+01	69		4.30E+01	69		6.35E-01	69		7.36E-05	69	
VOC	Methylene Chloride	75-09-2	8.49E+01	50		1.25E+00	44		1.17E+01	44	111				8.98E-02	44		1.30E+04	44		4.33E+02	50	92	8.73E-01	44		1.01E-04	44	
VOC	Styrene	100-42-5	1.04E+02	50		2.94E+00	44		7.77E+02	44	82				1.13E-01	44		3.10E+02	44		6.12E+00	50	92	6.13E-01	44		6.91E-05	44	
VOC	1,1,2,2-Tetrachloroethane	79-34-5	1.68E+02	50		2.39E+00	44		9.35E+01	44	111				1.41E-02	44		2.97E+03	44		4.62E+00	50	92	6.13E-01	44		6.83E-05	44	
VOC	Tetrachloroethene	127-18-4	1.66E+02	50		2.67E+00	44		1.56E+02	44	111				7.54E-01	44		2.00E+02	44		1.86E+01	50	92	6.22E-01	44		7.08E-05	44	
VOC	Toluene	108-88-3	9.21E+01	50		2.75E+00	44		1.80E+02	44	111				2.72E-01	44		5.26E+02	44		2.84E+01	50	92	7.52E-01	44		7.43E-05	44	
VOC	1,2,4-Trichlorobenzene	120-82-1	1.81E+02	50		4.01E+00	44		1.79E+03	44	111				5.82E-02	44		3.00E+02	44		4.31E-01	50	92	2.59E-01	44		7.11E-05	44	
VOC	1,1,1-Trichloroethane	71-55-6	1.33E+02	50		2.48E+00	44		1.10E+02	44	111				7.05E-01	44		1.33E+03	44		1.24E+02	50	92	6.74E-01	44		7.60E-05	44	
VOC	1,1,2-Trichloroethane	79-00-5	1.33E+02	50		2.05E+00	44		5.03E+01	44	111				3.74E-02	44		4.42E+03	44		2.33E+01	50	92	6.74E-01	44		7.60E-05	44	
VOC	Trichloroethene	79-01-6	1.31E+02	50		2.71E+00	44		1.68E+02	44	111				4.22E-01	44		1.10E+03	44		7.35E+01	50	92	6.83E-01	44		7.86E-05	44	
VOC	Trichlorofluoromethane	75-69-4	1.37E+02	50		2.53E+00	69		1.21E+02	69	111				3.96E+00	50	92	1.10E+03	50	92	8.03E+02	50	92	7.52E-01	69		8.38E-05	69	
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	1.87E+02	50		3.16E+00	38		3.81E+02	38	111				1.97E+01	50	92	1.70E+02	50	92	3.32E+02	50	92	6.74E-01	40		7.08E-05	40	
VOC	1,2,4-Trimethylbenzene	95-63-6	1.20E+02	55		3.63E+00	1		8.97E+02	1	111				2.52E-01	69		5.70E+01	1		1.00E+00	1		5.24E-01	69		6.84E-05	69	
VOC	1,3,5-Trimethylbenzene	108-67-8	1.20E+02	39		4.00E+00	69		1.76E+03	69	111				2.40E-01	69		4.82E+01	68		2.48E+00	68		5.20E-01	69		7.49E-05	69	
VOC	Vinyl Chloride	75-01-4	6.25E+01	50		1.50E+00	44		1.85E+01	44	111				1.11E+00	44		2.76E+03	44		2.98E+03	50	92	9.16E-01	44		1.06E-04	44	113
VOC	Xylenes (total)	1330-20-7	1.06E+02	50		3.17E+00	44		3.86E+02	44	111				2.76E-01	44		1.75E+02	44		7.99E+00	50	92	6.74E-01	44		7.56E-05	44	
SVOC	Acenaphthene	83-32-9	1.54E+02	1		3.92E+00	44		7.14E+03	44	82				6.36E-03	44		4.24E+00	44		2.50E-03	50	92	3.64E-01	44		6.64E-05	44	
SVOC	Acenaphthylene	208-96-8	1.52E+02	50		3.94E+00	69		7.47E+03	69	82				4.62E-03	50	92	1.61E+01	50	92	9.12E-04	50	92	3.88E-01	69		6.03E-05	69	
SVOC	Acetophenone	98-86-2	1.20E+02	50		1.58E+00	1		3.58E+01	1	82				4.37E-04	50	92	6.13E+03	50	92	3.97E-01	50	92	6.91E-01	40		6.91E-05	40	
SVOC	Anthracene	120-12-7	1.78E+02	50		4.55E+00	44		2.97E+04	44	82				2.67E-03	44		4.34E-02	44		2.67E-06	50	92	2.80E-01	44		6.69E-05	44	
SVOC	Atrazine	1912-24-9	2.16E+02	50		2.61E+00	69		3.68E+02	69	82				2.50E-07	69		7.00E+01	50	92	3.00E-07	50	92	2.24E-01	69		5.76E-05	69	
SVOC	Benzaldehyde	100-52-7	1.06E+02	39		1.48E+00	39		2.85E+01	39	82				9.73E-04	69		3.00E+03	39		9.00E-01	69		6.23E-01	69		7.84E-05	69	
SVOC	Benzo(a)anthracene	56-55-3	2.28E+02	50		5.70E+00	44		4.01E+05	44	82				1.37E-04	44		9.40E-03	44		1.05E-07	50	92	4.41E-01	44		7.78E-05	44	
SVOC	Benzo(a)pyrene	50-32-8	2.52E+02	50		6.11E+00	44		1.01E+06	44	82				4.63E-05	44		1.62E-03	44		5.49E-09	50	92	3.72E-01	44		7.78E-05	44	
SVOC	Benzo(b)fluoranthene	205-99-2	2.52E+02	50		6.20E+00	44		1.24E+06	44	82				4.55E-03	44		1.50E-03	44		5.00E-07	50	92	1.95E-01	44		4.80E-05	44	
SVOC	Benzo(g,h,i)perylene	191-24-2	2.76E+02	50		7.23E+00	69		1.28E+07	69	82				5.76E-06	50	92	2.60E-04	50	92	1.01E-10	50	92	1.88E-01	69		4.54E-05	69	
SVOC	Benzo(k)fluoranthene	207-08-9	2.52E+02	50		6.20E+00	44		1.24E+06	44	82				3.40E-05	44		8.00E-04	44		2.00E-09	50	92	1.95E-01	44		4.80E-05	44	
SVOC	Biphenyl	92-52-4	1.54E+02	50		4.09E+00	39		1.05E+04	39	82				1.23E-02	50	92	6.03E+00	50	93	9.64E-03	50	92	3.49E-01	69		7.04E-05	69	

Attachment G0: Physical and Chemical Information
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	MW (g/mole)			Log Kow (unitless)			Koc (L/kg)			Kd (L/kg)			H (unitless)			s (mg/L)			VP (mm Hg)			Dair (m^2/d)			Dwater (m^2/d)		
			Value	Ref	Notes	Value	Ref	Notes	Value	Ref	Notes				Value	Ref	Notes	Value	Ref	Notes	Value	Ref	Notes	Value	Ref	Notes	Value	Ref	Notes
SVOC	bis(2-Chloroethoxy)methane	111-91-1	1.73E+02	50		1.26E+00	69		1.73E+01	69	82				6.95E-06	50	92	1.21E+05	50	92	1.40E-04	50	92	3.77E-01	69		7.31E-05	69	
SVOC	bis(2-Chloroethyl) ether	111-44-4	1.43E+02	50		1.21E+00	44		1.55E+01	44	82				7.38E-04	44		1.72E+04	44		1.55E+00	50	92	5.98E-01	44		6.51E-05	44	
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	3.91E+02	50		7.30E+00	44		1.50E+07	44	82				4.18E-06	44		3.40E-01	44		6.45E-06	50	94	3.03E-01	44		3.16E-05	44	
SVOC	4-Bromophenyl-phenyl ether	101-55-3	2.49E+02	50		4.28E+00	1		1.61E+04	1	82				4.78E-03	50	92	4.60E+00	50	92	1.50E-03	50	92	2.26E-01	69		5.88E-05	69	
SVOC	Butylbenzylphthalate	85-68-7	3.12E+02	50		4.84E+00	44		5.73E+04	44	82				5.17E-05	44		2.69E+00	44		8.25E-06	50	92	1.50E-01	44		4.17E-05	44	
SVOC	Caprolactam	105-60-2	1.13E+02	39		-1.90E-01	39		6.51E-01	39	82				2.06E-07	69		7.72E+05	68		1.60E-03	39		5.98E-01	69		7.77E-05	69	
SVOC	Carbazole	86-74-8	1.67E+02	50		3.59E+00	44		3.38E+03	44	82				6.26E-07	44		7.48E+00	44		5.19E-07	50	90	3.37E-01	44		6.07E-05	44	
SVOC	4-Chloro-3-methylphenol	59-50-7	1.43E+02	50		3.10E+00	1		1.12E+03	1	82				1.63E-05	50	91	3.85E+03	50	94	8.17E-03	50	91	5.24E-01	69		8.22E-05	69	
SVOC	4-Chloroaniline	106-47-8	1.28E+02	50		1.85E+00	44		6.61E+01	44					1.36E-05	44		5.30E+03	44		1.23E-02	50	92	4.17E-01	44		8.73E-05	44	
SVOC	2-Chloronaphthalene	91-58-7	1.63E+02	50		4.12E+00	1		1.12E+04	1	82				1.28E-02	50	92	1.17E+01	50	92	7.98E-03	50	92	4.25E-01	69		7.59E-05	69	
SVOC	2-Chlorophenol	95-57-8	1.29E+02	50		2.15E+00	44		3.88E+02	44	43				1.60E-02	44		2.20E+04	44		2.34E+00	50	92	4.33E-01	44		8.17E-05	44	
SVOC	4-Chlorophenyl-phenyl ether	7005-72-3	2.05E+02	50		4.08E+00	1		1.03E+04	1	82				8.99E-03	1	55	1.42E+00	50	90	2.70E-03	1		2.45E-01	69		6.61E-05	69	
SVOC	Chrysene	218-01-9	2.28E+02	50		5.70E+00	44		4.01E+05	44	82				3.88E-03	44		1.60E-03	44		6.23E-09	50	92	2.14E-01	44		5.37E-05	44	
SVOC	Dibenz(a,h)anthracene	53-70-3	2.78E+02	50		6.69E+00	44		3.77E+06	44	82				6.03E-07	44		2.49E-03	44		1.00E-10	50	92	1.75E-01	44		4.48E-05	44	
SVOC	Dibenzofuran	132-64-9	1.68E+02	50		4.39E+00	69		2.07E+04	69	82				5.15E-04	50	92	1.00E+01	50	93	1.80E-04	50	92	2.06E-01	69		5.18E-05	69	
SVOC	3,3'-Dichlorobenzidine	91-94-1	2.53E+02	50		3.51E+00	44		7.21E+02	44	111				1.64E-07	44		3.11E+00	44		3.71E-08	50	92	1.68E-01	44		5.82E-05	44	
SVOC	2,4-Dichlorophenol	120-83-2	1.63E+02	50		3.08E+00	44		1.47E+02	44	43				1.30E-04	44		4.50E+03	44		6.70E-02	50	92	2.99E-01	44		7.58E-05	44	
SVOC	Diethylphthalate	84-66-2	2.22E+02	50		2.50E+00	44		2.87E+02	44	82				1.85E-05	44		1.08E+03	44		1.65E-03	50	92	2.21E-01	44		5.49E-05	44	
SVOC	2,4-Dimethylphenol	105-67-9	1.22E+02	50		2.36E+00	44		2.09E+02	44					8.20E-05	44		7.87E+03	44		9.80E-02	50	92	5.05E-01	44		7.51E-05	44	
SVOC	Dimethylphthalate	131-11-3	1.94E+02	50		1.87E+00	69		6.89E+01	69	82				4.29E-06	50	92	4.00E+03	50	92	1.65E-03	50	92	4.91E-01	69		5.43E-05	69	
SVOC	Di-n-butylphthalate	84-74-2	2.78E+02	50		4.61E+00	44		3.40E+04	44	82				3.85E-08	44		1.12E+01	44		7.30E-05	50	92	3.78E-01	44		6.79E-05	44	
SVOC	4,6-Dinitro-2-methylphenol	534-52-1	1.98E+02	50		2.12E+00	69		1.21E+02	69	82				1.75E-05	50	92	1.98E+02	50	92	3.24E-04	50	92	2.38E-01	69		5.97E-05	69	
SVOC	2,4-Dinitrophenol	51-28-5	1.84E+02	50		1.55E+00	44		1.00E-02	44	43				1.82E-05	44		2.79E+03	44		5.10E-03	50	92	2.36E-01	44		7.83E-05	44	
SVOC	2,4-Dinitrotoluene	121-14-2	1.82E+02	50		2.01E+00	44		9.46E+01	44	82				3.80E-06	44		2.70E+02	44		1.47E-04	50	92	1.75E+00	44		6.10E-05	44	
SVOC	2,6-Dinitrotoluene	606-20-2	1.82E+02	50		1.87E+00	44		6.89E+01	44	82				3.06E-05	44		1.82E+02	44		5.67E-04	50	92	2.83E-01	44		6.27E-05	44	
SVOC	Di-n-octylphthalate	117-84-0	3.91E+02	50		8.06E+00	44		8.38E+07	44	82				2.74E-03	44		2.00E-02	44		2.60E-06	50	92	1.30E-01	44		3.09E-05	44	
SVOC	Fluoranthene	206-44-0	2.02E+02	50		5.12E+00	44		1.08E+05	44	82				6.60E-04	44		2.06E-01	44		7.80E-06	50	94	2.61E-01	44		5.49E-05	44	
SVOC	Fluorene	86-73-7	1.66E+02	50		4.21E+00	44		1.38E+04	44	82				2.61E-03	44		1.98E+00	44		6.33E-04	50	92	3.14E-01	44		6.81E-05	44	
SVOC	Formaldehyde	50-00-0	3.00E+01	50		3.50E-01	62								1.39E-05	50	92	5.50E+05	50	92	5.24E+03	50	92	1.56E+00	40		1.73E-04	40	
SVOC	Hexachlorobenzene	118-74-1	2.85E+02	50		5.89E+00	44		5.53E+04	44	111				5.41E-02	44		6.20E+00	44		1.80E-05	50	92	4.68E-01	44		5.11E-05	44	
SVOC	Hexachlorobutadiene	87-68-3	2.61E+02	50		4.81E+00	44		5.35E+04	44	82				3.34E-01	44		3.23E+00	44		2.21E-01	50	92	4.85E-01	44		5.32E-05	44	
SVOC	Hexachlorocyclopentadiene	77-47-4	2.73E+02	50		5.39E+00	44		1.99E+05	44	82				1.11E+00	44		1.80E+00	44		5.96E-02	50	94	1.39E-01	44		6.23E-05	44	
SVOC	Hexachloroethane	67-72-1	2.37E+02	50		4.00E+00	44		1.76E+03	44	111				1.59E-01	44		5.00E+01	44		2.10E-01	50	92	2.16E-02	44		5.88E-05	44	
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	2.76E+02	50		6.65E+00	44		3.45E+06	44	82				6.56E-05	44		2.20E-05	44		1.00E-10	50	92	1.64E-01	44		4.89E-05	44	
SVOC	Isophorone	78-59-1	1.38E+02	50		1.70E+00	44		4.69E+01	44	82				2.72E-04	44		1.20E+04	44		4.38E-01	50	92	5.38E-01	44		5.84E-05	44	
SVOC	2-Methylnaphthalene	91-57-6	1.42E+02	50		3.86E+00	1		6.23E+03	1	82				2.12E-02	50	92	2.46E+01	50	92	5.50E-02	50	92	4.18E-01	52		6.70E-05	52	
SVOC	Methylphenol (total)	1319-77-3	1.08E+02	50	99	1.96E+00	1	99	8.45E+01	1	99, 82				3.54E-05	50	92, 99	2.27E+04	50	92, 99	1.38E-01	50	92, 99	6.39E-01	40	99	8.64E-05	40	99
SVOC	2-Methylphenol	95-48-7	1.08E+02	50		1.99E+00	44		9.12E+01	44					4.92E-05	44		2.60E+04	44		2.99E-01	50	92	6.39E-01	44		7.17E-05	44	
SVOC	4-Methylphenol	106-44-5	1.08E+02	50		1.92E+00	1		7.72E+01	1	82				3.24E-05	50	92	2.15E+04	50	92	1.10E-01	50	92	6.39E-01	40		8.64E-05	40	
SVOC	Naphthalene	91-20-3	1.28E+02	50		3.36E+00	44		2.01E+03	44	82				1.98E-02	44		3.10E+01	44		8.50E-02	50	92	5.10E-01	44		6.48E-05	44	
SVOC	2-Nitroaniline	88-74-4	1.38E+02	50		1.85E+00	69		6.59E+01	69	82				6.53E-06	69		2.94E+02	50	90	1.42E-04	50	90	6.31E-01	69		6.91E-05	69	
SVOC	3-Nitroaniline	99-09-2	1.38E+02	50		1.37E+00	1		2.22E+01	1	82				5.89E-06	50	92	1.21E+03	50	92	9.56E-05	50	92						
SVOC	4-Nitroaniline	100-01-6	1.38E+02	50		1.39E+00	1		2.33E+01	1	82				8.46E-08	50	92	7.28E+02	50	92	8.28E-06	50	92	5.00E-01	69		7.41E-05	69	
SVOC	Nitrobenzene	98-95-3	1.23E+02	50		1.84E+00	44		6.44E+01	44	82				9.84E-04	44		2.09E+03	44		2.45E-01	50	92	6.57E-01	44		7.43E-05	44	
SVOC	2-Nitrophenol	88-75-5	1.39E+02	50		1.79E+00	1		5.75E+01	1	82				3.87E-04	50	92	2.19E+03	50	92	1.13E-01	50	92	4.66E-01	69		6.78E-05	69	
SVOC	4-Nitrophenol	100-02-7	1.39E+02	50		1.91E+00	69		7.55E+01	69	82				1.70E-08	50	92	1.16E+04	50	92	4.10E-05	50	92	5.40E-01	69		8.30E-05	69	
SVOC	N-Nitrosodiphenylamine	86-30-6	1.98E+02	50		3.16E+00	44		1.29E+03	44					2.05E-04	44		3.51E+01	44		6.69E-04	50	92	2.70E-01	44		5.49E-05	44	
SVOC	N-Nitroso-di-n-propylamine	621-64-7	1.30E+02	50		1.40E+00	44		2.40E+01	44					9.23E-05	44		9.89E+03	44		1.30E-01	50	92	4.71E-01	44		7.06E-05	44	
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	1.71E+02	50		2.45E+00	69		2.56E+02	69	82				4.78E-03	50	92	1.70E+03	50	92	8.80E-01	50	92	5.20E-01	69		5.54E-05	69	
SVOC	Pentachlorophenol	87-86-5	2.66E+02	50		5.09E+00	44		5.92E+02	44	43				1.00E-06	44		1.95E+03	44		3.17E-05	50	92	4.84E-01	44		5.27E-05	44	
SVOC	Phenanthrene	85-01-8	1.78E+02	50		4.46E+00	69		2.42E+04	69	82				9.52E-04	50	92	1.15E+00	50	92	1.12E-04	50	92	3.24E-01	69		6.45E-05	69	
SVOC	Phenol	108-95-2	9.41E+01	50		1.48E+00	44		2.88E+01	44					1.63E-05	44		8.28E+04	44		2.76E-01	50	92	7.08E-01	44		7.86E-05	44	
SVOC	Pyrene	129-00-0	2.02E+02	50		5.11E+00	44		1.06E+05	44	82				4.51E-04	44		1.35E-01	44		4.59E-06	50	92	2.35E-01	44		6.26E-05	44	
SVOC	2,4,5-Trichlorophenol	95-95-4	1.97E+02	50		3.90E+00	44		1.60E+03	44	43				1.78E-04	44		1.20E+03	44		2.00E-02	50	92	2.51E-01	44		6.07E-05	44	
SVOC	2,4,6-Trichlorophenol	88-06-2	1.97E+02	50		3.70E+00	44		3.81E+02	44	43				3.19E-04	44		8.00E+02	44		2.40E-02	50	92	2.75E-01	44		5.40E-05	44	
PCB	PCBs (total)	1336-36-3	3.28E+02	64	116	6.50E+00	64	116	2.45E+06	64	116, 82				8.17E-02	64	116	1.20E-02	64	116	7.71E-05	64	116	1.75E-01	69	116	4.32E-05	69	116
INORG	Antimony	7440-36-0	1.22E+02	50			1	48				4.50E+01	44	43					1	61					40	48		40	48
INORG	Arsenic	7440-38-2	7.49E+01	50			1	48				2.90E+01	44	43					1	61					40	48		40	48
INORG	Barium	7440-39-3	1.37E+02	50			1	48				4.10E+01	44	43					1	60					40	48		40	48
INORG	Beryllium	7440-41-7	9.01E+00	50			1	48				7.90E+02	44	43					1	61					40	48		40	48
INORG	Cadmium	7440-43-9	1.12E+02	50			1	48				7.50E+01	44	43					1	61		40	48		40	48		40	48
INORG	Chromium (total)	7440-47-3	5.20E+01	50			1	48				1.90E+01	44	43, 45					1	61					40	48		40	48
INORG	Chromium III	16065-83-1	5.20E+01	50								1.80E+06	44	43															
INORG	Chromium VI	18540-29-9	5.20E+01	50								1.90E+01	44	43								40	48		40	48		40	48

Attachment G0: Physical and Chemical Information
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	MW (g/mole)			Log Kow (unitless)			Koc (L/kg)			Kd (L/kg)			H (unitless)			s (mg/L)			VP (mm Hg)			Dair (m^2/d)			Dwater (m^2/d)		
			Value	Ref	Notes	Value	Ref	Notes	Value	Ref	Notes				Value	Ref	Notes	Value	Ref	Notes	Value	Ref	Notes						
INORG	Cobalt	7440-48-4	5.89E+01	50			1	48				4.50E+01	35						1	61									
INORG	Copper	7440-50-8	6.35E+01	50			1	48				3.50E+01	35						1	61					40	48		40	48
INORG	Cyanide (total)	57-12-5	2.60E+01	1			1	48				9.90E+00	44	43															
INORG	Fluoride	16984-48-8																											
INORG	Lead	7439-92-1	2.07E+02	50			1	48				9.00E+02	35						1	61					40	48		40	48
INORG	Manganese	7439-96-5	5.49E+01	50								6.50E+01	35																
INORG	Mercury	7439-97-6	2.01E+02	67			1	48				1.00E+03	67		2.90E-01	67		5.60E-02	1		1.96E-03	50	92	2.65E-01	44		5.44E-05	44	
INORG	Nickel	7440-02-0	5.87E+01	50			1	48				6.50E+01	44	43					1	61					40	48		40	48
INORG	Selenium	7782-49-2	7.90E+01	50			1	48				5.00E+00	44	43					40	48		40	48		40	48		40	48
INORG	Silver	7440-22-4	1.08E+02	50			1	48				8.30E+00	44	43					1	61					40	48		40	48
INORG	Thallium	7440-28-0	2.04E+02	50			1	48				7.10E+01	44	43					1	61					40	48		40	48
INORG	Vanadium	7440-62-2	5.09E+01	50			1	48				1.00E+03	44	43					1	61		40	48		40	48		40	48
INORG	Zinc	7440-66-6	6.54E+01	50			1	48				6.20E+01	44	43					1	61					40	48		40	48

Attachment G0: Physical and Chemical Information Notes and References GMC: NAO Flint Operations Site, Flint, Michigan	
Notes:	
43	pH associated with value is 6.8.
45	ENVIRON used the value for Chromium VI [CASRN 18540-29-9] presented in indicated reference as a surrogate.
48	Not Available or Not Applicable
55	Reference temperature is unspecified.
60	Hydrolyzes
61	Insoluble
81	ENVIRON used the value for trans-1,2-Dichloroethene [CASRN 156-60-5] as a surrogate.
82	ENVIRON used Equation (70) from Reference 44 to calculate Koc value using Log Kow value from indicated reference.
90	Indicated source cites CHEMCALC.
91	Indicated source cites CHEMEST.
92	Indicated source cites CHEMFATE.
93	Indicated source cites FATE.
94	Indicated source cites LIVECHEM.
99	ENVIRON used the value for 3-Methylphenol [CASRN 108-39-4] value as a surrogate.
110	ENVIRON used the value for 4-Chlorobiphenyl [CASRN 2051-62-9] from the indicated reference as a surrogate.
111	ENVIRON used Equation (71) from Reference 44 to calculate Koc value using Log Kow value from indicated reference.
113	Personal communication with RCRA, Superfund & EPCRA Hotline on 9/15/2000; indicated reference presents the value which is off by an order of magnitude (1.23E-06 cm2/s). The database has the correct value of 1.23E-05 cm2/s.
114	A value of 1 is conservatively used because EPA guidance does not provide a default value.
115	ENVIRON calculated Kp value using equation 3.8 (p.3-8) in reference 62 with log Kow from the indicated reference and the MW presented in table.
116	ENVIRON used the value for Aroclor-1254 [CASRN 11097-69-1] from the indicated reference as a surrogate.
117	ENVIRON derived the FA based on Exhibit A-4 in the indicated reference.
References:	
1	USEPA. 1992. Handbook of RCRA Ground-Water Monitoring Constituents. Chemical and Physical Properties (40 CFR Part 264, Appendix IX). EPA-530-R-92-022. September.
35	Baes III, C.F., R.D. Sharp, A.L. Sjoreen, and R.W. Shor. 1984. A Review and Analysis of Parameters for Assessing Transport of Released Radionuclides through Agriculture (AD-89-T-2-A-106) (formerly EPA078-D-X0304), Oak Ridge National Laboratory, ORNL-5786.
38	USEPA. Region IV. 1994. Comments to TGPL on Draft HSL Screening Methodology document. December 27.
39	CHEMFATE data base. Syracuse Research Corporation.
40	Research Triangle Institute, Center for Environmental Analysis. 1995. Supplemental Technical Support Document for Hazardous Waste Identification Rule: Risk Assessment for Human and Ecological Receptors--Volume 1, TABLE A-1. November 1995.
44	USEPA. 1996. Soil Screening Guidance: Technical Background Document and User Guide. Office of Emergency and Remedial Response. EPA/540/R-95/128. May.
47	USEPA. 1990. Guidance on Remedial Actions for Superfund Sites with PCB Contamination. EPA/540/G-90/007. August.
48	US Department of Health and Human Services. 1995. DRAFT Toxicological Profile for Polychlorinated Biphenyls. Agency for Toxic Substances and Disease Registry. August.
50	USEPA. 1997. Superfund Chemical Data Matrix (SCDM). Office of Emergency and Remedial Response. September 12.
52	USEPA. 1997. CHEM9 Compound Properties Estimation and Data. Version 1.00. Office of Air Quality Planning and Standards. July.
55	W.G. Mallard and P.J. Linstrom, Eds., NIST Chemistry WebBook, NIST Standard Reference Database Number 69, March, 2003, National Institute of Standards and Technology, Gaithersburg MD, 20899
62	USEPA. 2004. Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. July.
64	Agency for Toxic Substances and Disease Registry (ATSDR). November 2000. Toxicological Profile for Polychlorindated Biphenyls (PCBs).
67	USEPA. 1997. Mercury Study Report to Congress. EPA's Office of Air Quality Planning and Standards and Office of Research and Development. December
68	PHYSPROP data base. Syracuse Research Corporation.
69	USEPA. 2004. WATER9. Version 2.0.0. Office of Air Quality Planning and Standards. July.

Attachment G0: High End Exposure Factors for all Receptors
GMC: NAO Flint Operations Site, Flint, Michigan

				Routine Worker		Maintenance Worker		Redevelopment Construction Worker		Resident Age 1-6	Resident Age 7-31	
Soil Ingestion												
Ingestion Rate	mg-soil/day	**IR**		50	b	200		200		200	100	b
Conversion Factor	kg/mg	**CF**		1E-06		1E-06		1E-06		1E-06	1E-06	
Fraction Contaminated	unitless	**FC**		1.0		1.0		1.0		1.0	1.0	
Exposure Frequency	days/year	**EF**		250	b	5	e	250	e	350	350	b
Exposure Duration	years	**ED**		25	b	10	e	1	e	6	24	b
Body Weight	kg	**BW**		70	a	70	a	70	a	15	70	a
Averaging Time, cancer	days	**AT_c**		25,550	a	25,550	a	25,550	a	25,550	25,550	a
Averaging Time, noncancer	days	**AT_{nc}**		9,125	a	3,650	a	365	a	10,950	10,950	a
Soil Dermal Contact												
Adherence Factor	mg-soil/cm^2	**AF**		0.2	d	0.2	d	0.2	d	0.2	0.07	d
Skin Surface Area	cm^2/day	**SA**		3,300	d	3,300	d	3,300	d	2,800	5,700	d
Conversion Factor	kg/mg	**CF**		1E-06		1E-06		1E-06		1E-06	1E-06	
Fraction Contaminated	unitless	**FC**		1.0		1.0		1.0		1.0	1.0	
Exposure Frequency	days/year	**EF**		250	b	5	e	250	e	350	350	b
Exposure Duration	years	**ED**		25	b	10	e	1	e	6	24	b
Body Weight	kg	**BW**		70	a	70	a	70	a	15	70	b
Averaging Time, cancer	days	**AT_c**		25,550	a	25,550	a	25,550	a	25,550	25,550	a
Averaging Time, noncancer	days	**AT_{nc}**		9,125	a	3,650	a	365	a	10,950	10,950	a
Ambient/Indoor Air Inhalation												
Fraction Contacted	unitless	**FC**		1		1		1		1	1	
Exposure Frequency	days/year	**EF**		250	b	5	e	5		350	350	b
Exposure Duration	years	**ED**		25	b	10	e	1		6	24	b
Averaging Time, cancer	days	**AT_c**		25550	a	25,550	a	25,550	a	25,550	25,550	a
Averaging Time, noncancer	days	**AT_{nc}**		9125	a	3,650	a	365	a	10,950	10,950	a

Attachment G0: High End Exposure Factors for all Receptors
GMC: NAO Flint Operations Site, Flint, Michigan

				Routine Worker		Maintenance Worker		Redevelopment Construction Worker		Resident Age 1-6	Resident Age 7-31	
Ground Water Incidental Ingestion												
Drinking Rate	L-water/hr	**DR**		NA		0.005	e	0.005	e	NA	NA	
Exposure Time	hours	**ET**		NA		2	e	2	e	NA	NA	
Exposure Frequency	days/year	**EF**		NA		5	e	5		NA	NA	
Exposure Duration	years	**ED**		NA		10	e	1		NA	NA	
Body Weight	kg	**BW**		NA		70	a	70	a	NA	NA	
Averaging Time, cancer	days	**AT_c**		NA		25,550	a	25,550	a	NA	NA	
Averaging Time, noncancer	days	**AT_{nc}**		NA		3,650	a	365	a	NA	NA	
Dermal Contact with Ground Water												
Event Time	hr	**t**		NA		2	e	2	e	NA	NA	
Skin Surface Area	cm^2	**SA**		NA		3,300	d	3,300	d	NA	NA	
Events per Day	1/d	**EV**		NA		1		1		NA	NA	
Exposure Frequency	days/year	**EF**		NA		5	e	5		NA	NA	
Exposure Duration	years	**ED**		NA		10	e	1		NA	NA	
Body Weight	kg	**BW**		NA		70	a	70	a	NA	NA	
Averaging Time, cancer	days	**AT_c**		NA		25550	a	25550	a	NA	NA	
Averaging Time, noncancer	days	**AT_{nc}**		NA		3650	a	365	a	NA	NA	
LNAPL Dermal Contact												
Event Time	hr	**t**		NA		2		2		NA	NA	
Skin Surface Area	cm^2	**SA**		NA		3,300	d	3,300	d	NA	NA	
Events per Day	1/day	**EV**		NA		1		1		NA	NA	
Exposure Frequency	days/year	**EF**		NA		5	e	5	e	NA	NA	
Exposure Duration	years	**ED**		NA		10	e	1	e	NA	NA	
Body Weight	kg	**BW**		NA		70	a	70	a	NA	NA	
Averaging Time, cancer	days	**AT_c**		NA		25,550	a	25,550	a	NA	NA	
Averaging Time, noncancer	days	**AT_{nc}**		NA		3,650	a	3,650	a	NA	NA	

Attachment G0: High End Exposure Factors for all Receptors
GMC: NAO Flint Operations Site, Flint, Michigan

				Routine Worker		Maintenance Worker		Redevelopment Construction Worker		Resident Age 1-6	Resident Age 7-31	
Smear Zone Soil Ingestion												
Ingestion Rate	mg-soil/day	**IR**		NA		200		200		NA	NA	
Conversion Factor	kg/mg	**CF**		NA		1E-06		1E-06		NA	NA	
Fraction Contaminated	unitless	**FC**		NA		1.0		1.0		NA	NA	
Exposure Frequency	days/year	**EF**		NA		5	e	5	e	NA	NA	
Exposure Duration	years	**ED**		NA		10	e	1	e	NA	NA	
Body Weight	kg	**BW**		NA		70	a	70	a	NA	NA	
Averaging Time, cancer	days	**AT_c**		NA		25,550	a	25,550	a	NA	NA	
Averaging Time, noncancer	days	**AT_{nc}**		NA		3,650	a	365	a	NA	NA	
Smear Zone Soil Dermal Contact												
Adherence Factor	mg-soil/cm^2	**AF**		NA		0.2	d	0.2	d	NA	NA	
Skin Surface Area	cm^2/day	**SA**		NA		3,300	d	3,300	d	NA	NA	
Conversion Factor	kg/mg	**CF**		NA		1E-06		1E-06		NA	NA	
Fraction Contaminated	unitless	**FC**		NA		1.0		1.0		NA	NA	
Exposure Frequency	days/year	**EF**		NA		5	e	5	e	NA	NA	
Exposure Duration	years	**ED**		NA		10	e	1	e	NA	NA	
Body Weight	kg	**BW**		NA		70	a	70	a	NA	NA	
Averaging Time, cancer	days	**AT_c**		NA		25,550	a	25,550	a	NA	NA	
Averaging Time, noncancer	days	**AT_{nc}**		NA		3,650	a	365	a	NA	NA	
References:												

a. Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part A) Interim Final (EPA 1989)

b. Human Health Evaluation Manual, Supplemental Guidance: "Standard default exposure factors." OSWER Directive 9285.6-03 (EPA 1991)

d. Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual: Part E, Supplemental Guidance for Dermal Risk Assessment, Interim Final (EPA 2001)

e. Based on professional judgement and site-specific considerations as follows:

- Maintenance workers: The exposure time and frequency is based on anticipated excavation time for minor underground repairs by a worker, assumed to take 5 days per year. The exposure duration for a worker at a given site is assumed to be 10 years.

- Redevelopment workers: The exposure time and frequency is based on assumed excavation time for site redevelopment by a worker. The exposure duration for a redevelopment worker at a given site is assumed to be 1 year. The worker is assumed to spend no more than 5 days in excavations.

Attachment G1
Exposure of Routine Workers to Outdoor Soil

Attachment G1: Vapor Flux from Soil to Ambient Air
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	K_{oc} (L/kg)	K_d (L/kg)	H (unitless)	D_{air} (m^2/d)	D_{water} (m^2/d)	R_L (unitless)	D_G (m^2/d)	D_L (m^2/d)	D_E (m^2/d)	J_G (kg/m^2-s)
VOC	Acetone	67-64-1	5.81E-01		7.95E-04	1.07E+00	9.85E-05	7.81E-02	1.47E-01	1.21E-07	1.50E-03	8.57E-06
VOC	Benzene	71-43-2	5.82E+01		1.14E-01	7.60E-01	8.47E-05	3.00E-01	1.04E-01	1.04E-07	3.96E-02	4.41E-05
VOC	Bromodichloromethane	75-27-4	5.51E+01		3.28E-02	2.57E-01	9.16E-05	2.65E-01	3.54E-02	1.13E-07	4.38E-03	1.47E-05
VOC	2-Butanone	78-93-3	2.00E+00		1.14E-03	6.98E-01	8.47E-05	8.28E-02	9.59E-02	1.04E-07	1.32E-03	8.06E-06
VOC	Carbon Disulfide	75-15-0	4.59E+01		6.20E-01	8.99E-01	8.64E-05	4.19E-01	1.23E-01	1.06E-07	1.83E-01	9.47E-05
VOC	Carbon Tetrachloride	56-23-5	1.74E+02		6.25E-01	6.74E-01	7.60E-05	8.35E-01	9.26E-02	9.36E-08	6.93E-02	5.83E-05
VOC	Chlorobenzene	108-90-7	2.20E+02		7.60E-02	6.31E-01	7.52E-05	8.14E-01	8.66E-02	9.25E-08	8.09E-03	1.99E-05
VOC	Chloroethane	75-00-3	1.62E+01		1.80E-01	2.34E+00	9.94E-05	1.85E-01	3.22E-01	1.22E-07	3.13E-01	1.24E-04
VOC	Chloroform	67-66-3	3.97E+01		7.50E-02	8.99E-01	8.64E-05	2.28E-01	1.23E-01	1.06E-07	4.06E-02	4.46E-05
VOC	Chloromethane	74-87-3	3.97E+01		1.80E-01	1.09E+00	5.62E-05	2.61E-01	1.50E-01	6.91E-08	1.03E-01	7.12E-05
VOC	Cumene	98-82-8	7.05E+02		2.66E-01	5.62E-01	6.13E-05	2.44E+00	7.71E-02	7.55E-08	8.39E-03	2.03E-05
VOC	Cyclohexane	110-82-7	6.35E+02		3.98E+00	7.25E-01	7.86E-05	3.38E+00	9.96E-02	9.68E-08	1.17E-01	7.59E-05
VOC	Dibromochloromethane	124-48-1	6.26E+01		1.61E-02	1.69E-01	9.07E-05	2.84E-01	2.33E-02	1.12E-07	1.32E-03	8.03E-06
VOC	1,2-Dichlorobenzene	95-50-1	6.23E+02		3.90E-02	5.96E-01	6.83E-05	2.11E+00	8.19E-02	8.40E-08	1.51E-03	8.62E-06
VOC	1,3-Dichlorobenzene	541-73-1	5.69E+02		6.33E-02	5.98E-01	6.79E-05	1.94E+00	8.21E-02	8.36E-08	2.68E-03	1.15E-05
VOC	1,4-Dichlorobenzene	106-46-7	6.12E+02		4.98E-02	5.96E-01	6.83E-05	2.07E+00	8.19E-02	8.40E-08	1.97E-03	9.82E-06
VOC	Dichlorodifluoromethane	75-71-8	6.15E+01		7.01E+00	6.91E-01	6.91E-05	2.47E+00	9.49E-02	8.51E-08	2.70E-01	1.15E-04
VOC	1,1-Dichloroethane	75-34-3	3.13E+01		1.15E-01	6.41E-01	9.07E-05	2.13E-01	8.81E-02	1.12E-07	4.74E-02	4.82E-05
VOC	1,2-Dichloroethane	107-06-2	1.75E+01		2.01E-02	8.99E-01	8.55E-05	1.39E-01	1.23E-01	1.05E-07	1.78E-02	2.96E-05
VOC	1,1-Dichloroethene	75-35-4	5.82E+01		5.35E-01	7.78E-01	8.99E-05	4.32E-01	1.07E-01	1.11E-07	1.32E-01	8.06E-05
VOC	cis-1,2-Dichloroethene	156-59-2	3.56E+01		8.35E-02	6.36E-01	9.76E-05	2.17E-01	8.73E-02	1.20E-07	3.35E-02	4.06E-05
VOC	trans-1,2-Dichloroethene	156-60-5	5.22E+01		1.93E-01	6.11E-01	1.03E-04	3.05E-01	8.39E-02	1.27E-07	5.29E-02	5.09E-05
VOC	1,2-Dichloropropane	78-87-5	4.35E+01		5.75E-02	6.76E-01	7.54E-05	2.35E-01	9.28E-02	9.28E-08	2.27E-02	3.34E-05
VOC	Ethyl Benzene	100-41-4	3.67E+02		1.62E-01	6.48E-01	6.74E-05	1.32E+00	8.90E-02	8.29E-08	1.09E-02	2.31E-05
VOC	2-Hexanone	591-78-6	1.48E+01		3.58E-02							
VOC	Methyl Acetate	79-20-9	1.66E+00		1.85E-03	8.27E-01	9.50E-05	8.20E-02	1.14E-01	1.17E-07	2.57E-03	1.12E-05
VOC	Methyl tert-butyl ether	1634-04-4	1.15E+01		1.20E-02	7.42E-01	8.73E-05	1.17E-01	1.02E-01	1.07E-07	1.05E-02	2.26E-05
VOC	4-Methyl-2-pentanone	108-10-1	1.05E+01		2.82E-03	6.48E-01	6.74E-05	1.11E-01	8.90E-02	8.29E-08	2.26E-03	1.05E-05
VOC	Methylcyclohexane	108-87-2	2.66E+02		8.78E+00	6.35E-01	7.36E-05	3.68E+00	8.72E-02	9.06E-08	2.08E-01	1.01E-04

Attachment G1: Vapor Flux from Soil to Ambient Air
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	K_{oc} (L/kg)	K_d (L/kg)	H (unitless)	D_{air} (m^2/d)	D_{water} (m^2/d)	R_L (unitless)	D_G (m^2/d)	D_L (m^2/d)	D_E (m^2/d)	J_G (kg/m^2-s)
VOC	Methylene Chloride	75-09-2	1.17E+01		4.49E-02	8.73E-01	1.01E-04	1.28E-01	1.20E-01	1.24E-07	4.21E-02	4.54E-05
VOC	Styrene	100-42-5	7.77E+02		5.65E-02	6.13E-01	6.91E-05	2.61E+00	8.43E-02	8.51E-08	1.82E-03	9.46E-06
VOC	Tetrachloroethene	127-18-4	1.56E+02		3.77E-01	6.22E-01	7.08E-05	6.99E-01	8.54E-02	8.72E-08	4.61E-02	4.75E-05
VOC	Toluene	108-88-3	1.80E+02		1.36E-01	7.52E-01	7.43E-05	7.03E-01	1.03E-01	9.15E-08	2.00E-02	3.13E-05
VOC	1,2,4-Trichlorobenzene	120-82-1	1.79E+03		2.91E-02	2.59E-01	7.11E-05	5.90E+00	3.56E-02	8.75E-08	1.76E-04	2.94E-06
VOC	1,1,1-Trichloroethane	71-55-6	1.10E+02		3.53E-01	6.74E-01	7.60E-05	5.43E-01	9.26E-02	9.36E-08	6.00E-02	5.43E-05
VOC	1,1,2-Trichloroethane	79-00-5	5.03E+01		1.87E-02	6.74E-01	7.60E-05	2.45E-01	9.26E-02	9.36E-08	7.07E-03	1.86E-05
VOC	Trichloroethene	79-01-6	1.68E+02		2.11E-01	6.83E-01	7.86E-05	6.85E-01	9.37E-02	9.68E-08	2.89E-02	3.76E-05
VOC	Trichlorofluoromethane	75-69-4	1.21E+02		1.98E+00	7.52E-01	8.38E-05	1.09E+00	1.03E-01	1.03E-07	1.88E-01	9.61E-05
VOC	1,1,2-Trichloro-1,2,2-trifluoroe	76-13-1	3.81E+02		9.83E+00	6.74E-01	7.08E-05	4.38E+00	9.26E-02	8.72E-08	2.08E-01	1.01E-04
VOC	1,2,4-Trimethylbenzene	95-63-6	8.97E+02		1.26E-01	5.24E-01	6.84E-05	3.02E+00	7.19E-02	8.42E-08	2.99E-03	1.21E-05
VOC	1,3,5-Trimethylbenzene	108-67-8	1.76E+03		1.20E-01	5.20E-01	7.49E-05	5.82E+00	7.14E-02	9.22E-08	1.48E-03	8.51E-06
VOC	Vinyl Chloride	75-01-4	1.85E+01		5.55E-01	9.16E-01	1.06E-04	3.09E-01	1.26E-01	1.31E-07	2.26E-01	1.05E-04
VOC	Xylenes (total)	1330-20-7	3.86E+02		1.38E-01	6.74E-01	7.56E-05	1.37E+00	9.25E-02	9.30E-08	9.33E-03	2.14E-05
SVOC	Acenaphthene	83-32-9	7.14E+03		3.18E-03	3.64E-01	6.64E-05	2.32E+01	5.00E-02	8.18E-08	6.85E-06	5.80E-07
SVOC	Acenaphthylene	208-96-8	7.47E+03		2.31E-03	3.88E-01	6.03E-05	2.43E+01	5.33E-02	7.42E-08	5.07E-06	4.99E-07
SVOC	Acetophenone	98-86-2	3.58E+01		2.19E-04	6.91E-01	6.91E-05	1.92E-01	9.49E-02	8.51E-08	1.09E-04	2.31E-06
SVOC	Anthracene	120-12-7	2.97E+04		1.34E-03	2.80E-01	6.69E-05	9.63E+01	3.84E-02	8.23E-08	5.34E-07	1.62E-07
SVOC	Atrazine	1912-24-9	3.68E+02		1.25E-07	2.24E-01	5.76E-05	1.27E+00	3.07E-02	7.09E-08	5.89E-08	5.38E-08
SVOC	Benzaldehyde	100-52-7	2.85E+01		4.86E-04	6.23E-01	7.84E-05	1.69E-01	8.56E-02	9.65E-08	2.47E-04	3.48E-06
SVOC	Benzo(a)anthracene	56-55-3	4.01E+05		6.85E-05	4.41E-01	7.78E-05	1.30E+03	6.05E-02	9.57E-08	3.26E-09	1.27E-08
SVOC	Benzo(a)pyrene	50-32-8	1.01E+06		2.32E-05	3.72E-01	7.78E-05	3.29E+03	5.10E-02	9.57E-08	3.88E-10	4.36E-09
SVOC	Benzo(b)fluoranthene	205-99-2	1.24E+06		2.28E-03	1.95E-01	4.80E-05	4.03E+03	2.68E-02	5.91E-08	1.51E-08	2.73E-08
SVOC	Benzo(g,h,i)perylene	191-24-2	1.28E+07		2.88E-06	1.88E-01	4.54E-05	4.15E+04	2.58E-02	5.59E-08	3.14E-12	3.92E-10
SVOC	Benzo(k)fluoranthene	207-08-9	1.24E+06		1.70E-05	1.95E-01	4.80E-05	4.03E+03	2.68E-02	5.91E-08	1.28E-10	2.50E-09
SVOC	Biphenyl	92-52-4	1.05E+04		6.13E-03	3.49E-01	7.04E-05	3.41E+01	4.79E-02	8.67E-08	8.63E-06	6.51E-07
SVOC	bis(2-Chloroethoxy)methane	111-91-1	1.73E+01		3.47E-06	3.77E-01	7.31E-05	1.32E-01	5.17E-02	9.00E-08	2.04E-06	3.16E-07
SVOC	bis(2-Chloroethyl) ether	111-44-4	1.55E+01		3.69E-04	5.98E-01	6.51E-05	1.26E-01	8.21E-02	8.01E-08	2.41E-04	3.44E-06
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	1.50E+07		2.09E-06	3.03E-01	3.16E-05	4.86E+04	4.17E-02	3.89E-08	2.59E-12	3.57E-10

Attachment G1: Vapor Flux from Soil to Ambient Air
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	K_{oc} (L/kg)	K_d (L/kg)	H (unitless)	D_{air} (m^2/d)	D_{water} (m^2/d)	R_L (unitless)	D_G (m^2/d)	D_L (m^2/d)	D_E (m^2/d)	J_G (kg/m^2-s)
SVOC	Butylbenzylphthalate	85-68-7	5.73E+04		2.59E-05	1.50E-01	4.17E-05	1.86E+02	2.06E-02	5.14E-08	3.15E-09	1.24E-08
SVOC	Caprolactam	105-60-2	6.51E-01		1.03E-07	5.98E-01	7.77E-05	7.81E-02	8.21E-02	9.56E-08	1.33E-06	2.56E-07
SVOC	Carbazole	86-74-8	3.38E+03		3.13E-07	3.37E-01	6.07E-05	1.10E+01	4.63E-02	7.48E-08	8.09E-09	1.99E-08
SVOC	4-Chloro-3-methylphenol	59-50-7	1.12E+03		8.15E-06	5.24E-01	8.22E-05	3.69E+00	7.19E-02	1.01E-07	1.86E-07	9.56E-08
SVOC	2-Chloronaphthalene	91-58-7	1.12E+04		6.42E-03	4.25E-01	7.59E-05	3.65E+01	5.84E-02	9.35E-08	1.03E-05	7.10E-07
SVOC	2-Chlorophenol	95-57-8	3.88E+02		8.00E-03	4.33E-01	8.17E-05	1.34E+00	5.95E-02	1.01E-07	3.56E-04	4.18E-06
SVOC	Chrysene	218-01-9	4.01E+05		1.94E-03	2.14E-01	5.37E-05	1.30E+03	2.94E-02	6.60E-08	4.40E-08	4.64E-08
SVOC	Dibenz(a,h)anthracene	53-70-3	3.77E+06		3.02E-07	1.75E-01	4.48E-05	1.22E+04	2.40E-02	5.51E-08	5.10E-12	5.00E-10
SVOC	Dibenzofuran	132-64-9	2.07E+04		2.57E-04	2.06E-01	5.18E-05	6.71E+01	2.82E-02	6.38E-08	1.09E-07	7.32E-08
SVOC	2,4-Dichlorophenol	120-83-2	1.47E+02		6.50E-05	2.99E-01	7.58E-05	5.52E-01	4.11E-02	9.33E-08	5.00E-06	4.95E-07
SVOC	Diethylphthalate	84-66-2	2.87E+02		9.25E-06	2.21E-01	5.49E-05	1.01E+00	3.04E-02	6.75E-08	3.47E-07	1.30E-07
SVOC	2,4-Dimethylphenol	105-67-9	2.09E+02		4.10E-05	5.05E-01	7.51E-05	7.53E-01	6.93E-02	9.24E-08	3.90E-06	4.37E-07
SVOC	Dimethylphthalate	131-11-3	6.89E+01		2.15E-06	4.91E-01	5.43E-05	2.99E-01	6.74E-02	6.69E-08	7.07E-07	1.86E-07
SVOC	Di-n-butylphthalate	84-74-2	3.40E+04		1.93E-08	3.78E-01	6.79E-05	1.10E+02	5.20E-02	8.36E-08	7.67E-10	6.13E-09
SVOC	4,6-Dinitro-2-methylphenol	534-52-1	1.21E+02		8.73E-06	2.38E-01	5.97E-05	4.69E-01	3.28E-02	7.35E-08	7.65E-07	1.94E-07
SVOC	2,4-Dinitrotoluene	121-14-2	9.46E+01		1.90E-06	1.75E+00	6.10E-05	3.83E-01	2.41E-01	7.51E-08	1.39E-06	2.61E-07
SVOC	2,6-Dinitrotoluene	606-20-2	6.89E+01		1.53E-05	2.83E-01	6.27E-05	2.99E-01	3.88E-02	7.72E-08	2.24E-06	3.32E-07
SVOC	Di-n-octylphthalate	117-84-0	8.38E+07		1.37E-03	1.30E-01	3.09E-05	2.72E+05	1.79E-02	3.81E-08	9.06E-11	2.11E-09
SVOC	Fluoranthene	206-44-0	1.08E+05		3.30E-04	2.61E-01	5.49E-05	3.50E+02	3.58E-02	6.75E-08	3.40E-08	4.08E-08
SVOC	Fluorene	86-73-7	1.38E+04		1.31E-03	3.14E-01	6.81E-05	4.47E+01	4.31E-02	8.38E-08	1.26E-06	2.49E-07
SVOC	Formaldehyde	50-00-0			6.95E-06	1.56E+00	1.73E-04					
SVOC	Hexachlorobutadiene	87-68-3	5.35E+04		1.67E-01	4.85E-01	5.32E-05	1.74E+02	6.66E-02	6.55E-08	6.41E-05	1.77E-06
SVOC	Hexachlorocyclopentadiene	77-47-4	1.99E+05		5.55E-01	1.39E-01	6.23E-05	6.45E+02	1.91E-02	7.67E-08	1.64E-05	8.98E-07
SVOC	Hexachloroethane	67-72-1	1.76E+03		7.95E-02	2.16E-02	5.88E-05	5.81E+00	2.97E-03	7.23E-08	4.06E-05	1.41E-06
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	3.45E+06		3.28E-05	1.64E-01	4.89E-05	1.12E+04	2.25E-02	6.02E-08	7.16E-11	1.87E-09
SVOC	Isophorone	78-59-1	4.69E+01		1.36E-04	5.38E-01	5.84E-05	2.28E-01	7.39E-02	7.19E-08	4.44E-05	1.48E-06
SVOC	2-Methylnaphthalene	91-57-6	6.23E+03		1.06E-02	4.18E-01	6.70E-05	2.03E+01	5.74E-02	8.24E-08	3.00E-05	1.21E-06
SVOC	Methylphenol (total)	1319-77-3	8.45E+01		1.77E-05	6.39E-01	8.64E-05	3.50E-01	8.78E-02	1.06E-07	4.74E-06	4.82E-07
SVOC	Naphthalene	91-20-3	2.01E+03		9.90E-03	5.10E-01	6.48E-05	6.59E+00	7.00E-02	7.98E-08	1.05E-04	2.27E-06

Attachment G1: Vapor Flux from Soil to Ambient Air
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	K_{oc} (L/kg)	K_d (L/kg)	H (unitless)	D_{air} (m^2/d)	D_{water} (m^2/d)	R_L (unitless)	D_G (m^2/d)	D_L (m^2/d)	D_E (m^2/d)	J_G (kg/m^2-s)
SVOC	2-Nitroaniline	88-74-4	6.59E+01		3.27E-06	6.31E-01	6.91E-05	2.89E-01	8.66E-02	8.51E-08	1.27E-06	2.50E-07
SVOC	Nitrobenzene	98-95-3	6.44E+01		4.92E-04	6.57E-01	7.43E-05	2.85E-01	9.02E-02	9.15E-08	1.56E-04	2.77E-06
SVOC	2-Nitrophenol	88-75-5	5.75E+01		1.94E-04	4.66E-01	6.78E-05	2.62E-01	6.40E-02	8.35E-08	4.75E-05	1.53E-06
SVOC	4-Nitrophenol	100-02-7	7.55E+01		8.48E-09	5.40E-01	8.30E-05	3.21E-01	7.42E-02	1.02E-07	3.21E-07	1.25E-07
SVOC	N-Nitrosodiphenylamine	86-30-6	1.29E+03		1.03E-04	2.70E-01	5.49E-05	4.26E+00	3.70E-02	6.75E-08	9.08E-07	2.11E-07
SVOC	N-Nitroso-di-n-propylamine	621-64-7	2.40E+01		4.62E-05	4.71E-01	7.06E-05	1.54E-01	6.47E-02	8.69E-08	2.00E-05	9.90E-07
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	2.56E+02		2.39E-03	5.20E-01	5.54E-05	9.07E-01	7.14E-02	6.82E-08	1.88E-04	3.04E-06
SVOC	Pentachlorophenol	87-86-5	5.92E+02		5.00E-07	4.84E-01	5.27E-05	1.99E+00	6.65E-02	6.49E-08	4.92E-08	4.91E-08
SVOC	Phenanthrene	85-01-8	2.42E+04		4.76E-04	3.24E-01	6.45E-05	7.86E+01	4.45E-02	7.94E-08	2.71E-07	1.15E-07
SVOC	Phenol	108-95-2	2.88E+01		8.15E-06	7.08E-01	7.86E-05	1.69E-01	9.73E-02	9.68E-08	5.26E-06	5.08E-07
SVOC	Pyrene	129-00-0	1.06E+05		2.26E-04	2.35E-01	6.26E-05	3.42E+02	3.23E-02	7.70E-08	2.15E-08	3.25E-08
SVOC	2,4,5-Trichlorophenol	95-95-4	1.60E+03		8.90E-05	2.51E-01	6.07E-05	5.25E+00	3.45E-02	7.48E-08	6.00E-07	1.72E-07
SVOC	2,4,6-Trichlorophenol	88-06-2	3.81E+02		1.60E-04	2.75E-01	5.40E-05	1.31E+00	3.77E-02	6.65E-08	4.64E-06	4.77E-07
PCB	PCBs (total)	1336-36-3	2.45E+06		4.09E-02	1.75E-01	4.32E-05	7.95E+03	2.40E-02	5.32E-08	1.23E-07	7.78E-08
INORG	Antimony	7440-36-0		4.50E+01								
INORG	Arsenic	7440-38-2		2.90E+01								
INORG	Barium	7440-39-3		4.10E+01								
INORG	Beryllium	7440-41-7		7.90E+02								
INORG	Cadmium	7440-43-9		7.50E+01								
INORG	Chromium (total)	7440-47-3		1.90E+01								
INORG	Chromium III	16065-83-1		1.80E+06								
INORG	Chromium VI	18540-29-9		1.90E+01								
INORG	Cobalt	7440-48-4		4.50E+01								
INORG	Copper	7440-50-8		3.50E+01								
INORG	Cyanide (total)	57-12-5		9.90E+00								
INORG	Fluoride	16984-48-8										
INORG	Lead	7439-92-1		9.00E+02								
INORG	Manganese	7439-96-5		6.50E+01								
INORG	Mercury	7439-97-6		1.00E+03	1.45E-01	2.65E-01	5.44E-05	1.62E+03	3.64E-02	6.70E-08	3.26E-06	4.00E-07

Attachment G1: Vapor Flux from Soil to Ambient Air
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	K_{oc} (L/kg)	K_d (L/kg)	H (unitless)	D_{air} (m^2/d)	D_{water} (m^2/d)	R_L (unitless)	D_G (m^2/d)	D_L (m^2/d)	D_E (m^2/d)	J_G (kg/m^2-s)
INORG	Nickel	7440-02-0		6.50E+01								
INORG	Selenium	7782-49-2		5.00E+00								
INORG	Silver	7440-22-4		8.30E+00								
INORG	Thallium	7440-28-0		7.10E+01								
INORG	Vanadium	7440-62-2		1.00E+03								
INORG	Zinc	7440-66-6		6.20E+01								
Notes:	Soil bulk density	kg/L	ρ_b	1.62	*Loamy Sand*							
	Soil particle density	kg/L	ρ_s	2.65	*EPA default/MDEQ 1998*							
	Soil porosity	L/L-soil	θ	0.39	*1-(pb/ps)*							
	Soil water content	L/L-soil	θ_w	0.076	*Loamy Sand*							
	Soil air-filled porosity	L/L-soil	θ_a	0.31	*porosity-water content*							
	Soil organic carbon fraction	unitless	f_{oc}	0.002								
	Averaging period	year	**ED**	25								
		s	**ED**	7.9E+08								
	Molar Gas Constant	L-mmHg/mole-^oK	**R**	62.411								
	Temperature	^oC	**T**	12								
		K	**T**	285								

Attachment G1: Risk-Based Cancer Criteria for Exposure of Routine Workers to Soil
GMC: NAO Flint Operations Site, Flint, Michigan

				Soil Ingestion			Soil Dermal Contact					Soil Vapor Inhalation				Soil Particulate Inhalation				
Chem Group	**Chemical**	**CASRN**	**Cancer Class**	**LADD** (mg/kg/d)	**SF_{oral}** $(mg/kg/d)^{-1}$	**RBC** (mg/kg)	**ABS_{derm}**	**LADD** (mg/kg/d)	**SF_{derm}** $(mg/kg/d)^{-1}$	**RBC** (mg/kg)	**C_{air}** (mg/m^3)	**Dose** (mg/m^3)	**URF** (m^3/mg)	**RBC** (mg/kg)	**C_{air}** (mg/m^3)	**Dose** (mg/m^3)	**URF** (m^3/mg)	**RBC** (mg/kg)	**Cancer RBC** (mg/kg)
VOC	Acetone	67-64-1	ID	1.75E-07							1.25E-04	3.05E-05			7.59E-10	1.86E-10			
VOC	Benzene	71-43-2	A	1.75E-07	5.5E-02	1.0E+03			5.5E-02		6.41E-04	1.57E-04	7.8E-03	8.2E+00	7.59E-10	1.86E-10	7.8E-03	6.9E+06	8.1E+00
VOC	Bromodichloromethane	75-27-4	B2	1.75E-07	6.2E-02	9.2E+02			6.2E-02		2.13E-04	5.21E-05	1.8E-02	1.1E+01	7.59E-10	1.86E-10	1.8E-02	3.0E+06	1.1E+01
VOC	2-Butanone	78-93-3	ID	1.75E-07							1.17E-04	2.86E-05			7.59E-10	1.86E-10			
VOC	Carbon Disulfide	75-15-0		1.75E-07							1.38E-03	3.37E-04			7.59E-10	1.86E-10			
VOC	Carbon Tetrachloride	56-23-5	B2	1.75E-07	1.3E-01	4.4E+02			1.3E-01		8.47E-04	2.07E-04	1.5E-02	3.2E+00	7.59E-10	1.86E-10	1.5E-02	3.6E+06	3.2E+00
VOC	Chlorobenzene	108-90-7	D	1.75E-07							2.89E-04	7.08E-05			7.59E-10	1.86E-10			
VOC	Chloroethane	75-00-3		1.75E-07	2.9E-03	2.0E+04			2.9E-03		1.80E-03	4.41E-04			7.59E-10	1.86E-10			
VOC	Chloroform	67-66-3	B2	1.75E-07							6.48E-04	1.59E-04	2.3E-02	2.7E+00	7.59E-10	1.86E-10	2.3E-02	2.3E+06	2.7E+00
VOC	Chloromethane	74-87-3	D	1.75E-07							1.03E-03	2.53E-04			7.59E-10	1.86E-10			
VOC	Cumene	98-82-8	D	1.75E-07							2.95E-04	7.21E-05			7.59E-10	1.86E-10			
VOC	Cyclohexane	110-82-7	ID	1.75E-07							1.10E-03	2.70E-04			7.59E-10	1.86E-10			
VOC	Dibromochloromethane	124-48-1	C	1.75E-07	8.4E-02	6.8E+02			8.4E-02		1.17E-04	2.86E-05	2.4E-02	1.5E+01	7.59E-10	1.86E-10	2.4E-02	2.2E+06	1.4E+01
VOC	1,2-Dichlorobenzene	95-50-1	D	1.75E-07							1.25E-04	3.06E-05			7.59E-10	1.86E-10			
VOC	1,3-Dichlorobenzene	541-73-1	D	1.75E-07							1.67E-04	4.08E-05			7.59E-10	1.86E-10			
VOC	1,4-Dichlorobenzene	106-46-7	C	1.75E-07	2.4E-02	2.4E+03			2.4E-02		1.43E-04	3.49E-05	6.3E-03	4.6E+01	7.59E-10	1.86E-10	6.3E-03	8.6E+06	4.5E+01
VOC	Dichlorodifluoromethane	75-71-8		1.75E-07							1.67E-03	4.09E-04			7.59E-10	1.86E-10			
VOC	1,1-Dichloroethane	75-34-3	C	1.75E-07							7.01E-04	1.71E-04			7.59E-10	1.86E-10			
VOC	1,2-Dichloroethane	107-06-2	B2	1.75E-07	9.1E-02	6.3E+02			9.1E-02		4.30E-04	1.05E-04	2.6E-02	3.7E+00	7.59E-10	1.86E-10	2.6E-02	2.1E+06	3.6E+00
VOC	1,1-Dichloroethene	75-35-4	C	1.75E-07							1.17E-03	2.86E-04			7.59E-10	1.86E-10			
VOC	cis-1,2-Dichloroethene	156-59-2	D	1.75E-07							5.90E-04	1.44E-04			7.59E-10	1.86E-10			
VOC	trans-1,2-Dichloroethene	156-60-5		1.75E-07							7.40E-04	1.81E-04			7.59E-10	1.86E-10			
VOC	1,2-Dichloropropane	78-87-5	B2	1.75E-07	6.8E-02	8.4E+02			6.8E-02		4.85E-04	1.19E-04			7.59E-10	1.86E-10			
VOC	Ethyl Benzene	100-41-4	D	1.75E-07							3.36E-04	8.23E-05			7.59E-10	1.86E-10			
VOC	2-Hexanone	591-78-6		1.75E-07											7.59E-10	1.86E-10			
VOC	Methyl Acetate	79-20-9		1.75E-07							1.63E-04	3.99E-05			7.59E-10	1.86E-10			
VOC	Methyl tert-butyl ether	1634-04-4		1.75E-07							3.29E-04	8.05E-05			7.59E-10	1.86E-10			
VOC	4-Methyl-2-pentanone	108-10-1	ID	1.75E-07							1.53E-04	3.75E-05			7.59E-10	1.86E-10			
VOC	Methylcyclohexane	108-87-2		1.75E-07							1.47E-03	3.59E-04			7.59E-10	1.86E-10			
VOC	Methylene Chloride	75-09-2	B2	1.75E-07	7.5E-03	7.6E+03			7.5E-03		6.60E-04	1.61E-04	4.7E-04	1.3E+02	7.59E-10	1.86E-10	4.7E-04	1.1E+08	1.3E+02
VOC	Styrene	100-42-5		1.75E-07							1.37E-04	3.36E-05			7.59E-10	1.86E-10			
VOC	Tetrachloroethene	127-18-4	C-B2	1.75E-07	5.2E-02	1.1E+03			5.2E-02		6.91E-04	1.69E-04	3.1E-03	1.9E+01	7.59E-10	1.86E-10	3.1E-03	1.8E+07	1.9E+01
VOC	Toluene	108-88-3	D	1.75E-07							4.55E-04	1.11E-04			7.59E-10	1.86E-10			
VOC	1,2,4-Trichlorobenzene	120-82-1	D	1.75E-07							4.27E-05	1.04E-05			7.59E-10	1.86E-10			
VOC	1,1,1-Trichloroethane	71-55-6	D	1.75E-07							7.89E-04	1.93E-04			7.59E-10	1.86E-10			
VOC	1,1,2-Trichloroethane	79-00-5	C	1.75E-07	5.7E-02	1.0E+03			5.7E-02		2.71E-04	6.62E-05	1.6E-02	9.4E+00	7.59E-10	1.86E-10	1.6E-02	3.4E+06	9.4E+00
VOC	Trichloroethene	79-01-6	C-B2	1.75E-07	1.1E-02	5.2E+03			1.1E-02		5.47E-04	1.34E-04	1.7E-03	4.4E+01	7.59E-10	1.86E-10	1.7E-03	3.2E+07	4.4E+01
VOC	Trichlorofluoromethane	75-69-4		1.75E-07							1.40E-03	3.42E-04			7.59E-10	1.86E-10			
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		1.75E-07							1.47E-03	3.59E-04			7.59E-10	1.86E-10			
VOC	1,2,4-Trimethylbenzene	95-63-6	ID	1.75E-07							1.76E-04	4.31E-05			7.59E-10	1.86E-10			
VOC	1,3,5-Trimethylbenzene	108-67-8	ID	1.75E-07							1.24E-04	3.02E-05			7.59E-10	1.86E-10			
VOC	Vinyl Chloride	75-01-4	A	1.75E-07	1.4E+00	4.1E+01			1.4E+00		1.53E-03	3.74E-04	8.8E-03	3.0E+00	7.59E-10	1.86E-10	8.8E-03	6.1E+06	2.8E+00
VOC	Xylenes (total)	1330-20-7	ID	1.75E-07							3.11E-04	7.61E-05			7.59E-10	1.86E-10			
SVOC	Acenaphthene	83-32-9		1.75E-07			1.30E-01	3.00E-07			8.42E-06	2.06E-06			7.59E-10	1.86E-10			
SVOC	Acenaphthylene	208-96-8	D	1.75E-07			1.30E-01	3.00E-07			7.25E-06	1.77E-06			7.59E-10	1.86E-10			
SVOC	Acetophenone	98-86-2	D	1.75E-07			1.00E-01	2.31E-07			3.35E-05	8.20E-06			7.59E-10	1.86E-10			
SVOC	Anthracene	120-12-7	D	1.75E-07			1.30E-01	3.00E-07			2.35E-06	5.75E-07			7.59E-10	1.86E-10			
SVOC	Atrazine	1912-24-9	C	1.75E-07	2.2E-01	2.6E+02	1.00E-01	2.31E-07	2.2E-01	2.0E+02	7.81E-07	1.91E-07	6.3E-02	8.2E+02	7.59E-10	1.86E-10	6.3E-02	8.5E+05	9.8E+01
SVOC	Benzaldehyde	100-52-7		1.75E-07			1.00E-01	2.31E-07			5.06E-05	1.24E-05			7.59E-10	1.86E-10			

Attachment G1: Risk-Based Cancer Criteria for Exposure of Routine Workers to Soil
GMC: NAO Flint Operations Site, Flint, Michigan

				Soil Ingestion			Soil Dermal Contact				Soil Vapor Inhalation				Soil Particulate Inhalation				
Chem Group	**Chemical**	**CASRN**	**Cancer Class**	**LADD** (mg/kg/d)	**SF_{oral}** $(mg/kg/d)^{-1}$	**RBC** (mg/kg)	**ABS_{derm}**	**LADD** (mg/kg/d)	**SF_{derm}** $(mg/kg/d)^{-1}$	**RBC** (mg/kg)	**C_{air}** (mg/m^3)	**Dose** (mg/m^3)	**URF** (m^3/mg)	**RBC** (mg/kg)	**C_{air}** (mg/m^3)	**Dose** (mg/m^3)	**URF** (m^3/mg)	**RBC** (mg/kg)	**Cancer RBC** (mg/kg)
SVOC	Benzo(a)anthracene	56-55-3	B2	1.75E-07	7.3E-01	7.8E+01	1.30E-01	3.00E-07	7.3E-01	4.6E+01	1.84E-07	4.50E-08	8.9E-02	2.5E+03	7.59E-10	1.86E-10	8.9E-02	6.1E+05	2.9E+01
SVOC	Benzo(a)pyrene	50-32-8	B2	1.75E-07	7.3E+00	7.8E+00	1.30E-01	3.00E-07	7.3E+00	4.6E+00	6.34E-08	1.55E-08	8.9E-01	7.3E+02	7.59E-10	1.86E-10	8.9E-01	6.1E+04	2.9E+00
SVOC	Benzo(b)fluoranthene	205-99-2	B2	1.75E-07	7.3E-01	7.8E+01	1.30E-01	3.00E-07	7.3E-01	4.6E+01	3.96E-07	9.69E-08	8.9E-02	1.2E+03	7.59E-10	1.86E-10	8.9E-02	6.1E+05	2.8E+01
SVOC	Benzo(g,h,i)perylene	191-24-2	D	1.75E-07			1.30E-01	3.00E-07			5.70E-09	1.39E-09			7.59E-10	1.86E-10			
SVOC	Benzo(k)fluoranthene	207-08-9	B2	1.75E-07	7.3E-02	7.8E+02	1.30E-01	3.00E-07	7.3E-02	4.6E+02	3.64E-08	8.90E-09	8.9E-03	1.3E+05	7.59E-10	1.86E-10	8.9E-03	6.1E+06	2.9E+02
SVOC	Biphenyl	92-52-4	D	1.75E-07			1.00E-01	2.31E-07			9.46E-06	2.31E-06			7.59E-10	1.86E-10			
SVOC	bis(2-Chloroethoxy)methane	111-91-1	D	1.75E-07			1.00E-01	2.31E-07			4.60E-06	1.12E-06			7.59E-10	1.86E-10			
SVOC	bis(2-Chloroethyl) ether	111-44-4	B2	1.75E-07	1.1E+00	5.2E+01	1.00E-01	2.31E-07	1.1E+00	3.9E+01	4.99E-05	1.22E-05	3.3E-01	2.5E+00	7.59E-10	1.86E-10	3.3E-01	1.6E+05	2.2E+00
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2	1.75E-07	1.4E-02	4.1E+03	1.00E-01	2.31E-07	1.4E-02	3.1E+03	5.18E-09	1.27E-09	4.0E-03	2.0E+06	7.59E-10	1.86E-10	4.0E-03	1.3E+07	1.8E+03
SVOC	Butylbenzylphthalate	85-68-7	C	1.75E-07	1.9E-03	3.0E+04	1.00E-01	2.31E-07	1.9E-03	2.3E+04	1.81E-07	4.42E-08	5.4E-04	4.2E+05	7.59E-10	1.86E-10	5.4E-04	9.9E+07	1.3E+04
SVOC	Caprolactam	105-60-2		1.75E-07			1.00E-01	2.31E-07			3.72E-06	9.09E-07			7.59E-10	1.86E-10			
SVOC	Carbazole	86-74-8	B2	1.75E-07	2.0E-02	2.9E+03	1.00E-01	2.31E-07	2.0E-02	2.2E+03	2.89E-07	7.08E-08	5.7E-03	2.5E+04	7.59E-10	1.86E-10	5.7E-03	9.4E+06	1.2E+03
SVOC	4-Chloro-3-methylphenol	59-50-7		1.75E-07			1.00E-01	2.31E-07			1.39E-06	3.40E-07			7.59E-10	1.86E-10			
SVOC	2-Chloronaphthalene	91-58-7		1.75E-07			1.00E-01	2.31E-07			1.03E-05	2.52E-06			7.59E-10	1.86E-10			
SVOC	2-Chlorophenol	95-57-8		1.75E-07			1.00E-01	2.31E-07			6.07E-05	1.49E-05			7.59E-10	1.86E-10			
SVOC	Chrysene	218-01-9	B2	1.75E-07	7.3E-03	7.8E+03	1.30E-01	3.00E-07	7.3E-03	4.6E+03	6.75E-07	1.65E-07	8.9E-04	6.8E+04	7.59E-10	1.86E-10	8.9E-04	6.1E+07	2.8E+03
SVOC	Dibenz(a,h)anthracene	53-70-3	B2	1.75E-07	7.3E+00	7.8E+00	1.30E-01	3.00E-07	7.3E+00	4.6E+00	7.27E-09	1.78E-09	8.9E-01	6.4E+03	7.59E-10	1.86E-10	8.9E-01	6.1E+04	2.9E+00
SVOC	Dibenzofuran	132-64-9	D	1.75E-07			1.00E-01	2.31E-07			1.06E-06	2.60E-07			7.59E-10	1.86E-10			
SVOC	2,4-Dichlorophenol	120-83-2		1.75E-07			1.00E-01	2.31E-07			7.20E-06	1.76E-06			7.59E-10	1.86E-10			
SVOC	Diethylphthalate	84-66-2	D	1.75E-07			1.00E-01	2.31E-07			1.89E-06	4.64E-07			7.59E-10	1.86E-10			
SVOC	2,4-Dimethylphenol	105-67-9		1.75E-07			1.00E-01	2.31E-07			6.35E-06	1.55E-06			7.59E-10	1.86E-10			
SVOC	Dimethylphthalate	131-11-3	D	1.75E-07			1.00E-01	2.31E-07			2.71E-06	6.62E-07			7.59E-10	1.86E-10			
SVOC	Di-n-butylphthalate	84-74-2	D	1.75E-07			1.00E-01	2.31E-07			8.91E-08	2.18E-08			7.59E-10	1.86E-10			
SVOC	4,6-Dinitro-2-methylphenol	534-52-1		1.75E-07			1.00E-01	2.31E-07			2.82E-06	6.89E-07			7.59E-10	1.86E-10			
SVOC	2,4-Dinitrotoluene	121-14-2	B2	1.75E-07	6.8E-01	8.4E+01	1.00E-01	2.31E-07	6.8E-01	6.4E+01	3.80E-06	9.29E-07			7.59E-10	1.86E-10			3.6E+01
SVOC	2,6-Dinitrotoluene	606-20-2	B2	1.75E-07	6.8E-01	8.4E+01	1.00E-01	2.31E-07	6.8E-01	6.4E+01	4.82E-06	1.18E-06	1.9E-01	4.4E+01	7.59E-10	1.86E-10	1.9E-01	2.8E+05	2.0E+01
SVOC	Di-n-octylphthalate	117-84-0		1.75E-07			1.00E-01	2.31E-07			3.06E-08	7.49E-09			7.59E-10	1.86E-10			
SVOC	Fluoranthene	206-44-0	D	1.75E-07			1.30E-01	3.00E-07			5.93E-07	1.45E-07			7.59E-10	1.86E-10			
SVOC	Fluorene	86-73-7	D	1.75E-07			1.30E-01	3.00E-07			3.61E-06	8.84E-07			7.59E-10	1.86E-10			
SVOC	Formaldehyde	50-00-0	B1	1.75E-07									1.3E-02		7.59E-10	1.86E-10	1.3E-02	4.1E+06	4.1E+06
SVOC	Hexachlorobutadiene	87-68-3	C	1.75E-07	7.8E-02	7.3E+02	1.00E-01	2.31E-07	7.8E-02	5.6E+02	2.58E-05	6.30E-06	2.2E-02	7.2E+01	7.59E-10	1.86E-10	2.2E-02	2.4E+06	5.9E+01
SVOC	Hexachlorocyclopentadiene	77-47-4	E	1.75E-07			1.00E-01	2.31E-07			1.31E-05	3.19E-06			7.59E-10	1.86E-10			
SVOC	Hexachloroethane	67-72-1	C	1.75E-07	1.4E-02	4.1E+03	1.00E-01	2.31E-07	1.4E-02	3.1E+03	2.05E-05	5.02E-06	4.0E-03	5.0E+02	7.59E-10	1.86E-10	4.0E-03	1.3E+07	3.9E+02
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	B2	1.75E-08	7.3E-01	7.8E+01	1.30E-01	3.00E-08	7.3E-01	4.6E+01	2.72E-09	6.66E-10	8.9E-02	1.7E+04	7.59E-11	1.86E-11	8.9E-02	6.1E+05	2.9E+01
SVOC	Isophorone	78-59-1	C	1.75E-07	9.5E-04	6.0E+04	1.00E-01	2.31E-07	9.5E-04	4.6E+04	2.14E-05	5.25E-06			7.59E-10	1.86E-10			2.6E+04
SVOC	2-Methylnaphthalene	91-57-6	ID	1.75E-07			1.00E-01	2.31E-07			1.76E-05	4.31E-06			7.59E-10	1.86E-10			
SVOC	Methylphenol (total)	1319-77-3		1.75E-07			1.00E-01	2.31E-07			7.01E-06	1.71E-06			7.59E-10	1.86E-10			
SVOC	Naphthalene	91-20-3	C	1.75E-07			1.30E-01	3.00E-07			3.30E-05	8.07E-06			7.59E-10	1.86E-10			
SVOC	2-Nitroaniline	88-74-4		1.75E-07			1.00E-01	2.31E-07			3.63E-06	8.88E-07			7.59E-10	1.86E-10			
SVOC	Nitrobenzene	98-95-3	D	1.75E-07			1.00E-01	2.31E-07			4.02E-05	9.84E-06			7.59E-10	1.86E-10			
SVOC	2-Nitrophenol	88-75-5		1.75E-07			1.00E-01	2.31E-07			2.22E-05	5.43E-06			7.59E-10	1.86E-10			
SVOC	4-Nitrophenol	100-02-7		1.75E-07			1.00E-01	2.31E-07			1.82E-06	4.46E-07			7.59E-10	1.86E-10			
SVOC	N-Nitrosodiphenylamine	86-30-6	B2	1.75E-07	4.9E-03	1.2E+04	1.00E-01	2.31E-07	4.9E-03	8.8E+03	3.07E-06	7.50E-07			7.59E-10	1.86E-10			5.0E+03
SVOC	N-Nitroso-di-n-propylamine	621-64-7	B2	1.75E-07	7.0E+00	8.2E+00	1.00E-01	2.31E-07	7.0E+00	6.2E+00	1.44E-05	3.52E-06	2.0E+00	1.4E+00	7.59E-10	1.86E-10	2.0E+00	2.7E+04	1.0E+00
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	C	1.75E-07	7.0E-02	8.2E+02	1.00E-01	2.31E-07	7.0E-02	6.2E+02	4.42E-05	1.08E-05	1.0E-02	9.3E+01	7.59E-10	1.86E-10	1.0E-02	5.4E+06	7.3E+01
SVOC	Pentachlorophenol	87-86-5	B2	1.75E-07	1.2E-01	4.8E+02	2.50E-01	5.77E-07	1.2E-01	1.4E+02	7.14E-07	1.75E-07	3.4E-02	1.7E+03	7.59E-10	1.86E-10	3.4E-02	1.6E+06	1.0E+02
SVOC	Phenanthrene	85-01-8	D	1.75E-07			1.30E-01	3.00E-07			1.67E-06	4.10E-07			7.59E-10	1.86E-10			
SVOC	Phenol	108-95-2	ID	1.75E-07			1.00E-01	2.31E-07			7.38E-06	1.81E-06			7.59E-10	1.86E-10			
SVOC	Pyrene	129-00-0	D	1.75E-07			1.30E-01	3.00E-07			4.72E-07	1.15E-07			7.59E-10	1.86E-10			

Attachment G1: Risk-Based Cancer Criteria for Exposure of Routine Workers to Soil
GMC: NAO Flint Operations Site, Flint, Michigan

				Soil Ingestion			Soil Dermal Contact				Soil Vapor Inhalation				Soil Particulate Inhalation				
Chem Group	**Chemical**	**CASRN**	**Cancer Class**	**LADD** (mg/kg/d)	**SF_{oral}** $(mg/kg/d)^{-1}$	**RBC** (mg/kg)	**ABS_{derm}**	**LADD** (mg/kg/d)	**SF_{derm}** $(mg/kg/d)^{-1}$	**RBC** (mg/kg)	**C_{air}** (mg/m^3)	**Dose** (mg/m^3)	**URF** (m^3/mg)	**RBC** (mg/kg)	**C_{air}** (mg/m^3)	**Dose** (mg/m^3)	**URF** (m^3/mg)	**RBC** (mg/kg)	**Cancer RBC** (mg/kg)
SVOC	2,4,5-Trichlorophenol	95-95-4		1.75E-07			1.00E-01	2.31E-07			2.49E-06	6.10E-07			7.59E-10	1.86E-10			
SVOC	2,4,6-Trichlorophenol	88-06-2	B2	1.75E-07	1.1E-02	5.2E+03	1.00E-01	2.31E-07	1.1E-02	3.9E+03	6.94E-06	1.70E-06	3.1E-03	1.9E+03	7.59E-10	1.86E-10	3.1E-03	1.7E+07	1.0E+03
PCB	PCBs (total)	1336-36-3	B2	1.75E-07	2.0E+00	2.9E+01	1.40E-01	3.23E-07	2.0E+00	1.5E+01	1.13E-06	2.76E-07	5.7E-01	6.3E+01	7.59E-10	1.86E-10	5.7E-01	9.4E+04	8.7E+00
INORG	Antimony	7440-36-0		1.75E-07											7.59E-10	1.86E-10			
INORG	Arsenic	7440-38-2	A	1.75E-07	1.5E+00	3.8E+01	3.00E-02	6.92E-08	1.5E+00	9.6E+01			4.3E+00		7.59E-10	1.86E-10	4.3E+00	1.3E+04	2.7E+01
INORG	Barium	7440-39-3	D	1.75E-07											7.59E-10	1.86E-10			
INORG	Beryllium	7440-41-7	B1	1.75E-07									2.4E+00		7.59E-10	1.86E-10	2.4E+00	2.2E+04	2.2E+04
INORG	Cadmium	7440-43-9	B1	1.75E-07			1.00E-03	2.31E-09					1.8E+00		7.59E-10	1.86E-10	1.8E+00	3.0E+04	3.0E+04
INORG	Chromium (total)	7440-47-3		1.75E-07									1.2E+01		7.59E-10	1.86E-10	1.2E+01	4.5E+03	4.5E+03
INORG	Chromium III	16065-83-1	D	1.75E-07											7.59E-10	1.86E-10			
INORG	Chromium VI	18540-29-9	A	1.75E-07									1.2E+01		7.59E-10	1.86E-10	1.2E+01	4.5E+03	4.5E+03
INORG	Cobalt	7440-48-4	B1	1.75E-07									2.8E+00		7.59E-10	1.86E-10	2.8E+00	1.9E+04	1.9E+04
INORG	Copper	7440-50-8	D	1.75E-07											7.59E-10	1.86E-10			
INORG	Cyanide (total)	57-12-5	D	1.75E-07											7.59E-10	1.86E-10			
INORG	Fluoride	16984-48-8		1.75E-07											7.59E-10	1.86E-10			
INORG	Lead	7439-92-1	B2	1.75E-07											7.59E-10	1.86E-10			
INORG	Manganese	7439-96-5	D	1.75E-07											7.59E-10	1.86E-10			
INORG	Mercury	7439-97-6	D	1.75E-07							5.81E-06	1.42E-06			7.59E-10	1.86E-10			
INORG	Nickel	7440-02-0	A	1.75E-07									2.4E-01		7.59E-10	1.86E-10	2.4E-01	2.2E+05	2.24E+05
INORG	Selenium	7782-49-2	D	1.75E-07											7.59E-10	1.86E-10			
INORG	Silver	7440-22-4	D	1.75E-07											7.59E-10	1.86E-10			
INORG	Thallium	7440-28-0		1.75E-07											7.59E-10	1.86E-10			
INORG	Vanadium	7440-62-2		1.75E-07											7.59E-10	1.86E-10			
INORG	Zinc	7440-66-6	D	1.75E-07											7.59E-10	1.86E-10			

Notes:

Target cancer risk of 1E-05

C/Q based on the annual maximum exposure for a 1/2 acre source area = 14.53 kg/m3 per (kg/m2-s)

PM10 flux modeled based on average wind speed in Flint

Attachment G1: Risk-Based Noncancer Criteria for Exposure of Routine Workers to Soil
GMC: NAO Flint Operations Site, Flint, Michigan

				Soil Ingestion			Soil Dermal Contact				Soil Vapor Inhalation				Soil Particulate Inhalation				
Chem Group	**Chemical**	**CASRN**	**Cancer Class**	**ADD** (mg/kg/d)	**RfD_{oral}** (mg/kg/d)	**RBC** (mg/kg)	**ABS_{derm}**	**ADD** (mg/kg/d)	**RfD_{derm}** (mg/kg/d)	**RBC** (mg/kg)	**C_{air}** (mg/m^3)	**Dose** (mg/m^3)	**RfC** (mg/m^3)	**RBC** (mg/kg)	**C_{air}** (mg/m^3)	**Dose** (mg/m^3)	**RfC** (mg/m^3)	**RBC** (mg/kg)	**Noncancer RBC** (mg/kg)
VOC	Acetone	67-64-1	ID	4.89E-07	9.0E-01	1.8E+06			9.0E-01		1.25E-04	8.54E-05	3.2E+00	3.7E+04	7.59E-10	5.20E-10	3.2E+00	6.1E+09	3.6E+04
VOC	Benzene	71-43-2	A	4.89E-07	4.0E-03	8.2E+03			4.0E-03		6.41E-04	4.39E-04	3.0E-02	6.8E+01	7.59E-10	5.20E-10	3.0E-02	5.8E+07	6.8E+01
VOC	Bromodichloromethane	75-27-4	B2	4.89E-07	2.0E-02	4.1E+04			2.0E-02		2.13E-04	1.46E-04	7.0E-02	4.8E+02	7.59E-10	5.20E-10	7.0E-02	1.3E+08	4.7E+02
VOC	2-Butanone	78-93-3	ID	4.89E-07	6.0E-01	1.2E+06			6.0E-01		1.17E-04	8.02E-05	5.0E+00	6.2E+04	7.59E-10	5.20E-10	5.0E+00	9.6E+09	5.9E+04
VOC	Carbon Disulfide	75-15-0		4.89E-07	1.0E-01	2.0E+05			1.0E-01		1.38E-03	9.42E-04	7.0E-01	7.4E+02	7.59E-10	5.20E-10	7.0E-01	1.3E+09	7.4E+02
VOC	Carbon Tetrachloride	56-23-5	B2	4.89E-07	7.0E-04	1.4E+03			7.0E-04		8.47E-04	5.80E-04			7.59E-10	5.20E-10			
VOC	Chlorobenzene	108-90-7	D	4.89E-07	2.0E-02	4.1E+04			2.0E-02		2.89E-04	1.98E-04	6.0E-02	3.0E+02	7.59E-10	5.20E-10	6.0E-02	1.2E+08	3.0E+02
VOC	Chloroethane	75-00-3		4.89E-07	4.0E-01	8.2E+05			4.0E-01		1.80E-03	1.23E-03	1.0E+01	8.1E+03	7.59E-10	5.20E-10	1.0E+01	1.9E+10	8.0E+03
VOC	Chloroform	67-66-3	B2	4.89E-07	1.0E-02	2.0E+04			1.0E-02		6.48E-04	4.44E-04	5.0E-02	1.1E+02	7.59E-10	5.20E-10	5.0E-02	9.6E+07	1.1E+02
VOC	Chloromethane	74-87-3	D	4.89E-07							1.03E-03	7.08E-04	9.0E-02	1.3E+02	7.59E-10	5.20E-10	9.0E-02	1.7E+08	1.3E+02
VOC	Cumene	98-82-8	D	4.89E-07	1.0E-01	2.0E+05			1.0E-01		2.95E-04	2.02E-04	4.0E-01	2.0E+03	7.59E-10	5.20E-10	4.0E-01	7.7E+08	2.0E+03
VOC	Cyclohexane	110-82-7	ID	4.89E-07							1.10E-03	7.56E-04	6.0E+00	7.9E+03	7.59E-10	5.20E-10	6.0E+00	1.2E+10	7.9E+03
VOC	Dibromochloromethane	124-48-1	C	4.89E-07	2.0E-02	4.1E+04			2.0E-02		1.17E-04	7.99E-05	7.0E-02	8.8E+02	7.59E-10	5.20E-10	7.0E-02	1.3E+08	8.6E+02
VOC	1,2-Dichlorobenzene	95-50-1	D	4.89E-07	9.0E-02	1.8E+05			9.0E-02		1.25E-04	8.58E-05	2.0E-01	2.3E+03	7.59E-10	5.20E-10	2.0E-01	3.8E+08	2.3E+03
VOC	1,3-Dichlorobenzene	541-73-1	D	4.89E-07	9.0E-02	1.8E+05			9.0E-02		1.67E-04	1.14E-04	1.4E-01	1.2E+03	7.59E-10	5.20E-10	1.4E-01	2.7E+08	1.2E+03
VOC	1,4-Dichlorobenzene	106-46-7	C	4.89E-07	3.0E-02	6.1E+04			3.0E-02		1.43E-04	9.78E-05	8.0E-01	8.2E+03	7.59E-10	5.20E-10	8.0E-01	1.5E+09	7.2E+03
VOC	Dichlorodifluoromethane	75-71-8		4.89E-07	2.0E-01	4.1E+05			2.0E-01		1.67E-03	1.14E-03	2.0E-01	1.7E+02	7.59E-10	5.20E-10	2.0E-01	3.8E+08	1.7E+02
VOC	1,1-Dichloroethane	75-34-3	C	4.89E-07	1.0E-01	2.0E+05			1.0E-01		7.01E-04	4.80E-04	5.0E-01	1.0E+03	7.59E-10	5.20E-10	5.0E-01	9.6E+08	1.0E+03
VOC	1,2-Dichloroethane	107-06-2	B2	4.89E-07	2.0E-02	4.1E+04			2.0E-02		4.30E-04	2.94E-04	5.0E-03	1.7E+01	7.59E-10	5.20E-10	5.0E-03	9.6E+06	1.7E+01
VOC	1,1-Dichloroethene	75-35-4	C	4.89E-07	5.0E-02	1.0E+05			5.0E-02		1.17E-03	8.02E-04	2.0E-01	2.5E+02	7.59E-10	5.20E-10	2.0E-01	3.8E+08	2.5E+02
VOC	cis-1,2-Dichloroethene	156-59-2	D	4.89E-07	1.0E-02	2.0E+04			1.0E-02		5.90E-04	4.04E-04	3.5E-02	8.7E+01	7.59E-10	5.20E-10	3.5E-02	6.7E+07	8.6E+01
VOC	trans-1,2-Dichloroethene	156-60-5		4.89E-07	2.0E-02	4.1E+04			2.0E-02		7.40E-04	5.07E-04	6.0E-02	1.2E+02	7.59E-10	5.20E-10	6.0E-02	1.1E+08	1.2E+02
VOC	1,2-Dichloropropane	78-87-5	B2	4.89E-07							4.85E-04	3.32E-04	4.0E-03	1.2E+01	7.59E-10	5.20E-10	4.0E-03	7.7E+06	1.2E+01
VOC	Ethyl Benzene	100-41-4	D	4.89E-07	1.0E-01	2.0E+05			1.0E-01		3.36E-04	2.30E-04	1.0E+00	4.3E+03	7.59E-10	5.20E-10	1.0E+00	1.9E+09	4.3E+03
VOC	2-Hexanone	591-78-6		4.89E-07	4.0E-02	8.2E+04			4.0E-02				5.0E-03		7.59E-10	5.20E-10	5.0E-03	9.6E+06	8.1E+04
VOC	Methyl Acetate	79-20-9		4.89E-07	1.0E+00	2.0E+06			1.0E+00		1.63E-04	1.12E-04	3.5E+00	3.1E+04	7.59E-10	5.20E-10	3.5E+00	6.7E+09	3.1E+04
VOC	Methyl tert-butyl ether	1634-04-4		4.89E-07							3.29E-04	2.25E-04	3.0E+00	1.3E+04	7.59E-10	5.20E-10	3.0E+00	5.8E+09	1.3E+04
VOC	4-Methyl-2-pentanone	108-10-1	ID	4.89E-07							1.53E-04	1.05E-04	3.0E+00	2.9E+04	7.59E-10	5.20E-10	3.0E+00	5.8E+09	2.9E+04
VOC	Methylcyclohexane	108-87-2		4.89E-07							1.47E-03	1.01E-03	3.0E+00	3.0E+03	7.59E-10	5.20E-10	3.0E+00	5.8E+09	3.0E+03
VOC	Methylene Chloride	75-09-2	B2	4.89E-07	6.0E-02	1.2E+05			6.0E-02		6.60E-04	4.52E-04	3.0E+00	6.6E+03	7.59E-10	5.20E-10	3.0E+00	5.8E+09	6.3E+03
VOC	Styrene	100-42-5		4.89E-07	2.0E-01	4.1E+05			2.0E-01		1.37E-04	9.41E-05	1.0E+00	1.1E+04	7.59E-10	5.20E-10	1.0E+00	1.9E+09	1.0E+04
VOC	Tetrachloroethene	127-18-4	C-B2	4.89E-07	1.0E-02	2.0E+04			1.0E-02		6.91E-04	4.73E-04	4.0E-01	8.5E+02	7.59E-10	5.20E-10	4.0E-01	7.7E+08	8.1E+02
VOC	Toluene	108-88-3	D	4.89E-07	8.0E-02	1.6E+05			8.0E-02		4.55E-04	3.12E-04	5.0E+00	1.6E+04	7.59E-10	5.20E-10	5.0E+00	9.6E+09	1.5E+04
VOC	1,2,4-Trichlorobenzene	120-82-1	D	4.89E-07	1.0E-02	2.0E+04			1.0E-02		4.27E-05	2.92E-05	2.0E-01	6.8E+03	7.59E-10	5.20E-10	2.0E-01	3.8E+08	5.1E+03
VOC	1,1,1-Trichloroethane	71-55-6	D	4.89E-07	2.8E-01	5.7E+05			2.8E-01		7.89E-04	5.40E-04	2.2E+00	4.1E+03	7.59E-10	5.20E-10	2.2E+00	4.2E+09	4.0E+03
VOC	1,1,2-Trichloroethane	79-00-5	C	4.89E-07	4.0E-03	8.2E+03			4.0E-03		2.71E-04	1.85E-04			7.59E-10	5.20E-10			
VOC	Trichloroethene	79-01-6	C-B2	4.89E-07	6.0E-03	1.2E+04			6.0E-03		5.47E-04	3.75E-04			7.59E-10	5.20E-10			
VOC	Trichlorofluoromethane	75-69-4		4.89E-07	3.0E-01	6.1E+05			3.0E-01		1.40E-03	9.57E-04	7.0E-01	7.3E+02	7.59E-10	5.20E-10	7.0E-01	1.3E+09	7.3E+02
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		4.89E-07	3.0E+01	6.1E+07			3.0E+01		1.47E-03	1.00E-03	3.0E+01	3.0E+04	7.59E-10	5.20E-10	3.0E+01	5.8E+10	3.0E+04
VOC	1,2,4-Trimethylbenzene	95-63-6	ID	4.89E-07	5.0E-02	1.0E+05			5.0E-02		1.76E-04	1.21E-04	6.0E-03	5.0E+01	7.59E-10	5.20E-10	6.0E-03	1.2E+07	5.0E+01
VOC	1,3,5-Trimethylbenzene	108-67-8	ID	4.89E-07	5.0E-02	1.0E+05			5.0E-02		1.24E-04	8.47E-05	6.0E-03	7.1E+01	7.59E-10	5.20E-10	6.0E-03	1.2E+07	7.1E+01
VOC	Vinyl Chloride	75-01-4	A	4.89E-07	3.0E-03	6.1E+03			3.0E-03		1.53E-03	1.05E-03	1.0E-01	9.5E+01	7.59E-10	5.20E-10	1.0E-01	1.9E+08	9.4E+01
VOC	Xylenes (total)	1330-20-7	ID	4.89E-07	2.0E-01	4.1E+05			2.0E-01		3.11E-04	2.13E-04	1.0E-01	4.7E+02	7.59E-10	5.20E-10	1.0E-01	1.9E+08	4.7E+02
SVOC	Acenaphthene	83-32-9		4.89E-07	6.0E-02	1.2E+05	1.30E-01	8.40E-07	6.0E-02	7.1E+04	8.42E-06	5.77E-06	2.1E-01	3.6E+04	7.59E-10	5.20E-10	2.1E-01	4.0E+08	2.0E+04
SVOC	Acenaphthylene	208-96-8	D	4.89E-07	3.0E-02	6.1E+04	1.30E-01	8.40E-07	3.0E-02	3.6E+04	7.25E-06	4.96E-06	1.1E-01	2.1E+04	7.59E-10	5.20E-10	1.1E-01	2.0E+08	1.1E+04
SVOC	Acetophenone	98-86-2	D	4.89E-07	1.0E-01	2.0E+05	1.00E-01	6.46E-07	1.0E-01	1.5E+05	3.35E-05	2.30E-05	3.5E-01	1.5E+04	7.59E-10	5.20E-10	3.5E-01	6.7E+08	1.3E+04
SVOC	Anthracene	120-12-7	D	4.89E-07	3.0E-01	6.1E+05	1.30E-01	8.40E-07	3.0E-01	3.6E+05	2.35E-06	1.61E-06			7.59E-10	5.20E-10			2.3E+05
SVOC	Atrazine	1912-24-9	C	4.89E-07	3.5E-02	7.2E+04	1.00E-01	6.46E-07	3.5E-02	5.4E+04	7.81E-07	5.35E-07	1.2E-01	2.3E+05	7.59E-10	5.20E-10	1.2E-01	2.4E+08	2.7E+04
SVOC	Benzaldehyde	100-52-7		4.89E-07	1.0E-01	2.0E+05	1.00E-01	6.46E-07	1.0E-01	1.5E+05	5.06E-05	3.47E-05	3.5E-01	1.0E+04	7.59E-10	5.20E-10	3.5E-01	6.7E+08	9.1E+03

Attachment G1: Risk-Based Noncancer Criteria for Exposure of Routine Workers to Soil
GMC: NAO Flint Operations Site, Flint, Michigan

				Soil Ingestion			Soil Dermal Contact				Soil Vapor Inhalation				Soil Particulate Inhalation				
Chem Group	**Chemical**	**CASRN**	**Cancer Class**	**ADD** (mg/kg/d)	**RfD_{oral}** (mg/kg/d)	**RBC** (mg/kg)	**ABS_{derm}**	**ADD** (mg/kg/d)	**RfD_{derm}** (mg/kg/d)	**RBC** (mg/kg)	**C_{air}** (mg/m^3)	**Dose** (mg/m^3)	**RfC** (mg/m^3)	**RBC** (mg/kg)	**C_{air}** (mg/m^3)	**Dose** (mg/m^3)	**RfC** (mg/m^3)	**RBC** (mg/kg)	**Noncancer RBC** (mg/kg)
SVOC	Benzo(a)anthracene	56-55-3	B2	4.89E-07			1.30E-01	8.40E-07			1.84E-07	1.26E-07			7.59E-10	5.20E-10			
SVOC	Benzo(a)pyrene	50-32-8	B2	4.89E-07			1.30E-01	8.40E-07			6.34E-08	4.34E-08			7.59E-10	5.20E-10			
SVOC	Benzo(b)fluoranthene	205-99-2	B2	4.89E-07			1.30E-01	8.40E-07			3.96E-07	2.71E-07			7.59E-10	5.20E-10			
SVOC	Benzo(g,h,i)perylene	191-24-2	D	4.89E-07	3.0E-02	6.1E+04	1.30E-01	8.40E-07	3.0E-02	3.6E+04	5.70E-09	3.90E-09	1.1E-01	2.7E+07	7.59E-10	5.20E-10	1.1E-01	2.0E+08	2.3E+04
SVOC	Benzo(k)fluoranthene	207-08-9	B2	4.89E-07			1.30E-01	8.40E-07			3.64E-08	2.49E-08			7.59E-10	5.20E-10			
SVOC	Biphenyl	92-52-4	D	4.89E-07	5.0E-02	1.0E+05	1.00E-01	6.46E-07	5.0E-02	7.7E+04	9.46E-06	6.48E-06	1.8E-01	2.7E+04	7.59E-10	5.20E-10	1.8E-01	3.4E+08	1.7E+04
SVOC	bis(2-Chloroethoxy)methane	111-91-1	D	4.89E-07			1.00E-01	6.46E-07			4.60E-06	3.15E-06			7.59E-10	5.20E-10			
SVOC	bis(2-Chloroethyl) ether	111-44-4	B2	4.89E-07			1.00E-01	6.46E-07			4.99E-05	3.42E-05			7.59E-10	5.20E-10			
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2	4.89E-07	2.0E-02	4.1E+04	1.00E-01	6.46E-07	2.0E-02	3.1E+04	5.18E-09	3.55E-09	7.0E-02	2.0E+07	7.59E-10	5.20E-10	7.0E-02	1.3E+08	1.8E+04
SVOC	Butylbenzylphthalate	85-68-7	C	4.89E-07	2.0E-01	4.1E+05	1.00E-01	6.46E-07	2.0E-01	3.1E+05	1.81E-07	1.24E-07	7.0E-01	5.7E+06	7.59E-10	5.20E-10	7.0E-01	1.3E+09	1.7E+05
SVOC	Caprolactam	105-60-2		4.89E-07	5.0E-01	1.0E+06	1.00E-01	6.46E-07	5.0E-01	7.7E+05	3.72E-06	2.54E-06	1.8E+00	6.9E+05	7.59E-10	5.20E-10	1.8E+00	3.4E+09	2.7E+05
SVOC	Carbazole	86-74-8	B2	4.89E-07			1.00E-01	6.46E-07			2.89E-07	1.98E-07			7.59E-10	5.20E-10			
SVOC	4-Chloro-3-methylphenol	59-50-7		4.89E-07			1.00E-01	6.46E-07			1.39E-06	9.51E-07			7.59E-10	5.20E-10			
SVOC	2-Chloronaphthalene	91-58-7		4.89E-07	8.0E-02	1.6E+05	1.00E-01	6.46E-07	8.0E-02	1.2E+05	1.03E-05	7.07E-06	2.8E-01	4.0E+04	7.59E-10	5.20E-10	2.8E-01	5.4E+08	2.5E+04
SVOC	2-Chlorophenol	95-57-8		4.89E-07	5.0E-03	1.0E+04	1.00E-01	6.46E-07	5.0E-03	7.7E+03	6.07E-05	4.16E-05	1.8E-02	4.2E+02	7.59E-10	5.20E-10	1.8E-02	3.4E+07	3.8E+02
SVOC	Chrysene	218-01-9	B2	4.89E-07			1.30E-01	8.40E-07			6.75E-07	4.62E-07			7.59E-10	5.20E-10			
SVOC	Dibenz(a,h)anthracene	53-70-3	B2	4.89E-07			1.30E-01	8.40E-07			7.27E-09	4.98E-09			7.59E-10	5.20E-10			
SVOC	Dibenzofuran	132-64-9	D	4.89E-07	2.0E-03	4.1E+03	1.00E-01	6.46E-07	2.0E-03	3.1E+03	1.06E-06	7.29E-07	7.0E-03	9.6E+03	7.59E-10	5.20E-10	7.0E-03	1.3E+07	1.5E+03
SVOC	2,4-Dichlorophenol	120-83-2		4.89E-07	3.0E-03	6.1E+03	1.00E-01	6.46E-07	3.0E-03	4.6E+03	7.20E-06	4.93E-06	1.1E-02	2.1E+03	7.59E-10	5.20E-10	1.1E-02	2.0E+07	1.2E+03
SVOC	Diethylphthalate	84-66-2	D	4.89E-07	8.0E-01	1.6E+06	1.00E-01	6.46E-07	8.0E-01	1.2E+06	1.89E-06	1.30E-06	2.8E+00	2.2E+06	7.59E-10	5.20E-10	2.8E+00	5.4E+09	5.3E+05
SVOC	2,4-Dimethylphenol	105-67-9		4.89E-07	2.0E-02	4.1E+04	1.00E-01	6.46E-07	2.0E-02	3.1E+04	6.35E-06	4.35E-06	7.0E-02	1.6E+04	7.59E-10	5.20E-10	7.0E-02	1.3E+08	8.4E+03
SVOC	Dimethylphthalate	131-11-3	D	4.89E-07			1.00E-01	6.46E-07			2.71E-06	1.85E-06			7.59E-10	5.20E-10			
SVOC	Di-n-butylphthalate	84-74-2	D	4.89E-07	1.0E-01	2.0E+05	1.00E-01	6.46E-07	1.0E-01	1.5E+05	8.91E-08	6.10E-08			7.59E-10	5.20E-10			8.8E+04
SVOC	4,6-Dinitro-2-methylphenol	534-52-1		4.89E-07	1.0E-04	2.0E+02	1.00E-01	6.46E-07	1.0E-04	1.5E+02	2.82E-06	1.93E-06	3.5E-04	1.8E+02	7.59E-10	5.20E-10	3.5E-04	6.7E+05	5.9E+01
SVOC	2,4-Dinitrotoluene	121-14-2	B2	4.89E-07	2.0E-03	4.1E+03	1.00E-01	6.46E-07	2.0E-03	3.1E+03	3.80E-06	2.60E-06			7.59E-10	5.20E-10			1.8E+03
SVOC	2,6-Dinitrotoluene	606-20-2	B2	4.89E-07	1.0E-03	2.0E+03	1.00E-01	6.46E-07	1.0E-03	1.5E+03	4.82E-06	3.30E-06	3.5E-03	1.1E+03	7.59E-10	5.20E-10	3.5E-03	6.7E+06	4.8E+02
SVOC	Di-n-octylphthalate	117-84-0		4.89E-07	4.0E-02	8.2E+04	1.00E-01	6.46E-07	4.0E-02	6.2E+04	3.06E-08	2.10E-08			7.59E-10	5.20E-10			3.5E+04
SVOC	Fluoranthene	206-44-0	D	4.89E-07	4.0E-02	8.2E+04	1.30E-01	8.40E-07	4.0E-02	4.8E+04	5.93E-07	4.06E-07	1.4E-01	3.4E+05	7.59E-10	5.20E-10	1.4E-01	2.7E+08	2.8E+04
SVOC	Fluorene	86-73-7	D	4.89E-07	4.0E-02	8.2E+04	1.30E-01	8.40E-07	4.0E-02	4.8E+04	3.61E-06	2.48E-06	1.4E-01	5.7E+04	7.59E-10	5.20E-10	1.4E-01	2.7E+08	2.0E+04
SVOC	Formaldehyde	50-00-0	B1	4.89E-07	2.0E-01	4.1E+05			2.0E-01						7.59E-10	5.20E-10			
SVOC	Hexachlorobutadiene	87-68-3	C	4.89E-07	2.0E-04	4.1E+02	1.00E-01	6.46E-07	2.0E-04	3.1E+02	2.58E-05	1.76E-05			7.59E-10	5.20E-10			1.8E+02
SVOC	Hexachlorocyclopentadiene	77-47-4	E	4.89E-07	6.0E-03	1.2E+04	1.00E-01	6.46E-07	6.0E-03	9.3E+03	1.31E-05	8.94E-06	2.0E-04	2.2E+01	7.59E-10	5.20E-10	2.0E-04	3.8E+05	2.2E+01
SVOC	Hexachloroethane	67-72-1	C	4.89E-07	1.0E-03	2.0E+03	1.00E-01	6.46E-07	1.0E-03	1.5E+03	2.05E-05	1.40E-05			7.59E-10	5.20E-10			8.8E+02
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	B2	4.89E-08			1.30E-01	8.40E-08			2.72E-09	1.87E-09			7.59E-11	5.20E-11			
SVOC	Isophorone	78-59-1	C	4.89E-07	2.0E-01	4.1E+05	1.00E-01	6.46E-07	2.0E-01	3.1E+05	2.14E-05	1.47E-05			7.59E-10	5.20E-10			1.8E+05
SVOC	2-Methylnaphthalene	91-57-6	ID	4.89E-07	4.0E-03	8.2E+03	1.00E-01	6.46E-07	4.0E-03	6.2E+03	1.76E-05	1.21E-05	3.0E-03	2.5E+02	7.59E-10	5.20E-10	3.0E-03	5.8E+06	2.3E+02
SVOC	Methylphenol (total)	1319-77-3		4.89E-07	5.0E-02	1.0E+05	1.00E-01	6.46E-07	5.0E-02	7.7E+04	7.01E-06	4.80E-06			7.59E-10	5.20E-10			4.4E+04
SVOC	Naphthalene	91-20-3	C	4.89E-07	2.0E-02	4.1E+04	1.30E-01	8.40E-07	2.0E-02	2.4E+04	3.30E-05	2.26E-05	3.0E-03	1.3E+02	7.59E-10	5.20E-10	3.0E-03	5.8E+06	1.3E+02
SVOC	2-Nitroaniline	88-74-4		4.89E-07	3.0E-03	6.1E+03	1.00E-01	6.46E-07	3.0E-03	4.6E+03	3.63E-06	2.49E-06	2.0E-04	8.0E+01	7.59E-10	5.20E-10	2.0E-04	3.8E+05	7.8E+01
SVOC	Nitrobenzene	98-95-3	D	4.89E-07	5.0E-04	1.0E+03	1.00E-01	6.46E-07	5.0E-04	7.7E+02	4.02E-05	2.75E-05	2.0E-03	7.3E+01	7.59E-10	5.20E-10	2.0E-03	3.8E+06	6.2E+01
SVOC	2-Nitrophenol	88-75-5		4.89E-07			1.00E-01	6.46E-07			2.22E-05	1.52E-05			7.59E-10	5.20E-10			
SVOC	4-Nitrophenol	100-02-7		4.89E-07			1.00E-01	6.46E-07			1.82E-06	1.25E-06			7.59E-10	5.20E-10			
SVOC	N-Nitrosodiphenylamine	86-30-6	B2	4.89E-07	2.0E-02	4.1E+04	1.00E-01	6.46E-07	2.0E-02	3.1E+04	3.07E-06	2.10E-06			7.59E-10	5.20E-10			1.8E+04
SVOC	N-Nitroso-di-n-propylamine	621-64-7	B2	4.89E-07			1.00E-01	6.46E-07			1.44E-05	9.85E-06			7.59E-10	5.20E-10			
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	C	4.89E-07	4.0E-02	8.2E+04	1.00E-01	6.46E-07	4.0E-02	6.2E+04	4.42E-05	3.03E-05			7.59E-10	5.20E-10			3.5E+04
SVOC	Pentachlorophenol	87-86-5	B2	4.89E-07	3.0E-02	6.1E+04	2.50E-01	1.61E-06	3.0E-02	1.9E+04	7.14E-07	4.89E-07	1.1E-01	2.1E+05	7.59E-10	5.20E-10	1.1E-01	2.0E+08	1.3E+04
SVOC	Phenanthrene	85-01-8	D	4.89E-07	3.0E-02	6.1E+04	1.30E-01	8.40E-07	3.0E-02	3.6E+04	1.67E-06	1.15E-06	1.1E-01	9.2E+04	7.59E-10	5.20E-10	1.1E-01	2.0E+08	1.8E+04
SVOC	Phenol	108-95-2	ID	4.89E-07	3.0E-01	6.1E+05	1.00E-01	6.46E-07	3.0E-01	4.6E+05	7.38E-06	5.05E-06			7.59E-10	5.20E-10			2.6E+05
SVOC	Pyrene	129-00-0	D	4.89E-07	3.0E-02	6.1E+04	1.30E-01	8.40E-07	3.0E-02	3.6E+04	4.72E-07	3.23E-07	1.1E-01	3.2E+05	7.59E-10	5.20E-10	1.1E-01	2.0E+08	2.1E+04

Attachment G1: Risk-Based Noncancer Criteria for Exposure of Routine Workers to Soil
GMC: NAO Flint Operations Site, Flint, Michigan

				Soil Ingestion			Soil Dermal Contact				Soil Vapor Inhalation				Soil Particulate Inhalation				
Chem Group	**Chemical**	**CASRN**	**Cancer Class**	**ADD** (mg/kg/d)	**RfD_{oral}** (mg/kg/d)	**RBC** (mg/kg)	**ABS_{derm}**	**ADD** (mg/kg/d)	**RfD_{derm}** (mg/kg/d)	**RBC** (mg/kg)	**C_{air}** (mg/m^3)	**Dose** (mg/m^3)	**RfC** (mg/m^3)	**RBC** (mg/kg)	**C_{air}** (mg/m^3)	**Dose** (mg/m^3)	**RfC** (mg/m^3)	**RBC** (mg/kg)	**Noncancer RBC** (mg/kg)
SVOC	2,4,5-Trichlorophenol	95-95-4		4.89E-07	1.0E-01	2.0E+05	1.00E-01	6.46E-07	1.0E-01	1.5E+05	2.49E-06	1.71E-06			7.59E-10	5.20E-10			8.8E+04
SVOC	2,4,6-Trichlorophenol	88-06-2	B2	4.89E-07	1.0E-04	2.0E+02	1.00E-01	6.46E-07	1.0E-04	1.5E+02	6.94E-06	4.75E-06			7.59E-10	5.20E-10			8.8E+01
PCB	PCBs (total)	1336-36-3	B2	4.89E-07	2.0E-05	4.1E+01	1.40E-01	9.04E-07	2.0E-05	2.2E+01	1.13E-06	7.74E-07			7.59E-10	5.20E-10			1.4E+01
INORG	Antimony	7440-36-0		4.89E-07	4.0E-04	8.2E+02			6.0E-05				1.4E-03		7.59E-10	5.20E-10	1.4E-03	2.7E+06	8.2E+02
INORG	Arsenic	7440-38-2	A	4.89E-07	3.0E-04	6.1E+02	3.00E-02	1.94E-07	3.0E-04	1.5E+03					7.59E-10	5.20E-10			4.4E+02
INORG	Barium	7440-39-3	D	4.89E-07	7.0E-02	1.4E+05			4.9E-03						7.59E-10	5.20E-10			
INORG	Beryllium	7440-41-7	B1	4.89E-07	2.0E-03	4.1E+03			1.4E-05				2.0E-05		7.59E-10	5.20E-10	2.0E-05	3.8E+04	3.7E+03
INORG	Cadmium	7440-43-9	B1	4.89E-07	1.0E-03	2.0E+03	1.00E-03	6.46E-09	2.5E-05	3.9E+03			2.0E-04		7.59E-10	5.20E-10	2.0E-04	3.8E+05	1.3E+03
INORG	Chromium (total)	7440-47-3		4.89E-07	3.0E-03	6.1E+03			7.5E-05				1.0E-04		7.59E-10	5.20E-10	1.0E-04	1.9E+05	5.9E+03
INORG	Chromium III	16065-83-1	D	4.89E-07	1.5E+00	3.1E+06			2.0E-02				5.3E+00		7.59E-10	5.20E-10	5.3E+00	1.0E+10	3.1E+06
INORG	Chromium VI	18540-29-9	A	4.89E-07	3.0E-03	6.1E+03			7.5E-05				1.0E-04		7.59E-10	5.20E-10	1.0E-04	1.9E+05	5.9E+03
INORG	Cobalt	7440-48-4	B1	4.89E-07	2.0E-02	4.1E+04			2.0E-02				2.0E-05		7.59E-10	5.20E-10	2.0E-05	3.8E+04	2.0E+04
INORG	Copper	7440-50-8	D	4.89E-07	4.0E-02	8.2E+04			4.0E-02				1.4E-01		7.59E-10	5.20E-10	1.4E-01	2.7E+08	8.2E+04
INORG	Cyanide (total)	57-12-5	D	4.89E-07	2.0E-02	4.1E+04			2.0E-02				7.0E-02		7.59E-10	5.20E-10	7.0E-02	1.3E+08	4.1E+04
INORG	Fluoride	16984-48-8		4.89E-07											7.59E-10	5.20E-10			
INORG	Lead	7439-92-1	B2	4.89E-07											7.59E-10	5.20E-10			
INORG	Manganese	7439-96-5	D	4.89E-07	1.4E-01	2.9E+05			8.4E-03				5.0E-05		7.59E-10	5.20E-10	5.0E-05	9.6E+04	7.2E+04
INORG	Mercury	7439-97-6	D	4.89E-07	3.0E-04	6.1E+02			3.0E-04		5.81E-06	3.98E-06	3.0E-04	7.5E+01	7.59E-10	5.20E-10	3.0E-04	5.8E+05	6.7E+01
INORG	Nickel	7440-02-0	A	4.89E-07	2.0E-02	4.1E+04			8.0E-04						7.59E-10	5.20E-10			
INORG	Selenium	7782-49-2	D	4.89E-07	5.0E-03	1.0E+04			5.0E-03				1.8E-02		7.59E-10	5.20E-10	1.8E-02	3.4E+07	1.0E+04
INORG	Silver	7440-22-4	D	4.89E-07	5.0E-03	1.0E+04			2.0E-04				1.0E-05		7.59E-10	5.20E-10	1.0E-05	1.9E+04	6.7E+03
INORG	Thallium	7440-28-0		4.89E-07	7.0E-05	1.4E+02			7.0E-05				2.5E-04		7.59E-10	5.20E-10	2.5E-04	4.7E+05	1.4E+02
INORG	Vanadium	7440-62-2		4.89E-07	7.0E-03	1.4E+04			1.8E-04				2.5E-02		7.59E-10	5.20E-10	2.5E-02	4.7E+07	1.4E+04
INORG	Zinc	7440-66-6	D	4.89E-07	3.0E-01	6.1E+05			3.0E-01				1.1E+00		7.59E-10	5.20E-10	1.1E+00	2.0E+09	6.1E+05

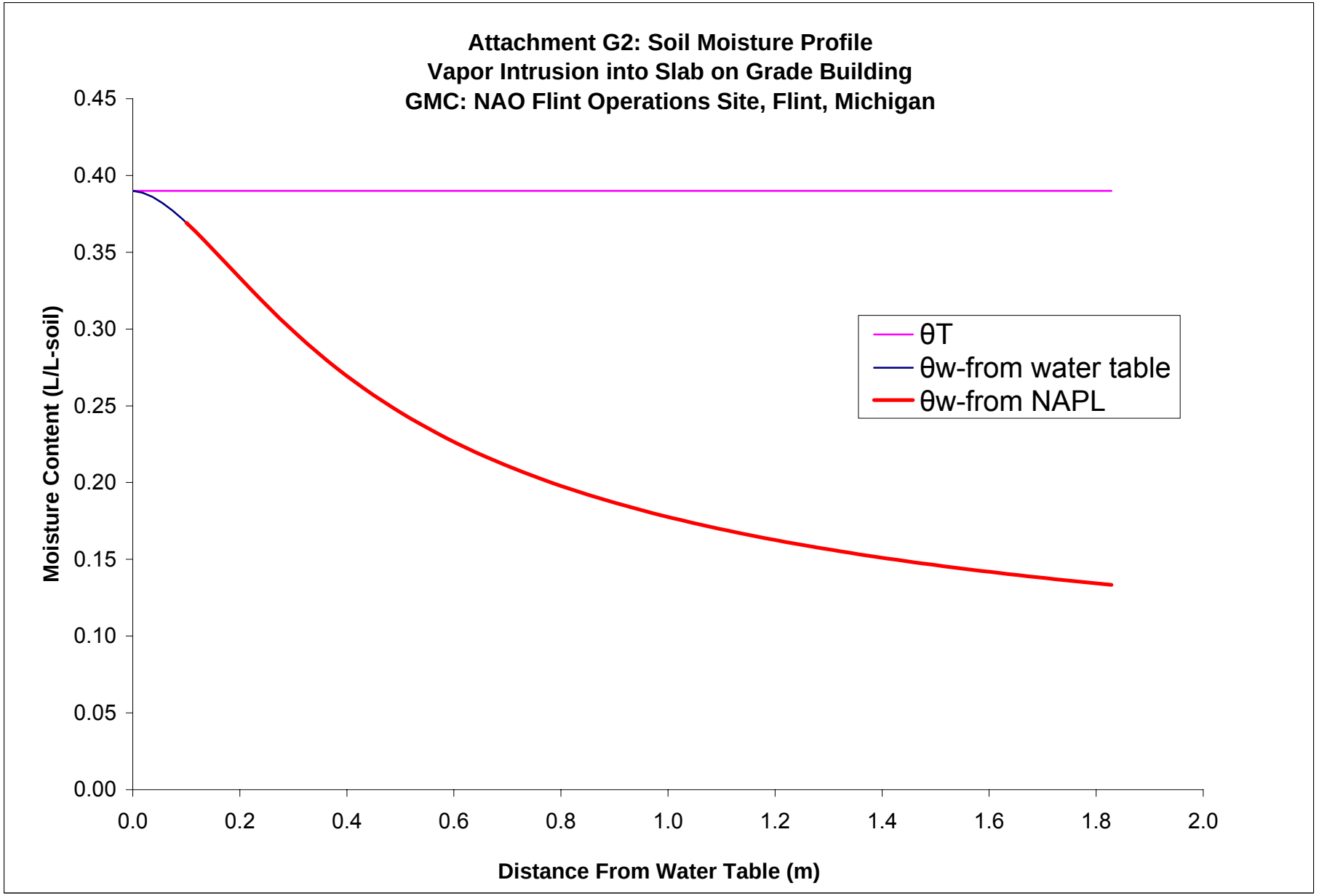
Notes:

Target hazard index of 1

C/Q based on the annual maximum exposure for a 1/2 acre source area = 14.53 kg/m3 per (kg/m2-s)

PM10 flux modeled based on average wind speed in Flint

Attachment G2
Exposure of Routine Workers via Vapor Intrusion
from Soil, Groundwater, and LNAPL


Attachment G2: Soil Moisture Profile
Vapor Intrusion into Slab on Grade Building
GMC: NAO Flint Operations Site, Flint, Michigan
Moisture Content (L/L-soil)
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
Distance From Water Table (m)
θT
θw-from water table
θw-from NAPL

Attachment G2:Vapor Intrusion into Commercial/Industrial Slab on Grade Building from Subsurface Soil
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	D_{air} (m^2/d)	D_{water} (m^2/d)	H (unitless)	D_{crack} (m^2/d)	D_{eff}^T (m^2/d)	α_∞ (unitless)	K_{oc} (L/kg)	K_d (L/kg)	$C_{s,\ vap}$ (kg-soil/m^3)	α_{ML} (unitless)	α (unitless)	C_{bldg} (kg-soil/m^3)
VOC	Acetone	67-64-1	1.07E+00	9.85E-05	7.95E-04	7.17E-02	7.17E-02	1.12E-05	5.81E-01	1.16E-03	9.15E+00	8.08E-04	1.12E-05	1.02E-04
VOC	Benzene	71-43-2	7.60E-01	8.47E-05	1.14E-01	5.01E-02	5.01E-02	1.11E-05	5.82E+01	1.16E-01	5.19E+02	1.42E-05	1.11E-05	5.78E-03
VOC	Bromodichloromethane	75-27-4	2.57E-01	9.16E-05	3.28E-02	1.70E-02	1.70E-02	1.11E-05	5.51E+01	1.10E-01	1.63E+02	4.53E-05	1.11E-05	1.81E-03
VOC	2-Butanone	78-93-3	6.98E-01	8.47E-05	1.14E-03	4.67E-02	4.67E-02	1.11E-05	2.00E+00	3.99E-03	1.27E+01	5.81E-04	1.11E-05	1.42E-04
VOC	Carbon Disulfide	75-15-0	8.99E-01	8.64E-05	6.20E-01	5.92E-02	5.92E-02	1.12E-05	4.59E+01	9.19E-02	2.27E+03	3.26E-06	3.26E-06	7.39E-03
VOC	Carbon Tetrachloride	56-23-5	6.74E-01	7.60E-05	6.25E-01	4.44E-02	4.44E-02	1.11E-05	1.74E+02	3.48E-01	1.18E+03	6.27E-06	6.27E-06	7.39E-03
VOC	Chlorobenzene	108-90-7	6.31E-01	7.52E-05	7.60E-02	4.16E-02	4.16E-02	1.11E-05	2.20E+02	4.41E-01	1.41E+02	5.24E-05	1.11E-05	1.57E-03
VOC	Chloroethane	75-00-3	2.34E+00	9.94E-05	1.80E-01	1.54E-01	1.54E-01	1.12E-05	1.62E+01	3.25E-02	1.23E+03	5.99E-06	5.99E-06	7.39E-03
VOC	Chloroform	67-66-3	8.99E-01	8.64E-05	7.50E-02	5.92E-02	5.92E-02	1.12E-05	3.97E+01	7.94E-02	4.25E+02	1.74E-05	1.12E-05	4.74E-03
VOC	Chloromethane	74-87-3	1.09E+00	5.62E-05	1.80E-01	7.17E-02	7.17E-02	1.12E-05	3.97E+01	7.94E-02	9.34E+02	7.91E-06	7.91E-06	7.39E-03
VOC	Cumene	98-82-8	5.62E-01	6.13E-05	2.66E-01	3.70E-02	3.70E-02	1.11E-05	7.05E+02	1.41E+00	1.73E+02	4.27E-05	1.11E-05	1.93E-03
VOC	Cyclohexane	110-82-7	7.25E-01	7.86E-05	3.98E+00	4.78E-02	4.78E-02	1.11E-05	6.35E+02	1.27E+00	2.02E+03	3.66E-06	3.66E-06	7.39E-03
VOC	Dibromochloromethane	124-48-1	1.69E-01	9.07E-05	1.61E-02	1.12E-02	1.12E-02	1.10E-05	6.26E+01	1.25E-01	7.52E+01	9.83E-05	1.10E-05	8.27E-04
VOC	1,2-Dichlorobenzene	95-50-1	5.96E-01	6.83E-05	3.90E-02	3.93E-02	3.93E-02	1.11E-05	6.23E+02	1.25E+00	2.91E+01	2.54E-04	1.11E-05	3.24E-04
VOC	1,3-Dichlorobenzene	541-73-1	5.98E-01	6.79E-05	6.33E-02	3.94E-02	3.94E-02	1.11E-05	5.69E+02	1.14E+00	5.14E+01	1.44E-04	1.11E-05	5.72E-04
VOC	1,4-Dichlorobenzene	106-46-7	5.96E-01	6.83E-05	4.98E-02	3.93E-02	3.93E-02	1.11E-05	6.12E+02	1.22E+00	3.78E+01	1.96E-04	1.11E-05	4.21E-04
VOC	Dichlorodifluoromethane	75-71-8	6.91E-01	6.91E-05	7.01E+00	4.55E-02	4.55E-02	1.11E-05	6.15E+01	1.23E-01	5.41E+03	1.37E-06	1.37E-06	7.39E-03
VOC	1,1-Dichloroethane	75-34-3	6.41E-01	9.07E-05	1.15E-01	4.22E-02	4.22E-02	1.11E-05	3.13E+01	6.27E-02	6.92E+02	1.07E-05	1.07E-05	7.39E-03
VOC	1,2-Dichloroethane	107-06-2	8.99E-01	8.55E-05	2.01E-02	5.92E-02	5.92E-02	1.12E-05	1.75E+01	3.50E-02	1.62E+02	4.56E-05	1.12E-05	1.81E-03
VOC	1,1-Dichloroethene	75-35-4	7.78E-01	8.99E-05	5.35E-01	5.12E-02	5.12E-02	1.11E-05	5.82E+01	1.16E-01	1.88E+03	3.94E-06	3.94E-06	7.39E-03
VOC	cis-1,2-Dichloroethene	156-59-2	6.36E-01	9.76E-05	8.35E-02	4.19E-02	4.19E-02	1.11E-05	3.56E+01	7.12E-02	4.92E+02	1.50E-05	1.11E-05	5.48E-03
VOC	trans-1,2-Dichloroethene	156-60-5	6.11E-01	1.03E-04	1.93E-01	4.02E-02	4.02E-02	1.11E-05	5.22E+01	1.04E-01	8.76E+02	8.44E-06	8.44E-06	7.39E-03
VOC	1,2-Dichloropropane	78-87-5	6.76E-01	7.54E-05	5.75E-02	4.45E-02	4.45E-02	1.11E-05	4.35E+01	8.70E-02	3.17E+02	2.33E-05	1.11E-05	3.53E-03
VOC	Ethyl Benzene	100-41-4	6.48E-01	6.74E-05	1.62E-01	4.27E-02	4.27E-02	1.11E-05	3.67E+02	7.35E-01	1.91E+02	3.87E-05	1.11E-05	2.13E-03
VOC	2-Hexanone	591-78-6			3.58E-02				1.48E+01	2.97E-02	2.96E+02	2.50E-05	2.50E-05	7.39E-03
VOC	Methyl Acetate	79-20-9	8.27E-01	9.50E-05	1.85E-03	5.49E-02	5.49E-02	1.12E-05	1.66E+00	3.33E-03	2.08E+01	3.56E-04	1.12E-05	2.32E-04
VOC	Methyl tert-butyl ether	1634-04-4	7.42E-01	8.73E-05	1.20E-02	4.90E-02	4.90E-02	1.11E-05	1.15E+01	2.30E-02	1.09E+02	6.81E-05	1.11E-05	1.21E-03
VOC	4-Methyl-2-pentanone	108-10-1	6.48E-01	6.74E-05	2.82E-03	4.29E-02	4.29E-02	1.11E-05	1.05E+01	2.10E-02	2.64E+01	2.81E-04	1.11E-05	2.94E-04
VOC	Methylcyclohexane	108-87-2	6.35E-01	7.36E-05	8.78E+00	4.18E-02	4.18E-02	1.11E-05	2.66E+02	5.33E-01	4.43E+03	1.67E-06	1.67E-06	7.39E-03
VOC	Methylene Chloride	75-09-2	8.73E-01	1.01E-04	4.49E-02	5.75E-02	5.75E-02	1.12E-05	1.17E+01	2.34E-02	3.87E+02	1.91E-05	1.12E-05	4.32E-03
VOC	Styrene	100-42-5	6.13E-01	6.91E-05	5.65E-02	4.04E-02	4.04E-02	1.11E-05	7.77E+02	1.55E+00	3.43E+01	2.16E-04	1.11E-05	3.82E-04
VOC	Tetrachloroethene	127-18-4	6.22E-01	7.08E-05	3.77E-01	4.10E-02	4.10E-02	1.11E-05	1.56E+02	3.12E-01	8.27E+02	8.94E-06	8.94E-06	7.39E-03
VOC	Toluene	108-88-3	7.52E-01	7.43E-05	1.36E-01	4.95E-02	4.95E-02	1.11E-05	1.80E+02	3.61E-01	2.91E+02	2.54E-05	1.11E-05	3.24E-03
VOC	1,2,4-Trichlorobenzene	120-82-1	2.59E-01	7.11E-05	2.91E-02	1.71E-02	1.71E-02	1.11E-05	1.79E+03	3.59E+00	7.91E+00	9.35E-04	1.11E-05	8.75E-05
VOC	1,1,1-Trichloroethane	71-55-6	6.74E-01	7.60E-05	3.53E-01	4.44E-02	4.44E-02	1.11E-05	1.10E+02	2.20E-01	9.77E+02	7.57E-06	7.57E-06	7.39E-03
VOC	1,1,2-Trichloroethane	79-00-5	6.74E-01	7.60E-05	1.87E-02	4.44E-02	4.44E-02	1.11E-05	5.03E+01	1.01E-01	9.89E+01	7.48E-05	1.11E-05	1.10E-03
VOC	Trichloroethene	79-01-6	6.83E-01	7.86E-05	2.11E-01	4.50E-02	4.50E-02	1.11E-05	1.68E+02	3.35E-01	4.65E+02	1.59E-05	1.11E-05	5.18E-03
VOC	Trichlorofluoromethane	75-69-4	7.52E-01	8.38E-05	1.98E+00	4.95E-02	4.95E-02	1.11E-05	1.21E+02	2.42E-01	3.12E+03	2.37E-06	2.37E-06	7.39E-03
VOC	1,1,2-Trichloro-1,2,2-trifluoroet	76-13-1	6.74E-01	7.08E-05	9.83E+00	4.44E-02	4.44E-02	1.11E-05	3.81E+02	7.62E-01	4.14E+03	1.78E-06	1.78E-06	7.39E-03
VOC	1,2,4-Trimethylbenzene	95-63-6	5.24E-01	6.84E-05	1.26E-01	3.45E-02	3.45E-02	1.11E-05	8.97E+02	1.79E+00	6.63E+01	1.12E-04	1.11E-05	7.37E-04
VOC	1,3,5-Trimethylbenzene	108-67-8	5.20E-01	7.49E-05	1.20E-01	3.43E-02	3.43E-02	1.11E-05	1.76E+03	3.52E+00	3.31E+01	2.23E-04	1.11E-05	3.69E-04
VOC	Vinyl Chloride	75-01-4	9.16E-01	1.06E-04	5.55E-01	6.03E-02	6.03E-02	1.12E-05	1.85E+01	3.69E-02	2.66E+03	2.78E-06	2.78E-06	7.39E-03
VOC	Xylenes (total)	1330-20-7	6.74E-01	7.56E-05	1.38E-01	4.44E-02	4.44E-02	1.11E-05	3.86E+02	7.71E-01	1.57E+02	4.70E-05	1.11E-05	1.75E-03
SVOC	Acenaphthene	83-32-9	3.64E-01	6.64E-05	3.18E-03	2.42E-02	2.42E-02	1.11E-05	7.14E+03	1.43E+01	2.21E-01	3.34E-02	1.11E-05	2.46E-06
SVOC	Acenaphthylene	208-96-8	3.88E-01	6.03E-05	2.31E-03	2.58E-02	2.58E-02	1.11E-05	7.47E+03	1.49E+01	1.54E-01	4.81E-02	1.11E-05	1.71E-06
SVOC	Acetophenone	98-86-2	6.91E-01	6.91E-05	2.19E-04	4.84E-02	4.84E-02	1.11E-05	3.58E+01	7.15E-02	1.39E+00	5.31E-03	1.11E-05	1.55E-05
SVOC	Anthracene	120-12-7	2.80E-01	6.69E-05	1.34E-03	1.89E-02	1.89E-02	1.11E-05	2.97E+04	5.94E+01	2.24E-02	3.30E-01	1.11E-05	2.48E-07
SVOC	Atrazine	1912-24-9	2.24E-01	5.76E-05	1.25E-07	4.20E+00	4.20E+00	3.08E-05	3.68E+02	7.36E-01	1.52E-04	4.86E+01	3.08E-05	4.68E-09

Attachment G2:Vapor Intrusion into Commercial/Industrial Slab on Grade Building from Subsurface Soil
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	D_{air} (m^2/d)	D_{water} (m^2/d)	H (unitless)	D_{crack} (m^2/d)	D_{eff}^T (m^2/d)	α_∞ (unitless)	K_{oc} (L/kg)	K_d (L/kg)	$C_{s,\ vap}$ (kg-soil/m^3)	α_{ML} (unitless)	α (unitless)	C_{bldg} (kg-soil/m^3)
SVOC	Benzaldehyde	100-52-7	6.23E-01	7.84E-05	4.86E-04	4.25E-02	4.25E-02	1.11E-05	2.85E+01	5.70E-02	3.41E+00	2.17E-03	1.11E-05	3.80E-05
SVOC	Benzo(a)anthracene	56-55-3	4.41E-01	7.78E-05	6.85E-05	3.93E-02	3.93E-02	1.11E-05	4.01E+05	8.02E+02	8.54E-05	8.66E+01	1.11E-05	9.51E-10
SVOC	Benzo(a)pyrene	50-32-8	3.72E-01	7.78E-05	2.32E-05	5.49E-02	5.49E-02	1.12E-05	1.01E+06	2.03E+03	1.14E-05	6.48E+02	1.12E-05	1.27E-10
SVOC	Benzo(b)fluoranthene	205-99-2	1.95E-01	4.80E-05	2.28E-03	1.31E-02	1.31E-02	1.10E-05	1.24E+06	2.49E+03	9.14E-04	8.09E+00	1.10E-05	1.01E-08
SVOC	Benzo(g,h,i)perylene	191-24-2	1.88E-01	4.54E-05	2.88E-06	1.55E-01	1.55E-01	1.12E-05	1.28E+07	2.56E+04	1.13E-07	6.57E+04	1.12E-05	1.26E-12
SVOC	Benzo(k)fluoranthene	207-08-9	1.95E-01	4.80E-05	1.70E-05	3.85E-02	3.85E-02	1.11E-05	1.24E+06	2.49E+03	6.83E-06	1.08E+03	1.11E-05	7.61E-11
SVOC	Biphenyl	92-52-4	3.49E-01	7.04E-05	6.13E-03	2.31E-02	2.31E-02	1.11E-05	1.05E+04	2.10E+01	2.91E-01	2.54E-02	1.11E-05	3.23E-06
SVOC	bis(2-Chloroethoxy)methane	111-91-1	3.77E-01	7.31E-05	3.47E-06	2.16E-01	2.16E-01	1.12E-05	1.73E+01	3.47E-02	2.89E-02	2.56E-01	1.12E-05	3.23E-07
SVOC	bis(2-Chloroethyl) ether	111-44-4	5.98E-01	6.51E-05	3.69E-04	4.10E-02	4.10E-02	1.11E-05	1.55E+01	3.10E-02	3.16E+00	2.34E-03	1.11E-05	3.52E-05
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	3.03E-01	3.16E-05	2.09E-06	1.57E-01	1.57E-01	1.12E-05	1.50E+07	3.00E+04	6.97E-08	1.06E+05	1.12E-05	7.79E-13
SVOC	Butylbenzylphthalate	85-68-7	1.50E-01	4.17E-05	2.59E-05	2.45E-02	2.45E-02	1.11E-05	5.73E+04	1.15E+02	2.25E-04	3.28E+01	1.11E-05	2.50E-09
SVOC	Caprolactam	105-60-2	5.98E-01	7.77E-05	1.03E-07	6.88E+00	6.88E+00	4.65E-05	6.51E-01	1.30E-03	1.19E-03	6.24E+00	4.65E-05	5.51E-08
SVOC	Carbazole	86-74-8	3.37E-01	6.07E-05	3.13E-07	1.78E+00	1.78E+00	1.71E-05	3.38E+03	6.77E+00	4.57E-05	1.62E+02	1.71E-05	7.81E-10
SVOC	4-Chloro-3-methylphenol	59-50-7	5.24E-01	8.22E-05	8.15E-06	1.26E-01	1.26E-01	1.12E-05	1.12E+03	2.23E+00	3.52E-03	2.10E+00	1.12E-05	3.93E-08
SVOC	2-Chloronaphthalene	91-58-7	4.25E-01	7.59E-05	6.42E-03	2.81E-02	2.81E-02	1.11E-05	1.12E+04	2.25E+01	2.85E-01	2.60E-02	1.11E-05	3.16E-06
SVOC	2-Chlorophenol	95-57-8	4.33E-01	8.17E-05	8.00E-03	2.86E-02	2.86E-02	1.11E-05	3.88E+02	7.76E-01	9.27E+00	7.97E-04	1.11E-05	1.03E-04
SVOC	Chrysene	218-01-9	2.14E-01	5.37E-05	1.94E-03	1.44E-02	1.44E-02	1.10E-05	4.01E+05	8.02E+02	2.42E-03	3.06E+00	1.10E-05	2.67E-08
SVOC	Dibenz(a,h)anthracene	53-70-3	1.75E-01	4.48E-05	3.02E-07	1.36E+00	1.36E+00	1.49E-05	3.77E+06	7.54E+03	4.00E-08	1.85E+05	1.49E-05	5.94E-13
SVOC	Dibenzofuran	132-64-9	2.06E-01	5.18E-05	2.57E-04	1.54E-02	1.54E-02	1.11E-05	2.07E+04	4.14E+01	6.21E-03	1.19E+00	1.11E-05	6.86E-08
SVOC	2,4-Dichlorophenol	120-83-2	2.99E-01	7.58E-05	6.50E-05	3.03E-02	3.03E-02	1.11E-05	1.47E+02	2.94E-01	1.71E-01	4.32E-02	1.11E-05	1.90E-06
SVOC	Diethylphthalate	84-66-2	2.21E-01	5.49E-05	9.25E-06	6.84E-02	6.84E-02	1.12E-05	2.87E+02	5.74E-01	1.40E-02	5.27E-01	1.12E-05	1.57E-07
SVOC	2,4-Dimethylphenol	105-67-9	5.05E-01	7.51E-05	4.10E-05	4.99E-02	4.99E-02	1.11E-05	2.09E+02	4.18E-01	8.14E-02	9.08E-02	1.11E-05	9.08E-07
SVOC	Dimethylphthalate	131-11-3	4.91E-01	5.43E-05	2.15E-06	2.62E-01	2.62E-01	1.12E-05	6.89E+01	1.38E-01	9.60E-03	7.70E-01	1.12E-05	1.07E-07
SVOC	Di-n-butylphthalate	84-74-2	3.78E-01	6.79E-05	1.93E-08	3.20E+01	3.20E+01	1.95E-04	3.40E+04	6.81E+01	2.82E-07	2.62E+04	1.95E-04	5.50E-11
SVOC	4,6-Dinitro-2-methylphenol	534-52-1	2.38E-01	5.97E-05	8.73E-06	7.78E-02	7.78E-02	1.12E-05	1.21E+02	2.43E-01	2.66E-02	2.78E-01	1.12E-05	2.97E-07
SVOC	2,4-Dinitrotoluene	121-14-2	1.75E+00	6.10E-05	1.90E-06	4.07E-01	4.07E-01	1.13E-05	9.46E+01	1.89E-01	6.91E-03	1.07E+00	1.13E-05	7.81E-08
SVOC	2,6-Dinitrotoluene	606-20-2	2.83E-01	6.27E-05	1.53E-05	5.58E-02	5.58E-02	1.12E-05	6.89E+01	1.38E-01	6.85E-02	1.08E-01	1.12E-05	7.64E-07
SVOC	Di-n-octylphthalate	117-84-0	1.30E-01	3.09E-05	1.37E-03	8.80E-03	8.80E-03	1.09E-05	8.38E+07	1.68E+05	8.17E-06	9.04E+02	1.09E-05	8.95E-11
SVOC	Fluoranthene	206-44-0	2.61E-01	5.49E-05	3.30E-04	1.87E-02	1.87E-02	1.11E-05	1.08E+05	2.16E+02	1.53E-03	4.84E+00	1.11E-05	1.69E-08
SVOC	Fluorene	86-73-7	3.14E-01	6.81E-05	1.31E-03	2.11E-02	2.11E-02	1.11E-05	1.38E+04	2.75E+01	4.73E-02	1.56E-01	1.11E-05	5.24E-07
SVOC	Formaldehyde	50-00-0	1.56E+00	1.73E-04	6.95E-06	3.28E-01	3.28E-01	1.12E-05					1.12E-05	
SVOC	Hexachlorobutadiene	87-68-3	4.85E-01	5.32E-05	1.67E-01	3.19E-02	3.19E-02	1.11E-05	5.35E+04	1.07E+02	1.56E+00	4.74E-03	1.11E-05	1.73E-05
SVOC	Hexachlorocyclopentadiene	77-47-4	1.39E-01	6.23E-05	5.55E-01	9.16E-03	9.16E-03	1.10E-05	1.99E+05	3.98E+02	1.39E+00	5.30E-03	1.10E-05	1.53E-05
SVOC	Hexachloroethane	67-72-1	2.16E-02	5.88E-05	7.95E-02	1.43E-03	1.43E-03	9.84E-06	1.76E+03	3.52E+00	2.19E+01	3.37E-04	9.84E-06	2.16E-04
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	1.64E-01	4.89E-05	3.28E-05	2.43E-02	2.43E-02	1.11E-05	3.45E+06	6.89E+03	4.76E-06	1.55E+03	1.11E-05	5.28E-11
SVOC	Isophorone	78-59-1	5.38E-01	5.84E-05	1.36E-04	3.94E-02	3.94E-02	1.11E-05	4.69E+01	9.38E-02	7.58E-01	9.75E-03	1.11E-05	8.44E-06
SVOC	2-Methylnaphthalene	91-57-6	4.18E-01	6.70E-05	1.06E-02	2.76E-02	2.76E-02	1.11E-05	6.23E+03	1.25E+01	8.43E-01	8.77E-03	1.11E-05	9.37E-06
SVOC	Methylphenol (total)	1319-77-3	6.39E-01	8.64E-05	1.77E-05	8.65E-02	8.65E-02	1.12E-05	8.45E+01	1.69E-01	6.94E-02	1.06E-01	1.12E-05	7.75E-07
SVOC	Naphthalene	91-20-3	5.10E-01	6.48E-05	9.90E-03	3.36E-02	3.36E-02	1.11E-05	2.01E+03	4.02E+00	2.41E+00	3.07E-03	1.11E-05	2.68E-05
SVOC	2-Nitroaniline	88-74-4	6.31E-01	6.91E-05	3.27E-06	2.34E-01	2.34E-01	1.12E-05	6.59E+01	1.32E-01	1.50E-02	4.92E-01	1.12E-05	1.68E-07
SVOC	Nitrobenzene	98-95-3	6.57E-01	7.43E-05	4.92E-04	4.46E-02	4.46E-02	1.11E-05	6.44E+01	1.29E-01	2.29E+00	3.22E-03	1.11E-05	2.56E-05
SVOC	2-Nitrophenol	88-75-5	4.66E-01	6.78E-05	1.94E-04	3.39E-02	3.39E-02	1.11E-05	5.75E+01	1.15E-01	9.64E-01	7.67E-03	1.11E-05	1.07E-05
SVOC	4-Nitrophenol	100-02-7	5.40E-01	8.30E-05	8.48E-09	8.89E+01	8.89E+01	5.30E-04	7.55E+01	1.51E-01	3.59E-05	2.06E+02	5.30E-04	1.90E-08
SVOC	N-Nitrosodiphenylamine	86-30-6	2.70E-01	5.49E-05	1.03E-04	2.26E-02	2.26E-02	1.11E-05	1.29E+03	2.58E+00	3.85E-02	1.92E-01	1.11E-05	4.27E-07
SVOC	N-Nitroso-di-n-propylamine	621-64-7	4.71E-01	7.06E-05	4.62E-05	4.49E-02	4.49E-02	1.11E-05	2.40E+01	4.80E-02	3.45E-01	2.14E-02	1.11E-05	3.85E-06
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	5.20E-01	5.54E-05	2.39E-03	3.45E-02	3.45E-02	1.11E-05	2.56E+02	5.12E-01	4.00E+00	1.85E-03	1.11E-05	4.45E-05
SVOC	Pentachlorophenol	87-86-5	4.84E-01	5.27E-05	5.00E-07	9.88E-01	9.88E-01	1.31E-05	5.92E+02	1.18E+00	3.94E-04	1.88E+01	1.31E-05	5.16E-09
SVOC	Phenanthrene	85-01-8	3.24E-01	6.45E-05	4.76E-04	2.26E-02	2.26E-02	1.11E-05	2.42E+04	4.85E+01	9.81E-03	7.54E-01	1.11E-05	1.09E-07

Attachment G2:Vapor Intrusion into Commercial/Industrial Slab on Grade Building from Subsurface Soil
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	D_{air} (m^2/d)	D_{water} (m^2/d)	H (unitless)	D_{crack} (m^2/d)	D_{eff}^T (m^2/d)	α_∞ (unitless)	K_{oc} (L/kg)	K_d (L/kg)	$C_{s,\ vap}$ (kg-soil/m^3)	α_{ML} (unitless)	α (unitless)	C_{bldg} (kg-soil/m^3)
SVOC	Phenol	108-95-2	7.08E-01	7.86E-05	8.15E-06	1.34E-01	1.34E-01	1.12E-05	2.88E+01	5.76E-02	5.69E-02	1.30E-01	1.12E-05	6.36E-07
SVOC	Pyrene	129-00-0	2.35E-01	6.26E-05	2.26E-04	1.80E-02	1.80E-02	1.11E-05	1.06E+05	2.11E+02	1.07E-03	6.92E+00	1.11E-05	1.18E-08
SVOC	2,4,5-Trichlorophenol	95-95-4	2.51E-01	6.07E-05	8.90E-05	2.28E-02	2.28E-02	1.11E-05	1.60E+03	3.19E+00	2.71E-02	2.72E-01	1.11E-05	3.01E-07
SVOC	2,4,6-Trichlorophenol	88-06-2	2.75E-01	5.40E-05	1.60E-04	2.12E-02	2.12E-02	1.11E-05	3.81E+02	7.62E-01	1.88E-01	3.93E-02	1.11E-05	2.09E-06
PCB	PCBs (total)	1336-36-3	1.75E-01	4.32E-05	4.09E-02	1.15E-02	1.15E-02	1.10E-05	2.45E+06	4.91E+03	8.33E-03	8.88E-01	1.10E-05	9.16E-08
INORG	Antimony	7440-36-0								4.50E+01				
INORG	Arsenic	7440-38-2								2.90E+01				
INORG	Barium	7440-39-3								4.10E+01				
INORG	Beryllium	7440-41-7								7.90E+02				
INORG	Cadmium	7440-43-9								7.50E+01				
INORG	Chromium (total)	7440-47-3								1.90E+01				
INORG	Chromium III	16065-83-1								1.80E+06				
INORG	Chromium VI	18540-29-9								1.90E+01				
INORG	Cobalt	7440-48-4								4.50E+01				
INORG	Copper	7440-50-8								3.50E+01				
INORG	Cyanide (total)	57-12-5								9.90E+00				
INORG	Fluoride	16984-48-8												
INORG	Lead	7439-92-1								9.00E+02				
INORG	Manganese	7439-96-5								6.50E+01				
INORG	Mercury	7439-97-6	2.65E-01	5.44E-05	1.45E-01	1.75E-02	1.75E-02	1.11E-05		1.00E+03	1.45E-01	5.10E-02	1.11E-05	1.61E-06
INORG	Nickel	7440-02-0								6.50E+01				
INORG	Selenium	7782-49-2								5.00E+00				
INORG	Silver	7440-22-4								8.30E+00				
INORG	Thallium	7440-28-0								7.10E+01				
INORG	Vanadium	7440-62-2								1.00E+03				
INORG	Zinc	7440-66-6								6.20E+01				
Notes:	**Soil and Building Characteristics**													
	SCS Soil texture class		Loamy Sand											
	Bulk density	kg/L	ρ_b	1.62										
	Total porosity	L/L-soil	θ	0.390										
	Water-filled porosity	L/L-soil	θ_w	0.139										
	Air-filled porosity	L/L-soil	θ_a	0.251										
	Organic carbon fraction	unitless	f_{oc}	0.002										
	Residual saturation	L/L-soil	θ_r	0.0490										
	Hydraulic conductivity	cm/s	K	1.2E-03										
	Dynamic viscosity of water	g/cm-s	μ	0.01307										
	Density of water	g/cm^3	ρ_w	1.0										
	Gravitational acceleration	cm/s^2	g	980.7										
	Intrinsic permeability	cm^2	k	1.62E-08										
	Relative saturation	unitless	S_e	0.263										
	van Genuchten N	unitless	N	1.746										
	van Genuchten M	unitless	M	0.427										
	Relative air permeability	unitless	k_{rg}	0.826										
	Permeability to vapor	cm^2	k_v	1.34E-08										

Attachment G2:Vapor Intrusion into Commercial/Industrial Slab on Grade Building from Subsurface Soil GMC: NAO Flint Operations Site, Flint, Michigan														
Chem Group	**Chemical**	**CASRN**	**D_{air}** (m^2/d)	**D_{water}** (m^2/d)	**H** (unitless)	**D_{crack}** (m^2/d)	**D_{eff}^T** (m^2/d)	**α_∞** (unitless)	**K_{oc}** (L/kg)	**K_d** (L/kg)	**$C_{s,\ vap}$** (kg-soil/m^3)	**α_{ML}** (unitless)	**α** (unitless)	**C_{bldg}** (kg-soil/m^3)
	Distance from building foundation to source	m	**L_T**	0.15										
	Bldg foundation thickness	m	**L_{crack}**	0.15										
	Bldg foundation length	m		19.29										
	Bldg foundation width	m		19.29										
	Bldg occupied height	m		2.44										
	Bldg occupied volume	m^3		907.93										
	Occupied depth below ground	m		0.0										
	Bldg area for vapor intrusion	m^2	**A_B**	372.1										
	Ratio of A_{crack} to A_B		**η**	1E-04										
	Area of cracks	m^2	**A_{crack}**	3.86E-02										
	Air exchange rate	$hour^{-1}$	**ac/h**	2.0										
	Building ventilation rate	m^3/d	**Q_{bldg}**	4.36E+04										
	Pressure difference between outdoors-indoors	kg/m-s^2	**ΔP**	1.0										
	Air viscosity	kg/m-s	**μ**	1.8E-05										
	Crack length (bldg perimeter)	m	**X_{crack}**	77.16										
	Crack depth below ground	m	**Z_{crack}**	0.15										
	Crack radius	m	**r_{crack}**	5E-04										
	Soil gas flow rate into bldg	m^3/d	**Q_{soil}**	4.88E-01										
	Averaging period	s	**T**	7.88E+08										
	Contaminant thickness	m	**ΔH**	4.88										

Attachment G2: Risk-Based Cancer Criteria for Routine Worker Exposure to Soil Vapor Intrusion (Commercial/Industrial Slab on Grade Building)
GMC: NAO Flint Operations Site, Flint, Michigan

				Vapor Inhalation		
Chem Group	**Chemical**	**CASRN**	**Carc Class**	**C_{air}** (mg/m^3)	**URF** (m^3/mg)	**RBC** (mg/kg)
VOC	Acetone	67-64-1	ID	1.02E-04		
VOC	Benzene	71-43-2	A	5.78E-03	7.8E-03	9.1E-01
VOC	Bromodichloromethane	75-27-4	B2	1.81E-03	1.8E-02	1.3E+00
VOC	2-Butanone	78-93-3	ID	1.42E-04		
VOC	Carbon Disulfide	75-15-0		7.39E-03		
VOC	Carbon Tetrachloride	56-23-5	B2	7.39E-03	1.5E-02	3.7E-01
VOC	Chlorobenzene	108-90-7	D	1.57E-03		
VOC	Chloroethane	75-00-3		7.39E-03		
VOC	Chloroform	67-66-3	B2	4.74E-03	2.3E-02	3.8E-01
VOC	Chloromethane	74-87-3	D	7.39E-03		
VOC	Cumene	98-82-8	D	1.93E-03		
VOC	Cyclohexane	110-82-7	ID	7.39E-03		
VOC	Dibromochloromethane	124-48-1	C	8.27E-04	2.4E-02	2.1E+00
VOC	1,2-Dichlorobenzene	95-50-1	D	3.24E-04		
VOC	1,3-Dichlorobenzene	541-73-1	D	5.72E-04		
VOC	1,4-Dichlorobenzene	106-46-7	C	4.21E-04	6.3E-03	1.5E+01
VOC	Dichlorodifluoromethane	75-71-8		7.39E-03		
VOC	1,1-Dichloroethane	75-34-3	C	7.39E-03		
VOC	1,2-Dichloroethane	107-06-2	B2	1.81E-03	2.6E-02	8.7E-01
VOC	1,1-Dichloroethene	75-35-4	C	7.39E-03		
VOC	cis-1,2-Dichloroethene	156-59-2	D	5.48E-03		
VOC	trans-1,2-Dichloroethene	156-60-5		7.39E-03		
VOC	1,2-Dichloropropane	78-87-5	B2	3.53E-03		
VOC	Ethyl Benzene	100-41-4	D	2.13E-03		
VOC	2-Hexanone	591-78-6		7.39E-03		
VOC	Methyl Acetate	79-20-9		2.32E-04		
VOC	Methyl tert-butyl ether	1634-04-4		1.21E-03		
VOC	4-Methyl-2-pentanone	108-10-1	ID	2.94E-04		
VOC	Methylcyclohexane	108-87-2		7.39E-03		
VOC	Methylene Chloride	75-09-2	B2	4.32E-03	4.7E-04	2.0E+01
VOC	Styrene	100-42-5		3.82E-04		
VOC	Tetrachloroethene	127-18-4	C-B2	7.39E-03	3.1E-03	1.8E+00
VOC	Toluene	108-88-3	D	3.24E-03		
VOC	1,2,4-Trichlorobenzene	120-82-1	D	8.75E-05		
VOC	1,1,1-Trichloroethane	71-55-6	D	7.39E-03		
VOC	1,1,2-Trichloroethane	79-00-5	C	1.10E-03	1.6E-02	2.3E+00
VOC	Trichloroethene	79-01-6	C-B2	5.18E-03	1.7E-03	4.6E+00
VOC	Trichlorofluoromethane	75-69-4		7.39E-03		
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		7.39E-03		
VOC	1,2,4-Trimethylbenzene	95-63-6	ID	7.37E-04		
VOC	1,3,5-Trimethylbenzene	108-67-8	ID	3.69E-04		
VOC	Vinyl Chloride	75-01-4	A	7.39E-03	8.8E-03	6.3E-01
VOC	Xylenes (total)	1330-20-7	ID	1.75E-03		
SVOC	Acenaphthene	83-32-9		2.46E-06		
SVOC	Acenaphthylene	208-96-8	D	1.71E-06		
SVOC	Acetophenone	98-86-2	D	1.55E-05		
SVOC	Anthracene	120-12-7	D	2.48E-07		

Attachment G2: Risk-Based Cancer Criteria for Routine Worker Exposure to Soil Vapor Intrusion (Commercial/Industrial Slab on Grade Building)
GMC: NAO Flint Operations Site, Flint, Michigan

				Vapor Inhalation		
Chem Group	**Chemical**	**CASRN**	**Carc Class**	**C_{air}** (mg/m^3)	**URF** (m^3/mg)	**RBC** (mg/kg)
SVOC	Atrazine	1912-24-9	C	4.68E-09	6.3E-02	1.4E+05
SVOC	Benzaldehyde	100-52-7		3.80E-05		
SVOC	Benzo(a)anthracene	56-55-3	B2	9.51E-10	8.9E-02	4.9E+05
SVOC	Benzo(a)pyrene	50-32-8	B2	1.27E-10	8.9E-01	3.6E+05
SVOC	Benzo(b)fluoranthene	205-99-2	B2	1.01E-08	8.9E-02	4.6E+04
SVOC	Benzo(g,h,i)perylene	191-24-2	D	1.26E-12		
SVOC	Benzo(k)fluoranthene	207-08-9	B2	7.61E-11	8.9E-03	6.1E+07
SVOC	Biphenyl	92-52-4	D	3.23E-06		
SVOC	bis(2-Chloroethoxy)methane	111-91-1	D	3.23E-07		
SVOC	bis(2-Chloroethyl) ether	111-44-4	B2	3.52E-05	3.3E-01	3.5E+00
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2	7.79E-13	4.0E-03	1.3E+10
SVOC	Butylbenzylphthalate	85-68-7	C	2.50E-09	5.4E-04	3.0E+07
SVOC	Caprolactam	105-60-2		5.51E-08		
SVOC	Carbazole	86-74-8	B2	7.81E-10	5.7E-03	9.2E+06
SVOC	4-Chloro-3-methylphenol	59-50-7		3.93E-08		
SVOC	2-Chloronaphthalene	91-58-7		3.16E-06		
SVOC	2-Chlorophenol	95-57-8		1.03E-04		
SVOC	Chrysene	218-01-9	B2	2.67E-08	8.9E-04	1.7E+06
SVOC	Dibenz(a,h)anthracene	53-70-3	B2	5.94E-13	8.9E-01	7.8E+07
SVOC	Dibenzofuran	132-64-9	D	6.86E-08		
SVOC	2,4-Dichlorophenol	120-83-2		1.90E-06		
SVOC	Diethylphthalate	84-66-2	D	1.57E-07		
SVOC	2,4-Dimethylphenol	105-67-9		9.08E-07		
SVOC	Dimethylphthalate	131-11-3	D	1.07E-07		
SVOC	Di-n-butylphthalate	84-74-2	D	5.50E-11		
SVOC	4,6-Dinitro-2-methylphenol	534-52-1		2.97E-07		
SVOC	2,4-Dinitrotoluene	121-14-2	B2	7.81E-08		
SVOC	2,6-Dinitrotoluene	606-20-2	B2	7.64E-07	1.9E-01	2.8E+02
SVOC	Di-n-octylphthalate	117-84-0		8.95E-11		
SVOC	Fluoranthene	206-44-0	D	1.69E-08		
SVOC	Fluorene	86-73-7	D	5.24E-07		
SVOC	Formaldehyde	50-00-0	B1		1.3E-02	
SVOC	Hexachlorobutadiene	87-68-3	C	1.73E-05	2.2E-02	1.1E+02
SVOC	Hexachlorocyclopentadiene	77-47-4	E	1.53E-05		
SVOC	Hexachloroethane	67-72-1	C	2.16E-04	4.0E-03	4.7E+01
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	B2	5.28E-11	8.9E-02	8.7E+06
SVOC	Isophorone	78-59-1	C	8.44E-06		
SVOC	2-Methylnaphthalene	91-57-6	ID	9.37E-06		
SVOC	Methylphenol (total)	1319-77-3		7.75E-07		
SVOC	Naphthalene	91-20-3	C	2.68E-05		
SVOC	2-Nitroaniline	88-74-4		1.68E-07		
SVOC	Nitrobenzene	98-95-3	D	2.56E-05		
SVOC	2-Nitrophenol	88-75-5		1.07E-05		
SVOC	4-Nitrophenol	100-02-7		1.90E-08		
SVOC	N-Nitrosodiphenylamine	86-30-6	B2	4.27E-07		
SVOC	N-Nitroso-di-n-propylamine	621-64-7	B2	3.85E-06	2.0E+00	5.3E+00
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	C	4.45E-05	1.0E-02	9.2E+01

Attachment G2: Risk-Based Cancer Criteria for Routine Worker Exposure to Soil Vapor Intrusion (Commercial/Industrial Slab on Grade Building)
GMC: NAO Flint Operations Site, Flint, Michigan

				Vapor Inhalation		
Chem Group	**Chemical**	**CASRN**	**Carc Class**	**C_{air}** (mg/m^3)	**URF** (m^3/mg)	**RBC** (mg/kg)
SVOC	Pentachlorophenol	87-86-5	B2	5.16E-09	3.4E-02	2.3E+05
SVOC	Phenanthrene	85-01-8	D	1.09E-07		
SVOC	Phenol	108-95-2	ID	6.36E-07		
SVOC	Pyrene	129-00-0	D	1.18E-08		
SVOC	2,4,5-Trichlorophenol	95-95-4		3.01E-07		
SVOC	2,4,6-Trichlorophenol	88-06-2	B2	2.09E-06	3.1E-03	6.3E+03
PCB	PCBs (total)	1336-36-3	B2	9.16E-08	5.7E-01	7.8E+02
INORG	Antimony	7440-36-0				
INORG	Arsenic	7440-38-2	A		4.3E+00	
INORG	Barium	7440-39-3	D			
INORG	Beryllium	7440-41-7	B1		2.4E+00	
INORG	Cadmium	7440-43-9	B1		1.8E+00	
INORG	Chromium (total)	7440-47-3			1.2E+01	
INORG	Chromium III	16065-83-1	D			
INORG	Chromium VI	18540-29-9	A		1.2E+01	
INORG	Cobalt	7440-48-4	B1		2.8E+00	
INORG	Copper	7440-50-8	D			
INORG	Cyanide (total)	57-12-5	D			
INORG	Fluoride	16984-48-8				
INORG	Lead	7439-92-1	B2			
INORG	Manganese	7439-96-5	D			
INORG	Mercury	7439-97-6	D	1.61E-06		
INORG	Nickel	7440-02-0	A		2.4E-01	
INORG	Selenium	7782-49-2	D			
INORG	Silver	7440-22-4	D			
INORG	Thallium	7440-28-0				
INORG	Vanadium	7440-62-2				
INORG	Zinc	7440-66-6	D			
Note:						
Target cancer risk of 1E-05						

Attachment G2: Risk-Based Noncancer Criteria for Routine Worker Exposure to Soil Vapor Intrusion (Commercial/Industrial Slab on Grade Building)
GMC: NAO Flint Operations Site, Flint, Michigan

				Vapor Inhalation		
Chem Group	**Chemical**	**CASRN**	**Carc Class**	**C_{air} (mg/m^3)**	**RfC (mg/m^3)**	**RBC (mg/kg)**
VOC	Acetone	67-64-1	ID	1.02E-04	3.2E+00	4.5E+04
VOC	Benzene	71-43-2	A	5.78E-03	3.0E-02	7.6E+00
VOC	Bromodichloromethane	75-27-4	B2	1.81E-03	7.0E-02	5.7E+01
VOC	2-Butanone	78-93-3	ID	1.42E-04	5.0E+00	5.1E+04
VOC	Carbon Disulfide	75-15-0		7.39E-03	7.0E-01	1.4E+02
VOC	Carbon Tetrachloride	56-23-5	B2	7.39E-03		
VOC	Chlorobenzene	108-90-7	D	1.57E-03	6.0E-02	5.6E+01
VOC	Chloroethane	75-00-3		7.39E-03	1.0E+01	2.0E+03
VOC	Chloroform	67-66-3	B2	4.74E-03	5.0E-02	1.5E+01
VOC	Chloromethane	74-87-3	D	7.39E-03	9.0E-02	1.8E+01
VOC	Cumene	98-82-8	D	1.93E-03	4.0E-01	3.0E+02
VOC	Cyclohexane	110-82-7	ID	7.39E-03	6.0E+00	1.2E+03
VOC	Dibromochloromethane	124-48-1	C	8.27E-04	7.0E-02	1.2E+02
VOC	1,2-Dichlorobenzene	95-50-1	D	3.24E-04	2.0E-01	9.0E+02
VOC	1,3-Dichlorobenzene	541-73-1	D	5.72E-04	1.4E-01	3.6E+02
VOC	1,4-Dichlorobenzene	106-46-7	C	4.21E-04	8.0E-01	2.8E+03
VOC	Dichlorodifluoromethane	75-71-8		7.39E-03	2.0E-01	3.9E+01
VOC	1,1-Dichloroethane	75-34-3	C	7.39E-03	5.0E-01	9.9E+01
VOC	1,2-Dichloroethane	107-06-2	B2	1.81E-03	5.0E-03	4.0E+00
VOC	1,1-Dichloroethene	75-35-4	C	7.39E-03	2.0E-01	3.9E+01
VOC	cis-1,2-Dichloroethene	156-59-2	D	5.48E-03	3.5E-02	9.3E+00
VOC	trans-1,2-Dichloroethene	156-60-5		7.39E-03	6.0E-02	1.2E+01
VOC	1,2-Dichloropropane	78-87-5	B2	3.53E-03	4.0E-03	1.7E+00
VOC	Ethyl Benzene	100-41-4	D	2.13E-03	1.0E+00	6.9E+02
VOC	2-Hexanone	591-78-6		7.39E-03	5.0E-03	9.9E-01
VOC	Methyl Acetate	79-20-9		2.32E-04	3.5E+00	2.2E+04
VOC	Methyl tert-butyl ether	1634-04-4		1.21E-03	3.0E+00	3.6E+03
VOC	4-Methyl-2-pentanone	108-10-1	ID	2.94E-04	3.0E+00	1.5E+04
VOC	Methylcyclohexane	108-87-2		7.39E-03	3.0E+00	5.9E+02
VOC	Methylene Chloride	75-09-2	B2	4.32E-03	3.0E+00	1.0E+03
VOC	Styrene	100-42-5		3.82E-04	1.0E+00	3.8E+03
VOC	Tetrachloroethene	127-18-4	C-B2	7.39E-03	4.0E-01	7.9E+01
VOC	Toluene	108-88-3	D	3.24E-03	5.0E+00	2.3E+03
VOC	1,2,4-Trichlorobenzene	120-82-1	D	8.75E-05	2.0E-01	3.3E+03
VOC	1,1,1-Trichloroethane	71-55-6	D	7.39E-03	2.2E+00	4.3E+02
VOC	1,1,2-Trichloroethane	79-00-5	C	1.10E-03		
VOC	Trichloroethene	79-01-6	C-B2	5.18E-03		
VOC	Trichlorofluoromethane	75-69-4		7.39E-03	7.0E-01	1.4E+02
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		7.39E-03	3.0E+01	5.9E+03
VOC	1,2,4-Trimethylbenzene	95-63-6	ID	7.37E-04	6.0E-03	1.2E+01
VOC	1,3,5-Trimethylbenzene	108-67-8	ID	3.69E-04	6.0E-03	2.4E+01
VOC	Vinyl Chloride	75-01-4	A	7.39E-03	1.0E-01	2.0E+01
VOC	Xylenes (total)	1330-20-7	ID	1.75E-03	1.0E-01	8.3E+01
SVOC	Acenaphthene	83-32-9		2.46E-06	2.1E-01	1.2E+05
SVOC	Acenaphthylene	208-96-8	D	1.71E-06	1.1E-01	9.0E+04
SVOC	Acetophenone	98-86-2	D	1.55E-05	3.5E-01	3.3E+04
SVOC	Anthracene	120-12-7	D	2.48E-07		
SVOC	Atrazine	1912-24-9	C	4.68E-09	1.2E-01	3.8E+07
SVOC	Benzaldehyde	100-52-7		3.80E-05	3.5E-01	1.3E+04

Attachment G2: Risk-Based Noncancer Criteria for Routine Worker Exposure to Soil Vapor Intrusion (Commercial/Industrial Slab on Grade Building)
GMC: NAO Flint Operations Site, Flint, Michigan

				Vapor Inhalation		
Chem Group	**Chemical**	**CASRN**	**Carc Class**	**C_{air}** (mg/m^3)	**RfC** (mg/m^3)	**RBC** (mg/kg)
SVOC	Benzo(a)anthracene	56-55-3	B2	9.51E-10		
SVOC	Benzo(a)pyrene	50-32-8	B2	1.27E-10		
SVOC	Benzo(b)fluoranthene	205-99-2	B2	1.01E-08		
SVOC	Benzo(g,h,i)perylene	191-24-2	D	1.26E-12	1.1E-01	1.2E+11
SVOC	Benzo(k)fluoranthene	207-08-9	B2	7.61E-11		
SVOC	Biphenyl	92-52-4	D	3.23E-06	1.8E-01	7.9E+04
SVOC	bis(2-Chloroethoxy)methane	111-91-1	D	3.23E-07		
SVOC	bis(2-Chloroethyl) ether	111-44-4	B2	3.52E-05		
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2	7.79E-13	7.0E-02	1.3E+11
SVOC	Butylbenzylphthalate	85-68-7	C	2.50E-09	7.0E-01	4.1E+08
SVOC	Caprolactam	105-60-2		5.51E-08	1.8E+00	4.6E+07
SVOC	Carbazole	86-74-8	B2	7.81E-10		
SVOC	4-Chloro-3-methylphenol	59-50-7		3.93E-08		
SVOC	2-Chloronaphthalene	91-58-7		3.16E-06	2.8E-01	1.3E+05
SVOC	2-Chlorophenol	95-57-8		1.03E-04	1.8E-02	2.5E+02
SVOC	Chrysene	218-01-9	B2	2.67E-08		
SVOC	Dibenz(a,h)anthracene	53-70-3	B2	5.94E-13		
SVOC	Dibenzofuran	132-64-9	D	6.86E-08	7.0E-03	1.5E+05
SVOC	2,4-Dichlorophenol	120-83-2		1.90E-06	1.1E-02	8.1E+03
SVOC	Diethylphthalate	84-66-2	D	1.57E-07	2.8E+00	2.6E+07
SVOC	2,4-Dimethylphenol	105-67-9		9.08E-07	7.0E-02	1.1E+05
SVOC	Dimethylphthalate	131-11-3	D	1.07E-07		
SVOC	Di-n-butylphthalate	84-74-2	D	5.50E-11		
SVOC	4,6-Dinitro-2-methylphenol	534-52-1		2.97E-07	3.5E-04	1.7E+03
SVOC	2,4-Dinitrotoluene	121-14-2	B2	7.81E-08		
SVOC	2,6-Dinitrotoluene	606-20-2	B2	7.64E-07	3.5E-03	6.7E+03
SVOC	Di-n-octylphthalate	117-84-0		8.95E-11		
SVOC	Fluoranthene	206-44-0	D	1.69E-08	1.4E-01	1.2E+07
SVOC	Fluorene	86-73-7	D	5.24E-07	1.4E-01	3.9E+05
SVOC	Formaldehyde	50-00-0	B1			
SVOC	Hexachlorobutadiene	87-68-3	C	1.73E-05		
SVOC	Hexachlorocyclopentadiene	77-47-4	E	1.53E-05	2.0E-04	1.9E+01
SVOC	Hexachloroethane	67-72-1	C	2.16E-04		
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	B2	5.28E-11		
SVOC	Isophorone	78-59-1	C	8.44E-06		
SVOC	2-Methylnaphthalene	91-57-6	ID	9.37E-06	3.0E-03	4.7E+02
SVOC	Methylphenol (total)	1319-77-3		7.75E-07		
SVOC	Naphthalene	91-20-3	C	2.68E-05	3.0E-03	1.6E+02
SVOC	2-Nitroaniline	88-74-4		1.68E-07	2.0E-04	1.7E+03
SVOC	Nitrobenzene	98-95-3	D	2.56E-05	2.0E-03	1.1E+02
SVOC	2-Nitrophenol	88-75-5		1.07E-05		
SVOC	4-Nitrophenol	100-02-7		1.90E-08		
SVOC	N-Nitrosodiphenylamine	86-30-6	B2	4.27E-07		
SVOC	N-Nitroso-di-n-propylamine	621-64-7	B2	3.85E-06		
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	C	4.45E-05		
SVOC	Pentachlorophenol	87-86-5	B2	5.16E-09	1.1E-01	3.0E+07
SVOC	Phenanthrene	85-01-8	D	1.09E-07	1.1E-01	1.4E+06
SVOC	Phenol	108-95-2	ID	6.36E-07		
SVOC	Pyrene	129-00-0	D	1.18E-08	1.1E-01	1.3E+07

Attachment G2: Risk-Based Noncancer Criteria for Routine Worker Exposure to Soil Vapor Intrusion (Commercial/Industrial Slab on Grade Building)
GMC: NAO Flint Operations Site, Flint, Michigan

				Vapor Inhalation		
Chem Group	**Chemical**	**CASRN**	**Carc Class**	**C_{air}** (mg/m^3)	**RfC** (mg/m^3)	**RBC** (mg/kg)
SVOC	2,4,5-Trichlorophenol	95-95-4		3.01E-07		
SVOC	2,4,6-Trichlorophenol	88-06-2	B2	2.09E-06		
PCB	PCBs (total)	1336-36-3	B2	9.16E-08		
INORG	Antimony	7440-36-0			1.4E-03	
INORG	Arsenic	7440-38-2	A			
INORG	Barium	7440-39-3	D			
INORG	Beryllium	7440-41-7	B1		2.0E-05	
INORG	Cadmium	7440-43-9	B1		2.0E-04	
INORG	Chromium (total)	7440-47-3			1.0E-04	
INORG	Chromium III	16065-83-1	D		5.3E+00	
INORG	Chromium VI	18540-29-9	A		1.0E-04	
INORG	Cobalt	7440-48-4	B1		2.0E-05	
INORG	Copper	7440-50-8	D		1.4E-01	
INORG	Cyanide (total)	57-12-5	D		7.0E-02	
INORG	Fluoride	16984-48-8				
INORG	Lead	7439-92-1	B2			
INORG	Manganese	7439-96-5	D		5.0E-05	
INORG	Mercury	7439-97-6	D	1.61E-06	3.0E-04	2.7E+02
INORG	Nickel	7440-02-0	A			
INORG	Selenium	7782-49-2	D		1.8E-02	
INORG	Silver	7440-22-4	D		1.0E-05	
INORG	Thallium	7440-28-0			2.5E-04	
INORG	Vanadium	7440-62-2			2.5E-02	
INORG	Zinc	7440-66-6	D		1.1E+00	
Note:						
Target hazard quotient of 1						

Attachment G2: Routine Worker Occupational Based Criteria for Soil Vapor Intrusion Inhalation
(Commercial/Industrial Slab on Grade Building)
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	C_{air} (mg/m^3)	Occupational Indoor Air Standard (mg/m3)	Occupational Criteria (mg/kg)
VOC	Acetone	67-64-1	1.02E-04	1.80E+03	1.8E+07
VOC	Benzene	71-43-2	5.78E-03	3.19E+00	5.5E+02
VOC	Bromodichloromethane	75-27-4	1.81E-03		
VOC	2-Butanone	78-93-3	1.42E-04	5.90E+02	4.2E+06
VOC	Carbon Disulfide	75-15-0	7.39E-03	1.20E+01	1.6E+03
VOC	Carbon Tetrachloride	56-23-5	7.39E-03	1.26E+01	1.7E+03
VOC	Chlorobenzene	108-90-7	1.57E-03	3.50E+02	2.2E+05
VOC	Chloroethane	75-00-3	7.39E-03	2.60E+03	3.5E+05
VOC	Chloroform	67-66-3	4.74E-03	9.78E+00	2.1E+03
VOC	Chloromethane	74-87-3	7.39E-03	1.03E+02	1.4E+04
VOC	Cumene	98-82-8	1.93E-03	2.45E+02	1.3E+05
VOC	Cyclohexane	110-82-7	7.39E-03	1.05E+03	1.4E+05
VOC	Dibromochloromethane	124-48-1	8.27E-04		
VOC	1,2-Dichlorobenzene	95-50-1	3.24E-04	1.50E+02	4.6E+05
VOC	1,3-Dichlorobenzene	541-73-1	5.72E-04		
VOC	1,4-Dichlorobenzene	106-46-7	4.21E-04	4.50E+02	1.1E+06
VOC	Dichlorodifluoromethane	75-71-8	7.39E-03	4.95E+03	6.7E+05
VOC	1,1-Dichloroethane	75-34-3	7.39E-03	4.00E+02	5.4E+04
VOC	1,2-Dichloroethane	107-06-2	1.81E-03	4.00E+00	2.2E+03
VOC	1,1-Dichloroethene	75-35-4	7.39E-03	1.98E+01	2.7E+03
VOC	cis-1,2-Dichloroethene	156-59-2	5.48E-03	7.93E+02	1.4E+05
VOC	trans-1,2-Dichloroethene	156-60-5	7.39E-03	7.93E+02	1.1E+05
VOC	1,2-Dichloropropane	78-87-5	3.53E-03	3.50E+02	9.9E+04
VOC	Ethyl Benzene	100-41-4	2.13E-03	4.35E+02	2.0E+05
VOC	2-Hexanone	591-78-6	7.39E-03	2.00E+01	2.7E+03
VOC	Methyl Acetate	79-20-9	2.32E-04	6.10E+02	2.6E+06
VOC	Methyl tert-butyl ether	1634-04-4	1.21E-03	1.80E+02	1.5E+05
VOC	4-Methyl-2-pentanone	108-10-1	2.94E-04	4.10E+02	1.4E+06
VOC	Methylcyclohexane	108-87-2	7.39E-03	2.00E+03	2.7E+05
VOC	Methylene Chloride	75-09-2	4.32E-03	8.70E+01	2.0E+04
VOC	Styrene	100-42-5	3.82E-04	2.15E+02	5.6E+05
VOC	Tetrachloroethene	127-18-4	7.39E-03	1.70E+02	2.3E+04
VOC	Toluene	108-88-3	3.24E-03	3.75E+02	1.2E+05
VOC	1,2,4-Trichlorobenzene	120-82-1	8.75E-05		
VOC	1,1,1-Trichloroethane	71-55-6	7.39E-03	1.90E+03	2.6E+05
VOC	1,1,2-Trichloroethane	79-00-5	1.10E-03	4.50E+01	4.1E+04
VOC	Trichloroethene	79-01-6	5.18E-03	2.70E+02	5.2E+04
VOC	Trichlorofluoromethane	75-69-4	7.39E-03	5.60E+03	7.6E+05
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	7.39E-03	7.60E+03	1.0E+06
VOC	1,2,4-Trimethylbenzene	95-63-6	7.37E-04	1.25E+02	1.7E+05
VOC	1,3,5-Trimethylbenzene	108-67-8	3.69E-04	1.25E+02	3.4E+05
VOC	Vinyl Chloride	75-01-4	7.39E-03	2.50E+00	3.4E+02
VOC	Xylenes (total)	1330-20-7	1.75E-03	4.35E+02	2.5E+05
SVOC	Acenaphthene	83-32-9	2.46E-06		
SVOC	Acenaphthylene	208-96-8	1.71E-06		
SVOC	Acetophenone	98-86-2	1.55E-05	4.91E+01	3.2E+06
SVOC	Anthracene	120-12-7	2.48E-07		
SVOC	Atrazine	1912-24-9	4.68E-09	5.00E+00	1.1E+09
SVOC	Benzaldehyde	100-52-7	3.80E-05		
SVOC	Benzo(a)anthracene	56-55-3	9.51E-10		
SVOC	Benzo(a)pyrene	50-32-8	1.27E-10		

Attachment G2: Routine Worker Occupational Based Criteria for Soil Vapor Intrusion Inhalation
(Commercial/Industrial Slab on Grade Building)
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	C_{air} (mg/m^3)	Occupational Indoor Air Standard (mg/m3)	Occupational Criteria (mg/kg)
SVOC	Benzo(b)fluoranthene	205-99-2	1.01E-08		
SVOC	Benzo(g,h,i)perylene	191-24-2	1.26E-12		
SVOC	Benzo(k)fluoranthene	207-08-9	7.61E-11		
SVOC	Biphenyl	92-52-4	3.23E-06	1.00E+00	3.1E+05
SVOC	bis(2-Chloroethoxy)methane	111-91-1	3.23E-07		
SVOC	bis(2-Chloroethyl) ether	111-44-4	3.52E-05	2.92E+01	8.3E+05
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	7.79E-13	5.00E+00	6.4E+12
SVOC	Butylbenzylphthalate	85-68-7	2.50E-09		
SVOC	Caprolactam	105-60-2	5.51E-08	5.00E+00	9.1E+07
SVOC	Carbazole	86-74-8	7.81E-10		
SVOC	4-Chloro-3-methylphenol	59-50-7	3.93E-08		
SVOC	2-Chloronaphthalene	91-58-7	3.16E-06		
SVOC	2-Chlorophenol	95-57-8	1.03E-04		
SVOC	Chrysene	218-01-9	2.67E-08		
SVOC	Dibenz(a,h)anthracene	53-70-3	5.94E-13		
SVOC	Dibenzofuran	132-64-9	6.86E-08		
SVOC	2,4-Dichlorophenol	120-83-2	1.90E-06		
SVOC	Diethylphthalate	84-66-2	1.57E-07	5.00E+00	3.2E+07
SVOC	2,4-Dimethylphenol	105-67-9	9.08E-07		
SVOC	Dimethylphthalate	131-11-3	1.07E-07	5.00E+00	4.7E+07
SVOC	Di-n-butylphthalate	84-74-2	5.50E-11	5.00E+00	9.1E+10
SVOC	4,6-Dinitro-2-methylphenol	534-52-1	2.97E-07	2.00E-01	6.7E+05
SVOC	2,4-Dinitrotoluene	121-14-2	7.81E-08		
SVOC	2,6-Dinitrotoluene	606-20-2	7.64E-07		
SVOC	Di-n-octylphthalate	117-84-0	8.95E-11		
SVOC	Fluoranthene	206-44-0	1.69E-08		
SVOC	Fluorene	86-73-7	5.24E-07		
SVOC	Formaldehyde	50-00-0		9.00E-01	
SVOC	Hexachlorobutadiene	87-68-3	1.73E-05	2.00E-02	1.2E+03
SVOC	Hexachlorocyclopentadiene	77-47-4	1.53E-05	1.00E-01	6.5E+03
SVOC	Hexachloroethane	67-72-1	2.16E-04	1.00E+01	4.6E+04
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	5.28E-11		
SVOC	Isophorone	78-59-1	8.44E-06	2.30E+01	2.7E+06
SVOC	2-Methylnaphthalene	91-57-6	9.37E-06		
SVOC	Methylphenol (total)	1319-77-3	7.75E-07	2.20E+01	2.8E+07
SVOC	Naphthalene	91-20-3	2.68E-05	5.00E+01	1.9E+06
SVOC	2-Nitroaniline	88-74-4	1.68E-07		
SVOC	Nitrobenzene	98-95-3	2.56E-05	5.00E+00	2.0E+05
SVOC	2-Nitrophenol	88-75-5	1.07E-05		
SVOC	4-Nitrophenol	100-02-7	1.90E-08		
SVOC	N-Nitrosodiphenylamine	86-30-6	4.27E-07		
SVOC	N-Nitroso-di-n-propylamine	621-64-7	3.85E-06		
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	4.45E-05		
SVOC	Pentachlorophenol	87-86-5	5.16E-09	5.00E-01	9.7E+07
SVOC	Phenanthrene	85-01-8	1.09E-07		
SVOC	Phenol	108-95-2	6.36E-07	1.90E+01	3.0E+07
SVOC	Pyrene	129-00-0	1.18E-08		
SVOC	2,4,5-Trichlorophenol	95-95-4	3.01E-07		
SVOC	2,4,6-Trichlorophenol	88-06-2	2.09E-06		
PCB	PCBs (total)	1336-36-3	9.16E-08	5.00E-01	5.5E+06
INORG	Antimony	7440-36-0		5.00E-01	

Attachment G2: Routine Worker Occupational Based Criteria for Soil Vapor Intrusion Inhalation
(Commercial/Industrial Slab on Grade Building)
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	C_{air} (mg/m^3)	Occupational Indoor Air Standard (mg/m3)	Occupational Criteria (mg/kg)
INORG	Arsenic	7440-38-2		5.00E-01	
INORG	Barium	7440-39-3		5.00E-01	
INORG	Beryllium	7440-41-7		2.00E-03	
INORG	Cadmium	7440-43-9		5.00E-03	
INORG	Chromium (total)	7440-47-3		1.00E+00	
INORG	Chromium III	16065-83-1		5.00E-01	
INORG	Chromium VI	18540-29-9			
INORG	Cobalt	7440-48-4		5.00E-02	
INORG	Copper	7440-50-8		1.00E+00	
INORG	Cyanide (total)	57-12-5		5.00E+00	
INORG	Fluoride	16984-48-8		2.50E+00	
INORG	Lead	7439-92-1		5.00E-02	
INORG	Manganese	7439-96-5		2.00E-01	
INORG	Mercury	7439-97-6	1.61E-06	5.00E-02	3.1E+04
INORG	Nickel	7440-02-0		1.00E+00	
INORG	Selenium	7782-49-2		2.00E-01	
INORG	Silver	7440-22-4		1.00E-02	
INORG	Thallium	7440-28-0		1.00E-01	
INORG	Vanadium	7440-62-2			
INORG	Zinc	7440-66-6			

Attachment G2: Vapor Intrusion into Commercial/Industrial Slab on Grade Building from Groundwater GMC: NAO Flint Operations Site, Flint, Michigan									
Chem Group	**Chemical**	**CASRN**	**D_{air}** (m^2/d)	**D_{water}** (m^2/d)	**H** (unitless)	**D_{crack}** (m^2/d)	**D_{eff}^T** (m^2/d)	**α_∞**	**C_{bldg}** (L-water/m^3)
VOC	Acetone	67-64-1	1.07E+00	9.85E-05	7.95E-04	7.17E-02	3.12E-02	1.05E-05	8.31E-06
VOC	Benzene	71-43-2	7.60E-01	8.47E-05	1.14E-01	5.01E-02	1.52E-03	4.57E-06	5.21E-04
VOC	Bromodichloromethane	75-27-4	2.57E-01	9.16E-05	3.28E-02	1.70E-02	2.36E-03	5.80E-06	1.90E-04
VOC	2-Butanone	78-93-3	6.98E-01	8.47E-05	1.14E-03	4.67E-02	1.96E-02	1.01E-05	1.15E-05
VOC	Carbon Disulfide	75-15-0	8.99E-01	8.64E-05	6.20E-01	5.92E-02	4.68E-04	1.96E-06	1.22E-03
VOC	Carbon Tetrachloride	56-23-5	6.74E-01	7.60E-05	6.25E-01	4.44E-02	3.94E-04	1.70E-06	1.06E-03
VOC	Chlorobenzene	108-90-7	6.31E-01	7.52E-05	7.60E-02	4.16E-02	1.74E-03	4.95E-06	3.76E-04
VOC	Chloroethane	75-00-3	2.34E+00	9.94E-05	1.80E-01	1.54E-01	1.67E-03	4.83E-06	8.70E-04
VOC	Chloroform	67-66-3	8.99E-01	8.64E-05	7.50E-02	5.92E-02	2.17E-03	5.55E-06	4.16E-04
VOC	Chloromethane	74-87-3	1.09E+00	5.62E-05	1.80E-01	7.17E-02	8.98E-04	3.24E-06	5.85E-04
VOC	Cumene	98-82-8	5.62E-01	6.13E-05	2.66E-01	3.70E-02	6.04E-04	2.41E-06	6.41E-04
VOC	Cyclohexane	110-82-7	7.25E-01	7.86E-05	3.98E+00	4.78E-02	9.88E-05	4.81E-07	1.92E-03
VOC	Dibromochloromethane	124-48-1	1.69E-01	9.07E-05	1.61E-02	1.12E-02	2.80E-03	6.27E-06	1.01E-04
VOC	1,2-Dichlorobenzene	95-50-1	5.96E-01	6.83E-05	3.90E-02	3.93E-02	2.49E-03	5.95E-06	2.32E-04
VOC	1,3-Dichlorobenzene	541-73-1	5.98E-01	6.79E-05	6.33E-02	3.94E-02	1.81E-03	5.05E-06	3.20E-04
VOC	1,4-Dichlorobenzene	106-46-7	5.96E-01	6.83E-05	4.98E-02	3.93E-02	2.13E-03	5.50E-06	2.74E-04
VOC	Dichlorodifluoromethane	75-71-8	6.91E-01	6.91E-05	7.01E+00	4.55E-02	5.68E-05	2.81E-07	1.97E-03
VOC	1,1-Dichloroethane	75-34-3	6.41E-01	9.07E-05	1.15E-01	4.22E-02	1.50E-03	4.54E-06	5.22E-04
VOC	1,2-Dichloroethane	107-06-2	8.99E-01	8.55E-05	2.01E-02	5.92E-02	5.08E-03	7.81E-06	1.57E-04
VOC	1,1-Dichloroethene	75-35-4	7.78E-01	8.99E-05	5.35E-01	5.12E-02	5.20E-04	2.14E-06	1.14E-03
VOC	cis-1,2-Dichloroethene	156-59-2	6.36E-01	9.76E-05	8.35E-02	4.19E-02	1.96E-03	5.27E-06	4.40E-04
VOC	trans-1,2-Dichloroethene	156-60-5	6.11E-01	1.03E-04	1.93E-01	4.02E-02	1.13E-03	3.79E-06	7.31E-04
VOC	1,2-Dichloropropane	78-87-5	6.76E-01	7.54E-05	5.75E-02	4.45E-02	2.16E-03	5.54E-06	3.18E-04
VOC	Ethyl Benzene	100-41-4	6.48E-01	6.74E-05	1.62E-01	4.27E-02	9.64E-04	3.41E-06	5.51E-04
VOC	2-Hexanone	591-78-6			3.58E-02				
VOC	Methyl Acetate	79-20-9	8.27E-01	9.50E-05	1.85E-03	5.49E-02	1.83E-02	9.99E-06	1.85E-05
VOC	Methyl tert-butyl ether	1634-04-4	7.42E-01	8.73E-05	1.20E-02	4.90E-02	6.44E-03	8.34E-06	1.00E-04
VOC	4-Methyl-2-pentanone	108-10-1	6.48E-01	6.74E-05	2.82E-03	4.29E-02	1.12E-02	9.36E-06	2.64E-05
VOC	Methylcyclohexane	108-87-2	6.35E-01	7.36E-05	8.78E+00	4.18E-02	4.91E-05	2.44E-07	2.14E-03
VOC	Methylene Chloride	75-09-2	8.73E-01	1.01E-04	4.49E-02	5.75E-02	3.36E-03	6.76E-06	3.03E-04
VOC	Styrene	100-42-5	6.13E-01	6.91E-05	5.65E-02	4.04E-02	1.99E-03	5.32E-06	3.00E-04
VOC	Tetrachloroethene	127-18-4	6.22E-01	7.08E-05	3.77E-01	4.10E-02	5.34E-04	2.19E-06	8.24E-04
VOC	Toluene	108-88-3	7.52E-01	7.43E-05	1.36E-01	4.95E-02	1.22E-03	3.99E-06	5.43E-04

Attachment G2: Vapor Intrusion into Commercial/Industrial Slab on Grade Building from Groundwater GMC: NAO Flint Operations Site, Flint, Michigan									
Chem Group	**Chemical**	**CASRN**	**D_{air}** (m^2/d)	**D_{water}** (m^2/d)	**H** (unitless)	**D_{crack}** (m^2/d)	**D_{eff}^T** (m^2/d)	**α_∞**	**C_{bldg}** (L-water/m^3)
VOC	1,2,4-Trichlorobenzene	120-82-1	2.59E-01	7.11E-05	2.91E-02	1.71E-02	2.20E-03	5.59E-06	1.63E-04
VOC	1,1,1-Trichloroethane	71-55-6	6.74E-01	7.60E-05	3.53E-01	4.44E-02	6.04E-04	2.41E-06	8.49E-04
VOC	1,1,2-Trichloroethane	79-00-5	6.74E-01	7.60E-05	1.87E-02	4.44E-02	4.40E-03	7.46E-06	1.40E-04
VOC	Trichloroethene	79-01-6	6.83E-01	7.86E-05	2.11E-01	4.50E-02	9.02E-04	3.25E-06	6.87E-04
VOC	Trichlorofluoromethane	75-69-4	7.52E-01	8.38E-05	1.98E+00	4.95E-02	1.80E-04	8.48E-07	1.68E-03
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	6.74E-01	7.08E-05	9.83E+00	4.44E-02	4.41E-05	2.20E-07	2.16E-03
VOC	1,2,4-Trimethylbenzene	95-63-6	5.24E-01	6.84E-05	1.26E-01	3.45E-02	1.09E-03	3.71E-06	4.67E-04
VOC	1,3,5-Trimethylbenzene	108-67-8	5.20E-01	7.49E-05	1.20E-01	3.43E-02	1.20E-03	3.94E-06	4.74E-04
VOC	Vinyl Chloride	75-01-4	9.16E-01	1.06E-04	5.55E-01	6.03E-02	5.98E-04	2.39E-06	1.33E-03
VOC	Xylenes (total)	1330-20-7	6.74E-01	7.56E-05	1.38E-01	4.44E-02	1.18E-03	3.91E-06	5.40E-04
SVOC	Acenaphthene	83-32-9	3.64E-01	6.64E-05	3.18E-03	2.42E-02	7.77E-03	8.72E-06	2.77E-05
SVOC	Acenaphthylene	208-96-8	3.88E-01	6.03E-05	2.31E-03	2.58E-02	8.90E-03	8.97E-06	2.07E-05
SVOC	Acetophenone	98-86-2	6.91E-01	6.91E-05	2.19E-04	4.84E-02	3.61E-02	1.05E-05	2.31E-06
SVOC	Anthracene	120-12-7	2.80E-01	6.69E-05	1.34E-03	1.89E-02	9.82E-03	9.14E-06	1.22E-05
SVOC	Atrazine	1912-24-9	2.24E-01	5.76E-05	1.25E-07	4.20E+00	1.07E+01	3.08E-05	3.85E-09
SVOC	Benzaldehyde	100-52-7	6.23E-01	7.84E-05	4.86E-04	4.25E-02	2.55E-02	1.03E-05	5.01E-06
SVOC	Benzo(a)anthracene	56-55-3	4.41E-01	7.78E-05	6.85E-05	3.93E-02	5.37E-02	1.08E-05	7.36E-07
SVOC	Benzo(a)pyrene	50-32-8	3.72E-01	7.78E-05	2.32E-05	5.49E-02	1.05E-01	1.10E-05	2.54E-07
SVOC	Benzo(b)fluoranthene	205-99-2	1.95E-01	4.80E-05	2.28E-03	1.31E-02	5.53E-03	8.00E-06	1.82E-05
SVOC	Benzo(g,h,i)perylene	191-24-2	1.88E-01	4.54E-05	2.88E-06	1.55E-01	3.80E-01	1.11E-05	3.21E-08
SVOC	Benzo(k)fluoranthene	207-08-9	1.95E-01	4.80E-05	1.70E-05	3.85E-02	8.03E-02	1.09E-05	1.85E-07
SVOC	Biphenyl	92-52-4	3.49E-01	7.04E-05	6.13E-03	2.31E-02	5.73E-03	8.09E-06	4.96E-05
SVOC	bis(2-Chloroethoxy)methane	111-91-1	3.77E-01	7.31E-05	3.47E-06	2.16E-01	5.17E-01	1.11E-05	3.87E-08
SVOC	bis(2-Chloroethyl) ether	111-44-4	5.98E-01	6.51E-05	3.69E-04	4.10E-02	2.59E-02	1.03E-05	3.81E-06
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	3.03E-01	3.16E-05	2.09E-06	1.57E-01	3.74E-01	1.11E-05	2.33E-08
SVOC	Butylbenzylphthalate	85-68-7	1.50E-01	4.17E-05	2.59E-05	2.45E-02	4.86E-02	1.07E-05	2.77E-07
SVOC	Caprolactam	105-60-2	5.98E-01	7.77E-05	1.03E-07	6.88E+00	1.75E+01	4.64E-05	4.78E-09
SVOC	Carbazole	86-74-8	3.37E-01	6.07E-05	3.13E-07	1.78E+00	4.51E+00	1.71E-05	5.35E-09
SVOC	4-Chloro-3-methylphenol	59-50-7	5.24E-01	8.22E-05	8.15E-06	1.26E-01	2.74E-01	1.11E-05	9.05E-08
SVOC	2-Chloronaphthalene	91-58-7	4.25E-01	7.59E-05	6.42E-03	2.81E-02	6.42E-03	8.34E-06	5.35E-05
SVOC	2-Chlorophenol	95-57-8	4.33E-01	8.17E-05	8.00E-03	2.86E-02	6.02E-03	8.20E-06	6.56E-05
SVOC	Chrysene	218-01-9	2.14E-01	5.37E-05	1.94E-03	1.44E-02	6.54E-03	8.37E-06	1.62E-05
SVOC	Dibenz(a,h)anthracene	53-70-3	1.75E-01	4.48E-05	3.02E-07	1.36E+00	3.44E+00	1.49E-05	4.48E-09

Attachment G2: Vapor Intrusion into Commercial/Industrial Slab on Grade Building from Groundwater GMC: NAO Flint Operations Site, Flint, Michigan									
Chem Group	**Chemical**	**CASRN**	**D_{air}** (m^2/d)	**D_{water}** (m^2/d)	**H** (unitless)	**D_{crack}** (m^2/d)	**D_{eff}^T** (m^2/d)	**α_∞**	**C_{bldg}** (L-water/m^3)
SVOC	Dibenzofuran	132-64-9	2.06E-01	5.18E-05	2.57E-04	1.54E-02	1.51E-02	9.77E-06	2.52E-06
SVOC	2,4-Dichlorophenol	120-83-2	2.99E-01	7.58E-05	6.50E-05	3.03E-02	4.69E-02	1.07E-05	6.95E-07
SVOC	Diethylphthalate	84-66-2	2.21E-01	5.49E-05	9.25E-06	6.84E-02	1.55E-01	1.10E-05	1.02E-07
SVOC	2,4-Dimethylphenol	105-67-9	5.05E-01	7.51E-05	4.10E-05	4.99E-02	7.56E-02	1.09E-05	4.46E-07
SVOC	Dimethylphthalate	131-11-3	4.91E-01	5.43E-05	2.15E-06	2.62E-01	6.25E-01	1.12E-05	2.39E-08
SVOC	Di-n-butylphthalate	84-74-2	3.78E-01	6.79E-05	1.93E-08	3.20E+01	8.16E+01	1.95E-04	3.75E-09
SVOC	4,6-Dinitro-2-methylphenol	534-52-1	2.38E-01	5.97E-05	8.73E-06	7.78E-02	1.77E-01	1.11E-05	9.65E-08
SVOC	2,4-Dinitrotoluene	121-14-2	1.75E+00	6.10E-05	1.90E-06	4.07E-01	8.78E-01	1.13E-05	2.14E-08
SVOC	2,6-Dinitrotoluene	606-20-2	2.83E-01	6.27E-05	1.53E-05	5.58E-02	1.16E-01	1.10E-05	1.68E-07
SVOC	Di-n-octylphthalate	117-84-0	1.30E-01	3.09E-05	1.37E-03	8.80E-03	4.51E-03	7.52E-06	1.03E-05
SVOC	Fluoranthene	206-44-0	2.61E-01	5.49E-05	3.30E-04	1.87E-02	1.58E-02	9.82E-06	3.24E-06
SVOC	Fluorene	86-73-7	3.14E-01	6.81E-05	1.31E-03	2.11E-02	1.07E-02	9.28E-06	1.21E-05
SVOC	Formaldehyde	50-00-0	1.56E+00	1.73E-04	6.95E-06	3.28E-01	6.95E-01	1.12E-05	7.78E-08
SVOC	Hexachlorobutadiene	87-68-3	4.85E-01	5.32E-05	1.67E-01	3.19E-02	7.32E-04	2.79E-06	4.67E-04
SVOC	Hexachlorocyclopentadiene	77-47-4	1.39E-01	6.23E-05	5.55E-01	9.16E-03	2.43E-04	1.11E-06	6.18E-04
SVOC	Hexachloroethane	67-72-1	2.16E-02	5.88E-05	7.95E-02	1.43E-03	3.61E-04	1.58E-06	1.25E-04
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	1.64E-01	4.89E-05	3.28E-05	2.43E-02	4.66E-02	1.07E-05	3.51E-07
SVOC	Isophorone	78-59-1	5.38E-01	5.84E-05	1.36E-04	3.94E-02	3.60E-02	1.05E-05	1.43E-06
SVOC	2-Methylnaphthalene	91-57-6	4.18E-01	6.70E-05	1.06E-02	2.76E-02	4.61E-03	7.57E-06	8.02E-05
SVOC	Methylphenol (total)	1319-77-3	6.39E-01	8.64E-05	1.77E-05	8.65E-02	1.59E-01	1.10E-05	1.95E-07
SVOC	Naphthalene	91-20-3	5.10E-01	6.48E-05	9.90E-03	3.36E-02	5.14E-03	7.84E-06	7.76E-05
SVOC	2-Nitroaniline	88-74-4	6.31E-01	6.91E-05	3.27E-06	2.34E-01	5.39E-01	1.11E-05	3.64E-08
SVOC	Nitrobenzene	98-95-3	6.57E-01	7.43E-05	4.92E-04	4.46E-02	2.56E-02	1.03E-05	5.07E-06
SVOC	2-Nitrophenol	88-75-5	4.66E-01	6.78E-05	1.94E-04	3.39E-02	3.03E-02	1.04E-05	2.02E-06
SVOC	4-Nitrophenol	100-02-7	5.40E-01	8.30E-05	8.48E-09	8.89E+01	2.26E+02	5.30E-04	4.49E-09
SVOC	N-Nitrosodiphenylamine	86-30-6	2.70E-01	5.49E-05	1.03E-04	2.26E-02	2.84E-02	1.04E-05	1.06E-06
SVOC	N-Nitroso-di-n-propylamine	621-64-7	4.71E-01	7.06E-05	4.62E-05	4.49E-02	6.59E-02	1.08E-05	5.00E-07
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	5.20E-01	5.54E-05	2.39E-03	3.45E-02	9.87E-03	9.15E-06	2.19E-05
SVOC	Pentachlorophenol	87-86-5	4.84E-01	5.27E-05	5.00E-07	9.88E-01	2.48E+00	1.31E-05	6.55E-09
SVOC	Phenanthrene	85-01-8	3.24E-01	6.45E-05	4.76E-04	2.26E-02	1.63E-02	9.86E-06	4.69E-06
SVOC	Phenol	108-95-2	7.08E-01	7.86E-05	8.15E-06	1.34E-01	2.77E-01	1.11E-05	9.05E-08
SVOC	Pyrene	129-00-0	2.35E-01	6.26E-05	2.26E-04	1.80E-02	1.89E-02	1.00E-05	2.26E-06
SVOC	2,4,5-Trichlorophenol	95-95-4	2.51E-01	6.07E-05	8.90E-05	2.28E-02	3.16E-02	1.05E-05	9.31E-07

Attachment G2: Vapor Intrusion into Commercial/Industrial Slab on Grade Building from Groundwater
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	D_{air} (m^2/d)	D_{water} (m^2/d)	H (unitless)	D_{crack} (m^2/d)	D_{eff}^T (m^2/d)	α_∞	C_{bldg} (L-water/m^3)
SVOC	2,4,6-Trichlorophenol	88-06-2	2.75E-01	5.40E-05	1.60E-04	2.12E-02	2.26E-02	1.02E-05	1.63E-06
PCB	PCBs (total)	1336-36-3	1.75E-01	4.32E-05	4.09E-02	1.15E-02	1.14E-03	3.83E-06	1.56E-04
INORG	Antimony	7440-36-0							
INORG	Arsenic	7440-38-2							
INORG	Barium	7440-39-3							
INORG	Beryllium	7440-41-7							
INORG	Cadmium	7440-43-9							
INORG	Chromium (total)	7440-47-3							
INORG	Chromium III	16065-83-1							
INORG	Chromium VI	18540-29-9							
INORG	Cobalt	7440-48-4							
INORG	Copper	7440-50-8							
INORG	Cyanide (total)	57-12-5							
INORG	Fluoride	16984-48-8							
INORG	Lead	7439-92-1							
INORG	Manganese	7439-96-5							
INORG	Mercury	7439-97-6	2.65E-01	5.44E-05	1.45E-01	1.75E-02	6.84E-04	2.65E-06	3.85E-04
INORG	Nickel	7440-02-0							
INORG	Selenium	7782-49-2							
INORG	Silver	7440-22-4							
INORG	Thallium	7440-28-0							
INORG	Vanadium	7440-62-2							
INORG	Zinc	7440-66-6							
Notes:	**Crack Soil and Building Characteristics**								
	SCS Soil texture class	Loamy Sand							
	Bulk density	kg/L	ρ_b	1.62					
	Total porosity	L/L-soil	θ	0.390					
	Water-filled porosity	L/L-soil	θ_w	0.139					
	Air-filled porosity	L/L-soil	θ_a	0.251					
	Residual saturation	L/L-soil	θ_r	0.049					

Attachment G2: Vapor Intrusion into Commercial/Industrial Slab on Grade Building from Groundwater GMC: NAO Flint Operations Site, Flint, Michigan									
Chem Group	**Chemical**	**CASRN**	**D_{air}** (m^2/d)	**D_{water}** (m^2/d)	**H** (unitless)	**D_{crack}** (m^2/d)	**D_{eff}^T** (m^2/d)	**α_∞**	**C_{bldg}** (L-water/m^3)
	Hydraulic conductivity	cm/s	**K**	1.2E-03					
	Dynamic viscosity of water	g/cm-s	**μ**	0.01307					
	Density of water	g/cm^3	**ρ_w**	1.0					
	Gravitational acceleration	cm/s^2	**g**	980.7					
	Intrinsic permeability	cm^2	**k**	1.6E-08					
	Relative saturation	unitless	**S_e**	0.263					
	van Genuchten N	unitless	**N**	1.746					
	van Genuchten M	unitless	**M**	0.427					
	Relative air permeability	unitless	**k_{rg}**	0.826					
	Permeability to vapor	cm^2	**k_v**	1.3E-08					
	Distance from building foundation to source	m	**L_T**	1.68					
	Bldg foundation thickness	m	**L_{crack}**	0.15					
	Bldg foundation length	m		19.29					
	Bldg foundation width	m		19.29					
	Bldg occupied height	m		2.44					
	Bldg occupied volume	m^3		907.93					
	Occupied depth below ground	m		0.0					
	Bldg area for vapor intrusion	m^2	**A_B**	372.1					
	Ratio of A_{crack} to A_B		**η**	1E-04					
	Area of cracks	m^2	**A_{crack}**	3.86E-02					
	Air exchange rate	$hour^{-1}$	**ac/h**	2.0					
	Building ventilation rate	m^3/d	**Q_{bldg}**	4.36E+04					
	Pressure difference between outdoors-indoors	kg/m-s^2	**ΔP**	1.0					
	Air viscosity	kg/m-s	**μ**	1.8E-05					
	Crack length (bldg perimeter)	m	**X_{crack}**	77.16					
	Crack depth below ground	m	**Z_{crack}**	0.15					
	Crack radius	m	**r_{crack}**	5E-04					
	Soil gas flow rate into bldg	m^3/d	**Q_{soil}**	4.88E-01					

Attachment G2: Risk-Based Cancer Criteria for Routine Worker Exposure to Groundwater Vapor Intrusion (Commercial/Industrial Slab on Grade Building)
GMC: NAO Flint Operations Site, Flint, Michigan

				Vapor Inhalation		
Chem Group	**Chemical**	**CASRN**	**Carc Class**	**C_{air}** (mg/m^3)	**URF** (m^3/mg)	**RBC** (mg/l)
VOC	Acetone	67-64-1	ID	8.31E-06		
VOC	Benzene	71-43-2	A	5.21E-04	7.8E-03	1.0E+01
VOC	Bromodichloromethane	75-27-4	B2	1.90E-04	1.8E-02	1.2E+01
VOC	2-Butanone	78-93-3	ID	1.15E-05		
VOC	Carbon Disulfide	75-15-0		1.22E-03		
VOC	Carbon Tetrachloride	56-23-5	B2	1.06E-03	1.5E-02	2.6E+00
VOC	Chlorobenzene	108-90-7	D	3.76E-04		
VOC	Chloroethane	75-00-3		8.70E-04		
VOC	Chloroform	67-66-3	B2	4.16E-04	2.3E-02	4.3E+00
VOC	Chloromethane	74-87-3	D	5.85E-04		
VOC	Cumene	98-82-8	D	6.41E-04		
VOC	Cyclohexane	110-82-7	ID	1.92E-03		
VOC	Dibromochloromethane	124-48-1	C	1.01E-04	2.4E-02	1.7E+01
VOC	1,2-Dichlorobenzene	95-50-1	D	2.32E-04		
VOC	1,3-Dichlorobenzene	541-73-1	D	3.20E-04		
VOC	1,4-Dichlorobenzene	106-46-7	C	2.74E-04	6.3E-03	2.4E+01
VOC	Dichlorodifluoromethane	75-71-8		1.97E-03		
VOC	1,1-Dichloroethane	75-34-3	C	5.22E-04		
VOC	1,2-Dichloroethane	107-06-2	B2	1.57E-04	2.6E-02	1.0E+01
VOC	1,1-Dichloroethene	75-35-4	C	1.14E-03		
VOC	cis-1,2-Dichloroethene	156-59-2	D	4.40E-04		
VOC	trans-1,2-Dichloroethene	156-60-5		7.31E-04		
VOC	1,2-Dichloropropane	78-87-5	B2	3.18E-04		
VOC	Ethyl Benzene	100-41-4	D	5.51E-04		
VOC	2-Hexanone	591-78-6				
VOC	Methyl Acetate	79-20-9		1.85E-05		
VOC	Methyl tert-butyl ether	1634-04-4		1.00E-04		
VOC	4-Methyl-2-pentanone	108-10-1	ID	2.64E-05		
VOC	Methylcyclohexane	108-87-2		2.14E-03		
VOC	Methylene Chloride	75-09-2	B2	3.03E-04	4.7E-04	2.9E+02
VOC	Styrene	100-42-5		3.00E-04		
VOC	Tetrachloroethene	127-18-4	C-B2	8.24E-04	3.1E-03	1.6E+01
VOC	Toluene	108-88-3	D	5.43E-04		
VOC	1,2,4-Trichlorobenzene	120-82-1	D	1.63E-04		
VOC	1,1,1-Trichloroethane	71-55-6	D	8.49E-04		
VOC	1,1,2-Trichloroethane	79-00-5	C	1.40E-04	1.6E-02	1.8E+01
VOC	Trichloroethene	79-01-6	C-B2	6.87E-04	1.7E-03	3.5E+01
VOC	Trichlorofluoromethane	75-69-4		1.68E-03		
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		2.16E-03		
VOC	1,2,4-Trimethylbenzene	95-63-6	ID	4.67E-04		
VOC	1,3,5-Trimethylbenzene	108-67-8	ID	4.74E-04		
VOC	Vinyl Chloride	75-01-4	A	1.33E-03	8.8E-03	3.5E+00
VOC	Xylenes (total)	1330-20-7	ID	5.40E-04		
SVOC	Acenaphthene	83-32-9		2.77E-05		
SVOC	Acenaphthylene	208-96-8	D	2.07E-05		
SVOC	Acetophenone	98-86-2	D	2.31E-06		
SVOC	Anthracene	120-12-7	D	1.22E-05		

Attachment G2: Risk-Based Cancer Criteria for Routine Worker Exposure to Groundwater Vapor Intrusion (Commercial/Industrial Slab on Grade Building)
GMC: NAO Flint Operations Site, Flint, Michigan

				Vapor Inhalation		
Chem Group	**Chemical**	**CASRN**	**Carc Class**	**C_{air}** (mg/m^3)	**URF** (m^3/mg)	**RBC** (mg/l)
SVOC	Atrazine	1912-24-9	C	3.85E-09	6.3E-02	1.7E+05
SVOC	Benzaldehyde	100-52-7		5.01E-06		
SVOC	Benzo(a)anthracene	56-55-3	B2	7.36E-07	8.9E-02	6.3E+02
SVOC	Benzo(a)pyrene	50-32-8	B2	2.54E-07	8.9E-01	1.8E+02
SVOC	Benzo(b)fluoranthene	205-99-2	B2	1.82E-05	8.9E-02	2.5E+01
SVOC	Benzo(g,h,i)perylene	191-24-2	D	3.21E-08		
SVOC	Benzo(k)fluoranthene	207-08-9	B2	1.85E-07	8.9E-03	2.5E+04
SVOC	Biphenyl	92-52-4	D	4.96E-05		
SVOC	bis(2-Chloroethoxy)methane	111-91-1	D	3.87E-08		
SVOC	bis(2-Chloroethyl) ether	111-44-4	B2	3.81E-06	3.3E-01	3.3E+01
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2	2.33E-08	4.0E-03	4.4E+05
SVOC	Butylbenzylphthalate	85-68-7	C	2.77E-07	5.4E-04	2.7E+05
SVOC	Caprolactam	105-60-2		4.78E-09		
SVOC	Carbazole	86-74-8	B2	5.35E-09	5.7E-03	1.3E+06
SVOC	4-Chloro-3-methylphenol	59-50-7		9.05E-08		
SVOC	2-Chloronaphthalene	91-58-7		5.35E-05		
SVOC	2-Chlorophenol	95-57-8		6.56E-05		
SVOC	Chrysene	218-01-9	B2	1.62E-05	8.9E-04	2.8E+03
SVOC	Dibenz(a,h)anthracene	53-70-3	B2	4.48E-09	8.9E-01	1.0E+04
SVOC	Dibenzofuran	132-64-9	D	2.52E-06		
SVOC	2,4-Dichlorophenol	120-83-2		6.95E-07		
SVOC	Diethylphthalate	84-66-2	D	1.02E-07		
SVOC	2,4-Dimethylphenol	105-67-9		4.46E-07		
SVOC	Dimethylphthalate	131-11-3	D	2.39E-08		
SVOC	Di-n-butylphthalate	84-74-2	D	3.75E-09		
SVOC	4,6-Dinitro-2-methylphenol	534-52-1		9.65E-08		
SVOC	2,4-Dinitrotoluene	121-14-2	B2	2.14E-08		
SVOC	2,6-Dinitrotoluene	606-20-2	B2	1.68E-07	1.9E-01	1.3E+03
SVOC	Di-n-octylphthalate	117-84-0		1.03E-05		
SVOC	Fluoranthene	206-44-0	D	3.24E-06		
SVOC	Fluorene	86-73-7	D	1.21E-05		
SVOC	Formaldehyde	50-00-0	B1	7.78E-08	1.3E-02	4.0E+04
SVOC	Hexachlorobutadiene	87-68-3	C	4.67E-04	2.2E-02	4.0E+00
SVOC	Hexachlorocyclopentadiene	77-47-4	E	6.18E-04		
SVOC	Hexachloroethane	67-72-1	C	1.25E-04	4.0E-03	8.1E+01
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	B2	3.51E-07	8.9E-02	1.3E+03
SVOC	Isophorone	78-59-1	C	1.43E-06		
SVOC	2-Methylnaphthalene	91-57-6	ID	8.02E-05		
SVOC	Methylphenol (total)	1319-77-3		1.95E-07		
SVOC	Naphthalene	91-20-3	C	7.76E-05		
SVOC	2-Nitroaniline	88-74-4		3.64E-08		

Attachment G2: Risk-Based Cancer Criteria for Routine Worker Exposure to Groundwater Vapor Intrusion (Commercial/Industrial Slab on Grade Building)
GMC: NAO Flint Operations Site, Flint, Michigan

				Vapor Inhalation		
Chem Group	**Chemical**	**CASRN**	**Carc Class**	**C_{air}** (mg/m^3)	**URF** (m^3/mg)	**RBC** (mg/l)
SVOC	Nitrobenzene	98-95-3	D	5.07E-06		
SVOC	2-Nitrophenol	88-75-5		2.02E-06		
SVOC	4-Nitrophenol	100-02-7		4.49E-09		
SVOC	N-Nitrosodiphenylamine	86-30-6	B2	1.06E-06		
SVOC	N-Nitroso-di-n-propylamine	621-64-7	B2	5.00E-07	2.0E+00	4.1E+01
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	C	2.19E-05	1.0E-02	1.9E+02
SVOC	Pentachlorophenol	87-86-5	B2	6.55E-09	3.4E-02	1.8E+05
SVOC	Phenanthrene	85-01-8	D	4.69E-06		
SVOC	Phenol	108-95-2	ID	9.05E-08		
SVOC	Pyrene	129-00-0	D	2.26E-06		
SVOC	2,4,5-Trichlorophenol	95-95-4		9.31E-07		
SVOC	2,4,6-Trichlorophenol	88-06-2	B2	1.63E-06	3.1E-03	8.1E+03
PCB	PCBs (total)	1336-36-3	B2	1.56E-04	5.7E-01	4.6E-01
INORG	Antimony	7440-36-0				
INORG	Arsenic	7440-38-2	A		4.3E+00	
INORG	Barium	7440-39-3	D			
INORG	Beryllium	7440-41-7	B1		2.4E+00	
INORG	Cadmium	7440-43-9	B1		1.8E+00	
INORG	Chromium (total)	7440-47-3			1.2E+01	
INORG	Chromium III	16065-83-1	D			
INORG	Chromium VI	18540-29-9	A		1.2E+01	
INORG	Cobalt	7440-48-4	B1		2.8E+00	
INORG	Copper	7440-50-8	D			
INORG	Cyanide (total)	57-12-5	D			
INORG	Fluoride	16984-48-8				
INORG	Lead	7439-92-1	B2			
INORG	Manganese	7439-96-5	D			
INORG	Mercury	7439-97-6	D	3.85E-04		
INORG	Nickel	7440-02-0	A		2.4E-01	
INORG	Selenium	7782-49-2	D			
INORG	Silver	7440-22-4	D			
INORG	Thallium	7440-28-0				
INORG	Vanadium	7440-62-2				
INORG	Zinc	7440-66-6	D			
Note:						
Target cancer risk of 1E-05						

Attachment G2: Risk-Based Noncancer Criteria for Routine Worker Exposure to Groundwater Vapor Intrusion
(Commercial/Industrial Slab on Grade Building)
GMC: NAO Flint Operations Site, Flint, Michigan

				Vapor Inhalation		
Chem Group	**Chemical**	**CASRN**	**Carc Class**	**C_{air}** (mg/m^3)	**RfC** (mg/m^3)	**RBC** (mg/l)
VOC	Acetone	67-64-1	ID	8.31E-06	3.2E+00	5.5E+05
VOC	Benzene	71-43-2	A	5.21E-04	3.0E-02	8.4E+01
VOC	Bromodichloromethane	75-27-4	B2	1.90E-04	7.0E-02	5.4E+02
VOC	2-Butanone	78-93-3	ID	1.15E-05	5.0E+00	6.4E+05
VOC	Carbon Disulfide	75-15-0		1.22E-03	7.0E-01	8.4E+02
VOC	Carbon Tetrachloride	56-23-5	B2	1.06E-03		
VOC	Chlorobenzene	108-90-7	D	3.76E-04	6.0E-02	2.3E+02
VOC	Chloroethane	75-00-3		8.70E-04	1.0E+01	1.7E+04
VOC	Chloroform	67-66-3	B2	4.16E-04	5.0E-02	1.8E+02
VOC	Chloromethane	74-87-3	D	5.85E-04	9.0E-02	2.2E+02
VOC	Cumene	98-82-8	D	6.41E-04	4.0E-01	9.1E+02
VOC	Cyclohexane	110-82-7	ID	1.92E-03	6.0E+00	4.6E+03
VOC	Dibromochloromethane	124-48-1	C	1.01E-04	7.0E-02	1.0E+03
VOC	1,2-Dichlorobenzene	95-50-1	D	2.32E-04	2.0E-01	1.3E+03
VOC	1,3-Dichlorobenzene	541-73-1	D	3.20E-04	1.4E-01	6.4E+02
VOC	1,4-Dichlorobenzene	106-46-7	C	2.74E-04	8.0E-01	4.3E+03
VOC	Dichlorodifluoromethane	75-71-8		1.97E-03	2.0E-01	1.5E+02
VOC	1,1-Dichloroethane	75-34-3	C	5.22E-04	5.0E-01	1.4E+03
VOC	1,2-Dichloroethane	107-06-2	B2	1.57E-04	5.0E-03	4.7E+01
VOC	1,1-Dichloroethene	75-35-4	C	1.14E-03	2.0E-01	2.6E+02
VOC	cis-1,2-Dichloroethene	156-59-2	D	4.40E-04	3.5E-02	1.2E+02
VOC	trans-1,2-Dichloroethene	156-60-5		7.31E-04	6.0E-02	1.2E+02
VOC	1,2-Dichloropropane	78-87-5	B2	3.18E-04	4.0E-03	1.8E+01
VOC	Ethyl Benzene	100-41-4	D	5.51E-04	1.0E+00	2.7E+03
VOC	2-Hexanone	591-78-6			5.0E-03	
VOC	Methyl Acetate	79-20-9		1.85E-05	3.5E+00	2.8E+05
VOC	Methyl tert-butyl ether	1634-04-4		1.00E-04	3.0E+00	4.4E+04
VOC	4-Methyl-2-pentanone	108-10-1	ID	2.64E-05	3.0E+00	1.7E+05
VOC	Methylcyclohexane	108-87-2		2.14E-03	3.0E+00	2.0E+03
VOC	Methylene Chloride	75-09-2	B2	3.03E-04	3.0E+00	1.4E+04
VOC	Styrene	100-42-5		3.00E-04	1.0E+00	4.9E+03
VOC	Tetrachloroethene	127-18-4	C-B2	8.24E-04	4.0E-01	7.1E+02
VOC	Toluene	108-88-3	D	5.43E-04	5.0E+00	1.3E+04
VOC	1,2,4-Trichlorobenzene	120-82-1	D	1.63E-04	2.0E-01	1.8E+03
VOC	1,1,1-Trichloroethane	71-55-6	D	8.49E-04	2.2E+00	3.8E+03
VOC	1,1,2-Trichloroethane	79-00-5	C	1.40E-04		
VOC	Trichloroethene	79-01-6	C-B2	6.87E-04		
VOC	Trichlorofluoromethane	75-69-4		1.68E-03	7.0E-01	6.1E+02
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		2.16E-03	3.0E+01	2.0E+04
VOC	1,2,4-Trimethylbenzene	95-63-6	ID	4.67E-04	6.0E-03	1.9E+01
VOC	1,3,5-Trimethylbenzene	108-67-8	ID	4.74E-04	6.0E-03	1.8E+01
VOC	Vinyl Chloride	75-01-4	A	1.33E-03	1.0E-01	1.1E+02
VOC	Xylenes (total)	1330-20-7	ID	5.40E-04	1.0E-01	2.7E+02
SVOC	Acenaphthene	83-32-9		2.77E-05	2.1E-01	1.1E+04
SVOC	Acenaphthylene	208-96-8	D	2.07E-05	1.1E-01	7.4E+03
SVOC	Acetophenone	98-86-2	D	2.31E-06	3.5E-01	2.2E+05
SVOC	Anthracene	120-12-7	D	1.22E-05		

Attachment G2: Risk-Based Noncancer Criteria for Routine Worker Exposure to Groundwater Vapor Intrusion
(Commercial/Industrial Slab on Grade Building)
GMC: NAO Flint Operations Site, Flint, Michigan

				Vapor Inhalation		
Chem Group	**Chemical**	**CASRN**	**Carc Class**	**C_{air} (mg/m^3)**	**RfC (mg/m^3)**	**RBC (mg/l)**
SVOC	Atrazine	1912-24-9	C	3.85E-09	1.2E-01	4.7E+07
SVOC	Benzaldehyde	100-52-7		5.01E-06	3.5E-01	1.0E+05
SVOC	Benzo(a)anthracene	56-55-3	B2	7.36E-07		
SVOC	Benzo(a)pyrene	50-32-8	B2	2.54E-07		
SVOC	Benzo(b)fluoranthene	205-99-2	B2	1.82E-05		
SVOC	Benzo(g,h,i)perylene	191-24-2	D	3.21E-08	1.1E-01	4.8E+06
SVOC	Benzo(k)fluoranthene	207-08-9	B2	1.85E-07		
SVOC	Biphenyl	92-52-4	D	4.96E-05	1.8E-01	5.2E+03
SVOC	bis(2-Chloroethoxy)methane	111-91-1	D	3.87E-08		
SVOC	bis(2-Chloroethyl) ether	111-44-4	B2	3.81E-06		
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2	2.33E-08	7.0E-02	4.4E+06
SVOC	Butylbenzylphthalate	85-68-7	C	2.77E-07	7.0E-01	3.7E+06
SVOC	Caprolactam	105-60-2		4.78E-09	1.8E+00	5.3E+08
SVOC	Carbazole	86-74-8	B2	5.35E-09		
SVOC	4-Chloro-3-methylphenol	59-50-7		9.05E-08		
SVOC	2-Chloronaphthalene	91-58-7		5.35E-05	2.8E-01	7.6E+03
SVOC	2-Chlorophenol	95-57-8		6.56E-05	1.8E-02	3.9E+02
SVOC	Chrysene	218-01-9	B2	1.62E-05		
SVOC	Dibenz(a,h)anthracene	53-70-3	B2	4.48E-09		
SVOC	Dibenzofuran	132-64-9	D	2.52E-06	7.0E-03	4.1E+03
SVOC	2,4-Dichlorophenol	120-83-2		6.95E-07	1.1E-02	2.2E+04
SVOC	Diethylphthalate	84-66-2	D	1.02E-07	2.8E+00	4.0E+07
SVOC	2,4-Dimethylphenol	105-67-9		4.46E-07	7.0E-02	2.3E+05
SVOC	Dimethylphthalate	131-11-3	D	2.39E-08		
SVOC	Di-n-butylphthalate	84-74-2	D	3.75E-09		
SVOC	4,6-Dinitro-2-methylphenol	534-52-1		9.65E-08	3.5E-04	5.3E+03
SVOC	2,4-Dinitrotoluene	121-14-2	B2	2.14E-08		
SVOC	2,6-Dinitrotoluene	606-20-2	B2	1.68E-07	3.5E-03	3.0E+04
SVOC	Di-n-octylphthalate	117-84-0		1.03E-05		
SVOC	Fluoranthene	206-44-0	D	3.24E-06	1.4E-01	6.3E+04
SVOC	Fluorene	86-73-7	D	1.21E-05	1.4E-01	1.7E+04
SVOC	Formaldehyde	50-00-0	B1	7.78E-08		
SVOC	Hexachlorobutadiene	87-68-3	C	4.67E-04		
SVOC	Hexachlorocyclopentadiene	77-47-4	E	6.18E-04	2.0E-04	4.7E-01
SVOC	Hexachloroethane	67-72-1	C	1.25E-04		
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	B2	3.51E-07		
SVOC	Isophorone	78-59-1	C	1.43E-06		
SVOC	2-Methylnaphthalene	91-57-6	ID	8.02E-05	3.0E-03	5.5E+01
SVOC	Methylphenol (total)	1319-77-3		1.95E-07		
SVOC	Naphthalene	91-20-3	C	7.76E-05	3.0E-03	5.6E+01
SVOC	2-Nitroaniline	88-74-4		3.64E-08	2.0E-04	8.0E+03
SVOC	Nitrobenzene	98-95-3	D	5.07E-06	2.0E-03	5.8E+02
SVOC	2-Nitrophenol	88-75-5		2.02E-06		
SVOC	4-Nitrophenol	100-02-7		4.49E-09		
SVOC	N-Nitrosodiphenylamine	86-30-6	B2	1.06E-06		
SVOC	N-Nitroso-di-n-propylamine	621-64-7	B2	5.00E-07		
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	C	2.19E-05		

Attachment G2: Risk-Based Noncancer Criteria for Routine Worker Exposure to Groundwater Vapor Intrusion
(Commercial/Industrial Slab on Grade Building)
GMC: NAO Flint Operations Site, Flint, Michigan

				Vapor Inhalation		
Chem Group	**Chemical**	**CASRN**	**Carc Class**	**C_{air}** (mg/m^3)	**RfC** (mg/m^3)	**RBC** (mg/l)
SVOC	Pentachlorophenol	87-86-5	B2	6.55E-09	1.1E-01	2.3E+07
SVOC	Phenanthrene	85-01-8	D	4.69E-06	1.1E-01	3.3E+04
SVOC	Phenol	108-95-2	ID	9.05E-08		
SVOC	Pyrene	129-00-0	D	2.26E-06	1.1E-01	6.8E+04
SVOC	2,4,5-Trichlorophenol	95-95-4		9.31E-07		
SVOC	2,4,6-Trichlorophenol	88-06-2	B2	1.63E-06		
PCB	PCBs (total)	1336-36-3	B2	1.56E-04		
INORG	Antimony	7440-36-0			1.4E-03	
INORG	Arsenic	7440-38-2	A			
INORG	Barium	7440-39-3	D			
INORG	Beryllium	7440-41-7	B1		2.0E-05	
INORG	Cadmium	7440-43-9	B1		2.0E-04	
INORG	Chromium (total)	7440-47-3			1.0E-04	
INORG	Chromium III	16065-83-1	D		5.3E+00	
INORG	Chromium VI	18540-29-9	A		1.0E-04	
INORG	Cobalt	7440-48-4	B1		2.0E-05	
INORG	Copper	7440-50-8	D		1.4E-01	
INORG	Cyanide (total)	57-12-5	D		7.0E-02	
INORG	Fluoride	16984-48-8				
INORG	Lead	7439-92-1	B2			
INORG	Manganese	7439-96-5	D		5.0E-05	
INORG	Mercury	7439-97-6	D	3.85E-04	3.0E-04	1.1E+00
INORG	Nickel	7440-02-0	A			
INORG	Selenium	7782-49-2	D		1.8E-02	
INORG	Silver	7440-22-4	D		1.0E-05	
INORG	Thallium	7440-28-0			2.5E-04	
INORG	Vanadium	7440-62-2			2.5E-02	
INORG	Zinc	7440-66-6	D		1.1E+00	
Note:						
Target hazard quotient of 1						

Attachment G2: Routine Worker Occupational Based Criteria for Groundwater Vapor Intrusion Inhalation
(Commercial/Industrial Slab on Grade Building)
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	C_{air} (mg/m^3)	Occupational Indoor Air Standard (mg/m^3)	Occupational Criteria (mg/L)
VOC	Acetone	67-64-1	8.31E-06	1.80E+03	2.2E+08
VOC	Benzene	71-43-2	5.21E-04	3.19E+00	6.1E+03
VOC	Bromodichloromethane	75-27-4	1.90E-04		
VOC	2-Butanone	78-93-3	1.15E-05	5.90E+02	5.1E+07
VOC	Carbon Disulfide	75-15-0	1.22E-03	1.20E+01	9.9E+03
VOC	Carbon Tetrachloride	56-23-5	1.06E-03	1.26E+01	1.2E+04
VOC	Chlorobenzene	108-90-7	3.76E-04	3.50E+02	9.3E+05
VOC	Chloroethane	75-00-3	8.70E-04	2.60E+03	3.0E+06
VOC	Chloroform	67-66-3	4.16E-04	9.78E+00	2.3E+04
VOC	Chloromethane	74-87-3	5.85E-04	1.03E+02	1.8E+05
VOC	Cumene	98-82-8	6.41E-04	2.45E+02	3.8E+05
VOC	Cyclohexane	110-82-7	1.92E-03	1.05E+03	5.5E+05
VOC	Dibromochloromethane	124-48-1	1.01E-04		
VOC	1,2-Dichlorobenzene	95-50-1	2.32E-04	1.50E+02	6.5E+05
VOC	1,3-Dichlorobenzene	541-73-1	3.20E-04		
VOC	1,4-Dichlorobenzene	106-46-7	2.74E-04	4.50E+02	1.6E+06
VOC	Dichlorodifluoromethane	75-71-8	1.97E-03	4.95E+03	2.5E+06
VOC	1,1-Dichloroethane	75-34-3	5.22E-04	4.00E+02	7.7E+05
VOC	1,2-Dichloroethane	107-06-2	1.57E-04	4.00E+00	2.6E+04
VOC	1,1-Dichloroethene	75-35-4	1.14E-03	1.98E+01	1.7E+04
VOC	cis-1,2-Dichloroethene	156-59-2	4.40E-04	7.93E+02	1.8E+06
VOC	trans-1,2-Dichloroethene	156-60-5	7.31E-04	7.93E+02	1.1E+06
VOC	1,2-Dichloropropane	78-87-5	3.18E-04	3.50E+02	1.1E+06
VOC	Ethyl Benzene	100-41-4	5.51E-04	4.35E+02	7.9E+05
VOC	2-Hexanone	591-78-6		2.00E+01	
VOC	Methyl Acetate	79-20-9	1.85E-05	6.10E+02	3.3E+07
VOC	Methyl tert-butyl ether	1634-04-4	1.00E-04	1.80E+02	1.8E+06
VOC	4-Methyl-2-pentanone	108-10-1	2.64E-05	4.10E+02	1.6E+07
VOC	Methylcyclohexane	108-87-2	2.14E-03	2.00E+03	9.3E+05
VOC	Methylene Chloride	75-09-2	3.03E-04	8.70E+01	2.9E+05
VOC	Styrene	100-42-5	3.00E-04	2.15E+02	7.2E+05
VOC	Tetrachloroethene	127-18-4	8.24E-04	1.70E+02	2.1E+05
VOC	Toluene	108-88-3	5.43E-04	3.75E+02	6.9E+05
VOC	1,2,4-Trichlorobenzene	120-82-1	1.63E-04		
VOC	1,1,1-Trichloroethane	71-55-6	8.49E-04	1.90E+03	2.2E+06
VOC	1,1,2-Trichloroethane	79-00-5	1.40E-04	4.50E+01	3.2E+05
VOC	Trichloroethene	79-01-6	6.87E-04	2.70E+02	3.9E+05
VOC	Trichlorofluoromethane	75-69-4	1.68E-03	5.60E+03	3.3E+06
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	2.16E-03	7.60E+03	3.5E+06
VOC	1,2,4-Trimethylbenzene	95-63-6	4.67E-04	1.25E+02	2.7E+05
VOC	1,3,5-Trimethylbenzene	108-67-8	4.74E-04	1.25E+02	2.6E+05
VOC	Vinyl Chloride	75-01-4	1.33E-03	2.50E+00	1.9E+03
VOC	Xylenes (total)	1330-20-7	5.40E-04	4.35E+02	8.1E+05
SVOC	Acenaphthene	83-32-9	2.77E-05		
SVOC	Acenaphthylene	208-96-8	2.07E-05		
SVOC	Acetophenone	98-86-2	2.31E-06	4.91E+01	2.1E+07

Attachment G2: Routine Worker Occupational Based Criteria for Groundwater Vapor Intrusion Inhalation
(Commercial/Industrial Slab on Grade Building)
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	C_{air} (mg/m^3)	Occupational Indoor Air Standard (mg/m^3)	Occupational Criteria (mg/L)
SVOC	Anthracene	120-12-7	1.22E-05		
SVOC	Atrazine	1912-24-9	3.85E-09	5.00E+00	1.3E+09
SVOC	Benzaldehyde	100-52-7	5.01E-06		
SVOC	Benzo(a)anthracene	56-55-3	7.36E-07		
SVOC	Benzo(a)pyrene	50-32-8	2.54E-07		
SVOC	Benzo(b)fluoranthene	205-99-2	1.82E-05		
SVOC	Benzo(g,h,i)perylene	191-24-2	3.21E-08		
SVOC	Benzo(k)fluoranthene	207-08-9	1.85E-07		
SVOC	Biphenyl	92-52-4	4.96E-05	1.00E+00	2.0E+04
SVOC	bis(2-Chloroethoxy)methane	111-91-1	3.87E-08		
SVOC	bis(2-Chloroethyl) ether	111-44-4	3.81E-06	2.92E+01	7.7E+06
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	2.33E-08	5.00E+00	2.2E+08
SVOC	Butylbenzylphthalate	85-68-7	2.77E-07		
SVOC	Caprolactam	105-60-2	4.78E-09	5.00E+00	1.0E+09
SVOC	Carbazole	86-74-8	5.35E-09		
SVOC	4-Chloro-3-methylphenol	59-50-7	9.05E-08		
SVOC	2-Chloronaphthalene	91-58-7	5.35E-05		
SVOC	2-Chlorophenol	95-57-8	6.56E-05		
SVOC	Chrysene	218-01-9	1.62E-05		
SVOC	Dibenz(a,h)anthracene	53-70-3	4.48E-09		
SVOC	Dibenzofuran	132-64-9	2.52E-06		
SVOC	2,4-Dichlorophenol	120-83-2	6.95E-07		
SVOC	Diethylphthalate	84-66-2	1.02E-07	5.00E+00	4.9E+07
SVOC	2,4-Dimethylphenol	105-67-9	4.46E-07		
SVOC	Dimethylphthalate	131-11-3	2.39E-08	5.00E+00	2.1E+08
SVOC	Di-n-butylphthalate	84-74-2	3.75E-09	5.00E+00	1.3E+09
SVOC	4,6-Dinitro-2-methylphenol	534-52-1	9.65E-08	2.00E-01	2.1E+06
SVOC	2,4-Dinitrotoluene	121-14-2	2.14E-08		
SVOC	2,6-Dinitrotoluene	606-20-2	1.68E-07		
SVOC	Di-n-octylphthalate	117-84-0	1.03E-05		
SVOC	Fluoranthene	206-44-0	3.24E-06		
SVOC	Fluorene	86-73-7	1.21E-05		
SVOC	Formaldehyde	50-00-0	7.78E-08	9.00E-01	1.2E+07
SVOC	Hexachlorobutadiene	87-68-3	4.67E-04	2.00E-02	4.3E+01
SVOC	Hexachlorocyclopentadiene	77-47-4	6.18E-04	1.00E-01	1.6E+02
SVOC	Hexachloroethane	67-72-1	1.25E-04	1.00E+01	8.0E+04
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	3.51E-07		
SVOC	Isophorone	78-59-1	1.43E-06	2.30E+01	1.6E+07
SVOC	2-Methylnaphthalene	91-57-6	8.02E-05		
SVOC	Methylphenol (total)	1319-77-3	1.95E-07	2.20E+01	1.1E+08
SVOC	Naphthalene	91-20-3	7.76E-05	5.00E+01	6.4E+05
SVOC	2-Nitroaniline	88-74-4	3.64E-08		
SVOC	Nitrobenzene	98-95-3	5.07E-06	5.00E+00	9.9E+05
SVOC	2-Nitrophenol	88-75-5	2.02E-06		
SVOC	4-Nitrophenol	100-02-7	4.49E-09		
SVOC	N-Nitrosodiphenylamine	86-30-6	1.06E-06		

Attachment G2: Routine Worker Occupational Based Criteria for Groundwater Vapor Intrusion Inhalation
(Commercial/Industrial Slab on Grade Building)
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	C_{air} (mg/m^3)	Occupational Indoor Air Standard (mg/m^3)	Occupational Criteria (mg/L)
SVOC	N-Nitroso-di-n-propylamine	621-64-7	5.00E-07		
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	2.19E-05		
SVOC	Pentachlorophenol	87-86-5	6.55E-09	5.00E-01	7.6E+07
SVOC	Phenanthrene	85-01-8	4.69E-06		
SVOC	Phenol	108-95-2	9.05E-08	1.90E+01	2.1E+08
SVOC	Pyrene	129-00-0	2.26E-06		
SVOC	2,4,5-Trichlorophenol	95-95-4	9.31E-07		
SVOC	2,4,6-Trichlorophenol	88-06-2	1.63E-06		
PCB	PCBs (total)	1336-36-3	1.56E-04	5.00E-01	3.2E+03
INORG	Antimony	7440-36-0		5.00E-01	
INORG	Arsenic	7440-38-2		5.00E-01	
INORG	Barium	7440-39-3		5.00E-01	
INORG	Beryllium	7440-41-7		2.00E-03	
INORG	Cadmium	7440-43-9		5.00E-03	
INORG	Chromium (total)	7440-47-3		1.00E+00	
INORG	Chromium III	16065-83-1		5.00E-01	
INORG	Chromium VI	18540-29-9			
INORG	Cobalt	7440-48-4		5.00E-02	
INORG	Copper	7440-50-8		1.00E+00	
INORG	Cyanide (total)	57-12-5		5.00E+00	
INORG	Fluoride	16984-48-8		2.50E+00	
INORG	Lead	7439-92-1		5.00E-02	
INORG	Manganese	7439-96-5		2.00E-01	
INORG	Mercury	7439-97-6	3.85E-04	5.00E-02	1.3E+02
INORG	Nickel	7440-02-0		1.00E+00	
INORG	Selenium	7782-49-2		2.00E-01	
INORG	Silver	7440-22-4		1.00E-02	
INORG	Thallium	7440-28-0		1.00E-01	
INORG	Vanadium	7440-62-2			
INORG	Zinc	7440-66-6			

Attachment G2: Vapor Intrusion into Commercial/Industrial Slab on Grade Building from NAPL at AOI 36-1
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	D_{air} (m^2/d)	D_{water} (m^2/d)	H (unitless)	D_{crack} (m^2/d)	D_{eff}^T (m^2/d)	α_∞
VOC	Acetone	67-64-1	2.30E+02	1.07E+00	7.95E-04	3.17E+01	2.92E+01	1.93E-04
VOC	Benzene	71-43-2	9.50E+01	7.60E-01	1.14E-01	1.22E+01	9.95E+00	7.81E-05
VOC	2-Butanone	78-93-3	9.53E+01	6.98E-01	1.14E-03	1.32E+01	1.23E+01	8.43E-05
VOC	Carbon Disulfide	75-15-0	3.59E+02	8.99E-01	6.20E-01	4.60E+01	3.75E+01	2.77E-04
VOC	Chloroethane	75-00-3	1.01E+03	2.34E+00	1.80E-01	1.29E+02	1.05E+02	7.65E-04
VOC	Chloromethane	74-87-3	4.30E+03	1.09E+00	1.80E-01	5.51E+02	4.49E+02	3.23E-03
VOC	Cumene	98-82-8	4.50E+00	5.62E-01	2.66E-01	5.80E-01	4.79E-01	1.29E-05
VOC	Cyclohexane	110-82-7	9.69E+01	7.25E-01	3.98E+00	1.24E+01	1.01E+01	7.95E-05
VOC	1,2-Dichlorobenzene	95-50-1	1.36E+00	5.96E-01	3.90E-02	1.99E-01	1.98E-01	1.24E-05
VOC	Dichlorodifluoromethane	75-71-8	4.85E+03	6.91E-01	7.01E+00	6.21E+02	5.06E+02	3.64E-03
VOC	1,1-Dichloroethane	75-34-3	2.27E+02	6.41E-01	1.15E-01	2.91E+01	2.38E+01	1.78E-04
VOC	cis-1,2-Dichloroethene	156-59-2	2.03E+02	6.36E-01	8.35E-02	2.60E+01	2.12E+01	1.59E-04
VOC	Ethyl Benzene	100-41-4	9.60E+00	6.48E-01	1.62E-01	1.24E+00	1.02E+00	1.54E-05
VOC	Methyl Acetate	79-20-9	2.16E+02	8.27E-01	1.85E-03	2.84E+01	2.44E+01	1.74E-04
VOC	4-Methyl-2-pentanone	108-10-1	1.99E+01	6.48E-01	2.82E-03	2.92E+00	2.91E+00	2.43E-05
VOC	Methylcyclohexane	108-87-2	4.30E+01	6.35E-01	8.78E+00	5.51E+00	4.49E+00	3.91E-05
VOC	Methylene Chloride	75-09-2	4.33E+02	8.73E-01	4.49E-02	5.55E+01	4.53E+01	3.33E-04
VOC	Tetrachloroethene	127-18-4	1.86E+01	6.22E-01	3.77E-01	2.38E+00	1.94E+00	2.13E-05
VOC	Toluene	108-88-3	2.84E+01	7.52E-01	1.36E-01	3.65E+00	2.99E+00	2.84E-05
VOC	1,2,4-Trichlorobenzene	120-82-1	4.31E-01	2.59E-01	2.91E-02	6.99E-02	7.56E-02	1.17E-05
VOC	1,1,1-Trichloroethane	71-55-6	1.24E+02	6.74E-01	3.53E-01	1.59E+01	1.29E+01	9.97E-05
VOC	1,1,2-Trichloroethane	79-00-5	2.33E+01	6.74E-01	1.87E-02	3.04E+00	2.57E+00	2.50E-05
VOC	Trichloroethene	79-01-6	7.35E+01	6.83E-01	2.11E-01	9.42E+00	7.68E+00	6.19E-05
VOC	Trichlorofluoromethane	75-69-4	8.03E+02	7.52E-01	1.98E+00	1.03E+02	8.38E+01	6.11E-04
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	3.32E+02	6.74E-01	9.83E+00	4.25E+01	3.46E+01	2.56E-04
VOC	Vinyl Chloride	75-01-4	2.98E+03	9.16E-01	5.55E-01	3.82E+02	3.11E+02	2.25E-03
VOC	Xylenes (total)	1330-20-7	7.99E+00	6.74E-01	1.38E-01	1.03E+00	8.54E-01	1.44E-05
SVOC	Acenaphthene	83-32-9	2.50E-03	3.64E-01	3.18E-03	1.89E-01	3.18E-01	1.25E-05
SVOC	Benzo(a)anthracene	56-55-3	1.05E-07	4.41E-01	6.85E-05	1.06E+01	1.79E+01	6.91E-05
SVOC	Benzo(a)pyrene	50-32-8	5.49E-09	3.72E-01	2.32E-05	2.65E+01	4.46E+01	1.62E-04
SVOC	Benzo(b)fluoranthene	205-99-2	5.00E-07	1.95E-01	2.28E-03	1.42E-01	2.39E-01	1.24E-05
SVOC	Benzo(k)fluoranthene	207-08-9	2.00E-09	1.95E-01	1.70E-05	1.90E+01	3.19E+01	1.18E-04
SVOC	Biphenyl	92-52-4	9.64E-03	3.49E-01	6.13E-03	9.52E-02	1.60E-01	1.23E-05
SVOC	bis(2-Chloroethoxy)methane	111-91-1	1.40E-04	3.77E-01	3.47E-06	1.79E+02	3.01E+02	1.06E-03
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	6.45E-06	3.03E-01	2.09E-06	2.39E+02	4.03E+02	1.42E-03
SVOC	Butylbenzylphthalate	85-68-7	8.25E-06	1.50E-01	2.59E-05	9.60E+00	1.62E+01	6.31E-05
SVOC	Chrysene	218-01-9	6.23E-09	2.14E-01	1.94E-03	1.82E-01	3.07E-01	1.25E-05
SVOC	2,4-Dinitrotoluene	121-14-2	1.47E-04	1.75E+00	1.90E-06	1.52E+03	2.57E+03	8.90E-03
SVOC	Di-n-octylphthalate	117-84-0	2.60E-06	1.30E-01	1.37E-03	1.57E-01	2.65E-01	1.25E-05
SVOC	Fluoranthene	206-44-0	7.80E-06	2.61E-01	3.30E-04	1.30E+00	2.20E+00	1.57E-05
SVOC	Fluorene	86-73-7	6.33E-04	3.14E-01	1.31E-03	3.97E-01	6.68E-01	1.27E-05
SVOC	2-Methylnaphthalene	91-57-6	5.50E-02	4.18E-01	1.06E-02	7.22E-02	1.17E-01	1.21E-05
SVOC	Naphthalene	91-20-3	8.50E-02	5.10E-01	9.90E-03	9.59E-02	1.55E-01	1.23E-05
SVOC	Phenanthrene	85-01-8	1.12E-04	3.24E-01	4.76E-04	1.12E+00	1.89E+00	1.49E-05
SVOC	Pyrene	129-00-0	4.59E-06	2.35E-01	2.26E-04	1.72E+00	2.90E+00	1.78E-05
PCB	PCBs (total)	1336-36-3	7.71E-05	1.75E-01	4.09E-02	7.06E-03	1.19E-02	8.15E-06
INORG	Antimony	7440-36-0						
INORG	Arsenic	7440-38-2						
INORG	Barium	7440-39-3						
INORG	Beryllium	7440-41-7						
INORG	Cadmium	7440-43-9						
INORG	Chromium (total)	7440-47-3						

Attachment G2: Vapor Intrusion into Commercial/Industrial Slab on Grade Building from NAPL at AOI 36-1
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	D_{air} (m^2/d)	D_{water} (m^2/d)	H (unitless)	D_{crack} (m^2/d)	D_{eff}^T (m^2/d)	α_∞
INORG	Cobalt	7440-48-4						
INORG	Copper	7440-50-8						
INORG	Cyanide (total)	57-12-5						
INORG	Lead	7439-92-1						
INORG	Manganese	7439-96-5						
INORG	Mercury	7439-97-6	1.96E-03	2.65E-01	1.45E-01	3.27E-03	5.35E-03	5.65E-06
INORG	Nickel	7440-02-0						
INORG	Selenium	7782-49-2						
INORG	Silver	7440-22-4						
INORG	Thallium	7440-28-0						
INORG	Vanadium	7440-62-2						
INORG	Zinc	7440-66-6						
Notes:	**Crack Soil and Building Characteristics**							
	SCS Soil texture class		Loamy Sand					
	Bulk density	kg/L	ρ_b	1.62				
	Total porosity	L/L-soil	θ	0.390				
	Water-filled porosity	L/L-soil	θ_w	0.083				
	Air-filled porosity	L/L-soil	θ_a	0.307				
	Residual saturation	L/L-soil	θ_r	0.049				
	Hydraulic conductivity	cm/s	**K**	1.2E-03				
	Dynamic viscosity of water	g/cm-s	μ	0.01307				
	Density of water	g/cm^3	ρ_w	1.0				
	Gravitational acceleration	cm/s^2	**g**	980.7				
	Intrinsic permeability	cm^2	**k**	1.6E-08				
	Relative saturation	unitless	S_e	0.100				
	van Genuchten N	unitless	**N**	1.746				
	van Genuchten M	unitless	**M**	0.427				
	Relative air permeability	unitless	k_{rg}	0.945				
	Permeability to vapor	cm^2	k_v	1.5E-08				
	Distance from building foundation to source	m	L_T	4.51				
	Bldg foundation thickness	m	L_{crack}	0.15				
	Bldg foundation length	m		19.29				
	Bldg foundation width	m		19.29				
	Bldg occupied height	m		2.44				
	Bldg occupied volume	m^3		907.93				
	Occupied depth below ground	m		0.0				
	Bldg area for vapor intrusion	m^2	A_B	372.1				
	Ratio of A_{crack} to A_B		η	1E-04				
	Area of cracks	m^2	A_{crack}	3.86E-02				
	Air exchange rate	$hour^{-1}$	**ac/h**	2.0				
	Building ventilation rate	m^3/d	Q_{bldg}	4.36E+04				
	Pressure difference between outdoors-indoors	$kg/m\text{-}s^2$	ΔP	1.0				
	Air viscosity	kg/m-s	μ	1.8E-05				
	Crack length (bldg perimeter)	m	X_{crack}	77.16				
	Crack depth below ground	m	Z_{crack}	0.15				
	Crack radius	m	r_{crack}	5E-04				

Attachment G2: Vapor Intrusion into Commercial/Industrial Slab on Grade Building from NAPL at AOI 36-1
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	D_{air} (m^2/d)	D_{water} (m^2/d)	H (unitless)	D_{crack} (m^2/d)	D_{eff}^T (m^2/d)	α_∞
	Soil gas flow rate into bldg	m^3/d	Q_{soil}	5.58E-01				

Attachment G2: Risk Calculations for Routine Worker Exposure to LNAPL via Vapor Intrusion at AOI 36-1
GMC: NAO Flint Operations Site, Flint, Michigan

								LNAPL Indoor Vapor Inhalation								
Chem Group	**Chemical**	**CASRN**	**Carc Class**	**C_{LNAPL}** (mg/kg)	**VP** (mmHg)	**v*** (mg/m^3)	**α_∞**	**$C_{indoor\ air}$** (mg/m^3)	**URF** (m^3/mg)	**Risk**		**RfC** (mg/m^3)	**HQ**		**Occupational Air Concentration Limit** (mg/m^3)	**Ratio**
VOC	Acetone	67-64-1	ID		2.30E+02		1.93E-04					3.2E+00			1.8E+03	
VOC	Benzene	71-43-2	A	2.90E+03	9.50E+01	4.61E+03	7.81E-05	3.60E-01	7.8E-03	7E-04		3.0E-02	8E+00		3.2E+00	1E-01
VOC	2-Butanone	78-93-3	ID		9.53E+01		8.43E-05					5.0E+00			5.9E+02	
VOC	Carbon Disulfide	75-15-0			3.59E+02		2.77E-04					7.0E-01			1.2E+01	
VOC	Chloroethane	75-00-3			1.01E+03		7.65E-04					1.0E+01			2.6E+03	
VOC	Chloromethane	74-87-3	D		4.30E+03		3.23E-03					9.0E-02			1.0E+02	
VOC	Cumene	98-82-8	D	6.10E+02	4.50E+00	4.59E+01	1.29E-05	5.93E-04				4.0E-01	1E-03		2.5E+02	2E-06
VOC	Cyclohexane	110-82-7	ID		9.69E+01		7.95E-05					6.0E+00			1.1E+03	
VOC	1,2-Dichlorobenzene	95-50-1	D		1.36E+00		1.24E-05					2.0E-01			1.5E+02	
VOC	Dichlorodifluoromethane	75-71-8			4.85E+03		3.64E-03					2.0E-01			5.0E+03	
VOC	1,1-Dichloroethane	75-34-3	C	1.04E+00	2.27E+02	3.95E+00	1.78E-04	7.02E-04				5.0E-01	1E-03		4.0E+02	2E-06
VOC	cis-1,2-Dichloroethene	156-59-2	D	1.35E+00	2.03E+02	4.58E+00	1.59E-04	7.29E-04				3.5E-02	1E-02		7.9E+02	9E-07
VOC	Ethyl Benzene	100-41-4	D	8.60E+03	9.60E+00	1.38E+03	1.54E-05	2.12E-02				1.0E+00	1E-02		4.4E+02	5E-05
VOC	Methyl Acetate	79-20-9			2.16E+02		1.74E-04					3.5E+00			6.1E+02	
VOC	4-Methyl-2-pentanone	108-10-1	ID		1.99E+01		2.43E-05					3.0E+00			4.1E+02	
VOC	Methylcyclohexane	108-87-2		3.90E+02	4.30E+01	2.80E+02	3.91E-05	1.10E-02				3.0E+00	3E-03		2.0E+03	5E-06
VOC	Methylene Chloride	75-09-2	B2	1.80E+02	4.33E+02	1.30E+03	3.33E-04	4.34E-01	4.7E-04	5E-05		3.0E+00	1E-01		8.7E+01	5E-03
VOC	Tetrachloroethene	127-18-4	C-B2		1.86E+01		2.13E-05		3.1E-03			4.0E-01			1.7E+02	
VOC	Toluene	108-88-3	D	5.20E+04	2.84E+01	2.47E+04	2.84E-05	7.02E-01				5.0E+00	1E-01		3.8E+02	2E-03
VOC	1,2,4-Trichlorobenzene	120-82-1	D		4.31E-01		1.17E-05					2.0E-01				
VOC	1,1,1-Trichloroethane	71-55-6	D		1.24E+02		9.97E-05					2.2E+00			1.9E+03	
VOC	1,1,2-Trichloroethane	79-00-5	C		2.33E+01		2.50E-05		1.6E-02						4.5E+01	
VOC	Trichloroethene	79-01-6	C-B2	4.19E+00	7.35E+01	5.15E+00	6.19E-05	3.19E-04	1.7E-03	1E-07					2.7E+02	1E-06
VOC	Trichlorofluoromethane	75-69-4			8.03E+02		6.11E-04					7.0E-01			5.6E+03	
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1			3.32E+02		2.56E-04					3.0E+01			7.6E+03	
VOC	Vinyl Chloride	75-01-4	A		2.98E+03		2.25E-03		8.8E-03			1.0E-01			2.5E+00	
VOC	Xylenes (total)	1330-20-7	ID	3.18E+04	7.99E+00	4.25E+03	1.44E-05	6.14E-02				1.0E-01	4E-01		4.4E+02	1E-04
SVOC	Acenaphthene	83-32-9			2.50E-03		1.25E-05					2.1E-01				
SVOC	Benzo(a)anthracene	56-55-3	B2		1.05E-07		6.91E-05		8.9E-02							
SVOC	Benzo(a)pyrene	50-32-8	B2		5.49E-09		1.62E-04		8.9E-01							
SVOC	Benzo(b)fluoranthene	205-99-2	B2		5.00E-07		1.24E-05		8.9E-02							
SVOC	Benzo(k)fluoranthene	207-08-9	B2		2.00E-09		1.18E-04		8.9E-03							
SVOC	Biphenyl	92-52-4	D		9.64E-03		1.23E-05					1.8E-01			1.0E+00	
SVOC	bis(2-Chloroethoxy)methane	111-91-1	D		1.40E-04		1.06E-03									
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2		6.45E-06		1.42E-03		4.0E-03			7.0E-02			5.0E+00	
SVOC	Butylbenzylphthalate	85-68-7	C		8.25E-06		6.31E-05		5.4E-04			7.0E-01				
SVOC	Chrysene	218-01-9	B2		6.23E-09		1.25E-05		8.9E-04							
SVOC	2,4-Dinitrotoluene	121-14-2	B2		1.47E-04		8.90E-03									
SVOC	Di-n-octylphthalate	117-84-0			2.60E-06		1.25E-05									
SVOC	Fluoranthene	206-44-0	D		7.80E-06		1.57E-05					1.4E-01				
SVOC	Fluorene	86-73-7	D		6.33E-04		1.27E-05					1.4E-01				
SVOC	2-Methylnaphthalene	91-57-6	ID	8.80E+02	5.50E-02	8.09E-01	1.21E-05	9.79E-06				3.0E-03	2E-03			

Attachment G2: Risk Calculations for Routine Worker Exposure to LNAPL via Vapor Intrusion at AOI 36-1
GMC: NAO Flint Operations Site, Flint, Michigan

								LNAPL Indoor Vapor Inhalation								
Chem Group	**Chemical**	**CASRN**	**Carc Class**	**C_{LNAPL}** (mg/kg)	**VP** (mmHg)	**v*** (mg/m^3)	**α_∞**	**$C_{indoor\ air}$** (mg/m^3)	**URF** (m^3/mg)	**Risk**		**RfC** (mg/m^3)	**HQ**		**Occupational Air Concentration Limit** (mg/m^3)	**Ratio**
SVOC	Naphthalene	91-20-3	C	1.40E+03	8.50E-02	1.99E+00	1.23E-05	2.44E-05				3.0E-03	6E-03		5.0E+01	5E-07
SVOC	Phenanthrene	85-01-8	D		1.12E-04		1.49E-05					1.1E-01				
SVOC	Pyrene	129-00-0	D		4.59E-06		1.78E-05					1.1E-01				
PCB	PCBs (total)	1336-36-3	B2		7.71E-05		8.15E-06		5.7E-01						5.0E-01	
INORG	Antimony	7440-36-0										1.4E-03			5.0E-01	
INORG	Arsenic	7440-38-2	A	1.50E+00					4.3E+00						5.0E-01	
INORG	Barium	7440-39-3	D	1.30E+00											5.0E-01	
INORG	Beryllium	7440-41-7	B1						2.4E+00			2.0E-05			2.0E-03	
INORG	Cadmium	7440-43-9	B1	1.90E-01					1.8E+00			2.0E-04			5.0E-03	
INORG	Chromium (total)	7440-47-3		3.90E+00					1.2E+01			1.0E-04			1.0E+00	
INORG	Cobalt	7440-48-4	B1	5.70E-02					2.8E+00			2.0E-05			5.0E-02	
INORG	Copper	7440-50-8	D	1.60E+00								1.4E-01			1.0E+00	
INORG	Cyanide (total)	57-12-5	D									7.0E-02			5.0E+00	
INORG	Lead	7439-92-1	B2	3.40E+00											5.0E-02	
INORG	Manganese	7439-96-5	D	1.10E+00								5.0E-05			2.0E-01	
INORG	Mercury	7439-97-6	D		1.96E-03		5.65E-06					3.0E-04			5.0E-02	
INORG	Nickel	7440-02-0	A	4.80E-01					2.4E-01						1.0E+00	
INORG	Selenium	7782-49-2	D									1.8E-02			2.0E-01	
INORG	Silver	7440-22-4	D									1.0E-05			1.0E-02	
INORG	Thallium	7440-28-0										2.5E-04			1.0E-01	
INORG	Vanadium	7440-62-2		8.90E-01								2.5E-02				
INORG	Zinc	7440-66-6	D	2.10E+00								1.1E+00				
									Cumulative Risk:	**7E-04**		**Cumulative HI:**	**9E+00**		**Sum of ratios:**	**1E-01**

Attachment G3
Exposure of Maintenance Workers to Soil

Attachment G3: Vapor Flux from Soil to Ambient Air
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	K_{oc} (L/kg)	K_d (L/kg)	H (unitless)	D_{air} (m^2/d)	D_{water} (m^2/d)	R_L (unitless)	D_G (m^2/d)	D_L (m^2/d)	D_E (m^2/d)	J_G (kg/m^2-s)
VOC	Acetone	67-64-1	5.81E-01		7.95E-04	1.07E+00	9.85E-05	7.81E-02	1.47E-01	1.21E-07	1.50E-03	1.36E-05
VOC	Benzene	71-43-2	5.82E+01		1.14E-01	7.60E-01	8.47E-05	3.00E-01	1.04E-01	1.04E-07	3.96E-02	6.97E-05
VOC	Bromodichloromethane	75-27-4	5.51E+01		3.28E-02	2.57E-01	9.16E-05	2.65E-01	3.54E-02	1.13E-07	4.38E-03	2.32E-05
VOC	2-Butanone	78-93-3	2.00E+00		1.14E-03	6.98E-01	8.47E-05	8.28E-02	9.59E-02	1.04E-07	1.32E-03	1.27E-05
VOC	Carbon Disulfide	75-15-0	4.59E+01		6.20E-01	8.99E-01	8.64E-05	4.19E-01	1.23E-01	1.06E-07	1.83E-01	1.50E-04
VOC	Carbon Tetrachloride	56-23-5	1.74E+02		6.25E-01	6.74E-01	7.60E-05	8.35E-01	9.26E-02	9.36E-08	6.93E-02	9.22E-05
VOC	Chlorobenzene	108-90-7	2.20E+02		7.60E-02	6.31E-01	7.52E-05	8.14E-01	8.66E-02	9.25E-08	8.09E-03	3.15E-05
VOC	Chloroethane	75-00-3	1.62E+01		1.80E-01	2.34E+00	9.94E-05	1.85E-01	3.22E-01	1.22E-07	3.13E-01	1.96E-04
VOC	Chloroform	67-66-3	3.97E+01		7.50E-02	8.99E-01	8.64E-05	2.28E-01	1.23E-01	1.06E-07	4.06E-02	7.05E-05
VOC	Chloromethane	74-87-3	3.97E+01		1.80E-01	1.09E+00	5.62E-05	2.61E-01	1.50E-01	6.91E-08	1.03E-01	1.13E-04
VOC	Cumene	98-82-8	7.05E+02		2.66E-01	5.62E-01	6.13E-05	2.44E+00	7.71E-02	7.55E-08	8.39E-03	3.21E-05
VOC	Cyclohexane	110-82-7	6.35E+02		3.98E+00	7.25E-01	7.86E-05	3.38E+00	9.96E-02	9.68E-08	1.17E-01	1.20E-04
VOC	Dibromochloromethane	124-48-1	6.26E+01		1.61E-02	1.69E-01	9.07E-05	2.84E-01	2.33E-02	1.12E-07	1.32E-03	1.27E-05
VOC	1,2-Dichlorobenzene	95-50-1	6.23E+02		3.90E-02	5.96E-01	6.83E-05	2.11E+00	8.19E-02	8.40E-08	1.51E-03	1.36E-05
VOC	1,3-Dichlorobenzene	541-73-1	5.69E+02		6.33E-02	5.98E-01	6.79E-05	1.94E+00	8.21E-02	8.36E-08	2.68E-03	1.81E-05
VOC	1,4-Dichlorobenzene	106-46-7	6.12E+02		4.98E-02	5.96E-01	6.83E-05	2.07E+00	8.19E-02	8.40E-08	1.97E-03	1.55E-05
VOC	Dichlorodifluoromethane	75-71-8	6.15E+01		7.01E+00	6.91E-01	6.91E-05	2.47E+00	9.49E-02	8.51E-08	2.70E-01	1.82E-04
VOC	1,1-Dichloroethane	75-34-3	3.13E+01		1.15E-01	6.41E-01	9.07E-05	2.13E-01	8.81E-02	1.12E-07	4.74E-02	7.63E-05
VOC	1,2-Dichloroethane	107-06-2	1.75E+01		2.01E-02	8.99E-01	8.55E-05	1.39E-01	1.23E-01	1.05E-07	1.78E-02	4.67E-05
VOC	1,1-Dichloroethene	75-35-4	5.82E+01		5.35E-01	7.78E-01	8.99E-05	4.32E-01	1.07E-01	1.11E-07	1.32E-01	1.27E-04
VOC	cis-1,2-Dichloroethene	156-59-2	3.56E+01		8.35E-02	6.36E-01	9.76E-05	2.17E-01	8.73E-02	1.20E-07	3.35E-02	6.41E-05
VOC	trans-1,2-Dichloroethene	156-60-5	5.22E+01		1.93E-01	6.11E-01	1.03E-04	3.05E-01	8.39E-02	1.27E-07	5.29E-02	8.05E-05
VOC	1,2-Dichloropropane	78-87-5	4.35E+01		5.75E-02	6.76E-01	7.54E-05	2.35E-01	9.28E-02	9.28E-08	2.27E-02	5.28E-05
VOC	Ethyl Benzene	100-41-4	3.67E+02		1.62E-01	6.48E-01	6.74E-05	1.32E+00	8.90E-02	8.29E-08	1.09E-02	3.66E-05
VOC	2-Hexanone	591-78-6	1.48E+01		3.58E-02							
VOC	Methyl Acetate	79-20-9	1.66E+00		1.85E-03	8.27E-01	9.50E-05	8.20E-02	1.14E-01	1.17E-07	2.57E-03	1.78E-05
VOC	Methyl tert-butyl ether	1634-04-4	1.15E+01		1.20E-02	7.42E-01	8.73E-05	1.17E-01	1.02E-01	1.07E-07	1.05E-02	3.58E-05
VOC	4-Methyl-2-pentanone	108-10-1	1.05E+01		2.82E-03	6.48E-01	6.74E-05	1.11E-01	8.90E-02	8.29E-08	2.26E-03	1.67E-05
VOC	Methylcyclohexane	108-87-2	2.66E+02		8.78E+00	6.35E-01	7.36E-05	3.68E+00	8.72E-02	9.06E-08	2.08E-01	1.60E-04

Attachment G3: Vapor Flux from Soil to Ambient Air
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	K_{oc} (L/kg)	K_d (L/kg)	H (unitless)	D_{air} (m^2/d)	D_{water} (m^2/d)	R_L (unitless)	D_G (m^2/d)	D_L (m^2/d)	D_E (m^2/d)	J_G (kg/m^2-s)
VOC	Methylene Chloride	75-09-2	1.17E+01		4.49E-02	8.73E-01	1.01E-04	1.28E-01	1.20E-01	1.24E-07	4.21E-02	7.18E-05
VOC	Styrene	100-42-5	7.77E+02		5.65E-02	6.13E-01	6.91E-05	2.61E+00	8.43E-02	8.51E-08	1.82E-03	1.50E-05
VOC	Tetrachloroethene	127-18-4	1.56E+02		3.77E-01	6.22E-01	7.08E-05	6.99E-01	8.54E-02	8.72E-08	4.61E-02	7.52E-05
VOC	Toluene	108-88-3	1.80E+02		1.36E-01	7.52E-01	7.43E-05	7.03E-01	1.03E-01	9.15E-08	2.00E-02	4.95E-05
VOC	1,2,4-Trichlorobenzene	120-82-1	1.79E+03		2.91E-02	2.59E-01	7.11E-05	5.90E+00	3.56E-02	8.75E-08	1.76E-04	4.64E-06
VOC	1,1,1-Trichloroethane	71-55-6	1.10E+02		3.53E-01	6.74E-01	7.60E-05	5.43E-01	9.26E-02	9.36E-08	6.00E-02	8.58E-05
VOC	1,1,2-Trichloroethane	79-00-5	5.03E+01		1.87E-02	6.74E-01	7.60E-05	2.45E-01	9.26E-02	9.36E-08	7.07E-03	2.94E-05
VOC	Trichloroethene	79-01-6	1.68E+02		2.11E-01	6.83E-01	7.86E-05	6.85E-01	9.37E-02	9.68E-08	2.89E-02	5.95E-05
VOC	Trichlorofluoromethane	75-69-4	1.21E+02		1.98E+00	7.52E-01	8.38E-05	1.09E+00	1.03E-01	1.03E-07	1.88E-01	1.52E-04
VOC	1,1,2-Trichloro-1,2,2-trifluoroe	76-13-1	3.81E+02		9.83E+00	6.74E-01	7.08E-05	4.38E+00	9.26E-02	8.72E-08	2.08E-01	1.60E-04
VOC	1,2,4-Trimethylbenzene	95-63-6	8.97E+02		1.26E-01	5.24E-01	6.84E-05	3.02E+00	7.19E-02	8.42E-08	2.99E-03	1.92E-05
VOC	1,3,5-Trimethylbenzene	108-67-8	1.76E+03		1.20E-01	5.20E-01	7.49E-05	5.82E+00	7.14E-02	9.22E-08	1.48E-03	1.35E-05
VOC	Vinyl Chloride	75-01-4	1.85E+01		5.55E-01	9.16E-01	1.06E-04	3.09E-01	1.26E-01	1.31E-07	2.26E-01	1.66E-04
VOC	Xylenes (total)	1330-20-7	3.86E+02		1.38E-01	6.74E-01	7.56E-05	1.37E+00	9.25E-02	9.30E-08	9.33E-03	3.38E-05
SVOC	Acenaphthene	83-32-9	7.14E+03		3.18E-03	3.64E-01	6.64E-05	2.32E+01	5.00E-02	8.18E-08	6.85E-06	9.16E-07
SVOC	Acenaphthylene	208-96-8	7.47E+03		2.31E-03	3.88E-01	6.03E-05	2.43E+01	5.33E-02	7.42E-08	5.07E-06	7.89E-07
SVOC	Acetophenone	98-86-2	3.58E+01		2.19E-04	6.91E-01	6.91E-05	1.92E-01	9.49E-02	8.51E-08	1.09E-04	3.65E-06
SVOC	Anthracene	120-12-7	2.97E+04		1.34E-03	2.80E-01	6.69E-05	9.63E+01	3.84E-02	8.23E-08	5.34E-07	2.56E-07
SVOC	Atrazine	1912-24-9	3.68E+02		1.25E-07	2.24E-01	5.76E-05	1.27E+00	3.07E-02	7.09E-08	5.89E-08	8.50E-08
SVOC	Benzaldehyde	100-52-7	2.85E+01		4.86E-04	6.23E-01	7.84E-05	1.69E-01	8.56E-02	9.65E-08	2.47E-04	5.51E-06
SVOC	Benzo(a)anthracene	56-55-3	4.01E+05		6.85E-05	4.41E-01	7.78E-05	1.30E+03	6.05E-02	9.57E-08	3.26E-09	2.00E-08
SVOC	Benzo(a)pyrene	50-32-8	1.01E+06		2.32E-05	3.72E-01	7.78E-05	3.29E+03	5.10E-02	9.57E-08	3.88E-10	6.90E-09
SVOC	Benzo(b)fluoranthene	205-99-2	1.24E+06		2.28E-03	1.95E-01	4.80E-05	4.03E+03	2.68E-02	5.91E-08	1.51E-08	4.31E-08
SVOC	Benzo(g,h,i)perylene	191-24-2	1.28E+07		2.88E-06	1.88E-01	4.54E-05	4.15E+04	2.58E-02	5.59E-08	3.14E-12	6.20E-10
SVOC	Benzo(k)fluoranthene	207-08-9	1.24E+06		1.70E-05	1.95E-01	4.80E-05	4.03E+03	2.68E-02	5.91E-08	1.28E-10	3.96E-09
SVOC	Biphenyl	92-52-4	1.05E+04		6.13E-03	3.49E-01	7.04E-05	3.41E+01	4.79E-02	8.67E-08	8.63E-06	1.03E-06
SVOC	bis(2-Chloroethoxy)methane	111-91-1	1.73E+01		3.47E-06	3.77E-01	7.31E-05	1.32E-01	5.17E-02	9.00E-08	2.04E-06	5.00E-07
SVOC	bis(2-Chloroethyl) ether	111-44-4	1.55E+01		3.69E-04	5.98E-01	6.51E-05	1.26E-01	8.21E-02	8.01E-08	2.41E-04	5.43E-06
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	1.50E+07		2.09E-06	3.03E-01	3.16E-05	4.86E+04	4.17E-02	3.89E-08	2.59E-12	5.64E-10

Attachment G3: Vapor Flux from Soil to Ambient Air
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	K_{oc} (L/kg)	K_d (L/kg)	H (unitless)	D_{air} (m^2/d)	D_{water} (m^2/d)	R_L (unitless)	D_G (m^2/d)	D_L (m^2/d)	D_E (m^2/d)	J_G (kg/m^2-s)
SVOC	Butylbenzylphthalate	85-68-7	5.73E+04		2.59E-05	1.50E-01	4.17E-05	1.86E+02	2.06E-02	5.14E-08	3.15E-09	1.97E-08
SVOC	Caprolactam	105-60-2	6.51E-01		1.03E-07	5.98E-01	7.77E-05	7.81E-02	8.21E-02	9.56E-08	1.33E-06	4.04E-07
SVOC	Carbazole	86-74-8	3.38E+03		3.13E-07	3.37E-01	6.07E-05	1.10E+01	4.63E-02	7.48E-08	8.09E-09	3.15E-08
SVOC	4-Chloro-3-methylphenol	59-50-7	1.12E+03		8.15E-06	5.24E-01	8.22E-05	3.69E+00	7.19E-02	1.01E-07	1.86E-07	1.51E-07
SVOC	2-Chloronaphthalene	91-58-7	1.12E+04		6.42E-03	4.25E-01	7.59E-05	3.65E+01	5.84E-02	9.35E-08	1.03E-05	1.12E-06
SVOC	2-Chlorophenol	95-57-8	3.88E+02		8.00E-03	4.33E-01	8.17E-05	1.34E+00	5.95E-02	1.01E-07	3.56E-04	6.61E-06
SVOC	Chrysene	218-01-9	4.01E+05		1.94E-03	2.14E-01	5.37E-05	1.30E+03	2.94E-02	6.60E-08	4.40E-08	7.34E-08
SVOC	Dibenz(a,h)anthracene	53-70-3	3.77E+06		3.02E-07	1.75E-01	4.48E-05	1.22E+04	2.40E-02	5.51E-08	5.10E-12	7.91E-10
SVOC	Dibenzofuran	132-64-9	2.07E+04		2.57E-04	2.06E-01	5.18E-05	6.71E+01	2.82E-02	6.38E-08	1.09E-07	1.16E-07
SVOC	2,4-Dichlorophenol	120-83-2	1.47E+02		6.50E-05	2.99E-01	7.58E-05	5.52E-01	4.11E-02	9.33E-08	5.00E-06	7.83E-07
SVOC	Diethylphthalate	84-66-2	2.87E+02		9.25E-06	2.21E-01	5.49E-05	1.01E+00	3.04E-02	6.75E-08	3.47E-07	2.06E-07
SVOC	2,4-Dimethylphenol	105-67-9	2.09E+02		4.10E-05	5.05E-01	7.51E-05	7.53E-01	6.93E-02	9.24E-08	3.90E-06	6.91E-07
SVOC	Dimethylphthalate	131-11-3	6.89E+01		2.15E-06	4.91E-01	5.43E-05	2.99E-01	6.74E-02	6.69E-08	7.07E-07	2.94E-07
SVOC	Di-n-butylphthalate	84-74-2	3.40E+04		1.93E-08	3.78E-01	6.79E-05	1.10E+02	5.20E-02	8.36E-08	7.67E-10	9.70E-09
SVOC	4,6-Dinitro-2-methylphenol	534-52-1	1.21E+02		8.73E-06	2.38E-01	5.97E-05	4.69E-01	3.28E-02	7.35E-08	7.65E-07	3.06E-07
SVOC	2,4-Dinitrotoluene	121-14-2	9.46E+01		1.90E-06	1.75E+00	6.10E-05	3.83E-01	2.41E-01	7.51E-08	1.39E-06	4.13E-07
SVOC	2,6-Dinitrotoluene	606-20-2	6.89E+01		1.53E-05	2.83E-01	6.27E-05	2.99E-01	3.88E-02	7.72E-08	2.24E-06	5.24E-07
SVOC	Di-n-octylphthalate	117-84-0	8.38E+07		1.37E-03	1.30E-01	3.09E-05	2.72E+05	1.79E-02	3.81E-08	9.06E-11	3.33E-09
SVOC	Fluoranthene	206-44-0	1.08E+05		3.30E-04	2.61E-01	5.49E-05	3.50E+02	3.58E-02	6.75E-08	3.40E-08	6.46E-08
SVOC	Fluorene	86-73-7	1.38E+04		1.31E-03	3.14E-01	6.81E-05	4.47E+01	4.31E-02	8.38E-08	1.26E-06	3.93E-07
SVOC	Formaldehyde	50-00-0			6.95E-06	1.56E+00	1.73E-04					
SVOC	Hexachlorobutadiene	87-68-3	5.35E+04		1.67E-01	4.85E-01	5.32E-05	1.74E+02	6.66E-02	6.55E-08	6.41E-05	2.80E-06
SVOC	Hexachlorocyclopentadiene	77-47-4	1.99E+05		5.55E-01	1.39E-01	6.23E-05	6.45E+02	1.91E-02	7.67E-08	1.64E-05	1.42E-06
SVOC	Hexachloroethane	67-72-1	1.76E+03		7.95E-02	2.16E-02	5.88E-05	5.81E+00	2.97E-03	7.23E-08	4.06E-05	2.23E-06
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	3.45E+06		3.28E-05	1.64E-01	4.89E-05	1.12E+04	2.25E-02	6.02E-08	7.16E-11	2.96E-09
SVOC	Isophorone	78-59-1	4.69E+01		1.36E-04	5.38E-01	5.84E-05	2.28E-01	7.39E-02	7.19E-08	4.44E-05	2.33E-06
SVOC	2-Methylnaphthalene	91-57-6	6.23E+03		1.06E-02	4.18E-01	6.70E-05	2.03E+01	5.74E-02	8.24E-08	3.00E-05	1.92E-06
SVOC	Methylphenol (total)	1319-77-3	8.45E+01		1.77E-05	6.39E-01	8.64E-05	3.50E-01	8.78E-02	1.06E-07	4.74E-06	7.62E-07
SVOC	Naphthalene	91-20-3	2.01E+03		9.90E-03	5.10E-01	6.48E-05	6.59E+00	7.00E-02	7.98E-08	1.05E-04	3.59E-06

Attachment G3: Vapor Flux from Soil to Ambient Air
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	K_{oc} (L/kg)	K_d (L/kg)	H (unitless)	D_{air} (m^2/d)	D_{water} (m^2/d)	R_L (unitless)	D_G (m^2/d)	D_L (m^2/d)	D_E (m^2/d)	J_G (kg/m^2-s)
SVOC	2-Nitroaniline	88-74-4	6.59E+01		3.27E-06	6.31E-01	6.91E-05	2.89E-01	8.66E-02	8.51E-08	1.27E-06	3.95E-07
SVOC	Nitrobenzene	98-95-3	6.44E+01		4.92E-04	6.57E-01	7.43E-05	2.85E-01	9.02E-02	9.15E-08	1.56E-04	4.38E-06
SVOC	2-Nitrophenol	88-75-5	5.75E+01		1.94E-04	4.66E-01	6.78E-05	2.62E-01	6.40E-02	8.35E-08	4.75E-05	2.41E-06
SVOC	4-Nitrophenol	100-02-7	7.55E+01		8.48E-09	5.40E-01	8.30E-05	3.21E-01	7.42E-02	1.02E-07	3.21E-07	1.98E-07
SVOC	N-Nitrosodiphenylamine	86-30-6	1.29E+03		1.03E-04	2.70E-01	5.49E-05	4.26E+00	3.70E-02	6.75E-08	9.08E-07	3.34E-07
SVOC	N-Nitroso-di-n-propylamine	621-64-7	2.40E+01		4.62E-05	4.71E-01	7.06E-05	1.54E-01	6.47E-02	8.69E-08	2.00E-05	1.57E-06
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	2.56E+02		2.39E-03	5.20E-01	5.54E-05	9.07E-01	7.14E-02	6.82E-08	1.88E-04	4.81E-06
SVOC	Pentachlorophenol	87-86-5	5.92E+02		5.00E-07	4.84E-01	5.27E-05	1.99E+00	6.65E-02	6.49E-08	4.92E-08	7.77E-08
SVOC	Phenanthrene	85-01-8	2.42E+04		4.76E-04	3.24E-01	6.45E-05	7.86E+01	4.45E-02	7.94E-08	2.71E-07	1.82E-07
SVOC	Phenol	108-95-2	2.88E+01		8.15E-06	7.08E-01	7.86E-05	1.69E-01	9.73E-02	9.68E-08	5.26E-06	8.03E-07
SVOC	Pyrene	129-00-0	1.06E+05		2.26E-04	2.35E-01	6.26E-05	3.42E+02	3.23E-02	7.70E-08	2.15E-08	5.14E-08
SVOC	2,4,5-Trichlorophenol	95-95-4	1.60E+03		8.90E-05	2.51E-01	6.07E-05	5.25E+00	3.45E-02	7.48E-08	6.00E-07	2.71E-07
SVOC	2,4,6-Trichlorophenol	88-06-2	3.81E+02		1.60E-04	2.75E-01	5.40E-05	1.31E+00	3.77E-02	6.65E-08	4.64E-06	7.55E-07
PCB	PCBs (total)	1336-36-3	2.45E+06		4.09E-02	1.75E-01	4.32E-05	7.95E+03	2.40E-02	5.32E-08	1.23E-07	1.23E-07
INORG	Antimony	7440-36-0		4.50E+01								
INORG	Arsenic	7440-38-2		2.90E+01								
INORG	Barium	7440-39-3		4.10E+01								
INORG	Beryllium	7440-41-7		7.90E+02								
INORG	Cadmium	7440-43-9		7.50E+01								
INORG	Chromium (total)	7440-47-3		1.90E+01								
INORG	Chromium III	16065-83-1		1.80E+06								
INORG	Chromium VI	18540-29-9		1.90E+01								
INORG	Cobalt	7440-48-4		4.50E+01								
INORG	Copper	7440-50-8		3.50E+01								
INORG	Cyanide (total)	57-12-5		9.90E+00								
INORG	Fluoride	16984-48-8										
INORG	Lead	7439-92-1		9.00E+02								
INORG	Manganese	7439-96-5		6.50E+01								
INORG	Mercury	7439-97-6		1.00E+03	1.45E-01	2.65E-01	5.44E-05	1.62E+03	3.64E-02	6.70E-08	3.26E-06	6.33E-07

Attachment G3: Vapor Flux from Soil to Ambient Air
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	K_{oc} (L/kg)	K_d (L/kg)	H (unitless)	D_{air} (m^2/d)	D_{water} (m^2/d)	R_L (unitless)	D_G (m^2/d)	D_L (m^2/d)	D_E (m^2/d)	J_G (kg/m^2-s)
INORG	Nickel	7440-02-0		6.50E+01								
INORG	Selenium	7782-49-2		5.00E+00								
INORG	Silver	7440-22-4		8.30E+00								
INORG	Thallium	7440-28-0		7.10E+01								
INORG	Vanadium	7440-62-2		1.00E+03								
INORG	Zinc	7440-66-6		6.20E+01								
Notes:	Soil bulk density	kg/L	ρ_b	1.62	*Loamy Sand*							
	Soil particle density	kg/L	ρ_s	2.65	*EPA default/MDEQ 1998*							
	Soil porosity	L/L-soil	θ	0.39	*1-(pb/ps)*							
	Soil water content	L/L-soil	θ_w	0.076	*Loamy Sand*							
	Soil air-filled porosity	L/L-soil	θ_a	0.31	*porosity-water content*							
	Soil organic carbon fraction	unitless	f_{oc}	0.002								
	Averaging period	year	**ED**	10								
		s	**ED**	3.2E+08								
	Molar Gas Constant	L-mmHg/mole-^oK	**R**	62.411								
	Temperature	^oC	**T**	12								
		K	**T**	285								

Attachment G3: Risk-Based Cancer Criteria for Exposure of Maintenance Workers to Soil
GMC: NAO Flint Operations Site, Flint, Michigan

				Soil Ingestion			Soil Dermal Contact				Soil Vapor Inhalation				Soil Particulate Inhalation				
Chem Group	**Chemical**	**CASRN**	**Cancer Class**	**LADD** (mg/kg/d)	**SF_{oral}** $(mg/kg/d)^{-1}$	**RBC** (mg/kg)	**ABS_{derm}**	**LADD** (mg/kg/d)	**SF_{derm}** $(mg/kg/d)^{-1}$	**RBC** (mg/kg)	**C_{air}** (mg/m^3)	**Dose** (mg/m^3)	**URF** (m^3/mg)	**RBC** (mg/kg)	**C_{air}** (mg/m^3)	**Dose** (mg/m^3)	**URF** (m^3/mg)	**RBC** (mg/kg)	**Cancer RBC** (mg/kg)
VOC	Acetone	67-64-1	ID	5.59E-09							1.49E-04	2.91E-07			1.50E-07	2.94E-10			
VOC	Benzene	71-43-2	A	5.59E-09	5.5E-02	3.3E+04			5.5E-02		7.64E-04	1.50E-06	7.8E-03	8.6E+02	1.50E-07	2.94E-10	7.8E-03	4.4E+06	8.4E+02
VOC	Bromodichloromethane	75-27-4	B2	5.59E-09	6.2E-02	2.9E+04			6.2E-02		2.54E-04	4.97E-07	1.8E-02	1.1E+03	1.50E-07	2.94E-10	1.8E-02	1.9E+06	1.1E+03
VOC	2-Butanone	78-93-3	ID	5.59E-09							1.40E-04	2.73E-07			1.50E-07	2.94E-10			
VOC	Carbon Disulfide	75-15-0		5.59E-09							1.64E-03	3.21E-06			1.50E-07	2.94E-10			
VOC	Carbon Tetrachloride	56-23-5	B2	5.59E-09	1.3E-01	1.4E+04			1.3E-01		1.01E-03	1.98E-06	1.5E-02	3.4E+02	1.50E-07	2.94E-10	1.5E-02	2.3E+06	3.3E+02
VOC	Chlorobenzene	108-90-7	D	5.59E-09							3.45E-04	6.76E-07			1.50E-07	2.94E-10			
VOC	Chloroethane	75-00-3		5.59E-09	2.9E-03	6.2E+05			2.9E-03		2.15E-03	4.20E-06			1.50E-07	2.94E-10			
VOC	Chloroform	67-66-3	B2	5.59E-09							7.73E-04	1.51E-06	2.3E-02	2.9E+02	1.50E-07	2.94E-10	2.3E-02	1.5E+06	2.9E+02
VOC	Chloromethane	74-87-3	D	5.59E-09							1.23E-03	2.41E-06			1.50E-07	2.94E-10			
VOC	Cumene	98-82-8	D	5.59E-09							3.52E-04	6.88E-07			1.50E-07	2.94E-10			
VOC	Cyclohexane	110-82-7	ID	5.59E-09							1.32E-03	2.57E-06			1.50E-07	2.94E-10			
VOC	Dibromochloromethane	124-48-1	C	5.59E-09	8.4E-02	2.1E+04			8.4E-02		1.39E-04	2.72E-07	2.4E-02	1.5E+03	1.50E-07	2.94E-10	2.4E-02	1.4E+06	1.4E+03
VOC	1,2-Dichlorobenzene	95-50-1	D	5.59E-09							1.49E-04	2.92E-07			1.50E-07	2.94E-10			
VOC	1,3-Dichlorobenzene	541-73-1	D	5.59E-09							1.99E-04	3.89E-07			1.50E-07	2.94E-10			
VOC	1,4-Dichlorobenzene	106-46-7	C	5.59E-09	2.4E-02	7.5E+04			2.4E-02		1.70E-04	3.33E-07	6.3E-03	4.8E+03	1.50E-07	2.94E-10	6.3E-03	5.4E+06	4.5E+03
VOC	Dichlorodifluoromethane	75-71-8		5.59E-09							1.99E-03	3.90E-06			1.50E-07	2.94E-10			
VOC	1,1-Dichloroethane	75-34-3	C	5.59E-09							8.36E-04	1.64E-06			1.50E-07	2.94E-10			
VOC	1,2-Dichloroethane	107-06-2	B2	5.59E-09	9.1E-02	2.0E+04			9.1E-02		5.12E-04	1.00E-06	2.6E-02	3.8E+02	1.50E-07	2.94E-10	2.6E-02	1.3E+06	3.8E+02
VOC	1,1-Dichloroethene	75-35-4	C	5.59E-09							1.40E-03	2.73E-06			1.50E-07	2.94E-10			
VOC	cis-1,2-Dichloroethene	156-59-2	D	5.59E-09							7.03E-04	1.38E-06			1.50E-07	2.94E-10			
VOC	trans-1,2-Dichloroethene	156-60-5		5.59E-09							8.83E-04	1.73E-06			1.50E-07	2.94E-10			
VOC	1,2-Dichloropropane	78-87-5	B2	5.59E-09	6.8E-02	2.6E+04			6.8E-02		5.78E-04	1.13E-06			1.50E-07	2.94E-10			
VOC	Ethyl Benzene	100-41-4	D	5.59E-09							4.01E-04	7.85E-07			1.50E-07	2.94E-10			
VOC	2-Hexanone	591-78-6		5.59E-09											1.50E-07	2.94E-10			
VOC	Methyl Acetate	79-20-9		5.59E-09							1.95E-04	3.81E-07			1.50E-07	2.94E-10			
VOC	Methyl tert-butyl ether	1634-04-4		5.59E-09							3.92E-04	7.68E-07			1.50E-07	2.94E-10			
VOC	4-Methyl-2-pentanone	108-10-1	ID	5.59E-09							1.83E-04	3.57E-07			1.50E-07	2.94E-10			
VOC	Methylcyclohexane	108-87-2		5.59E-09							1.75E-03	3.42E-06			1.50E-07	2.94E-10			
VOC	Methylene Chloride	75-09-2	B2	5.59E-09	7.5E-03	2.4E+05			7.5E-03		7.87E-04	1.54E-06	4.7E-04	1.4E+04	1.50E-07	2.94E-10	4.7E-04	7.2E+07	1.3E+04
VOC	Styrene	100-42-5		5.59E-09							1.64E-04	3.21E-07			1.50E-07	2.94E-10			
VOC	Tetrachloroethene	127-18-4	C-B2	5.59E-09	5.2E-02	3.4E+04			5.2E-02		8.24E-04	1.61E-06	3.1E-03	2.0E+03	1.50E-07	2.94E-10	3.1E-03	1.1E+07	1.9E+03
VOC	Toluene	108-88-3	D	5.59E-09							5.42E-04	1.06E-06			1.50E-07	2.94E-10			
VOC	1,2,4-Trichlorobenzene	120-82-1	D	5.59E-09							5.09E-05	9.95E-08			1.50E-07	2.94E-10			
VOC	1,1,1-Trichloroethane	71-55-6	D	5.59E-09							9.41E-04	1.84E-06			1.50E-07	2.94E-10			
VOC	1,1,2-Trichloroethane	79-00-5	C	5.59E-09	5.7E-02	3.1E+04			5.7E-02		3.23E-04	6.31E-07	1.6E-02	9.9E+02	1.50E-07	2.94E-10	1.6E-02	2.1E+06	9.6E+02
VOC	Trichloroethene	79-01-6	C-B2	5.59E-09	1.1E-02	1.6E+05			1.1E-02		6.52E-04	1.28E-06	1.7E-03	4.6E+03	1.50E-07	2.94E-10	1.7E-03	2.0E+07	4.5E+03
VOC	Trichlorofluoromethane	75-69-4		5.59E-09							1.67E-03	3.26E-06			1.50E-07	2.94E-10			
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		5.59E-09							1.75E-03	3.42E-06			1.50E-07	2.94E-10			
VOC	1,2,4-Trimethylbenzene	95-63-6	ID	5.59E-09							2.10E-04	4.11E-07			1.50E-07	2.94E-10			
VOC	1,3,5-Trimethylbenzene	108-67-8	ID	5.59E-09							1.47E-04	2.89E-07			1.50E-07	2.94E-10			
VOC	Vinyl Chloride	75-01-4	A	5.59E-09	1.4E+00	1.3E+03			1.4E+00		1.82E-03	3.57E-06	8.8E-03	3.2E+02	1.50E-07	2.94E-10	8.8E-03	3.9E+06	2.5E+02
VOC	Xylenes (total)	1330-20-7	ID	5.59E-09							3.71E-04	7.26E-07			1.50E-07	2.94E-10			
SVOC	Acenaphthene	83-32-9		5.59E-09			1.30E-01	2.40E-09			1.00E-05	1.97E-08			1.50E-07	2.94E-10			
SVOC	Acenaphthylene	208-96-8	D	5.59E-09			1.30E-01	2.40E-09			8.64E-06	1.69E-08			1.50E-07	2.94E-10			
SVOC	Acetophenone	98-86-2	D	5.59E-09			1.00E-01	1.85E-09			4.00E-05	7.83E-08			1.50E-07	2.94E-10			
SVOC	Anthracene	120-12-7	D	5.59E-09			1.30E-01	2.40E-09			2.80E-06	5.49E-09			1.50E-07	2.94E-10			
SVOC	Atrazine	1912-24-9	C	5.59E-09	2.2E-01	8.1E+03	1.00E-01	1.85E-09	2.2E-01	2.4E+04	9.32E-07	1.82E-09	6.3E-02	8.6E+04	1.50E-07	2.94E-10	6.3E-02	5.4E+05	5.6E+03
SVOC	Benzaldehyde	100-52-7		5.59E-09			1.00E-01	1.85E-09			6.04E-05	1.18E-07			1.50E-07	2.94E-10			

Attachment G3: Risk-Based Cancer Criteria for Exposure of Maintenance Workers to Soil
GMC: NAO Flint Operations Site, Flint, Michigan

				Soil Ingestion			Soil Dermal Contact				Soil Vapor Inhalation				Soil Particulate Inhalation				
Chem Group	**Chemical**	**CASRN**	**Cancer Class**	**LADD** (mg/kg/d)	**SF_{oral}** $(mg/kg/d)^{-1}$	**RBC** (mg/kg)	**ABS_{derm}**	**LADD** (mg/kg/d)	**SF_{derm}** $(mg/kg/d)^{-1}$	**RBC** (mg/kg)	**C_{air}** (mg/m^3)	**Dose** (mg/m^3)	**URF** (m^3/mg)	**RBC** (mg/kg)	**C_{air}** (mg/m^3)	**Dose** (mg/m^3)	**URF** (m^3/mg)	**RBC** (mg/kg)	**Cancer RBC** (mg/kg)
SVOC	Benzo(a)anthracene	56-55-3	B2	5.59E-09	7.3E-01	2.5E+03	1.30E-01	2.40E-09	7.3E-01	5.7E+03	2.19E-07	4.29E-10	8.9E-02	2.6E+05	1.50E-07	2.94E-10	8.9E-02	3.8E+05	1.7E+03
SVOC	Benzo(a)pyrene	50-32-8	B2	5.59E-09	7.3E+00	2.5E+02	1.30E-01	2.40E-09	7.3E+00	5.7E+02	7.56E-08	1.48E-10	8.9E-01	7.6E+04	1.50E-07	2.94E-10	8.9E-01	3.8E+04	1.7E+02
SVOC	Benzo(b)fluoranthene	205-99-2	B2	5.59E-09	7.3E-01	2.5E+03	1.30E-01	2.40E-09	7.3E-01	5.7E+03	4.72E-07	9.24E-10	8.9E-02	1.2E+05	1.50E-07	2.94E-10	8.9E-02	3.8E+05	1.7E+03
SVOC	Benzo(g,h,i)perylene	191-24-2	D	5.59E-09			1.30E-01	2.40E-09			6.80E-09	1.33E-11			1.50E-07	2.94E-10			
SVOC	Benzo(k)fluoranthene	207-08-9	B2	5.59E-09	7.3E-02	2.5E+04	1.30E-01	2.40E-09	7.3E-02	5.7E+04	4.34E-08	8.49E-11	8.9E-03	1.3E+07	1.50E-07	2.94E-10	8.9E-03	3.8E+06	1.7E+04
SVOC	Biphenyl	92-52-4	D	5.59E-09			1.00E-01	1.85E-09			1.13E-05	2.21E-08			1.50E-07	2.94E-10			
SVOC	bis(2-Chloroethoxy)methane	111-91-1	D	5.59E-09			1.00E-01	1.85E-09			5.48E-06	1.07E-08			1.50E-07	2.94E-10			
SVOC	bis(2-Chloroethyl) ether	111-44-4	B2	5.59E-09	1.1E+00	1.6E+03	1.00E-01	1.85E-09	1.1E+00	4.9E+03	5.95E-05	1.17E-07	3.3E-01	2.6E+02	1.50E-07	2.94E-10	3.3E-01	1.0E+05	2.1E+02
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2	5.59E-09	1.4E-02	1.3E+05	1.00E-01	1.85E-09	1.4E-02	3.9E+05	6.18E-09	1.21E-11	4.0E-03	2.1E+08	1.50E-07	2.94E-10	4.0E-03	8.5E+06	9.5E+04
SVOC	Butylbenzylphthalate	85-68-7	C	5.59E-09	1.9E-03	9.4E+05	1.00E-01	1.85E-09	1.9E-03	2.9E+06	2.15E-07	4.22E-10	5.4E-04	4.4E+07	1.50E-07	2.94E-10	5.4E-04	6.3E+07	6.9E+05
SVOC	Caprolactam	105-60-2		5.59E-09			1.00E-01	1.85E-09			4.43E-06	8.67E-09			1.50E-07	2.94E-10			
SVOC	Carbazole	86-74-8	B2	5.59E-09	2.0E-02	8.9E+04	1.00E-01	1.85E-09	2.0E-02	2.7E+05	3.45E-07	6.75E-10	5.7E-03	2.6E+06	1.50E-07	2.94E-10	5.7E-03	6.0E+06	6.5E+04
SVOC	4-Chloro-3-methylphenol	59-50-7		5.59E-09			1.00E-01	1.85E-09			1.66E-06	3.24E-09			1.50E-07	2.94E-10			
SVOC	2-Chloronaphthalene	91-58-7		5.59E-09			1.00E-01	1.85E-09			1.23E-05	2.41E-08			1.50E-07	2.94E-10			
SVOC	2-Chlorophenol	95-57-8		5.59E-09			1.00E-01	1.85E-09			7.24E-05	1.42E-07			1.50E-07	2.94E-10			
SVOC	Chrysene	218-01-9	B2	5.59E-09	7.3E-03	2.5E+05	1.30E-01	2.40E-09	7.3E-03	5.7E+05	8.05E-07	1.57E-09	8.9E-04	7.2E+06	1.50E-07	2.94E-10	8.9E-04	3.8E+07	1.7E+05
SVOC	Dibenz(a,h)anthracene	53-70-3	B2	5.59E-09	7.3E+00	2.5E+02	1.30E-01	2.40E-09	7.3E+00	5.7E+02	8.67E-09	1.70E-11	8.9E-01	6.7E+05	1.50E-07	2.94E-10	8.9E-01	3.8E+04	1.7E+02
SVOC	Dibenzofuran	132-64-9	D	5.59E-09			1.00E-01	1.85E-09			1.27E-06	2.48E-09			1.50E-07	2.94E-10			
SVOC	2,4-Dichlorophenol	120-83-2		5.59E-09			1.00E-01	1.85E-09			8.58E-06	1.68E-08			1.50E-07	2.94E-10			
SVOC	Diethylphthalate	84-66-2	D	5.59E-09			1.00E-01	1.85E-09			2.26E-06	4.42E-09			1.50E-07	2.94E-10			
SVOC	2,4-Dimethylphenol	105-67-9		5.59E-09			1.00E-01	1.85E-09			7.58E-06	1.48E-08			1.50E-07	2.94E-10			
SVOC	Dimethylphthalate	131-11-3	D	5.59E-09			1.00E-01	1.85E-09			3.23E-06	6.31E-09			1.50E-07	2.94E-10			
SVOC	Di-n-butylphthalate	84-74-2	D	5.59E-09			1.00E-01	1.85E-09			1.06E-07	2.08E-10			1.50E-07	2.94E-10			
SVOC	4,6-Dinitro-2-methylphenol	534-52-1		5.59E-09			1.00E-01	1.85E-09			3.36E-06	6.57E-09			1.50E-07	2.94E-10			
SVOC	2,4-Dinitrotoluene	121-14-2	B2	5.59E-09	6.8E-01	2.6E+03	1.00E-01	1.85E-09	6.8E-01	8.0E+03	4.53E-06	8.86E-09			1.50E-07	2.94E-10			2.0E+03
SVOC	2,6-Dinitrotoluene	606-20-2	B2	5.59E-09	6.8E-01	2.6E+03	1.00E-01	1.85E-09	6.8E-01	8.0E+03	5.75E-06	1.12E-08	1.9E-01	4.6E+03	1.50E-07	2.94E-10	1.9E-01	1.8E+05	1.4E+03
SVOC	Di-n-octylphthalate	117-84-0		5.59E-09			1.00E-01	1.85E-09			3.65E-08	7.15E-11			1.50E-07	2.94E-10			
SVOC	Fluoranthene	206-44-0	D	5.59E-09			1.30E-01	2.40E-09			7.08E-07	1.38E-09			1.50E-07	2.94E-10			
SVOC	Fluorene	86-73-7	D	5.59E-09			1.30E-01	2.40E-09			4.31E-06	8.43E-09			1.50E-07	2.94E-10			
SVOC	Formaldehyde	50-00-0	B1	5.59E-09									1.3E-02		1.50E-07	2.94E-10	1.3E-02	2.6E+06	2.6E+06
SVOC	Hexachlorobutadiene	87-68-3	C	5.59E-09	7.8E-02	2.3E+04	1.00E-01	1.85E-09	7.8E-02	6.9E+04	3.07E-05	6.01E-08	2.2E-02	7.6E+03	1.50E-07	2.94E-10	2.2E-02	1.5E+06	5.2E+03
SVOC	Hexachlorocyclopentadiene	77-47-4	E	5.59E-09			1.00E-01	1.85E-09			1.56E-05	3.05E-08			1.50E-07	2.94E-10			
SVOC	Hexachloroethane	67-72-1	C	5.59E-09	1.4E-02	1.3E+05	1.00E-01	1.85E-09	1.4E-02	3.9E+05	2.45E-05	4.79E-08	4.0E-03	5.2E+04	1.50E-07	2.94E-10	4.0E-03	8.5E+06	3.4E+04
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	B2	5.59E-10	7.3E-01	2.5E+03	1.30E-01	2.40E-10	7.3E-01	5.7E+03	3.25E-09	6.36E-12	8.9E-02	1.8E+06	1.50E-08	2.94E-11	8.9E-02	3.8E+05	1.7E+03
SVOC	Isophorone	78-59-1	C	5.59E-09	9.5E-04	1.9E+06	1.00E-01	1.85E-09	9.5E-04	5.7E+06	2.56E-05	5.00E-08			1.50E-07	2.94E-10			1.4E+06
SVOC	2-Methylnaphthalene	91-57-6	ID	5.59E-09			1.00E-01	1.85E-09			2.10E-05	4.11E-08			1.50E-07	2.94E-10			
SVOC	Methylphenol (total)	1319-77-3		5.59E-09			1.00E-01	1.85E-09			8.36E-06	1.64E-08			1.50E-07	2.94E-10			
SVOC	Naphthalene	91-20-3	C	5.59E-09			1.30E-01	2.40E-09			3.94E-05	7.70E-08			1.50E-07	2.94E-10			
SVOC	2-Nitroaniline	88-74-4		5.59E-09			1.00E-01	1.85E-09			4.33E-06	8.47E-09			1.50E-07	2.94E-10			
SVOC	Nitrobenzene	98-95-3	D	5.59E-09			1.00E-01	1.85E-09			4.80E-05	9.38E-08			1.50E-07	2.94E-10			
SVOC	2-Nitrophenol	88-75-5		5.59E-09			1.00E-01	1.85E-09			2.64E-05	5.18E-08			1.50E-07	2.94E-10			
SVOC	4-Nitrophenol	100-02-7		5.59E-09			1.00E-01	1.85E-09			2.17E-06	4.25E-09			1.50E-07	2.94E-10			
SVOC	N-Nitrosodiphenylamine	86-30-6	B2	5.59E-09	4.9E-03	3.7E+05	1.00E-01	1.85E-09	4.9E-03	1.1E+06	3.66E-06	7.16E-09			1.50E-07	2.94E-10			2.7E+05
SVOC	N-Nitroso-di-n-propylamine	621-64-7	B2	5.59E-09	7.0E+00	2.6E+02	1.00E-01	1.85E-09	7.0E+00	7.7E+02	1.72E-05	3.36E-08	2.0E+00	1.5E+02	1.50E-07	2.94E-10	2.0E+00	1.7E+04	8.3E+01
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	C	5.59E-09	7.0E-02	2.6E+04	1.00E-01	1.85E-09	7.0E-02	7.7E+04	5.27E-05	1.03E-07	1.0E-02	9.7E+03	1.50E-07	2.94E-10	1.0E-02	3.4E+06	6.4E+03
SVOC	Pentachlorophenol	87-86-5	B2	5.59E-09	1.2E-01	1.5E+04	2.50E-01	4.61E-09	1.2E-01	1.8E+04	8.51E-07	1.67E-09	3.4E-02	1.8E+05	1.50E-07	2.94E-10	3.4E-02	9.9E+05	7.7E+03
SVOC	Phenanthrene	85-01-8	D	5.59E-09			1.30E-01	2.40E-09			2.00E-06	3.91E-09			1.50E-07	2.94E-10			
SVOC	Phenol	108-95-2	ID	5.59E-09			1.00E-01	1.85E-09			8.80E-06	1.72E-08			1.50E-07	2.94E-10			
SVOC	Pyrene	129-00-0	D	5.59E-09			1.30E-01	2.40E-09			5.63E-07	1.10E-09			1.50E-07	2.94E-10			

Attachment G3: Risk-Based Cancer Criteria for Exposure of Maintenance Workers to Soil
GMC: NAO Flint Operations Site, Flint, Michigan

				Soil Ingestion			Soil Dermal Contact				Soil Vapor Inhalation				Soil Particulate Inhalation				
Chem Group	**Chemical**	**CASRN**	**Cancer Class**	**LADD** (mg/kg/d)	**SF_{oral}** $(mg/kg/d)^{-1}$	**RBC** (mg/kg)	**ABS_{derm}**	**LADD** (mg/kg/d)	**SF_{derm}** $(mg/kg/d)^{-1}$	**RBC** (mg/kg)	**C_{air}** (mg/m^3)	**Dose** (mg/m^3)	**URF** (m^3/mg)	**RBC** (mg/kg)	**C_{air}** (mg/m^3)	**Dose** (mg/m^3)	**URF** (m^3/mg)	**RBC** (mg/kg)	**Cancer RBC** (mg/kg)
SVOC	2,4,5-Trichlorophenol	95-95-4		5.59E-09			1.00E-01	1.85E-09			2.97E-06	5.82E-09			1.50E-07	2.94E-10			
SVOC	2,4,6-Trichlorophenol	88-06-2	B2	5.59E-09	1.1E-02	1.6E+05	1.00E-01	1.85E-09	1.1E-02	4.9E+05	8.27E-06	1.62E-08	3.1E-03	2.0E+05	1.50E-07	2.94E-10	3.1E-03	1.1E+07	7.5E+04
PCB	PCBs (total)	1336-36-3	B2	5.59E-09	2.0E+00	8.9E+02	1.40E-01	2.58E-09	2.0E+00	1.9E+03	1.35E-06	2.64E-09	5.7E-01	6.6E+03	1.50E-07	2.94E-10	5.7E-01	6.0E+04	5.5E+02
INORG	Antimony	7440-36-0		5.59E-09											1.50E-07	2.94E-10			
INORG	Arsenic	7440-38-2	A	5.59E-09	1.5E+00	1.2E+03	3.00E-02	5.54E-10	1.5E+00	1.2E+04			4.3E+00		1.50E-07	2.94E-10	4.3E+00	7.9E+03	9.5E+02
INORG	Barium	7440-39-3	D	5.59E-09											1.50E-07	2.94E-10			
INORG	Beryllium	7440-41-7	B1	5.59E-09									2.4E+00		1.50E-07	2.94E-10	2.4E+00	1.4E+04	1.4E+04
INORG	Cadmium	7440-43-9	B1	5.59E-09			1.00E-03	1.85E-11					1.8E+00		1.50E-07	2.94E-10	1.8E+00	1.9E+04	1.9E+04
INORG	Chromium (total)	7440-47-3		5.59E-09									1.2E+01		1.50E-07	2.94E-10	1.2E+01	2.8E+03	2.8E+03
INORG	Chromium III	16065-83-1	D	5.59E-09											1.50E-07	2.94E-10			
INORG	Chromium VI	18540-29-9	A	5.59E-09									1.2E+01		1.50E-07	2.94E-10	1.2E+01	2.8E+03	2.8E+03
INORG	Cobalt	7440-48-4	B1	5.59E-09									2.8E+00		1.50E-07	2.94E-10	2.8E+00	1.2E+04	1.2E+04
INORG	Copper	7440-50-8	D	5.59E-09											1.50E-07	2.94E-10			
INORG	Cyanide (total)	57-12-5	D	5.59E-09											1.50E-07	2.94E-10			
INORG	Fluoride	16984-48-8		5.59E-09											1.50E-07	2.94E-10			
INORG	Lead	7439-92-1	B2	5.59E-09											1.50E-07	2.94E-10			
INORG	Manganese	7439-96-5	D	5.59E-09											1.50E-07	2.94E-10			
INORG	Mercury	7439-97-6	D	5.59E-09							6.93E-06	1.36E-08			1.50E-07	2.94E-10			
INORG	Nickel	7440-02-0	A	5.59E-09									2.4E-01		1.50E-07	2.94E-10	2.4E-01	1.4E+05	1.42E+05
INORG	Selenium	7782-49-2	D	5.59E-09											1.50E-07	2.94E-10			
INORG	Silver	7440-22-4	D	5.59E-09											1.50E-07	2.94E-10			
INORG	Thallium	7440-28-0		5.59E-09											1.50E-07	2.94E-10			
INORG	Vanadium	7440-62-2		5.59E-09											1.50E-07	2.94E-10			
INORG	Zinc	7440-66-6	D	5.59E-09											1.50E-07	2.94E-10			

Notes:

Target cancer risk of 1E-05

C/Q based on the 24-hour maximum exposure for a 15' x 15' excavation area = 10.96 kg/m3 per (kg/m2-s)

PM10 based on 24-hour NAAQS standards of 150 ug/m3

Attachment G3: Risk-Based Noncancer Criteria for Exposure of Maintenance Workers to Soil
GMC: NAO Flint Operations Site, Flint, Michigan

				Soil Ingestion			Soil Dermal Contact				Soil Vapor Inhalation				Soil Particulate Inhalation				
Chem Group	**Chemical**	**CASRN**	**Cancer Class**	**ADD** (mg/kg/d)	**RfD_{oral}** (mg/kg/d)	**RBC** (mg/kg)	**ABS_{derm}**	**ADD** (mg/kg/d)	**RfD_{derm}** (mg/kg/d)	**RBC** (mg/kg)	**C_{air}** (mg/m^3)	**Dose** (mg/m^3)	**RfC** (mg/m^3)	**RBC** (mg/kg)	**C_{air}** (mg/m^3)	**Dose** (mg/m^3)	**RfC** (mg/m^3)	**RBC** (mg/kg)	**Noncancer RBC** (mg/kg)
VOC	Acetone	67-64-1	ID	3.91E-08	9.0E-01	2.3E+07			9.0E-01		1.49E-04	2.04E-06	3.2E+00	1.5E+06	1.50E-07	2.05E-09	3.2E+00	1.5E+09	1.4E+06
VOC	Benzene	71-43-2	A	3.91E-08	4.0E-03	1.0E+05			4.0E-03		7.64E-04	1.05E-05	3.0E-02	2.9E+03	1.50E-07	2.05E-09	3.0E-02	1.5E+07	2.8E+03
VOC	Bromodichloromethane	75-27-4	B2	3.91E-08	2.0E-02	5.1E+05			2.0E-02		2.54E-04	3.48E-06	7.0E-02	2.0E+04	1.50E-07	2.05E-09	7.0E-02	3.4E+07	1.9E+04
VOC	2-Butanone	78-93-3	ID	3.91E-08	6.0E-01	1.5E+07			6.0E-01		1.40E-04	1.91E-06	5.0E+00	2.6E+06	1.50E-07	2.05E-09	5.0E+00	2.4E+09	2.2E+06
VOC	Carbon Disulfide	75-15-0		3.91E-08	1.0E-01	2.6E+06			1.0E-01		1.64E-03	2.25E-05	7.0E-01	3.1E+04	1.50E-07	2.05E-09	7.0E-01	3.4E+08	3.1E+04
VOC	Carbon Tetrachloride	56-23-5	B2	3.91E-08	7.0E-04	1.8E+04			7.0E-04		1.01E-03	1.38E-05			1.50E-07	2.05E-09			
VOC	Chlorobenzene	108-90-7	D	3.91E-08	2.0E-02	5.1E+05			2.0E-02		3.45E-04	4.73E-06	6.0E-02	1.3E+04	1.50E-07	2.05E-09	6.0E-02	2.9E+07	1.2E+04
VOC	Chloroethane	75-00-3		3.91E-08	4.0E-01	1.0E+07			4.0E-01		2.15E-03	2.94E-05	1.0E+01	3.4E+05	1.50E-07	2.05E-09	1.0E+01	4.9E+09	3.3E+05
VOC	Chloroform	67-66-3	B2	3.91E-08	1.0E-02	2.6E+05			1.0E-02		7.73E-04	1.06E-05	5.0E-02	4.7E+03	1.50E-07	2.05E-09	5.0E-02	2.4E+07	4.6E+03
VOC	Chloromethane	74-87-3	D	3.91E-08							1.23E-03	1.69E-05	9.0E-02	5.3E+03	1.50E-07	2.05E-09	9.0E-02	4.4E+07	5.3E+03
VOC	Cumene	98-82-8	D	3.91E-08	1.0E-01	2.6E+06			1.0E-01		3.52E-04	4.82E-06	4.0E-01	8.3E+04	1.50E-07	2.05E-09	4.0E-01	1.9E+08	8.0E+04
VOC	Cyclohexane	110-82-7	ID	3.91E-08							1.32E-03	1.80E-05	6.0E+00	3.3E+05	1.50E-07	2.05E-09	6.0E+00	2.9E+09	3.3E+05
VOC	Dibromochloromethane	124-48-1	C	3.91E-08	2.0E-02	5.1E+05			2.0E-02		1.39E-04	1.91E-06	7.0E-02	3.7E+04	1.50E-07	2.05E-09	7.0E-02	3.4E+07	3.4E+04
VOC	1,2-Dichlorobenzene	95-50-1	D	3.91E-08	9.0E-02	2.3E+06			9.0E-02		1.49E-04	2.05E-06	2.0E-01	9.8E+04	1.50E-07	2.05E-09	2.0E-01	9.7E+07	9.4E+04
VOC	1,3-Dichlorobenzene	541-73-1	D	3.91E-08	9.0E-02	2.3E+06			9.0E-02		1.99E-04	2.72E-06	1.4E-01	5.1E+04	1.50E-07	2.05E-09	1.4E-01	6.8E+07	5.0E+04
VOC	1,4-Dichlorobenzene	106-46-7	C	3.91E-08	3.0E-02	7.7E+05			3.0E-02		1.70E-04	2.33E-06	8.0E-01	3.4E+05	1.50E-07	2.05E-09	8.0E-01	3.9E+08	2.4E+05
VOC	Dichlorodifluoromethane	75-71-8		3.91E-08	2.0E-01	5.1E+06			2.0E-01		1.99E-03	2.73E-05	2.0E-01	7.3E+03	1.50E-07	2.05E-09	2.0E-01	9.7E+07	7.3E+03
VOC	1,1-Dichloroethane	75-34-3	C	3.91E-08	1.0E-01	2.6E+06			1.0E-01		8.36E-04	1.15E-05	5.0E-01	4.4E+04	1.50E-07	2.05E-09	5.0E-01	2.4E+08	4.3E+04
VOC	1,2-Dichloroethane	107-06-2	B2	3.91E-08	2.0E-02	5.1E+05			2.0E-02		5.12E-04	7.02E-06	5.0E-03	7.1E+02	1.50E-07	2.05E-09	5.0E-03	2.4E+06	7.1E+02
VOC	1,1-Dichloroethene	75-35-4	C	3.91E-08	5.0E-02	1.3E+06			5.0E-02		1.40E-03	1.91E-05	2.0E-01	1.0E+04	1.50E-07	2.05E-09	2.0E-01	9.7E+07	1.0E+04
VOC	cis-1,2-Dichloroethene	156-59-2	D	3.91E-08	1.0E-02	2.6E+05			1.0E-02		7.03E-04	9.63E-06	3.5E-02	3.6E+03	1.50E-07	2.05E-09	3.5E-02	1.7E+07	3.6E+03
VOC	trans-1,2-Dichloroethene	156-60-5		3.91E-08	2.0E-02	5.1E+05			2.0E-02		8.83E-04	1.21E-05	6.0E-02	4.9E+03	1.50E-07	2.05E-09	6.0E-02	2.9E+07	4.9E+03
VOC	1,2-Dichloropropane	78-87-5	B2	3.91E-08							5.78E-04	7.92E-06	4.0E-03	5.0E+02	1.50E-07	2.05E-09	4.0E-03	1.9E+06	5.0E+02
VOC	Ethyl Benzene	100-41-4	D	3.91E-08	1.0E-01	2.6E+06			1.0E-01		4.01E-04	5.49E-06	1.0E+00	1.8E+05	1.50E-07	2.05E-09	1.0E+00	4.9E+08	1.7E+05
VOC	2-Hexanone	591-78-6		3.91E-08	4.0E-02	1.0E+06			4.0E-02				5.0E-03		1.50E-07	2.05E-09	5.0E-03	2.4E+06	7.2E+05
VOC	Methyl Acetate	79-20-9		3.91E-08	1.0E+00	2.6E+07			1.0E+00		1.95E-04	2.67E-06	3.5E+00	1.3E+06	1.50E-07	2.05E-09	3.5E+00	1.7E+09	1.2E+06
VOC	Methyl tert-butyl ether	1634-04-4		3.91E-08							3.92E-04	5.38E-06	3.0E+00	5.6E+05	1.50E-07	2.05E-09	3.0E+00	1.5E+09	5.6E+05
VOC	4-Methyl-2-pentanone	108-10-1	ID	3.91E-08							1.83E-04	2.50E-06	3.0E+00	1.2E+06	1.50E-07	2.05E-09	3.0E+00	1.5E+09	1.2E+06
VOC	Methylcyclohexane	108-87-2		3.91E-08							1.75E-03	2.40E-05	3.0E+00	1.3E+05	1.50E-07	2.05E-09	3.0E+00	1.5E+09	1.3E+05
VOC	Methylene Chloride	75-09-2	B2	3.91E-08	6.0E-02	1.5E+06			6.0E-02		7.87E-04	1.08E-05	3.0E+00	2.8E+05	1.50E-07	2.05E-09	3.0E+00	1.5E+09	2.4E+05
VOC	Styrene	100-42-5		3.91E-08	2.0E-01	5.1E+06			2.0E-01		1.64E-04	2.25E-06	1.0E+00	4.5E+05	1.50E-07	2.05E-09	1.0E+00	4.9E+08	4.1E+05
VOC	Tetrachloroethene	127-18-4	C-B2	3.91E-08	1.0E-02	2.6E+05			1.0E-02		8.24E-04	1.13E-05	4.0E-01	3.5E+04	1.50E-07	2.05E-09	4.0E-01	1.9E+08	3.1E+04
VOC	Toluene	108-88-3	D	3.91E-08	8.0E-02	2.0E+06			8.0E-02		5.42E-04	7.43E-06	5.0E+00	6.7E+05	1.50E-07	2.05E-09	5.0E+00	2.4E+09	5.1E+05
VOC	1,2,4-Trichlorobenzene	120-82-1	D	3.91E-08	1.0E-02	2.6E+05			1.0E-02		5.09E-05	6.97E-07	2.0E-01	2.9E+05	1.50E-07	2.05E-09	2.0E-01	9.7E+07	1.3E+05
VOC	1,1,1-Trichloroethane	71-55-6	D	3.91E-08	2.8E-01	7.2E+06			2.8E-01		9.41E-04	1.29E-05	2.2E+00	1.7E+05	1.50E-07	2.05E-09	2.2E+00	1.1E+09	1.7E+05
VOC	1,1,2-Trichloroethane	79-00-5	C	3.91E-08	4.0E-03	1.0E+05			4.0E-03		3.23E-04	4.42E-06			1.50E-07	2.05E-09			
VOC	Trichloroethene	79-01-6	C-B2	3.91E-08	6.0E-03	1.5E+05			6.0E-03		6.52E-04	8.93E-06			1.50E-07	2.05E-09			
VOC	Trichlorofluoromethane	75-69-4		3.91E-08	3.0E-01	7.7E+06			3.0E-01		1.67E-03	2.28E-05	7.0E-01	3.1E+04	1.50E-07	2.05E-09	7.0E-01	3.4E+08	3.1E+04
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		3.91E-08	3.0E+01	7.7E+08			3.0E+01		1.75E-03	2.40E-05	3.0E+01	1.3E+06	1.50E-07	2.05E-09	3.0E+01	1.5E+10	1.3E+06
VOC	1,2,4-Trimethylbenzene	95-63-6	ID	3.91E-08	5.0E-02	1.3E+06			5.0E-02		2.10E-04	2.88E-06	6.0E-03	2.1E+03	1.50E-07	2.05E-09	6.0E-03	2.9E+06	2.1E+03
VOC	1,3,5-Trimethylbenzene	108-67-8	ID	3.91E-08	5.0E-02	1.3E+06			5.0E-02		1.47E-04	2.02E-06	6.0E-03	3.0E+03	1.50E-07	2.05E-09	6.0E-03	2.9E+06	3.0E+03
VOC	Vinyl Chloride	75-01-4	A	3.91E-08	3.0E-03	7.7E+04			3.0E-03		1.82E-03	2.50E-05	1.0E-01	4.0E+03	1.50E-07	2.05E-09	1.0E-01	4.9E+07	3.8E+03
VOC	Xylenes (total)	1330-20-7	ID	3.91E-08	2.0E-01	5.1E+06			2.0E-01		3.71E-04	5.08E-06	1.0E-01	2.0E+04	1.50E-07	2.05E-09	1.0E-01	4.9E+07	2.0E+04
SVOC	Acenaphthene	83-32-9		3.91E-08	6.0E-02	1.5E+06	1.30E-01	1.68E-08	6.0E-02	3.6E+06	1.00E-05	1.38E-07	2.1E-01	1.5E+06	1.50E-07	2.05E-09	2.1E-01	1.0E+08	6.3E+05
SVOC	Acenaphthylene	208-96-8	D	3.91E-08	3.0E-02	7.7E+05	1.30E-01	1.68E-08	3.0E-02	1.8E+06	8.64E-06	1.18E-07	1.1E-01	8.9E+05	1.50E-07	2.05E-09	1.1E-01	5.1E+07	3.3E+05
SVOC	Acetophenone	98-86-2	D	3.91E-08	1.0E-01	2.6E+06	1.00E-01	1.29E-08	1.0E-01	7.7E+06	4.00E-05	5.48E-07	3.5E-01	6.4E+05	1.50E-07	2.05E-09	3.5E-01	1.7E+08	4.8E+05
SVOC	Anthracene	120-12-7	D	3.91E-08	3.0E-01	7.7E+06	1.30E-01	1.68E-08	3.0E-01	1.8E+07	2.80E-06	3.84E-08			1.50E-07	2.05E-09			5.4E+06
SVOC	Atrazine	1912-24-9	C	3.91E-08	3.5E-02	8.9E+05	1.00E-01	1.29E-08	3.5E-02	2.7E+06	9.32E-07	1.28E-08	1.2E-01	9.6E+06	1.50E-07	2.05E-09	1.2E-01	6.0E+07	6.2E+05
SVOC	Benzaldehyde	100-52-7		3.91E-08	1.0E-01	2.6E+06	1.00E-01	1.29E-08	1.0E-01	7.7E+06	6.04E-05	8.27E-07	3.5E-01	4.2E+05	1.50E-07	2.05E-09	3.5E-01	1.7E+08	3.5E+05

Attachment G3: Risk-Based Noncancer Criteria for Exposure of Maintenance Workers to Soil
GMC: NAO Flint Operations Site, Flint, Michigan

				Soil Ingestion			Soil Dermal Contact				Soil Vapor Inhalation				Soil Particulate Inhalation				
Chem Group	Chemical	CASRN	Cancer Class	ADD (mg/kg/d)	RfD_{oral} (mg/kg/d)	RBC (mg/kg)	ABS_{derm}	ADD (mg/kg/d)	RfD_{derm} (mg/kg/d)	RBC (mg/kg)	C_{air} (mg/m^3)	Dose (mg/m^3)	RfC (mg/m^3)	RBC (mg/kg)	C_{air} (mg/m^3)	Dose (mg/m^3)	RfC (mg/m^3)	RBC (mg/kg)	Noncancer RBC (mg/kg)
SVOC	Benzo(a)anthracene	56-55-3	B2	3.91E-08			1.30E-01	1.68E-08			2.19E-07	3.00E-09			1.50E-07	2.05E-09			
SVOC	Benzo(a)pyrene	50-32-8	B2	3.91E-08			1.30E-01	1.68E-08			7.56E-08	1.04E-09			1.50E-07	2.05E-09			
SVOC	Benzo(b)fluoranthene	205-99-2	B2	3.91E-08			1.30E-01	1.68E-08			4.72E-07	6.47E-09			1.50E-07	2.05E-09			
SVOC	Benzo(g,h,i)perylene	191-24-2	D	3.91E-08	3.0E-02	7.7E+05	1.30E-01	1.68E-08	3.0E-02	1.8E+06	6.80E-09	9.31E-11	1.1E-01	1.1E+09	1.50E-07	2.05E-09	1.1E-01	5.1E+07	5.3E+05
SVOC	Benzo(k)fluoranthene	207-08-9	B2	3.91E-08			1.30E-01	1.68E-08			4.34E-08	5.94E-10			1.50E-07	2.05E-09			
SVOC	Biphenyl	92-52-4	D	3.91E-08	5.0E-02	1.3E+06	1.00E-01	1.29E-08	5.0E-02	3.9E+06	1.13E-05	1.54E-07	1.8E-01	1.1E+06	1.50E-07	2.05E-09	1.8E-01	8.5E+07	5.2E+05
SVOC	bis(2-Chloroethoxy)methane	111-91-1	D	3.91E-08			1.00E-01	1.29E-08			5.48E-06	7.51E-08			1.50E-07	2.05E-09			
SVOC	bis(2-Chloroethyl) ether	111-44-4	B2	3.91E-08			1.00E-01	1.29E-08			5.95E-05	8.16E-07			1.50E-07	2.05E-09			
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2	3.91E-08	2.0E-02	5.1E+05	1.00E-01	1.29E-08	2.0E-02	1.5E+06	6.18E-09	8.46E-11	7.0E-02	8.3E+08	1.50E-07	2.05E-09	7.0E-02	3.4E+07	3.8E+05
SVOC	Butylbenzylphthalate	85-68-7	C	3.91E-08	2.0E-01	5.1E+06	1.00E-01	1.29E-08	2.0E-01	1.5E+07	2.15E-07	2.95E-09	7.0E-01	2.4E+08	1.50E-07	2.05E-09	7.0E-01	3.4E+08	3.7E+06
SVOC	Caprolactam	105-60-2		3.91E-08	5.0E-01	1.3E+07	1.00E-01	1.29E-08	5.0E-01	3.9E+07	4.43E-06	6.07E-08	1.8E+00	2.9E+07	1.50E-07	2.05E-09	1.8E+00	8.5E+08	7.1E+06
SVOC	Carbazole	86-74-8	B2	3.91E-08			1.00E-01	1.29E-08			3.45E-07	4.73E-09			1.50E-07	2.05E-09			
SVOC	4-Chloro-3-methylphenol	59-50-7		3.91E-08			1.00E-01	1.29E-08			1.66E-06	2.27E-08			1.50E-07	2.05E-09			
SVOC	2-Chloronaphthalene	91-58-7		3.91E-08	8.0E-02	2.0E+06	1.00E-01	1.29E-08	8.0E-02	6.2E+06	1.23E-05	1.69E-07	2.8E-01	1.7E+06	1.50E-07	2.05E-09	2.8E-01	1.4E+08	7.9E+05
SVOC	2-Chlorophenol	95-57-8		3.91E-08	5.0E-03	1.3E+05	1.00E-01	1.29E-08	5.0E-03	3.9E+05	7.24E-05	9.92E-07	1.8E-02	1.8E+04	1.50E-07	2.05E-09	1.8E-02	8.5E+06	1.5E+04
SVOC	Chrysene	218-01-9	B2	3.91E-08			1.30E-01	1.68E-08			8.05E-07	1.10E-08			1.50E-07	2.05E-09			
SVOC	Dibenz(a,h)anthracene	53-70-3	B2	3.91E-08			1.30E-01	1.68E-08			8.67E-09	1.19E-10			1.50E-07	2.05E-09			
SVOC	Dibenzofuran	132-64-9	D	3.91E-08	2.0E-03	5.1E+04	1.00E-01	1.29E-08	2.0E-03	1.5E+05	1.27E-06	1.74E-08	7.0E-03	4.0E+05	1.50E-07	2.05E-09	7.0E-03	3.4E+06	3.5E+04
SVOC	2,4-Dichlorophenol	120-83-2		3.91E-08	3.0E-03	7.7E+04	1.00E-01	1.29E-08	3.0E-03	2.3E+05	8.58E-06	1.18E-07	1.1E-02	8.9E+04	1.50E-07	2.05E-09	1.1E-02	5.1E+06	3.5E+04
SVOC	Diethylphthalate	84-66-2	D	3.91E-08	8.0E-01	2.0E+07	1.00E-01	1.29E-08	8.0E-01	6.2E+07	2.26E-06	3.10E-08	2.8E+00	9.0E+07	1.50E-07	2.05E-09	2.8E+00	1.4E+09	1.3E+07
SVOC	2,4-Dimethylphenol	105-67-9		3.91E-08	2.0E-02	5.1E+05	1.00E-01	1.29E-08	2.0E-02	1.5E+06	7.58E-06	1.04E-07	7.0E-02	6.7E+05	1.50E-07	2.05E-09	7.0E-02	3.4E+07	2.4E+05
SVOC	Dimethylphthalate	131-11-3	D	3.91E-08			1.00E-01	1.29E-08			3.23E-06	4.42E-08			1.50E-07	2.05E-09			
SVOC	Di-n-butylphthalate	84-74-2	D	3.91E-08	1.0E-01	2.6E+06	1.00E-01	1.29E-08	1.0E-01	7.7E+06	1.06E-07	1.46E-09			1.50E-07	2.05E-09			1.9E+06
SVOC	4,6-Dinitro-2-methylphenol	534-52-1		3.91E-08	1.0E-04	2.6E+03	1.00E-01	1.29E-08	1.0E-04	7.7E+03	3.36E-06	4.60E-08	3.5E-04	7.6E+03	1.50E-07	2.05E-09	3.5E-04	1.7E+05	1.5E+03
SVOC	2,4-Dinitrotoluene	121-14-2	B2	3.91E-08	2.0E-03	5.1E+04	1.00E-01	1.29E-08	2.0E-03	1.5E+05	4.53E-06	6.20E-08			1.50E-07	2.05E-09			3.8E+04
SVOC	2,6-Dinitrotoluene	606-20-2	B2	3.91E-08	1.0E-03	2.6E+04	1.00E-01	1.29E-08	1.0E-03	7.7E+04	5.75E-06	7.87E-08	3.5E-03	4.4E+04	1.50E-07	2.05E-09	3.5E-03	1.7E+06	1.3E+04
SVOC	Di-n-octylphthalate	117-84-0		3.91E-08	4.0E-02	1.0E+06	1.00E-01	1.29E-08	4.0E-02	3.1E+06	3.65E-08	5.00E-10			1.50E-07	2.05E-09			7.7E+05
SVOC	Fluoranthene	206-44-0	D	3.91E-08	4.0E-02	1.0E+06	1.30E-01	1.68E-08	4.0E-02	2.4E+06	7.08E-07	9.69E-09	1.4E-01	1.4E+07	1.50E-07	2.05E-09	1.4E-01	6.8E+07	6.7E+05
SVOC	Fluorene	86-73-7	D	3.91E-08	4.0E-02	1.0E+06	1.30E-01	1.68E-08	4.0E-02	2.4E+06	4.31E-06	5.90E-08	1.4E-01	2.4E+06	1.50E-07	2.05E-09	1.4E-01	6.8E+07	5.5E+05
SVOC	Formaldehyde	50-00-0	B1	3.91E-08	2.0E-01	5.1E+06			2.0E-01						1.50E-07	2.05E-09			
SVOC	Hexachlorobutadiene	87-68-3	C	3.91E-08	2.0E-04	5.1E+03	1.00E-01	1.29E-08	2.0E-04	1.5E+04	3.07E-05	4.21E-07			1.50E-07	2.05E-09			3.8E+03
SVOC	Hexachlorocyclopentadiene	77-47-4	E	3.91E-08	6.0E-03	1.5E+05	1.00E-01	1.29E-08	6.0E-03	4.6E+05	1.56E-05	2.13E-07	2.0E-04	9.4E+02	1.50E-07	2.05E-09	2.0E-04	9.7E+04	9.2E+02
SVOC	Hexachloroethane	67-72-1	C	3.91E-08	1.0E-03	2.6E+04	1.00E-01	1.29E-08	1.0E-03	7.7E+04	2.45E-05	3.35E-07			1.50E-07	2.05E-09			1.9E+04
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	B2	3.91E-09			1.30E-01	1.68E-09			3.25E-09	4.45E-11			1.50E-08	2.05E-10			
SVOC	Isophorone	78-59-1	C	3.91E-08	2.0E-01	5.1E+06	1.00E-01	1.29E-08	2.0E-01	1.5E+07	2.56E-05	3.50E-07			1.50E-07	2.05E-09			3.8E+06
SVOC	2-Methylnaphthalene	91-57-6	ID	3.91E-08	4.0E-03	1.0E+05	1.00E-01	1.29E-08	4.0E-03	3.1E+05	2.10E-05	2.88E-07	3.0E-03	1.0E+04	1.50E-07	2.05E-09	3.0E-03	1.5E+06	9.1E+03
SVOC	Methylphenol (total)	1319-77-3		3.91E-08	5.0E-02	1.3E+06	1.00E-01	1.29E-08	5.0E-02	3.9E+06	8.36E-06	1.14E-07			1.50E-07	2.05E-09			9.6E+05
SVOC	Naphthalene	91-20-3	C	3.91E-08	2.0E-02	5.1E+05	1.30E-01	1.68E-08	2.0E-02	1.2E+06	3.94E-05	5.39E-07	3.0E-03	5.6E+03	1.50E-07	2.05E-09	3.0E-03	1.5E+06	5.5E+03
SVOC	2-Nitroaniline	88-74-4		3.91E-08	3.0E-03	7.7E+04	1.00E-01	1.29E-08	3.0E-03	2.3E+05	4.33E-06	5.93E-08	2.0E-04	3.4E+03	1.50E-07	2.05E-09	2.0E-04	9.7E+04	3.1E+03
SVOC	Nitrobenzene	98-95-3	D	3.91E-08	5.0E-04	1.3E+04	1.00E-01	1.29E-08	5.0E-04	3.9E+04	4.80E-05	6.57E-07	2.0E-03	3.0E+03	1.50E-07	2.05E-09	2.0E-03	9.7E+05	2.3E+03
SVOC	2-Nitrophenol	88-75-5		3.91E-08			1.00E-01	1.29E-08			2.64E-05	3.62E-07			1.50E-07	2.05E-09			
SVOC	4-Nitrophenol	100-02-7		3.91E-08			1.00E-01	1.29E-08			2.17E-06	2.98E-08			1.50E-07	2.05E-09			
SVOC	N-Nitrosodiphenylamine	86-30-6	B2	3.91E-08	2.0E-02	5.1E+05	1.00E-01	1.29E-08	2.0E-02	1.5E+06	3.66E-06	5.01E-08			1.50E-07	2.05E-09			3.8E+05
SVOC	N-Nitroso-di-n-propylamine	621-64-7	B2	3.91E-08			1.00E-01	1.29E-08			1.72E-05	2.35E-07			1.50E-07	2.05E-09			
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	C	3.91E-08	4.0E-02	1.0E+06	1.00E-01	1.29E-08	4.0E-02	3.1E+06	5.27E-05	7.22E-07			1.50E-07	2.05E-09			7.7E+05
SVOC	Pentachlorophenol	87-86-5	B2	3.91E-08	3.0E-02	7.7E+05	2.50E-01	3.23E-08	3.0E-02	9.3E+05	8.51E-07	1.17E-08	1.1E-01	9.0E+06	1.50E-07	2.05E-09	1.1E-01	5.1E+07	4.0E+05
SVOC	Phenanthrene	85-01-8	D	3.91E-08	3.0E-02	7.7E+05	1.30E-01	1.68E-08	3.0E-02	1.8E+06	2.00E-06	2.73E-08	1.1E-01	3.8E+06	1.50E-07	2.05E-09	1.1E-01	5.1E+07	4.7E+05
SVOC	Phenol	108-95-2	ID	3.91E-08	3.0E-01	7.7E+06	1.00E-01	1.29E-08	3.0E-01	2.3E+07	8.80E-06	1.21E-07			1.50E-07	2.05E-09			5.8E+06
SVOC	Pyrene	129-00-0	D	3.91E-08	3.0E-02	7.7E+05	1.30E-01	1.68E-08	3.0E-02	1.8E+06	5.63E-07	7.71E-09	1.1E-01	1.4E+07	1.50E-07	2.05E-09	1.1E-01	5.1E+07	5.1E+05

Attachment G3: Risk-Based Noncancer Criteria for Exposure of Maintenance Workers to Soil
GMC: NAO Flint Operations Site, Flint, Michigan

				Soil Ingestion			Soil Dermal Contact				Soil Vapor Inhalation				Soil Particulate Inhalation				
Chem Group	Chemical	CASRN	Cancer Class	ADD (mg/kg/d)	RfD_{oral} (mg/kg/d)	RBC (mg/kg)	ABS_{derm}	ADD (mg/kg/d)	RfD_{derm} (mg/kg/d)	RBC (mg/kg)	C_{air} (mg/m^3)	Dose (mg/m^3)	RfC (mg/m^3)	RBC (mg/kg)	C_{air} (mg/m^3)	Dose (mg/m^3)	RfC (mg/m^3)	RBC (mg/kg)	Noncancer RBC (mg/kg)
SVOC	2,4,5-Trichlorophenol	95-95-4		3.91E-08	1.0E-01	2.6E+06	1.00E-01	1.29E-08	1.0E-01	7.7E+06	2.97E-06	4.07E-08			1.50E-07	2.05E-09			1.9E+06
SVOC	2,4,6-Trichlorophenol	88-06-2	B2	3.91E-08	1.0E-04	2.6E+03	1.00E-01	1.29E-08	1.0E-04	7.7E+03	8.27E-06	1.13E-07			1.50E-07	2.05E-09			1.9E+03
PCB	PCBs (total)	1336-36-3	B2	3.91E-08	2.0E-05	5.1E+02	1.40E-01	1.81E-08	2.0E-05	1.1E+03	1.35E-06	1.85E-08			1.50E-07	2.05E-09			3.5E+02
INORG	Antimony	7440-36-0		3.91E-08	4.0E-04	1.0E+04			6.0E-05				1.4E-03		1.50E-07	2.05E-09	1.4E-03	6.8E+05	1.0E+04
INORG	Arsenic	7440-38-2	A	3.91E-08	3.0E-04	7.7E+03	3.00E-02	3.87E-09	3.0E-04	7.7E+04					1.50E-07	2.05E-09			7.0E+03
INORG	Barium	7440-39-3	D	3.91E-08	7.0E-02	1.8E+06			4.9E-03						1.50E-07	2.05E-09			
INORG	Beryllium	7440-41-7	B1	3.91E-08	2.0E-03	5.1E+04			1.4E-05				2.0E-05		1.50E-07	2.05E-09	2.0E-05	9.7E+03	8.2E+03
INORG	Cadmium	7440-43-9	B1	3.91E-08	1.0E-03	2.6E+04	1.00E-03	1.29E-10	2.5E-05	1.9E+05			2.0E-04		1.50E-07	2.05E-09	2.0E-04	9.7E+04	1.8E+04
INORG	Chromium (total)	7440-47-3		3.91E-08	3.0E-03	7.7E+04			7.5E-05				1.0E-04		1.50E-07	2.05E-09	1.0E-04	4.9E+04	3.0E+04
INORG	Chromium III	16065-83-1	D	3.91E-08	1.5E+00	3.8E+07			2.0E-02				5.3E+00		1.50E-07	2.05E-09	5.3E+00	2.6E+09	3.8E+07
INORG	Chromium VI	18540-29-9	A	3.91E-08	3.0E-03	7.7E+04			7.5E-05				1.0E-04		1.50E-07	2.05E-09	1.0E-04	4.9E+04	3.0E+04
INORG	Cobalt	7440-48-4	B1	3.91E-08	2.0E-02	5.1E+05			2.0E-02				2.0E-05		1.50E-07	2.05E-09	2.0E-05	9.7E+03	9.6E+03
INORG	Copper	7440-50-8	D	3.91E-08	4.0E-02	1.0E+06			4.0E-02				1.4E-01		1.50E-07	2.05E-09	1.4E-01	6.8E+07	1.0E+06
INORG	Cyanide (total)	57-12-5	D	3.91E-08	2.0E-02	5.1E+05			2.0E-02				7.0E-02		1.50E-07	2.05E-09	7.0E-02	3.4E+07	5.0E+05
INORG	Fluoride	16984-48-8		3.91E-08											1.50E-07	2.05E-09			
INORG	Lead	7439-92-1	B2	3.91E-08											1.50E-07	2.05E-09			
INORG	Manganese	7439-96-5	D	3.91E-08	1.4E-01	3.6E+06			8.4E-03				5.0E-05		1.50E-07	2.05E-09	5.0E-05	2.4E+04	2.4E+04
INORG	Mercury	7439-97-6	D	3.91E-08	3.0E-04	7.7E+03			3.0E-04		6.93E-06	9.50E-08	3.0E-04	3.2E+03	1.50E-07	2.05E-09	3.0E-04	1.5E+05	2.2E+03
INORG	Nickel	7440-02-0	A	3.91E-08	2.0E-02	5.1E+05			8.0E-04						1.50E-07	2.05E-09			
INORG	Selenium	7782-49-2	D	3.91E-08	5.0E-03	1.3E+05			5.0E-03				1.8E-02		1.50E-07	2.05E-09	1.8E-02	8.5E+06	1.3E+05
INORG	Silver	7440-22-4	D	3.91E-08	5.0E-03	1.3E+05			2.0E-04				1.0E-05		1.50E-07	2.05E-09	1.0E-05	4.9E+03	4.7E+03
INORG	Thallium	7440-28-0		3.91E-08	7.0E-05	1.8E+03			7.0E-05				2.5E-04		1.50E-07	2.05E-09	2.5E-04	1.2E+05	1.8E+03
INORG	Vanadium	7440-62-2		3.91E-08	7.0E-03	1.8E+05			1.8E-04				2.5E-02		1.50E-07	2.05E-09	2.5E-02	1.2E+07	1.8E+05
INORG	Zinc	7440-66-6	D	3.91E-08	3.0E-01	7.7E+06			3.0E-01				1.1E+00		1.50E-07	2.05E-09	1.1E+00	5.1E+08	7.6E+06

Notes:

Target hazard index of 1

C/Q based on the 24-hour maximum exposure for a 15' x 15' excavation area = 10.96 kg/m3 per (kg/m2-s)

PM10 based on 24-hour NAAQS standards of 150 ug/m3

Attachment G4
Exposure of Maintenance Workers to Groundwater

Attachment G4: Vapor Flux (mg/m2-s per mg/L) from Exposed Groundwater to Ambient Air
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	H (unitless)	MW (g/mol)	K_{Gi} (cm/s)	K_{li} (cm/s)	$1/K_L$ (cm/s)	K_L (cm/s)	J_L (L/m^2-s)
VOC	Acetone	67-64-1	8.0E-04	5.8E+01	5.34E-01	1.41E-03	3.06E+03	3.26E-04	3.26E-03
VOC	Benzene	71-43-2	1.1E-01	7.8E+01	4.84E-01	1.22E-03	8.41E+02	1.19E-03	1.19E-02
VOC	Bromodichloromethane	75-27-4	3.3E-02	1.6E+02	3.77E-01	8.39E-04	1.27E+03	7.86E-04	7.86E-03
VOC	2-Butanone	78-93-3	1.1E-03	7.2E+01	4.97E-01	1.27E-03	2.55E+03	3.92E-04	3.92E-03
VOC	Carbon Disulfide	75-15-0	6.2E-01	7.6E+01	4.88E-01	1.23E-03	8.15E+02	1.23E-03	1.23E-02
VOC	Carbon Tetrachloride	56-23-5	6.3E-01	1.5E+02	3.85E-01	8.66E-04	1.16E+03	8.63E-04	8.63E-03
VOC	Chlorobenzene	108-90-7	7.6E-02	1.1E+02	4.28E-01	1.01E-03	1.02E+03	9.82E-04	9.82E-03
VOC	Chloroethane	75-00-3	1.8E-01	6.5E+01	5.16E-01	1.34E-03	7.58E+02	1.32E-03	1.32E-02
VOC	Chloroform	67-66-3	7.5E-02	1.2E+02	4.20E-01	9.83E-04	1.05E+03	9.54E-04	9.54E-03
VOC	Chloromethane	74-87-3	1.8E-01	5.0E+01	5.60E-01	1.51E-03	6.71E+02	1.49E-03	1.49E-02
VOC	Cumene	98-82-8	2.7E-01	1.2E+02	4.19E-01	9.80E-04	1.03E+03	9.71E-04	9.71E-03
VOC	Cyclohexane	110-82-7	4.0E+00	8.4E+01	4.72E-01	1.17E-03	8.54E+02	1.17E-03	1.17E-02
VOC	Dibromochloromethane	124-48-1	1.6E-02	2.1E+02	3.48E-01	7.44E-04	1.52E+03	6.57E-04	6.57E-03
VOC	1,2-Dichlorobenzene	95-50-1	3.9E-02	1.5E+02	3.91E-01	8.86E-04	1.19E+03	8.37E-04	8.37E-03
VOC	1,3-Dichlorobenzene	541-73-1	6.3E-02	1.5E+02	3.91E-01	8.86E-04	1.17E+03	8.56E-04	8.56E-03
VOC	1,4-Dichlorobenzene	106-46-7	5.0E-02	1.5E+02	3.91E-01	8.86E-04	1.18E+03	8.48E-04	8.48E-03
VOC	Dichlorodifluoromethane	75-71-8	7.0E+00	1.2E+02	4.18E-01	9.77E-04	1.02E+03	9.77E-04	9.77E-03
VOC	1,1-Dichloroethane	75-34-3	1.2E-01	9.9E+01	4.47E-01	1.08E-03	9.45E+02	1.06E-03	1.06E-02
VOC	1,2-Dichloroethane	107-06-2	2.0E-02	9.9E+01	4.47E-01	1.08E-03	1.04E+03	9.64E-04	9.64E-03
VOC	1,1-Dichloroethene	75-35-4	5.4E-01	9.7E+01	4.50E-01	1.09E-03	9.21E+02	1.09E-03	1.09E-02
VOC	cis-1,2-Dichloroethene	156-59-2	8.4E-02	9.7E+01	4.50E-01	1.09E-03	9.43E+02	1.06E-03	1.06E-02
VOC	trans-1,2-Dichloroethene	156-60-5	1.9E-01	9.7E+01	4.50E-01	1.09E-03	9.28E+02	1.08E-03	1.08E-02
VOC	1,2-Dichloropropane	78-87-5	5.8E-02	1.1E+02	4.27E-01	1.01E-03	1.03E+03	9.71E-04	9.71E-03
VOC	Ethyl Benzene	100-41-4	1.6E-01	1.1E+02	4.36E-01	1.04E-03	9.73E+02	1.03E-03	1.03E-02
VOC	2-Hexanone	591-78-6	3.6E-02	1.0E+02	4.45E-01	1.07E-03	9.94E+02	1.01E-03	1.01E-02
VOC	Methyl Acetate	79-20-9	1.9E-03	7.4E+01	4.92E-01	1.25E-03	1.90E+03	5.27E-04	5.27E-03
VOC	Methyl tert-butyl ether	1634-04-4	1.2E-02	8.8E+01	4.64E-01	1.14E-03	1.05E+03	9.49E-04	9.49E-03
VOC	4-Methyl-2-pentanone	108-10-1	2.8E-03	1.0E+02	4.45E-01	1.07E-03	1.73E+03	5.79E-04	5.79E-03
VOC	Methylcyclohexane	108-87-2	8.8E+00	9.8E+01	4.48E-01	1.08E-03	9.23E+02	1.08E-03	1.08E-02
VOC	Methylene Chloride	75-09-2	4.5E-02	8.5E+01	4.70E-01	1.17E-03	9.05E+02	1.10E-03	1.10E-02
VOC	Styrene	100-42-5	5.7E-02	1.0E+02	4.39E-01	1.05E-03	9.90E+02	1.01E-03	1.01E-02
VOC	Tetrachloroethene	127-18-4	3.8E-01	1.7E+02	3.76E-01	8.34E-04	1.21E+03	8.29E-04	8.29E-03
VOC	Toluene	108-88-3	1.4E-01	9.2E+01	4.58E-01	1.12E-03	9.09E+02	1.10E-03	1.10E-02
VOC	1,2,4-Trichlorobenzene	120-82-1	2.9E-02	1.8E+02	3.65E-01	7.98E-04	1.35E+03	7.42E-04	7.42E-03
VOC	1,1,1-Trichloroethane	71-55-6	3.5E-01	1.3E+02	4.04E-01	9.30E-04	1.08E+03	9.24E-04	9.24E-03
VOC	1,1,2-Trichloroethane	79-00-5	1.9E-02	1.3E+02	4.04E-01	9.30E-04	1.21E+03	8.28E-04	8.28E-03
VOC	Trichloroethene	79-01-6	2.1E-01	1.3E+02	4.06E-01	9.37E-04	1.08E+03	9.27E-04	9.27E-03
VOC	Trichlorofluoromethane	75-69-4	2.0E+00	1.4E+02	4.00E-01	9.17E-04	1.09E+03	9.16E-04	9.16E-03
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	9.8E+00	1.9E+02	3.61E-01	7.85E-04	1.27E+03	7.85E-04	7.85E-03
VOC	1,2,4-Trimethylbenzene	95-63-6	1.3E-01	1.2E+02	4.19E-01	9.80E-04	1.04E+03	9.62E-04	9.62E-03
VOC	1,3,5-Trimethylbenzene	108-67-8	1.2E-01	1.2E+02	4.19E-01	9.80E-04	1.04E+03	9.61E-04	9.61E-03
VOC	Vinyl Chloride	75-01-4	5.6E-01	6.3E+01	5.21E-01	1.36E-03	7.39E+02	1.35E-03	1.35E-02
VOC	Xylenes (total)	1330-20-7	1.4E-01	1.1E+02	4.36E-01	1.04E-03	9.76E+02	1.02E-03	1.02E-02
SVOC	Acenaphthene	83-32-9	3.2E-03	1.5E+02	3.85E-01	8.65E-04	1.97E+03	5.07E-04	5.07E-03
SVOC	Acenaphthylene	208-96-8	2.3E-03	1.5E+02	3.87E-01	8.71E-04	2.27E+03	4.41E-04	4.41E-03
SVOC	Acetophenone	98-86-2	2.2E-04	1.2E+02	4.19E-01	9.80E-04	1.19E+04	8.37E-05	8.37E-04
SVOC	Anthracene	120-12-7	1.3E-03	1.8E+02	3.67E-01	8.05E-04	3.28E+03	3.04E-04	3.04E-03
SVOC	Atrazine	1912-24-9	1.2E-07	2.2E+02	3.44E-01	7.32E-04	2.33E+07	4.30E-08	4.30E-07
SVOC	Benzaldehyde	100-52-7	4.9E-04	1.1E+02	4.36E-01	1.04E-03	5.67E+03	1.76E-04	1.76E-03
SVOC	Benzo(a)anthracene	56-55-3	6.9E-05	2.3E+02	3.38E-01	7.11E-04	4.46E+04	2.24E-05	2.24E-04
SVOC	Benzo(a)pyrene	50-32-8	2.3E-05	2.5E+02	3.27E-01	6.76E-04	1.34E+05	7.48E-06	7.48E-05
SVOC	Benzo(b)fluoranthene	205-99-2	2.3E-03	2.5E+02	3.27E-01	6.76E-04	2.82E+03	3.54E-04	3.54E-03
SVOC	Benzo(g,h,i)perylene	191-24-2	2.9E-06	2.8E+02	3.17E-01	6.46E-04	1.10E+06	9.11E-07	9.11E-06
SVOC	Benzo(k)fluoranthene	207-08-9	1.7E-05	2.5E+02	3.27E-01	6.76E-04	1.82E+05	5.51E-06	5.51E-05
SVOC	Biphenyl	92-52-4	6.1E-03	1.5E+02	3.85E-01	8.65E-04	1.58E+03	6.33E-04	6.33E-03
SVOC	bis(2-Chloroethoxy)methane	111-91-1	3.5E-06	1.7E+02	3.71E-01	8.17E-04	7.78E+05	1.29E-06	1.29E-05
SVOC	bis(2-Chloroethyl) ether	111-44-4	3.7E-04	1.4E+02	3.95E-01	8.98E-04	7.97E+03	1.25E-04	1.25E-03
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	2.1E-06	3.9E+02	2.82E-01	5.44E-04	1.70E+06	5.89E-07	5.89E-06
SVOC	Butylbenzylphthalate	85-68-7	2.6E-05	3.1E+02	3.04E-01	6.08E-04	1.29E+05	7.76E-06	7.76E-05
SVOC	Caprolactam	105-60-2	1.0E-07	1.1E+02	4.27E-01	1.01E-03	2.27E+07	4.40E-08	4.40E-07
SVOC	Carbazole	86-74-8	3.1E-07	1.7E+02	3.75E-01	8.31E-04	8.52E+06	1.17E-07	1.17E-06
SVOC	4-Chloro-3-methylphenol	59-50-7	8.2E-06	1.4E+02	3.95E-01	9.00E-04	3.11E+05	3.21E-06	3.21E-05
SVOC	2-Chloronaphthalene	91-58-7	6.4E-03	1.6E+02	3.78E-01	8.43E-04	1.60E+03	6.25E-04	6.25E-03
SVOC	2-Chlorophenol	95-57-8	8.0E-03	1.3E+02	4.09E-01	9.48E-04	1.36E+03	7.35E-04	7.35E-03
SVOC	Chrysene	218-01-9	1.9E-03	2.3E+02	3.38E-01	7.11E-04	2.93E+03	3.41E-04	3.41E-03
SVOC	Dibenz(a,h)anthracene	53-70-3	3.0E-07	2.8E+02	3.16E-01	6.44E-04	1.05E+07	9.53E-08	9.53E-07
SVOC	Dibenzofuran	132-64-9	2.6E-04	1.7E+02	3.74E-01	8.28E-04	1.16E+04	8.63E-05	8.63E-04
SVOC	2,4-Dichlorophenol	120-83-2	6.5E-05	1.6E+02	3.78E-01	8.42E-04	4.19E+04	2.39E-05	2.39E-04
SVOC	Diethylphthalate	84-66-2	9.3E-06	2.2E+02	3.41E-01	7.21E-04	3.19E+05	3.14E-06	3.14E-05
SVOC	2,4-Dimethylphenol	105-67-9	4.1E-05	1.2E+02	4.16E-01	9.72E-04	5.96E+04	1.68E-05	1.68E-04

Attachment G4: Vapor Flux (mg/m2-s per mg/L) from Exposed Groundwater to Ambient Air
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	H (unitless)	MW (g/mol)	K_{Gi} (cm/s)	K_{li} (cm/s)	$1/K_L$ (cm/s)	K_L (cm/s)	J_L (L/m^2-s)
SVOC	Dimethylphthalate	131-11-3	2.1E-06	1.9E+02	3.57E-01	7.71E-04	1.31E+06	7.64E-07	7.64E-06
SVOC	Di-n-butylphthalate	84-74-2	1.9E-08	2.8E+02	3.16E-01	6.44E-04	1.64E+08	6.08E-09	6.08E-08
SVOC	4,6-Dinitro-2-methylphenol	534-52-1	8.7E-06	2.0E+02	3.54E-01	7.63E-04	3.25E+05	3.08E-06	3.08E-05
SVOC	2,4-Dinitrotoluene	121-14-2	1.9E-06	1.8E+02	3.64E-01	7.96E-04	1.45E+06	6.91E-07	6.91E-06
SVOC	2,6-Dinitrotoluene	606-20-2	1.5E-05	1.8E+02	3.64E-01	7.96E-04	1.81E+05	5.53E-06	5.53E-05
SVOC	Di-n-octylphthalate	117-84-0	1.4E-03	3.9E+02	2.82E-01	5.44E-04	4.43E+03	2.26E-04	2.26E-03
SVOC	Fluoranthene	206-44-0	3.3E-04	2.0E+02	3.52E-01	7.55E-04	9.94E+03	1.01E-04	1.01E-03
SVOC	Fluorene	86-73-7	1.3E-03	1.7E+02	3.76E-01	8.33E-04	3.24E+03	3.09E-04	3.09E-03
SVOC	Formaldehyde	50-00-0	6.9E-06	3.0E+01	6.66E-01	1.96E-03	2.17E+05	4.62E-06	4.62E-05
SVOC	Hexachlorobutadiene	87-68-3	1.7E-01	2.6E+02	3.23E-01	6.65E-04	1.52E+03	6.57E-04	6.57E-03
SVOC	Hexachlorocyclopentadiene	77-47-4	5.6E-01	2.7E+02	3.18E-01	6.51E-04	1.54E+03	6.48E-04	6.48E-03
SVOC	Hexachloroethane	67-72-1	8.0E-02	2.4E+02	3.34E-01	6.98E-04	1.47E+03	6.80E-04	6.80E-03
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	3.3E-05	2.8E+02	3.17E-01	6.46E-04	9.78E+04	1.02E-05	1.02E-04
SVOC	Isophorone	78-59-1	1.4E-04	1.4E+02	4.00E-01	9.14E-04	1.95E+04	5.13E-05	5.13E-04
SVOC	2-Methylnaphthalene	91-57-6	1.1E-02	1.4E+02	3.96E-01	9.01E-04	1.35E+03	7.42E-04	7.42E-03
SVOC	Methylphenol (total)	1319-77-3	1.8E-05	1.1E+02	4.34E-01	1.03E-03	1.31E+05	7.61E-06	7.61E-05
SVOC	Naphthalene	91-20-3	9.9E-03	1.3E+02	4.10E-01	9.49E-04	1.30E+03	7.69E-04	7.69E-03
SVOC	2-Nitroaniline	88-74-4	3.3E-06	1.4E+02	4.00E-01	9.14E-04	7.67E+05	1.30E-06	1.30E-05
SVOC	Nitrobenzene	98-95-3	4.9E-04	1.2E+02	4.15E-01	9.68E-04	5.93E+03	1.69E-04	1.69E-03
SVOC	2-Nitrophenol	88-75-5	1.9E-04	1.4E+02	3.99E-01	9.11E-04	1.41E+04	7.11E-05	7.11E-04
SVOC	4-Nitrophenol	100-02-7	8.5E-09	1.4E+02	3.99E-01	9.11E-04	2.96E+08	3.38E-09	3.38E-08
SVOC	N-Nitrosodiphenylamine	86-30-6	1.0E-04	2.0E+02	3.54E-01	7.63E-04	2.89E+04	3.46E-05	3.46E-04
SVOC	N-Nitroso-di-n-propylamine	621-64-7	4.6E-05	1.3E+02	4.08E-01	9.42E-04	5.42E+04	1.84E-05	1.84E-04
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	2.4E-03	1.7E+02	3.72E-01	8.21E-04	2.34E+03	4.27E-04	4.27E-03
SVOC	Pentachlorophenol	87-86-5	5.0E-07	2.7E+02	3.21E-01	6.58E-04	6.24E+06	1.60E-07	1.60E-06
SVOC	Phenanthrene	85-01-8	4.8E-04	1.8E+02	3.67E-01	8.05E-04	6.97E+03	1.44E-04	1.44E-03
SVOC	Phenol	108-95-2	8.2E-06	9.4E+01	4.54E-01	1.11E-03	2.71E+05	3.69E-06	3.69E-05
SVOC	Pyrene	129-00-0	2.3E-04	2.0E+02	3.52E-01	7.55E-04	1.39E+04	7.18E-05	7.18E-04
SVOC	2,4,5-Trichlorophenol	95-95-4	8.9E-05	2.0E+02	3.55E-01	7.65E-04	3.30E+04	3.03E-05	3.03E-04
SVOC	2,4,6-Trichlorophenol	88-06-2	1.6E-04	2.0E+02	3.55E-01	7.65E-04	1.90E+04	5.27E-05	5.27E-04
PCB	PCBs (total)	1336-36-3	4.1E-02	3.3E+02	2.99E-01	5.93E-04	1.77E+03	5.66E-04	5.66E-03
INORG	Antimony	7440-36-0		1.2E+02	4.17E-01	9.74E-04			
INORG	Arsenic	7440-38-2		7.5E+01	4.90E-01	1.24E-03			
INORG	Barium	7440-39-3		1.4E+02	4.00E-01	9.17E-04			
INORG	Beryllium	7440-41-7		9.0E+00	9.97E-01	3.58E-03			
INORG	Cadmium	7440-43-9		1.1E+02	4.28E-01	1.01E-03			
INORG	Chromium (total)	7440-47-3		5.2E+01	5.54E-01	1.49E-03			
INORG	Chromium III	16065-83-1		5.2E+01	5.54E-01	1.49E-03			
INORG	Chromium VI	18540-29-9		5.2E+01	5.54E-01	1.49E-03			
INORG	Cobalt	7440-48-4		5.9E+01	5.32E-01	1.40E-03			
INORG	Copper	7440-50-8		6.4E+01	5.18E-01	1.35E-03			
INORG	Cyanide (total)	57-12-5		2.6E+01	6.99E-01	2.11E-03			
INORG	Fluoride	16984-48-8							
INORG	Lead	7439-92-1		2.1E+02	3.49E-01	7.46E-04			
INORG	Manganese	7439-96-5		5.5E+01	5.44E-01	1.45E-03			
INORG	Mercury	7439-97-6	1.5E-01	2.0E+02	3.52E-01	7.58E-04	1.34E+03	7.47E-04	7.47E-03
INORG	Nickel	7440-02-0		5.9E+01	5.32E-01	1.40E-03			
INORG	Selenium	7782-49-2		7.9E+01	4.82E-01	1.21E-03			
INORG	Silver	7440-22-4		1.1E+02	4.34E-01	1.03E-03			
INORG	Thallium	7440-28-0		2.0E+02	3.50E-01	7.52E-04			
INORG	Vanadium	7440-62-2		5.1E+01	5.58E-01	1.51E-03			
INORG	Zinc	7440-66-6		6.5E+01	5.13E-01	1.33E-03			

Notes:	molecular weight of oxygen	g/mol	MW_{O2}	32					
	molecular weight of water	g/mol	MW_{H2O}	18					
	absolute temperature	K	**T**	283					
	liquid-phase mass transfer coefficient for oxygen	cm/s	$k_{L,O2}$	0.002					
	gas-phase mass transfer coefficient for water vapor at 25 C	cm/s	$K_{G,H2O}$	0.833					

Attachment G4: Nonsteady State Dermal Absorption of Chemical from Water
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	MW (g/mole)	Log K_{ow} (unitless)	K_p (cm/hr)	B (unitless)	τ (hr)	c	b	ts (hr)	FA (unitless)	DA (L/cm^2-event)
VOC	Acetone	67-64-1	5.8E+01	-2.4E-01	5.2E-04	1.5E-03	2.2E-01	3.3E-01	3.0E-01	5.3E-01	1.0E+00	1.27E-06
VOC	Benzene	71-43-2	7.8E+01	2.1E+00	1.5E-02	5.0E-02	2.9E-01	3.7E-01	3.3E-01	6.9E-01	1.0E+00	3.70E-05
VOC	Bromodichloromethane	75-27-4	1.6E+02	2.1E+00	4.7E-03	2.3E-02	8.7E-01	3.5E-01	3.2E-01	2.1E+00	1.0E+00	1.70E-05
VOC	2-Butanone	78-93-3	7.2E+01	2.8E-01	9.6E-04	3.1E-03	2.7E-01	3.4E-01	3.1E-01	6.4E-01	1.0E+00	2.42E-06
VOC	Carbon Disulfide	75-15-0	7.6E+01	2.0E+00	1.2E-02	4.2E-02	2.8E-01	3.6E-01	3.3E-01	6.7E-01	1.0E+00	3.11E-05
VOC	Carbon Tetrachloride	56-23-5	1.5E+02	2.7E+00	1.4E-02	6.6E-02	7.6E-01	3.8E-01	3.4E-01	1.8E+00	1.0E+00	4.84E-05
VOC	Chlorobenzene	108-90-7	1.1E+02	2.9E+00	2.9E-02	1.2E-01	4.5E-01	4.2E-01	3.8E-01	1.1E+00	1.0E+00	8.00E-05
VOC	Chloroethane	75-00-3	6.5E+01	1.4E+00	6.1E-03	1.9E-02	2.4E-01	3.5E-01	3.1E-01	5.8E-01	1.0E+00	1.49E-05
VOC	Chloroform	67-66-3	1.2E+02	1.9E+00	6.3E-03	2.6E-02	4.9E-01	3.5E-01	3.2E-01	1.2E+00	1.0E+00	1.86E-05
VOC	Chloromethane	74-87-3	5.0E+01	1.9E+00	1.5E-02	4.2E-02	2.0E-01	3.6E-01	3.3E-01	4.8E-01	1.0E+00	3.58E-05
VOC	Cumene	98-82-8	1.2E+02	3.5E+00	6.8E-02	2.9E-01	5.0E-01	5.5E-01	5.1E-01	1.2E+00	1.0E+00	1.93E-04
VOC	Cyclohexane	110-82-7	8.4E+01	3.4E+00	1.0E-01	3.5E-01	3.1E-01	6.0E-01	5.7E-01	7.5E-01	1.0E+00	2.30E-04
VOC	Dibromochloromethane	124-48-1	2.1E+02	2.2E+00	2.9E-03	1.6E-02	1.5E+00	3.4E-01	3.1E-01	3.7E+00	1.0E+00	1.42E-05
VOC	1,2-Dichlorobenzene	95-50-1	1.5E+02	3.4E+00	4.4E-02	2.0E-01	7.0E-01	4.8E-01	4.4E-01	1.7E+00	1.0E+00	1.46E-04
VOC	1,3-Dichlorobenzene	541-73-1	1.5E+02	3.4E+00	4.1E-02	1.9E-01	7.0E-01	4.7E-01	4.3E-01	1.7E+00	1.0E+00	1.35E-04
VOC	1,4-Dichlorobenzene	106-46-7	1.5E+02	3.4E+00	4.3E-02	2.0E-01	7.0E-01	4.8E-01	4.4E-01	1.7E+00	1.0E+00	1.44E-04
VOC	Dichlorodifluoromethane	75-71-8	1.2E+02	2.2E+00	8.9E-03	3.8E-02	5.0E-01	3.6E-01	3.3E-01	1.2E+00	1.0E+00	2.63E-05
VOC	1,1-Dichloroethane	75-34-3	9.9E+01	1.8E+00	6.7E-03	2.6E-02	3.8E-01	3.5E-01	3.2E-01	9.0E-01	1.0E+00	1.83E-05
VOC	1,2-Dichloroethane	107-06-2	9.9E+01	1.5E+00	4.1E-03	1.6E-02	3.8E-01	3.4E-01	3.1E-01	9.0E-01	1.0E+00	1.13E-05
VOC	1,1-Dichloroethene	75-35-4	9.7E+01	2.1E+00	1.2E-02	4.4E-02	3.7E-01	3.6E-01	3.3E-01	8.8E-01	1.0E+00	3.10E-05
VOC	cis-1,2-Dichloroethene	156-59-2	9.7E+01	1.9E+00	7.7E-03	2.9E-02	3.7E-01	3.5E-01	3.2E-01	8.8E-01	1.0E+00	2.07E-05
VOC	trans-1,2-Dichloroethene	156-60-5	9.7E+01	2.1E+00	1.1E-02	4.0E-02	3.7E-01	3.6E-01	3.3E-01	8.8E-01	1.0E+00	2.83E-05
VOC	1,2-Dichloropropane	78-87-5	1.1E+02	2.0E+00	7.4E-03	3.0E-02	4.5E-01	3.5E-01	3.2E-01	1.1E+00	1.0E+00	2.12E-05
VOC	Ethyl Benzene	100-41-4	1.1E+02	3.1E+00	4.8E-02	1.9E-01	4.1E-01	4.7E-01	4.3E-01	9.9E-01	1.0E+00	1.27E-04
VOC	2-Hexanone	591-78-6	1.0E+02	1.4E+00	3.5E-03	1.4E-02	3.8E-01	3.4E-01	3.1E-01	9.2E-01	1.0E+00	9.75E-06
VOC	Methyl Acetate	79-20-9	7.4E+01	1.8E-01	8.0E-04	2.7E-03	2.7E-01	3.4E-01	3.0E-01	6.6E-01	1.0E+00	2.04E-06
VOC	Methyl tert-butyl ether	1634-04-4	8.8E+01	1.2E+00	3.3E-03	1.2E-02	3.3E-01	3.4E-01	3.1E-01	7.9E-01	1.0E+00	8.84E-06
VOC	4-Methyl-2-pentanone	108-10-1	1.0E+02	1.2E+00	2.7E-03	1.0E-02	3.8E-01	3.4E-01	3.1E-01	9.2E-01	1.0E+00	7.32E-06
VOC	Methylcyclohexane	108-87-2	9.8E+01	3.0E+00	4.0E-02	1.5E-01	3.7E-01	4.4E-01	4.0E-01	9.0E-01	1.0E+00	1.05E-04
VOC	Methylene Chloride	75-09-2	8.5E+01	1.3E+00	3.5E-03	1.3E-02	3.1E-01	3.4E-01	3.1E-01	7.5E-01	1.0E+00	9.25E-06
VOC	Styrene	100-42-5	1.0E+02	2.9E+00	3.6E-02	1.4E-01	4.0E-01	4.3E-01	4.0E-01	9.7E-01	1.0E+00	9.63E-05
VOC	Tetrachloroethene	127-18-4	1.7E+02	2.7E+00	1.1E-02	5.4E-02	8.9E-01	3.7E-01	3.4E-01	2.1E+00	1.0E+00	3.99E-05
VOC	Toluene	108-88-3	9.2E+01	2.8E+00	3.2E-02	1.2E-01	3.5E-01	4.2E-01	3.8E-01	8.3E-01	1.0E+00	8.08E-05
VOC	1,2,4-Trichlorobenzene	120-82-1	1.8E+02	4.0E+00	6.8E-02	3.5E-01	1.1E+00	6.0E-01	5.6E-01	2.6E+00	1.0E+00	2.76E-04
VOC	1,1,1-Trichloroethane	71-55-6	1.3E+02	2.5E+00	1.2E-02	5.5E-02	5.9E-01	3.7E-01	3.4E-01	1.4E+00	1.0E+00	3.85E-05
VOC	1,1,2-Trichloroethane	79-00-5	1.3E+02	2.1E+00	6.4E-03	2.8E-02	5.9E-01	3.5E-01	3.2E-01	1.4E+00	1.0E+00	2.02E-05
VOC	Trichloroethene	79-01-6	1.3E+02	2.7E+00	1.8E-02	7.9E-02	5.7E-01	3.9E-01	3.5E-01	1.4E+00	1.0E+00	5.53E-05
VOC	Trichlorofluoromethane	75-69-4	1.4E+02	2.5E+00	1.3E-02	5.7E-02	6.2E-01	3.7E-01	3.4E-01	1.5E+00	1.0E+00	4.03E-05
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	1.9E+02	3.2E+00	1.7E-02	9.1E-02	1.2E+00	4.0E-01	3.6E-01	2.8E+00	1.0E+00	7.31E-05

Attachment G4: Nonsteady State Dermal Absorption of Chemical from Water
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	MW (g/mole)	Log K_{ow} (unitless)	K_p (cm/hr)	B (unitless)	τ (hr)	c	b	ts (hr)	FA (unitless)	DA (L/cm^2-event)
VOC	1,2,4-Trimethylbenzene	95-63-6	1.2E+02	3.6E+00	8.4E-02	3.5E-01	5.0E-01	6.0E-01	5.7E-01	1.2E+00	1.0E+00	2.34E-04
VOC	1,3,5-Trimethylbenzene	108-67-8	1.2E+02	4.0E+00	1.5E-01	6.2E-01	5.0E-01	8.2E-01	8.4E-01	2.0E+00	1.0E+00	4.04E-04
VOC	Vinyl Chloride	75-01-4	6.3E+01	1.5E+00	6.9E-03	2.1E-02	2.4E-01	3.5E-01	3.2E-01	5.7E-01	1.0E+00	1.69E-05
VOC	Xylenes (total)	1330-20-7	1.1E+02	3.2E+00	5.0E-02	2.0E-01	4.1E-01	4.8E-01	4.4E-01	9.9E-01	1.0E+00	1.32E-04
SVOC	Acenaphthene	83-32-9	1.5E+02	3.9E+00	8.4E-02	4.0E-01	7.7E-01	6.4E-01	6.1E-01	1.8E+00	1.0E+00	2.96E-04
SVOC	Acenaphthylene	208-96-8	1.5E+02	3.9E+00	8.9E-02	4.2E-01	7.5E-01	6.6E-01	6.3E-01	1.8E+00	1.0E+00	3.09E-04
SVOC	Acetophenone	98-86-2	1.2E+02	1.6E+00	3.7E-03	1.6E-02	5.0E-01	3.4E-01	3.1E-01	1.2E+00	1.0E+00	1.11E-05
SVOC	Anthracene	120-12-7	1.8E+02	4.6E+00	1.6E-01	8.2E-01	1.0E+00	1.0E+00	1.1E+00	4.0E+00	1.0E+00	6.41E-04
SVOC	Atrazine	1912-24-9	2.2E+02	2.6E+00	5.2E-03	2.9E-02	1.7E+00	3.5E-01	3.2E-01	4.1E+00	1.0E+00	2.64E-05
SVOC	Benzaldehyde	100-52-7	1.1E+02	1.5E+00	3.8E-03	1.5E-02	4.1E-01	3.4E-01	3.1E-01	9.9E-01	1.0E+00	1.07E-05
SVOC	Benzo(a)anthracene	56-55-3	2.3E+02	5.7E+00	4.8E-01	2.8E+00	2.0E+00	2.9E+00	6.3E+00	8.4E+00	9.0E-01	2.40E-03
SVOC	Benzo(a)pyrene	50-32-8	2.5E+02	6.1E+00	6.6E-01	4.0E+00	2.7E+00	4.1E+00	1.2E+01	1.2E+01	8.0E-01	3.41E-03
SVOC	Benzo(b)fluoranthene	205-99-2	2.5E+02	6.2E+00	7.6E-01	4.6E+00	2.7E+00	4.7E+00	1.5E+01	1.2E+01	8.0E-01	3.90E-03
SVOC	Benzo(g,h,i)perylene	191-24-2	2.8E+02	7.2E+00	1.0E+00	6.4E+00	3.7E+00	6.4E+00	2.8E+01	1.6E+01	7.0E-01	5.27E-03
SVOC	Benzo(k)fluoranthene	207-08-9	2.5E+02	6.2E+00	7.6E-01	4.6E+00	2.7E+00	4.7E+00	1.5E+01	1.2E+01	8.0E-01	3.90E-03
SVOC	Biphenyl	92-52-4	1.5E+02	4.1E+00	1.1E-01	5.2E-01	7.7E-01	7.4E-01	7.3E-01	1.8E+00	1.0E+00	3.86E-04
SVOC	bis(2-Chloroethoxy)methane	111-91-1	1.7E+02	1.3E+00	1.2E-03	5.8E-03	9.8E-01	3.4E-01	3.1E-01	2.3E+00	1.0E+00	4.47E-06
SVOC	bis(2-Chloroethyl) ether	111-44-4	1.4E+02	1.2E+00	1.6E-03	7.3E-03	6.6E-01	3.4E-01	3.1E-01	1.6E+00	1.0E+00	5.24E-06
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	3.9E+02	7.3E+00	6.8E-01	5.1E+00	1.6E+01	5.2E+00	1.9E+01	7.1E+01	4.0E-01	4.26E-03
SVOC	Butylbenzylphthalate	85-68-7	3.1E+02	4.8E+00	4.4E-02	3.0E-01	5.9E+00	5.6E-01	5.2E-01	1.4E+01	9.0E-01	3.78E-04
SVOC	Caprolactam	105-60-2	1.1E+02	-1.9E-01	2.8E-04	1.1E-03	4.5E-01	3.3E-01	3.0E-01	1.1E+00	1.0E+00	8.01E-07
SVOC	Carbazole	86-74-8	1.7E+02	3.6E+00	4.3E-02	2.1E-01	9.1E-01	4.9E-01	4.5E-01	2.2E+00	1.0E+00	1.60E-04
SVOC	4-Chloro-3-methylphenol	59-50-7	1.4E+02	3.1E+00	2.8E-02	1.3E-01	6.6E-01	4.2E-01	3.9E-01	1.6E+00	1.0E+00	9.14E-05
SVOC	2-Chloronaphthalene	91-58-7	1.6E+02	4.1E+00	1.0E-01	5.0E-01	8.6E-01	7.2E-01	7.1E-01	2.1E+00	1.0E+00	3.69E-04
SVOC	2-Chlorophenol	95-57-8	1.3E+02	2.2E+00	7.9E-03	3.5E-02	5.5E-01	3.6E-01	3.2E-01	1.3E+00	1.0E+00	2.44E-05
SVOC	Chrysene	218-01-9	2.3E+02	5.7E+00	4.8E-01	2.8E+00	2.0E+00	2.9E+00	6.3E+00	8.4E+00	9.0E-01	2.40E-03
SVOC	Dibenz(a,h)anthracene	53-70-3	2.8E+02	6.7E+00	1.0E+00	6.4E+00	3.8E+00	6.5E+00	2.9E+01	1.7E+01	7.0E-01	5.34E-03
SVOC	Dibenzofuran	132-64-9	1.7E+02	4.4E+00	1.4E-01	7.1E-01	9.2E-01	9.1E-01	9.6E-01	3.6E+00	1.0E+00	5.36E-04
SVOC	2,4-Dichlorophenol	120-83-2	1.6E+02	3.1E+00	2.1E-02	1.0E-01	8.6E-01	4.0E-01	3.7E-01	2.1E+00	1.0E+00	7.57E-05
SVOC	Diethylphthalate	84-66-2	2.2E+02	2.5E+00	4.0E-03	2.3E-02	1.8E+00	3.5E-01	3.2E-01	4.4E+00	1.0E+00	2.14E-05
SVOC	2,4-Dimethylphenol	105-67-9	1.2E+02	2.4E+00	1.2E-02	5.0E-02	5.1E-01	3.7E-01	3.3E-01	1.2E+00	1.0E+00	3.52E-05
SVOC	Dimethylphthalate	131-11-3	1.9E+02	1.9E+00	2.2E-03	1.2E-02	1.3E+00	3.4E-01	3.1E-01	3.1E+00	1.0E+00	9.85E-06
SVOC	Di-n-butylphthalate	84-74-2	2.8E+02	4.6E+00	4.8E-02	3.1E-01	3.8E+00	5.6E-01	5.3E-01	9.1E+00	9.0E-01	3.31E-04
SVOC	4,6-Dinitro-2-methylphenol	534-52-1	2.0E+02	2.1E+00	3.1E-03	1.7E-02	1.4E+00	3.4E-01	3.1E-01	3.2E+00	1.0E+00	1.40E-05
SVOC	2,4-Dinitrotoluene	121-14-2	1.8E+02	2.0E+00	3.2E-03	1.7E-02	1.1E+00	3.4E-01	3.1E-01	2.6E+00	1.0E+00	1.32E-05
SVOC	2,6-Dinitrotoluene	606-20-2	1.8E+02	1.9E+00	2.6E-03	1.3E-02	1.1E+00	3.4E-01	3.1E-01	2.6E+00	1.0E+00	1.06E-05
SVOC	Di-n-octylphthalate	117-84-0	3.9E+02	8.1E+00	1.0E+00	7.6E+00	1.6E+01	7.6E+00	3.9E+01	7.2E+01	3.0E-01	4.72E-03
SVOC	Fluoranthene	206-44-0	2.0E+02	5.1E+00	2.8E-01	1.5E+00	1.4E+00	1.7E+00	2.4E+00	5.7E+00	1.0E+00	1.31E-03
SVOC	Fluorene	86-73-7	1.7E+02	4.2E+00	1.1E-01	5.5E-01	9.0E-01	7.7E-01	7.7E-01	2.2E+00	1.0E+00	4.13E-04

Attachment G4: Nonsteady State Dermal Absorption of Chemical from Water
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	MW (g/mole)	Log K_{ow} (unitless)	K_p (cm/hr)	B (unitless)	τ (hr)	c	b	ts (hr)	FA (unitless)	DA (L/cm^2-event)
SVOC	Formaldehyde	50-00-0	3.0E+01	3.5E-01	1.8E-03	3.9E-03	1.5E-01	3.4E-01	3.1E-01	3.7E-01	1.0E+00	4.22E-06
SVOC	Hexachlorobutadiene	87-68-3	2.6E+02	4.8E+00	8.2E-02	5.1E-01	3.0E+00	7.3E-01	7.2E-01	7.3E+00	9.0E-01	5.03E-04
SVOC	Hexachlorocyclopentadiene	77-47-4	2.7E+02	5.4E+00	1.7E-01	1.1E+00	3.5E+00	1.2E+00	1.5E+00	1.4E+01	9.0E-01	1.12E-03
SVOC	Hexachloroethane	67-72-1	2.4E+02	4.0E+00	3.3E-02	1.9E-01	2.2E+00	4.7E-01	4.3E-01	5.3E+00	1.0E+00	1.91E-04
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	2.8E+02	6.7E+00	1.0E+00	6.4E+00	3.7E+00	6.4E+00	2.8E+01	1.6E+01	7.0E-01	5.27E-03
SVOC	Isophorone	78-59-1	1.4E+02	1.7E+00	3.5E-03	1.6E-02	6.2E-01	3.4E-01	3.1E-01	1.5E+00	1.0E+00	1.14E-05
SVOC	2-Methylnaphthalene	91-57-6	1.4E+02	3.9E+00	8.9E-02	4.1E-01	6.6E-01	6.5E-01	6.2E-01	1.6E+00	1.0E+00	2.89E-04
SVOC	Methylphenol (total)	1319-77-3	1.1E+02	2.0E+00	7.7E-03	3.1E-02	4.2E-01	3.5E-01	3.2E-01	1.0E+00	1.0E+00	2.17E-05
SVOC	Naphthalene	91-20-3	1.3E+02	3.4E+00	5.0E-02	2.2E-01	5.5E-01	4.9E-01	4.5E-01	1.3E+00	1.0E+00	1.49E-04
SVOC	2-Nitroaniline	88-74-4	1.4E+02	1.9E+00	4.4E-03	2.0E-02	6.2E-01	3.5E-01	3.2E-01	1.5E+00	1.0E+00	1.44E-05
SVOC	Nitrobenzene	98-95-3	1.2E+02	1.8E+00	5.3E-03	2.3E-02	5.1E-01	3.5E-01	3.2E-01	1.2E+00	1.0E+00	1.60E-05
SVOC	2-Nitrophenol	88-75-5	1.4E+02	1.8E+00	4.0E-03	1.8E-02	6.3E-01	3.5E-01	3.1E-01	1.5E+00	1.0E+00	1.30E-05
SVOC	4-Nitrophenol	100-02-7	1.4E+02	1.9E+00	4.8E-03	2.2E-02	6.3E-01	3.5E-01	3.2E-01	1.5E+00	1.0E+00	1.56E-05
SVOC	N-Nitrosodiphenylamine	86-30-6	2.0E+02	3.2E+00	1.5E-02	8.1E-02	1.4E+00	3.9E-01	3.5E-01	3.3E+00	1.0E+00	6.82E-05
SVOC	N-Nitroso-di-n-propylamine	621-64-7	1.3E+02	1.4E+00	2.5E-03	1.1E-02	5.6E-01	3.4E-01	3.1E-01	1.4E+00	1.0E+00	7.74E-06
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	1.7E+02	2.5E+00	7.2E-03	3.6E-02	9.5E-01	3.6E-01	3.3E-01	2.3E+00	1.0E+00	2.76E-05
SVOC	Pentachlorophenol	87-86-5	2.7E+02	5.1E+00	1.2E-01	7.3E-01	3.3E+00	9.3E-01	9.9E-01	1.3E+01	9.0E-01	7.43E-04
SVOC	Phenanthrene	85-01-8	1.8E+02	4.5E+00	1.4E-01	7.2E-01	1.0E+00	9.1E-01	9.7E-01	4.1E+00	1.0E+00	5.59E-04
SVOC	Phenol	108-95-2	9.4E+01	1.5E+00	4.5E-03	1.7E-02	3.5E-01	3.4E-01	3.1E-01	8.5E-01	1.0E+00	1.20E-05
SVOC	Pyrene	129-00-0	2.0E+02	5.1E+00	2.8E-01	1.5E+00	1.4E+00	1.6E+00	2.4E+00	5.7E+00	1.0E+00	1.29E-03
SVOC	2,4,5-Trichlorophenol	95-95-4	2.0E+02	3.9E+00	4.7E-02	2.5E-01	1.3E+00	5.2E-01	4.8E-01	3.2E+00	1.0E+00	2.11E-04
SVOC	2,4,6-Trichlorophenol	88-06-2	2.0E+02	3.7E+00	3.4E-02	1.9E-01	1.3E+00	4.7E-01	4.3E-01	3.2E+00	1.0E+00	1.56E-04
PCB	PCBs (total)	1336-36-3	3.3E+02	6.5E+00	4.5E-01	3.1E+00	7.2E+00	3.2E+00	7.7E+00	3.1E+01	7.0E-01	3.31E-03
INORG	Antimony	7440-36-0	1.2E+02		1.0E-03							2.00E-06
INORG	Arsenic	7440-38-2	7.5E+01		1.0E-03							2.00E-06
INORG	Barium	7440-39-3	1.4E+02		1.0E-03							2.00E-06
INORG	Beryllium	7440-41-7	9.0E+00		1.0E-03							2.00E-06
INORG	Cadmium	7440-43-9	1.1E+02		1.0E-03							2.00E-06
INORG	Chromium (total)	7440-47-3	5.2E+01		2.0E-03							4.00E-06
INORG	Chromium III	16065-83-1	5.2E+01		1.0E-03							2.00E-06
INORG	Chromium VI	18540-29-9	5.2E+01		2.0E-03							4.00E-06
INORG	Cobalt	7440-48-4	5.9E+01		4.0E-04							8.00E-07
INORG	Copper	7440-50-8	6.4E+01		1.0E-03							2.00E-06
INORG	Cyanide (total)	57-12-5	2.6E+01		1.0E-03							2.00E-06
INORG	Fluoride	16984-48-8			1.0E-03							2.00E-06
INORG	Lead	7439-92-1	2.1E+02		1.0E-04							2.00E-07
INORG	Manganese	7439-96-5	5.5E+01		1.0E-03							2.00E-06
INORG	Mercury	7439-97-6	2.0E+02		1.0E-03							2.00E-06
INORG	Nickel	7440-02-0	5.9E+01		2.0E-04							4.00E-07

Attachment G4: Nonsteady State Dermal Absorption of Chemical from Water GMC: NAO Flint Operations Site, Flint, Michigan												
Chem Group	**Chemical**	**CASRN**	**MW** (g/mole)	**Log K_{ow}** (unitless)	**K_p** (cm/hr)	**B** (unitless)	**τ** (hr)	**c**	**b**	**ts** (hr)	**FA** (unitless)	**DA** (L/cm^2-event)
INORG	Selenium	7782-49-2	7.9E+01		1.0E-03							2.00E-06
INORG	Silver	7440-22-4	1.1E+02		6.0E-04							1.20E-06
INORG	Thallium	7440-28-0	2.0E+02		1.0E-03							2.00E-06
INORG	Vanadium	7440-62-2	5.1E+01		1.0E-03							2.00E-06
INORG	Zinc	7440-66-6	6.5E+01		6.0E-04							1.20E-06
Note:	Event Time	hours	**t**	2								
	K_p capped at 1 cm/hr (USEPA 1992)											

Attachment G4: Risk-Based Cancer Criteria for Exposure of Maintenance Workers to Groundwater
GMC: NAO Flint Operations Site, Flint, Michigan

					Incidental Ingestion			Dermal Contact				Vapor Inhalation				
Chem Group	Chemical	CASRN	Carc Class	C_{gw} (mg/L)	LADD (mg/kg/d)	SF_{oral} $(mg/kg/d)^{-1}$	RBC_{ing} (mg/L)	DA (L/cm^2 - event)	LADD (mg/kg/d)	SF_{derm} $(mg/kg/d)^{-1}$	RBC_{derm} (mg/L)	C_{air} (mg/m^3)	LADD (mg/m^3)	URF (m^3/mg)	RBC_{inh} (mg/L)	Cancer RBC (mg/L)
VOC	Acetone	67-64-1	ID	1.0E+00	2.8E-07			1.3E-06	1.2E-07			3.6E-02	7.0E-05			
VOC	Benzene	71-43-2	A	1.0E+00	2.8E-07	5.5E-02	6.5E+02	3.7E-05	3.4E-06	5.5E-02	5.3E+01	1.3E-01	2.6E-04	7.8E-03	5.0E+00	4.6E+00
VOC	Bromodichloromethane	75-27-4	B2	1.0E+00	2.8E-07	6.2E-02	5.8E+02	1.7E-05	1.6E-06	6.2E-02	1.0E+02	8.6E-02	1.7E-04	1.8E-02	3.3E+00	3.2E+00
VOC	2-Butanone	78-93-3	ID	1.0E+00	2.8E-07			2.4E-06	2.2E-07			4.3E-02	8.4E-05			
VOC	Carbon Disulfide	75-15-0		1.0E+00	2.8E-07			3.1E-05	2.9E-06			1.3E-01	2.6E-04			
VOC	Carbon Tetrachloride	56-23-5	B2	1.0E+00	2.8E-07	1.3E-01	2.8E+02	4.8E-05	4.5E-06	1.3E-01	1.7E+01	9.5E-02	1.9E-04	1.5E-02	3.6E+00	2.9E+00
VOC	Chlorobenzene	108-90-7	D	1.0E+00	2.8E-07			8.0E-05	7.4E-06			1.1E-01	2.1E-04			
VOC	Chloroethane	75-00-3		1.0E+00	2.8E-07	2.9E-03	1.2E+04	1.5E-05	1.4E-06	2.9E-03	2.5E+03	1.4E-01	2.8E-04			2.1E+03
VOC	Chloroform	67-66-3	B2	1.0E+00	2.8E-07			1.9E-05	1.7E-06			1.0E-01	2.0E-04	2.3E-02	2.1E+00	2.1E+00
VOC	Chloromethane	74-87-3	D	1.0E+00	2.8E-07			3.6E-05	3.3E-06			1.6E-01	3.2E-04			
VOC	Cumene	98-82-8	D	1.0E+00	2.8E-07			1.9E-04	1.8E-05			1.1E-01	2.1E-04			
VOC	Cyclohexane	110-82-7	ID	1.0E+00	2.8E-07			2.3E-04	2.1E-05			1.3E-01	2.5E-04			
VOC	Dibromochloromethane	124-48-1	C	1.0E+00	2.8E-07	8.4E-02	4.3E+02	1.4E-05	1.3E-06	8.4E-02	9.1E+01	7.2E-02	1.4E-04	2.4E-02	3.0E+00	2.8E+00
VOC	1,2-Dichlorobenzene	95-50-1	D	1.0E+00	2.8E-07			1.5E-04	1.3E-05			9.2E-02	1.8E-04			
VOC	1,3-Dichlorobenzene	541-73-1	D	1.0E+00	2.8E-07			1.4E-04	1.2E-05			9.4E-02	1.8E-04			
VOC	1,4-Dichlorobenzene	106-46-7	C	1.0E+00	2.8E-07	2.4E-02	1.5E+03	1.4E-04	1.3E-05	2.4E-02	3.1E+01	9.3E-02	1.8E-04	6.3E-03	8.8E+00	6.8E+00
VOC	Dichlorodifluoromethane	75-71-8		1.0E+00	2.8E-07			2.6E-05	2.4E-06			1.1E-01	2.1E-04			
VOC	1,1-Dichloroethane	75-34-3	C	1.0E+00	2.8E-07			1.8E-05	1.7E-06			1.2E-01	2.3E-04			
VOC	1,2-Dichloroethane	107-06-2	B2	1.0E+00	2.8E-07	9.1E-02	3.9E+02	1.1E-05	1.0E-06	9.1E-02	1.1E+02	1.1E-01	2.1E-04	2.6E-02	1.9E+00	1.8E+00
VOC	1,1-Dichloroethene	75-35-4	C	1.0E+00	2.8E-07			3.1E-05	2.9E-06			1.2E-01	2.3E-04			
VOC	cis-1,2-Dichloroethene	156-59-2	D	1.0E+00	2.8E-07			2.1E-05	1.9E-06			1.2E-01	2.3E-04			
VOC	trans-1,2-Dichloroethene	156-60-5		1.0E+00	2.8E-07			2.8E-05	2.6E-06			1.2E-01	2.3E-04			
VOC	1,2-Dichloropropane	78-87-5	B2	1.0E+00	2.8E-07	6.8E-02	5.3E+02	2.1E-05	2.0E-06	6.8E-02	7.5E+01	1.1E-01	2.1E-04			6.6E+01
VOC	Ethyl Benzene	100-41-4	D	1.0E+00	2.8E-07			1.3E-04	1.2E-05			1.1E-01	2.2E-04			
VOC	2-Hexanone	591-78-6		1.0E+00	2.8E-07			9.8E-06	9.0E-07			1.1E-01	2.2E-04			
VOC	Methyl Acetate	79-20-9		1.0E+00	2.8E-07			2.0E-06	1.9E-07			5.8E-02	1.1E-04			
VOC	Methyl tert-butyl ether	1634-04-4		1.0E+00	2.8E-07			8.8E-06	8.2E-07			1.0E-01	2.0E-04			
VOC	4-Methyl-2-pentanone	108-10-1	ID	1.0E+00	2.8E-07			7.3E-06	6.7E-07			6.3E-02	1.2E-04			
VOC	Methylcyclohexane	108-87-2		1.0E+00	2.8E-07			1.0E-04	9.7E-06			1.2E-01	2.3E-04			
VOC	Methylene Chloride	75-09-2	B2	1.0E+00	2.8E-07	7.5E-03	4.8E+03	9.3E-06	8.5E-07	7.5E-03	1.6E+03	1.2E-01	2.4E-04	4.7E-04	9.0E+01	8.3E+01
VOC	Styrene	100-42-5		1.0E+00	2.8E-07			9.6E-05	8.9E-06			1.1E-01	2.2E-04			
VOC	Tetrachloroethene	127-18-4	C-B2	1.0E+00	2.8E-07	5.2E-02	6.9E+02	4.0E-05	3.7E-06	5.2E-02	5.2E+01	9.1E-02	1.8E-04	3.1E-03	1.8E+01	1.3E+01
VOC	Toluene	108-88-3	D	1.0E+00	2.8E-07			8.1E-05	7.5E-06			1.2E-01	2.4E-04			
VOC	1,2,4-Trichlorobenzene	120-82-1	D	1.0E+00	2.8E-07			2.8E-04	2.5E-05			8.1E-02	1.6E-04			
VOC	1,1,1-Trichloroethane	71-55-6	D	1.0E+00	2.8E-07			3.9E-05	3.6E-06			1.0E-01	2.0E-04			
VOC	1,1,2-Trichloroethane	79-00-5	C	1.0E+00	2.8E-07	5.7E-02	6.3E+02	2.0E-05	1.9E-06	5.7E-02	9.4E+01	9.1E-02	1.8E-04	1.6E-02	3.5E+00	3.4E+00
VOC	Trichloroethene	79-01-6	C-B2	1.0E+00	2.8E-07	1.1E-02	3.3E+03	5.5E-05	5.1E-06	1.1E-02	1.8E+02	1.0E-01	2.0E-04	1.7E-03	3.0E+01	2.5E+01
VOC	Trichlorofluoromethane	75-69-4		1.0E+00	2.8E-07			4.0E-05	3.7E-06			1.0E-01	2.0E-04			
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		1.0E+00	2.8E-07			7.3E-05	6.7E-06			8.6E-02	1.7E-04			
VOC	1,2,4-Trimethylbenzene	95-63-6	ID	1.0E+00	2.8E-07			2.3E-04	2.2E-05			1.1E-01	2.1E-04			
VOC	1,3,5-Trimethylbenzene	108-67-8	ID	1.0E+00	2.8E-07			4.0E-04	3.7E-05			1.1E-01	2.1E-04			
VOC	Vinyl Chloride	75-01-4	A	1.0E+00	2.8E-07	1.4E+00	2.6E+01	1.7E-05	1.6E-06	1.4E+00	4.6E+00	1.5E-01	2.9E-04	8.8E-03	3.9E+00	2.0E+00
VOC	Xylenes (total)	1330-20-7	ID	1.0E+00	2.8E-07			1.3E-04	1.2E-05			1.1E-01	2.2E-04			
SVOC	Acenaphthene	83-32-9		1.0E+00	2.8E-07			3.0E-04	2.7E-05			5.6E-02	1.1E-04			
SVOC	Acenaphthylene	208-96-8	D	1.0E+00	2.8E-07			3.1E-04	2.8E-05			4.8E-02	9.5E-05			
SVOC	Acetophenone	98-86-2	D	1.0E+00	2.8E-07			1.1E-05	1.0E-06			9.2E-03	1.8E-05			

Attachment G4: Risk-Based Cancer Criteria for Exposure of Maintenance Workers to Groundwater
GMC: NAO Flint Operations Site, Flint, Michigan

					Incidental Ingestion			Dermal Contact				Vapor Inhalation				
Chem Group	Chemical	CASRN	Carc Class	C_{gw} (mg/L)	LADD (mg/kg/d)	SF_{oral} $(mg/kg/d)^{-1}$	RBC_{ing} (mg/L)	DA (L/cm^2 - event)	LADD (mg/kg/d)	SF_{derm} $(mg/kg/d)^{-1}$	RBC_{derm} (mg/L)	C_{air} (mg/m^3)	LADD (mg/m^3)	URF (m^3/mg)	RBC_{inh} (mg/L)	Cancer RBC (mg/L)
SVOC	Anthracene	120-12-7	D	1.0E+00	2.8E-07			6.4E-04	5.9E-05			3.3E-02	6.5E-05			
SVOC	Atrazine	1912-24-9	C	1.0E+00	2.8E-07	2.2E-01	1.6E+02	2.6E-05	2.4E-06	2.2E-01	1.8E+01	4.7E-06	9.2E-09	6.3E-02	1.7E+04	1.7E+01
SVOC	Benzaldehyde	100-52-7		1.0E+00	2.8E-07			1.1E-05	9.9E-07			1.9E-02	3.8E-05			
SVOC	Benzo(a)anthracene	56-55-3	B2	1.0E+00	2.8E-07	7.3E-01	4.9E+01	2.4E-03	2.2E-04	7.3E-01	6.2E-02	2.5E-03	4.8E-06	8.9E-02	2.3E+01	6.2E-02
SVOC	Benzo(a)pyrene	50-32-8	B2	1.0E+00	2.8E-07	7.3E+00	4.9E+00	3.4E-03	3.1E-04	7.3E+00	4.4E-03	8.2E-04	1.6E-06	8.9E-01	7.0E+00	4.4E-03
SVOC	Benzo(b)fluoranthene	205-99-2	B2	1.0E+00	2.8E-07	7.3E-01	4.9E+01	3.9E-03	3.6E-04	7.3E-01	3.8E-02	3.9E-02	7.6E-05	8.9E-02	1.5E+00	3.7E-02
SVOC	Benzo(g,h,i)perylene	191-24-2	D	1.0E+00	2.8E-07			5.3E-03	4.9E-04			1.0E-04	2.0E-07			
SVOC	Benzo(k)fluoranthene	207-08-9	B2	1.0E+00	2.8E-07	7.3E-02	4.9E+02	3.9E-03	3.6E-04	7.3E-02	3.8E-01	6.0E-04	1.2E-06	8.9E-03	9.6E+02	3.8E-01
SVOC	Biphenyl	92-52-4	D	1.0E+00	2.8E-07			3.9E-04	3.6E-05			6.9E-02	1.4E-04			
SVOC	bis(2-Chloroethoxy)methane	111-91-1	D	1.0E+00	2.8E-07			4.5E-06	4.1E-07			1.4E-04	2.8E-07			
SVOC	bis(2-Chloroethyl) ether	111-44-4	B2	1.0E+00	2.8E-07	1.1E+00	3.3E+01	5.2E-06	4.8E-07	1.1E+00	1.9E+01	1.4E-02	2.7E-05	3.3E-01	1.1E+00	1.0E+00
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2	1.0E+00	2.8E-07	1.4E-02	2.6E+03	4.3E-03	3.9E-04	1.4E-02	1.8E+00	6.5E-05	1.3E-07	4.0E-03	2.0E+04	1.8E+00
SVOC	Butylbenzylphthalate	85-68-7	C	1.0E+00	2.8E-07	1.9E-03	1.9E+04	3.8E-04	3.5E-05	1.9E-03	1.5E+02	8.5E-04	1.7E-06	5.4E-04	1.1E+04	1.5E+02
SVOC	Caprolactam	105-60-2		1.0E+00	2.8E-07			8.0E-07	7.4E-08			4.8E-06	9.4E-09			
SVOC	Carbazole	86-74-8	B2	1.0E+00	2.8E-07	2.0E-02	1.8E+03	1.6E-04	1.5E-05	2.0E-02	3.4E+01	1.3E-05	2.5E-08	5.7E-03	7.0E+04	3.3E+01
SVOC	4-Chloro-3-methylphenol	59-50-7		1.0E+00	2.8E-07			9.1E-05	8.4E-06			3.5E-04	6.9E-07			
SVOC	2-Chloronaphthalene	91-58-7		1.0E+00	2.8E-07			3.7E-04	3.4E-05			6.9E-02	1.3E-04			
SVOC	2-Chlorophenol	95-57-8		1.0E+00	2.8E-07			2.4E-05	2.2E-06			8.1E-02	1.6E-04			
SVOC	Chrysene	218-01-9	B2	1.0E+00	2.8E-07	7.3E-03	4.9E+03	2.4E-03	2.2E-04	7.3E-03	6.2E+00	3.7E-02	7.3E-05	8.9E-04	1.5E+02	5.9E+00
SVOC	Dibenz(a,h)anthracene	53-70-3	B2	1.0E+00	2.8E-07	7.3E+00	4.9E+00	5.3E-03	4.9E-04	7.3E+00	2.8E-03	1.0E-05	2.0E-08	8.9E-01	5.5E+02	2.8E-03
SVOC	Dibenzofuran	132-64-9	D	1.0E+00	2.8E-07			5.4E-04	4.9E-05			9.5E-03	1.9E-05			
SVOC	2,4-Dichlorophenol	120-83-2		1.0E+00	2.8E-07			7.6E-05	7.0E-06			2.6E-03	5.1E-06			
SVOC	Diethylphthalate	84-66-2	D	1.0E+00	2.8E-07			2.1E-05	2.0E-06			3.4E-04	6.7E-07			
SVOC	2,4-Dimethylphenol	105-67-9		1.0E+00	2.8E-07			3.5E-05	3.2E-06			1.8E-03	3.6E-06			
SVOC	Dimethylphthalate	131-11-3	D	1.0E+00	2.8E-07			9.9E-06	9.1E-07			8.4E-05	1.6E-07			
SVOC	Di-n-butylphthalate	84-74-2	D	1.0E+00	2.8E-07			3.3E-04	3.1E-05			6.7E-07	1.3E-09			
SVOC	4,6-Dinitro-2-methylphenol	534-52-1		1.0E+00	2.8E-07			1.4E-05	1.3E-06			3.4E-04	6.6E-07			
SVOC	2,4-Dinitrotoluene	121-14-2	B2	1.0E+00	2.8E-07	6.8E-01	5.3E+01	1.3E-05	1.2E-06	6.8E-01	1.2E+01	7.6E-05	1.5E-07			9.8E+00
SVOC	2,6-Dinitrotoluene	606-20-2	B2	1.0E+00	2.8E-07	6.8E-01	5.3E+01	1.1E-05	9.8E-07	6.8E-01	1.5E+01	6.1E-04	1.2E-06	1.9E-01	4.3E+01	9.2E+00
SVOC	Di-n-octylphthalate	117-84-0		1.0E+00	2.8E-07			4.7E-03	4.4E-04			2.5E-02	4.8E-05			
SVOC	Fluoranthene	206-44-0	D	1.0E+00	2.8E-07			1.3E-03	1.2E-04			1.1E-02	2.2E-05			
SVOC	Fluorene	86-73-7	D	1.0E+00	2.8E-07			4.1E-04	3.8E-05			3.4E-02	6.6E-05			
SVOC	Formaldehyde	50-00-0	B1	1.0E+00	2.8E-07			4.2E-06	3.9E-07			5.1E-04	9.9E-07	1.3E-02	7.8E+02	7.8E+02
SVOC	Hexachlorobutadiene	87-68-3	C	1.0E+00	2.8E-07	7.8E-02	4.6E+02	5.0E-04	4.6E-05	7.8E-02	2.8E+00	7.2E-02	1.4E-04	2.2E-02	3.2E+00	1.5E+00
SVOC	Hexachlorocyclopentadiene	77-47-4	E	1.0E+00	2.8E-07			1.1E-03	1.0E-04			7.1E-02	1.4E-04			
SVOC	Hexachloroethane	67-72-1	C	1.0E+00	2.8E-07	1.4E-02	2.6E+03	1.9E-04	1.8E-05	1.4E-02	4.1E+01	7.5E-02	1.5E-04	4.0E-03	1.7E+01	1.2E+01
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	B2	1.0E+00	2.8E-07	7.3E-01	4.9E+01	5.3E-03	4.9E-04	7.3E-01	2.8E-02	1.1E-03	2.2E-06	8.9E-02	5.1E+01	2.8E-02
SVOC	Isophorone	78-59-1	C	1.0E+00	2.8E-07	9.5E-04	3.8E+04	1.1E-05	1.1E-06	9.5E-04	1.0E+04	5.6E-03	1.1E-05			7.9E+03
SVOC	2-Methylnaphthalene	91-57-6	ID	1.0E+00	2.8E-07			2.9E-04	2.7E-05			8.1E-02	1.6E-04			
SVOC	Methylphenol (total)	1319-77-3		1.0E+00	2.8E-07			2.2E-05	2.0E-06			8.3E-04	1.6E-06			
SVOC	Naphthalene	91-20-3	C	1.0E+00	2.8E-07			1.5E-04	1.4E-05			8.4E-02	1.6E-04			
SVOC	2-Nitroaniline	88-74-4		1.0E+00	2.8E-07			1.4E-05	1.3E-06			1.4E-04	2.8E-07			
SVOC	Nitrobenzene	98-95-3	D	1.0E+00	2.8E-07			1.6E-05	1.5E-06			1.8E-02	3.6E-05			
SVOC	2-Nitrophenol	88-75-5		1.0E+00	2.8E-07			1.3E-05	1.2E-06			7.8E-03	1.5E-05			
SVOC	4-Nitrophenol	100-02-7		1.0E+00	2.8E-07			1.6E-05	1.4E-06			3.7E-07	7.3E-10			
SVOC	N-Nitrosodiphenylamine	86-30-6	B2	1.0E+00	2.8E-07	4.9E-03	7.3E+03	6.8E-05	6.3E-06	4.9E-03	3.2E+02	3.8E-03	7.4E-06			3.1E+02

Attachment G4: Risk-Based Cancer Criteria for Exposure of Maintenance Workers to Groundwater
GMC: NAO Flint Operations Site, Flint, Michigan

					Incidental Ingestion			Dermal Contact				Vapor Inhalation				
Chem Group	Chemical	CASRN	Carc Class	C_{gw} (mg/L)	LADD (mg/kg/d)	SF_{oral} $(mg/kg/d)^{-1}$	RBC_{ing} (mg/L)	DA (L/cm^2 - event)	LADD (mg/kg/d)	SF_{derm} $(mg/kg/d)^{-1}$	RBC_{derm} (mg/L)	C_{air} (mg/m^3)	LADD (mg/m^3)	URF (m^3/mg)	RBC_{inh} (mg/L)	Cancer RBC (mg/L)
SVOC	N-Nitroso-di-n-propylamine	621-64-7	B2	1.0E+00	2.8E-07	7.0E+00	5.1E+00	7.7E-06	7.1E-07	7.0E+00	2.0E+00	2.0E-03	4.0E-06	2.0E+00	1.3E+00	6.7E-01
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	C	1.0E+00	2.8E-07	7.0E-02	5.1E+02	2.8E-05	2.5E-06	7.0E-02	5.6E+01	4.7E-02	9.2E-05	1.0E-02	1.1E+01	9.0E+00
SVOC	Pentachlorophenol	87-86-5	B2	1.0E+00	2.8E-07	1.2E-01	3.0E+02	7.4E-04	6.9E-05	1.2E-01	1.2E+00	1.8E-05	3.4E-08	3.4E-02	8.5E+03	1.2E+00
SVOC	Phenanthrene	85-01-8	D	1.0E+00	2.8E-07			5.6E-04	5.2E-05			1.6E-02	3.1E-05			
SVOC	Phenol	108-95-2	ID	1.0E+00	2.8E-07			1.2E-05	1.1E-06			4.0E-04	7.9E-07			
SVOC	Pyrene	129-00-0	D	1.0E+00	2.8E-07			1.3E-03	1.2E-04			7.9E-03	1.5E-05			
SVOC	2,4,5-Trichlorophenol	95-95-4		1.0E+00	2.8E-07			2.1E-04	1.9E-05			3.3E-03	6.5E-06			
SVOC	2,4,6-Trichlorophenol	88-06-2	B2	1.0E+00	2.8E-07	1.1E-02	3.3E+03	1.6E-04	1.4E-05	1.1E-02	6.3E+01	5.8E-03	1.1E-05	3.1E-03	2.9E+02	5.1E+01
PCB	PCBs (total)	1336-36-3	B2	1.0E+00	2.8E-07	2.0E+00	1.8E+01	3.3E-03	3.1E-04	2.0E+00	1.6E-02	6.2E-02	1.2E-04	5.7E-01	1.4E-01	1.5E-02
INORG	Antimony	7440-36-0		1.0E+00	2.8E-07			2.0E-06	1.8E-07							
INORG	Arsenic	7440-38-2	A	1.0E+00	2.8E-07	1.5E+00	2.4E+01	2.0E-06	1.8E-07	1.5E+00	3.6E+01			4.3E+00		1.4E+01
INORG	Barium	7440-39-3	D	1.0E+00	2.8E-07			2.0E-06	1.8E-07							
INORG	Beryllium	7440-41-7	B1	1.0E+00	2.8E-07			2.0E-06	1.8E-07					2.4E+00		
INORG	Cadmium	7440-43-9	B1	1.0E+00	2.8E-07			2.0E-06	1.8E-07					1.8E+00		
INORG	Chromium (total)	7440-47-3		1.0E+00	2.8E-07			4.0E-06	3.7E-07					1.2E+01		
INORG	Chromium III	16065-83-1	D	1.0E+00	2.8E-07			2.0E-06	1.8E-07							
INORG	Chromium VI	18540-29-9	A	1.0E+00	2.8E-07			4.0E-06	3.7E-07					1.2E+01		
INORG	Cobalt	7440-48-4	B1	1.0E+00	2.8E-07			8.0E-07	7.4E-08					2.8E+00		
INORG	Copper	7440-50-8	D	1.0E+00	2.8E-07			2.0E-06	1.8E-07							
INORG	Cyanide (total)	57-12-5	D	1.0E+00	2.8E-07			2.0E-06	1.8E-07							
INORG	Fluoride	16984-48-8		1.0E+00	2.8E-07			2.0E-06	1.8E-07							
INORG	Lead	7439-92-1	B2	1.0E+00	2.8E-07			2.0E-07	1.8E-08							
INORG	Manganese	7439-96-5	D	1.0E+00	2.8E-07			2.0E-06	1.8E-07							
INORG	Mercury	7439-97-6	D	1.0E+00	2.8E-07			2.0E-06	1.8E-07			8.2E-02	1.6E-04			
INORG	Nickel	7440-02-0	A	1.0E+00	2.8E-07			4.0E-07	3.7E-08					2.4E-01		
INORG	Selenium	7782-49-2	D	1.0E+00	2.8E-07			2.0E-06	1.8E-07							
INORG	Silver	7440-22-4	D	1.0E+00	2.8E-07			1.2E-06	1.1E-07							
INORG	Thallium	7440-28-0		1.0E+00	2.8E-07			2.0E-06	1.8E-07							
INORG	Vanadium	7440-62-2		1.0E+00	2.8E-07			2.0E-06	1.8E-07							
INORG	Zinc	7440-66-6	D	1.0E+00	2.8E-07			1.2E-06	1.1E-07							
Note:																
Target cancer risk of 1E-05																
C/Q based on the 24-hour maximum exposure for a 15' x 15' excavation area = 10.96 kg/m3 per (kg/m2-s)																

Attachment G4: Risk-Based Noncancer Criteria for Exposure of Maintenance Workers to Groundwater
GMC: NAO Flint Operations Site, Flint, Michigan

					Incidental Ingestion			Dermal Contact				Vapor Inhalation				
Chem Group	Chemical	CASRN	Carc Class	C_{gw} (mg/L)	ADD (mg/kg/d)	RfD_{oral} (mg/kg/d)	RBC_{ing} (mg/L)	DA (L/cm^2 - event)	ADD (mg/kg/d)	RfD_{derm} $(mg/kg/d)^{-1}$	RBC_{derm} (mg/L)	C_{air} (mg/m^3)	ADD (mg/m^3)	RfC (mg/m^3)	RBC_{inh} (mg/L)	Noncancer RBC (mg/L)
VOC	Acetone	67-64-1	ID	1.0E+00	2.0E-06	9.0E-01	4.6E+05	1.3E-06	8.2E-07	9.0E-01	1.1E+06	3.6E-02	4.9E-04	3.2E+00	6.4E+03	6.3E+03
VOC	Benzene	71-43-2	A	1.0E+00	2.0E-06	4.0E-03	2.0E+03	3.7E-05	2.4E-05	4.0E-03	1.7E+02	1.3E-01	1.8E-03	3.0E-02	1.7E+01	1.5E+01
VOC	Bromodichloromethane	75-27-4	B2	1.0E+00	2.0E-06	2.0E-02	1.0E+04	1.7E-05	1.1E-05	2.0E-02	1.8E+03	8.6E-02	1.2E-03	7.0E-02	5.9E+01	5.7E+01
VOC	Bromoform	75-25-2	B2	1.0E+00	2.0E-06	2.0E-02	1.0E+04	1.4E-05	9.0E-06	2.0E-02	2.2E+03	6.2E-02	8.5E-04			1.8E+03
VOC	Bromomethane	74-83-9	D	1.0E+00	2.0E-06	1.4E-03	7.2E+02	7.7E-06	5.0E-06	1.4E-03	2.8E+02	1.2E-01	1.6E-03	5.0E-03	3.1E+00	3.0E+00
VOC	2-Butanone	78-93-3	ID	1.0E+00	2.0E-06	6.0E-01	3.1E+05	2.4E-06	1.6E-06	6.0E-01	3.8E+05	4.3E-02	5.9E-04	5.0E+00	8.5E+03	8.1E+03
VOC	Carbon Disulfide	75-15-0		1.0E+00	2.0E-06	1.0E-01	5.1E+04	3.1E-05	2.0E-05	1.0E-01	5.0E+03	1.3E-01	1.8E-03	7.0E-01	3.8E+02	3.5E+02
VOC	Carbon Tetrachloride	56-23-5	B2	1.0E+00	2.0E-06	7.0E-04	3.6E+02	4.8E-05	3.1E-05	7.0E-04	2.2E+01	9.5E-02	1.3E-03			2.1E+01
VOC	Chlorobenzene	108-90-7	D	1.0E+00	2.0E-06	2.0E-02	1.0E+04	8.0E-05	5.2E-05	2.0E-02	3.9E+02	1.1E-01	1.5E-03	6.0E-02	4.1E+01	3.7E+01
VOC	Chloroethane	75-00-3		1.0E+00	2.0E-06	4.0E-01	2.0E+05	1.5E-05	9.6E-06	4.0E-01	4.2E+04	1.4E-01	2.0E-03	1.0E+01	5.1E+03	4.4E+03
VOC	Chloroform	67-66-3	B2	1.0E+00	2.0E-06	1.0E-02	5.1E+03	1.9E-05	1.2E-05	1.0E-02	8.3E+02	1.0E-01	1.4E-03	5.0E-02	3.5E+01	3.3E+01
VOC	Chloromethane	74-87-3	D	1.0E+00	2.0E-06			3.6E-05	2.3E-05			1.6E-01	2.2E-03	9.0E-02	4.0E+01	4.0E+01
VOC	Cumene	98-82-8	D	1.0E+00	2.0E-06	1.0E-01	5.1E+04	1.9E-04	1.2E-04	1.0E-01	8.0E+02	1.1E-01	1.5E-03	4.0E-01	2.7E+02	2.0E+02
VOC	Cyclohexane	110-82-7	ID	1.0E+00	2.0E-06			2.3E-04	1.5E-04			1.3E-01	1.8E-03	6.0E+00	3.4E+03	3.4E+03
VOC	1,2-Dibromo-3-chloropropane	96-12-8	B2	1.0E+00	2.0E-06			2.4E-05	1.5E-05			4.5E-02	6.2E-04	2.0E-04	3.2E-01	3.2E-01
VOC	Dibromochloromethane	124-48-1	C	1.0E+00	2.0E-06	2.0E-02	1.0E+04	1.4E-05	9.2E-06	2.0E-02	2.2E+03	7.2E-02	9.9E-04	7.0E-02	7.1E+01	6.8E+01
VOC	1,2-Dibromoethane	106-93-4	LC	1.0E+00	2.0E-06	9.0E-03	4.6E+03	6.8E-06	4.4E-06	9.0E-03	2.0E+03	7.5E-02	1.0E-03	9.0E-03	8.7E+00	8.7E+00
VOC	1,2-Dichlorobenzene	95-50-1	D	1.0E+00	2.0E-06	9.0E-02	4.6E+04	1.5E-04	9.4E-05	9.0E-02	9.6E+02	9.2E-02	1.3E-03	2.0E-01	1.6E+02	1.4E+02
VOC	1,3-Dichlorobenzene	541-73-1	D	1.0E+00	2.0E-06	9.0E-02	4.6E+04	1.4E-04	8.7E-05	9.0E-02	1.0E+03	9.4E-02	1.3E-03	1.4E-01	1.1E+02	9.8E+01
VOC	1,4-Dichlorobenzene	106-46-7	C	1.0E+00	2.0E-06	3.0E-02	1.5E+04	1.4E-04	9.3E-05	3.0E-02	3.2E+02	9.3E-02	1.3E-03	8.0E-01	6.3E+02	2.1E+02
VOC	Dichlorodifluoromethane	75-71-8		1.0E+00	2.0E-06	2.0E-01	1.0E+05	2.6E-05	1.7E-05	2.0E-01	1.2E+04	1.1E-01	1.5E-03	2.0E-01	1.4E+02	1.3E+02
VOC	1,1-Dichloroethane	75-34-3	C	1.0E+00	2.0E-06	1.0E-01	5.1E+04	1.8E-05	1.2E-05	1.0E-01	8.5E+03	1.2E-01	1.6E-03	5.0E-01	3.1E+02	3.0E+02
VOC	1,2-Dichloroethane	107-06-2	B2	1.0E+00	2.0E-06	2.0E-02	1.0E+04	1.1E-05	7.3E-06	2.0E-02	2.7E+03	1.1E-01	1.4E-03	5.0E-03	3.5E+00	3.4E+00
VOC	1,1-Dichloroethene	75-35-4	C	1.0E+00	2.0E-06	5.0E-02	2.6E+04	3.1E-05	2.0E-05	5.0E-02	2.5E+03	1.2E-01	1.6E-03	2.0E-01	1.2E+02	1.2E+02
VOC	1,2-Dichloroethene (total)	540-59-0		1.0E+00	2.0E-06	9.0E-03	4.6E+03	2.1E-05	1.3E-05	9.0E-03	6.7E+02	1.2E-01	1.6E-03	3.2E-02	1.9E+01	1.9E+01
VOC	cis-1,2-Dichloroethene	156-59-2	D	1.0E+00	2.0E-06	1.0E-02	5.1E+03	2.1E-05	1.3E-05	1.0E-02	7.5E+02	1.2E-01	1.6E-03	3.5E-02	2.2E+01	2.1E+01
VOC	trans-1,2-Dichloroethene	156-60-5		1.0E+00	2.0E-06	2.0E-02	1.0E+04	2.8E-05	1.8E-05	2.0E-02	1.1E+03	1.2E-01	1.6E-03	6.0E-02	3.7E+01	3.5E+01
VOC	1,2-Dichloropropane	78-87-5	B2	1.0E+00	2.0E-06			2.1E-05	1.4E-05			1.1E-01	1.5E-03	4.0E-03	2.7E+00	2.7E+00
VOC	1,3-Dichloropropene (total)	542-75-6	B2	1.0E+00	2.0E-06	3.0E-02	1.5E+04	2.3E-05	1.5E-05	3.0E-02	2.1E+03	1.1E-01	1.5E-03	2.0E-02	1.3E+01	1.3E+01
VOC	cis-1,3-Dichloropropene	10061-01-5		1.0E+00	2.0E-06	3.0E-02	1.5E+04	9.3E-06	6.0E-06	3.0E-02	5.0E+03	1.1E-01	1.5E-03	2.0E-02	1.3E+01	1.3E+01
VOC	trans-1,3-Dichloropropene	10061-02-6		1.0E+00	2.0E-06			2.2E-05	1.4E-05			1.0E-01	1.4E-03			
VOC	Ethyl Benzene	100-41-4	D	1.0E+00	2.0E-06	1.0E-01	5.1E+04	1.3E-04	8.2E-05	1.0E-01	1.2E+03	1.1E-01	1.5E-03	1.0E+00	6.5E+02	4.2E+02
VOC	2-Hexanone	591-78-6		1.0E+00	2.0E-06	4.0E-02	2.0E+04	9.8E-06	6.3E-06	4.0E-02	6.4E+03	1.1E-01	1.5E-03	5.0E-03	3.3E+00	3.3E+00
VOC	Methyl Acetate	79-20-9		1.0E+00	2.0E-06	1.0E+00	5.1E+05	2.0E-06	1.3E-06	1.0E+00	7.6E+05	5.8E-02	7.9E-04	3.5E+00	4.4E+03	4.4E+03
VOC	Methyl tert-butyl ether	1634-04-4		1.0E+00	2.0E-06			8.8E-06	5.7E-06			1.0E-01	1.4E-03	3.0E+00	2.1E+03	2.1E+03
VOC	4-Methyl-2-pentanone	108-10-1	ID	1.0E+00	2.0E-06			7.3E-06	4.7E-06			6.3E-02	8.7E-04	3.0E+00	3.5E+03	3.5E+03
VOC	Methylcyclohexane	108-87-2		1.0E+00	2.0E-06			1.0E-04	6.8E-05			1.2E-01	1.6E-03	3.0E+00	1.8E+03	1.8E+03
VOC	Methylene Chloride	75-09-2	B2	1.0E+00	2.0E-06	6.0E-02	3.1E+04	9.3E-06	6.0E-06	6.0E-02	1.0E+04	1.2E-01	1.7E-03	3.0E+00	1.8E+03	1.5E+03
VOC	Styrene	100-42-5		1.0E+00	2.0E-06	2.0E-01	1.0E+05	9.6E-05	6.2E-05	2.0E-01	3.2E+03	1.1E-01	1.5E-03	1.0E+00	6.6E+02	5.4E+02
VOC	1,1,2,2-Tetrachloroethane	79-34-5	C	1.0E+00	2.0E-06	6.0E-02	3.1E+04	2.6E-05	1.7E-05	6.0E-02	3.6E+03	6.9E-02	9.5E-04			3.2E+03
VOC	Tetrachloroethene	127-18-4	C-B2	1.0E+00	2.0E-06	1.0E-02	5.1E+03	4.0E-05	2.6E-05	1.0E-02	3.9E+02	9.1E-02	1.2E-03	4.0E-01	3.2E+02	1.7E+02
VOC	Toluene	108-88-3	D	1.0E+00	2.0E-06	8.0E-02	4.1E+04	8.1E-05	5.2E-05	8.0E-02	1.5E+03	1.2E-01	1.7E-03	5.0E+00	3.0E+03	9.9E+02
VOC	1,2,4-Trichlorobenzene	120-82-1	D	1.0E+00	2.0E-06	1.0E-02	5.1E+03	2.8E-04	1.8E-04	1.0E-02	5.6E+01	8.1E-02	1.1E-03	2.0E-01	1.8E+02	4.2E+01
VOC	1,1,1-Trichloroethane	71-55-6	D	1.0E+00	2.0E-06	2.8E-01	1.4E+05	3.9E-05	2.5E-05	2.8E-01	1.1E+04	1.0E-01	1.4E-03	2.2E+00	1.6E+03	1.4E+03
VOC	1,1,2-Trichloroethane	79-00-5	C	1.0E+00	2.0E-06	4.0E-03	2.0E+03	2.0E-05	1.3E-05	4.0E-03	3.1E+02	9.1E-02	1.2E-03			2.7E+02

Attachment G4: Risk-Based Noncancer Criteria for Exposure of Maintenance Workers to Groundwater
GMC: NAO Flint Operations Site, Flint, Michigan

					Incidental Ingestion			Dermal Contact				Vapor Inhalation				
Chem Group	Chemical	CASRN	Carc Class	C_{gw} (mg/L)	ADD (mg/kg/d)	RfD_{oral} (mg/kg/d)	RBC_{ing} (mg/L)	DA (L/cm^2 - event)	ADD (mg/kg/d)	RfD_{derm} $(mg/kg/d)^{-1}$	RBC_{derm} (mg/L)	C_{air} (mg/m^3)	ADD (mg/m^3)	RfC (mg/m^3)	RBC_{inh} (mg/L)	Noncancer RBC (mg/L)
VOC	Trichloroethene	79-01-6	C-B2	1.0E+00	2.0E-06	6.0E-03	3.1E+03	5.5E-05	3.6E-05	6.0E-03	1.7E+02	1.0E-01	1.4E-03			1.6E+02
VOC	Trichlorofluoromethane	75-69-4		1.0E+00	2.0E-06	3.0E-01	1.5E+05	4.0E-05	2.6E-05	3.0E-01	1.2E+04	1.0E-01	1.4E-03	7.0E-01	5.1E+02	4.9E+02
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		1.0E+00	2.0E-06	3.0E+01	1.5E+07	7.3E-05	4.7E-05	3.0E+01	6.4E+05	8.6E-02	1.2E-03	3.0E+01	2.5E+04	2.4E+04
VOC	1,2,4-Trimethylbenzene	95-63-6	ID	1.0E+00	2.0E-06	5.0E-02	2.6E+04	2.3E-04	1.5E-04	5.0E-02	3.3E+02	1.1E-01	1.4E-03	6.0E-03	4.2E+00	4.1E+00
VOC	1,3,5-Trimethylbenzene	108-67-8	ID	1.0E+00	2.0E-06	5.0E-02	2.6E+04	4.0E-04	2.6E-04	5.0E-02	1.9E+02	1.1E-01	1.4E-03	6.0E-03	4.2E+00	4.1E+00
VOC	Vinyl Chloride	75-01-4	A	1.0E+00	2.0E-06	3.0E-03	1.5E+03	1.7E-05	1.1E-05	3.0E-03	2.8E+02	1.5E-01	2.0E-03	1.0E-01	4.9E+01	4.1E+01
VOC	Xylenes (total)	1330-20-7	ID	1.0E+00	2.0E-06	2.0E-01	1.0E+05	1.3E-04	8.5E-05	2.0E-01	2.4E+03	1.1E-01	1.5E-03	1.0E-01	6.5E+01	6.3E+01
SVOC	Acenaphthene	83-32-9		1.0E+00	2.0E-06	6.0E-02	3.1E+04	3.0E-04	1.9E-04	6.0E-02	3.1E+02	5.6E-02	7.6E-04	2.1E-01	2.8E+02	1.5E+02
SVOC	Acenaphthylene	208-96-8	D	1.0E+00	2.0E-06	3.0E-02	1.5E+04	3.1E-04	2.0E-04	3.0E-02	1.5E+02	4.8E-02	6.6E-04	1.1E-01	1.6E+02	7.7E+01
SVOC	Acetophenone	98-86-2	D	1.0E+00	2.0E-06	1.0E-01	5.1E+04	1.1E-05	7.1E-06	1.0E-01	1.4E+04	9.2E-03	1.3E-04	3.5E-01	2.8E+03	2.2E+03
SVOC	Anthracene	120-12-7	D	1.0E+00	2.0E-06	3.0E-01	1.5E+05	6.4E-04	4.1E-04	3.0E-01	7.2E+02	3.3E-02	4.6E-04			7.2E+02
SVOC	Atrazine	1912-24-9	C	1.0E+00	2.0E-06	3.5E-02	1.8E+04	2.6E-05	1.7E-05	3.5E-02	2.1E+03	4.7E-06	6.5E-08	1.2E-01	1.9E+06	1.8E+03
SVOC	Benzaldehyde	100-52-7		1.0E+00	2.0E-06	1.0E-01	5.1E+04	1.1E-05	6.9E-06	1.0E-01	1.4E+04	1.9E-02	2.6E-04	3.5E-01	1.3E+03	1.2E+03
SVOC	Benzo(a)anthracene	56-55-3	B2	1.0E+00	2.0E-06			2.4E-03	1.5E-03			2.5E-03	3.4E-05			
SVOC	Benzo(a)pyrene	50-32-8	B2	1.0E+00	2.0E-06			3.4E-03	2.2E-03			8.2E-04	1.1E-05			
SVOC	Benzo(b)fluoranthene	205-99-2	B2	1.0E+00	2.0E-06			3.9E-03	2.5E-03			3.9E-02	5.3E-04			
SVOC	Benzo(g,h,i)perylene	191-24-2	D	1.0E+00	2.0E-06	3.0E-02	1.5E+04	5.3E-03	3.4E-03	3.0E-02	8.8E+00	1.0E-04	1.4E-06	1.1E-01	7.7E+04	8.8E+00
SVOC	Benzo(k)fluoranthene	207-08-9	B2	1.0E+00	2.0E-06			3.9E-03	2.5E-03			6.0E-04	8.3E-06			
SVOC	Biphenyl	92-52-4	D	1.0E+00	2.0E-06	5.0E-02	2.6E+04	3.9E-04	2.5E-04	5.0E-02	2.0E+02	6.9E-02	9.5E-04	1.8E-01	1.8E+02	9.6E+01
SVOC	bis(2-Chloroethoxy)methane	111-91-1	D	1.0E+00	2.0E-06			4.5E-06	2.9E-06			1.4E-04	1.9E-06			
SVOC	bis(2-Chloroethyl) ether	111-44-4	B2	1.0E+00	2.0E-06			5.2E-06	3.4E-06			1.4E-02	1.9E-04			
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2	1.0E+00	2.0E-06	2.0E-02	1.0E+04	4.3E-03	2.8E-03	2.0E-02	7.3E+00	6.5E-05	8.8E-07	7.0E-02	7.9E+04	7.3E+00
SVOC	4-Bromophenyl-phenyl ether	101-55-3	D	1.0E+00	2.0E-06			2.7E-04	1.7E-04			4.0E-02	5.5E-04			
SVOC	Butylbenzylphthalate	85-68-7	C	1.0E+00	2.0E-06	2.0E-01	1.0E+05	3.8E-04	2.4E-04	2.0E-01	8.2E+02	8.5E-04	1.2E-05	7.0E-01	6.0E+04	8.0E+02
SVOC	Caprolactam	105-60-2		1.0E+00	2.0E-06	5.0E-01	2.6E+05	8.0E-07	5.2E-07	5.0E-01	9.7E+05	4.8E-06	6.6E-08	1.8E+00	2.6E+07	2.0E+05
SVOC	Carbazole	86-74-8	B2	1.0E+00	2.0E-06			1.6E-04	1.0E-04			1.3E-05	1.8E-07			
SVOC	4-Chloro-3-methylphenol	59-50-7		1.0E+00	2.0E-06			9.1E-05	5.9E-05			3.5E-04	4.8E-06			
SVOC	4-Chloroaniline	106-47-8		1.0E+00	2.0E-06	4.0E-03	2.0E+03	1.6E-05	1.0E-05	4.0E-03	4.0E+02	3.0E-04	4.2E-06	1.4E-02	3.4E+03	3.0E+02
SVOC	2-Chloronaphthalene	91-58-7		1.0E+00	2.0E-06	8.0E-02	4.1E+04	3.7E-04	2.4E-04	8.0E-02	3.4E+02	6.9E-02	9.4E-04	2.8E-01	3.0E+02	1.6E+02
SVOC	2-Chlorophenol	95-57-8		1.0E+00	2.0E-06	5.0E-03	2.6E+03	2.4E-05	1.6E-05	5.0E-03	3.2E+02	8.1E-02	1.1E-03	1.8E-02	1.6E+01	1.5E+01
SVOC	4-Chlorophenyl-phenyl ether	7005-72-3		1.0E+00	2.0E-06			2.6E-04	1.7E-04			5.6E-02	7.6E-04			
SVOC	Chrysene	218-01-9	B2	1.0E+00	2.0E-06			2.4E-03	1.5E-03			3.7E-02	5.1E-04			
SVOC	Dibenz(a,h)anthracene	53-70-3	B2	1.0E+00	2.0E-06			5.3E-03	3.4E-03			1.0E-05	1.4E-07			
SVOC	Dibenzofuran	132-64-9	D	1.0E+00	2.0E-06	2.0E-03	1.0E+03	5.4E-04	3.5E-04	2.0E-03	5.8E+00	9.5E-03	1.3E-04	7.0E-03	5.4E+01	5.2E+00
SVOC	3,3'-Dichlorobenzidine	91-94-1	B2	1.0E+00	2.0E-06			8.1E-05	5.3E-05			2.9E-06	4.0E-08			
SVOC	2,4-Dichlorophenol	120-83-2		1.0E+00	2.0E-06	3.0E-03	1.5E+03	7.6E-05	4.9E-05	3.0E-03	6.1E+01	2.6E-03	3.6E-05	1.1E-02	2.9E+02	4.9E+01
SVOC	Diethylphthalate	84-66-2	D	1.0E+00	2.0E-06	8.0E-01	4.1E+05	2.1E-05	1.4E-05	8.0E-01	5.8E+04	3.4E-04	4.7E-06	2.8E+00	5.9E+05	4.7E+04
SVOC	2,4-Dimethylphenol	105-67-9		1.0E+00	2.0E-06	2.0E-02	1.0E+04	3.5E-05	2.3E-05	2.0E-02	8.8E+02	1.8E-03	2.5E-05	7.0E-02	2.8E+03	6.3E+02
SVOC	Dimethylphthalate	131-11-3	D	1.0E+00	2.0E-06			9.9E-06	6.4E-06			8.4E-05	1.1E-06			
SVOC	Di-n-butylphthalate	84-74-2	D	1.0E+00	2.0E-06	1.0E-01	5.1E+04	3.3E-04	2.1E-04	1.0E-01	4.7E+02	6.7E-07	9.1E-09			4.6E+02
SVOC	4,6-Dinitro-2-methylphenol	534-52-1		1.0E+00	2.0E-06	1.0E-04	5.1E+01	1.4E-05	9.1E-06	1.0E-04	1.1E+01	3.4E-04	4.6E-06	3.5E-04	7.6E+01	8.1E+00
SVOC	2,4-Dinitrophenol	51-28-5		1.0E+00	2.0E-06	2.0E-03	1.0E+03	6.5E-06	4.2E-06	2.0E-03	4.8E+02	3.6E-04	4.9E-06			3.3E+02
SVOC	2,4-Dinitrotoluene	121-14-2	B2	1.0E+00	2.0E-06	2.0E-03	1.0E+03	1.3E-05	8.5E-06	2.0E-03	2.4E+02	7.6E-05	1.0E-06			1.9E+02
SVOC	2,6-Dinitrotoluene	606-20-2	B2	1.0E+00	2.0E-06	1.0E-03	5.1E+02	1.1E-05	6.9E-06	1.0E-03	1.5E+02	6.1E-04	8.3E-06	3.5E-03	4.2E+02	8.9E+01
SVOC	Di-n-octylphthalate	117-84-0		1.0E+00	2.0E-06	4.0E-02	2.0E+04	4.7E-03	3.0E-03	4.0E-02	1.3E+01	2.5E-02	3.4E-04			1.3E+01

Attachment G4: Risk-Based Noncancer Criteria for Exposure of Maintenance Workers to Groundwater
GMC: NAO Flint Operations Site, Flint, Michigan

					Incidental Ingestion			Dermal Contact				Vapor Inhalation				
Chem Group	Chemical	CASRN	Carc Class	C_{gw} (mg/L)	ADD (mg/kg/d)	RfD_{oral} (mg/kg/d)	RBC_{ing} (mg/L)	DA (L/cm^2 - event)	ADD (mg/kg/d)	RfD_{derm} $(mg/kg/d)^{-1}$	RBC_{derm} (mg/L)	C_{air} (mg/m^3)	ADD (mg/m^3)	RfC (mg/m^3)	RBC_{inh} (mg/L)	Noncancer RBC (mg/L)
SVOC	Fluoranthene	206-44-0	D	1.0E+00	2.0E-06	4.0E-02	2.0E+04	1.3E-03	8.4E-04	4.0E-02	4.7E+01	1.1E-02	1.5E-04	1.4E-01	9.3E+02	4.5E+01
SVOC	Fluorene	86-73-7	D	1.0E+00	2.0E-06	4.0E-02	2.0E+04	4.1E-04	2.7E-04	4.0E-02	1.5E+02	3.4E-02	4.6E-04	1.4E-01	3.0E+02	1.0E+02
SVOC	Formaldehyde	50-00-0	B1	1.0E+00	2.0E-06	2.0E-01	1.0E+05	4.2E-06	2.7E-06	2.0E-01	7.3E+04	5.1E-04	6.9E-06			4.3E+04
SVOC	Hexachlorobenzene	118-74-1	B2	1.0E+00	2.0E-06	8.0E-04	4.1E+02	2.0E-03	1.3E-03	8.0E-04	6.3E-01	6.5E-02	8.9E-04			6.3E-01
SVOC	Hexachlorobutadiene	87-68-3	C	1.0E+00	2.0E-06	2.0E-04	1.0E+02	5.0E-04	3.2E-04	2.0E-04	6.2E-01	7.2E-02	9.9E-04			6.1E-01
SVOC	Hexachlorocyclopentadiene	77-47-4	E	1.0E+00	2.0E-06	6.0E-03	3.1E+03	1.1E-03	7.3E-04	6.0E-03	8.3E+00	7.1E-02	9.7E-04	2.0E-04	2.1E-01	2.0E-01
SVOC	Hexachloroethane	67-72-1	C	1.0E+00	2.0E-06	1.0E-03	5.1E+02	1.9E-04	1.2E-04	1.0E-03	8.1E+00	7.5E-02	1.0E-03			8.0E+00
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	B2	1.0E+00	2.0E-06			5.3E-03	3.4E-03			1.1E-03	1.5E-05			
SVOC	Isophorone	78-59-1	C	1.0E+00	2.0E-06	2.0E-01	1.0E+05	1.1E-05	7.4E-06	2.0E-01	2.7E+04	5.6E-03	7.7E-05			2.1E+04
SVOC	2-Methylnaphthalene	91-57-6	ID	1.0E+00	2.0E-06	4.0E-03	2.0E+03	2.9E-04	1.9E-04	4.0E-03	2.1E+01	8.1E-02	1.1E-03	3.0E-03	2.7E+00	2.4E+00
SVOC	Methylphenol (total)	1319-77-3		1.0E+00	2.0E-06	5.0E-02	2.6E+04	2.2E-05	1.4E-05	5.0E-02	3.6E+03	8.3E-04	1.1E-05			3.1E+03
SVOC	2-Methylphenol	95-48-7	C	1.0E+00	2.0E-06	5.0E-02	2.6E+04	2.3E-05	1.5E-05	5.0E-02	3.4E+03	1.2E-03	1.6E-05			3.0E+03
SVOC	4-Methylphenol	106-44-5	C	1.0E+00	2.0E-06	5.0E-03	2.6E+03	2.0E-05	1.3E-05	5.0E-03	3.8E+02	7.6E-04	1.0E-05			3.3E+02
SVOC	Naphthalene	91-20-3	C	1.0E+00	2.0E-06	2.0E-02	1.0E+04	1.5E-04	9.6E-05	2.0E-02	2.1E+02	8.4E-02	1.2E-03	3.0E-03	2.6E+00	2.6E+00
SVOC	2-Nitroaniline	88-74-4		1.0E+00	2.0E-06	3.0E-03	1.5E+03	1.4E-05	9.3E-06	3.0E-03	3.2E+02	1.4E-04	2.0E-06	2.0E-04	1.0E+02	7.4E+01
SVOC	3-Nitroaniline	99-09-2	C	1.0E+00	2.0E-06	3.0E-04	1.5E+02	6.9E-06	4.5E-06	3.0E-04	6.7E+01	1.3E-04	1.8E-06	1.0E-03	5.7E+02	4.3E+01
SVOC	4-Nitroaniline	100-01-6	C	1.0E+00	2.0E-06	3.0E-03	1.5E+03	7.2E-06	4.6E-06	3.0E-03	6.5E+02	1.9E-06	2.5E-08	4.0E-03	1.6E+05	4.5E+02
SVOC	Nitrobenzene	98-95-3	D	1.0E+00	2.0E-06	5.0E-04	2.6E+02	1.6E-05	1.0E-05	5.0E-04	4.8E+01	1.8E-02	2.5E-04	2.0E-03	7.9E+00	6.6E+00
SVOC	2-Nitrophenol	88-75-5		1.0E+00	2.0E-06			1.3E-05	8.4E-06			7.8E-03	1.1E-04			
SVOC	4-Nitrophenol	100-02-7		1.0E+00	2.0E-06			1.6E-05	1.0E-05			3.7E-07	5.1E-09			
SVOC	N-Nitrosodiphenylamine	86-30-6	B2	1.0E+00	2.0E-06	2.0E-02	1.0E+04	6.8E-05	4.4E-05	2.0E-02	4.5E+02	3.8E-03	5.2E-05			4.4E+02
SVOC	N-Nitroso-di-n-propylamine	621-64-7	B2	1.0E+00	2.0E-06			7.7E-06	5.0E-06			2.0E-03	2.8E-05			
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	C	1.0E+00	2.0E-06	4.0E-02	2.0E+04	2.8E-05	1.8E-05	4.0E-02	2.2E+03	4.7E-02	6.4E-04			2.0E+03
SVOC	Pentachlorophenol	87-86-5	B2	1.0E+00	2.0E-06	3.0E-02	1.5E+04	7.4E-04	4.8E-04	3.0E-02	6.3E+01	1.8E-05	2.4E-07	1.1E-01	4.4E+05	6.2E+01
SVOC	Phenanthrene	85-01-8	D	1.0E+00	2.0E-06	3.0E-02	1.5E+04	5.6E-04	3.6E-04	3.0E-02	8.3E+01	1.6E-02	2.2E-04	1.1E-01	4.9E+02	7.1E+01
SVOC	Phenol	108-95-2	ID	1.0E+00	2.0E-06	3.0E-01	1.5E+05	1.2E-05	7.7E-06	3.0E-01	3.9E+04	4.0E-04	5.5E-06			3.1E+04
SVOC	Pyrene	129-00-0	D	1.0E+00	2.0E-06	3.0E-02	1.5E+04	1.3E-03	8.3E-04	3.0E-02	3.6E+01	7.9E-03	1.1E-04	1.1E-01	9.7E+02	3.5E+01
SVOC	2,4,5-Trichlorophenol	95-95-4		1.0E+00	2.0E-06	1.0E-01	5.1E+04	2.1E-04	1.4E-04	1.0E-01	7.3E+02	3.3E-03	4.5E-05			7.2E+02
SVOC	2,4,6-Trichlorophenol	88-06-2	B2	1.0E+00	2.0E-06	1.0E-04	5.1E+01	1.6E-04	1.0E-04	1.0E-04	9.9E-01	5.8E-03	7.9E-05			9.8E-01
PCB	PCBs (total)	1336-36-3	B2	1.0E+00	2.0E-06	2.0E-05	1.0E+01	3.3E-03	2.1E-03	2.0E-05	9.4E-03	6.2E-02	8.5E-04			9.4E-03
INORG	Antimony	7440-36-0		1.0E+00	2.0E-06	4.0E-04	2.0E+02	2.0E-06	1.3E-06	6.0E-05	4.6E+01			1.4E-03		3.8E+01
INORG	Arsenic	7440-38-2	A	1.0E+00	2.0E-06	3.0E-04	1.5E+02	2.0E-06	1.3E-06	3.0E-04	2.3E+02					9.2E+01
INORG	Barium	7440-39-3	D	1.0E+00	2.0E-06	7.0E-02	3.6E+04	2.0E-06	1.3E-06	4.9E-03	3.8E+03					3.4E+03
INORG	Beryllium	7440-41-7	B1	1.0E+00	2.0E-06	2.0E-03	1.0E+03	2.0E-06	1.3E-06	1.4E-05	1.1E+01			2.0E-05		1.1E+01
INORG	Cadmium	7440-43-9	B1	1.0E+00	2.0E-06	1.0E-03	5.1E+02	2.0E-06	1.3E-06	2.5E-05	1.9E+01			2.0E-04		1.9E+01
INORG	Chromium (total)	7440-47-3		1.0E+00	2.0E-06	3.0E-03	1.5E+03	4.0E-06	2.6E-06	7.5E-05	2.9E+01			1.0E-04		2.8E+01
INORG	Chromium III	16065-83-1	D	1.0E+00	2.0E-06	1.5E+00	7.7E+05	2.0E-06	1.3E-06	2.0E-02	1.5E+04			5.3E+00		1.5E+04
INORG	Chromium VI	18540-29-9	A	1.0E+00	2.0E-06	3.0E-03	1.5E+03	4.0E-06	2.6E-06	7.5E-05	2.9E+01			1.0E-04		2.8E+01
INORG	Cobalt	7440-48-4	B1	1.0E+00	2.0E-06	2.0E-02	1.0E+04	8.0E-07	5.2E-07	2.0E-02	3.9E+04			2.0E-05		8.1E+03
INORG	Copper	7440-50-8	D	1.0E+00	2.0E-06	4.0E-02	2.0E+04	2.0E-06	1.3E-06	4.0E-02	3.1E+04			1.4E-01		1.2E+04
INORG	Cyanide (total)	57-12-5	D	1.0E+00	2.0E-06	2.0E-02	1.0E+04	2.0E-06	1.3E-06	2.0E-02	1.5E+04			7.0E-02		6.2E+03
INORG	Fluoride	16984-48-8		1.0E+00	2.0E-06			2.0E-06	1.3E-06							
INORG	Lead	7439-92-1	B2	1.0E+00	2.0E-06			2.0E-07	1.3E-07							
INORG	Manganese	7439-96-5	D	1.0E+00	2.0E-06	1.4E-01	7.2E+04	2.0E-06	1.3E-06	8.4E-03	6.5E+03			5.0E-05		6.0E+03
INORG	Mercury	7439-97-6	D	1.0E+00	2.0E-06	3.0E-04	1.5E+02	2.0E-06	1.3E-06	3.0E-04	2.3E+02	8.2E-02	1.1E-03	3.0E-04	2.7E-01	2.7E-01

Attachment G4: Risk-Based Noncancer Criteria for Exposure of Maintenance Workers to Groundwater
GMC: NAO Flint Operations Site, Flint, Michigan

					Incidental Ingestion			Dermal Contact				Vapor Inhalation				
Chem Group	**Chemical**	**CASRN**	**Carc Class**	**C_{gw} (mg/L)**	**ADD (mg/kg/d)**	**RfD_{oral} (mg/kg/d)**	**RBC_{ing} (mg/L)**	**DA (L/cm^2 - event)**	**ADD (mg/kg/d)**	**RfD_{derm} $(mg/kg/d)^{-1}$**	**RBC_{derm} (mg/L)**	**C_{air} (mg/m^3)**	**ADD (mg/m^3)**	**RfC (mg/m^3)**	**RBC_{inh} (mg/L)**	**Noncancer RBC (mg/L)**
INORG	Nickel	7440-02-0	A	1.0E+00	2.0E-06	2.0E-02	1.0E+04	4.0E-07	2.6E-07	8.0E-04	3.1E+03					2.4E+03
INORG	Selenium	7782-49-2	D	1.0E+00	2.0E-06	5.0E-03	2.6E+03	2.0E-06	1.3E-06	5.0E-03	3.9E+03			1.8E-02		1.5E+03
INORG	Silver	7440-22-4	D	1.0E+00	2.0E-06	5.0E-03	2.6E+03	1.2E-06	7.7E-07	2.0E-04	2.6E+02			1.0E-05		2.3E+02
INORG	Thallium	7440-28-0		1.0E+00	2.0E-06	7.0E-05	3.6E+01	2.0E-06	1.3E-06	7.0E-05	5.4E+01			2.5E-04		2.2E+01
INORG	Vanadium	7440-62-2		1.0E+00	2.0E-06	7.0E-03	3.6E+03	2.0E-06	1.3E-06	1.8E-04	1.4E+02			2.5E-02		1.4E+02
INORG	Zinc	7440-66-6	D	1.0E+00	2.0E-06	3.0E-01	1.5E+05	1.2E-06	7.7E-07	3.0E-01	3.9E+05			1.1E+00		1.1E+05
				1.0E+00	2.0E-06											
				1.0E+00	2.0E-06											
				1.0E+00	2.0E-06											
				1.0E+00	2.0E-06											
				1.0E+00	2.0E-06											
				1.0E+00	2.0E-06											
				1.0E+00	2.0E-06											
				1.0E+00	2.0E-06											
				1.0E+00	2.0E-06											
Note:																
Target hazard index of 1																
C/Q based on the 24-hour maximum exposure for a 15' x 15' excavation area = 10.96 kg/m3 per (kg/m2-s)																

Attachment G5
Exposure of Maintenance Workers to LNAPL and Smear Zone Soil

Attachment G5: Estimated Ambient Air Concentration from Excavation Into Soil with Free-Phase NAPL at AOI 36-1
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	C_{NAPL} (mg/kg)	K_{eq} (unitless)	D_{air} (cm^2/s)	Sc	k_G (m/s)	K (m/s)	J_L (mg/m^2-s)	$C_{air, worker}$ (mg/m^3)
VOC	Acetone	67-64-1		4.62E-03	1.24E-01	1.13E+00	2.17E-03	1.00E-05		
VOC	Benzene	71-43-2	2.90E+03	1.91E-03	8.80E-02	1.59E+00	1.72E-03	3.28E-06	8.38E+00	9.19E+01
VOC	2-Butanone	78-93-3		1.91E-03	8.08E-02	1.73E+00	1.63E-03	3.11E-06		
VOC	Carbon Disulfide	75-15-0		7.21E-03	1.04E-01	1.34E+00	1.92E-03	1.39E-05		
VOC	Chloroethane	75-00-3		2.03E-02	2.71E-01	5.15E-01	3.66E-03	7.40E-05		
VOC	Chloromethane	74-87-3		8.64E-02	1.26E-01	1.11E+00	2.19E-03	1.89E-04		
VOC	Cumene	98-82-8	6.10E+02	9.04E-05	6.50E-02	2.15E+00	1.40E-03	1.27E-07	6.82E-02	7.47E-01
VOC	Cyclohexane	110-82-7		1.95E-03	8.39E-02	1.66E+00	1.67E-03	3.24E-06		
VOC	1,2-Dichlorobenzene	95-50-1		2.73E-05	6.90E-02	2.02E+00	1.46E-03	3.99E-08		
VOC	Dichlorodifluoromethane	75-71-8		9.74E-02	8.00E-02	1.74E+00	1.61E-03	1.57E-04		
VOC	1,1-Dichloroethane	75-34-3	1.04E+00	4.57E-03	7.42E-02	1.88E+00	1.53E-03	7.01E-06	6.42E-03	7.03E-02
VOC	cis-1,2-Dichloroethene	156-59-2	1.35E+00	4.08E-03	7.36E-02	1.90E+00	1.53E-03	6.22E-06	7.39E-03	8.10E-02
VOC	Ethyl Benzene	100-41-4	8.60E+03	1.93E-04	7.50E-02	1.86E+00	1.55E-03	2.98E-07	2.26E+00	2.47E+01
VOC	Methyl Acetate	79-20-9		4.34E-03	9.57E-02	1.46E+00	1.82E-03	7.91E-06		
VOC	4-Methyl-2-pentanone	108-10-1		3.99E-04	7.50E-02	1.86E+00	1.55E-03	6.17E-07		
VOC	Methylcyclohexane	108-87-2	3.90E+02	8.64E-04	7.35E-02	1.90E+00	1.53E-03	1.32E-06	4.52E-01	4.96E+00
VOC	Methylene Chloride	75-09-2	1.80E+02	8.70E-03	1.01E-01	1.38E+00	1.89E-03	1.64E-05	2.60E+00	2.85E+01
VOC	Tetrachloroethene	127-18-4		3.73E-04	7.20E-02	1.94E+00	1.50E-03	5.61E-07		
VOC	Toluene	108-88-3	5.20E+04	5.71E-04	8.70E-02	1.60E+00	1.71E-03	9.74E-07	4.46E+01	4.89E+02
VOC	1,2,4-Trichlorobenzene	120-82-1		8.65E-06	3.00E-02	4.65E+00	8.37E-04	7.24E-09		
VOC	1,1,1-Trichloroethane	71-55-6		2.49E-03	7.80E-02	1.79E+00	1.59E-03	3.95E-06		
VOC	1,1,2-Trichloroethane	79-00-5		4.67E-04	7.80E-02	1.79E+00	1.59E-03	7.41E-07		
VOC	Trichloroethene	79-01-6	4.19E+00	1.48E-03	7.90E-02	1.77E+00	1.60E-03	2.36E-06	8.71E-03	9.55E-02
VOC	Trichlorofluoromethane	75-69-4		1.61E-02	8.70E-02	1.60E+00	1.71E-03	2.75E-05		
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		6.66E-03	7.80E-02	1.79E+00	1.59E-03	1.06E-05		
VOC	Vinyl Chloride	75-01-4		5.99E-02	1.06E-01	1.32E+00	1.95E-03	1.17E-04		
VOC	Xylenes (total)	1330-20-7	3.18E+04	1.60E-04	7.80E-02	1.79E+00	1.59E-03	2.55E-07	7.13E+00	7.81E+01
SVOC	Acenaphthene	83-32-9		5.02E-08	4.21E-02	3.31E+00	1.05E-03	5.27E-11		
SVOC	Benzo(a)anthracene	56-55-3		2.11E-12	5.10E-02	2.74E+00	1.19E-03	2.52E-15		
SVOC	Benzo(a)pyrene	50-32-8		1.10E-13	4.30E-02	3.24E+00	1.06E-03	1.17E-16		

Attachment G5: Estimated Ambient Air Concentration from Excavation Into Soil with Free-Phase NAPL at AOI 36-1
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	C_{NAPL} (mg/kg)	K_{eq} (unitless)	D_{air} (cm^2/s)	Sc	k_G (m/s)	K (m/s)	J_L (mg/m^2-s)	$C_{air, worker}$ (mg/m^3)
SVOC	Benzo(b)fluoranthene	205-99-2		1.00E-11	2.26E-02	6.17E+00	6.92E-04	6.95E-15		
SVOC	Benzo(k)fluoranthene	207-08-9		4.02E-14	2.26E-02	6.17E+00	6.92E-04	2.78E-17		
SVOC	Biphenyl	92-52-4		1.94E-07	4.04E-02	3.45E+00	1.02E-03	1.98E-10		
SVOC	bis(2-Chloroethoxy)methane	111-91-1		2.81E-09	4.36E-02	3.20E+00	1.07E-03	3.02E-12		
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7		1.30E-10	3.51E-02	3.98E+00	9.30E-04	1.20E-13		
SVOC	Butylbenzylphthalate	85-68-7		1.66E-10	1.74E-02	8.02E+00	5.81E-04	9.63E-14		
SVOC	Chrysene	218-01-9		1.25E-13	2.48E-02	5.63E+00	7.37E-04	9.22E-17		
SVOC	2,4-Dinitrotoluene	121-14-2		2.95E-09	2.03E-01	6.87E-01	3.01E-03	8.90E-12		
SVOC	Di-n-octylphthalate	117-84-0		5.22E-11	1.51E-02	9.24E+00	5.28E-04	2.76E-14		
SVOC	Fluoranthene	206-44-0		1.57E-10	3.02E-02	4.62E+00	8.40E-04	1.32E-13		
SVOC	Fluorene	86-73-7		1.27E-08	3.63E-02	3.84E+00	9.51E-04	1.21E-11		
SVOC	2-Methylnaphthalene	91-57-6	8.80E+02	1.11E-06	4.84E-02	2.88E+00	1.15E-03	1.27E-09	9.87E-04	1.08E-02
SVOC	Naphthalene	91-20-3	1.40E+03	1.71E-06	5.90E-02	2.36E+00	1.32E-03	2.25E-09	2.77E-03	3.04E-02
SVOC	Phenanthrene	85-01-8		2.25E-09	3.75E-02	3.72E+00	9.72E-04	2.19E-12		
SVOC	Pyrene	129-00-0		9.22E-11	2.72E-02	5.13E+00	7.84E-04	7.23E-14		
PCB	PCBs (total)	1336-36-3		1.55E-09	2.02E-02	6.91E+00	6.42E-04	9.94E-13		
INORG	Antimony	7440-36-0								
INORG	Arsenic	7440-38-2	1.50E+00							
INORG	Barium	7440-39-3	1.30E+00							
INORG	Beryllium	7440-41-7								
INORG	Cadmium	7440-43-9	1.90E-01							
INORG	Chromium (total)	7440-47-3	3.90E+00							
INORG	Cobalt	7440-48-4	5.70E-02							
INORG	Copper	7440-50-8	1.60E+00							
INORG	Cyanide (total)	57-12-5								
INORG	Lead	7439-92-1	3.40E+00							
INORG	Manganese	7439-96-5	1.10E+00							
INORG	Mercury	7439-97-6		3.93E-08	3.07E-02	4.55E+00	8.50E-04	3.34E-11		
INORG	Nickel	7440-02-0	4.80E-01							
INORG	Selenium	7782-49-2								
INORG	Silver	7440-22-4								

Attachment G5: Estimated Ambient Air Concentration from Excavation Into Soil with Free-Phase NAPL at AOI 36-1
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	C_{NAPL} (mg/kg)	K_{eq} (unitless)	D_{air} (cm^2/s)	Sc	k_G (m/s)	K (m/s)	J_L (mg/m^2-s)	$C_{air, worker}$ (mg/m^3)
INORG	Thallium	7440-28-0								
INORG	Vanadium	7440-62-2	8.90E-01							
INORG	Zinc	7440-66-6	2.10E+00							
Notes:										
Physical Properties of Air										
	Pressure	1	atm	assumed						
	Molecular Weight	28.8	g/g mol	Perry and Chilton (1973)						
	Viscosity	1.80E-04	g/(cm.s)	Perry and Chilton (1973)						
	Density	0.00129	g/cm^3	Perry and Chilton (1973)						
Physical Properties of NAPL										
	Molecular Weight	300	g/g mol							
	Density	0.88	g/cm^3							
Physical Characteristics of Excavation Pit										
	Windspeed	0.5	m/s	assumed						
	Surface Area	2.1E+01	m^2							
	Effective Diameter of Area	5.2E+00	m	calculated						

Attachment G5: Vapor Flux from Soil to Ambient Air at AOI 36-1
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	K_{oc} (L/kg)	K_d (L/kg)	H (unitless)	D_{air} (cm^2/s)	D_{water} (cm^2/s)	R_L (unitless)	D_G (cm^2/s)	D_L (cm^2/s)	D_E (cm^2/s)		MW (g/mole)	VP (mm Hg)	S (mg/L)	V* (mg/L)	C_{sat} (mg/kg)	C_{soil} (mg/kg)	J_{sat} (mg/m^2-s)	J_{unsat} (mg/m^2-s)	$J_{critical}$ (mg/m^2-s)	J (mg/m^2-s)
VOC	Acetone	67-64-1	5.81E-01		7.95E-04	1.24E-01	1.14E-05	5.10E-02	2.73E-02	2.61E-09	4.26E-04		5.81E+01	2.30E+02	1.00E+06	7.18E+02	3.40E+04				5.7E+00	
VOC	Benzene	71-43-2	5.82E+01		1.14E-01	8.80E-02	9.80E-06	2.68E-01	1.94E-02	2.24E-09	8.26E-03		7.81E+01	9.50E+01	1.75E+03	3.99E+02	3.12E+02	1.5E+02		1.1E-01	2.3E-01	1.1E-01
VOC	2-Butanone	78-93-3	2.00E+00		1.14E-03	8.08E-02	9.80E-06	5.54E-02	1.78E-02	2.24E-09	3.67E-04		7.21E+01	9.53E+01	2.75E+05	3.69E+02	1.02E+04				1.6E+00	
VOC	Carbon Disulfide	75-15-0	4.59E+01		6.20E-01	1.04E-01	1.00E-05	4.25E-01	2.29E-02	2.29E-09	3.34E-02		7.61E+01	3.59E+02	1.19E+03	1.47E+03	3.38E+02				5.0E-01	
VOC	Chloroethane	75-00-3	1.62E+01		1.80E-01	2.71E-01	1.15E-05	1.67E-01	5.97E-02	2.63E-09	6.44E-02		6.45E+01	1.01E+03	5.68E+03	3.50E+03	6.33E+02				1.3E+00	
VOC	Chloromethane	74-87-3	3.97E+01		1.80E-01	1.26E-01	6.50E-06	2.38E-01	2.78E-02	1.49E-09	2.11E-02		5.05E+01	4.30E+03	5.33E+03	1.17E+04	8.43E+02				1.0E+00	
VOC	Cumene	98-82-8	7.05E+02		2.66E-01	6.50E-02	7.10E-06	2.27E+00	1.43E-02	1.62E-09	1.68E-03		1.20E+02	4.50E+00	6.13E+01	2.91E+01	9.26E+01	3.1E+01		1.0E-02	3.1E-02	1.0E-02
VOC	Cyclohexane	110-82-7	6.35E+02		3.98E+00	8.39E-02	9.10E-06	3.49E+00	1.85E-02	2.08E-09	2.11E-02		8.42E+01	9.69E+01	5.50E+01	4.38E+02	1.28E+02				1.5E-01	
VOC	1,2-Dichlorobenzene	95-50-1	6.23E+02		3.90E-02	6.90E-02	7.90E-06	1.933549	1.52E-02	1.81E-09	3.06E-04		1.47E+02	1.36E+00	1.56E+02	1.07E+01	2.01E+02				2.9E-02	
VOC	Dichlorodifluoromethane	75-71-8	6.15E+01		7.01E+00	8.00E-02	8.00E-06	2.93E+00	1.76E-02	1.83E-09	4.21E-02		1.21E+02	4.85E+03	2.80E+02	3.15E+04	5.47E+02				9.1E-01	
VOC	1,1-Dichloroethane	75-34-3	3.13E+01		1.15E-01	7.42E-02	1.05E-05	1.87E-01	1.64E-02	2.40E-09	1.00E-02		9.90E+01	2.27E+02	5.06E+03	1.21E+03	6.32E+02	5.2E-02		4.3E-05	5.2E-01	4.3E-05
VOC	cis-1,2-Dichloroethene	156-59-2	3.56E+01		8.35E-02	7.36E-02	1.13E-05	1.88E-01	1.62E-02	2.58E-09	7.21E-03		9.69E+01	2.03E+02	3.50E+03	1.06E+03	4.38E+02	6.8E-02		4.7E-05	3.0E-01	4.7E-05
VOC	Ethyl Benzene	100-41-4	3.67E+02		1.62E-01	7.50E-02	7.80E-06	1.21E+00	1.65E-02	1.78E-09	2.20E-03		1.06E+02	9.60E+00	1.69E+02	5.48E+01	1.37E+02	4.3E+02	1.1E-01		5.2E-02	1.1E-01
VOC	Methyl Acetate	79-20-9	1.66E+00		1.85E-03	9.57E-02	1.10E-05	5.47E-02	2.11E-02	2.51E-09	7.15E-04		7.41E+01	2.16E+02	2.44E+05	8.61E+02	8.88E+03				1.9E+00	
VOC	4-Methyl-2-pentanone	108-10-1	1.05E+01		2.82E-03	7.50E-02	7.80E-06	8.16E-02	1.65E-02	1.78E-09	5.72E-04		1.00E+02	1.99E+01	1.90E+04	1.07E+02	1.03E+03				2.0E-01	
VOC	Methylcyclohexane	108-87-2	2.66E+02		8.78E+00	7.35E-02	8.52E-06	4.23E+00	1.62E-02	1.95E-09	3.36E-02		9.82E+01	4.30E+01	1.40E+01	2.27E+02	3.95E+01	2.0E+01		2.9E-02	5.9E-02	2.9E-02
VOC	Methylene Chloride	75-09-2	1.17E+01		4.49E-02	1.01E-01	1.17E-05	1.01E-01	2.23E-02	2.67E-09	9.86E-03		8.49E+01	4.33E+02	1.30E+04	1.98E+03	8.79E+02	9.1E+00		7.3E-03	7.1E-01	7.3E-03
VOC	Tetrachloroethene	127-18-4	1.56E+02		3.77E-01	7.20E-02	8.20E-06	6.62E-01	1.59E-02	1.87E-09	9.04E-03		1.66E+02	1.86E+01	2.00E+02	1.65E+02	8.82E+01				6.8E-02	
VOC	Toluene	108-88-3	1.80E+02		1.36E-01	8.70E-02	8.60E-06	6.42E-01	1.92E-02	1.97E-09	4.06E-03		9.21E+01	2.84E+01	5.26E+02	1.41E+02	2.25E+02	2.6E+03	4.9E-01		1.2E-01	4.9E-01
VOC	1,2,4-Trichlorobenzene	120-82-1	1.79E+03		2.91E-02	3.00E-02	8.23E-06	5.44E+00	6.61E-03	1.88E-09	3.53E-05		1.81E+02	4.31E-01	3.00E+02	4.20E+00	1.09E+03				5.3E-02	
VOC	1,1,1-Trichloroethane	71-55-6	1.10E+02		3.53E-01	7.80E-02	8.80E-06	5.15E-01	1.72E-02	2.01E-09	1.18E-02		1.33E+02	1.24E+02	1.33E+03	8.87E+02	4.57E+02				4.0E-01	
VOC	1,1,2-Trichloroethane	79-00-5	5.03E+01		1.87E-02	7.80E-02	8.80E-06	2.07E-01	1.72E-02	2.01E-09	1.55E-03		1.33E+02	2.33E+01	4.42E+03	1.67E+02	6.10E+02				2.0E-01	
VOC	Trichloroethene	79-01-6	1.68E+02		2.11E-01	7.90E-02	9.10E-06	6.33E-01	1.74E-02	2.08E-09	5.80E-03		1.31E+02	7.35E+01	1.10E+03	5.19E+02	4.64E+02	2.1E-01		1.3E-04	2.9E-01	1.3E-04
VOC	Trichlorofluoromethane	75-69-4	1.21E+02		1.98E+00	8.70E-02	9.70E-06	1.17E+00	1.92E-02	2.22E-09	3.24E-02		1.37E+02	8.03E+02	1.10E+03	5.93E+03	8.61E+02				1.3E+00	
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	3.81E+02		9.83E+00	7.80E-02	8.20E-06	4.97E+00	1.72E-02	1.87E-09	3.40E-02		1.87E+02	3.32E+02	1.70E+02	3.34E+03	5.64E+02				8.5E-01	
VOC	Vinyl Chloride	75-01-4	1.85E+01		5.55E-01	1.06E-01	1.23E-05	3.18E-01	2.34E-02	2.81E-09	4.08E-02		6.25E+01	2.98E+03	2.76E+03	1.00E+04	5.85E+02				9.6E-01	
VOC	Xylenes (total)	1330-20-7	3.86E+02		1.38E-01	7.80E-02	8.75E-06	1.26E+00	1.72E-02	2.00E-09	1.88E-03		1.06E+02	7.99E+00	1.75E+02	4.56E+01	1.47E+02	1.6E+03	2.1E-01		5.2E-02	2.1E-01
SVOC	Acenaphthene	83-32-9	7.14E+03		3.18E-03	4.21E-02	7.69E-06	2.15E+01	9.28E-03	1.76E-09	1.37E-06		1.54E+02	2.50E-03	4.24E+00	2.07E-02	6.07E+01				5.8E-04	
SVOC	Benzo(a)anthracene	56-55-3	4.01E+05		6.85E-05	5.10E-02	9.00E-06	1.20E+03	1.12E-02	2.06E-09	6.41E-10		2.28E+02	1.05E-07	9.40E-03	1.29E-06	7.54E+00				1.6E-06	
SVOC	Benzo(a)pyrene	50-32-8	1.01E+06		2.32E-05	4.30E-02	9.00E-06	3.04E+03	9.48E-03	2.06E-09	7.27E-11		2.52E+02	5.49E-09	1.62E-03	7.45E-08	3.29E+00				2.3E-07	
SVOC	Benzo(b)fluoranthene	205-99-2	1.24E+06		2.28E-03	2.26E-02	5.56E-06	3.73E+03	4.98E-03	1.27E-09	3.04E-09		2.52E+02	5.00E-07	1.50E-03	6.78E-06	3.73E+00				1.7E-06	
SVOC	Benzo(k)fluoranthene	207-08-9	1.24E+06		1.70E-05	2.26E-02	5.56E-06	3.73E+03	4.98E-03	1.27E-09	2.30E-11		2.52E+02	2.00E-09	8.00E-04	2.71E-08	1.99E+00				7.8E-08	
SVOC	Biphenyl	92-52-4	1.05E+04		6.13E-03	4.04E-02	8.15E-06	3.15E+01	8.90E-03	1.86E-09	1.73E-06		1.54E+02	9.64E-03	6.03E+00	7.99E-02	1.27E+02				1.4E-03	
SVOC	bis(2-Chloroethoxy)methane	111-91-1	1.73E+01		3.47E-06	4.36E-02	8.46E-06	1.01E-01	9.61E-03	1.93E-09	3.50E-07		1.73E+02	1.40E-04	1.21E+05	1.30E-03	8.15E+03				3.9E-02	
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	1.50E+07		2.09E-06	3.51E-02	3.66E-06	4.50E+04	7.74E-03	8.37E-10	3.78E-13		3.91E+02	6.45E-06	3.40E-01	1.35E-04	1.02E+04				5.1E-05	
SVOC	Butylbenzylphthalate	85-68-7	5.73E+04		2.59E-05	1.74E-02	4.83E-06	1.72E+02	3.83E-03	1.10E-09	5.83E-10		3.12E+02	8.25E-06	2.69E+00	1.39E-04	3.08E+02				6.1E-05	
SVOC	Chrysene	218-01-9	4.01E+05		1.94E-03	2.48E-02	6.21E-06	1.20E+03	5.47E-03	1.42E-09	8.81E-09		2.28E+02	6.23E-09	1.60E-03	7.65E-08	1.28E+00				9.8E-07	
SVOC	2,4-Dinitrotoluene	121-14-2	9.46E+01		1.90E-06	2.03E-01	7.06E-06	3.33E-01	4.47E-02	1.61E-09	2.60E-07		1.82E+02	1.47E-04	2.70E+02	1.44E-03	5.99E+01				2.5E-04	
SVOC	Di-n-octylphthalate	117-84-0	8.38E+07		1.37E-03	1.51E-02	3.58E-06	2.51E+05	3.33E-03	8.18E-10	1.81E-11		3.91E+02	2.60E-06	2.00E-02	5.46E-05	3.35E+03				1.2E-04	
SVOC	Fluoranthene	206-44-0	1.08E+05		3.30E-04	3.02E-02	6.35E-06	3.24E+02	6.66E-03	1.45E-09	6.78E-09		2.02E+02	7.80E-06	2.06E-01	8.48E-05	4.45E+01				3.0E-05	
SVOC	Fluorene	86-73-7	1.38E+04		1.31E-03	3.63E-02	7.88E-06	4.13E+01	8.00E-03	1.80E-09	2.53E-07		1.66E+02	6.33E-04	1.98E+00	5.66E-03	5.46E+01				2.2E-04	
SVOC	2-Methylnaphthalene	91-57-6	6.23E+03		1.06E-02	4.84E-02	7.75E-06	1.88E+01	1.07E-02	1.77E-09	6.02E-06		1.42E+02	5.50E-02	2.46E+01	4.21E-01	3.08E+02	4.4E+01		8.9E-04	6.1E-03	8.9E-04
SVOC	Naphthalene	91-20-3	2.01E+03		9.90E-03	5.90E-02	7.50E-06	6.08E+00	1.30E-02	1.71E-09	2.12E-05		1.28E+02	8.50E-02	3.10E+01	5.86E-01	1.26E+02	7.1E+01		2.6E-03	4.7E-03	2.6E-03
SVOC	Phenanthrene	85-01-8	2.42E+04		4.76E-04	3.75E-02	7.47E-06	7.28E+01	8.26E-03	1.71E-09	5.41E-08		1.78E+02	1.12E-04	1.15E+00	1.07E-03	5.58E+01				1.1E-04	
SVOC	Pyrene	129-00-0	1.06E+05		2.26E-04	2.72E-02	7.24E-06	3.17E+02	5.99E-03	1.66E-09	4.27E-09		2.02E+02	4.59E-06	1.35E-01	4.99E-05	2.85E+01				1.5E-05	
PCB	PCBs (total)	1336-36-3	2.45E+06		4.09E-02	2.02E-02	5.00E-06	7.36E+03	4.45E-03	1.14E-09	2.47E-08		3.28E+02	7.71E-05	1.20E-02	1.36E-03	5.89E+01				7.5E-05	
INORG	Antimony	7440-36-0		4.50E+01									1.22E+02									
INORG	Arsenic	7440-38-2		2.90E+01									7.49E+01					7.6E-02				
INORG	Barium	7440-39-3		4.10E+01									1.37E+02					6.6E-02				
INORG	Beryllium	7440-41-7		7.90E+02									9.01E+00									
INORG	Cadmium	7440-43-9		7.50E+01									1.12E+02					9.6E-03				
INORG	Chromium (total)	7440-47-3		1.90E+01									5.20E+01					2.0E-01				

Attachment G5: Vapor Flux from Soil to Ambient Air at AOI 36-1
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	K_{oc} (L/kg)	K_d (L/kg)	H (unitless)	D_{air} (cm^2/s)	D_{water} (cm^2/s)	R_L (unitless)	D_G (cm^2/s)	D_L (cm^2/s)	D_E (cm^2/s)		MW (g/mole)	VP (mm Hg)	S (mg/L)	V* (mg/L)	C_{sat} (mg/kg)	C_{soil} (mg/kg)	J_{sat} (mg/m^2-s)	J_{unsat} (mg/m^2-s)	$J_{critical}$ (mg/m^2-s)	J (mg/m^2-s)
INORG	Cobalt	7440-48-4		4.50E+01									5.89E+01					2.9E-03				
INORG	Copper	7440-50-8		3.50E+01									6.35E+01					8.1E-02				
INORG	Cyanide (total)	57-12-5		9.90E+00									2.60E+01									
INORG	Lead	7439-92-1		9.00E+02									2.07E+02					1.7E-01				
INORG	Manganese	7439-96-5		6.50E+01									5.49E+01					5.5E-02				
INORG	Mercury	7439-97-6		1.00E+03	1.45E-01	3.07E-02	6.30E-06	0.104854	6.77E-03	1.44E-09	9.36E-03		2.01E+02	1.96E-03	5.60E-02	2.12E-02	3.91E-03				3.1E-06	
INORG	Nickel	7440-02-0		6.50E+01									5.87E+01					2.4E-02				
INORG	Selenium	7782-49-2		5.00E+00									7.90E+01									
INORG	Silver	7440-22-4		8.30E+00									1.08E+02									
INORG	Thallium	7440-28-0		7.10E+01									2.04E+02									
INORG	Vanadium	7440-62-2		1.00E+03									5.09E+01					4.5E-02				
INORG	Zinc	7440-66-6		6.20E+01									6.54E+01					1.1E-01				
Notes:	Soil bulk density	kg/L	ρ_b	1.50																		
	Soil particle density	kg/L	ρ_s	2.65																		
	Soil porosity	L/L-soil	θ	0.43																		
	Soil water content	L/L-soil	θ_w	0.049																		
	Soil air-filled porosity	L/L-soil	θ_a	0.38																		
	Soil organic carbon fraction	unitless	f_{oc}	0.002																		
	Averaging period	day	**EF * ED**	50																		
	Averaging period	s	**EF * ED**	4.32E+06																		
	Molar Gas Constant	L-mmHg/mole-^oK	**R**	62.411																		
	Temperature	^oC	**T**	25																		
		K	**T**	298																		

Attachment G5: Concentrations in Ambient Air - AOI 36-1
GMC: NAO Flint Operations Site, Flint, Michigan

				Vapor		
		C/Q (kg/m^3 per kg/m^2-s):		10.96		
	Chem Chem	**Chemical**	**CASRN**	**C_{SZsoil}** (mg/kg)	**J** (mg/m^2-s)	**C_{air}** (mg/m^3)
X	VOC	Acetone	67-64-1			
X	VOC	Benzene	71-43-2	1.46E+02	1.08E-01	1.19E+00
X	VOC	2-Butanone	78-93-3			
X	VOC	Carbon Disulfide	75-15-0			
X	VOC	Chloroethane	75-00-3			
X	VOC	Chloromethane	74-87-3			
X	VOC	Cumene	98-82-8	3.08E+01	1.03E-02	1.13E-01
X	VOC	Cyclohexane	110-82-7			
X	VOC	1,2-Dichlorobenzene	95-50-1			
X	VOC	Dichlorodifluoromethane	75-71-8			
X	VOC	1,1-Dichloroethane	75-34-3	5.25E-02	4.28E-05	4.69E-04
X	VOC	cis-1,2-Dichloroethene	156-59-2	6.81E-02	4.71E-05	5.16E-04
X	VOC	Ethyl Benzene	100-41-4	4.34E+02	1.07E-01	1.17E+00
X	VOC	Methyl Acetate	79-20-9			
X	VOC	4-Methyl-2-pentanone	108-10-1			
X	VOC	Methylcyclohexane	108-87-2	1.97E+01	2.94E-02	3.22E-01
X	VOC	Methylene Chloride	75-09-2	9.08E+00	7.34E-03	8.05E-02
X	VOC	Tetrachloroethene	127-18-4			
X	VOC	Toluene	108-88-3	2.62E+03	4.89E-01	5.36E+00
X	VOC	1,2,4-Trichlorobenzene	120-82-1			
X	VOC	1,1,1-Trichloroethane	71-55-6			
X	VOC	1,1,2-Trichloroethane	79-00-5			
X	VOC	Trichloroethene	79-01-6	2.11E-01	1.31E-04	1.44E-03
X	VOC	Trichlorofluoromethane	75-69-4			
X	VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1			
X	VOC	Vinyl Chloride	75-01-4			
X	VOC	Xylenes (total)	1330-20-7	1.60E+03	2.10E-01	2.30E+00
X	SVOC	Acenaphthene	83-32-9			
X	SVOC	Benzo(a)anthracene	56-55-3			
X	SVOC	Benzo(a)pyrene	50-32-8			
X	SVOC	Benzo(b)fluoranthene	205-99-2			
X	SVOC	Benzo(k)fluoranthene	207-08-9			
X	SVOC	Biphenyl	92-52-4			
X	SVOC	bis(2-Chloroethoxy)methane	111-91-1			
X	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7			
X	SVOC	Butylbenzylphthalate	85-68-7			
X	SVOC	Chrysene	218-01-9			
X	SVOC	2,4-Dinitrotoluene	121-14-2			
X	SVOC	Di-n-octylphthalate	117-84-0			
X	SVOC	Fluoranthene	206-44-0			
X	SVOC	Fluorene	86-73-7			
X	SVOC	2-Methylnaphthalene	91-57-6	4.44E+01	8.87E-04	9.72E-03
X	SVOC	Naphthalene	91-20-3	7.06E+01	2.65E-03	2.90E-02
X	SVOC	Phenanthrene	85-01-8			
X	SVOC	Pyrene	129-00-0			
X	PCB	PCBs (total)	1336-36-3			
X	INORG	Antimony	7440-36-0			
X	INORG	Arsenic	7440-38-2	7.57E-02		
X	INORG	Barium	7440-39-3	6.56E-02		
X	INORG	Beryllium	7440-41-7			
X	INORG	Cadmium	7440-43-9	9.59E-03		
X	INORG	Chromium (total)	7440-47-3	1.97E-01		
X	INORG	Cobalt	7440-48-4	2.88E-03		

	Attachment G5: Concentrations in Ambient Air - AOI 36-1 GMC: NAO Flint Operations Site, Flint, Michigan					
				Vapor		
		C/Q (kg/m^3 per kg/m^2-s)**:**		10.96		
	Chem Chem	**Chemical**	**CASRN**	**C_{SZsoil}** (mg/kg)	**J** (mg/m^2-s)	**C_{air}** (mg/m^3)
X	INORG	Copper	7440-50-8	8.07E-02		
X	INORG	Cyanide (total)	57-12-5			
X	INORG	Lead	7439-92-1	1.72E-01		
X	INORG	Manganese	7439-96-5	5.55E-02		
X	INORG	Mercury	7439-97-6			
X	INORG	Nickel	7440-02-0	2.42E-02		
X	INORG	Selenium	7782-49-2			
X	INORG	Silver	7440-22-4			
X	INORG	Thallium	7440-28-0			
X	INORG	Vanadium	7440-62-2	4.49E-02		
X	INORG	Zinc	7440-66-6	1.06E-01		

Attachment G5: Nonsteady State Dermal Absorption of Chemical from NAPL
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	MW (g/mole)	Log K_{ow} (unitless)	K_p (cm/hr)	B (unitless)	τ (hr)	c	b	ts (hr)	FA (unitless)	DA (L/cm^2-event)
VOC	Acetone	67-64-1	5.8E+01	-2.4E-01	9.0E-04	2.7E-03	2.2E-01	3.4E-01	3.0E-01	5.3E-01	1.0E+00	2.21E-06
VOC	Benzene	71-43-2	7.8E+01	2.1E+00	1.1E-04	3.7E-04	2.9E-01	3.3E-01	3.0E-01	6.9E-01	1.0E+00	2.81E-07
VOC	2-Butanone	78-93-3	7.2E+01	2.8E-01	5.0E-04	1.6E-03	2.7E-01	3.3E-01	3.0E-01	6.4E-01	1.0E+00	1.27E-06
VOC	Carbon Disulfide	75-15-0	7.6E+01	2.0E+00	1.2E-04	4.2E-04	2.8E-01	3.3E-01	3.0E-01	6.7E-01	1.0E+00	3.18E-07
VOC	Chloroethane	75-00-3	6.5E+01	1.4E+00	2.3E-04	7.0E-04	2.4E-01	3.3E-01	3.0E-01	5.8E-01	1.0E+00	5.59E-07
VOC	Chloromethane	74-87-3	5.0E+01	1.9E+00	1.8E-04	5.0E-04	2.0E-01	3.3E-01	3.0E-01	4.8E-01	1.0E+00	4.42E-07
VOC	Cumene	98-82-8	1.2E+02	3.5E+00	2.2E-05	9.2E-05	5.0E-01	3.3E-01	3.0E-01	1.2E+00	1.0E+00	6.51E-08
VOC	Cyclohexane	110-82-7	8.4E+01	3.4E+00	3.6E-05	1.3E-04	3.1E-01	3.3E-01	3.0E-01	7.5E-01	1.0E+00	9.50E-08
VOC	1,2-Dichlorobenzene	95-50-1	1.5E+02	3.4E+00	1.6E-05	7.6E-05	7.0E-01	3.3E-01	3.0E-01	1.7E+00	1.0E+00	5.52E-08
VOC	Dichlorodifluoromethane	75-71-8	1.2E+02	2.2E+00	6.1E-05	2.6E-04	5.0E-01	3.3E-01	3.0E-01	1.2E+00	1.0E+00	1.84E-07
VOC	1,1-Dichloroethane	75-34-3	9.9E+01	1.8E+00	1.1E-04	4.2E-04	3.8E-01	3.3E-01	3.0E-01	9.0E-01	1.0E+00	3.00E-07
VOC	cis-1,2-Dichloroethene	156-59-2	9.7E+01	1.9E+00	1.1E-04	4.0E-04	3.7E-01	3.3E-01	3.0E-01	8.8E-01	1.0E+00	2.89E-07
VOC	Ethyl Benzene	100-41-4	1.1E+02	3.1E+00	3.5E-05	1.4E-04	4.1E-01	3.3E-01	3.0E-01	9.9E-01	1.0E+00	9.75E-08
VOC	Methyl Acetate	79-20-9	7.4E+01	1.8E-01	5.3E-04	1.8E-03	2.7E-01	3.3E-01	3.0E-01	6.6E-01	1.0E+00	1.35E-06
VOC	4-Methyl-2-pentanone	108-10-1	1.0E+02	1.2E+00	1.7E-04	6.6E-04	3.8E-01	3.3E-01	3.0E-01	9.2E-01	1.0E+00	4.74E-07
VOC	Methylcyclohexane	108-87-2	9.8E+01	3.0E+00	4.4E-05	1.7E-04	3.7E-01	3.3E-01	3.0E-01	9.0E-01	1.0E+00	1.21E-07
VOC	Methylene Chloride	75-09-2	8.5E+01	1.3E+00	2.0E-04	7.1E-04	3.1E-01	3.3E-01	3.0E-01	7.5E-01	1.0E+00	5.24E-07
VOC	Tetrachloroethene	127-18-4	1.7E+02	2.7E+00	2.3E-05	1.1E-04	8.9E-01	3.3E-01	3.0E-01	2.1E+00	1.0E+00	8.53E-08
VOC	Toluene	108-88-3	9.2E+01	2.8E+00	5.6E-05	2.1E-04	3.5E-01	3.3E-01	3.0E-01	8.3E-01	1.0E+00	1.51E-07
VOC	1,2,4-Trichlorobenzene	120-82-1	1.8E+02	4.0E+00	6.6E-06	3.4E-05	1.1E+00	3.3E-01	3.0E-01	2.6E+00	1.0E+00	2.70E-08
VOC	1,1,1-Trichloroethane	71-55-6	1.3E+02	2.5E+00	4.1E-05	1.8E-04	5.9E-01	3.3E-01	3.0E-01	1.4E+00	1.0E+00	1.29E-07
VOC	1,1,2-Trichloroethane	79-00-5	1.3E+02	2.1E+00	5.7E-05	2.5E-04	5.9E-01	3.3E-01	3.0E-01	1.4E+00	1.0E+00	1.81E-07
VOC	Trichloroethene	79-01-6	1.3E+02	2.7E+00	3.5E-05	1.5E-04	5.7E-01	3.3E-01	3.0E-01	1.4E+00	1.0E+00	1.10E-07
VOC	Trichlorofluoromethane	75-69-4	1.4E+02	2.5E+00	3.7E-05	1.7E-04	6.2E-01	3.3E-01	3.0E-01	1.5E+00	1.0E+00	1.20E-07
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	1.9E+02	3.2E+00	1.2E-05	6.3E-05	1.2E+00	3.3E-01	3.0E-01	2.8E+00	1.0E+00	5.06E-08
VOC	Vinyl Chloride	75-01-4	6.3E+01	1.5E+00	2.2E-04	6.7E-04	2.4E-01	3.3E-01	3.0E-01	5.7E-01	1.0E+00	5.40E-07
VOC	Xylenes (total)	1330-20-7	1.1E+02	3.2E+00	3.4E-05	1.3E-04	4.1E-01	3.3E-01	3.0E-01	9.9E-01	1.0E+00	9.55E-08
SVOC	Acenaphthene	83-32-9	1.5E+02	3.9E+00	1.0E-05	4.8E-05	7.7E-01	3.3E-01	3.0E-01	1.8E+00	1.0E+00	3.57E-08
SVOC	Benzo(a)anthracene	56-55-3	2.3E+02	5.7E+00	9.6E-07	5.6E-06	2.0E+00	3.3E-01	3.0E-01	4.8E+00	9.0E-01	4.79E-09
SVOC	Benzo(a)pyrene	50-32-8	2.5E+02	6.1E+00	5.1E-07	3.1E-06	2.7E+00	3.3E-01	3.0E-01	6.5E+00	8.0E-01	2.64E-09
SVOC	Benzo(b)fluoranthene	205-99-2	2.5E+02	6.2E+00	4.8E-07	2.9E-06	2.7E+00	3.3E-01	3.0E-01	6.5E+00	8.0E-01	2.46E-09
SVOC	Benzo(k)fluoranthene	207-08-9	2.5E+02	6.2E+00	4.8E-07	2.9E-06	2.7E+00	3.3E-01	3.0E-01	6.5E+00	8.0E-01	2.46E-09
SVOC	Biphenyl	92-52-4	1.5E+02	4.1E+00	8.8E-06	4.2E-05	7.7E-01	3.3E-01	3.0E-01	1.8E+00	1.0E+00	3.12E-08
SVOC	bis(2-Chloroethoxy)methane	111-91-1	1.7E+02	1.3E+00	6.4E-05	3.2E-04	9.8E-01	3.3E-01	3.0E-01	2.3E+00	1.0E+00	2.46E-07
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	3.9E+02	7.3E+00	3.4E-08	2.6E-07	1.6E+01	3.3E-01	3.0E-01	3.9E+01	4.0E-01	2.14E-10
SVOC	Butylbenzylphthalate	85-68-7	3.1E+02	4.8E+00	6.4E-07	4.3E-06	5.9E+00	3.3E-01	3.0E-01	1.4E+01	9.0E-01	5.46E-09
SVOC	Chrysene	218-01-9	2.3E+02	5.7E+00	9.6E-07	5.6E-06	2.0E+00	3.3E-01	3.0E-01	4.8E+00	9.0E-01	4.79E-09

Attachment G5: Nonsteady State Dermal Absorption of Chemical from NAPL
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	MW (g/mole)	Log K_{ow} (unitless)	K_p (cm/hr)	B (unitless)	τ (hr)	c	b	ts (hr)	FA (unitless)	DA (L/cm^2-event)
SVOC	2,4-Dinitrotoluene	121-14-2	1.8E+02	2.0E+00	3.1E-05	1.6E-04	1.1E+00	3.3E-01	3.0E-01	2.6E+00	1.0E+00	1.29E-07
SVOC	Di-n-octylphthalate	117-84-0	3.9E+02	8.1E+00	1.9E-08	1.4E-07	1.6E+01	3.3E-01	3.0E-01	3.9E+01	3.0E-01	8.83E-11
SVOC	Fluoranthene	206-44-0	2.0E+02	5.1E+00	2.1E-06	1.2E-05	1.4E+00	3.3E-01	3.0E-01	3.4E+00	1.0E+00	9.90E-09
SVOC	Fluorene	86-73-7	1.7E+02	4.2E+00	6.9E-06	3.4E-05	9.0E-01	3.3E-01	3.0E-01	2.2E+00	1.0E+00	2.55E-08
SVOC	2-Methylnaphthalene	91-57-6	1.4E+02	3.9E+00	1.2E-05	5.7E-05	6.6E-01	3.3E-01	3.0E-01	1.6E+00	1.0E+00	4.09E-08
SVOC	Naphthalene	91-20-3	1.3E+02	3.4E+00	2.2E-05	9.5E-05	5.5E-01	3.3E-01	3.0E-01	1.3E+00	1.0E+00	6.78E-08
SVOC	Phenanthrene	85-01-8	1.8E+02	4.5E+00	4.8E-06	2.5E-05	1.0E+00	3.3E-01	3.0E-01	2.5E+00	1.0E+00	1.94E-08
SVOC	Pyrene	129-00-0	2.0E+02	5.1E+00	2.1E-06	1.2E-05	1.4E+00	3.3E-01	3.0E-01	3.4E+00	1.0E+00	9.98E-09
PCB	PCBs (total)	1336-36-3	3.3E+02	6.5E+00	1.4E-07	9.9E-07	7.2E+00	3.3E-01	3.0E-01	1.7E+01	7.0E-01	1.05E-09
INORG	Antimony	7440-36-0	1.2E+02		1.0E-03							2.00E-06
INORG	Arsenic	7440-38-2	7.5E+01		1.0E-03							2.00E-06
INORG	Barium	7440-39-3	1.4E+02		1.0E-03							2.00E-06
INORG	Beryllium	7440-41-7	9.0E+00		1.0E-03							2.00E-06
INORG	Cadmium	7440-43-9	1.1E+02		1.0E-03							2.00E-06
INORG	Chromium (total)	7440-47-3	5.2E+01		2.0E-03							4.00E-06
INORG	Cobalt	7440-48-4	5.9E+01		4.0E-04							8.00E-07
INORG	Copper	7440-50-8	6.4E+01		1.0E-03							2.00E-06
INORG	Cyanide (total)	57-12-5	2.6E+01		1.0E-03							2.00E-06
INORG	Lead	7439-92-1	207.2		1.0E-04							2.00E-07
INORG	Manganese	7439-96-5	54.9		1.0E-03							2.00E-06
INORG	Mercury	7439-97-6	201.0		1.0E-03							2.00E-06
INORG	Nickel	7440-02-0	58.7		2.0E-04							4.00E-07
INORG	Selenium	7782-49-2	79.0		1.0E-03							2.00E-06
INORG	Silver	7440-22-4	107.9		6.0E-04							1.20E-06
INORG	Thallium	7440-28-0	204.4		1.0E-03							2.00E-06
INORG	Vanadium	7440-62-2	50.9		1.0E-03							2.00E-06
INORG	Zinc	7440-66-6	65.4		6.0E-04							1.20E-06

Attachment G5: Maintenance Worker Cancer Risk Calculations - AOI 36-1
GMC: NAO Flint Operations Site, Flint, Michigan

				Smear Zone Soil Ingestion				Smear Zone Soil Dermal Contact				Smear Zone Soil Vapor Inhalation				NAPL Dermal Contact					NAPL Vapor Inhalation			
Chem Group	Chemical	CASRN	Cancer Class	C_{SZsoil} (mg/kg)	LADD (mg/kg/d)	SF_{oral} $(mg/kg/d)^{-1}$	Risk	AF_{derm}	LADD (mg/kg/d)	SF_{derm} $(mg/kg/d)^{-1}$	Risk	C_{air} (mg/m^3)	C_{exp} (mg/m^3)	URF (m^3/mg)	Risk	C_{NAPL} (mg/L)	DA (L/cm^2)	LADD (mg/kg/d)	SF_{derm} $(mg/kg/d)^{-1}$	Risk	C_{air} (mg/m^3)	C_{air} (mg/m^3)	URF (m^3/mg)	Risk
VOC	Acetone	67-64-1	ID														2.21E-06							
VOC	Benzene	71-43-2	A	1.46E+02	8.18E-07	5.5E-02	4E-08			5.5E-02		1.2E+00	2.3E-03	7.8E-03	2E-05	2.55E+03	2.81E-07	6.62E-05	5.5E-02	4E-06	9.19E+01	1.80E-01	7.8E-03	**1E-03**
VOC	2-Butanone	78-93-3	ID														1.27E-06							
VOC	Carbon Disulfide	75-15-0															3.18E-07							
VOC	Chloroethane	75-00-3				2.9E-03				2.9E-03							5.59E-07		2.9E-03					
VOC	Chloromethane	74-87-3	D														4.42E-07							
VOC	Cumene	98-82-8	D	3.08E+01	1.72E-07							1.1E-01	2.2E-04			5.37E+02	6.51E-08	3.22E-06			7.47E-01	1.46E-03		
VOC	Cyclohexane	110-82-7	ID														9.50E-08							
VOC	1,2-Dichlorobenzene	95-50-1	D														5.52E-08							
VOC	Dichlorodifluoromethane	75-71-8															1.84E-07							
VOC	1,1-Dichloroethane	75-34-3	C	5.25E-02	2.93E-10							4.7E-04	9.2E-07			9.15E-01	3.00E-07	2.53E-08			7.03E-02	1.38E-04		
VOC	cis-1,2-Dichloroethene	156-59-2	D	6.81E-02	3.81E-10							5.2E-04	1.0E-06			1.19E+00	2.89E-07	3.17E-08			8.10E-02	1.59E-04		
VOC	Ethyl Benzene	100-41-4	D	4.34E+02	2.43E-06							1.2E+00	2.3E-03			7.57E+03	9.75E-08	6.81E-05			2.47E+01	4.84E-02		
VOC	Methyl Acetate	79-20-9															1.35E-06							
VOC	4-Methyl-2-pentanone	108-10-1	ID														4.74E-07							
VOC	Methylcyclohexane	108-87-2		1.97E+01	1.10E-07							3.2E-01	6.3E-04			3.43E+02	1.21E-07	3.82E-06			4.96E+00	9.70E-03		
VOC	Methylene Chloride	75-09-2	B2	9.08E+00	5.08E-08	7.5E-03	4E-10			7.5E-03		8.0E-02	1.6E-04	4.7E-04	7E-08	1.58E+02	5.24E-07	7.65E-06	7.5E-03	6E-08	2.85E+01	5.58E-02	4.7E-04	3E-05
VOC	Tetrachloroethene	127-18-4	C-B2			5.2E-02				5.2E-02				3.1E-03			8.53E-08		5.2E-02				3.1E-03	
VOC	Toluene	108-88-3	D	2.62E+03	1.47E-05							5.4E+00	1.0E-02			4.58E+04	1.51E-07	6.37E-04			4.89E+02	9.56E-01		
VOC	1,2,4-Trichlorobenzene	120-82-1	D														2.70E-08							
VOC	1,1,1-Trichloroethane	71-55-6	D														1.29E-07							
VOC	1,1,2-Trichloroethane	79-00-5	C			5.7E-02				5.7E-02				1.6E-02			1.81E-07		5.7E-02				1.6E-02	
VOC	Trichloroethene	79-01-6	C-B2	2.11E-01	1.18E-09	1.1E-02	1E-11			1.1E-02		1.4E-03	2.8E-06	1.7E-03	5E-09	3.69E+00	1.10E-07	3.73E-08	1.1E-02	4E-10	9.55E-02	1.87E-04	1.7E-03	3E-07
VOC	Trichlorofluoromethane	75-69-4															1.20E-07							
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1															5.06E-08							
VOC	Vinyl Chloride	75-01-4	A			1.4E+00				1.4E+00				8.8E-03			5.40E-07		1.4E+00				8.8E-03	
VOC	Xylenes (total)	1330-20-7	ID	1.60E+03	8.97E-06							2.3E+00	4.5E-03			2.80E+04	9.55E-08	2.47E-04			7.81E+01	1.53E-01		
SVOC	Acenaphthene	83-32-9						1.3E-01									3.57E-08							
SVOC	Benzo(a)anthracene	56-55-3	B2			7.3E-01		1.3E-01		7.3E-01				8.9E-02			4.79E-09		7.3E-01				8.9E-02	
SVOC	Benzo(a)pyrene	50-32-8	B2			7.3E+00		1.3E-01		7.3E+00				8.9E-01			2.64E-09		7.3E+00				8.9E-01	
SVOC	Benzo(b)fluoranthene	205-99-2	B2			7.3E-01		1.3E-01		7.3E-01				8.9E-02			2.46E-09		7.3E-01				8.9E-02	
SVOC	Benzo(k)fluoranthene	207-08-9	B2			7.3E-02		1.3E-01		7.3E-02				8.9E-03			2.46E-09		7.3E-02				8.9E-03	
SVOC	Biphenyl	92-52-4	D					1.0E-01									3.12E-08							
SVOC	bis(2-Chloroethoxy)methane	111-91-1	D					1.0E-01									2.46E-07							
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2			1.4E-02		1.0E-01		1.4E-02				4.0E-03			2.14E-10		1.4E-02				4.0E-03	
SVOC	Butylbenzylphthalate	85-68-7	C			1.9E-03		1.0E-01		1.9E-03				5.4E-04			5.46E-09		1.9E-03				5.4E-04	
SVOC	Chrysene	218-01-9	B2			7.3E-03		1.3E-01		7.3E-03				8.9E-04			4.79E-09		7.3E-03				8.9E-04	
SVOC	2,4-Dinitrotoluene	121-14-2	B2			6.8E-01		1.0E-01		6.8E-01							1.29E-07		6.8E-01					
SVOC	Di-n-octylphthalate	117-84-0						1.0E-01									8.83E-11							
SVOC	Fluoranthene	206-44-0	D					1.3E-01									9.90E-09							
SVOC	Fluorene	86-73-7	D					1.3E-01									2.55E-08							
SVOC	2-Methylnaphthalene	91-57-6	ID	4.44E+01	2.48E-07			1.0E-01	8.19E-08			9.7E-03	1.9E-05			7.74E+02	4.09E-08	2.92E-06			1.08E-02	2.12E-05		
SVOC	Naphthalene	91-20-3	C	7.06E+01	3.95E-07			1.3E-01	1.69E-07			2.9E-02	5.7E-05			1.23E+03	6.78E-08	7.70E-06			3.04E-02	5.94E-05		
SVOC	Phenanthrene	85-01-8	D					1.3E-01									1.94E-08							
SVOC	Pyrene	129-00-0	D					1.3E-01									9.98E-09							
PCB	PCBs (total)	1336-36-3	B2			2.0E+00		1.4E-01		2.0E+00				5.7E-01			1.05E-09		2.0E+00				5.7E-01	
INORG	Antimony	7440-36-0															2.00E-06							
INORG	Arsenic	7440-38-2	A	7.57E-02	4.23E-10	1.5E+00	6E-10	3.0E-02	4.19E-11	1.5E+00	6E-11			4.3E+00		1.32E+00	2.00E-06	2.44E-07	1.5E+00	4E-07			4.3E+00	
INORG	Barium	7440-39-3	D	6.56E-02	3.67E-10											1.14E+00	2.00E-06	2.11E-07						
INORG	Beryllium	7440-41-7	B1											2.4E+00			2.00E-06						2.4E+00	
INORG	Cadmium	7440-43-9	B1	9.59E-03	5.36E-11			1.0E-03	1.77E-13					1.8E+00		1.67E-01	2.00E-06	3.09E-08					1.8E+00	
INORG	Chromium (total)	7440-47-3		1.97E-01	1.10E-09									1.2E+01		3.43E+00	4.00E-06	1.27E-06					1.2E+01	
INORG	Cobalt	7440-48-4	B1	2.88E-03	1.61E-11									2.8E+00		5.02E-02	8.00E-07	3.70E-09					2.8E+00	
INORG	Copper	7440-50-8	D	8.07E-02	4.51E-10											1.41E+00	2.00E-06	2.60E-07						
INORG	Cyanide (total)	57-12-5	D														2.00E-06							
INORG	Lead	7439-92-1	B2	1.72E-01	9.59E-10											2.99E+00	2.00E-07	5.52E-08						
INORG	Manganese	7439-96-5	D	5.55E-02	3.10E-10											9.68E-01	2.00E-06	1.79E-07						
INORG	Mercury	7439-97-6	D														2.00E-06							

Attachment G5: Maintenance Worker Cancer Risk Calculations - AOI 36-1
GMC: NAO Flint Operations Site, Flint, Michigan

				Smear Zone Soil Ingestion				Smear Zone Soil Dermal Contact				Smear Zone Soil Vapor Inhalation				NAPL Dermal Contact					NAPL Vapor Inhalation			
Chem Group	**Chemical**	**CASRN**	**Cancer Class**	**C_{SZsoil}** (mg/kg)	**LADD** (mg/kg/d)	**SF_{oral}** $(mg/kg/d)^{-1}$	**Risk**	**AF_{derm}**	**LADD** (mg/kg/d)	**SF_{derm}** $(mg/kg/d)^{-1}$	**Risk**	**C_{air}** (mg/m^3)	**C_{exp}** (mg/m^3)	**URF** (m^3/mg)	**Risk**	**C_{NAPL}** (mg/L)	**DA** (L/cm^2)	**LADD** (mg/kg/d)	**SF_{derm}** $(mg/kg/d)^{-1}$	**Risk**	**C_{air}** (mg/m^3)	**C_{air}** (mg/m^3)	**URF** (m^3/mg)	**Risk**
INORG	Nickel	7440-02-0	A	2.42E-02	1.35E-10									2.4E-01		4.22E-01	4.00E-07	1.56E-08					2.4E-01	
INORG	Selenium	7782-49-2	D														2.00E-06							
INORG	Silver	7440-22-4	D														1.20E-06							
INORG	Thallium	7440-28-0															2.00E-06							
INORG	Vanadium	7440-62-2		4.49E-02	2.51E-10											7.83E-01	2.00E-06	1.45E-07						
INORG	Zinc	7440-66-6	D	1.06E-01	5.92E-10											1.85E+00	1.20E-06	2.05E-07						

Attachment G5: Maintenance Worker Hazard Index Calculations - AOI 36-1
GMC: NAO Flint Operations Site, Flint, Michigan

				Smear Zone Soil Ingestion				Smear Zone Soil Dermal Contact				Smear Zone Soil Vapor Inhalation				NAPL Dermal Contact					NAPL Vapor Inhalation			
Chem Group	Chemical	CASRN	Cancer Class	C_{SZsoil} (mg/kg)	ADD (mg/kg/d)	RfD_{oral} (mg/kg/d)	HQ	AF_{derm}	ADD (mg/kg/d)	RfD_{derm} (mg/kg/d)	HQ	C_{air} (mg/m^3)	C_{exp} (mg/m^3)	RfC (mg/m^3)	HQ	C_{NAPL} (mg/L)	DA (L/cm^2)	ADD (mg/kg/d)	RfD_{derm} (mg/kg/d)	HQ	C_{air} (mg/m^3)	C_{air} (mg/m^3)	RfC (mg/m^3)	HQ
VOC	Acetone	67-64-1	ID			9.0E-01				9.0E-01				3.2E+00			2.21E-06		9.0E-01				3.2E+00	
VOC	Benzene	71-43-2	A	1.46E+02	5.73E-06	4.0E-03	1E-03			4.0E-03		1.2E+00	1.6E-02	3.0E-02	5E-01	2.55E+03	2.81E-07	4.64E-04	4.0E-03	1E-01	9.19E+01	1.26E+00	3.0E-02	**4E+01**
VOC	2-Butanone	78-93-3	ID			6.0E-01				6.0E-01				5.0E+00			1.27E-06		6.0E-01				5.0E+00	
VOC	Carbon Disulfide	75-15-0				1.0E-01				1.0E-01				7.0E-01			3.18E-07		1.0E-01				7.0E-01	
VOC	Chloroethane	75-00-3				4.0E-01				4.0E-01				1.0E+01			5.59E-07		4.0E-01				1.0E+01	
VOC	Chloromethane	74-87-3	D											9.0E-02			4.42E-07						9.0E-02	
VOC	Cumene	98-82-8	D	3.08E+01	1.20E-06	1.0E-01	1E-05			1.0E-01		1.1E-01	1.5E-03	4.0E-01	4E-03	5.37E+02	6.51E-08	2.26E-05	1.0E-01	2E-04	7.47E-01	1.02E-02	4.0E-01	3E-02
VOC	Cyclohexane	110-82-7	ID											6.0E+00			9.50E-08						6.0E+00	
VOC	1,2-Dichlorobenzene	95-50-1	D			9.0E-02				9.0E-02				2.0E-01			5.52E-08		9.0E-02				2.0E-01	
VOC	Dichlorodifluoromethane	75-71-8				2.0E-01				2.0E-01				2.0E-01			1.84E-07		2.0E-01				2.0E-01	
VOC	1,1-Dichloroethane	75-34-3	C	5.25E-02	2.05E-09	1.0E-01	2E-08			1.0E-01		4.7E-04	6.4E-06	5.0E-01	1E-05	9.15E-01	3.00E-07	1.77E-07	1.0E-01	2E-06	7.03E-02	9.63E-04	5.0E-01	2E-03
VOC	cis-1,2-Dichloroethene	156-59-2	D	6.81E-02	2.67E-09	1.0E-02	3E-07			1.0E-02		5.2E-04	7.1E-06	3.5E-02	2E-04	1.19E+00	2.89E-07	2.22E-07	1.0E-02	2E-05	8.10E-02	1.11E-03	3.5E-02	3E-02
VOC	Ethyl Benzene	100-41-4	D	4.34E+02	1.70E-05	1.0E-01	2E-04			1.0E-01		1.2E+00	1.6E-02	1.0E+00	2E-02	7.57E+03	9.75E-08	4.77E-04	1.0E-01	5E-03	2.47E+01	3.39E-01	1.0E+00	3E-01
VOC	Methyl Acetate	79-20-9				1.0E+00				1.0E+00				3.5E+00			1.35E-06		1.0E+00				3.5E+00	
VOC	4-Methyl-2-pentanone	108-10-1	ID											3.0E+00			4.74E-07						3.0E+00	
VOC	Methylcyclohexane	108-87-2		1.97E+01	7.70E-07							3.2E-01	4.4E-03	3.0E+00	1E-03	3.43E+02	1.21E-07	2.67E-05			4.96E+00	6.79E-02	3.0E+00	2E-02
VOC	Methylene Chloride	75-09-2	B2	9.08E+00	3.55E-07	6.0E-02	6E-06			6.0E-02		8.0E-02	1.1E-03	3.0E+00	4E-04	1.58E+02	5.24E-07	5.36E-05	6.0E-02	9E-04	2.85E+01	3.91E-01	3.0E+00	1E-01
VOC	Tetrachloroethene	127-18-4	C-B2			1.0E-02				1.0E-02				4.0E-01			8.53E-08		1.0E-02				4.0E-01	
VOC	Toluene	108-88-3	D	2.62E+03	1.03E-04	8.0E-02	1E-03			8.0E-02		5.4E+00	7.3E-02	5.0E+00	1E-02	4.58E+04	1.51E-07	4.46E-03	8.0E-02	6E-02	4.89E+02	6.69E+00	5.0E+00	1E+00
VOC	1,2,4-Trichlorobenzene	120-82-1	D			1.0E-02				1.0E-02				2.0E-01			2.70E-08		1.0E-02				2.0E-01	
VOC	1,1,1-Trichloroethane	71-55-6	D			2.8E-01				2.8E-01				2.2E+00			1.29E-07		2.8E-01				2.2E+00	
VOC	1,1,2-Trichloroethane	79-00-5	C			4.0E-03				4.0E-03							1.81E-07		4.0E-03					
VOC	Trichloroethene	79-01-6	C-B2	2.11E-01	8.27E-09	6.0E-03	1E-06			6.0E-03		1.4E-03	2.0E-05			3.69E+00	1.10E-07	2.61E-07	6.0E-03	4E-05	9.55E-02	1.31E-03		
VOC	Trichlorofluoromethane	75-69-4				3.0E-01				3.0E-01				7.0E-01			1.20E-07		3.0E-01				7.0E-01	
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1				3.0E+01				3.0E+01				3.0E+01			5.06E-08		3.0E+01				3.0E+01	
VOC	Vinyl Chloride	75-01-4	A			3.0E-03				3.0E-03				1.0E-01			5.40E-07		3.0E-03				1.0E-01	
VOC	Xylenes (total)	1330-20-7	ID	1.60E+03	6.28E-05	2.0E-01	3E-04			2.0E-01		2.3E+00	3.2E-02	1.0E-01	3E-01	2.80E+04	9.55E-08	1.73E-03	2.0E-01	9E-03	7.81E+01	1.07E+00	1.0E-01	**1E+01**
SVOC	Acenaphthene	83-32-9				6.0E-02		1.30E-01		6.0E-02				2.1E-01			3.57E-08		6.0E-02				2.1E-01	
SVOC	Benzo(a)anthracene	56-55-3	B2					1.30E-01									4.79E-09							
SVOC	Benzo(a)pyrene	50-32-8	B2					1.30E-01									2.64E-09							
SVOC	Benzo(b)fluoranthene	205-99-2	B2					1.30E-01									2.46E-09							
SVOC	Benzo(k)fluoranthene	207-08-9	B2					1.30E-01									2.46E-09							
SVOC	Biphenyl	92-52-4	D			5.0E-02		1.00E-01		5.0E-02				1.8E-01			3.12E-08		5.0E-02				1.8E-01	
SVOC	bis(2-Chloroethoxy)methane	111-91-1	D					1.00E-01									2.46E-07							
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2			2.0E-02		1.00E-01		2.0E-02				7.0E-02			2.14E-10		2.0E-02				7.0E-02	
SVOC	Butylbenzylphthalate	85-68-7	C			2.0E-01		1.00E-01		2.0E-01				7.0E-01			5.46E-09		2.0E-01				7.0E-01	
SVOC	Chrysene	218-01-9	B2					1.30E-01									4.79E-09							
SVOC	2,4-Dinitrotoluene	121-14-2	B2			2.0E-03		1.00E-01		2.0E-03							1.29E-07		2.0E-03					
SVOC	Di-n-octylphthalate	117-84-0				4.0E-02		1.00E-01		4.0E-02							8.83E-11		4.0E-02					
SVOC	Fluoranthene	206-44-0	D			4.0E-02		1.30E-01		4.0E-02				1.4E-01			9.90E-09		4.0E-02				1.4E-01	
SVOC	Fluorene	86-73-7	D			4.0E-02		1.30E-01		4.0E-02				1.4E-01			2.55E-08		4.0E-02				1.4E-01	
SVOC	2-Methylnaphthalene	91-57-6	ID	4.44E+01	1.74E-06	4.0E-03	4E-04	1.00E-01	5.73E-07	4.0E-03	1E-04	9.7E-03	1.3E-04	3.0E-03	4E-02	7.74E+02	4.09E-08	2.05E-05	4.0E-03	5E-03	1.08E-02	1.48E-04	3.0E-03	5E-02
SVOC	Naphthalene	91-20-3	C	7.06E+01	2.76E-06	2.0E-02	1E-04	1.30E-01	1.19E-06	2.0E-02	6E-05	2.9E-02	4.0E-04	3.0E-03	1E-01	1.23E+03	6.78E-08	5.39E-05	2.0E-02	3E-03	3.04E-02	4.16E-04	3.0E-03	1E-01
SVOC	Phenanthrene	85-01-8	D			3.0E-02		1.30E-01		3.0E-02				1.1E-01			1.94E-08		3.0E-02				1.1E-01	
SVOC	Pyrene	129-00-0	D			3.0E-02		1.30E-01		3.0E-02				1.1E-01			9.98E-09		3.0E-02				1.1E-01	
PCB	PCBs (total)	1336-36-3	B2			2.0E-05		1.40E-01		2.0E-05							1.05E-09		2.0E-05					
INORG	Antimony	7440-36-0				4.0E-04				6.0E-05				1.4E-03			2.00E-06		6.0E-05				1.4E-03	
INORG	Arsenic	7440-38-2	A	7.57E-02	2.96E-09	3.0E-04	1E-05	3.00E-02	2.93E-10	3.0E-04	1E-06					1.32E+00	2.00E-06	1.70E-06	3.0E-04	6E-03				
INORG	Barium	7440-39-3	D	6.56E-02	2.57E-09	7.0E-02	4E-08			4.9E-03						1.14E+00	2.00E-06	1.48E-06	4.9E-03	3E-04				
INORG	Beryllium	7440-41-7	B1			2.0E-03				1.4E-05				2.0E-05			2.00E-06		1.4E-05				2.0E-05	
INORG	Cadmium	7440-43-9	B1	9.59E-03	3.75E-10	1.0E-03	4E-07	1.00E-03	1.24E-12	2.5E-05	5E-08			2.0E-04		1.67E-01	2.00E-06	2.16E-07	2.5E-05	9E-03			2.0E-04	
INORG	Chromium (total)	7440-47-3		1.97E-01	7.70E-09	3.0E-03	3E-06			7.5E-05				1.0E-04		3.43E+00	4.00E-06	8.87E-06	7.5E-05	1E-01			1.0E-04	
INORG	Cobalt	7440-48-4	B1	2.88E-03	1.13E-10	2.0E-02	6E-09			2.0E-02				2.0E-05		5.02E-02	8.00E-07	2.59E-08	2.0E-02	1E-06			2.0E-05	
INORG	Copper	7440-50-8	D	8.07E-02	3.16E-09	4.0E-02	8E-08			4.0E-02				1.4E-01		1.41E+00	2.00E-06	1.82E-06	4.0E-02	5E-05			1.4E-01	
INORG	Cyanide (total)	57-12-5	D			2.0E-02				2.0E-02				7.0E-02			2.00E-06		2.0E-02				7.0E-02	
INORG	Lead	7439-92-1	B2	1.72E-01	6.71E-09											2.99E+00	2.00E-07	3.86E-07						
INORG	Manganese	7439-96-5	D	5.55E-02	2.17E-09	1.4E-01	2E-08			8.4E-03				5.0E-05		9.68E-01	2.00E-06	1.25E-06	8.4E-03	1E-04			5.0E-05	
INORG	Mercury	7439-97-6	D			3.0E-04				3.0E-04				3.0E-04			2.00E-06		3.0E-04				3.0E-04	
INORG	Nickel	7440-02-0	A	2.42E-02	9.48E-10	2.0E-02	5E-08			8.0E-04						4.22E-01	4.00E-07	1.09E-07	8.0E-04	1E-04				

Attachment G5: Maintenance Worker Hazard Index Calculations - AOI 36-1
GMC: NAO Flint Operations Site, Flint, Michigan

				Smear Zone Soil Ingestion				Smear Zone Soil Dermal Contact				Smear Zone Soil Vapor Inhalation				NAPL Dermal Contact					NAPL Vapor Inhalation			
Chem Group	**Chemical**	**CASRN**	**Cancer Class**	**C_{SZsoil}** (mg/kg)	**ADD** (mg/kg/d)	**RfD_{oral}** (mg/kg/d)	**HQ**	**AF_{derm}**	**ADD** (mg/kg/d)	**RfD_{derm}** (mg/kg/d)	**HQ**	**C_{air}** (mg/m^3)	**C_{exp}** (mg/m^3)	**RfC** (mg/m^3)	**HQ**	**C_{NAPL}** (mg/L)	**DA** (L/cm^2)	**ADD** (mg/kg/d)	**RfD_{derm}** (mg/kg/d)	**HQ**	**C_{air}** (mg/m^3)	**C_{air}** (mg/m^3)	**RfC** (mg/m^3)	**HQ**
INORG	Selenium	7782-49-2	D			5.0E-03				5.0E-03				1.8E-02			2.00E-06		5.0E-03				1.8E-02	
INORG	Silver	7440-22-4	D			5.0E-03				2.0E-04				1.0E-05			1.20E-06		2.0E-04				1.0E-05	
INORG	Thallium	7440-28-0				7.0E-05				7.0E-05				2.5E-04			2.00E-06		7.0E-05				2.5E-04	
INORG	Vanadium	7440-62-2		4.49E-02	1.76E-09	7.0E-03	3E-07			1.8E-04				2.5E-02		7.83E-01	2.00E-06	1.01E-06	1.8E-04	6E-03			2.5E-02	
INORG	Zinc	7440-66-6	D	1.06E-01	4.15E-09	3.0E-01	1E-08			3.0E-01				1.1E+00		1.85E+00	1.20E-06	1.43E-06	3.0E-01	5E-06			1.1E+00	

Attachment G6
Exposure of Redevelopment Construction Workers to Soil

Attachment G6: Vapor Flux from Soil to Ambient Air
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	K_{oc} (L/kg)	K_d (L/kg)	H (unitless)	D_{air} (m^2/d)	D_{water} (m^2/d)	R_L (unitless)	D_G (m^2/d)	D_L (m^2/d)	D_E (m^2/d)	J_G (kg/m^2-s)
VOC	Acetone	67-64-1	5.81E-01		7.95E-04	1.07E+00	9.85E-05	7.81E-02	1.47E-01	1.21E-07	1.50E-03	4.29E-05
VOC	Benzene	71-43-2	5.82E+01		1.14E-01	7.60E-01	8.47E-05	3.00E-01	1.04E-01	1.04E-07	3.96E-02	2.20E-04
VOC	Bromodichloromethane	75-27-4	5.51E+01		3.28E-02	2.57E-01	9.16E-05	2.65E-01	3.54E-02	1.13E-07	4.38E-03	7.33E-05
VOC	2-Butanone	78-93-3	2.00E+00		1.14E-03	6.98E-01	8.47E-05	8.28E-02	9.59E-02	1.04E-07	1.32E-03	4.03E-05
VOC	Carbon Disulfide	75-15-0	4.59E+01		6.20E-01	8.99E-01	8.64E-05	4.19E-01	1.23E-01	1.06E-07	1.83E-01	4.73E-04
VOC	Carbon Tetrachloride	56-23-5	1.74E+02		6.25E-01	6.74E-01	7.60E-05	8.35E-01	9.26E-02	9.36E-08	6.93E-02	2.92E-04
VOC	Chlorobenzene	108-90-7	2.20E+02		7.60E-02	6.31E-01	7.52E-05	8.14E-01	8.66E-02	9.25E-08	8.09E-03	9.96E-05
VOC	Chloroethane	75-00-3	1.62E+01		1.80E-01	2.34E+00	9.94E-05	1.85E-01	3.22E-01	1.22E-07	3.13E-01	6.20E-04
VOC	Chloroform	67-66-3	3.97E+01		7.50E-02	8.99E-01	8.64E-05	2.28E-01	1.23E-01	1.06E-07	4.06E-02	2.23E-04
VOC	Chloromethane	74-87-3	3.97E+01		1.80E-01	1.09E+00	5.62E-05	2.61E-01	1.50E-01	6.91E-08	1.03E-01	3.56E-04
VOC	Cumene	98-82-8	7.05E+02		2.66E-01	5.62E-01	6.13E-05	2.44E+00	7.71E-02	7.55E-08	8.39E-03	1.01E-04
VOC	Cyclohexane	110-82-7	6.35E+02		3.98E+00	7.25E-01	7.86E-05	3.38E+00	9.96E-02	9.68E-08	1.17E-01	3.80E-04
VOC	Dibromochloromethane	124-48-1	6.26E+01		1.61E-02	1.69E-01	9.07E-05	2.84E-01	2.33E-02	1.12E-07	1.32E-03	4.02E-05
VOC	1,2-Dichlorobenzene	95-50-1	6.23E+02		3.90E-02	5.96E-01	6.83E-05	2.11E+00	8.19E-02	8.40E-08	1.51E-03	4.31E-05
VOC	1,3-Dichlorobenzene	541-73-1	5.69E+02		6.33E-02	5.98E-01	6.79E-05	1.94E+00	8.21E-02	8.36E-08	2.68E-03	5.74E-05
VOC	1,4-Dichlorobenzene	106-46-7	6.12E+02		4.98E-02	5.96E-01	6.83E-05	2.07E+00	8.19E-02	8.40E-08	1.97E-03	4.91E-05
VOC	Dichlorodifluoromethane	75-71-8	6.15E+01		7.01E+00	6.91E-01	6.91E-05	2.47E+00	9.49E-02	8.51E-08	2.70E-01	5.75E-04
VOC	1,1-Dichloroethane	75-34-3	3.13E+01		1.15E-01	6.41E-01	9.07E-05	2.13E-01	8.81E-02	1.12E-07	4.74E-02	2.41E-04
VOC	1,2-Dichloroethane	107-06-2	1.75E+01		2.01E-02	8.99E-01	8.55E-05	1.39E-01	1.23E-01	1.05E-07	1.78E-02	1.48E-04
VOC	1,1-Dichloroethene	75-35-4	5.82E+01		5.35E-01	7.78E-01	8.99E-05	4.32E-01	1.07E-01	1.11E-07	1.32E-01	4.03E-04
VOC	cis-1,2-Dichloroethene	156-59-2	3.56E+01		8.35E-02	6.36E-01	9.76E-05	2.17E-01	8.73E-02	1.20E-07	3.35E-02	2.03E-04
VOC	trans-1,2-Dichloroethene	156-60-5	5.22E+01		1.93E-01	6.11E-01	1.03E-04	3.05E-01	8.39E-02	1.27E-07	5.29E-02	2.55E-04
VOC	1,2-Dichloropropane	78-87-5	4.35E+01		5.75E-02	6.76E-01	7.54E-05	2.35E-01	9.28E-02	9.28E-08	2.27E-02	1.67E-04
VOC	Ethyl Benzene	100-41-4	3.67E+02		1.62E-01	6.48E-01	6.74E-05	1.32E+00	8.90E-02	8.29E-08	1.09E-02	1.16E-04
VOC	2-Hexanone	591-78-6	1.48E+01		3.58E-02							
VOC	Methyl Acetate	79-20-9	1.66E+00		1.85E-03	8.27E-01	9.50E-05	8.20E-02	1.14E-01	1.17E-07	2.57E-03	5.61E-05
VOC	Methyl tert-butyl ether	1634-04-4	1.15E+01		1.20E-02	7.42E-01	8.73E-05	1.17E-01	1.02E-01	1.07E-07	1.05E-02	1.13E-04
VOC	4-Methyl-2-pentanone	108-10-1	1.05E+01		2.82E-03	6.48E-01	6.74E-05	1.11E-01	8.90E-02	8.29E-08	2.26E-03	5.27E-05
VOC	Methylcyclohexane	108-87-2	2.66E+02		8.78E+00	6.35E-01	7.36E-05	3.68E+00	8.72E-02	9.06E-08	2.08E-01	5.05E-04

Attachment G6: Vapor Flux from Soil to Ambient Air
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	K_{oc} (L/kg)	K_d (L/kg)	H (unitless)	D_{air} (m^2/d)	D_{water} (m^2/d)	R_L (unitless)	D_G (m^2/d)	D_L (m^2/d)	D_E (m^2/d)	J_G (kg/m^2-s)
VOC	Methylene Chloride	75-09-2	1.17E+01		4.49E-02	8.73E-01	1.01E-04	1.28E-01	1.20E-01	1.24E-07	4.21E-02	2.27E-04
VOC	Styrene	100-42-5	7.77E+02		5.65E-02	6.13E-01	6.91E-05	2.61E+00	8.43E-02	8.51E-08	1.82E-03	4.73E-05
VOC	Tetrachloroethene	127-18-4	1.56E+02		3.77E-01	6.22E-01	7.08E-05	6.99E-01	8.54E-02	8.72E-08	4.61E-02	2.38E-04
VOC	Toluene	108-88-3	1.80E+02		1.36E-01	7.52E-01	7.43E-05	7.03E-01	1.03E-01	9.15E-08	2.00E-02	1.57E-04
VOC	1,2,4-Trichlorobenzene	120-82-1	1.79E+03		2.91E-02	2.59E-01	7.11E-05	5.90E+00	3.56E-02	8.75E-08	1.76E-04	1.47E-05
VOC	1,1,1-Trichloroethane	71-55-6	1.10E+02		3.53E-01	6.74E-01	7.60E-05	5.43E-01	9.26E-02	9.36E-08	6.00E-02	2.71E-04
VOC	1,1,2-Trichloroethane	79-00-5	5.03E+01		1.87E-02	6.74E-01	7.60E-05	2.45E-01	9.26E-02	9.36E-08	7.07E-03	9.31E-05
VOC	Trichloroethene	79-01-6	1.68E+02		2.11E-01	6.83E-01	7.86E-05	6.85E-01	9.37E-02	9.68E-08	2.89E-02	1.88E-04
VOC	Trichlorofluoromethane	75-69-4	1.21E+02		1.98E+00	7.52E-01	8.38E-05	1.09E+00	1.03E-01	1.03E-07	1.88E-01	4.80E-04
VOC	1,1,2-Trichloro-1,2,2-trifluoroe	76-13-1	3.81E+02		9.83E+00	6.74E-01	7.08E-05	4.38E+00	9.26E-02	8.72E-08	2.08E-01	5.04E-04
VOC	1,2,4-Trimethylbenzene	95-63-6	8.97E+02		1.26E-01	5.24E-01	6.84E-05	3.02E+00	7.19E-02	8.42E-08	2.99E-03	6.06E-05
VOC	1,3,5-Trimethylbenzene	108-67-8	1.76E+03		1.20E-01	5.20E-01	7.49E-05	5.82E+00	7.14E-02	9.22E-08	1.48E-03	4.25E-05
VOC	Vinyl Chloride	75-01-4	1.85E+01		5.55E-01	9.16E-01	1.06E-04	3.09E-01	1.26E-01	1.31E-07	2.26E-01	5.26E-04
VOC	Xylenes (total)	1330-20-7	3.86E+02		1.38E-01	6.74E-01	7.56E-05	1.37E+00	9.25E-02	9.30E-08	9.33E-03	1.07E-04
SVOC	Acenaphthene	83-32-9	7.14E+03		3.18E-03	3.64E-01	6.64E-05	2.32E+01	5.00E-02	8.18E-08	6.85E-06	2.90E-06
SVOC	Acenaphthylene	208-96-8	7.47E+03		2.31E-03	3.88E-01	6.03E-05	2.43E+01	5.33E-02	7.42E-08	5.07E-06	2.49E-06
SVOC	Acetophenone	98-86-2	3.58E+01		2.19E-04	6.91E-01	6.91E-05	1.92E-01	9.49E-02	8.51E-08	1.09E-04	1.15E-05
SVOC	Anthracene	120-12-7	2.97E+04		1.34E-03	2.80E-01	6.69E-05	9.63E+01	3.84E-02	8.23E-08	5.34E-07	8.09E-07
SVOC	Atrazine	1912-24-9	3.68E+02		1.25E-07	2.24E-01	5.76E-05	1.27E+00	3.07E-02	7.09E-08	5.89E-08	2.69E-07
SVOC	Benzaldehyde	100-52-7	2.85E+01		4.86E-04	6.23E-01	7.84E-05	1.69E-01	8.56E-02	9.65E-08	2.47E-04	1.74E-05
SVOC	Benzo(a)anthracene	56-55-3	4.01E+05		6.85E-05	4.41E-01	7.78E-05	1.30E+03	6.05E-02	9.57E-08	3.26E-09	6.33E-08
SVOC	Benzo(a)pyrene	50-32-8	1.01E+06		2.32E-05	3.72E-01	7.78E-05	3.29E+03	5.10E-02	9.57E-08	3.88E-10	2.18E-08
SVOC	Benzo(b)fluoranthene	205-99-2	1.24E+06		2.28E-03	1.95E-01	4.80E-05	4.03E+03	2.68E-02	5.91E-08	1.51E-08	1.36E-07
SVOC	Benzo(g,h,i)perylene	191-24-2	1.28E+07		2.88E-06	1.88E-01	4.54E-05	4.15E+04	2.58E-02	5.59E-08	3.14E-12	1.96E-09
SVOC	Benzo(k)fluoranthene	207-08-9	1.24E+06		1.70E-05	1.95E-01	4.80E-05	4.03E+03	2.68E-02	5.91E-08	1.28E-10	1.25E-08
SVOC	Biphenyl	92-52-4	1.05E+04		6.13E-03	3.49E-01	7.04E-05	3.41E+01	4.79E-02	8.67E-08	8.63E-06	3.25E-06
SVOC	bis(2-Chloroethoxy)methane	111-91-1	1.73E+01		3.47E-06	3.77E-01	7.31E-05	1.32E-01	5.17E-02	9.00E-08	2.04E-06	1.58E-06
SVOC	bis(2-Chloroethyl) ether	111-44-4	1.55E+01		3.69E-04	5.98E-01	6.51E-05	1.26E-01	8.21E-02	8.01E-08	2.41E-04	1.72E-05
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	1.50E+07		2.09E-06	3.03E-01	3.16E-05	4.86E+04	4.17E-02	3.89E-08	2.59E-12	1.78E-09

Attachment G6: Vapor Flux from Soil to Ambient Air
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	K_{oc} (L/kg)	K_d (L/kg)	H (unitless)	D_{air} (m^2/d)	D_{water} (m^2/d)	R_L (unitless)	D_G (m^2/d)	D_L (m^2/d)	D_E (m^2/d)	J_G (kg/m^2-s)
SVOC	Butylbenzylphthalate	85-68-7	5.73E+04		2.59E-05	1.50E-01	4.17E-05	1.86E+02	2.06E-02	5.14E-08	3.15E-09	6.22E-08
SVOC	Caprolactam	105-60-2	6.51E-01		1.03E-07	5.98E-01	7.77E-05	7.81E-02	8.21E-02	9.56E-08	1.33E-06	1.28E-06
SVOC	Carbazole	86-74-8	3.38E+03		3.13E-07	3.37E-01	6.07E-05	1.10E+01	4.63E-02	7.48E-08	8.09E-09	9.96E-08
SVOC	4-Chloro-3-methylphenol	59-50-7	1.12E+03		8.15E-06	5.24E-01	8.22E-05	3.69E+00	7.19E-02	1.01E-07	1.86E-07	4.78E-07
SVOC	2-Chloronaphthalene	91-58-7	1.12E+04		6.42E-03	4.25E-01	7.59E-05	3.65E+01	5.84E-02	9.35E-08	1.03E-05	3.55E-06
SVOC	2-Chlorophenol	95-57-8	3.88E+02		8.00E-03	4.33E-01	8.17E-05	1.34E+00	5.95E-02	1.01E-07	3.56E-04	2.09E-05
SVOC	Chrysene	218-01-9	4.01E+05		1.94E-03	2.14E-01	5.37E-05	1.30E+03	2.94E-02	6.60E-08	4.40E-08	2.32E-07
SVOC	Dibenz(a,h)anthracene	53-70-3	3.77E+06		3.02E-07	1.75E-01	4.48E-05	1.22E+04	2.40E-02	5.51E-08	5.10E-12	2.50E-09
SVOC	Dibenzofuran	132-64-9	2.07E+04		2.57E-04	2.06E-01	5.18E-05	6.71E+01	2.82E-02	6.38E-08	1.09E-07	3.66E-07
SVOC	2,4-Dichlorophenol	120-83-2	1.47E+02		6.50E-05	2.99E-01	7.58E-05	5.52E-01	4.11E-02	9.33E-08	5.00E-06	2.48E-06
SVOC	Diethylphthalate	84-66-2	2.87E+02		9.25E-06	2.21E-01	5.49E-05	1.01E+00	3.04E-02	6.75E-08	3.47E-07	6.52E-07
SVOC	2,4-Dimethylphenol	105-67-9	2.09E+02		4.10E-05	5.05E-01	7.51E-05	7.53E-01	6.93E-02	9.24E-08	3.90E-06	2.19E-06
SVOC	Dimethylphthalate	131-11-3	6.89E+01		2.15E-06	4.91E-01	5.43E-05	2.99E-01	6.74E-02	6.69E-08	7.07E-07	9.31E-07
SVOC	Di-n-butylphthalate	84-74-2	3.40E+04		1.93E-08	3.78E-01	6.79E-05	1.10E+02	5.20E-02	8.36E-08	7.67E-10	3.07E-08
SVOC	4,6-Dinitro-2-methylphenol	534-52-1	1.21E+02		8.73E-06	2.38E-01	5.97E-05	4.69E-01	3.28E-02	7.35E-08	7.65E-07	9.69E-07
SVOC	2,4-Dinitrotoluene	121-14-2	9.46E+01		1.90E-06	1.75E+00	6.10E-05	3.83E-01	2.41E-01	7.51E-08	1.39E-06	1.31E-06
SVOC	2,6-Dinitrotoluene	606-20-2	6.89E+01		1.53E-05	2.83E-01	6.27E-05	2.99E-01	3.88E-02	7.72E-08	2.24E-06	1.66E-06
SVOC	Di-n-octylphthalate	117-84-0	8.38E+07		1.37E-03	1.30E-01	3.09E-05	2.72E+05	1.79E-02	3.81E-08	9.06E-11	1.05E-08
SVOC	Fluoranthene	206-44-0	1.08E+05		3.30E-04	2.61E-01	5.49E-05	3.50E+02	3.58E-02	6.75E-08	3.40E-08	2.04E-07
SVOC	Fluorene	86-73-7	1.38E+04		1.31E-03	3.14E-01	6.81E-05	4.47E+01	4.31E-02	8.38E-08	1.26E-06	1.24E-06
SVOC	Formaldehyde	50-00-0			6.95E-06	1.56E+00	1.73E-04					
SVOC	Hexachlorobutadiene	87-68-3	5.35E+04		1.67E-01	4.85E-01	5.32E-05	1.74E+02	6.66E-02	6.55E-08	6.41E-05	8.86E-06
SVOC	Hexachlorocyclopentadiene	77-47-4	1.99E+05		5.55E-01	1.39E-01	6.23E-05	6.45E+02	1.91E-02	7.67E-08	1.64E-05	4.49E-06
SVOC	Hexachloroethane	67-72-1	1.76E+03		7.95E-02	2.16E-02	5.88E-05	5.81E+00	2.97E-03	7.23E-08	4.06E-05	7.06E-06
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	3.45E+06		3.28E-05	1.64E-01	4.89E-05	1.12E+04	2.25E-02	6.02E-08	7.16E-11	9.37E-09
SVOC	Isophorone	78-59-1	4.69E+01		1.36E-04	5.38E-01	5.84E-05	2.28E-01	7.39E-02	7.19E-08	4.44E-05	7.38E-06
SVOC	2-Methylnaphthalene	91-57-6	6.23E+03		1.06E-02	4.18E-01	6.70E-05	2.03E+01	5.74E-02	8.24E-08	3.00E-05	6.06E-06
SVOC	Methylphenol (total)	1319-77-3	8.45E+01		1.77E-05	6.39E-01	8.64E-05	3.50E-01	8.78E-02	1.06E-07	4.74E-06	2.41E-06
SVOC	Naphthalene	91-20-3	2.01E+03		9.90E-03	5.10E-01	6.48E-05	6.59E+00	7.00E-02	7.98E-08	1.05E-04	1.14E-05

Attachment G6: Vapor Flux from Soil to Ambient Air
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	K_{oc} (L/kg)	K_d (L/kg)	H (unitless)	D_{air} (m^2/d)	D_{water} (m^2/d)	R_L (unitless)	D_G (m^2/d)	D_L (m^2/d)	D_E (m^2/d)	J_G (kg/m^2-s)
SVOC	2-Nitroaniline	88-74-4	6.59E+01		3.27E-06	6.31E-01	6.91E-05	2.89E-01	8.66E-02	8.51E-08	1.27E-06	1.25E-06
SVOC	Nitrobenzene	98-95-3	6.44E+01		4.92E-04	6.57E-01	7.43E-05	2.85E-01	9.02E-02	9.15E-08	1.56E-04	1.38E-05
SVOC	2-Nitrophenol	88-75-5	5.75E+01		1.94E-04	4.66E-01	6.78E-05	2.62E-01	6.40E-02	8.35E-08	4.75E-05	7.63E-06
SVOC	4-Nitrophenol	100-02-7	7.55E+01		8.48E-09	5.40E-01	8.30E-05	3.21E-01	7.42E-02	1.02E-07	3.21E-07	6.27E-07
SVOC	N-Nitrosodiphenylamine	86-30-6	1.29E+03		1.03E-04	2.70E-01	5.49E-05	4.26E+00	3.70E-02	6.75E-08	9.08E-07	1.06E-06
SVOC	N-Nitroso-di-n-propylamine	621-64-7	2.40E+01		4.62E-05	4.71E-01	7.06E-05	1.54E-01	6.47E-02	8.69E-08	2.00E-05	4.95E-06
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	2.56E+02		2.39E-03	5.20E-01	5.54E-05	9.07E-01	7.14E-02	6.82E-08	1.88E-04	1.52E-05
SVOC	Pentachlorophenol	87-86-5	5.92E+02		5.00E-07	4.84E-01	5.27E-05	1.99E+00	6.65E-02	6.49E-08	4.92E-08	2.46E-07
SVOC	Phenanthrene	85-01-8	2.42E+04		4.76E-04	3.24E-01	6.45E-05	7.86E+01	4.45E-02	7.94E-08	2.71E-07	5.76E-07
SVOC	Phenol	108-95-2	2.88E+01		8.15E-06	7.08E-01	7.86E-05	1.69E-01	9.73E-02	9.68E-08	5.26E-06	2.54E-06
SVOC	Pyrene	129-00-0	1.06E+05		2.26E-04	2.35E-01	6.26E-05	3.42E+02	3.23E-02	7.70E-08	2.15E-08	1.62E-07
SVOC	2,4,5-Trichlorophenol	95-95-4	1.60E+03		8.90E-05	2.51E-01	6.07E-05	5.25E+00	3.45E-02	7.48E-08	6.00E-07	8.58E-07
SVOC	2,4,6-Trichlorophenol	88-06-2	3.81E+02		1.60E-04	2.75E-01	5.40E-05	1.31E+00	3.77E-02	6.65E-08	4.64E-06	2.39E-06
PCB	PCBs (total)	1336-36-3	2.45E+06		4.09E-02	1.75E-01	4.32E-05	7.95E+03	2.40E-02	5.32E-08	1.23E-07	3.89E-07
INORG	Antimony	7440-36-0		4.50E+01								
INORG	Arsenic	7440-38-2		2.90E+01								
INORG	Barium	7440-39-3		4.10E+01								
INORG	Beryllium	7440-41-7		7.90E+02								
INORG	Cadmium	7440-43-9		7.50E+01								
INORG	Chromium (total)	7440-47-3		1.90E+01								
INORG	Chromium III	16065-83-1		1.80E+06								
INORG	Chromium VI	18540-29-9		1.90E+01								
INORG	Cobalt	7440-48-4		4.50E+01								
INORG	Copper	7440-50-8		3.50E+01								
INORG	Cyanide (total)	57-12-5		9.90E+00								
INORG	Fluoride	16984-48-8										
INORG	Lead	7439-92-1		9.00E+02								
INORG	Manganese	7439-96-5		6.50E+01								
INORG	Mercury	7439-97-6		1.00E+03	1.45E-01	2.65E-01	5.44E-05	1.62E+03	3.64E-02	6.70E-08	3.26E-06	2.00E-06

Attachment G6: Vapor Flux from Soil to Ambient Air
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	K_{oc} (L/kg)	K_d (L/kg)	H (unitless)	D_{air} (m^2/d)	D_{water} (m^2/d)	R_L (unitless)	D_G (m^2/d)	D_L (m^2/d)	D_E (m^2/d)	J_G (kg/m^2-s)
INORG	Nickel	7440-02-0		6.50E+01								
INORG	Selenium	7782-49-2		5.00E+00								
INORG	Silver	7440-22-4		8.30E+00								
INORG	Thallium	7440-28-0		7.10E+01								
INORG	Vanadium	7440-62-2		1.00E+03								
INORG	Zinc	7440-66-6		6.20E+01								
Notes:	Soil bulk density	kg/L	ρ_b	1.62	*Loamy Sand*							
	Soil particle density	kg/L	ρ_s	2.65	*EPA default/MDEQ 1998*							
	Soil porosity	L/L-soil	θ	0.39	*1-(pb/ps)*							
	Soil water content	L/L-soil	θ_w	0.076	*Loamy Sand*							
	Soil air-filled porosity	L/L-soil	θ_a	0.31	*porosity-water content*							
	Soil organic carbon fraction	unitless	f_{oc}	0.002								
	Averaging period	year	**ED**	1								
		s	**ED**	3.2E+07								
	Molar Gas Constant	L-mmHg/mole-^oK	**R**	62.411								
	Temperature	^oC	**T**	12								
		K	**T**	285								

Attachment G6: Risk-Based Cancer Criteria for Exposure of Redevelopment Construction Workers to Soil
GMC: NAO Flint Operations Site, Flint, Michigan

				Soil Ingestion			Soil Dermal Contact				Soil Vapor Inhalation				Soil Particulate Inhalation				
Chem Group	Chemical	CASRN	Cancer Class	LADD (mg/kg/d)	SF_{oral} $(mg/kg/d)^{-1}$	RBC (mg/kg)	ABS_{derm}	LADD (mg/kg/d)	SF_{derm} $(mg/kg/d)^{-1}$	RBC (mg/kg)	C_{air} (mg/m^3)	Dose (mg/m^3)	URF (m^3/mg)	RBC (mg/kg)	C_{air} (mg/m^3)	Dose (mg/m^3)	URF (m^3/mg)	RBC (mg/kg)	Cancer RBC (mg/kg)
VOC	Acetone	67-64-1	ID	2.80E-08							1.16E-03	1.13E-05			5.00E-08	4.89E-10			
VOC	Benzene	71-43-2	A	2.80E-08	5.5E-02	6.5E+03			5.5E-02		5.96E-03	5.83E-05	7.8E-03	2.2E+01	5.00E-08	4.89E-10	7.8E-03	2.6E+06	2.2E+01
VOC	Bromodichloromethane	75-27-4	B2	2.80E-08	6.2E-02	5.8E+03			6.2E-02		1.98E-03	1.94E-05	1.8E-02	2.9E+01	5.00E-08	4.89E-10	1.8E-02	1.2E+06	2.9E+01
VOC	2-Butanone	78-93-3	ID	2.80E-08							1.09E-03	1.06E-05			5.00E-08	4.89E-10			
VOC	Carbon Disulfide	75-15-0		2.80E-08							1.28E-02	1.25E-04			5.00E-08	4.89E-10			
VOC	Carbon Tetrachloride	56-23-5	B2	2.80E-08	1.3E-01	2.8E+03			1.3E-01		7.87E-03	7.70E-05	1.5E-02	8.7E+00	5.00E-08	4.89E-10	1.5E-02	1.4E+06	8.6E+00
VOC	Chlorobenzene	108-90-7	D	2.80E-08							2.69E-03	2.63E-05			5.00E-08	4.89E-10			
VOC	Chloroethane	75-00-3		2.80E-08	2.9E-03	1.2E+05			2.9E-03		1.67E-02	1.64E-04			5.00E-08	4.89E-10			
VOC	Chloroform	67-66-3	B2	2.80E-08							6.03E-03	5.90E-05	2.3E-02	7.4E+00	5.00E-08	4.89E-10	2.3E-02	8.9E+05	7.4E+00
VOC	Chloromethane	74-87-3	D	2.80E-08							9.61E-03	9.40E-05			5.00E-08	4.89E-10			
VOC	Cumene	98-82-8	D	2.80E-08							2.74E-03	2.68E-05			5.00E-08	4.89E-10			
VOC	Cyclohexane	110-82-7	ID	2.80E-08							1.03E-02	1.00E-04			5.00E-08	4.89E-10			
VOC	Dibromochloromethane	124-48-1	C	2.80E-08	8.4E-02	4.3E+03			8.4E-02		1.08E-03	1.06E-05	2.4E-02	3.9E+01	5.00E-08	4.89E-10	2.4E-02	8.5E+05	3.9E+01
VOC	1,2-Dichlorobenzene	95-50-1	D	2.80E-08							1.16E-03	1.14E-05			5.00E-08	4.89E-10			
VOC	1,3-Dichlorobenzene	541-73-1	D	2.80E-08							1.55E-03	1.52E-05			5.00E-08	4.89E-10			
VOC	1,4-Dichlorobenzene	106-46-7	C	2.80E-08	2.4E-02	1.5E+04			2.4E-02		1.33E-03	1.30E-05	6.3E-03	1.2E+02	5.00E-08	4.89E-10	6.3E-03	3.3E+06	1.2E+02
VOC	Dichlorodifluoromethane	75-71-8		2.80E-08							1.55E-02	1.52E-04			5.00E-08	4.89E-10			
VOC	1,1-Dichloroethane	75-34-3	C	2.80E-08							6.51E-03	6.37E-05			5.00E-08	4.89E-10			
VOC	1,2-Dichloroethane	107-06-2	B2	2.80E-08	9.1E-02	3.9E+03			9.1E-02		3.99E-03	3.91E-05	2.6E-02	9.8E+00	5.00E-08	4.89E-10	2.6E-02	7.9E+05	9.8E+00
VOC	1,1-Dichloroethene	75-35-4	C	2.80E-08							1.09E-02	1.06E-04			5.00E-08	4.89E-10			
VOC	cis-1,2-Dichloroethene	156-59-2	D	2.80E-08							5.48E-03	5.36E-05			5.00E-08	4.89E-10			
VOC	trans-1,2-Dichloroethene	156-60-5		2.80E-08							6.88E-03	6.73E-05			5.00E-08	4.89E-10			
VOC	1,2-Dichloropropane	78-87-5	B2	2.80E-08	6.8E-02	5.3E+03			6.8E-02		4.51E-03	4.41E-05			5.00E-08	4.89E-10			
VOC	Ethyl Benzene	100-41-4	D	2.80E-08							3.13E-03	3.06E-05			5.00E-08	4.89E-10			
VOC	2-Hexanone	591-78-6		2.80E-08											5.00E-08	4.89E-10			
VOC	Methyl Acetate	79-20-9		2.80E-08							1.52E-03	1.48E-05			5.00E-08	4.89E-10			
VOC	Methyl tert-butyl ether	1634-04-4		2.80E-08							3.06E-03	2.99E-05			5.00E-08	4.89E-10			
VOC	4-Methyl-2-pentanone	108-10-1	ID	2.80E-08							1.42E-03	1.39E-05			5.00E-08	4.89E-10			
VOC	Methylcyclohexane	108-87-2		2.80E-08							1.36E-02	1.33E-04			5.00E-08	4.89E-10			
VOC	Methylene Chloride	75-09-2	B2	2.80E-08	7.5E-03	4.8E+04			7.5E-03		6.13E-03	6.00E-05	4.7E-04	3.5E+02	5.00E-08	4.89E-10	4.7E-04	4.3E+07	3.5E+02
VOC	Styrene	100-42-5		2.80E-08							1.28E-03	1.25E-05			5.00E-08	4.89E-10			
VOC	Tetrachloroethene	127-18-4	C-B2	2.80E-08	5.2E-02	6.9E+03			5.2E-02		6.42E-03	6.28E-05	3.1E-03	5.2E+01	5.00E-08	4.89E-10	3.1E-03	6.7E+06	5.2E+01
VOC	Toluene	108-88-3	D	2.80E-08							4.23E-03	4.14E-05			5.00E-08	4.89E-10			
VOC	1,2,4-Trichlorobenzene	120-82-1	D	2.80E-08							3.96E-04	3.88E-06			5.00E-08	4.89E-10			
VOC	1,1,1-Trichloroethane	71-55-6	D	2.80E-08							7.33E-03	7.17E-05			5.00E-08	4.89E-10			
VOC	1,1,2-Trichloroethane	79-00-5	C	2.80E-08	5.7E-02	6.3E+03			5.7E-02		2.51E-03	2.46E-05	1.6E-02	2.5E+01	5.00E-08	4.89E-10	1.6E-02	1.3E+06	2.5E+01
VOC	Trichloroethene	79-01-6	C-B2	2.80E-08	1.1E-02	3.3E+04			1.1E-02		5.08E-03	4.97E-05	1.7E-03	1.2E+02	5.00E-08	4.89E-10	1.7E-03	1.2E+07	1.2E+02
VOC	Trichlorofluoromethane	75-69-4		2.80E-08							1.30E-02	1.27E-04			5.00E-08	4.89E-10			
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		2.80E-08							1.36E-02	1.33E-04			5.00E-08	4.89E-10			
VOC	1,2,4-Trimethylbenzene	95-63-6	ID	2.80E-08							1.64E-03	1.60E-05			5.00E-08	4.89E-10			
VOC	1,3,5-Trimethylbenzene	108-67-8	ID	2.80E-08							1.15E-03	1.12E-05			5.00E-08	4.89E-10			
VOC	Vinyl Chloride	75-01-4	A	2.80E-08	1.4E+00	2.6E+02			1.4E+00		1.42E-02	1.39E-04	8.8E-03	8.2E+00	5.00E-08	4.89E-10	8.8E-03	2.3E+06	7.9E+00
VOC	Xylenes (total)	1330-20-7	ID	2.80E-08							2.89E-03	2.83E-05			5.00E-08	4.89E-10			
SVOC	Acenaphthene	83-32-9		2.80E-08			1.30E-01	1.20E-08			7.83E-05	7.66E-07			5.00E-08	4.89E-10			
SVOC	Acenaphthylene	208-96-8	D	2.80E-08			1.30E-01	1.20E-08			6.74E-05	6.59E-07			5.00E-08	4.89E-10			
SVOC	Acetophenone	98-86-2	D	2.80E-08			1.00E-01	9.23E-09			3.12E-04	3.05E-06			5.00E-08	4.89E-10			
SVOC	Anthracene	120-12-7	D	2.80E-08			1.30E-01	1.20E-08			2.18E-05	2.14E-07			5.00E-08	4.89E-10			
SVOC	Atrazine	1912-24-9	C	2.80E-08	2.2E-01	1.6E+03	1.00E-01	9.23E-09	2.2E-01	4.9E+03	7.26E-06	7.11E-08	6.3E-02	2.2E+03	5.00E-08	4.89E-10	6.3E-02	3.2E+05	7.8E+02
SVOC	Benzaldehyde	100-52-7		2.80E-08			1.00E-01	9.23E-09			4.71E-04	4.60E-06			5.00E-08	4.89E-10			

Attachment G6: Risk-Based Cancer Criteria for Exposure of Redevelopment Construction Workers to Soil
GMC: NAO Flint Operations Site, Flint, Michigan

				Soil Ingestion			Soil Dermal Contact				Soil Vapor Inhalation				Soil Particulate Inhalation				
Chem Group	Chemical	CASRN	Cancer Class	LADD (mg/kg/d)	SF_{oral} $(mg/kg/d)^{-1}$	RBC (mg/kg)	ABS_{derm}	LADD (mg/kg/d)	SF_{derm} $(mg/kg/d)^{-1}$	RBC (mg/kg)	C_{air} (mg/m^3)	Dose (mg/m^3)	URF (m^3/mg)	RBC (mg/kg)	C_{air} (mg/m^3)	Dose (mg/m^3)	URF (m^3/mg)	RBC (mg/kg)	Cancer RBC (mg/kg)
SVOC	Benzo(a)anthracene	56-55-3	B2	2.80E-08	7.3E-01	4.9E+02	1.30E-01	1.20E-08	7.3E-01	1.1E+03	1.71E-06	1.67E-08	8.9E-02	6.8E+03	5.00E-08	4.89E-10	8.9E-02	2.3E+05	3.3E+02
SVOC	Benzo(a)pyrene	50-32-8	B2	2.80E-08	7.3E+00	4.9E+01	1.30E-01	1.20E-08	7.3E+00	1.1E+02	5.89E-07	5.77E-09	8.9E-01	2.0E+03	5.00E-08	4.89E-10	8.9E-01	2.3E+04	3.4E+01
SVOC	Benzo(b)fluoranthene	205-99-2	B2	2.80E-08	7.3E-01	4.9E+02	1.30E-01	1.20E-08	7.3E-01	1.1E+03	3.68E-06	3.60E-08	8.9E-02	3.1E+03	5.00E-08	4.89E-10	8.9E-02	2.3E+05	3.1E+02
SVOC	Benzo(g,h,i)perylene	191-24-2	D	2.80E-08			1.30E-01	1.20E-08			5.30E-08	5.18E-10			5.00E-08	4.89E-10			
SVOC	Benzo(k)fluoranthene	207-08-9	B2	2.80E-08	7.3E-02	4.9E+03	1.30E-01	1.20E-08	7.3E-02	1.1E+04	3.38E-07	3.31E-09	8.9E-03	3.4E+05	5.00E-08	4.89E-10	8.9E-03	2.3E+06	3.4E+03
SVOC	Biphenyl	92-52-4	D	2.80E-08			1.00E-01	9.23E-09			8.79E-05	8.60E-07			5.00E-08	4.89E-10			
SVOC	bis(2-Chloroethoxy)methane	111-91-1	D	2.80E-08			1.00E-01	9.23E-09			4.27E-05	4.18E-07			5.00E-08	4.89E-10			
SVOC	bis(2-Chloroethyl) ether	111-44-4	B2	2.80E-08	1.1E+00	3.3E+02	1.00E-01	9.23E-09	1.1E+00	9.9E+02	4.64E-04	4.54E-06	3.3E-01	6.7E+00	5.00E-08	4.89E-10	3.3E-01	6.2E+04	6.5E+00
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2	2.80E-08	1.4E-02	2.6E+04	1.00E-01	9.23E-09	1.4E-02	7.7E+04	4.82E-08	4.71E-10	4.0E-03	5.3E+06	5.00E-08	4.89E-10	4.0E-03	5.1E+06	1.9E+04
SVOC	Butylbenzylphthalate	85-68-7	C	2.80E-08	1.9E-03	1.9E+05	1.00E-01	9.23E-09	1.9E-03	5.7E+05	1.68E-06	1.64E-08	5.4E-04	1.1E+06	5.00E-08	4.89E-10	5.4E-04	3.8E+07	1.3E+05
SVOC	Caprolactam	105-60-2		2.80E-08			1.00E-01	9.23E-09			3.45E-05	3.38E-07			5.00E-08	4.89E-10			
SVOC	Carbazole	86-74-8	B2	2.80E-08	2.0E-02	1.8E+04	1.00E-01	9.23E-09	2.0E-02	5.4E+04	2.69E-06	2.63E-08	5.7E-03	6.6E+04	5.00E-08	4.89E-10	5.7E-03	3.6E+06	1.1E+04
SVOC	4-Chloro-3-methylphenol	59-50-7		2.80E-08			1.00E-01	9.23E-09			1.29E-05	1.26E-07			5.00E-08	4.89E-10			
SVOC	2-Chloronaphthalene	91-58-7		2.80E-08			1.00E-01	9.23E-09			9.59E-05	9.38E-07			5.00E-08	4.89E-10			
SVOC	2-Chlorophenol	95-57-8		2.80E-08			1.00E-01	9.23E-09			5.64E-04	5.52E-06			5.00E-08	4.89E-10			
SVOC	Chrysene	218-01-9	B2	2.80E-08	7.3E-03	4.9E+04	1.30E-01	1.20E-08	7.3E-03	1.1E+05	6.27E-06	6.14E-08	8.9E-04	1.8E+05	5.00E-08	4.89E-10	8.9E-04	2.3E+07	2.9E+04
SVOC	Dibenz(a,h)anthracene	53-70-3	B2	2.80E-08	7.3E+00	4.9E+01	1.30E-01	1.20E-08	7.3E+00	1.1E+02	6.75E-08	6.61E-10	8.9E-01	1.7E+04	5.00E-08	4.89E-10	8.9E-01	2.3E+04	3.4E+01
SVOC	Dibenzofuran	132-64-9	D	2.80E-08			1.00E-01	9.23E-09			9.89E-06	9.68E-08			5.00E-08	4.89E-10			
SVOC	2,4-Dichlorophenol	120-83-2		2.80E-08			1.00E-01	9.23E-09			6.69E-05	6.54E-07			5.00E-08	4.89E-10			
SVOC	Diethylphthalate	84-66-2	D	2.80E-08			1.00E-01	9.23E-09			1.76E-05	1.72E-07			5.00E-08	4.89E-10			
SVOC	2,4-Dimethylphenol	105-67-9		2.80E-08			1.00E-01	9.23E-09			5.90E-05	5.78E-07			5.00E-08	4.89E-10			
SVOC	Dimethylphthalate	131-11-3	D	2.80E-08			1.00E-01	9.23E-09			2.51E-05	2.46E-07			5.00E-08	4.89E-10			
SVOC	Di-n-butylphthalate	84-74-2	D	2.80E-08			1.00E-01	9.23E-09			8.28E-07	8.10E-09			5.00E-08	4.89E-10			
SVOC	4,6-Dinitro-2-methylphenol	534-52-1		2.80E-08			1.00E-01	9.23E-09			2.62E-05	2.56E-07			5.00E-08	4.89E-10			
SVOC	2,4-Dinitrotoluene	121-14-2	B2	2.80E-08	6.8E-01	5.3E+02	1.00E-01	9.23E-09	6.8E-01	1.6E+03	3.53E-05	3.45E-07			5.00E-08	4.89E-10			4.0E+02
SVOC	2,6-Dinitrotoluene	606-20-2	B2	2.80E-08	6.8E-01	5.3E+02	1.00E-01	9.23E-09	6.8E-01	1.6E+03	4.48E-05	4.38E-07	1.9E-01	1.2E+02	5.00E-08	4.89E-10	1.9E-01	1.1E+05	9.0E+01
SVOC	Di-n-octylphthalate	117-84-0		2.80E-08			1.00E-01	9.23E-09			2.85E-07	2.78E-09			5.00E-08	4.89E-10			
SVOC	Fluoranthene	206-44-0	D	2.80E-08			1.30E-01	1.20E-08			5.52E-06	5.40E-08			5.00E-08	4.89E-10			
SVOC	Fluorene	86-73-7	D	2.80E-08			1.30E-01	1.20E-08			3.36E-05	3.29E-07			5.00E-08	4.89E-10			
SVOC	Formaldehyde	50-00-0	B1	2.80E-08									1.3E-02		5.00E-08	4.89E-10	1.3E-02	1.6E+06	1.6E+06
SVOC	Hexachlorobutadiene	87-68-3	C	2.80E-08	7.8E-02	4.6E+03	1.00E-01	9.23E-09	7.8E-02	1.4E+04	2.39E-04	2.34E-06	2.2E-02	1.9E+02	5.00E-08	4.89E-10	2.2E-02	9.3E+05	1.8E+02
SVOC	Hexachlorocyclopentadiene	77-47-4	E	2.80E-08			1.00E-01	9.23E-09			1.21E-04	1.19E-06			5.00E-08	4.89E-10			
SVOC	Hexachloroethane	67-72-1	C	2.80E-08	1.4E-02	2.6E+04	1.00E-01	9.23E-09	1.4E-02	7.7E+04	1.91E-04	1.87E-06	4.0E-03	1.3E+03	5.00E-08	4.89E-10	4.0E-03	5.1E+06	1.3E+03
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	B2	2.80E-09	7.3E-01	4.9E+02	1.30E-01	1.20E-09	7.3E-01	1.1E+03	2.53E-08	2.48E-10	8.9E-02	4.6E+04	5.00E-09	4.89E-11	8.9E-02	2.3E+05	3.4E+02
SVOC	Isophorone	78-59-1	C	2.80E-08	9.5E-04	3.8E+05	1.00E-01	9.23E-09	9.5E-04	1.1E+06	1.99E-04	1.95E-06			5.00E-08	4.89E-10			2.8E+05
SVOC	2-Methylnaphthalene	91-57-6	ID	2.80E-08			1.00E-01	9.23E-09			1.64E-04	1.60E-06			5.00E-08	4.89E-10			
SVOC	Methylphenol (total)	1319-77-3		2.80E-08			1.00E-01	9.23E-09			6.51E-05	6.37E-07			5.00E-08	4.89E-10			
SVOC	Naphthalene	91-20-3	C	2.80E-08			1.30E-01	1.20E-08			3.07E-04	3.00E-06			5.00E-08	4.89E-10			
SVOC	2-Nitroaniline	88-74-4		2.80E-08			1.00E-01	9.23E-09			3.37E-05	3.30E-07			5.00E-08	4.89E-10			
SVOC	Nitrobenzene	98-95-3	D	2.80E-08			1.00E-01	9.23E-09			3.74E-04	3.66E-06			5.00E-08	4.89E-10			
SVOC	2-Nitrophenol	88-75-5		2.80E-08			1.00E-01	9.23E-09			2.06E-04	2.02E-06			5.00E-08	4.89E-10			
SVOC	4-Nitrophenol	100-02-7		2.80E-08			1.00E-01	9.23E-09			1.69E-05	1.66E-07			5.00E-08	4.89E-10			
SVOC	N-Nitrosodiphenylamine	86-30-6	B2	2.80E-08	4.9E-03	7.3E+04	1.00E-01	9.23E-09	4.9E-03	2.2E+05	2.85E-05	2.79E-07			5.00E-08	4.89E-10			5.5E+04
SVOC	N-Nitroso-di-n-propylamine	621-64-7	B2	2.80E-08	7.0E+00	5.1E+01	1.00E-01	9.23E-09	7.0E+00	1.5E+02	1.34E-04	1.31E-06	2.0E+00	3.8E+00	5.00E-08	4.89E-10	2.0E+00	1.0E+04	3.5E+00
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	C	2.80E-08	7.0E-02	5.1E+03	1.00E-01	9.23E-09	7.0E-02	1.5E+04	4.11E-04	4.02E-06	1.0E-02	2.5E+02	5.00E-08	4.89E-10	1.0E-02	2.0E+06	2.3E+02
SVOC	Pentachlorophenol	87-86-5	B2	2.80E-08	1.2E-01	3.0E+03	2.50E-01	2.31E-08	1.2E-01	3.6E+03	6.63E-06	6.49E-08	3.4E-02	4.5E+03	5.00E-08	4.89E-10	3.4E-02	6.0E+05	1.2E+03
SVOC	Phenanthrene	85-01-8	D	2.80E-08			1.30E-01	1.20E-08			1.56E-05	1.52E-07			5.00E-08	4.89E-10			
SVOC	Phenol	108-95-2	ID	2.80E-08			1.00E-01	9.23E-09			6.86E-05	6.71E-07			5.00E-08	4.89E-10			
SVOC	Pyrene	129-00-0	D	2.80E-08			1.30E-01	1.20E-08			4.39E-06	4.29E-08			5.00E-08	4.89E-10			

Attachment G6: Risk-Based Cancer Criteria for Exposure of Redevelopment Construction Workers to Soil
GMC: NAO Flint Operations Site, Flint, Michigan

				Soil Ingestion			Soil Dermal Contact				Soil Vapor Inhalation				Soil Particulate Inhalation				
Chem Group	**Chemical**	**CASRN**	**Cancer Class**	**LADD** (mg/kg/d)	**SF_{oral}** $(mg/kg/d)^{-1}$	**RBC** (mg/kg)	**ABS_{derm}**	**LADD** (mg/kg/d)	**SF_{derm}** $(mg/kg/d)^{-1}$	**RBC** (mg/kg)	**C_{air}** (mg/m^3)	**Dose** (mg/m^3)	**URF** (m^3/mg)	**RBC** (mg/kg)	**C_{air}** (mg/m^3)	**Dose** (mg/m^3)	**URF** (m^3/mg)	**RBC** (mg/kg)	**Cancer RBC** (mg/kg)
SVOC	2,4,5-Trichlorophenol	95-95-4		2.80E-08			1.00E-01	9.23E-09			2.32E-05	2.27E-07			5.00E-08	4.89E-10			
SVOC	2,4,6-Trichlorophenol	88-06-2	B2	2.80E-08	1.1E-02	3.3E+04	1.00E-01	9.23E-09	1.1E-02	9.9E+04	6.45E-05	6.31E-07	3.1E-03	5.1E+03	5.00E-08	4.89E-10	3.1E-03	6.6E+06	4.2E+03
PCB	PCBs (total)	1336-36-3	B2	2.80E-08	2.0E+00	1.8E+02	1.40E-01	1.29E-08	2.0E+00	3.9E+02	1.05E-05	1.03E-07	5.7E-01	1.7E+02	5.00E-08	4.89E-10	5.7E-01	3.6E+04	7.1E+01
INORG	Antimony	7440-36-0		2.80E-08											5.00E-08	4.89E-10			
INORG	Arsenic	7440-38-2	A	2.80E-08	1.5E+00	2.4E+02	3.00E-02	2.77E-09	1.5E+00	2.4E+03			4.3E+00		5.00E-08	4.89E-10	4.3E+00	4.8E+03	2.1E+02
INORG	Barium	7440-39-3	D	2.80E-08											5.00E-08	4.89E-10			
INORG	Beryllium	7440-41-7	B1	2.80E-08									2.4E+00		5.00E-08	4.89E-10	2.4E+00	8.5E+03	8.5E+03
INORG	Cadmium	7440-43-9	B1	2.80E-08			1.00E-03	9.23E-11					1.8E+00		5.00E-08	4.89E-10	1.8E+00	1.1E+04	1.1E+04
INORG	Chromium (total)	7440-47-3		2.80E-08									1.2E+01		5.00E-08	4.89E-10	1.2E+01	1.7E+03	1.7E+03
INORG	Chromium III	16065-83-1	D	2.80E-08											5.00E-08	4.89E-10			
INORG	Chromium VI	18540-29-9	A	2.80E-08									1.2E+01		5.00E-08	4.89E-10	1.2E+01	1.7E+03	1.7E+03
INORG	Cobalt	7440-48-4	B1	2.80E-08									2.8E+00		5.00E-08	4.89E-10	2.8E+00	7.3E+03	7.3E+03
INORG	Copper	7440-50-8	D	2.80E-08											5.00E-08	4.89E-10			
INORG	Cyanide (total)	57-12-5	D	2.80E-08											5.00E-08	4.89E-10			
INORG	Fluoride	16984-48-8		2.80E-08											5.00E-08	4.89E-10			
INORG	Lead	7439-92-1	B2	2.80E-08											5.00E-08	4.89E-10			
INORG	Manganese	7439-96-5	D	2.80E-08											5.00E-08	4.89E-10			
INORG	Mercury	7439-97-6	D	2.80E-08							5.40E-05	5.29E-07			5.00E-08	4.89E-10			
INORG	Nickel	7440-02-0	A	2.80E-08									2.4E-01		5.00E-08	4.89E-10	2.4E-01	8.5E+04	8.52E+04
INORG	Selenium	7782-49-2	D	2.80E-08											5.00E-08	4.89E-10			
INORG	Silver	7440-22-4	D	2.80E-08											5.00E-08	4.89E-10			
INORG	Thallium	7440-28-0		2.80E-08											5.00E-08	4.89E-10			
INORG	Vanadium	7440-62-2		2.80E-08											5.00E-08	4.89E-10			
INORG	Zinc	7440-66-6	D	2.80E-08											5.00E-08	4.89E-10			
Notes:																			
Target cancer risk of 1E-05																			
C/Q based on the annual maximum exposure for a 180-acre (entire Southend) source area = 27.01 kg/m3 per (kg/m2-s)																			
PM10 based on annual NAAQS standards of 50 ug/m3																			

Attachment G6: Risk-Based Noncancer Criteria for Exposure of Redevelopment Construction Workers to Soil
GMC: NAO Flint Operations Site, Flint, Michigan

				Soil Ingestion			Soil Dermal Contact				Soil Vapor Inhalation				Soil Particulate Inhalation				
Chem Group	Chemical	CASRN	Cancer Class	ADD (mg/kg/d)	RfD_{oral} (mg/kg/d)	RBC (mg/kg)	ABS_{derm}	ADD (mg/kg/d)	RfD_{derm} (mg/kg/d)	RBC (mg/kg)	C_{air} (mg/m^3)	Dose (mg/m^3)	RfC (mg/m^3)	RBC (mg/kg)	C_{air} (mg/m^3)	Dose (mg/m^3)	RfC (mg/m^3)	RBC (mg/kg)	Noncancer RBC (mg/kg)
VOC	Acetone	67-64-1	ID	1.96E-06	1.0E+00	5.1E+05			1.0E+00		1.16E-03	7.93E-04	3.5E+00	4.4E+03	5.00E-08	3.42E-08	3.5E+00	1.0E+08	4.4E+03
VOC	Benzene	71-43-2	A	1.96E-06	4.0E-03	2.0E+03			4.0E-03		5.96E-03	4.08E-03	6.0E-02	1.5E+01	5.00E-08	3.42E-08	6.0E-02	1.8E+06	1.5E+01
VOC	Bromodichloromethane	75-27-4	B2	1.96E-06	2.0E-02	1.0E+04			2.0E-02		1.98E-03	1.36E-03	7.0E-02	5.2E+01	5.00E-08	3.42E-08	7.0E-02	2.0E+06	5.1E+01
VOC	2-Butanone	78-93-3	ID	1.96E-06	2.0E+00	1.0E+06			2.0E+00		1.09E-03	7.45E-04	5.0E+00	6.7E+03	5.00E-08	3.42E-08	5.0E+00	1.5E+08	6.7E+03
VOC	Carbon Disulfide	75-15-0		1.96E-06	1.0E-01	5.1E+04			1.0E-01		1.28E-02	8.76E-03	7.0E-01	8.0E+01	5.00E-08	3.42E-08	7.0E-01	2.0E+07	8.0E+01
VOC	Carbon Tetrachloride	56-23-5	B2	1.96E-06	7.0E-03	3.6E+03			7.0E-03		7.87E-03	5.39E-03			5.00E-08	3.42E-08			
VOC	Chlorobenzene	108-90-7	D	1.96E-06	2.0E-02	1.0E+04			2.0E-02		2.69E-03	1.84E-03	6.0E-02	3.3E+01	5.00E-08	3.42E-08	6.0E-02	1.8E+06	3.2E+01
VOC	Chloroethane	75-00-3		1.96E-06	4.0E-01	2.0E+05			4.0E-01		1.67E-02	1.15E-02	1.0E+01	8.7E+02	5.00E-08	3.42E-08	1.0E+01	2.9E+08	8.7E+02
VOC	Chloroform	67-66-3	B2	1.96E-06	1.0E-02	5.1E+03			1.0E-02		6.03E-03	4.13E-03	5.0E-02	1.2E+01	5.00E-08	3.42E-08	5.0E-02	1.5E+06	1.2E+01
VOC	Chloromethane	74-87-3	D	1.96E-06							9.61E-03	6.58E-03	9.0E-02	1.4E+01	5.00E-08	3.42E-08	9.0E-02	2.6E+06	1.4E+01
VOC	Cumene	98-82-8	D	1.96E-06	4.0E-01	2.0E+05			4.0E-01		2.74E-03	1.88E-03	4.0E-01	2.1E+02	5.00E-08	3.42E-08	4.0E-01	1.2E+07	2.1E+02
VOC	Cyclohexane	110-82-7	ID	1.96E-06							1.03E-02	7.02E-03	6.0E+00	8.5E+02	5.00E-08	3.42E-08	6.0E+00	1.8E+08	8.5E+02
VOC	Dibromochloromethane	124-48-1	C	1.96E-06	2.0E-01	1.0E+05			2.0E-01		1.08E-03	7.43E-04	7.0E-01	9.4E+02	5.00E-08	3.42E-08	7.0E-01	2.0E+07	9.3E+02
VOC	1,2-Dichlorobenzene	95-50-1	D	1.96E-06	9.0E-02	4.6E+04			9.0E-02		1.16E-03	7.97E-04	2.0E+00	2.5E+03	5.00E-08	3.42E-08	2.0E+00	5.8E+07	2.4E+03
VOC	1,3-Dichlorobenzene	541-73-1	D	1.96E-06	9.0E-02	4.6E+04			9.0E-02		1.55E-03	1.06E-03	1.4E-01	1.3E+02	5.00E-08	3.42E-08	1.4E-01	4.1E+06	1.3E+02
VOC	1,4-Dichlorobenzene	106-46-7	C	1.96E-06	3.0E-02	1.5E+04			3.0E-02		1.33E-03	9.08E-04	2.5E+00	2.8E+03	5.00E-08	3.42E-08	2.5E+00	7.3E+07	2.3E+03
VOC	Dichlorodifluoromethane	75-71-8		1.96E-06	9.0E-01	4.6E+05			9.0E-01		1.55E-02	1.06E-02	2.0E+00	1.9E+02	5.00E-08	3.42E-08	2.0E+00	5.8E+07	1.9E+02
VOC	1,1-Dichloroethane	75-34-3	C	1.96E-06	1.0E+00	5.1E+05			1.0E+00		6.51E-03	4.46E-03	5.0E+00	1.1E+03	5.00E-08	3.42E-08	5.0E+00	1.5E+08	1.1E+03
VOC	1,2-Dichloroethane	107-06-2	B2	1.96E-06	2.0E-02	1.0E+04			2.0E-02		3.99E-03	2.73E-03	5.0E-03	1.8E+00	5.00E-08	3.42E-08	5.0E-03	1.5E+05	1.8E+00
VOC	1,1-Dichloroethene	75-35-4	C	1.96E-06	5.0E-02	2.6E+04			5.0E-02		1.09E-02	7.45E-03	2.0E-01	2.7E+01	5.00E-08	3.42E-08	2.0E-01	5.8E+06	2.7E+01
VOC	cis-1,2-Dichloroethene	156-59-2	D	1.96E-06	1.0E-01	5.1E+04			1.0E-01		5.48E-03	3.75E-03	3.5E-01	9.3E+01	5.00E-08	3.42E-08	3.5E-01	1.0E+07	9.3E+01
VOC	trans-1,2-Dichloroethene	156-60-5		1.96E-06	2.0E-01	1.0E+05			2.0E-01		6.88E-03	4.71E-03	6.0E-02	1.3E+01	5.00E-08	3.42E-08	6.0E-02	1.7E+06	1.3E+01
VOC	1,2-Dichloropropane	78-87-5	B2	1.96E-06							4.51E-03	3.09E-03	1.3E-02	4.2E+00	5.00E-08	3.42E-08	1.3E-02	3.8E+05	4.2E+00
VOC	Ethyl Benzene	100-41-4	D	1.96E-06	1.0E-01	5.1E+04			1.0E-01		3.13E-03	2.14E-03	1.0E+00	4.7E+02	5.00E-08	3.42E-08	1.0E+00	2.9E+07	4.6E+02
VOC	2-Hexanone	591-78-6		1.96E-06	4.0E-02	2.0E+04			4.0E-02				5.0E-03		5.00E-08	3.42E-08	5.0E-03	1.5E+05	1.8E+04
VOC	Methyl Acetate	79-20-9		1.96E-06	1.0E+01	5.1E+06			1.0E+01		1.52E-03	1.04E-03	3.5E+01	3.4E+04	5.00E-08	3.42E-08	3.5E+01	1.0E+09	3.3E+04
VOC	Methyl tert-butyl ether	1634-04-4		1.96E-06							3.06E-03	2.09E-03	3.0E+00	1.4E+03	5.00E-08	3.42E-08	3.0E+00	8.8E+07	1.4E+03
VOC	4-Methyl-2-pentanone	108-10-1	ID	1.96E-06							1.42E-03	9.75E-04	3.0E+00	3.1E+03	5.00E-08	3.42E-08	3.0E+00	8.8E+07	3.1E+03
VOC	Methylcyclohexane	108-87-2		1.96E-06							1.36E-02	9.34E-03	3.0E+00	3.2E+02	5.00E-08	3.42E-08	3.0E+00	8.8E+07	3.2E+02
VOC	Methylene Chloride	75-09-2	B2	1.96E-06	6.0E-02	3.1E+04			6.0E-02		6.13E-03	4.20E-03	3.0E+00	7.1E+02	5.00E-08	3.42E-08	3.0E+00	8.8E+07	7.0E+02
VOC	Styrene	100-42-5		1.96E-06	2.0E-01	1.0E+05			2.0E-01		1.28E-03	8.75E-04	3.0E+00	3.4E+03	5.00E-08	3.42E-08	3.0E+00	8.8E+07	3.3E+03
VOC	Tetrachloroethene	127-18-4	C-B2	1.96E-06	1.0E-01	5.1E+04			1.0E-01		6.42E-03	4.40E-03	4.0E-01	9.1E+01	5.00E-08	3.42E-08	4.0E-01	1.2E+07	9.1E+01
VOC	Toluene	108-88-3	D	1.96E-06	8.0E-01	4.1E+05			8.0E-01		4.23E-03	2.90E-03	5.0E+00	1.7E+03	5.00E-08	3.42E-08	5.0E+00	1.5E+08	1.7E+03
VOC	1,2,4-Trichlorobenzene	120-82-1	D	1.96E-06	1.0E-02	5.1E+03			1.0E-02		3.96E-04	2.72E-04	2.0E+00	7.4E+03	5.00E-08	3.42E-08	2.0E+00	5.8E+07	3.0E+03
VOC	1,1,1-Trichloroethane	71-55-6	D	1.96E-06	2.8E-01	1.4E+05			2.8E-01		7.33E-03	5.02E-03	2.2E+01	4.4E+03	5.00E-08	3.42E-08	2.2E+01	6.4E+08	4.3E+03
VOC	1,1,2-Trichloroethane	79-00-5	C	1.96E-06	4.0E-02	2.0E+04			4.0E-02		2.51E-03	1.72E-03			5.00E-08	3.42E-08			
VOC	Trichloroethene	79-01-6	C-B2	1.96E-06	6.0E-03	3.1E+03			6.0E-03		5.08E-03	3.48E-03			5.00E-08	3.42E-08			
VOC	Trichlorofluoromethane	75-69-4		1.96E-06	7.0E-01	3.6E+05			7.0E-01		1.30E-02	8.89E-03	7.0E+00	7.9E+02	5.00E-08	3.42E-08	7.0E+00	2.0E+08	7.9E+02
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		1.96E-06	3.0E+01	1.5E+07			3.0E+01		1.36E-02	9.33E-03	3.0E+01	3.2E+03	5.00E-08	3.42E-08	3.0E+01	8.8E+08	3.2E+03
VOC	1,2,4-Trimethylbenzene	95-63-6	ID	1.96E-06	5.0E-01	2.6E+05			5.0E-01		1.64E-03	1.12E-03	6.0E-02	5.4E+01	5.00E-08	3.42E-08	6.0E-02	1.8E+06	5.4E+01
VOC	1,3,5-Trimethylbenzene	108-67-8	ID	1.96E-06	5.0E-01	2.6E+05			5.0E-01		1.15E-03	7.87E-04	6.0E-02	7.6E+01	5.00E-08	3.42E-08	6.0E-02	1.8E+06	7.6E+01
VOC	Vinyl Chloride	75-01-4	A	1.96E-06	3.0E-03	1.5E+03			3.0E-03		1.42E-02	9.73E-03	1.0E-01	1.0E+01	5.00E-08	3.42E-08	1.0E-01	2.9E+06	1.0E+01
VOC	Xylenes (total)	1330-20-7	ID	1.96E-06	4.0E-01	2.0E+05			4.0E-01		2.89E-03	1.98E-03	1.0E-01	5.1E+01	5.00E-08	3.42E-08	1.0E-01	2.9E+06	5.1E+01
SVOC	Acenaphthene	83-32-9		1.96E-06	6.0E-01	3.1E+05	1.30E-01	8.40E-07	6.0E-01	7.1E+05	7.83E-05	5.36E-05	2.1E+00	3.9E+04	5.00E-08	3.42E-08	2.1E+00	6.1E+07	3.3E+04
SVOC	Acenaphthylene	208-96-8	D	1.96E-06	3.0E-01	1.5E+05	1.30E-01	8.40E-07	3.0E-01	3.6E+05	6.74E-05	4.61E-05	1.1E+00	2.3E+04	5.00E-08	3.42E-08	1.1E+00	3.1E+07	1.9E+04
SVOC	Acetophenone	98-86-2	D	1.96E-06	1.0E+00	5.1E+05	1.00E-01	6.46E-07	1.0E+00	1.5E+06	3.12E-04	2.13E-04	3.5E+00	1.6E+04	5.00E-08	3.42E-08	3.5E+00	1.0E+08	1.6E+04
SVOC	Anthracene	120-12-7	D	1.96E-06	3.0E+00	1.5E+06	1.30E-01	8.40E-07	3.0E+00	3.6E+06	2.18E-05	1.50E-05			5.00E-08	3.42E-08			1.1E+06
SVOC	Atrazine	1912-24-9	C	1.96E-06	3.5E-02	1.8E+04	1.00E-01	6.46E-07	3.5E-02	5.4E+04	7.26E-06	4.97E-06	1.2E-01	2.5E+04	5.00E-08	3.42E-08	1.2E-01	3.6E+06	8.7E+03
SVOC	Benzaldehyde	100-52-7		1.96E-06	1.0E-01	5.1E+04	1.00E-01	6.46E-07	1.0E-01	1.5E+05	4.71E-04	3.22E-04	3.5E-01	1.1E+03	5.00E-08	3.42E-08	3.5E-01	1.0E+07	1.1E+03

Attachment G6: Risk-Based Noncancer Criteria for Exposure of Redevelopment Construction Workers to Soil
GMC: NAO Flint Operations Site, Flint, Michigan

				Soil Ingestion			Soil Dermal Contact				Soil Vapor Inhalation				Soil Particulate Inhalation				
Chem Group	Chemical	CASRN	Cancer Class	ADD (mg/kg/d)	RfD_{oral} (mg/kg/d)	RBC (mg/kg)	ABS_{derm}	ADD (mg/kg/d)	RfD_{derm} (mg/kg/d)	RBC (mg/kg)	C_{air} (mg/m^3)	Dose (mg/m^3)	RfC (mg/m^3)	RBC (mg/kg)	C_{air} (mg/m^3)	Dose (mg/m^3)	RfC (mg/m^3)	RBC (mg/kg)	Noncancer RBC (mg/kg)
SVOC	Benzo(a)anthracene	56-55-3	B2	1.96E-06			1.30E-01	8.40E-07			1.71E-06	1.17E-06			5.00E-08	3.42E-08			
SVOC	Benzo(a)pyrene	50-32-8	B2	1.96E-06			1.30E-01	8.40E-07			5.89E-07	4.04E-07			5.00E-08	3.42E-08			
SVOC	Benzo(b)fluoranthene	205-99-2	B2	1.96E-06			1.30E-01	8.40E-07			3.68E-06	2.52E-06			5.00E-08	3.42E-08			
SVOC	Benzo(g,h,i)perylene	191-24-2	D	1.96E-06	3.0E-01	1.5E+05	1.30E-01	8.40E-07	3.0E-01	3.6E+05	5.30E-08	3.63E-08	1.1E+00	2.9E+07	5.00E-08	3.42E-08	1.1E+00	3.1E+07	1.1E+05
SVOC	Benzo(k)fluoranthene	207-08-9	B2	1.96E-06			1.30E-01	8.40E-07			3.38E-07	2.32E-07			5.00E-08	3.42E-08			
SVOC	Biphenyl	92-52-4	D	1.96E-06	5.0E-02	2.6E+04	1.00E-01	6.46E-07	5.0E-02	7.7E+04	8.79E-05	6.02E-05	1.8E-01	2.9E+03	5.00E-08	3.42E-08	1.8E-01	5.1E+06	2.5E+03
SVOC	bis(2-Chloroethoxy)methane	111-91-1	D	1.96E-06			1.00E-01	6.46E-07			4.27E-05	2.93E-05			5.00E-08	3.42E-08			
SVOC	bis(2-Chloroethyl) ether	111-44-4	B2	1.96E-06			1.00E-01	6.46E-07			4.64E-04	3.18E-04			5.00E-08	3.42E-08			
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2	1.96E-06	2.0E-02	1.0E+04	1.00E-01	6.46E-07	2.0E-02	3.1E+04	4.82E-08	3.30E-08	2.0E-01	6.1E+06	5.00E-08	3.42E-08	2.0E-01	5.8E+06	7.7E+03
SVOC	Butylbenzylphthalate	85-68-7	C	1.96E-06	2.0E+00	1.0E+06	1.00E-01	6.46E-07	2.0E+00	3.1E+06	1.68E-06	1.15E-06	7.0E+00	6.1E+06	5.00E-08	3.42E-08	7.0E+00	2.0E+08	6.8E+05
SVOC	Caprolactam	105-60-2		1.96E-06	5.0E-01	2.6E+05	1.00E-01	6.46E-07	5.0E-01	7.7E+05	3.45E-05	2.36E-05	1.8E+00	7.4E+04	5.00E-08	3.42E-08	1.8E+00	5.1E+07	5.3E+04
SVOC	Carbazole	86-74-8	B2	1.96E-06			1.00E-01	6.46E-07			2.69E-06	1.84E-06			5.00E-08	3.42E-08			
SVOC	4-Chloro-3-methylphenol	59-50-7		1.96E-06	2.0E+00	1.0E+06	1.00E-01	6.46E-07	2.0E+00	3.1E+06	1.29E-05	8.84E-06	7.0E+00	7.9E+05	5.00E-08	3.42E-08	7.0E+00	2.0E+08	3.9E+05
SVOC	2-Chloronaphthalene	91-58-7		1.96E-06	8.0E-02	4.1E+04	1.00E-01	6.46E-07	8.0E-02	1.2E+05	9.59E-05	6.57E-05	2.8E-01	4.3E+03	5.00E-08	3.42E-08	2.8E-01	8.2E+06	3.7E+03
SVOC	2-Chlorophenol	95-57-8		1.96E-06	5.0E-02	2.6E+04	1.00E-01	6.46E-07	5.0E-02	7.7E+04	5.64E-04	3.87E-04	1.8E-01	4.5E+02	5.00E-08	3.42E-08	1.8E-01	5.1E+06	4.4E+02
SVOC	Chrysene	218-01-9	B2	1.96E-06			1.30E-01	8.40E-07			6.27E-06	4.30E-06			5.00E-08	3.42E-08			
SVOC	Dibenz(a,h)anthracene	53-70-3	B2	1.96E-06			1.30E-01	8.40E-07			6.75E-08	4.63E-08			5.00E-08	3.42E-08			
SVOC	Dibenzofuran	132-64-9	D	1.96E-06	2.0E-03	1.0E+03	1.00E-01	6.46E-07	2.0E-03	3.1E+03	9.89E-06	6.77E-06	7.0E-03	1.0E+03	5.00E-08	3.42E-08	7.0E-03	2.0E+05	4.4E+02
SVOC	2,4-Dichlorophenol	120-83-2		1.96E-06	3.0E-03	1.5E+03	1.00E-01	6.46E-07	3.0E-03	4.6E+03	6.69E-05	4.58E-05	1.1E-02	2.3E+02	5.00E-08	3.42E-08	1.1E-02	3.1E+05	1.9E+02
SVOC	Diethylphthalate	84-66-2	D	1.96E-06	8.0E+00	4.1E+06	1.00E-01	6.46E-07	8.0E+00	1.2E+07	1.76E-05	1.21E-05	2.8E+01	2.3E+06	5.00E-08	3.42E-08	2.8E+01	8.2E+08	1.3E+06
SVOC	2,4-Dimethylphenol	105-67-9		1.96E-06	2.0E-01	1.0E+05	1.00E-01	6.46E-07	2.0E-01	3.1E+05	5.90E-05	4.04E-05	7.0E-01	1.7E+04	5.00E-08	3.42E-08	7.0E-01	2.0E+07	1.4E+04
SVOC	Dimethylphthalate	131-11-3	D	1.96E-06	1.0E+01	5.1E+06	1.00E-01	6.46E-07	1.0E+01	1.5E+07	2.51E-05	1.72E-05			5.00E-08	3.42E-08			3.8E+06
SVOC	Di-n-butylphthalate	84-74-2	D	1.96E-06	1.0E+00	5.1E+05	1.00E-01	6.46E-07	1.0E+00	1.5E+06	8.28E-07	5.67E-07			5.00E-08	3.42E-08			3.8E+05
SVOC	4,6-Dinitro-2-methylphenol	534-52-1		1.96E-06	1.0E-04	5.1E+01	1.00E-01	6.46E-07	1.0E-04	1.5E+02	2.62E-05	1.79E-05	3.5E-04	2.0E+01	5.00E-08	3.42E-08	3.5E-04	1.0E+04	1.3E+01
SVOC	2,4-Dinitrotoluene	121-14-2	B2	1.96E-06	2.0E-03	1.0E+03	1.00E-01	6.46E-07	2.0E-03	3.1E+03	3.53E-05	2.42E-05			5.00E-08	3.42E-08			7.7E+02
SVOC	2,6-Dinitrotoluene	606-20-2	B2	1.96E-06	1.0E-02	5.1E+03	1.00E-01	6.46E-07	1.0E-02	1.5E+04	4.48E-05	3.07E-05	3.5E-02	1.1E+03	5.00E-08	3.42E-08	3.5E-02	1.0E+06	8.8E+02
SVOC	Di-n-octylphthalate	117-84-0		1.96E-06	4.0E-01	2.0E+05	1.00E-01	6.46E-07	4.0E-01	6.2E+05	2.85E-07	1.95E-07			5.00E-08	3.42E-08			1.5E+05
SVOC	Fluoranthene	206-44-0	D	1.96E-06	4.0E-01	2.0E+05	1.30E-01	8.40E-07	4.0E-01	4.8E+05	5.52E-06	3.78E-06	1.4E+00	3.7E+05	5.00E-08	3.42E-08	1.4E+00	4.1E+07	1.0E+05
SVOC	Fluorene	86-73-7	D	1.96E-06	4.0E-01	2.0E+05	1.30E-01	8.40E-07	4.0E-01	4.8E+05	3.36E-05	2.30E-05	1.4E+00	6.1E+04	5.00E-08	3.42E-08	1.4E+00	4.1E+07	4.3E+04
SVOC	Formaldehyde	50-00-0	B1	1.96E-06	2.0E-01	1.0E+05			2.0E-01						5.00E-08	3.42E-08			
SVOC	Hexachlorobutadiene	87-68-3	C	1.96E-06	7.0E-04	3.6E+02	1.00E-01	6.46E-07	7.0E-04	1.1E+03	2.39E-04	1.64E-04			5.00E-08	3.42E-08			2.7E+02
SVOC	Hexachlorocyclopentadiene	77-47-4	E	1.96E-06	7.0E-02	3.6E+04	1.00E-01	6.46E-07	7.0E-02	1.1E+05	1.21E-04	8.31E-05	7.0E-04	8.4E+00	5.00E-08	3.42E-08	7.0E-04	2.0E+04	8.4E+00
SVOC	Hexachloroethane	67-72-1	C	1.96E-06	1.0E-02	5.1E+03	1.00E-01	6.46E-07	1.0E-02	1.5E+04	1.91E-04	1.31E-04			5.00E-08	3.42E-08			3.8E+03
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	B2	1.96E-07			1.30E-01	8.40E-08			2.53E-08	1.73E-08			5.00E-09	3.42E-09			
SVOC	Isophorone	78-59-1	C	1.96E-06	2.0E+00	1.0E+06	1.00E-01	6.46E-07	2.0E+00	3.1E+06	1.99E-04	1.37E-04			5.00E-08	3.42E-08			7.7E+05
SVOC	2-Methylnaphthalene	91-57-6	ID	1.96E-06	4.0E-03	2.0E+03	1.00E-01	6.46E-07	4.0E-03	6.2E+03	1.64E-04	1.12E-04	3.0E-03	2.7E+01	5.00E-08	3.42E-08	3.0E-03	8.8E+04	2.6E+01
SVOC	Methylphenol (total)	1319-77-3		1.96E-06	5.0E-01	2.6E+05	1.00E-01	6.46E-07	5.0E-01	7.7E+05	6.51E-05	4.46E-05			5.00E-08	3.42E-08			1.9E+05
SVOC	Naphthalene	91-20-3	C	1.96E-06	2.0E-01	1.0E+05	1.30E-01	8.40E-07	2.0E-01	2.4E+05	3.07E-04	2.10E-04	3.0E-03	1.4E+01	5.00E-08	3.42E-08	3.0E-03	8.8E+04	1.4E+01
SVOC	2-Nitroaniline	88-74-4		1.96E-06	3.0E-03	1.5E+03	1.00E-01	6.46E-07	3.0E-03	4.6E+03	3.37E-05	2.31E-05	2.0E-03	8.7E+01	5.00E-08	3.42E-08	2.0E-03	5.8E+04	8.0E+01
SVOC	Nitrobenzene	98-95-3	D	1.96E-06	5.0E-03	2.6E+03	1.00E-01	6.46E-07	5.0E-03	7.7E+03	3.74E-04	2.56E-04	2.0E-02	7.8E+01	5.00E-08	3.42E-08	2.0E-02	5.8E+05	7.5E+01
SVOC	2-Nitrophenol	88-75-5		1.96E-06			1.00E-01	6.46E-07			2.06E-04	1.41E-04			5.00E-08	3.42E-08			
SVOC	4-Nitrophenol	100-02-7		1.96E-06			1.00E-01	6.46E-07			1.69E-05	1.16E-05			5.00E-08	3.42E-08			
SVOC	N-Nitrosodiphenylamine	86-30-6	B2	1.96E-06	2.0E-02	1.0E+04	1.00E-01	6.46E-07	2.0E-02	3.1E+04	2.85E-05	1.95E-05			5.00E-08	3.42E-08			7.7E+03
SVOC	N-Nitroso-di-n-propylamine	621-64-7	B2	1.96E-06			1.00E-01	6.46E-07			1.34E-04	9.16E-05			5.00E-08	3.42E-08			
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	C	1.96E-06	4.0E-02	2.0E+04	1.00E-01	6.46E-07	4.0E-02	6.2E+04	4.11E-04	2.81E-04			5.00E-08	3.42E-08			1.5E+04
SVOC	Pentachlorophenol	87-86-5	B2	1.96E-06	3.0E-02	1.5E+04	2.50E-01	1.61E-06	3.0E-02	1.9E+04	6.63E-06	4.54E-06	1.1E-01	2.3E+04	5.00E-08	3.42E-08	1.1E-01	3.1E+06	6.1E+03
SVOC	Phenanthrene	85-01-8	D	1.96E-06	3.0E-01	1.5E+05	1.30E-01	8.40E-07	3.0E-01	3.6E+05	1.56E-05	1.07E-05	1.1E+00	9.9E+04	5.00E-08	3.42E-08	1.1E+00	3.1E+07	5.1E+04
SVOC	Phenol	108-95-2	ID	1.96E-06	3.0E-01	1.5E+05	1.00E-01	6.46E-07	3.0E-01	4.6E+05	6.86E-05	4.70E-05			5.00E-08	3.42E-08			1.2E+05
SVOC	Pyrene	129-00-0	D	1.96E-06	3.0E-01	1.5E+05	1.30E-01	8.40E-07	3.0E-01	3.6E+05	4.39E-06	3.00E-06	1.1E+00	3.5E+05	5.00E-08	3.42E-08	1.1E+00	3.1E+07	8.2E+04

Attachment G6: Risk-Based Noncancer Criteria for Exposure of Redevelopment Construction Workers to Soil
GMC: NAO Flint Operations Site, Flint, Michigan

				Soil Ingestion			Soil Dermal Contact				Soil Vapor Inhalation				Soil Particulate Inhalation				
Chem Group	Chemical	CASRN	Cancer Class	ADD (mg/kg/d)	RfD_{oral} (mg/kg/d)	RBC (mg/kg)	ABS_{derm}	ADD (mg/kg/d)	RfD_{derm} (mg/kg/d)	RBC (mg/kg)	C_{air} (mg/m^3)	Dose (mg/m^3)	RfC (mg/m^3)	RBC (mg/kg)	C_{air} (mg/m^3)	Dose (mg/m^3)	RfC (mg/m^3)	RBC (mg/kg)	Noncancer RBC (mg/kg)
SVOC	2,4,5-Trichlorophenol	95-95-4		1.96E-06	1.0E+00	5.1E+05	1.00E-01	6.46E-07	1.0E+00	1.5E+06	2.32E-05	1.59E-05			5.00E-08	3.42E-08			3.8E+05
SVOC	2,4,6-Trichlorophenol	88-06-2	B2	1.96E-06	1.0E-04	5.1E+01	1.00E-01	6.46E-07	1.0E-04	1.5E+02	6.45E-05	4.41E-05			5.00E-08	3.42E-08			3.8E+01
PCB	PCBs (total)	1336-36-3	B2	1.96E-06	5.0E-05	2.6E+01	1.40E-01	9.04E-07	5.0E-05	5.5E+01	1.05E-05	7.19E-06			5.00E-08	3.42E-08			1.7E+01
INORG	Antimony	7440-36-0		1.96E-06	4.0E-04	2.0E+02			6.0E-05				1.4E-03		5.00E-08	3.42E-08	1.4E-03	4.1E+04	2.0E+02
INORG	Arsenic	7440-38-2	A	1.96E-06	5.0E-03	2.6E+03	3.00E-02	1.94E-07	5.0E-03	2.6E+04					5.00E-08	3.42E-08			2.3E+03
INORG	Barium	7440-39-3	D	1.96E-06	7.0E-02	3.6E+04			4.9E-03						5.00E-08	3.42E-08			
INORG	Beryllium	7440-41-7	B1	1.96E-06	2.0E-03	1.0E+03			1.4E-05				2.0E-05		5.00E-08	3.42E-08	2.0E-05	5.8E+02	3.7E+02
INORG	Cadmium	7440-43-9	B1	1.96E-06	1.0E-03	5.1E+02	1.00E-03	6.46E-09	2.5E-05	3.9E+03			9.0E-04		5.00E-08	3.42E-08	9.0E-04	2.6E+04	4.4E+02
INORG	Chromium (total)	7440-47-3		1.96E-06	2.0E-02	1.0E+04			5.0E-04				1.0E-04		5.00E-08	3.42E-08	1.0E-04	2.9E+03	2.3E+03
INORG	Chromium III	16065-83-1	D	1.96E-06	1.5E+00	7.7E+05			2.0E-02				5.3E+00		5.00E-08	3.42E-08	5.3E+00	1.5E+08	7.6E+05
INORG	Chromium VI	18540-29-9	A	1.96E-06	2.0E-02	1.0E+04			5.0E-04				1.0E-04		5.00E-08	3.42E-08	1.0E-04	2.9E+03	2.3E+03
INORG	Cobalt	7440-48-4	B1	1.96E-06	2.0E-02	1.0E+04			2.0E-02				2.0E-05		5.00E-08	3.42E-08	2.0E-05	5.8E+02	5.5E+02
INORG	Copper	7440-50-8	D	1.96E-06	4.0E-02	2.0E+04			4.0E-02				1.4E-01		5.00E-08	3.42E-08	1.4E-01	4.1E+06	2.0E+04
INORG	Cyanide (total)	57-12-5	D	1.96E-06	2.0E-02	1.0E+04			2.0E-02				7.0E-02		5.00E-08	3.42E-08	7.0E-02	2.0E+06	1.0E+04
INORG	Fluoride	16984-48-8		1.96E-06											5.00E-08	3.42E-08			
INORG	Lead	7439-92-1	B2	1.96E-06											5.00E-08	3.42E-08			
INORG	Manganese	7439-96-5	D	1.96E-06	1.4E-01	7.2E+04			8.4E-03				5.0E-05		5.00E-08	3.42E-08	5.0E-05	1.5E+03	1.4E+03
INORG	Mercury	7439-97-6	D	1.96E-06	3.0E-04	1.5E+02			3.0E-04		5.40E-05	3.70E-05	3.0E-04	8.1E+00	5.00E-08	3.42E-08	3.0E-04	8.8E+03	7.7E+00
INORG	Nickel	7440-02-0	A	1.96E-06	2.0E-02	1.0E+04			8.0E-04						5.00E-08	3.42E-08			
INORG	Selenium	7782-49-2	D	1.96E-06	5.0E-03	2.6E+03			5.0E-03				1.8E-02		5.00E-08	3.42E-08	1.8E-02	5.1E+05	2.5E+03
INORG	Silver	7440-22-4	D	1.96E-06	5.0E-03	2.6E+03			2.0E-04				1.0E-05		5.00E-08	3.42E-08	1.0E-05	2.9E+02	2.6E+02
INORG	Thallium	7440-28-0		1.96E-06	7.0E-05	3.6E+01			7.0E-05				2.5E-04		5.00E-08	3.42E-08	2.5E-04	7.2E+03	3.6E+01
INORG	Vanadium	7440-62-2		1.96E-06	7.0E-03	3.6E+03			1.8E-04				2.5E-02		5.00E-08	3.42E-08	2.5E-02	7.2E+05	3.6E+03
INORG	Zinc	7440-66-6	D	1.96E-06	3.0E-01	1.5E+05			3.0E-01				1.1E+00		5.00E-08	3.42E-08	1.1E+00	3.1E+07	1.5E+05

Notes:

Target hazard index of 1

C/Q based on the annual maximum exposure for a 180-acre (entire Southend) source area = 27.01 kg/m3 per (kg/m2-s)

PM10 based on annual NAAQS standards of 50 ug/m3

Attachment G7
Exposure of Redevelopment Construction Workers to Groundwater

Attachment G7: Vapor Flux (mg/m2-s per mg/L) from Exposed Groundwater to Ambient Air
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	H (unitless)	MW (g/mol)	K_{Gi} (cm/s)	K_{li} (cm/s)	$1/K_L$ (cm/s)	K_L (cm/s)	J_L (L/m^2-s)
VOC	Acetone	67-64-1	8.0E-04	5.8E+01	5.34E-01	1.41E-03	3.06E+03	3.26E-04	3.26E-03
VOC	Benzene	71-43-2	1.1E-01	7.8E+01	4.84E-01	1.22E-03	8.41E+02	1.19E-03	1.19E-02
VOC	Bromodichloromethane	75-27-4	3.3E-02	1.6E+02	3.77E-01	8.39E-04	1.27E+03	7.86E-04	7.86E-03
VOC	2-Butanone	78-93-3	1.1E-03	7.2E+01	4.97E-01	1.27E-03	2.55E+03	3.92E-04	3.92E-03
VOC	Carbon Disulfide	75-15-0	6.2E-01	7.6E+01	4.88E-01	1.23E-03	8.15E+02	1.23E-03	1.23E-02
VOC	Carbon Tetrachloride	56-23-5	6.3E-01	1.5E+02	3.85E-01	8.66E-04	1.16E+03	8.63E-04	8.63E-03
VOC	Chlorobenzene	108-90-7	7.6E-02	1.1E+02	4.28E-01	1.01E-03	1.02E+03	9.82E-04	9.82E-03
VOC	Chloroethane	75-00-3	1.8E-01	6.5E+01	5.16E-01	1.34E-03	7.58E+02	1.32E-03	1.32E-02
VOC	Chloroform	67-66-3	7.5E-02	1.2E+02	4.20E-01	9.83E-04	1.05E+03	9.54E-04	9.54E-03
VOC	Chloromethane	74-87-3	1.8E-01	5.0E+01	5.60E-01	1.51E-03	6.71E+02	1.49E-03	1.49E-02
VOC	Cumene	98-82-8	2.7E-01	1.2E+02	4.19E-01	9.80E-04	1.03E+03	9.71E-04	9.71E-03
VOC	Cyclohexane	110-82-7	4.0E+00	8.4E+01	4.72E-01	1.17E-03	8.54E+02	1.17E-03	1.17E-02
VOC	Dibromochloromethane	124-48-1	1.6E-02	2.1E+02	3.48E-01	7.44E-04	1.52E+03	6.57E-04	6.57E-03
VOC	1,2-Dichlorobenzene	95-50-1	3.9E-02	1.5E+02	3.91E-01	8.86E-04	1.19E+03	8.37E-04	8.37E-03
VOC	1,3-Dichlorobenzene	541-73-1	6.3E-02	1.5E+02	3.91E-01	8.86E-04	1.17E+03	8.56E-04	8.56E-03
VOC	1,4-Dichlorobenzene	106-46-7	5.0E-02	1.5E+02	3.91E-01	8.86E-04	1.18E+03	8.48E-04	8.48E-03
VOC	Dichlorodifluoromethane	75-71-8	7.0E+00	1.2E+02	4.18E-01	9.77E-04	1.02E+03	9.77E-04	9.77E-03
VOC	1,1-Dichloroethane	75-34-3	1.2E-01	9.9E+01	4.47E-01	1.08E-03	9.45E+02	1.06E-03	1.06E-02
VOC	1,2-Dichloroethane	107-06-2	2.0E-02	9.9E+01	4.47E-01	1.08E-03	1.04E+03	9.64E-04	9.64E-03
VOC	1,1-Dichloroethene	75-35-4	5.4E-01	9.7E+01	4.50E-01	1.09E-03	9.21E+02	1.09E-03	1.09E-02
VOC	cis-1,2-Dichloroethene	156-59-2	8.4E-02	9.7E+01	4.50E-01	1.09E-03	9.43E+02	1.06E-03	1.06E-02
VOC	trans-1,2-Dichloroethene	156-60-5	1.9E-01	9.7E+01	4.50E-01	1.09E-03	9.28E+02	1.08E-03	1.08E-02
VOC	1,2-Dichloropropane	78-87-5	5.8E-02	1.1E+02	4.27E-01	1.01E-03	1.03E+03	9.71E-04	9.71E-03
VOC	Ethyl Benzene	100-41-4	1.6E-01	1.1E+02	4.36E-01	1.04E-03	9.73E+02	1.03E-03	1.03E-02
VOC	2-Hexanone	591-78-6	3.6E-02	1.0E+02	4.45E-01	1.07E-03	9.94E+02	1.01E-03	1.01E-02
VOC	Methyl Acetate	79-20-9	1.9E-03	7.4E+01	4.92E-01	1.25E-03	1.90E+03	5.27E-04	5.27E-03
VOC	Methyl tert-butyl ether	1634-04-4	1.2E-02	8.8E+01	4.64E-01	1.14E-03	1.05E+03	9.49E-04	9.49E-03
VOC	4-Methyl-2-pentanone	108-10-1	2.8E-03	1.0E+02	4.45E-01	1.07E-03	1.73E+03	5.79E-04	5.79E-03
VOC	Methylcyclohexane	108-87-2	8.8E+00	9.8E+01	4.48E-01	1.08E-03	9.23E+02	1.08E-03	1.08E-02
VOC	Methylene Chloride	75-09-2	4.5E-02	8.5E+01	4.70E-01	1.17E-03	9.05E+02	1.10E-03	1.10E-02
VOC	Styrene	100-42-5	5.7E-02	1.0E+02	4.39E-01	1.05E-03	9.90E+02	1.01E-03	1.01E-02
VOC	Tetrachloroethene	127-18-4	3.8E-01	1.7E+02	3.76E-01	8.34E-04	1.21E+03	8.29E-04	8.29E-03
VOC	Toluene	108-88-3	1.4E-01	9.2E+01	4.58E-01	1.12E-03	9.09E+02	1.10E-03	1.10E-02
VOC	1,2,4-Trichlorobenzene	120-82-1	2.9E-02	1.8E+02	3.65E-01	7.98E-04	1.35E+03	7.42E-04	7.42E-03
VOC	1,1,1-Trichloroethane	71-55-6	3.5E-01	1.3E+02	4.04E-01	9.30E-04	1.08E+03	9.24E-04	9.24E-03
VOC	1,1,2-Trichloroethane	79-00-5	1.9E-02	1.3E+02	4.04E-01	9.30E-04	1.21E+03	8.28E-04	8.28E-03
VOC	Trichloroethene	79-01-6	2.1E-01	1.3E+02	4.06E-01	9.37E-04	1.08E+03	9.27E-04	9.27E-03
VOC	Trichlorofluoromethane	75-69-4	2.0E+00	1.4E+02	4.00E-01	9.17E-04	1.09E+03	9.16E-04	9.16E-03
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	9.8E+00	1.9E+02	3.61E-01	7.85E-04	1.27E+03	7.85E-04	7.85E-03
VOC	1,2,4-Trimethylbenzene	95-63-6	1.3E-01	1.2E+02	4.19E-01	9.80E-04	1.04E+03	9.62E-04	9.62E-03
VOC	1,3,5-Trimethylbenzene	108-67-8	1.2E-01	1.2E+02	4.19E-01	9.80E-04	1.04E+03	9.61E-04	9.61E-03
VOC	Vinyl Chloride	75-01-4	5.6E-01	6.3E+01	5.21E-01	1.36E-03	7.39E+02	1.35E-03	1.35E-02
VOC	Xylenes (total)	1330-20-7	1.4E-01	1.1E+02	4.36E-01	1.04E-03	9.76E+02	1.02E-03	1.02E-02
SVOC	Acenaphthene	83-32-9	3.2E-03	1.5E+02	3.85E-01	8.65E-04	1.97E+03	5.07E-04	5.07E-03
SVOC	Acenaphthylene	208-96-8	2.3E-03	1.5E+02	3.87E-01	8.71E-04	2.27E+03	4.41E-04	4.41E-03
SVOC	Acetophenone	98-86-2	2.2E-04	1.2E+02	4.19E-01	9.80E-04	1.19E+04	8.37E-05	8.37E-04
SVOC	Anthracene	120-12-7	1.3E-03	1.8E+02	3.67E-01	8.05E-04	3.28E+03	3.04E-04	3.04E-03
SVOC	Atrazine	1912-24-9	1.2E-07	2.2E+02	3.44E-01	7.32E-04	2.33E+07	4.30E-08	4.30E-07
SVOC	Benzaldehyde	100-52-7	4.9E-04	1.1E+02	4.36E-01	1.04E-03	5.67E+03	1.76E-04	1.76E-03
SVOC	Benzo(a)anthracene	56-55-3	6.9E-05	2.3E+02	3.38E-01	7.11E-04	4.46E+04	2.24E-05	2.24E-04
SVOC	Benzo(a)pyrene	50-32-8	2.3E-05	2.5E+02	3.27E-01	6.76E-04	1.34E+05	7.48E-06	7.48E-05
SVOC	Benzo(b)fluoranthene	205-99-2	2.3E-03	2.5E+02	3.27E-01	6.76E-04	2.82E+03	3.54E-04	3.54E-03
SVOC	Benzo(g,h,i)perylene	191-24-2	2.9E-06	2.8E+02	3.17E-01	6.46E-04	1.10E+06	9.11E-07	9.11E-06
SVOC	Benzo(k)fluoranthene	207-08-9	1.7E-05	2.5E+02	3.27E-01	6.76E-04	1.82E+05	5.51E-06	5.51E-05
SVOC	Biphenyl	92-52-4	6.1E-03	1.5E+02	3.85E-01	8.65E-04	1.58E+03	6.33E-04	6.33E-03
SVOC	bis(2-Chloroethoxy)methane	111-91-1	3.5E-06	1.7E+02	3.71E-01	8.17E-04	7.78E+05	1.29E-06	1.29E-05
SVOC	bis(2-Chloroethyl) ether	111-44-4	3.7E-04	1.4E+02	3.95E-01	8.98E-04	7.97E+03	1.25E-04	1.25E-03
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	2.1E-06	3.9E+02	2.82E-01	5.44E-04	1.70E+06	5.89E-07	5.89E-06
SVOC	Butylbenzylphthalate	85-68-7	2.6E-05	3.1E+02	3.04E-01	6.08E-04	1.29E+05	7.76E-06	7.76E-05
SVOC	Caprolactam	105-60-2	1.0E-07	1.1E+02	4.27E-01	1.01E-03	2.27E+07	4.40E-08	4.40E-07
SVOC	Carbazole	86-74-8	3.1E-07	1.7E+02	3.75E-01	8.31E-04	8.52E+06	1.17E-07	1.17E-06
SVOC	4-Chloro-3-methylphenol	59-50-7	8.2E-06	1.4E+02	3.95E-01	9.00E-04	3.11E+05	3.21E-06	3.21E-05
SVOC	2-Chloronaphthalene	91-58-7	6.4E-03	1.6E+02	3.78E-01	8.43E-04	1.60E+03	6.25E-04	6.25E-03
SVOC	2-Chlorophenol	95-57-8	8.0E-03	1.3E+02	4.09E-01	9.48E-04	1.36E+03	7.35E-04	7.35E-03
SVOC	Chrysene	218-01-9	1.9E-03	2.3E+02	3.38E-01	7.11E-04	2.93E+03	3.41E-04	3.41E-03
SVOC	Dibenz(a,h)anthracene	53-70-3	3.0E-07	2.8E+02	3.16E-01	6.44E-04	1.05E+07	9.53E-08	9.53E-07
SVOC	Dibenzofuran	132-64-9	2.6E-04	1.7E+02	3.74E-01	8.28E-04	1.16E+04	8.63E-05	8.63E-04
SVOC	2,4-Dichlorophenol	120-83-2	6.5E-05	1.6E+02	3.78E-01	8.42E-04	4.19E+04	2.39E-05	2.39E-04
SVOC	Diethylphthalate	84-66-2	9.3E-06	2.2E+02	3.41E-01	7.21E-04	3.19E+05	3.14E-06	3.14E-05
SVOC	2,4-Dimethylphenol	105-67-9	4.1E-05	1.2E+02	4.16E-01	9.72E-04	5.96E+04	1.68E-05	1.68E-04

Attachment G7: Vapor Flux (mg/m2-s per mg/L) from Exposed Groundwater to Ambient Air
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	H (unitless)	MW (g/mol)	K_{Gi} (cm/s)	K_{li} (cm/s)	$1/K_L$ (cm/s)	K_L (cm/s)	J_L (L/m^2-s)
SVOC	Dimethylphthalate	131-11-3	2.1E-06	1.9E+02	3.57E-01	7.71E-04	1.31E+06	7.64E-07	7.64E-06
SVOC	Di-n-butylphthalate	84-74-2	1.9E-08	2.8E+02	3.16E-01	6.44E-04	1.64E+08	6.08E-09	6.08E-08
SVOC	4,6-Dinitro-2-methylphenol	534-52-1	8.7E-06	2.0E+02	3.54E-01	7.63E-04	3.25E+05	3.08E-06	3.08E-05
SVOC	2,4-Dinitrotoluene	121-14-2	1.9E-06	1.8E+02	3.64E-01	7.96E-04	1.45E+06	6.91E-07	6.91E-06
SVOC	2,6-Dinitrotoluene	606-20-2	1.5E-05	1.8E+02	3.64E-01	7.96E-04	1.81E+05	5.53E-06	5.53E-05
SVOC	Di-n-octylphthalate	117-84-0	1.4E-03	3.9E+02	2.82E-01	5.44E-04	4.43E+03	2.26E-04	2.26E-03
SVOC	Fluoranthene	206-44-0	3.3E-04	2.0E+02	3.52E-01	7.55E-04	9.94E+03	1.01E-04	1.01E-03
SVOC	Fluorene	86-73-7	1.3E-03	1.7E+02	3.76E-01	8.33E-04	3.24E+03	3.09E-04	3.09E-03
SVOC	Formaldehyde	50-00-0	6.9E-06	3.0E+01	6.66E-01	1.96E-03	2.17E+05	4.62E-06	4.62E-05
SVOC	Hexachlorobutadiene	87-68-3	1.7E-01	2.6E+02	3.23E-01	6.65E-04	1.52E+03	6.57E-04	6.57E-03
SVOC	Hexachlorocyclopentadiene	77-47-4	5.6E-01	2.7E+02	3.18E-01	6.51E-04	1.54E+03	6.48E-04	6.48E-03
SVOC	Hexachloroethane	67-72-1	8.0E-02	2.4E+02	3.34E-01	6.98E-04	1.47E+03	6.80E-04	6.80E-03
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	3.3E-05	2.8E+02	3.17E-01	6.46E-04	9.78E+04	1.02E-05	1.02E-04
SVOC	Isophorone	78-59-1	1.4E-04	1.4E+02	4.00E-01	9.14E-04	1.95E+04	5.13E-05	5.13E-04
SVOC	2-Methylnaphthalene	91-57-6	1.1E-02	1.4E+02	3.96E-01	9.01E-04	1.35E+03	7.42E-04	7.42E-03
SVOC	Methylphenol (total)	1319-77-3	1.8E-05	1.1E+02	4.34E-01	1.03E-03	1.31E+05	7.61E-06	7.61E-05
SVOC	Naphthalene	91-20-3	9.9E-03	1.3E+02	4.10E-01	9.49E-04	1.30E+03	7.69E-04	7.69E-03
SVOC	2-Nitroaniline	88-74-4	3.3E-06	1.4E+02	4.00E-01	9.14E-04	7.67E+05	1.30E-06	1.30E-05
SVOC	Nitrobenzene	98-95-3	4.9E-04	1.2E+02	4.15E-01	9.68E-04	5.93E+03	1.69E-04	1.69E-03
SVOC	2-Nitrophenol	88-75-5	1.9E-04	1.4E+02	3.99E-01	9.11E-04	1.41E+04	7.11E-05	7.11E-04
SVOC	4-Nitrophenol	100-02-7	8.5E-09	1.4E+02	3.99E-01	9.11E-04	2.96E+08	3.38E-09	3.38E-08
SVOC	N-Nitrosodiphenylamine	86-30-6	1.0E-04	2.0E+02	3.54E-01	7.63E-04	2.89E+04	3.46E-05	3.46E-04
SVOC	N-Nitroso-di-n-propylamine	621-64-7	4.6E-05	1.3E+02	4.08E-01	9.42E-04	5.42E+04	1.84E-05	1.84E-04
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	2.4E-03	1.7E+02	3.72E-01	8.21E-04	2.34E+03	4.27E-04	4.27E-03
SVOC	Pentachlorophenol	87-86-5	5.0E-07	2.7E+02	3.21E-01	6.58E-04	6.24E+06	1.60E-07	1.60E-06
SVOC	Phenanthrene	85-01-8	4.8E-04	1.8E+02	3.67E-01	8.05E-04	6.97E+03	1.44E-04	1.44E-03
SVOC	Phenol	108-95-2	8.2E-06	9.4E+01	4.54E-01	1.11E-03	2.71E+05	3.69E-06	3.69E-05
SVOC	Pyrene	129-00-0	2.3E-04	2.0E+02	3.52E-01	7.55E-04	1.39E+04	7.18E-05	7.18E-04
SVOC	2,4,5-Trichlorophenol	95-95-4	8.9E-05	2.0E+02	3.55E-01	7.65E-04	3.30E+04	3.03E-05	3.03E-04
SVOC	2,4,6-Trichlorophenol	88-06-2	1.6E-04	2.0E+02	3.55E-01	7.65E-04	1.90E+04	5.27E-05	5.27E-04
PCB	PCBs (total)	1336-36-3	4.1E-02	3.3E+02	2.99E-01	5.93E-04	1.77E+03	5.66E-04	5.66E-03
INORG	Antimony	7440-36-0		1.2E+02	4.17E-01	9.74E-04			
INORG	Arsenic	7440-38-2		7.5E+01	4.90E-01	1.24E-03			
INORG	Barium	7440-39-3		1.4E+02	4.00E-01	9.17E-04			
INORG	Beryllium	7440-41-7		9.0E+00	9.97E-01	3.58E-03			
INORG	Cadmium	7440-43-9		1.1E+02	4.28E-01	1.01E-03			
INORG	Chromium (total)	7440-47-3		5.2E+01	5.54E-01	1.49E-03			
INORG	Chromium III	16065-83-1		5.2E+01	5.54E-01	1.49E-03			
INORG	Chromium VI	18540-29-9		5.2E+01	5.54E-01	1.49E-03			
INORG	Cobalt	7440-48-4		5.9E+01	5.32E-01	1.40E-03			
INORG	Copper	7440-50-8		6.4E+01	5.18E-01	1.35E-03			
INORG	Cyanide (total)	57-12-5		2.6E+01	6.99E-01	2.11E-03			
INORG	Fluoride	16984-48-8							
INORG	Lead	7439-92-1		2.1E+02	3.49E-01	7.46E-04			
INORG	Manganese	7439-96-5		5.5E+01	5.44E-01	1.45E-03			
INORG	Mercury	7439-97-6	1.5E-01	2.0E+02	3.52E-01	7.58E-04	1.34E+03	7.47E-04	7.47E-03
INORG	Nickel	7440-02-0		5.9E+01	5.32E-01	1.40E-03			
INORG	Selenium	7782-49-2		7.9E+01	4.82E-01	1.21E-03			
INORG	Silver	7440-22-4		1.1E+02	4.34E-01	1.03E-03			
INORG	Thallium	7440-28-0		2.0E+02	3.50E-01	7.52E-04			
INORG	Vanadium	7440-62-2		5.1E+01	5.58E-01	1.51E-03			
INORG	Zinc	7440-66-6		6.5E+01	5.13E-01	1.33E-03			
Notes:	molecular weight of oxygen	g/mol	MW_{O2}	32					
	molecular weight of water	g/mol	MW_{H2O}	18					
	absolute temperature	K	**T**	283					
	liquid-phase mass transfer coefficient for oxygen	cm/s	$k_{L,O2}$	0.002					
	gas-phase mass transfer coefficient for water vapor at 25 C	cm/s	$K_{G,H2O}$	0.833					

Attachment G7: Nonsteady State Dermal Absorption of Chemical from Water
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	MW (g/mole)	Log K_{ow} (unitless)	K_p (cm/hr)	B (unitless)	τ (hr)	c	b	ts (hr)	FA (unitless)	DA (L/cm^2-event)
VOC	Acetone	67-64-1	5.8E+01	-2.4E-01	5.2E-04	1.5E-03	2.2E-01	3.3E-01	3.0E-01	5.3E-01	1.0E+00	1.27E-06
VOC	Benzene	71-43-2	7.8E+01	2.1E+00	1.5E-02	5.0E-02	2.9E-01	3.7E-01	3.3E-01	6.9E-01	1.0E+00	3.70E-05
VOC	Bromodichloromethane	75-27-4	1.6E+02	2.1E+00	4.7E-03	2.3E-02	8.7E-01	3.5E-01	3.2E-01	2.1E+00	1.0E+00	1.70E-05
VOC	2-Butanone	78-93-3	7.2E+01	2.8E-01	9.6E-04	3.1E-03	2.7E-01	3.4E-01	3.1E-01	6.4E-01	1.0E+00	2.42E-06
VOC	Carbon Disulfide	75-15-0	7.6E+01	2.0E+00	1.2E-02	4.2E-02	2.8E-01	3.6E-01	3.3E-01	6.7E-01	1.0E+00	3.11E-05
VOC	Carbon Tetrachloride	56-23-5	1.5E+02	2.7E+00	1.4E-02	6.6E-02	7.6E-01	3.8E-01	3.4E-01	1.8E+00	1.0E+00	4.84E-05
VOC	Chlorobenzene	108-90-7	1.1E+02	2.9E+00	2.9E-02	1.2E-01	4.5E-01	4.2E-01	3.8E-01	1.1E+00	1.0E+00	8.00E-05
VOC	Chloroethane	75-00-3	6.5E+01	1.4E+00	6.1E-03	1.9E-02	2.4E-01	3.5E-01	3.1E-01	5.8E-01	1.0E+00	1.49E-05
VOC	Chloroform	67-66-3	1.2E+02	1.9E+00	6.3E-03	2.6E-02	4.9E-01	3.5E-01	3.2E-01	1.2E+00	1.0E+00	1.86E-05
VOC	Chloromethane	74-87-3	5.0E+01	1.9E+00	1.5E-02	4.2E-02	2.0E-01	3.6E-01	3.3E-01	4.8E-01	1.0E+00	3.58E-05
VOC	Cumene	98-82-8	1.2E+02	3.5E+00	6.8E-02	2.9E-01	5.0E-01	5.5E-01	5.1E-01	1.2E+00	1.0E+00	1.93E-04
VOC	Cyclohexane	110-82-7	8.4E+01	3.4E+00	1.0E-01	3.5E-01	3.1E-01	6.0E-01	5.7E-01	7.5E-01	1.0E+00	2.30E-04
VOC	Dibromochloromethane	124-48-1	2.1E+02	2.2E+00	2.9E-03	1.6E-02	1.5E+00	3.4E-01	3.1E-01	3.7E+00	1.0E+00	1.42E-05
VOC	1,2-Dichlorobenzene	95-50-1	1.5E+02	3.4E+00	4.4E-02	2.0E-01	7.0E-01	4.8E-01	4.4E-01	1.7E+00	1.0E+00	1.46E-04
VOC	1,3-Dichlorobenzene	541-73-1	1.5E+02	3.4E+00	4.1E-02	1.9E-01	7.0E-01	4.7E-01	4.3E-01	1.7E+00	1.0E+00	1.35E-04
VOC	1,4-Dichlorobenzene	106-46-7	1.5E+02	3.4E+00	4.3E-02	2.0E-01	7.0E-01	4.8E-01	4.4E-01	1.7E+00	1.0E+00	1.44E-04
VOC	Dichlorodifluoromethane	75-71-8	1.2E+02	2.2E+00	8.9E-03	3.8E-02	5.0E-01	3.6E-01	3.3E-01	1.2E+00	1.0E+00	2.63E-05
VOC	1,1-Dichloroethane	75-34-3	9.9E+01	1.8E+00	6.7E-03	2.6E-02	3.8E-01	3.5E-01	3.2E-01	9.0E-01	1.0E+00	1.83E-05
VOC	1,2-Dichloroethane	107-06-2	9.9E+01	1.5E+00	4.1E-03	1.6E-02	3.8E-01	3.4E-01	3.1E-01	9.0E-01	1.0E+00	1.13E-05
VOC	1,1-Dichloroethene	75-35-4	9.7E+01	2.1E+00	1.2E-02	4.4E-02	3.7E-01	3.6E-01	3.3E-01	8.8E-01	1.0E+00	3.10E-05
VOC	cis-1,2-Dichloroethene	156-59-2	9.7E+01	1.9E+00	7.7E-03	2.9E-02	3.7E-01	3.5E-01	3.2E-01	8.8E-01	1.0E+00	2.07E-05
VOC	trans-1,2-Dichloroethene	156-60-5	9.7E+01	2.1E+00	1.1E-02	4.0E-02	3.7E-01	3.6E-01	3.3E-01	8.8E-01	1.0E+00	2.83E-05
VOC	1,2-Dichloropropane	78-87-5	1.1E+02	2.0E+00	7.4E-03	3.0E-02	4.5E-01	3.5E-01	3.2E-01	1.1E+00	1.0E+00	2.12E-05
VOC	Ethyl Benzene	100-41-4	1.1E+02	3.1E+00	4.8E-02	1.9E-01	4.1E-01	4.7E-01	4.3E-01	9.9E-01	1.0E+00	1.27E-04
VOC	2-Hexanone	591-78-6	1.0E+02	1.4E+00	3.5E-03	1.4E-02	3.8E-01	3.4E-01	3.1E-01	9.2E-01	1.0E+00	9.75E-06
VOC	Methyl Acetate	79-20-9	7.4E+01	1.8E-01	8.0E-04	2.7E-03	2.7E-01	3.4E-01	3.0E-01	6.6E-01	1.0E+00	2.04E-06
VOC	Methyl tert-butyl ether	1634-04-4	8.8E+01	1.2E+00	3.3E-03	1.2E-02	3.3E-01	3.4E-01	3.1E-01	7.9E-01	1.0E+00	8.84E-06
VOC	4-Methyl-2-pentanone	108-10-1	1.0E+02	1.2E+00	2.7E-03	1.0E-02	3.8E-01	3.4E-01	3.1E-01	9.2E-01	1.0E+00	7.32E-06
VOC	Methylcyclohexane	108-87-2	9.8E+01	3.0E+00	4.0E-02	1.5E-01	3.7E-01	4.4E-01	4.0E-01	9.0E-01	1.0E+00	1.05E-04
VOC	Methylene Chloride	75-09-2	8.5E+01	1.3E+00	3.5E-03	1.3E-02	3.1E-01	3.4E-01	3.1E-01	7.5E-01	1.0E+00	9.25E-06
VOC	Styrene	100-42-5	1.0E+02	2.9E+00	3.6E-02	1.4E-01	4.0E-01	4.3E-01	4.0E-01	9.7E-01	1.0E+00	9.63E-05
VOC	Tetrachloroethene	127-18-4	1.7E+02	2.7E+00	1.1E-02	5.4E-02	8.9E-01	3.7E-01	3.4E-01	2.1E+00	1.0E+00	3.99E-05
VOC	Toluene	108-88-3	9.2E+01	2.8E+00	3.2E-02	1.2E-01	3.5E-01	4.2E-01	3.8E-01	8.3E-01	1.0E+00	8.08E-05
VOC	1,2,4-Trichlorobenzene	120-82-1	1.8E+02	4.0E+00	6.8E-02	3.5E-01	1.1E+00	6.0E-01	5.6E-01	2.6E+00	1.0E+00	2.76E-04
VOC	1,1,1-Trichloroethane	71-55-6	1.3E+02	2.5E+00	1.2E-02	5.5E-02	5.9E-01	3.7E-01	3.4E-01	1.4E+00	1.0E+00	3.85E-05
VOC	1,1,2-Trichloroethane	79-00-5	1.3E+02	2.1E+00	6.4E-03	2.8E-02	5.9E-01	3.5E-01	3.2E-01	1.4E+00	1.0E+00	2.02E-05
VOC	Trichloroethene	79-01-6	1.3E+02	2.7E+00	1.8E-02	7.9E-02	5.7E-01	3.9E-01	3.5E-01	1.4E+00	1.0E+00	5.53E-05
VOC	Trichlorofluoromethane	75-69-4	1.4E+02	2.5E+00	1.3E-02	5.7E-02	6.2E-01	3.7E-01	3.4E-01	1.5E+00	1.0E+00	4.03E-05
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	1.9E+02	3.2E+00	1.7E-02	9.1E-02	1.2E+00	4.0E-01	3.6E-01	2.8E+00	1.0E+00	7.31E-05

Attachment G7: Nonsteady State Dermal Absorption of Chemical from Water
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	MW (g/mole)	Log K_{ow} (unitless)	K_p (cm/hr)	B (unitless)	τ (hr)	c	b	ts (hr)	FA (unitless)	DA (L/cm^2-event)
VOC	1,2,4-Trimethylbenzene	95-63-6	1.2E+02	3.6E+00	8.4E-02	3.5E-01	5.0E-01	6.0E-01	5.7E-01	1.2E+00	1.0E+00	2.34E-04
VOC	1,3,5-Trimethylbenzene	108-67-8	1.2E+02	4.0E+00	1.5E-01	6.2E-01	5.0E-01	8.2E-01	8.4E-01	2.0E+00	1.0E+00	4.04E-04
VOC	Vinyl Chloride	75-01-4	6.3E+01	1.5E+00	6.9E-03	2.1E-02	2.4E-01	3.5E-01	3.2E-01	5.7E-01	1.0E+00	1.69E-05
VOC	Xylenes (total)	1330-20-7	1.1E+02	3.2E+00	5.0E-02	2.0E-01	4.1E-01	4.8E-01	4.4E-01	9.9E-01	1.0E+00	1.32E-04
SVOC	Acenaphthene	83-32-9	1.5E+02	3.9E+00	8.4E-02	4.0E-01	7.7E-01	6.4E-01	6.1E-01	1.8E+00	1.0E+00	2.96E-04
SVOC	Acenaphthylene	208-96-8	1.5E+02	3.9E+00	8.9E-02	4.2E-01	7.5E-01	6.6E-01	6.3E-01	1.8E+00	1.0E+00	3.09E-04
SVOC	Acetophenone	98-86-2	1.2E+02	1.6E+00	3.7E-03	1.6E-02	5.0E-01	3.4E-01	3.1E-01	1.2E+00	1.0E+00	1.11E-05
SVOC	Anthracene	120-12-7	1.8E+02	4.6E+00	1.6E-01	8.2E-01	1.0E+00	1.0E+00	1.1E+00	4.0E+00	1.0E+00	6.41E-04
SVOC	Atrazine	1912-24-9	2.2E+02	2.6E+00	5.2E-03	2.9E-02	1.7E+00	3.5E-01	3.2E-01	4.1E+00	1.0E+00	2.64E-05
SVOC	Benzaldehyde	100-52-7	1.1E+02	1.5E+00	3.8E-03	1.5E-02	4.1E-01	3.4E-01	3.1E-01	9.9E-01	1.0E+00	1.07E-05
SVOC	Benzo(a)anthracene	56-55-3	2.3E+02	5.7E+00	4.8E-01	2.8E+00	2.0E+00	2.9E+00	6.3E+00	8.4E+00	9.0E-01	2.40E-03
SVOC	Benzo(a)pyrene	50-32-8	2.5E+02	6.1E+00	6.6E-01	4.0E+00	2.7E+00	4.1E+00	1.2E+01	1.2E+01	8.0E-01	3.41E-03
SVOC	Benzo(b)fluoranthene	205-99-2	2.5E+02	6.2E+00	7.6E-01	4.6E+00	2.7E+00	4.7E+00	1.5E+01	1.2E+01	8.0E-01	3.90E-03
SVOC	Benzo(g,h,i)perylene	191-24-2	2.8E+02	7.2E+00	1.0E+00	6.4E+00	3.7E+00	6.4E+00	2.8E+01	1.6E+01	7.0E-01	5.27E-03
SVOC	Benzo(k)fluoranthene	207-08-9	2.5E+02	6.2E+00	7.6E-01	4.6E+00	2.7E+00	4.7E+00	1.5E+01	1.2E+01	8.0E-01	3.90E-03
SVOC	Biphenyl	92-52-4	1.5E+02	4.1E+00	1.1E-01	5.2E-01	7.7E-01	7.4E-01	7.3E-01	1.8E+00	1.0E+00	3.86E-04
SVOC	bis(2-Chloroethoxy)methane	111-91-1	1.7E+02	1.3E+00	1.2E-03	5.8E-03	9.8E-01	3.4E-01	3.1E-01	2.3E+00	1.0E+00	4.47E-06
SVOC	bis(2-Chloroethyl) ether	111-44-4	1.4E+02	1.2E+00	1.6E-03	7.3E-03	6.6E-01	3.4E-01	3.1E-01	1.6E+00	1.0E+00	5.24E-06
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	3.9E+02	7.3E+00	6.8E-01	5.1E+00	1.6E+01	5.2E+00	1.9E+01	7.1E+01	4.0E-01	4.26E-03
SVOC	Butylbenzylphthalate	85-68-7	3.1E+02	4.8E+00	4.4E-02	3.0E-01	5.9E+00	5.6E-01	5.2E-01	1.4E+01	9.0E-01	3.78E-04
SVOC	Caprolactam	105-60-2	1.1E+02	-1.9E-01	2.8E-04	1.1E-03	4.5E-01	3.3E-01	3.0E-01	1.1E+00	1.0E+00	8.01E-07
SVOC	Carbazole	86-74-8	1.7E+02	3.6E+00	4.3E-02	2.1E-01	9.1E-01	4.9E-01	4.5E-01	2.2E+00	1.0E+00	1.60E-04
SVOC	4-Chloro-3-methylphenol	59-50-7	1.4E+02	3.1E+00	2.8E-02	1.3E-01	6.6E-01	4.2E-01	3.9E-01	1.6E+00	1.0E+00	9.14E-05
SVOC	2-Chloronaphthalene	91-58-7	1.6E+02	4.1E+00	1.0E-01	5.0E-01	8.6E-01	7.2E-01	7.1E-01	2.1E+00	1.0E+00	3.69E-04
SVOC	2-Chlorophenol	95-57-8	1.3E+02	2.2E+00	7.9E-03	3.5E-02	5.5E-01	3.6E-01	3.2E-01	1.3E+00	1.0E+00	2.44E-05
SVOC	Chrysene	218-01-9	2.3E+02	5.7E+00	4.8E-01	2.8E+00	2.0E+00	2.9E+00	6.3E+00	8.4E+00	9.0E-01	2.40E-03
SVOC	Dibenz(a,h)anthracene	53-70-3	2.8E+02	6.7E+00	1.0E+00	6.4E+00	3.8E+00	6.5E+00	2.9E+01	1.7E+01	7.0E-01	5.34E-03
SVOC	Dibenzofuran	132-64-9	1.7E+02	4.4E+00	1.4E-01	7.1E-01	9.2E-01	9.1E-01	9.6E-01	3.6E+00	1.0E+00	5.36E-04
SVOC	2,4-Dichlorophenol	120-83-2	1.6E+02	3.1E+00	2.1E-02	1.0E-01	8.6E-01	4.0E-01	3.7E-01	2.1E+00	1.0E+00	7.57E-05
SVOC	Diethylphthalate	84-66-2	2.2E+02	2.5E+00	4.0E-03	2.3E-02	1.8E+00	3.5E-01	3.2E-01	4.4E+00	1.0E+00	2.14E-05
SVOC	2,4-Dimethylphenol	105-67-9	1.2E+02	2.4E+00	1.2E-02	5.0E-02	5.1E-01	3.7E-01	3.3E-01	1.2E+00	1.0E+00	3.52E-05
SVOC	Dimethylphthalate	131-11-3	1.9E+02	1.9E+00	2.2E-03	1.2E-02	1.3E+00	3.4E-01	3.1E-01	3.1E+00	1.0E+00	9.85E-06
SVOC	Di-n-butylphthalate	84-74-2	2.8E+02	4.6E+00	4.8E-02	3.1E-01	3.8E+00	5.6E-01	5.3E-01	9.1E+00	9.0E-01	3.31E-04
SVOC	4,6-Dinitro-2-methylphenol	534-52-1	2.0E+02	2.1E+00	3.1E-03	1.7E-02	1.4E+00	3.4E-01	3.1E-01	3.2E+00	1.0E+00	1.40E-05
SVOC	2,4-Dinitrotoluene	121-14-2	1.8E+02	2.0E+00	3.2E-03	1.7E-02	1.1E+00	3.4E-01	3.1E-01	2.6E+00	1.0E+00	1.32E-05
SVOC	2,6-Dinitrotoluene	606-20-2	1.8E+02	1.9E+00	2.6E-03	1.3E-02	1.1E+00	3.4E-01	3.1E-01	2.6E+00	1.0E+00	1.06E-05
SVOC	Di-n-octylphthalate	117-84-0	3.9E+02	8.1E+00	1.0E+00	7.6E+00	1.6E+01	7.6E+00	3.9E+01	7.2E+01	3.0E-01	4.72E-03
SVOC	Fluoranthene	206-44-0	2.0E+02	5.1E+00	2.8E-01	1.5E+00	1.4E+00	1.7E+00	2.4E+00	5.7E+00	1.0E+00	1.31E-03
SVOC	Fluorene	86-73-7	1.7E+02	4.2E+00	1.1E-01	5.5E-01	9.0E-01	7.7E-01	7.7E-01	2.2E+00	1.0E+00	4.13E-04

Attachment G7: Nonsteady State Dermal Absorption of Chemical from Water
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	MW (g/mole)	Log K_{ow} (unitless)	K_p (cm/hr)	B (unitless)	τ (hr)	c	b	ts (hr)	FA (unitless)	DA (L/cm^2-event)
SVOC	Formaldehyde	50-00-0	3.0E+01	3.5E-01	1.8E-03	3.9E-03	1.5E-01	3.4E-01	3.1E-01	3.7E-01	1.0E+00	4.22E-06
SVOC	Hexachlorobutadiene	87-68-3	2.6E+02	4.8E+00	8.2E-02	5.1E-01	3.0E+00	7.3E-01	7.2E-01	7.3E+00	9.0E-01	5.03E-04
SVOC	Hexachlorocyclopentadiene	77-47-4	2.7E+02	5.4E+00	1.7E-01	1.1E+00	3.5E+00	1.2E+00	1.5E+00	1.4E+01	9.0E-01	1.12E-03
SVOC	Hexachloroethane	67-72-1	2.4E+02	4.0E+00	3.3E-02	1.9E-01	2.2E+00	4.7E-01	4.3E-01	5.3E+00	1.0E+00	1.91E-04
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	2.8E+02	6.7E+00	1.0E+00	6.4E+00	3.7E+00	6.4E+00	2.8E+01	1.6E+01	7.0E-01	5.27E-03
SVOC	Isophorone	78-59-1	1.4E+02	1.7E+00	3.5E-03	1.6E-02	6.2E-01	3.4E-01	3.1E-01	1.5E+00	1.0E+00	1.14E-05
SVOC	2-Methylnaphthalene	91-57-6	1.4E+02	3.9E+00	8.9E-02	4.1E-01	6.6E-01	6.5E-01	6.2E-01	1.6E+00	1.0E+00	2.89E-04
SVOC	Methylphenol (total)	1319-77-3	1.1E+02	2.0E+00	7.7E-03	3.1E-02	4.2E-01	3.5E-01	3.2E-01	1.0E+00	1.0E+00	2.17E-05
SVOC	Naphthalene	91-20-3	1.3E+02	3.4E+00	5.0E-02	2.2E-01	5.5E-01	4.9E-01	4.5E-01	1.3E+00	1.0E+00	1.49E-04
SVOC	2-Nitroaniline	88-74-4	1.4E+02	1.9E+00	4.4E-03	2.0E-02	6.2E-01	3.5E-01	3.2E-01	1.5E+00	1.0E+00	1.44E-05
SVOC	Nitrobenzene	98-95-3	1.2E+02	1.8E+00	5.3E-03	2.3E-02	5.1E-01	3.5E-01	3.2E-01	1.2E+00	1.0E+00	1.60E-05
SVOC	2-Nitrophenol	88-75-5	1.4E+02	1.8E+00	4.0E-03	1.8E-02	6.3E-01	3.5E-01	3.1E-01	1.5E+00	1.0E+00	1.30E-05
SVOC	4-Nitrophenol	100-02-7	1.4E+02	1.9E+00	4.8E-03	2.2E-02	6.3E-01	3.5E-01	3.2E-01	1.5E+00	1.0E+00	1.56E-05
SVOC	N-Nitrosodiphenylamine	86-30-6	2.0E+02	3.2E+00	1.5E-02	8.1E-02	1.4E+00	3.9E-01	3.5E-01	3.3E+00	1.0E+00	6.82E-05
SVOC	N-Nitroso-di-n-propylamine	621-64-7	1.3E+02	1.4E+00	2.5E-03	1.1E-02	5.6E-01	3.4E-01	3.1E-01	1.4E+00	1.0E+00	7.74E-06
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	1.7E+02	2.5E+00	7.2E-03	3.6E-02	9.5E-01	3.6E-01	3.3E-01	2.3E+00	1.0E+00	2.76E-05
SVOC	Pentachlorophenol	87-86-5	2.7E+02	5.1E+00	1.2E-01	7.3E-01	3.3E+00	9.3E-01	9.9E-01	1.3E+01	9.0E-01	7.43E-04
SVOC	Phenanthrene	85-01-8	1.8E+02	4.5E+00	1.4E-01	7.2E-01	1.0E+00	9.1E-01	9.7E-01	4.1E+00	1.0E+00	5.59E-04
SVOC	Phenol	108-95-2	9.4E+01	1.5E+00	4.5E-03	1.7E-02	3.5E-01	3.4E-01	3.1E-01	8.5E-01	1.0E+00	1.20E-05
SVOC	Pyrene	129-00-0	2.0E+02	5.1E+00	2.8E-01	1.5E+00	1.4E+00	1.6E+00	2.4E+00	5.7E+00	1.0E+00	1.29E-03
SVOC	2,4,5-Trichlorophenol	95-95-4	2.0E+02	3.9E+00	4.7E-02	2.5E-01	1.3E+00	5.2E-01	4.8E-01	3.2E+00	1.0E+00	2.11E-04
SVOC	2,4,6-Trichlorophenol	88-06-2	2.0E+02	3.7E+00	3.4E-02	1.9E-01	1.3E+00	4.7E-01	4.3E-01	3.2E+00	1.0E+00	1.56E-04
PCB	PCBs (total)	1336-36-3	3.3E+02	6.5E+00	4.5E-01	3.1E+00	7.2E+00	3.2E+00	7.7E+00	3.1E+01	7.0E-01	3.31E-03
INORG	Antimony	7440-36-0	1.2E+02		1.0E-03							2.00E-06
INORG	Arsenic	7440-38-2	7.5E+01		1.0E-03							2.00E-06
INORG	Barium	7440-39-3	1.4E+02		1.0E-03							2.00E-06
INORG	Beryllium	7440-41-7	9.0E+00		1.0E-03							2.00E-06
INORG	Cadmium	7440-43-9	1.1E+02		1.0E-03							2.00E-06
INORG	Chromium (total)	7440-47-3	5.2E+01		2.0E-03							4.00E-06
INORG	Chromium III	16065-83-1	5.2E+01		1.0E-03							2.00E-06
INORG	Chromium VI	18540-29-9	5.2E+01		2.0E-03							4.00E-06
INORG	Cobalt	7440-48-4	5.9E+01		4.0E-04							8.00E-07
INORG	Copper	7440-50-8	6.4E+01		1.0E-03							2.00E-06
INORG	Cyanide (total)	57-12-5	2.6E+01		1.0E-03							2.00E-06
INORG	Fluoride	16984-48-8			1.0E-03							2.00E-06
INORG	Lead	7439-92-1	2.1E+02		1.0E-04							2.00E-07
INORG	Manganese	7439-96-5	5.5E+01		1.0E-03							2.00E-06
INORG	Mercury	7439-97-6	2.0E+02		1.0E-03							2.00E-06
INORG	Nickel	7440-02-0	5.9E+01		2.0E-04							4.00E-07

Attachment G7: Nonsteady State Dermal Absorption of Chemical from Water GMC: NAO Flint Operations Site, Flint, Michigan												
Chem Group	**Chemical**	**CASRN**	**MW** (g/mole)	**Log K_{ow}** (unitless)	**K_p** (cm/hr)	**B** (unitless)	**τ** (hr)	**c**	**b**	**ts** (hr)	**FA** (unitless)	**DA** (L/cm^2-event)
INORG	Selenium	7782-49-2	7.9E+01		1.0E-03							2.00E-06
INORG	Silver	7440-22-4	1.1E+02		6.0E-04							1.20E-06
INORG	Thallium	7440-28-0	2.0E+02		1.0E-03							2.00E-06
INORG	Vanadium	7440-62-2	5.1E+01		1.0E-03							2.00E-06
INORG	Zinc	7440-66-6	6.5E+01		6.0E-04							1.20E-06
Note:	Event Time	hours	**t**	2								
	K_p capped at 1 cm/hr (USEPA 1992)											

Attachment G7: Risk-Based Cancer Criteria for Exposure of Redevelopment Workers to Groundwater
GMC: NAO Flint Operations Site, Flint, Michigan

					Incidental Ingestion			Dermal Contact				Vapor Inhalation				
Chem Group	Chemical	CASRN	Carc Class	C_{gw} (mg/L)	LADD (mg/kg/d)	SF_{oral} $(mg/kg/d)^{-1}$	RBC_{ing} (mg/L)	DA (L/cm^2 - event)	LADD (mg/kg/d)	SF_{derm} $(mg/kg/d)^{-1}$	RBC_{derm} (mg/L)	C_{air} (mg/m^3)	LADD (mg/m^3)	URF (m^3/mg)	RBC_{inh} (mg/L)	Cancer RBC (mg/L)
VOC	Acetone	67-64-1	ID	1.0E+00	2.8E-08			1.3E-06	1.2E-08			3.6E-02	7.0E-06			
VOC	Benzene	71-43-2	A	1.0E+00	2.8E-08	5.5E-02	6.5E+03	3.7E-05	3.4E-07	5.5E-02	5.3E+02	1.3E-01	2.6E-05	7.8E-03	5.0E+01	4.6E+01
VOC	Bromodichloromethane	75-27-4	B2	1.0E+00	2.8E-08	6.2E-02	5.8E+03	1.7E-05	1.6E-07	6.2E-02	1.0E+03	8.6E-02	1.7E-05	1.8E-02	3.3E+01	3.2E+01
VOC	2-Butanone	78-93-3	ID	1.0E+00	2.8E-08			2.4E-06	2.2E-08			4.3E-02	8.4E-06			
VOC	Carbon Disulfide	75-15-0		1.0E+00	2.8E-08			3.1E-05	2.9E-07			1.3E-01	2.6E-05			
VOC	Carbon Tetrachloride	56-23-5	B2	1.0E+00	2.8E-08	1.3E-01	2.8E+03	4.8E-05	4.5E-07	1.3E-01	1.7E+02	9.5E-02	1.9E-05	1.5E-02	3.6E+01	2.9E+01
VOC	Chlorobenzene	108-90-7	D	1.0E+00	2.8E-08			8.0E-05	7.4E-07			1.1E-01	2.1E-05			
VOC	Chloroethane	75-00-3		1.0E+00	2.8E-08	2.9E-03	1.2E+05	1.5E-05	1.4E-07	2.9E-03	2.5E+04	1.4E-01	2.8E-05			2.1E+04
VOC	Chloroform	67-66-3	B2	1.0E+00	2.8E-08			1.9E-05	1.7E-07			1.0E-01	2.0E-05	2.3E-02	2.1E+01	2.1E+01
VOC	Chloromethane	74-87-3	D	1.0E+00	2.8E-08			3.6E-05	3.3E-07			1.6E-01	3.2E-05			
VOC	Cumene	98-82-8	D	1.0E+00	2.8E-08			1.9E-04	1.8E-06			1.1E-01	2.1E-05			
VOC	Cyclohexane	110-82-7	ID	1.0E+00	2.8E-08			2.3E-04	2.1E-06			1.3E-01	2.5E-05			
VOC	Dibromochloromethane	124-48-1	C	1.0E+00	2.8E-08	8.4E-02	4.3E+03	1.4E-05	1.3E-07	8.4E-02	9.1E+02	7.2E-02	1.4E-05	2.4E-02	3.0E+01	2.8E+01
VOC	1,2-Dichlorobenzene	95-50-1	D	1.0E+00	2.8E-08			1.5E-04	1.3E-06			9.2E-02	1.8E-05			
VOC	1,3-Dichlorobenzene	541-73-1	D	1.0E+00	2.8E-08			1.4E-04	1.2E-06			9.4E-02	1.8E-05			
VOC	1,4-Dichlorobenzene	106-46-7	C	1.0E+00	2.8E-08	2.4E-02	1.5E+04	1.4E-04	1.3E-06	2.4E-02	3.1E+02	9.3E-02	1.8E-05	6.3E-03	8.8E+01	6.8E+01
VOC	Dichlorodifluoromethane	75-71-8		1.0E+00	2.8E-08			2.6E-05	2.4E-07			1.1E-01	2.1E-05			
VOC	1,1-Dichloroethane	75-34-3	C	1.0E+00	2.8E-08			1.8E-05	1.7E-07			1.2E-01	2.3E-05			
VOC	1,2-Dichloroethane	107-06-2	B2	1.0E+00	2.8E-08	9.1E-02	3.9E+03	1.1E-05	1.0E-07	9.1E-02	1.1E+03	1.1E-01	2.1E-05	2.6E-02	1.9E+01	1.8E+01
VOC	1,1-Dichloroethene	75-35-4	C	1.0E+00	2.8E-08			3.1E-05	2.9E-07			1.2E-01	2.3E-05			
VOC	cis-1,2-Dichloroethene	156-59-2	D	1.0E+00	2.8E-08			2.1E-05	1.9E-07			1.2E-01	2.3E-05			
VOC	trans-1,2-Dichloroethene	156-60-5		1.0E+00	2.8E-08			2.8E-05	2.6E-07			1.2E-01	2.3E-05			
VOC	1,2-Dichloropropane	78-87-5	B2	1.0E+00	2.8E-08	6.8E-02	5.3E+03	2.1E-05	2.0E-07	6.8E-02	7.5E+02	1.1E-01	2.1E-05			6.6E+02
VOC	Ethyl Benzene	100-41-4	D	1.0E+00	2.8E-08			1.3E-04	1.2E-06			1.1E-01	2.2E-05			
VOC	2-Hexanone	591-78-6		1.0E+00	2.8E-08			9.8E-06	9.0E-08			1.1E-01	2.2E-05			
VOC	Methyl Acetate	79-20-9		1.0E+00	2.8E-08			2.0E-06	1.9E-08			5.8E-02	1.1E-05			
VOC	Methyl tert-butyl ether	1634-04-4		1.0E+00	2.8E-08			8.8E-06	8.2E-08			1.0E-01	2.0E-05			
VOC	4-Methyl-2-pentanone	108-10-1	ID	1.0E+00	2.8E-08			7.3E-06	6.7E-08			6.3E-02	1.2E-05			
VOC	Methylcyclohexane	108-87-2		1.0E+00	2.8E-08			1.0E-04	9.7E-07			1.2E-01	2.3E-05			
VOC	Methylene Chloride	75-09-2	B2	1.0E+00	2.8E-08	7.5E-03	4.8E+04	9.3E-06	8.5E-08	7.5E-03	1.6E+04	1.2E-01	2.4E-05	4.7E-04	9.0E+02	8.3E+02
VOC	Styrene	100-42-5		1.0E+00	2.8E-08			9.6E-05	8.9E-07			1.1E-01	2.2E-05			
VOC	Tetrachloroethene	127-18-4	C-B2	1.0E+00	2.8E-08	5.2E-02	6.9E+03	4.0E-05	3.7E-07	5.2E-02	5.2E+02	9.1E-02	1.8E-05	3.1E-03	1.8E+02	1.3E+02
VOC	Toluene	108-88-3	D	1.0E+00	2.8E-08			8.1E-05	7.5E-07			1.2E-01	2.4E-05			
VOC	1,2,4-Trichlorobenzene	120-82-1	D	1.0E+00	2.8E-08			2.8E-04	2.5E-06			8.1E-02	1.6E-05			
VOC	1,1,1-Trichloroethane	71-55-6	D	1.0E+00	2.8E-08			3.9E-05	3.6E-07			1.0E-01	2.0E-05			
VOC	1,1,2-Trichloroethane	79-00-5	C	1.0E+00	2.8E-08	5.7E-02	6.3E+03	2.0E-05	1.9E-07	5.7E-02	9.4E+02	9.1E-02	1.8E-05	1.6E-02	3.5E+01	3.4E+01
VOC	Trichloroethene	79-01-6	C-B2	1.0E+00	2.8E-08	1.1E-02	3.3E+04	5.5E-05	5.1E-07	1.1E-02	1.8E+03	1.0E-01	2.0E-05	1.7E-03	3.0E+02	2.5E+02
VOC	Trichlorofluoromethane	75-69-4		1.0E+00	2.8E-08			4.0E-05	3.7E-07			1.0E-01	2.0E-05			
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		1.0E+00	2.8E-08			7.3E-05	6.7E-07			8.6E-02	1.7E-05			
VOC	1,2,4-Trimethylbenzene	95-63-6	ID	1.0E+00	2.8E-08			2.3E-04	2.2E-06			1.1E-01	2.1E-05			
VOC	1,3,5-Trimethylbenzene	108-67-8	ID	1.0E+00	2.8E-08			4.0E-04	3.7E-06			1.1E-01	2.1E-05			
VOC	Vinyl Chloride	75-01-4	A	1.0E+00	2.8E-08	1.4E+00	2.6E+02	1.7E-05	1.6E-07	1.4E+00	4.6E+01	1.5E-01	2.9E-05	8.8E-03	3.9E+01	2.0E+01
VOC	Xylenes (total)	1330-20-7	ID	1.0E+00	2.8E-08			1.3E-04	1.2E-06			1.1E-01	2.2E-05			
SVOC	Acenaphthene	83-32-9		1.0E+00	2.8E-08			3.0E-04	2.7E-06			5.6E-02	1.1E-05			
SVOC	Acenaphthylene	208-96-8	D	1.0E+00	2.8E-08			3.1E-04	2.8E-06			4.8E-02	9.5E-06			
SVOC	Acetophenone	98-86-2	D	1.0E+00	2.8E-08			1.1E-05	1.0E-07			9.2E-03	1.8E-06			

Attachment G7: Risk-Based Cancer Criteria for Exposure of Redevelopment Workers to Groundwater
GMC: NAO Flint Operations Site, Flint, Michigan

					Incidental Ingestion			Dermal Contact				Vapor Inhalation				
Chem Group	Chemical	CASRN	Carc Class	C_{gw} (mg/L)	LADD (mg/kg/d)	SF_{oral} $(mg/kg/d)^{-1}$	RBC_{ing} (mg/L)	DA (L/cm^2 - event)	LADD (mg/kg/d)	SF_{derm} $(mg/kg/d)^{-1}$	RBC_{derm} (mg/L)	C_{air} (mg/m^3)	LADD (mg/m^3)	URF (m^3/mg)	RBC_{inh} (mg/L)	Cancer RBC (mg/L)
SVOC	Anthracene	120-12-7	D	1.0E+00	2.8E-08			6.4E-04	5.9E-06			3.3E-02	6.5E-06			
SVOC	Atrazine	1912-24-9	C	1.0E+00	2.8E-08	2.2E-01	1.6E+03	2.6E-05	2.4E-07	2.2E-01	1.8E+02	4.7E-06	9.2E-10	6.3E-02	1.7E+05	1.7E+02
SVOC	Benzaldehyde	100-52-7		1.0E+00	2.8E-08			1.1E-05	9.9E-08			1.9E-02	3.8E-06			
SVOC	Benzo(a)anthracene	56-55-3	B2	1.0E+00	2.8E-08	7.3E-01	4.9E+02	2.4E-03	2.2E-05	7.3E-01	6.2E-01	2.5E-03	4.8E-07	8.9E-02	2.3E+02	6.2E-01
SVOC	Benzo(a)pyrene	50-32-8	B2	1.0E+00	2.8E-08	7.3E+00	4.9E+01	3.4E-03	3.1E-05	7.3E+00	4.4E-02	8.2E-04	1.6E-07	8.9E-01	7.0E+01	4.4E-02
SVOC	Benzo(b)fluoranthene	205-99-2	B2	1.0E+00	2.8E-08	7.3E-01	4.9E+02	3.9E-03	3.6E-05	7.3E-01	3.8E-01	3.9E-02	7.6E-06	8.9E-02	1.5E+01	3.7E-01
SVOC	Benzo(g,h,i)perylene	191-24-2	D	1.0E+00	2.8E-08			5.3E-03	4.9E-05			1.0E-04	2.0E-08			
SVOC	Benzo(k)fluoranthene	207-08-9	B2	1.0E+00	2.8E-08	7.3E-02	4.9E+03	3.9E-03	3.6E-05	7.3E-02	3.8E+00	6.0E-04	1.2E-07	8.9E-03	9.6E+03	3.8E+00
SVOC	Biphenyl	92-52-4	D	1.0E+00	2.8E-08			3.9E-04	3.6E-06			6.9E-02	1.4E-05			
SVOC	bis(2-Chloroethoxy)methane	111-91-1	D	1.0E+00	2.8E-08			4.5E-06	4.1E-08			1.4E-04	2.8E-08			
SVOC	bis(2-Chloroethyl) ether	111-44-4	B2	1.0E+00	2.8E-08	1.1E+00	3.3E+02	5.2E-06	4.8E-08	1.1E+00	1.9E+02	1.4E-02	2.7E-06	3.3E-01	1.1E+01	1.0E+01
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2	1.0E+00	2.8E-08	1.4E-02	2.6E+04	4.3E-03	3.9E-05	1.4E-02	1.8E+01	6.5E-05	1.3E-08	4.0E-03	2.0E+05	1.8E+01
SVOC	Butylbenzylphthalate	85-68-7	C	1.0E+00	2.8E-08	1.9E-03	1.9E+05	3.8E-04	3.5E-06	1.9E-03	1.5E+03	8.5E-04	1.7E-07	5.4E-04	1.1E+05	1.5E+03
SVOC	Caprolactam	105-60-2		1.0E+00	2.8E-08			8.0E-07	7.4E-09			4.8E-06	9.4E-10			
SVOC	Carbazole	86-74-8	B2	1.0E+00	2.8E-08	2.0E-02	1.8E+04	1.6E-04	1.5E-06	2.0E-02	3.4E+02	1.3E-05	2.5E-09	5.7E-03	7.0E+05	3.3E+02
SVOC	4-Chloro-3-methylphenol	59-50-7		1.0E+00	2.8E-08			9.1E-05	8.4E-07			3.5E-04	6.9E-08			
SVOC	2-Chloronaphthalene	91-58-7		1.0E+00	2.8E-08			3.7E-04	3.4E-06			6.9E-02	1.3E-05			
SVOC	2-Chlorophenol	95-57-8		1.0E+00	2.8E-08			2.4E-05	2.2E-07			8.1E-02	1.6E-05			
SVOC	Chrysene	218-01-9	B2	1.0E+00	2.8E-08	7.3E-03	4.9E+04	2.4E-03	2.2E-05	7.3E-03	6.2E+01	3.7E-02	7.3E-06	8.9E-04	1.5E+03	5.9E+01
SVOC	Dibenz(a,h)anthracene	53-70-3	B2	1.0E+00	2.8E-08	7.3E+00	4.9E+01	5.3E-03	4.9E-05	7.3E+00	2.8E-02	1.0E-05	2.0E-09	8.9E-01	5.5E+03	2.8E-02
SVOC	Dibenzofuran	132-64-9	D	1.0E+00	2.8E-08			5.4E-04	4.9E-06			9.5E-03	1.9E-06			
SVOC	2,4-Dichlorophenol	120-83-2		1.0E+00	2.8E-08			7.6E-05	7.0E-07			2.6E-03	5.1E-07			
SVOC	Diethylphthalate	84-66-2	D	1.0E+00	2.8E-08			2.1E-05	2.0E-07			3.4E-04	6.7E-08			
SVOC	2,4-Dimethylphenol	105-67-9		1.0E+00	2.8E-08			3.5E-05	3.2E-07			1.8E-03	3.6E-07			
SVOC	Dimethylphthalate	131-11-3	D	1.0E+00	2.8E-08			9.9E-06	9.1E-08			8.4E-05	1.6E-08			
SVOC	Di-n-butylphthalate	84-74-2	D	1.0E+00	2.8E-08			3.3E-04	3.1E-06			6.7E-07	1.3E-10			
SVOC	4,6-Dinitro-2-methylphenol	534-52-1		1.0E+00	2.8E-08			1.4E-05	1.3E-07			3.4E-04	6.6E-08			
SVOC	2,4-Dinitrotoluene	121-14-2	B2	1.0E+00	2.8E-08	6.8E-01	5.3E+02	1.3E-05	1.2E-07	6.8E-01	1.2E+02	7.6E-05	1.5E-08			9.8E+01
SVOC	2,6-Dinitrotoluene	606-20-2	B2	1.0E+00	2.8E-08	6.8E-01	5.3E+02	1.1E-05	9.8E-08	6.8E-01	1.5E+02	6.1E-04	1.2E-07	1.9E-01	4.3E+02	9.2E+01
SVOC	Di-n-octylphthalate	117-84-0		1.0E+00	2.8E-08			4.7E-03	4.4E-05			2.5E-02	4.8E-06			
SVOC	Fluoranthene	206-44-0	D	1.0E+00	2.8E-08			1.3E-03	1.2E-05			1.1E-02	2.2E-06			
SVOC	Fluorene	86-73-7	D	1.0E+00	2.8E-08			4.1E-04	3.8E-06			3.4E-02	6.6E-06			
SVOC	Formaldehyde	50-00-0	B1	1.0E+00	2.8E-08			4.2E-06	3.9E-08			5.1E-04	9.9E-08	1.3E-02	7.8E+03	7.8E+03
SVOC	Hexachlorobutadiene	87-68-3	C	1.0E+00	2.8E-08	7.8E-02	4.6E+03	5.0E-04	4.6E-06	7.8E-02	2.8E+01	7.2E-02	1.4E-05	2.2E-02	3.2E+01	1.5E+01
SVOC	Hexachlorocyclopentadiene	77-47-4	E	1.0E+00	2.8E-08			1.1E-03	1.0E-05			7.1E-02	1.4E-05			
SVOC	Hexachloroethane	67-72-1	C	1.0E+00	2.8E-08	1.4E-02	2.6E+04	1.9E-04	1.8E-06	1.4E-02	4.1E+02	7.5E-02	1.5E-05	4.0E-03	1.7E+02	1.2E+02
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	B2	1.0E+00	2.8E-08	7.3E-01	4.9E+02	5.3E-03	4.9E-05	7.3E-01	2.8E-01	1.1E-03	2.2E-07	8.9E-02	5.1E+02	2.8E-01
SVOC	Isophorone	78-59-1	C	1.0E+00	2.8E-08	9.5E-04	3.8E+05	1.1E-05	1.1E-07	9.5E-04	1.0E+05	5.6E-03	1.1E-06			7.9E+04
SVOC	2-Methylnaphthalene	91-57-6	ID	1.0E+00	2.8E-08			2.9E-04	2.7E-06			8.1E-02	1.6E-05			
SVOC	Methylphenol (total)	1319-77-3		1.0E+00	2.8E-08			2.2E-05	2.0E-07			8.3E-04	1.6E-07			
SVOC	Naphthalene	91-20-3	C	1.0E+00	2.8E-08			1.5E-04	1.4E-06			8.4E-02	1.6E-05			
SVOC	2-Nitroaniline	88-74-4		1.0E+00	2.8E-08			1.4E-05	1.3E-07			1.4E-04	2.8E-08			
SVOC	Nitrobenzene	98-95-3	D	1.0E+00	2.8E-08			1.6E-05	1.5E-07			1.8E-02	3.6E-06			
SVOC	2-Nitrophenol	88-75-5		1.0E+00	2.8E-08			1.3E-05	1.2E-07			7.8E-03	1.5E-06			
SVOC	4-Nitrophenol	100-02-7		1.0E+00	2.8E-08			1.6E-05	1.4E-07			3.7E-07	7.3E-11			
SVOC	N-Nitrosodiphenylamine	86-30-6	B2	1.0E+00	2.8E-08	4.9E-03	7.3E+04	6.8E-05	6.3E-07	4.9E-03	3.2E+03	3.8E-03	7.4E-07			3.1E+03

Attachment G7: Risk-Based Cancer Criteria for Exposure of Redevelopment Workers to Groundwater
GMC: NAO Flint Operations Site, Flint, Michigan

					Incidental Ingestion			Dermal Contact				Vapor Inhalation				
Chem Group	Chemical	CASRN	Carc Class	C_{gw} (mg/L)	LADD (mg/kg/d)	SF_{oral} $(mg/kg/d)^{-1}$	RBC_{ing} (mg/L)	DA (L/cm^2 - event)	LADD (mg/kg/d)	SF_{derm} $(mg/kg/d)^{-1}$	RBC_{derm} (mg/L)	C_{air} (mg/m^3)	LADD (mg/m^3)	URF (m^3/mg)	RBC_{inh} (mg/L)	Cancer RBC (mg/L)
SVOC	N-Nitroso-di-n-propylamine	621-64-7	B2	1.0E+00	2.8E-08	7.0E+00	5.1E+01	7.7E-06	7.1E-08	7.0E+00	2.0E+01	2.0E-03	4.0E-07	2.0E+00	1.3E+01	6.7E+00
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	C	1.0E+00	2.8E-08	7.0E-02	5.1E+03	2.8E-05	2.5E-07	7.0E-02	5.6E+02	4.7E-02	9.2E-06	1.0E-02	1.1E+02	9.0E+01
SVOC	Pentachlorophenol	87-86-5	B2	1.0E+00	2.8E-08	1.2E-01	3.0E+03	7.4E-04	6.9E-06	1.2E-01	1.2E+01	1.8E-05	3.4E-09	3.4E-02	8.5E+04	1.2E+01
SVOC	Phenanthrene	85-01-8	D	1.0E+00	2.8E-08			5.6E-04	5.2E-06			1.6E-02	3.1E-06			
SVOC	Phenol	108-95-2	ID	1.0E+00	2.8E-08			1.2E-05	1.1E-07			4.0E-04	7.9E-08			
SVOC	Pyrene	129-00-0	D	1.0E+00	2.8E-08			1.3E-03	1.2E-05			7.9E-03	1.5E-06			
SVOC	2,4,5-Trichlorophenol	95-95-4		1.0E+00	2.8E-08			2.1E-04	1.9E-06			3.3E-03	6.5E-07			
SVOC	2,4,6-Trichlorophenol	88-06-2	B2	1.0E+00	2.8E-08	1.1E-02	3.3E+04	1.6E-04	1.4E-06	1.1E-02	6.3E+02	5.8E-03	1.1E-06	3.1E-03	2.9E+03	5.1E+02
PCB	PCBs (total)	1336-36-3	B2	1.0E+00	2.8E-08	2.0E+00	1.8E+02	3.3E-03	3.1E-05	2.0E+00	1.6E-01	6.2E-02	1.2E-05	5.7E-01	1.4E+00	1.5E-01
INORG	Antimony	7440-36-0		1.0E+00	2.8E-08			2.0E-06	1.8E-08							
INORG	Arsenic	7440-38-2	A	1.0E+00	2.8E-08	1.5E+00	2.4E+02	2.0E-06	1.8E-08	1.5E+00	3.6E+02			4.3E+00		1.4E+02
INORG	Barium	7440-39-3	D	1.0E+00	2.8E-08			2.0E-06	1.8E-08							
INORG	Beryllium	7440-41-7	B1	1.0E+00	2.8E-08			2.0E-06	1.8E-08					2.4E+00		
INORG	Cadmium	7440-43-9	B1	1.0E+00	2.8E-08			2.0E-06	1.8E-08					1.8E+00		
INORG	Chromium (total)	7440-47-3		1.0E+00	2.8E-08			4.0E-06	3.7E-08					1.2E+01		
INORG	Chromium III	16065-83-1	D	1.0E+00	2.8E-08			2.0E-06	1.8E-08							
INORG	Chromium VI	18540-29-9	A	1.0E+00	2.8E-08			4.0E-06	3.7E-08					1.2E+01		
INORG	Cobalt	7440-48-4	B1	1.0E+00	2.8E-08			8.0E-07	7.4E-09					2.8E+00		
INORG	Copper	7440-50-8	D	1.0E+00	2.8E-08			2.0E-06	1.8E-08							
INORG	Cyanide (total)	57-12-5	D	1.0E+00	2.8E-08			2.0E-06	1.8E-08							
INORG	Fluoride	16984-48-8		1.0E+00	2.8E-08			2.0E-06	1.8E-08							
INORG	Lead	7439-92-1	B2	1.0E+00	2.8E-08			2.0E-07	1.8E-09							
INORG	Manganese	7439-96-5	D	1.0E+00	2.8E-08			2.0E-06	1.8E-08							
INORG	Mercury	7439-97-6	D	1.0E+00	2.8E-08			2.0E-06	1.8E-08			8.2E-02	1.6E-05			
INORG	Nickel	7440-02-0	A	1.0E+00	2.8E-08			4.0E-07	3.7E-09					2.4E-01		
INORG	Selenium	7782-49-2	D	1.0E+00	2.8E-08			2.0E-06	1.8E-08							
INORG	Silver	7440-22-4	D	1.0E+00	2.8E-08			1.2E-06	1.1E-08							
INORG	Thallium	7440-28-0		1.0E+00	2.8E-08			2.0E-06	1.8E-08							
INORG	Vanadium	7440-62-2		1.0E+00	2.8E-08			2.0E-06	1.8E-08							
INORG	Zinc	7440-66-6	D	1.0E+00	2.8E-08			1.2E-06	1.1E-08							
Note:																
Target cancer risk of 1E-05																
C/Q based on the 24-hour maximum exposure for a 15' x 15' excavation area = 10.96 kg/m3 per (kg/m2-s)																

Attachment G7: Risk-Based Noncancer Criteria for Exposure of Redevelopment Workers to Groundwater
GMC: NAO Flint Operations Site, Flint, Michigan

					Incidental Ingestion			Dermal Contact				Vapor Inhalation				
Chem Group	Chemical	CASRN	Carc Class	C_{gw} (mg/L)	ADD (mg/kg/d)	RfD_{oral} (mg/kg/d)	RBC_{ing} (mg/L)	DA (L/cm^2 - event)	ADD (mg/kg/d)	RfD_{derm} $(mg/kg/d)^{-1}$	RBC_{derm} (mg/L)	C_{air} (mg/m^3)	ADD (mg/m^3)	RfC (mg/m^3)	RBC_{inh} (mg/L)	Noncancer RBC (mg/L)
VOC	Acetone	67-64-1	ID	1.0E+00	2.0E-06	1.0E+00	5.1E+05	1.3E-06	8.2E-07	1.0E+00	1.2E+06	3.6E-02	4.9E-04	3.5E+00	7.1E+03	7.0E+03
VOC	Benzene	71-43-2	A	1.0E+00	2.0E-06	4.0E-03	2.0E+03	3.7E-05	2.4E-05	4.0E-03	1.7E+02	1.3E-01	1.8E-03	6.0E-02	3.4E+01	2.8E+01
VOC	Bromodichloromethane	75-27-4	B2	1.0E+00	2.0E-06	2.0E-02	1.0E+04	1.7E-05	1.1E-05	2.0E-02	1.8E+03	8.6E-02	1.2E-03	7.0E-02	5.9E+01	5.7E+01
VOC	Bromoform	75-25-2	B2	1.0E+00	2.0E-06	2.0E-01	1.0E+05	1.4E-05	9.0E-06	2.0E-01	2.2E+04	6.2E-02	8.5E-04			1.8E+04
VOC	Bromomethane	74-83-9	D	1.0E+00	2.0E-06	5.0E-03	2.6E+03	7.7E-06	5.0E-06	5.0E-03	1.0E+03	1.2E-01	1.6E-03	2.0E-01	1.2E+02	1.1E+02
VOC	2-Butanone	78-93-3	ID	1.0E+00	2.0E-06	2.0E+00	1.0E+06	2.4E-06	1.6E-06	2.0E+00	1.3E+06	4.3E-02	5.9E-04	5.0E+00	8.5E+03	8.4E+03
VOC	Carbon Disulfide	75-15-0		1.0E+00	2.0E-06	1.0E-01	5.1E+04	3.1E-05	2.0E-05	1.0E-01	5.0E+03	1.3E-01	1.8E-03	7.0E-01	3.8E+02	3.5E+02
VOC	Carbon Tetrachloride	56-23-5	B2	1.0E+00	2.0E-06	7.0E-03	3.6E+03	4.8E-05	3.1E-05	7.0E-03	2.2E+02	9.5E-02	1.3E-03			2.1E+02
VOC	Chlorobenzene	108-90-7	D	1.0E+00	2.0E-06	2.0E-02	1.0E+04	8.0E-05	5.2E-05	2.0E-02	3.9E+02	1.1E-01	1.5E-03	6.0E-02	4.1E+01	3.7E+01
VOC	Chloroethane	75-00-3		1.0E+00	2.0E-06	4.0E-01	2.0E+05	1.5E-05	9.6E-06	4.0E-01	4.2E+04	1.4E-01	2.0E-03	1.0E+01	5.1E+03	4.4E+03
VOC	Chloroform	67-66-3	B2	1.0E+00	2.0E-06	1.0E-02	5.1E+03	1.9E-05	1.2E-05	1.0E-02	8.3E+02	1.0E-01	1.4E-03	5.0E-02	3.5E+01	3.3E+01
VOC	Chloromethane	74-87-3	D	1.0E+00	2.0E-06			3.6E-05	2.3E-05			1.6E-01	2.2E-03	9.0E-02	4.0E+01	4.0E+01
VOC	Cumene	98-82-8	D	1.0E+00	2.0E-06	4.0E-01	2.0E+05	1.9E-04	1.2E-04	4.0E-01	3.2E+03	1.1E-01	1.5E-03	4.0E-01	2.7E+02	2.5E+02
VOC	Cyclohexane	110-82-7	ID	1.0E+00	2.0E-06			2.3E-04	1.5E-04			1.3E-01	1.8E-03	6.0E+00	3.4E+03	3.4E+03
VOC	1,2-Dibromo-3-chloropropane	96-12-8	B2	1.0E+00	2.0E-06			2.4E-05	1.5E-05			4.5E-02	6.2E-04	2.0E-04	3.2E-01	3.2E-01
VOC	Dibromochloromethane	124-48-1	C	1.0E+00	2.0E-06	2.0E-01	1.0E+05	1.4E-05	9.2E-06	2.0E-01	2.2E+04	7.2E-02	9.9E-04	7.0E-01	7.1E+02	6.8E+02
VOC	1,2-Dibromoethane	106-93-4	LC	1.0E+00	2.0E-06	9.0E-03	4.6E+03	6.8E-06	4.4E-06	9.0E-03	2.0E+03	7.5E-02	1.0E-03	9.0E-03	8.7E+00	8.7E+00
VOC	1,2-Dichlorobenzene	95-50-1	D	1.0E+00	2.0E-06	9.0E-02	4.6E+04	1.5E-04	9.4E-05	9.0E-02	9.6E+02	9.2E-02	1.3E-03	2.0E+00	1.6E+03	5.9E+02
VOC	1,3-Dichlorobenzene	541-73-1	D	1.0E+00	2.0E-06	9.0E-02	4.6E+04	1.4E-04	8.7E-05	9.0E-02	1.0E+03	9.4E-02	1.3E-03	1.4E-01	1.1E+02	9.8E+01
VOC	1,4-Dichlorobenzene	106-46-7	C	1.0E+00	2.0E-06	3.0E-02	1.5E+04	1.4E-04	9.3E-05	3.0E-02	3.2E+02	9.3E-02	1.3E-03	2.5E+00	2.0E+03	2.7E+02
VOC	Dichlorodifluoromethane	75-71-8		1.0E+00	2.0E-06	9.0E-01	4.6E+05	2.6E-05	1.7E-05	9.0E-01	5.3E+04	1.1E-01	1.5E-03	2.0E+00	1.4E+03	1.3E+03
VOC	1,1-Dichloroethane	75-34-3	C	1.0E+00	2.0E-06	1.0E+00	5.1E+05	1.8E-05	1.2E-05	1.0E+00	8.5E+04	1.2E-01	1.6E-03	5.0E+00	3.1E+03	3.0E+03
VOC	1,2-Dichloroethane	107-06-2	B2	1.0E+00	2.0E-06	2.0E-02	1.0E+04	1.1E-05	7.3E-06	2.0E-02	2.7E+03	1.1E-01	1.4E-03	5.0E-03	3.5E+00	3.4E+00
VOC	1,1-Dichloroethene	75-35-4	C	1.0E+00	2.0E-06	5.0E-02	2.6E+04	3.1E-05	2.0E-05	5.0E-02	2.5E+03	1.2E-01	1.6E-03	2.0E-01	1.2E+02	1.2E+02
VOC	1,2-Dichloroethene (total)	540-59-0		1.0E+00	2.0E-06	9.0E-03	4.6E+03	2.1E-05	1.3E-05	9.0E-03	6.7E+02	1.2E-01	1.6E-03	3.2E-02	1.9E+01	1.9E+01
VOC	cis-1,2-Dichloroethene	156-59-2	D	1.0E+00	2.0E-06	1.0E-01	5.1E+04	2.1E-05	1.3E-05	1.0E-01	7.5E+03	1.2E-01	1.6E-03	3.5E-01	2.2E+02	2.1E+02
VOC	trans-1,2-Dichloroethene	156-60-5		1.0E+00	2.0E-06	2.0E-01	1.0E+05	2.8E-05	1.8E-05	2.0E-01	1.1E+04	1.2E-01	1.6E-03	6.0E-02	3.7E+01	3.7E+01
VOC	1,2-Dichloropropane	78-87-5	B2	1.0E+00	2.0E-06			2.1E-05	1.4E-05			1.1E-01	1.5E-03	1.3E-02	8.9E+00	8.9E+00
VOC	1,3-Dichloropropene (total)	542-75-6	B2	1.0E+00	2.0E-06	3.0E-02	1.5E+04	2.3E-05	1.5E-05	3.0E-02	2.1E+03	1.1E-01	1.5E-03	2.0E-02	1.3E+01	1.3E+01
VOC	cis-1,3-Dichloropropene	10061-01-5		1.0E+00	2.0E-06	3.0E-02	1.5E+04	9.3E-06	6.0E-06	3.0E-02	5.0E+03	1.1E-01	1.5E-03	2.0E-02	1.3E+01	1.3E+01
VOC	trans-1,3-Dichloropropene	10061-02-6		1.0E+00	2.0E-06			2.2E-05	1.4E-05			1.0E-01	1.4E-03			
VOC	Ethyl Benzene	100-41-4	D	1.0E+00	2.0E-06	1.0E-01	5.1E+04	1.3E-04	8.2E-05	1.0E-01	1.2E+03	1.1E-01	1.5E-03	1.0E+00	6.5E+02	4.2E+02
VOC	2-Hexanone	591-78-6		1.0E+00	2.0E-06	4.0E-02	2.0E+04	9.8E-06	6.3E-06	4.0E-02	6.4E+03	1.1E-01	1.5E-03	5.0E-03	3.3E+00	3.3E+00
VOC	Methyl Acetate	79-20-9		1.0E+00	2.0E-06	1.0E+01	5.1E+06	2.0E-06	1.3E-06	1.0E+01	7.6E+06	5.8E-02	7.9E-04	3.5E+01	4.4E+04	4.4E+04
VOC	Methyl tert-butyl ether	1634-04-4		1.0E+00	2.0E-06			8.8E-06	5.7E-06			1.0E-01	1.4E-03	3.0E+00	2.1E+03	2.1E+03
VOC	4-Methyl-2-pentanone	108-10-1	ID	1.0E+00	2.0E-06			7.3E-06	4.7E-06			6.3E-02	8.7E-04	3.0E+00	3.5E+03	3.5E+03
VOC	Methylcyclohexane	108-87-2		1.0E+00	2.0E-06			1.0E-04	6.8E-05			1.2E-01	1.6E-03	3.0E+00	1.8E+03	1.8E+03
VOC	Methylene Chloride	75-09-2	B2	1.0E+00	2.0E-06	6.0E-02	3.1E+04	9.3E-06	6.0E-06	6.0E-02	1.0E+04	1.2E-01	1.7E-03	3.0E+00	1.8E+03	1.5E+03
VOC	Styrene	100-42-5		1.0E+00	2.0E-06	2.0E-01	1.0E+05	9.6E-05	6.2E-05	2.0E-01	3.2E+03	1.1E-01	1.5E-03	3.0E+00	2.0E+03	1.2E+03
VOC	1,1,2,2-Tetrachloroethane	79-34-5	C	1.0E+00	2.0E-06	6.0E-02	3.1E+04	2.6E-05	1.7E-05	6.0E-02	3.6E+03	6.9E-02	9.5E-04			3.2E+03
VOC	Tetrachloroethene	127-18-4	C-B2	1.0E+00	2.0E-06	1.0E-01	5.1E+04	4.0E-05	2.6E-05	1.0E-01	3.9E+03	9.1E-02	1.2E-03	4.0E-01	3.2E+02	2.9E+02
VOC	Toluene	108-88-3	D	1.0E+00	2.0E-06	8.0E-01	4.1E+05	8.1E-05	5.2E-05	8.0E-01	1.5E+04	1.2E-01	1.7E-03	5.0E+00	3.0E+03	2.5E+03
VOC	1,2,4-Trichlorobenzene	120-82-1	D	1.0E+00	2.0E-06	1.0E-02	5.1E+03	2.8E-04	1.8E-04	1.0E-02	5.6E+01	8.1E-02	1.1E-03	2.0E+00	1.8E+03	5.4E+01
VOC	1,1,1-Trichloroethane	71-55-6	D	1.0E+00	2.0E-06	2.8E-01	1.4E+05	3.9E-05	2.5E-05	2.8E-01	1.1E+04	1.0E-01	1.4E-03	2.2E+01	1.6E+04	6.3E+03
VOC	1,1,2-Trichloroethane	79-00-5	C	1.0E+00	2.0E-06	4.0E-02	2.0E+04	2.0E-05	1.3E-05	4.0E-02	3.1E+03	9.1E-02	1.2E-03			2.7E+03

Attachment G7: Risk-Based Noncancer Criteria for Exposure of Redevelopment Workers to Groundwater
GMC: NAO Flint Operations Site, Flint, Michigan

					Incidental Ingestion			Dermal Contact				Vapor Inhalation				
Chem Group	Chemical	CASRN	Carc Class	C_{gw} (mg/L)	ADD (mg/kg/d)	RfD_{oral} (mg/kg/d)	RBC_{ing} (mg/L)	DA (L/cm^2 - event)	ADD (mg/kg/d)	RfD_{derm} $(mg/kg/d)^{-1}$	RBC_{derm} (mg/L)	C_{air} (mg/m^3)	ADD (mg/m^3)	RfC (mg/m^3)	RBC_{inh} (mg/L)	Noncancer RBC (mg/L)
VOC	Trichloroethene	79-01-6	C-B2	1.0E+00	2.0E-06	6.0E-03	3.1E+03	5.5E-05	3.6E-05	6.0E-03	1.7E+02	1.0E-01	1.4E-03			1.6E+02
VOC	Trichlorofluoromethane	75-69-4		1.0E+00	2.0E-06	7.0E-01	3.6E+05	4.0E-05	2.6E-05	7.0E-01	2.7E+04	1.0E-01	1.4E-03	7.0E+00	5.1E+03	4.2E+03
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		1.0E+00	2.0E-06	3.0E+01	1.5E+07	7.3E-05	4.7E-05	3.0E+01	6.4E+05	8.6E-02	1.2E-03	3.0E+01	2.5E+04	2.4E+04
VOC	1,2,4-Trimethylbenzene	95-63-6	ID	1.0E+00	2.0E-06	5.0E-01	2.6E+05	2.3E-04	1.5E-04	5.0E-01	3.3E+03	1.1E-01	1.4E-03	6.0E-02	4.2E+01	4.1E+01
VOC	1,3,5-Trimethylbenzene	108-67-8	ID	1.0E+00	2.0E-06	5.0E-01	2.6E+05	4.0E-04	2.6E-04	5.0E-01	1.9E+03	1.1E-01	1.4E-03	6.0E-02	4.2E+01	4.1E+01
VOC	Vinyl Chloride	75-01-4	A	1.0E+00	2.0E-06	3.0E-03	1.5E+03	1.7E-05	1.1E-05	3.0E-03	2.8E+02	1.5E-01	2.0E-03	1.0E-01	4.9E+01	4.1E+01
VOC	Xylenes (total)	1330-20-7	ID	1.0E+00	2.0E-06	4.0E-01	2.0E+05	1.3E-04	8.5E-05	4.0E-01	4.7E+03	1.1E-01	1.5E-03	1.0E-01	6.5E+01	6.4E+01
SVOC	Acenaphthene	83-32-9		1.0E+00	2.0E-06	6.0E-01	3.1E+05	3.0E-04	1.9E-04	6.0E-01	3.1E+03	5.6E-02	7.6E-04	2.1E+00	2.8E+03	1.5E+03
SVOC	Acenaphthylene	208-96-8	D	1.0E+00	2.0E-06	3.0E-01	1.5E+05	3.1E-04	2.0E-04	3.0E-01	1.5E+03	4.8E-02	6.6E-04	1.1E+00	1.6E+03	7.7E+02
SVOC	Acetophenone	98-86-2	D	1.0E+00	2.0E-06	1.0E+00	5.1E+05	1.1E-05	7.1E-06	1.0E+00	1.4E+05	9.2E-03	1.3E-04	3.5E+00	2.8E+04	2.2E+04
SVOC	Anthracene	120-12-7	D	1.0E+00	2.0E-06	3.0E+00	1.5E+06	6.4E-04	4.1E-04	3.0E+00	7.2E+03	3.3E-02	4.6E-04			7.2E+03
SVOC	Atrazine	1912-24-9	C	1.0E+00	2.0E-06	3.5E-02	1.8E+04	2.6E-05	1.7E-05	3.5E-02	2.1E+03	4.7E-06	6.5E-08	1.2E-01	1.9E+06	1.8E+03
SVOC	Benzaldehyde	100-52-7		1.0E+00	2.0E-06	1.0E-01	5.1E+04	1.1E-05	6.9E-06	1.0E-01	1.4E+04	1.9E-02	2.6E-04	3.5E-01	1.3E+03	1.2E+03
SVOC	Benzo(a)anthracene	56-55-3	B2	1.0E+00	2.0E-06			2.4E-03	1.5E-03			2.5E-03	3.4E-05			
SVOC	Benzo(a)pyrene	50-32-8	B2	1.0E+00	2.0E-06			3.4E-03	2.2E-03			8.2E-04	1.1E-05			
SVOC	Benzo(b)fluoranthene	205-99-2	B2	1.0E+00	2.0E-06			3.9E-03	2.5E-03			3.9E-02	5.3E-04			
SVOC	Benzo(g,h,i)perylene	191-24-2	D	1.0E+00	2.0E-06	3.0E-01	1.5E+05	5.3E-03	3.4E-03	3.0E-01	8.8E+01	1.0E-04	1.4E-06	1.1E+00	7.7E+05	8.8E+01
SVOC	Benzo(k)fluoranthene	207-08-9	B2	1.0E+00	2.0E-06			3.9E-03	2.5E-03			6.0E-04	8.3E-06			
SVOC	Biphenyl	92-52-4	D	1.0E+00	2.0E-06	5.0E-02	2.6E+04	3.9E-04	2.5E-04	5.0E-02	2.0E+02	6.9E-02	9.5E-04	1.8E-01	1.8E+02	9.6E+01
SVOC	bis(2-Chloroethoxy)methane	111-91-1	D	1.0E+00	2.0E-06			4.5E-06	2.9E-06			1.4E-04	1.9E-06			
SVOC	bis(2-Chloroethyl) ether	111-44-4	B2	1.0E+00	2.0E-06			5.2E-06	3.4E-06			1.4E-02	1.9E-04			
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2	1.0E+00	2.0E-06	2.0E-02	1.0E+04	4.3E-03	2.8E-03	2.0E-02	7.3E+00	6.5E-05	8.8E-07	2.0E-01	2.3E+05	7.3E+00
SVOC	4-Bromophenyl-phenyl ether	101-55-3	D	1.0E+00	2.0E-06			2.7E-04	1.7E-04			4.0E-02	5.5E-04			
SVOC	Butylbenzylphthalate	85-68-7	C	1.0E+00	2.0E-06	2.0E+00	1.0E+06	3.8E-04	2.4E-04	2.0E+00	8.2E+03	8.5E-04	1.2E-05	7.0E+00	6.0E+05	8.0E+03
SVOC	Caprolactam	105-60-2		1.0E+00	2.0E-06	5.0E-01	2.6E+05	8.0E-07	5.2E-07	5.0E-01	9.7E+05	4.8E-06	6.6E-08	1.8E+00	2.6E+07	2.0E+05
SVOC	Carbazole	86-74-8	B2	1.0E+00	2.0E-06			1.6E-04	1.0E-04			1.3E-05	1.8E-07			
SVOC	4-Chloro-3-methylphenol	59-50-7		1.0E+00	2.0E-06	2.0E+00	1.0E+06	9.1E-05	5.9E-05	2.0E+00	3.4E+04	3.5E-04	4.8E-06	7.0E+00	1.5E+06	3.2E+04
SVOC	4-Chloroaniline	106-47-8		1.0E+00	2.0E-06	4.0E-03	2.0E+03	1.6E-05	1.0E-05	4.0E-03	4.0E+02	3.0E-04	4.2E-06	1.4E-02	3.4E+03	3.0E+02
SVOC	2-Chloronaphthalene	91-58-7		1.0E+00	2.0E-06	8.0E-02	4.1E+04	3.7E-04	2.4E-04	8.0E-02	3.4E+02	6.9E-02	9.4E-04	2.8E-01	3.0E+02	1.6E+02
SVOC	2-Chlorophenol	95-57-8		1.0E+00	2.0E-06	5.0E-02	2.6E+04	2.4E-05	1.6E-05	5.0E-02	3.2E+03	8.1E-02	1.1E-03	1.8E-01	1.6E+02	1.5E+02
SVOC	4-Chlorophenyl-phenyl ether	7005-72-3		1.0E+00	2.0E-06			2.6E-04	1.7E-04			5.6E-02	7.6E-04			
SVOC	Chrysene	218-01-9	B2	1.0E+00	2.0E-06			2.4E-03	1.5E-03			3.7E-02	5.1E-04			
SVOC	Dibenz(a,h)anthracene	53-70-3	B2	1.0E+00	2.0E-06			5.3E-03	3.4E-03			1.0E-05	1.4E-07			
SVOC	Dibenzofuran	132-64-9	D	1.0E+00	2.0E-06	2.0E-03	1.0E+03	5.4E-04	3.5E-04	2.0E-03	5.8E+00	9.5E-03	1.3E-04	7.0E-03	5.4E+01	5.2E+00
SVOC	3,3'-Dichlorobenzidine	91-94-1	B2	1.0E+00	2.0E-06			8.1E-05	5.3E-05			2.9E-06	4.0E-08			
SVOC	2,4-Dichlorophenol	120-83-2		1.0E+00	2.0E-06	3.0E-03	1.5E+03	7.6E-05	4.9E-05	3.0E-03	6.1E+01	2.6E-03	3.6E-05	1.1E-02	2.9E+02	4.9E+01
SVOC	Diethylphthalate	84-66-2	D	1.0E+00	2.0E-06	8.0E+00	4.1E+06	2.1E-05	1.4E-05	8.0E+00	5.8E+05	3.4E-04	4.7E-06	2.8E+01	5.9E+06	4.7E+05
SVOC	2,4-Dimethylphenol	105-67-9		1.0E+00	2.0E-06	2.0E-01	1.0E+05	3.5E-05	2.3E-05	2.0E-01	8.8E+03	1.8E-03	2.5E-05	7.0E-01	2.8E+04	6.3E+03
SVOC	Dimethylphthalate	131-11-3	D	1.0E+00	2.0E-06	1.0E+01	5.1E+06	9.9E-06	6.4E-06	1.0E+01	1.6E+06	8.4E-05	1.1E-06			1.2E+06
SVOC	Di-n-butylphthalate	84-74-2	D	1.0E+00	2.0E-06	1.0E+00	5.1E+05	3.3E-04	2.1E-04	1.0E+00	4.7E+03	6.7E-07	9.1E-09			4.6E+03
SVOC	4,6-Dinitro-2-methylphenol	534-52-1		1.0E+00	2.0E-06	1.0E-04	5.1E+01	1.4E-05	9.1E-06	1.0E-04	1.1E+01	3.4E-04	4.6E-06	3.5E-04	7.6E+01	8.1E+00
SVOC	2,4-Dinitrophenol	51-28-5		1.0E+00	2.0E-06	2.0E-03	1.0E+03	6.5E-06	4.2E-06	2.0E-03	4.8E+02	3.6E-04	4.9E-06			3.3E+02
SVOC	2,4-Dinitrotoluene	121-14-2	B2	1.0E+00	2.0E-06	2.0E-03	1.0E+03	1.3E-05	8.5E-06	2.0E-03	2.4E+02	7.6E-05	1.0E-06			1.9E+02
SVOC	2,6-Dinitrotoluene	606-20-2	B2	1.0E+00	2.0E-06	1.0E-02	5.1E+03	1.1E-05	6.9E-06	1.0E-02	1.5E+03	6.1E-04	8.3E-06	3.5E-02	4.2E+03	8.9E+02
SVOC	Di-n-octylphthalate	117-84-0		1.0E+00	2.0E-06	4.0E-01	2.0E+05	4.7E-03	3.0E-03	4.0E-01	1.3E+02	2.5E-02	3.4E-04			1.3E+02

Attachment G7: Risk-Based Noncancer Criteria for Exposure of Redevelopment Workers to Groundwater
GMC: NAO Flint Operations Site, Flint, Michigan

					Incidental Ingestion			Dermal Contact				Vapor Inhalation				
Chem Group	Chemical	CASRN	Carc Class	C_{gw} (mg/L)	ADD (mg/kg/d)	RfD_{oral} (mg/kg/d)	RBC_{ing} (mg/L)	DA (L/cm^2 - event)	ADD (mg/kg/d)	RfD_{derm} $(mg/kg/d)^{-1}$	RBC_{derm} (mg/L)	C_{air} (mg/m^3)	ADD (mg/m^3)	RfC (mg/m^3)	RBC_{inh} (mg/L)	Noncancer RBC (mg/L)
SVOC	Fluoranthene	206-44-0	D	1.0E+00	2.0E-06	4.0E-01	2.0E+05	1.3E-03	8.4E-04	4.0E-01	4.7E+02	1.1E-02	1.5E-04	1.4E+00	9.3E+03	4.5E+02
SVOC	Fluorene	86-73-7	D	1.0E+00	2.0E-06	4.0E-01	2.0E+05	4.1E-04	2.7E-04	4.0E-01	1.5E+03	3.4E-02	4.6E-04	1.4E+00	3.0E+03	1.0E+03
SVOC	Formaldehyde	50-00-0	B1	1.0E+00	2.0E-06	2.0E-01	1.0E+05	4.2E-06	2.7E-06	2.0E-01	7.3E+04	5.1E-04	6.9E-06			4.3E+04
SVOC	Hexachlorobenzene	118-74-1	B2	1.0E+00	2.0E-06	8.0E-04	4.1E+02	2.0E-03	1.3E-03	8.0E-04	6.3E-01	6.5E-02	8.9E-04			6.3E-01
SVOC	Hexachlorobutadiene	87-68-3	C	1.0E+00	2.0E-06	7.0E-04	3.6E+02	5.0E-04	3.2E-04	7.0E-04	2.2E+00	7.2E-02	9.9E-04			2.1E+00
SVOC	Hexachlorocyclopentadiene	77-47-4	E	1.0E+00	2.0E-06	7.0E-02	3.6E+04	1.1E-03	7.3E-04	7.0E-02	9.6E+01	7.1E-02	9.7E-04	7.0E-04	7.2E-01	7.1E-01
SVOC	Hexachloroethane	67-72-1	C	1.0E+00	2.0E-06	1.0E-02	5.1E+03	1.9E-04	1.2E-04	1.0E-02	8.1E+01	7.5E-02	1.0E-03			8.0E+01
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	B2	1.0E+00	2.0E-06			5.3E-03	3.4E-03			1.1E-03	1.5E-05			
SVOC	Isophorone	78-59-1	C	1.0E+00	2.0E-06	2.0E+00	1.0E+06	1.1E-05	7.4E-06	2.0E+00	2.7E+05	5.6E-03	7.7E-05			2.1E+05
SVOC	2-Methylnaphthalene	91-57-6	ID	1.0E+00	2.0E-06	4.0E-03	2.0E+03	2.9E-04	1.9E-04	4.0E-03	2.1E+01	8.1E-02	1.1E-03	3.0E-03	2.7E+00	2.4E+00
SVOC	Methylphenol (total)	1319-77-3		1.0E+00	2.0E-06	5.0E-01	2.6E+05	2.2E-05	1.4E-05	5.0E-01	3.6E+04	8.3E-04	1.1E-05			3.1E+04
SVOC	2-Methylphenol	95-48-7	C	1.0E+00	2.0E-06	5.0E-01	2.6E+05	2.3E-05	1.5E-05	5.0E-01	3.4E+04	1.2E-03	1.6E-05			3.0E+04
SVOC	4-Methylphenol	106-44-5	C	1.0E+00	2.0E-06	5.0E-03	2.6E+03	2.0E-05	1.3E-05	5.0E-03	3.8E+02	7.6E-04	1.0E-05			3.3E+02
SVOC	Naphthalene	91-20-3	C	1.0E+00	2.0E-06	2.0E-01	1.0E+05	1.5E-04	9.6E-05	2.0E-01	2.1E+03	8.4E-02	1.2E-03	3.0E-03	2.6E+00	2.6E+00
SVOC	2-Nitroaniline	88-74-4		1.0E+00	2.0E-06	3.0E-03	1.5E+03	1.4E-05	9.3E-06	3.0E-03	3.2E+02	1.4E-04	2.0E-06	2.0E-03	1.0E+03	2.1E+02
SVOC	3-Nitroaniline	99-09-2	C	1.0E+00	2.0E-06	3.0E-04	1.5E+02	6.9E-06	4.5E-06	3.0E-04	6.7E+01	1.3E-04	1.8E-06	1.0E-03	5.7E+02	4.3E+01
SVOC	4-Nitroaniline	100-01-6	C	1.0E+00	2.0E-06	3.0E-03	1.5E+03	7.2E-06	4.6E-06	3.0E-03	6.5E+02	1.9E-06	2.5E-08	4.0E-03	1.6E+05	4.5E+02
SVOC	Nitrobenzene	98-95-3	D	1.0E+00	2.0E-06	5.0E-03	2.6E+03	1.6E-05	1.0E-05	5.0E-03	4.8E+02	1.8E-02	2.5E-04	2.0E-02	7.9E+01	6.6E+01
SVOC	2-Nitrophenol	88-75-5		1.0E+00	2.0E-06			1.3E-05	8.4E-06			7.8E-03	1.1E-04			
SVOC	4-Nitrophenol	100-02-7		1.0E+00	2.0E-06			1.6E-05	1.0E-05			3.7E-07	5.1E-09			
SVOC	N-Nitrosodiphenylamine	86-30-6	B2	1.0E+00	2.0E-06	2.0E-02	1.0E+04	6.8E-05	4.4E-05	2.0E-02	4.5E+02	3.8E-03	5.2E-05			4.4E+02
SVOC	N-Nitroso-di-n-propylamine	621-64-7	B2	1.0E+00	2.0E-06			7.7E-06	5.0E-06			2.0E-03	2.8E-05			
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	C	1.0E+00	2.0E-06	4.0E-02	2.0E+04	2.8E-05	1.8E-05	4.0E-02	2.2E+03	4.7E-02	6.4E-04			2.0E+03
SVOC	Pentachlorophenol	87-86-5	B2	1.0E+00	2.0E-06	3.0E-02	1.5E+04	7.4E-04	4.8E-04	3.0E-02	6.3E+01	1.8E-05	2.4E-07	1.1E-01	4.4E+05	6.2E+01
SVOC	Phenanthrene	85-01-8	D	1.0E+00	2.0E-06	3.0E-01	1.5E+05	5.6E-04	3.6E-04	3.0E-01	8.3E+02	1.6E-02	2.2E-04	1.1E+00	4.9E+03	7.1E+02
SVOC	Phenol	108-95-2	ID	1.0E+00	2.0E-06	3.0E-01	1.5E+05	1.2E-05	7.7E-06	3.0E-01	3.9E+04	4.0E-04	5.5E-06			3.1E+04
SVOC	Pyrene	129-00-0	D	1.0E+00	2.0E-06	3.0E-01	1.5E+05	1.3E-03	8.3E-04	3.0E-01	3.6E+02	7.9E-03	1.1E-04	1.1E+00	9.7E+03	3.5E+02
SVOC	2,4,5-Trichlorophenol	95-95-4		1.0E+00	2.0E-06	1.0E+00	5.1E+05	2.1E-04	1.4E-04	1.0E+00	7.3E+03	3.3E-03	4.5E-05			7.2E+03
SVOC	2,4,6-Trichlorophenol	88-06-2	B2	1.0E+00	2.0E-06	1.0E-04	5.1E+01	1.6E-04	1.0E-04	1.0E-04	9.9E-01	5.8E-03	7.9E-05			9.8E-01
PCB	PCBs (total)	1336-36-3	B2	1.0E+00	2.0E-06	5.0E-05	2.6E+01	3.3E-03	2.1E-03	5.0E-05	2.3E-02	6.2E-02	8.5E-04			2.3E-02
INORG	Antimony	7440-36-0		1.0E+00	2.0E-06	4.0E-04	2.0E+02	2.0E-06	1.3E-06	6.0E-05	4.6E+01			1.4E-03		3.8E+01
INORG	Arsenic	7440-38-2	A	1.0E+00	2.0E-06	5.0E-03	2.6E+03	2.0E-06	1.3E-06	5.0E-03	3.9E+03					1.5E+03
INORG	Barium	7440-39-3	D	1.0E+00	2.0E-06	7.0E-02	3.6E+04	2.0E-06	1.3E-06	4.9E-03	3.8E+03					3.4E+03
INORG	Beryllium	7440-41-7	B1	1.0E+00	2.0E-06	2.0E-03	1.0E+03	2.0E-06	1.3E-06	1.4E-05	1.1E+01			2.0E-05		1.1E+01
INORG	Cadmium	7440-43-9	B1	1.0E+00	2.0E-06	1.0E-03	5.1E+02	2.0E-06	1.3E-06	2.5E-05	1.9E+01			9.0E-04		1.9E+01
INORG	Chromium (total)	7440-47-3		1.0E+00	2.0E-06	2.0E-02	1.0E+04	4.0E-06	2.6E-06	5.0E-04	1.9E+02			1.0E-04		1.9E+02
INORG	Chromium III	16065-83-1	D	1.0E+00	2.0E-06	1.5E+00	7.7E+05	2.0E-06	1.3E-06	2.0E-02	1.5E+04			5.3E+00		1.5E+04
INORG	Chromium VI	18540-29-9	A	1.0E+00	2.0E-06	2.0E-02	1.0E+04	4.0E-06	2.6E-06	5.0E-04	1.9E+02			1.0E-04		1.9E+02
INORG	Cobalt	7440-48-4	B1	1.0E+00	2.0E-06	2.0E-02	1.0E+04	8.0E-07	5.2E-07	2.0E-02	3.9E+04			2.0E-05		8.1E+03
INORG	Copper	7440-50-8	D	1.0E+00	2.0E-06	4.0E-02	2.0E+04	2.0E-06	1.3E-06	4.0E-02	3.1E+04			1.4E-01		1.2E+04
INORG	Cyanide (total)	57-12-5	D	1.0E+00	2.0E-06	2.0E-02	1.0E+04	2.0E-06	1.3E-06	2.0E-02	1.5E+04			7.0E-02		6.2E+03
INORG	Fluoride	16984-48-8		1.0E+00	2.0E-06			2.0E-06	1.3E-06							
INORG	Lead	7439-92-1	B2	1.0E+00	2.0E-06			2.0E-07	1.3E-07							
INORG	Manganese	7439-96-5	D	1.0E+00	2.0E-06	1.4E-01	7.2E+04	2.0E-06	1.3E-06	8.4E-03	6.5E+03			5.0E-05		6.0E+03
INORG	Mercury	7439-97-6	D	1.0E+00	2.0E-06	3.0E-04	1.5E+02	2.0E-06	1.3E-06	3.0E-04	2.3E+02	8.2E-02	1.1E-03	3.0E-04	2.7E-01	2.7E-01

Attachment G7: Risk-Based Noncancer Criteria for Exposure of Redevelopment Workers to Groundwater
GMC: NAO Flint Operations Site, Flint, Michigan

					Incidental Ingestion			Dermal Contact				Vapor Inhalation				
Chem Group	**Chemical**	**CASRN**	**Carc Class**	**C_{gw} (mg/L)**	**ADD (mg/kg/d)**	**RfD_{oral} (mg/kg/d)**	**RBC_{ing} (mg/L)**	**DA (L/cm^2 - event)**	**ADD (mg/kg/d)**	**RfD_{derm} $(mg/kg/d)^{-1}$**	**RBC_{derm} (mg/L)**	**C_{air} (mg/m^3)**	**ADD (mg/m^3)**	**RfC (mg/m^3)**	**RBC_{inh} (mg/L)**	**Noncancer RBC (mg/L)**
INORG	Nickel	7440-02-0	A	1.0E+00	2.0E-06	2.0E-02	1.0E+04	4.0E-07	2.6E-07	8.0E-04	3.1E+03					2.4E+03
INORG	Selenium	7782-49-2	D	1.0E+00	2.0E-06	5.0E-03	2.6E+03	2.0E-06	1.3E-06	5.0E-03	3.9E+03			1.8E-02		1.5E+03
INORG	Silver	7440-22-4	D	1.0E+00	2.0E-06	5.0E-03	2.6E+03	1.2E-06	7.7E-07	2.0E-04	2.6E+02			1.0E-05		2.3E+02
INORG	Thallium	7440-28-0		1.0E+00	2.0E-06	7.0E-05	3.6E+01	2.0E-06	1.3E-06	7.0E-05	5.4E+01			2.5E-04		2.2E+01
INORG	Vanadium	7440-62-2		1.0E+00	2.0E-06	7.0E-03	3.6E+03	2.0E-06	1.3E-06	1.8E-04	1.4E+02			2.5E-02		1.4E+02
INORG	Zinc	7440-66-6	D	1.0E+00	2.0E-06	3.0E-01	1.5E+05	1.2E-06	7.7E-07	3.0E-01	3.9E+05			1.1E+00		1.1E+05
				1.0E+00	2.0E-06											
				1.0E+00	2.0E-06											
				1.0E+00	2.0E-06											
				1.0E+00	2.0E-06											
				1.0E+00	2.0E-06											
				1.0E+00	2.0E-06											
				1.0E+00	2.0E-06											
				1.0E+00	2.0E-06											
				1.0E+00	2.0E-06											
Note:																
Target hazard index of 1																
C/Q based on the 24-hour maximum exposure for a 15' x 15' excavation area = 10.96 kg/m3 per (kg/m2-s)																

Attachment G8
Exposure of Redevelopment Construction Workers to LNAPL and Smear Zone Soil

Attachment G8: Estimated Ambient Air Concentration from Excavation Into Soil with Free-Phase NAPL at AOI 09-B
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	C_{NAPL} (mg/kg)	K_{eq} (unitless)	D_{air} (cm^2/s)	Sc	k_G (m/s)	K (m/s)	J_L (mg/m^2-s)	$C_{air, worker}$ (mg/m^3)
VOC	Acetone	67-64-1		4.62E-03	1.24E-01	1.13E+00	2.17E-03	1.00E-05		
VOC	Benzene	71-43-2	9.30E+02	1.91E-03	8.80E-02	1.59E+00	1.72E-03	3.28E-06	2.69E+00	5.89E+00
VOC	2-Butanone	78-93-3		1.91E-03	8.08E-02	1.73E+00	1.63E-03	3.11E-06		
VOC	Carbon Disulfide	75-15-0		7.21E-03	1.04E-01	1.34E+00	1.92E-03	1.39E-05		
VOC	Chloroethane	75-00-3		2.03E-02	2.71E-01	5.15E-01	3.66E-03	7.40E-05		
VOC	Chloromethane	74-87-3		8.64E-02	1.26E-01	1.11E+00	2.19E-03	1.89E-04		
VOC	Cumene	98-82-8	7.90E+02	9.04E-05	6.50E-02	2.15E+00	1.40E-03	1.27E-07	8.83E-02	1.94E-01
VOC	Cyclohexane	110-82-7	1.00E+04	1.95E-03	8.39E-02	1.66E+00	1.67E-03	3.24E-06	2.85E+01	6.26E+01
VOC	1,2-Dichlorobenzene	95-50-1		2.73E-05	6.90E-02	2.02E+00	1.46E-03	3.99E-08		
VOC	Dichlorodifluoromethane	75-71-8		9.74E-02	8.00E-02	1.74E+00	1.61E-03	1.57E-04		
VOC	1,1-Dichloroethane	75-34-3		4.57E-03	7.42E-02	1.88E+00	1.53E-03	7.01E-06		
VOC	cis-1,2-Dichloroethene	156-59-2		4.08E-03	7.36E-02	1.90E+00	1.53E-03	6.22E-06		
VOC	Ethyl Benzene	100-41-4	2.20E+03	1.93E-04	7.50E-02	1.86E+00	1.55E-03	2.98E-07	5.77E-01	1.27E+00
VOC	Methyl Acetate	79-20-9		4.34E-03	9.57E-02	1.46E+00	1.82E-03	7.91E-06		
VOC	4-Methyl-2-pentanone	108-10-1		3.99E-04	7.50E-02	1.86E+00	1.55E-03	6.17E-07		
VOC	Methylcyclohexane	108-87-2	2.60E+04	8.64E-04	7.35E-02	1.90E+00	1.53E-03	1.32E-06	3.01E+01	6.61E+01
VOC	Methylene Chloride	75-09-2		8.70E-03	1.01E-01	1.38E+00	1.89E-03	1.64E-05		
VOC	Tetrachloroethene	127-18-4		3.73E-04	7.20E-02	1.94E+00	1.50E-03	5.61E-07		
VOC	Toluene	108-88-3	4.20E+03	5.71E-04	8.70E-02	1.60E+00	1.71E-03	9.74E-07	3.60E+00	7.89E+00
VOC	1,2,4-Trichlorobenzene	120-82-1		8.65E-06	3.00E-02	4.65E+00	8.37E-04	7.24E-09		
VOC	1,1,1-Trichloroethane	71-55-6		2.49E-03	7.80E-02	1.79E+00	1.59E-03	3.95E-06		
VOC	1,1,2-Trichloroethane	79-00-5		4.67E-04	7.80E-02	1.79E+00	1.59E-03	7.41E-07		
VOC	Trichloroethene	79-01-6		1.48E-03	7.90E-02	1.77E+00	1.60E-03	2.36E-06		
VOC	Trichlorofluoromethane	75-69-4		1.61E-02	8.70E-02	1.60E+00	1.71E-03	2.75E-05		
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		6.66E-03	7.80E-02	1.79E+00	1.59E-03	1.06E-05		
VOC	Vinyl Chloride	75-01-4		5.99E-02	1.06E-01	1.32E+00	1.95E-03	1.17E-04		
VOC	Xylenes (total)	1330-20-7	1.02E+04	1.60E-04	7.80E-02	1.79E+00	1.59E-03	2.55E-07	2.29E+00	5.01E+00
SVOC	Acenaphthene	83-32-9		5.02E-08	4.21E-02	3.31E+00	1.05E-03	5.27E-11		
SVOC	Benzo(a)anthracene	56-55-3		2.11E-12	5.10E-02	2.74E+00	1.19E-03	2.52E-15		
SVOC	Benzo(a)pyrene	50-32-8		1.10E-13	4.30E-02	3.24E+00	1.06E-03	1.17E-16		

Attachment G8: Estimated Ambient Air Concentration from Excavation Into Soil with Free-Phase NAPL at AOI 09-B
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	C_{NAPL} (mg/kg)	K_{eq} (unitless)	D_{air} (cm^2/s)	Sc	k_G (m/s)	K (m/s)	J_L (mg/m^2-s)	$C_{air, worker}$ (mg/m^3)
SVOC	Benzo(b)fluoranthene	205-99-2		1.00E-11	2.26E-02	6.17E+00	6.92E-04	6.95E-15		
SVOC	Benzo(k)fluoranthene	207-08-9		4.02E-14	2.26E-02	6.17E+00	6.92E-04	2.78E-17		
SVOC	Biphenyl	92-52-4		1.94E-07	4.04E-02	3.45E+00	1.02E-03	1.98E-10		
SVOC	bis(2-Chloroethoxy)methane	111-91-1		2.81E-09	4.36E-02	3.20E+00	1.07E-03	3.02E-12		
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7		1.30E-10	3.51E-02	3.98E+00	9.30E-04	1.20E-13		
SVOC	Butylbenzylphthalate	85-68-7		1.66E-10	1.74E-02	8.02E+00	5.81E-04	9.63E-14		
SVOC	Chrysene	218-01-9		1.25E-13	2.48E-02	5.63E+00	7.37E-04	9.22E-17		
SVOC	2,4-Dinitrotoluene	121-14-2		2.95E-09	2.03E-01	6.87E-01	3.01E-03	8.90E-12		
SVOC	Di-n-octylphthalate	117-84-0		5.22E-11	1.51E-02	9.24E+00	5.28E-04	2.76E-14		
SVOC	Fluoranthene	206-44-0		1.57E-10	3.02E-02	4.62E+00	8.40E-04	1.32E-13		
SVOC	Fluorene	86-73-7		1.27E-08	3.63E-02	3.84E+00	9.51E-04	1.21E-11		
SVOC	2-Methylnaphthalene	91-57-6	5.60E+02	1.11E-06	4.84E-02	2.88E+00	1.15E-03	1.27E-09	6.28E-04	1.38E-03
SVOC	Naphthalene	91-20-3	8.30E+02	1.71E-06	5.90E-02	2.36E+00	1.32E-03	2.25E-09	1.64E-03	3.60E-03
SVOC	Phenanthrene	85-01-8		2.25E-09	3.75E-02	3.72E+00	9.72E-04	2.19E-12		
SVOC	Pyrene	129-00-0		9.22E-11	2.72E-02	5.13E+00	7.84E-04	7.23E-14		
PCB	PCBs (total)	1336-36-3		1.55E-09	2.02E-02	6.91E+00	6.42E-04	9.94E-13		
INORG	Antimony	7440-36-0								
INORG	Arsenic	7440-38-2	3.60E+00							
INORG	Barium	7440-39-3	6.60E-01							
INORG	Beryllium	7440-41-7								
INORG	Cadmium	7440-43-9	7.00E-03							
INORG	Chromium (total)	7440-47-3	6.40E-01							
INORG	Cobalt	7440-48-4								
INORG	Copper	7440-50-8	9.60E-01							
INORG	Cyanide (total)	57-12-5								
INORG	Lead	7439-92-1	2.30E+02							
INORG	Manganese	7439-96-5	6.00E-02							
INORG	Mercury	7439-97-6		3.93E-08	3.07E-02	4.55E+00	8.50E-04	3.34E-11		
INORG	Nickel	7440-02-0	1.90E+00							
INORG	Selenium	7782-49-2	4.10E+00							
INORG	Silver	7440-22-4								

Attachment G8: Estimated Ambient Air Concentration from Excavation Into Soil with Free-Phase NAPL at AOI 09-B
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	C_{NAPL} (mg/kg)	K_{eq} (unitless)	D_{air} (cm^2/s)	Sc	k_G (m/s)	K (m/s)	J_L (mg/m^2-s)	$C_{air, worker}$ (mg/m^3)
INORG	Thallium	7440-28-0								
INORG	Vanadium	7440-62-2	1.70E-01							
INORG	Zinc	7440-66-6	4.70E-01							
Notes:										
Physical Properties of Air										
	Pressure	1	atm	assumed						
	Molecular Weight	28.8	g/g mol	Perry and Chilton (1973)						
	Viscosity	1.80E-04	g/(cm.s)	Perry and Chilton (1973)						
	Density	0.00129	g/cm^3	Perry and Chilton (1973)						
Physical Properties of NAPL										
	Molecular Weight	300	g/g mol							
	Density	0.88	g/cm^3							
Physical Characteristics of Excavation Pit										
	Windspeed	0.5	m/s	assumed						
	Surface Area	2.1E+01	m^2							
	Effective Diameter of Area	5.2E+00	m	calculated						

Attachment G8: Vapor Flux from Soil to Ambient Air at AOI 09-B
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	K_{oc} (L/kg)	K_d (L/kg)	H (unitless)	D_{air} (cm^2/s)	D_{water} (cm^2/s)	R_L (unitless)	D_G (cm^2/s)	D_L (cm^2/s)	D_E (cm^2/s)		MW (g/mole)	VP (mm Hg)	S (mg/L)	V* (mg/L)	C_{sat} (mg/kg)	C_{soil} (mg/kg)	J_{sat} (mg/m^2-s)	J_{unsat} (mg/m^2-s)	$J_{critical}$ (mg/m^2-s)	J (mg/m^2-s)
VOC	Acetone	67-64-1	5.81E-01		7.95E-04	1.24E-01	1.14E-05	5.10E-02	2.73E-02	2.61E-09	4.26E-04		5.81E+01	2.30E+02	1.00E+06	7.18E+02	3.40E+04				1.8E+01	
VOC	Benzene	71-43-2	5.82E+01		1.14E-01	8.80E-02	9.80E-06	2.68E-01	1.94E-02	2.24E-09	8.26E-03		7.81E+01	9.50E+01	1.75E+03	3.99E+02	3.12E+02	4.7E+01		1.1E-01	7.3E-01	1.1E-01
VOC	2-Butanone	78-93-3	2.00E+00		1.14E-03	8.08E-02	9.80E-06	5.54E-02	1.78E-02	2.24E-09	3.67E-04		7.21E+01	9.53E+01	2.75E+05	3.69E+02	1.02E+04				5.0E+00	
VOC	Carbon Disulfide	75-15-0	4.59E+01		6.20E-01	1.04E-01	1.00E-05	4.25E-01	2.29E-02	2.29E-09	3.34E-02		7.61E+01	3.59E+02	1.19E+03	1.47E+03	3.38E+02				1.6E+00	
VOC	Chloroethane	75-00-3	1.62E+01		1.80E-01	2.71E-01	1.15E-05	1.67E-01	5.97E-02	2.63E-09	6.44E-02		6.45E+01	1.01E+03	5.68E+03	3.50E+03	6.33E+02				4.1E+00	
VOC	Chloromethane	74-87-3	3.97E+01		1.80E-01	1.26E-01	6.50E-06	2.38E-01	2.78E-02	1.49E-09	2.11E-02		5.05E+01	4.30E+03	5.33E+03	1.17E+04	8.43E+02				3.2E+00	
VOC	Cumene	98-82-8	7.05E+02		2.66E-01	6.50E-02	7.10E-06	2.27E+00	1.43E-02	1.62E-09	1.68E-03		1.20E+02	4.50E+00	6.13E+01	2.91E+01	9.26E+01	4.0E+01		4.2E-02	9.8E-02	4.2E-02
VOC	Cyclohexane	110-82-7	6.35E+02		3.98E+00	8.39E-02	9.10E-06	3.49E+00	1.85E-02	2.08E-09	2.11E-02		8.42E+01	9.69E+01	5.50E+01	4.38E+02	1.28E+02	5.0E+02	1.1E+00		4.8E-01	1.1E+00
VOC	1,2-Dichlorobenzene	95-50-1	6.23E+02		3.90E-02	6.90E-02	7.90E-06	1.933549	1.52E-02	1.81E-09	3.06E-04		1.47E+02	1.36E+00	1.56E+02	1.07E+01	2.01E+02				9.1E-02	
VOC	Dichlorodifluoromethane	75-71-8	6.15E+01		7.01E+00	8.00E-02	8.00E-06	2.93E+00	1.76E-02	1.83E-09	4.21E-02		1.21E+02	4.85E+03	2.80E+02	3.15E+04	5.47E+02				2.9E+00	
VOC	1,1-Dichloroethane	75-34-3	3.13E+01		1.15E-01	7.42E-02	1.05E-05	1.87E-01	1.64E-02	2.40E-09	1.00E-02		9.90E+01	2.27E+02	5.06E+03	1.21E+03	6.32E+02				1.6E+00	
VOC	cis-1,2-Dichloroethene	156-59-2	3.56E+01		8.35E-02	7.36E-02	1.13E-05	1.88E-01	1.62E-02	2.58E-09	7.21E-03		9.69E+01	2.03E+02	3.50E+03	1.06E+03	4.38E+02				9.6E-01	
VOC	Ethyl Benzene	100-41-4	3.67E+02		1.62E-01	7.50E-02	7.80E-06	1.21E+00	1.65E-02	1.78E-09	2.20E-03		1.06E+02	9.60E+00	1.69E+02	5.48E+01	1.37E+02	1.1E+02		1.3E-01	1.7E-01	1.3E-01
VOC	Methyl Acetate	79-20-9	1.66E+00		1.85E-03	9.57E-02	1.10E-05	5.47E-02	2.11E-02	2.51E-09	7.15E-04		7.41E+01	2.16E+02	2.44E+05	8.61E+02	8.88E+03				6.1E+00	
VOC	4-Methyl-2-pentanone	108-10-1	1.05E+01		2.82E-03	7.50E-02	7.80E-06	8.16E-02	1.65E-02	1.78E-09	5.72E-04		1.00E+02	1.99E+01	1.90E+04	1.07E+02	1.03E+03				6.4E-01	
VOC	Methylcyclohexane	108-87-2	2.66E+02		8.78E+00	7.35E-02	8.52E-06	4.23E+00	1.62E-02	1.95E-09	3.36E-02		9.82E+01	4.30E+01	1.40E+01	2.27E+02	3.95E+01	1.3E+03	1.3E+00		1.9E-01	1.3E+00
VOC	Methylene Chloride	75-09-2	1.17E+01		4.49E-02	1.01E-01	1.17E-05	1.01E-01	2.23E-02	2.67E-09	9.86E-03		8.49E+01	4.33E+02	1.30E+04	1.98E+03	8.79E+02				2.2E+00	
VOC	Tetrachloroethene	127-18-4	1.56E+02		3.77E-01	7.20E-02	8.20E-06	6.62E-01	1.59E-02	1.87E-09	9.04E-03		1.66E+02	1.86E+01	2.00E+02	1.65E+02	8.82E+01				2.2E-01	
VOC	Toluene	108-88-3	1.80E+02		1.36E-01	8.70E-02	8.60E-06	6.42E-01	1.92E-02	1.97E-09	4.06E-03		9.21E+01	2.84E+01	5.26E+02	1.41E+02	2.25E+02	2.1E+02		3.5E-01	3.7E-01	3.5E-01
VOC	1,2,4-Trichlorobenzene	120-82-1	1.79E+03		2.91E-02	3.00E-02	8.23E-06	5.44E+00	6.61E-03	1.88E-09	3.53E-05		1.81E+02	4.31E-01	3.00E+02	4.20E+00	1.09E+03				1.7E-01	
VOC	1,1,1-Trichloroethane	71-55-6	1.10E+02		3.53E-01	7.80E-02	8.80E-06	5.15E-01	1.72E-02	2.01E-09	1.18E-02		1.33E+02	1.24E+02	1.33E+03	8.87E+02	4.57E+02				1.3E+00	
VOC	1,1,2-Trichloroethane	79-00-5	5.03E+01		1.87E-02	7.80E-02	8.80E-06	2.07E-01	1.72E-02	2.01E-09	1.55E-03		1.33E+02	2.33E+01	4.42E+03	1.67E+02	6.10E+02				6.2E-01	
VOC	Trichloroethene	79-01-6	1.68E+02		2.11E-01	7.90E-02	9.10E-06	6.33E-01	1.74E-02	2.08E-09	5.80E-03		1.31E+02	7.35E+01	1.10E+03	5.19E+02	4.64E+02				9.1E-01	
VOC	Trichlorofluoromethane	75-69-4	1.21E+02		1.98E+00	8.70E-02	9.70E-06	1.17E+00	1.92E-02	2.22E-09	3.24E-02		1.37E+02	8.03E+02	1.10E+03	5.93E+03	8.61E+02				4.0E+00	
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	3.81E+02		9.83E+00	7.80E-02	8.20E-06	4.97E+00	1.72E-02	1.87E-09	3.40E-02		1.87E+02	3.32E+02	1.70E+02	3.34E+03	5.64E+02				2.7E+00	
VOC	Vinyl Chloride	75-01-4	1.85E+01		5.55E-01	1.06E-01	1.23E-05	3.18E-01	2.34E-02	2.81E-09	4.08E-02		6.25E+01	2.98E+03	2.76E+03	1.00E+04	5.85E+02				3.0E+00	
VOC	Xylenes (total)	1330-20-7	3.86E+02		1.38E-01	7.80E-02	8.75E-06	1.26E+00	1.72E-02	2.00E-09	1.88E-03		1.06E+02	7.99E+00	1.75E+02	4.56E+01	1.47E+02	5.1E+02	3.6E-01		1.6E-01	3.6E-01
SVOC	Acenaphthene	83-32-9	7.14E+03		3.18E-03	4.21E-02	7.69E-06	2.15E+01	9.28E-03	1.76E-09	1.37E-06		1.54E+02	2.50E-03	4.24E+00	2.07E-02	6.07E+01				1.8E-03	
SVOC	Benzo(a)anthracene	56-55-3	4.01E+05		6.85E-05	5.10E-02	9.00E-06	1.20E+03	1.12E-02	2.06E-09	6.41E-10		2.28E+02	1.05E-07	9.40E-03	1.29E-06	7.54E+00				4.9E-06	
SVOC	Benzo(a)pyrene	50-32-8	1.01E+06		2.32E-05	4.30E-02	9.00E-06	3.04E+03	9.48E-03	2.06E-09	7.27E-11		2.52E+02	5.49E-09	1.62E-03	7.45E-08	3.29E+00				7.2E-07	
SVOC	Benzo(b)fluoranthene	205-99-2	1.24E+06		2.28E-03	2.26E-02	5.56E-06	3.73E+03	4.98E-03	1.27E-09	3.04E-09		2.52E+02	5.00E-07	1.50E-03	6.78E-06	3.73E+00				5.3E-06	
SVOC	Benzo(k)fluoranthene	207-08-9	1.24E+06		1.70E-05	2.26E-02	5.56E-06	3.73E+03	4.98E-03	1.27E-09	2.30E-11		2.52E+02	2.00E-09	8.00E-04	2.71E-08	1.99E+00				2.5E-07	
SVOC	Biphenyl	92-52-4	1.05E+04		6.13E-03	4.04E-02	8.15E-06	3.15E+01	8.90E-03	1.86E-09	1.73E-06		1.54E+02	9.64E-03	6.03E+00	7.99E-02	1.27E+02				4.3E-03	
SVOC	bis(2-Chloroethoxy)methane	111-91-1	1.73E+01		3.47E-06	4.36E-02	8.46E-06	1.01E-01	9.61E-03	1.93E-09	3.50E-07		1.73E+02	1.40E-04	1.21E+05	1.30E-03	8.15E+03				1.2E-01	
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	1.50E+07		2.09E-06	3.51E-02	3.66E-06	4.50E+04	7.74E-03	8.37E-10	3.78E-13		3.91E+02	6.45E-06	3.40E-01	1.35E-04	1.02E+04				1.6E-04	
SVOC	Butylbenzylphthalate	85-68-7	5.73E+04		2.59E-05	1.74E-02	4.83E-06	1.72E+02	3.83E-03	1.10E-09	5.83E-10		3.12E+02	8.25E-06	2.69E+00	1.39E-04	3.08E+02				1.9E-04	
SVOC	Chrysene	218-01-9	4.01E+05		1.94E-03	2.48E-02	6.21E-06	1.20E+03	5.47E-03	1.42E-09	8.81E-09		2.28E+02	6.23E-09	1.60E-03	7.65E-08	1.28E+00				3.1E-06	
SVOC	2,4-Dinitrotoluene	121-14-2	9.46E+01		1.90E-06	2.03E-01	7.06E-06	3.33E-01	4.47E-02	1.61E-09	2.60E-07		1.82E+02	1.47E-04	2.70E+02	1.44E-03	5.99E+01				7.9E-04	
SVOC	Di-n-octylphthalate	117-84-0	8.38E+07		1.37E-03	1.51E-02	3.58E-06	2.51E+05	3.33E-03	8.18E-10	1.81E-11		3.91E+02	2.60E-06	2.00E-02	5.46E-05	3.35E+03				3.7E-04	
SVOC	Fluoranthene	206-44-0	1.08E+05		3.30E-04	3.02E-02	6.35E-06	3.24E+02	6.66E-03	1.45E-09	6.78E-09		2.02E+02	7.80E-06	2.06E-01	8.48E-05	4.45E+01				9.4E-05	
SVOC	Fluorene	86-73-7	1.38E+04		1.31E-03	3.63E-02	7.88E-06	4.13E+01	8.00E-03	1.80E-09	2.53E-07		1.66E+02	6.33E-04	1.98E+00	5.66E-03	5.46E+01				7.1E-04	
SVOC	2-Methylnaphthalene	91-57-6	6.23E+03		1.06E-02	4.84E-02	7.75E-06	1.88E+01	1.07E-02	1.77E-09	6.02E-06		1.42E+02	5.50E-02	2.46E+01	4.21E-01	3.08E+02	2.8E+01		1.8E-03	1.9E-02	1.8E-03
SVOC	Naphthalene	91-20-3	2.01E+03		9.90E-03	5.90E-02	7.50E-06	6.08E+00	1.30E-02	1.71E-09	2.12E-05		1.28E+02	8.50E-02	3.10E+01	5.86E-01	1.26E+02	4.2E+01		5.0E-03	1.5E-02	5.0E-03
SVOC	Phenanthrene	85-01-8	2.42E+04		4.76E-04	3.75E-02	7.47E-06	7.28E+01	8.26E-03	1.71E-09	5.41E-08		1.78E+02	1.12E-04	1.15E+00	1.07E-03	5.58E+01				3.3E-04	
SVOC	Pyrene	129-00-0	1.06E+05		2.26E-04	2.72E-02	7.24E-06	3.17E+02	5.99E-03	1.66E-09	4.27E-09		2.02E+02	4.59E-06	1.35E-01	4.99E-05	2.85E+01				4.8E-05	
PCB	PCBs (total)	1336-36-3	2.45E+06		4.09E-02	2.02E-02	5.00E-06	7.36E+03	4.45E-03	1.14E-09	2.47E-08		3.28E+02	7.71E-05	1.20E-02	1.36E-03	5.89E+01				2.4E-04	
INORG	Antimony	7440-36-0		4.50E+01									1.22E+02									
INORG	Arsenic	7440-38-2		2.90E+01									7.49E+01					1.8E-01				
INORG	Barium	7440-39-3		4.10E+01									1.37E+02					3.3E-02				
INORG	Beryllium	7440-41-7		7.90E+02									9.01E+00									
INORG	Cadmium	7440-43-9		7.50E+01									1.12E+02					3.5E-04				
INORG	Chromium (total)	7440-47-3		1.90E+01									5.20E+01					3.2E-02				

Attachment G8: Vapor Flux from Soil to Ambient Air at AOI 09-B
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	K_{oc} (L/kg)	K_d (L/kg)	H (unitless)	D_{air} (cm^2/s)	D_{water} (cm^2/s)	R_L (unitless)	D_G (cm^2/s)	D_L (cm^2/s)	D_E (cm^2/s)		MW (g/mole)	VP (mm Hg)	S (mg/L)	V* (mg/L)	C_{sat} (mg/kg)	C_{soil} (mg/kg)	J_{sat} (mg/m^2-s)	J_{unsat} (mg/m^2-s)	$J_{critical}$ (mg/m^2-s)	J (mg/m^2-s)
INORG	Cobalt	7440-48-4		4.50E+01									5.89E+01									
INORG	Copper	7440-50-8		3.50E+01									6.35E+01					4.8E-02				
INORG	Cyanide (total)	57-12-5		9.90E+00									2.60E+01									
INORG	Lead	7439-92-1		9.00E+02									2.07E+02					1.2E+01				
INORG	Manganese	7439-96-5		6.50E+01									5.49E+01					3.0E-03				
INORG	Mercury	7439-97-6		1.00E+03	1.45E-01	3.07E-02	6.30E-06	0.104854	6.77E-03	1.44E-09	9.36E-03		2.01E+02	1.96E-03	5.60E-02	2.12E-02	3.91E-03				9.8E-06	
INORG	Nickel	7440-02-0		6.50E+01									5.87E+01					9.6E-02				
INORG	Selenium	7782-49-2		5.00E+00									7.90E+01					2.1E-01				
INORG	Silver	7440-22-4		8.30E+00									1.08E+02									
INORG	Thallium	7440-28-0		7.10E+01									2.04E+02									
INORG	Vanadium	7440-62-2		1.00E+03									5.09E+01					8.6E-03				
INORG	Zinc	7440-66-6		6.20E+01									6.54E+01					2.4E-02				
Notes:	Soil bulk density	kg/L	ρ_b	1.50																		
	Soil particle density	kg/L	ρ_s	2.65																		
	Soil porosity	L/L-soil	θ	0.43																		
	Soil water content	L/L-soil	θ_w	0.049																		
	Soil air-filled porosity	L/L-soil	θ_a	0.38																		
	Soil organic carbon fraction	unitless	f_{oc}	0.002																		
	Averaging period	day	**EF * ED**	5																		
	Averaging period	s	**EF * ED**	4.32E+05																		
	Molar Gas Constant	L-mmHg/mole-^oK	**R**	62.411																		
	Temperature	^oC	**T**	25																		
		K	**T**	298																		

Attachment G8: Concentrations in Ambient Air - AOI 09-B
GMC: NAO Flint Operations Site, Flint, Michigan

				Vapor		
		C/Q (kg/m^3 per kg/m^2-s):		2.192		
	Chem Chem	**Chemical**	**CASRN**	**C_{SZsoil}** (mg/kg)	**J** (mg/m^2-s)	**C_{air}** (mg/m^3)
X	VOC	Acetone	67-64-1			
X	VOC	Benzene	71-43-2	4.69E+01	1.10E-01	2.41E-01
X	VOC	2-Butanone	78-93-3			
X	VOC	Carbon Disulfide	75-15-0			
X	VOC	Chloroethane	75-00-3			
X	VOC	Chloromethane	74-87-3			
X	VOC	Cumene	98-82-8	3.99E+01	4.21E-02	9.22E-02
X	VOC	Cyclohexane	110-82-7	5.05E+02	1.11E+00	2.44E+00
X	VOC	1,2-Dichlorobenzene	95-50-1			
X	VOC	Dichlorodifluoromethane	75-71-8			
X	VOC	1,1-Dichloroethane	75-34-3			
X	VOC	cis-1,2-Dichloroethene	156-59-2			
X	VOC	Ethyl Benzene	100-41-4	1.11E+02	1.34E-01	2.94E-01
X	VOC	Methyl Acetate	79-20-9			
X	VOC	4-Methyl-2-pentanone	108-10-1			
X	VOC	Methylcyclohexane	108-87-2	1.31E+03	1.34E+00	2.93E+00
X	VOC	Methylene Chloride	75-09-2			
X	VOC	Tetrachloroethene	127-18-4			
X	VOC	Toluene	108-88-3	2.12E+02	3.48E-01	7.62E-01
X	VOC	1,2,4-Trichlorobenzene	120-82-1			
X	VOC	1,1,1-Trichloroethane	71-55-6			
X	VOC	1,1,2-Trichloroethane	79-00-5			
X	VOC	Trichloroethene	79-01-6			
X	VOC	Trichlorofluoromethane	75-69-4			
X	VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1			
X	VOC	Vinyl Chloride	75-01-4			
X	VOC	Xylenes (total)	1330-20-7	5.15E+02	3.56E-01	7.81E-01
X	SVOC	Acenaphthene	83-32-9			
X	SVOC	Benzo(a)anthracene	56-55-3			
X	SVOC	Benzo(a)pyrene	50-32-8			
X	SVOC	Benzo(b)fluoranthene	205-99-2			
X	SVOC	Benzo(k)fluoranthene	207-08-9			
X	SVOC	Biphenyl	92-52-4			
X	SVOC	bis(2-Chloroethoxy)methane	111-91-1			
X	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7			
X	SVOC	Butylbenzylphthalate	85-68-7			
X	SVOC	Chrysene	218-01-9			
X	SVOC	2,4-Dinitrotoluene	121-14-2			
X	SVOC	Di-n-octylphthalate	117-84-0			
X	SVOC	Fluoranthene	206-44-0			
X	SVOC	Fluorene	86-73-7			
X	SVOC	2-Methylnaphthalene	91-57-6	2.83E+01	1.79E-03	3.91E-03
X	SVOC	Naphthalene	91-20-3	4.19E+01	4.96E-03	1.09E-02
X	SVOC	Phenanthrene	85-01-8			
X	SVOC	Pyrene	129-00-0			
X	PCB	PCBs (total)	1336-36-3			
X	INORG	Antimony	7440-36-0			
X	INORG	Arsenic	7440-38-2	1.82E-01		
X	INORG	Barium	7440-39-3	3.33E-02		
X	INORG	Beryllium	7440-41-7			
X	INORG	Cadmium	7440-43-9	3.53E-04		
X	INORG	Chromium (total)	7440-47-3	3.23E-02		
X	INORG	Cobalt	7440-48-4			

	Attachment G8: Concentrations in Ambient Air - AOI 09-B GMC: NAO Flint Operations Site, Flint, Michigan					
				Vapor		
		C/Q (kg/m^3 per kg/m^2-s)**:**		2.192		
	Chem Chem	**Chemical**	**CASRN**	**C_{SZsoil}** (mg/kg)	**J** (mg/m^2-s)	**C_{air}** (mg/m^3)
X	INORG	Copper	7440-50-8	4.84E-02		
X	INORG	Cyanide (total)	57-12-5			
X	INORG	Lead	7439-92-1	1.16E+01		
X	INORG	Manganese	7439-96-5	3.03E-03		
X	INORG	Mercury	7439-97-6			
X	INORG	Nickel	7440-02-0	9.59E-02		
X	INORG	Selenium	7782-49-2	2.07E-01		
X	INORG	Silver	7440-22-4			
X	INORG	Thallium	7440-28-0			
X	INORG	Vanadium	7440-62-2	8.58E-03		
X	INORG	Zinc	7440-66-6	2.37E-02		

Attachment G8: Nonsteady State Dermal Absorption of Chemical from NAPL
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	MW (g/mole)	Log K_{ow} (unitless)	K_p (cm/hr)	B (unitless)	τ (hr)	c	b	ts (hr)	FA (unitless)	DA (L/cm^2-event)
VOC	Acetone	67-64-1	5.8E+01	-2.4E-01	9.0E-04	2.7E-03	2.2E-01	3.4E-01	3.0E-01	5.3E-01	1.0E+00	2.21E-06
VOC	Benzene	71-43-2	7.8E+01	2.1E+00	1.1E-04	3.7E-04	2.9E-01	3.3E-01	3.0E-01	6.9E-01	1.0E+00	2.81E-07
VOC	2-Butanone	78-93-3	7.2E+01	2.8E-01	5.0E-04	1.6E-03	2.7E-01	3.3E-01	3.0E-01	6.4E-01	1.0E+00	1.27E-06
VOC	Carbon Disulfide	75-15-0	7.6E+01	2.0E+00	1.2E-04	4.2E-04	2.8E-01	3.3E-01	3.0E-01	6.7E-01	1.0E+00	3.18E-07
VOC	Chloroethane	75-00-3	6.5E+01	1.4E+00	2.3E-04	7.0E-04	2.4E-01	3.3E-01	3.0E-01	5.8E-01	1.0E+00	5.59E-07
VOC	Chloromethane	74-87-3	5.0E+01	1.9E+00	1.8E-04	5.0E-04	2.0E-01	3.3E-01	3.0E-01	4.8E-01	1.0E+00	4.42E-07
VOC	Cumene	98-82-8	1.2E+02	3.5E+00	2.2E-05	9.2E-05	5.0E-01	3.3E-01	3.0E-01	1.2E+00	1.0E+00	6.51E-08
VOC	Cyclohexane	110-82-7	8.4E+01	3.4E+00	3.6E-05	1.3E-04	3.1E-01	3.3E-01	3.0E-01	7.5E-01	1.0E+00	9.50E-08
VOC	1,2-Dichlorobenzene	95-50-1	1.5E+02	3.4E+00	1.6E-05	7.6E-05	7.0E-01	3.3E-01	3.0E-01	1.7E+00	1.0E+00	5.52E-08
VOC	Dichlorodifluoromethane	75-71-8	1.2E+02	2.2E+00	6.1E-05	2.6E-04	5.0E-01	3.3E-01	3.0E-01	1.2E+00	1.0E+00	1.84E-07
VOC	1,1-Dichloroethane	75-34-3	9.9E+01	1.8E+00	1.1E-04	4.2E-04	3.8E-01	3.3E-01	3.0E-01	9.0E-01	1.0E+00	3.00E-07
VOC	cis-1,2-Dichloroethene	156-59-2	9.7E+01	1.9E+00	1.1E-04	4.0E-04	3.7E-01	3.3E-01	3.0E-01	8.8E-01	1.0E+00	2.89E-07
VOC	Ethyl Benzene	100-41-4	1.1E+02	3.1E+00	3.5E-05	1.4E-04	4.1E-01	3.3E-01	3.0E-01	9.9E-01	1.0E+00	9.75E-08
VOC	Methyl Acetate	79-20-9	7.4E+01	1.8E-01	5.3E-04	1.8E-03	2.7E-01	3.3E-01	3.0E-01	6.6E-01	1.0E+00	1.35E-06
VOC	4-Methyl-2-pentanone	108-10-1	1.0E+02	1.2E+00	1.7E-04	6.6E-04	3.8E-01	3.3E-01	3.0E-01	9.2E-01	1.0E+00	4.74E-07
VOC	Methylcyclohexane	108-87-2	9.8E+01	3.0E+00	4.4E-05	1.7E-04	3.7E-01	3.3E-01	3.0E-01	9.0E-01	1.0E+00	1.21E-07
VOC	Methylene Chloride	75-09-2	8.5E+01	1.3E+00	2.0E-04	7.1E-04	3.1E-01	3.3E-01	3.0E-01	7.5E-01	1.0E+00	5.24E-07
VOC	Tetrachloroethene	127-18-4	1.7E+02	2.7E+00	2.3E-05	1.1E-04	8.9E-01	3.3E-01	3.0E-01	2.1E+00	1.0E+00	8.53E-08
VOC	Toluene	108-88-3	9.2E+01	2.8E+00	5.6E-05	2.1E-04	3.5E-01	3.3E-01	3.0E-01	8.3E-01	1.0E+00	1.51E-07
VOC	1,2,4-Trichlorobenzene	120-82-1	1.8E+02	4.0E+00	6.6E-06	3.4E-05	1.1E+00	3.3E-01	3.0E-01	2.6E+00	1.0E+00	2.70E-08
VOC	1,1,1-Trichloroethane	71-55-6	1.3E+02	2.5E+00	4.1E-05	1.8E-04	5.9E-01	3.3E-01	3.0E-01	1.4E+00	1.0E+00	1.29E-07
VOC	1,1,2-Trichloroethane	79-00-5	1.3E+02	2.1E+00	5.7E-05	2.5E-04	5.9E-01	3.3E-01	3.0E-01	1.4E+00	1.0E+00	1.81E-07
VOC	Trichloroethene	79-01-6	1.3E+02	2.7E+00	3.5E-05	1.5E-04	5.7E-01	3.3E-01	3.0E-01	1.4E+00	1.0E+00	1.10E-07
VOC	Trichlorofluoromethane	75-69-4	1.4E+02	2.5E+00	3.7E-05	1.7E-04	6.2E-01	3.3E-01	3.0E-01	1.5E+00	1.0E+00	1.20E-07
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	1.9E+02	3.2E+00	1.2E-05	6.3E-05	1.2E+00	3.3E-01	3.0E-01	2.8E+00	1.0E+00	5.06E-08
VOC	Vinyl Chloride	75-01-4	6.3E+01	1.5E+00	2.2E-04	6.7E-04	2.4E-01	3.3E-01	3.0E-01	5.7E-01	1.0E+00	5.40E-07
VOC	Xylenes (total)	1330-20-7	1.1E+02	3.2E+00	3.4E-05	1.3E-04	4.1E-01	3.3E-01	3.0E-01	9.9E-01	1.0E+00	9.55E-08
SVOC	Acenaphthene	83-32-9	1.5E+02	3.9E+00	1.0E-05	4.8E-05	7.7E-01	3.3E-01	3.0E-01	1.8E+00	1.0E+00	3.57E-08
SVOC	Benzo(a)anthracene	56-55-3	2.3E+02	5.7E+00	9.6E-07	5.6E-06	2.0E+00	3.3E-01	3.0E-01	4.8E+00	9.0E-01	4.79E-09
SVOC	Benzo(a)pyrene	50-32-8	2.5E+02	6.1E+00	5.1E-07	3.1E-06	2.7E+00	3.3E-01	3.0E-01	6.5E+00	8.0E-01	2.64E-09
SVOC	Benzo(b)fluoranthene	205-99-2	2.5E+02	6.2E+00	4.8E-07	2.9E-06	2.7E+00	3.3E-01	3.0E-01	6.5E+00	8.0E-01	2.46E-09
SVOC	Benzo(k)fluoranthene	207-08-9	2.5E+02	6.2E+00	4.8E-07	2.9E-06	2.7E+00	3.3E-01	3.0E-01	6.5E+00	8.0E-01	2.46E-09
SVOC	Biphenyl	92-52-4	1.5E+02	4.1E+00	8.8E-06	4.2E-05	7.7E-01	3.3E-01	3.0E-01	1.8E+00	1.0E+00	3.12E-08
SVOC	bis(2-Chloroethoxy)methane	111-91-1	1.7E+02	1.3E+00	6.4E-05	3.2E-04	9.8E-01	3.3E-01	3.0E-01	2.3E+00	1.0E+00	2.46E-07
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	3.9E+02	7.3E+00	3.4E-08	2.6E-07	1.6E+01	3.3E-01	3.0E-01	3.9E+01	4.0E-01	2.14E-10
SVOC	Butylbenzylphthalate	85-68-7	3.1E+02	4.8E+00	6.4E-07	4.3E-06	5.9E+00	3.3E-01	3.0E-01	1.4E+01	9.0E-01	5.46E-09
SVOC	Chrysene	218-01-9	2.3E+02	5.7E+00	9.6E-07	5.6E-06	2.0E+00	3.3E-01	3.0E-01	4.8E+00	9.0E-01	4.79E-09

Attachment G8: Nonsteady State Dermal Absorption of Chemical from NAPL
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	MW (g/mole)	Log K_{ow} (unitless)	K_p (cm/hr)	B (unitless)	τ (hr)	c	b	ts (hr)	FA (unitless)	DA (L/cm^2-event)
SVOC	2,4-Dinitrotoluene	121-14-2	1.8E+02	2.0E+00	3.1E-05	1.6E-04	1.1E+00	3.3E-01	3.0E-01	2.6E+00	1.0E+00	1.29E-07
SVOC	Di-n-octylphthalate	117-84-0	3.9E+02	8.1E+00	1.9E-08	1.4E-07	1.6E+01	3.3E-01	3.0E-01	3.9E+01	3.0E-01	8.83E-11
SVOC	Fluoranthene	206-44-0	2.0E+02	5.1E+00	2.1E-06	1.2E-05	1.4E+00	3.3E-01	3.0E-01	3.4E+00	1.0E+00	9.90E-09
SVOC	Fluorene	86-73-7	1.7E+02	4.2E+00	6.9E-06	3.4E-05	9.0E-01	3.3E-01	3.0E-01	2.2E+00	1.0E+00	2.55E-08
SVOC	2-Methylnaphthalene	91-57-6	1.4E+02	3.9E+00	1.2E-05	5.7E-05	6.6E-01	3.3E-01	3.0E-01	1.6E+00	1.0E+00	4.09E-08
SVOC	Naphthalene	91-20-3	1.3E+02	3.4E+00	2.2E-05	9.5E-05	5.5E-01	3.3E-01	3.0E-01	1.3E+00	1.0E+00	6.78E-08
SVOC	Phenanthrene	85-01-8	1.8E+02	4.5E+00	4.8E-06	2.5E-05	1.0E+00	3.3E-01	3.0E-01	2.5E+00	1.0E+00	1.94E-08
SVOC	Pyrene	129-00-0	2.0E+02	5.1E+00	2.1E-06	1.2E-05	1.4E+00	3.3E-01	3.0E-01	3.4E+00	1.0E+00	9.98E-09
PCB	PCBs (total)	1336-36-3	3.3E+02	6.5E+00	1.4E-07	9.9E-07	7.2E+00	3.3E-01	3.0E-01	1.7E+01	7.0E-01	1.05E-09
INORG	Antimony	7440-36-0	1.2E+02		1.0E-03							2.00E-06
INORG	Arsenic	7440-38-2	7.5E+01		1.0E-03							2.00E-06
INORG	Barium	7440-39-3	1.4E+02		1.0E-03							2.00E-06
INORG	Beryllium	7440-41-7	9.0E+00		1.0E-03							2.00E-06
INORG	Cadmium	7440-43-9	1.1E+02		1.0E-03							2.00E-06
INORG	Chromium (total)	7440-47-3	5.2E+01		2.0E-03							4.00E-06
INORG	Cobalt	7440-48-4	5.9E+01		4.0E-04							8.00E-07
INORG	Copper	7440-50-8	6.4E+01		1.0E-03							2.00E-06
INORG	Cyanide (total)	57-12-5	2.6E+01		1.0E-03							2.00E-06
INORG	Lead	7439-92-1	207.2		1.0E-04							2.00E-07
INORG	Manganese	7439-96-5	54.9		1.0E-03							2.00E-06
INORG	Mercury	7439-97-6	201.0		1.0E-03							2.00E-06
INORG	Nickel	7440-02-0	58.7		2.0E-04							4.00E-07
INORG	Selenium	7782-49-2	79.0		1.0E-03							2.00E-06
INORG	Silver	7440-22-4	107.9		6.0E-04							1.20E-06
INORG	Thallium	7440-28-0	204.4		1.0E-03							2.00E-06
INORG	Vanadium	7440-62-2	50.9		1.0E-03							2.00E-06
INORG	Zinc	7440-66-6	65.4		6.0E-04							1.20E-06

Attachment G8: Redevelopment Construction Worker Cancer Risk Calculations - AOI 09-B
GMC: NAO Flint Operations Site, Flint, Michigan

				Smear Zone Soil Ingestion				Smear Zone Soil Dermal Contact				Smear Zone Soil Vapor Inhalation				NAPL Dermal Contact					NAPL Vapor Inhalation			
Chem Group	Chemical	CASRN	Cancer Class	C_{SZsoil} (mg/kg)	LADD (mg/kg/d)	SF_{oral} $(mg/kg/d)^{-1}$	Risk	AF_{derm}	LADD (mg/kg/d)	SF_{derm} $(mg/kg/d)^{-1}$	Risk	C_{air} (mg/m^3)	C_{exp} (mg/m^3)	URF (m^3/mg)	Risk	C_{NAPL} (mg/L)	DA (L/cm^2)	LADD (mg/kg/d)	SF_{derm} $(mg/kg/d)^{-1}$	Risk	C_{air} (mg/m^3)	C_{air} (mg/m^3)	URF (m^3/mg)	Risk
VOC	Acetone	67-64-1	ID														2.21E-06							
VOC	Benzene	71-43-2	A	4.69E+01	2.62E-08	5.5E-02	1E-09			5.5E-02		2.4E-01	4.7E-05	7.8E-03	4E-07	8.18E+02	2.81E-07	2.12E-06	5.5E-02	1E-07	5.89E+00	1.15E-03	7.8E-03	9E-06
VOC	2-Butanone	78-93-3	ID														1.27E-06							
VOC	Carbon Disulfide	75-15-0															3.18E-07							
VOC	Chloroethane	75-00-3				2.9E-03				2.9E-03							5.59E-07		2.9E-03					
VOC	Chloromethane	74-87-3	D														4.42E-07							
VOC	Cumene	98-82-8	D	3.99E+01	2.23E-08							9.2E-02	1.8E-05			6.95E+02	6.51E-08	4.17E-07			1.94E-01	3.79E-05		
VOC	Cyclohexane	110-82-7	ID	5.05E+02	2.82E-07							2.4E+00	4.8E-04			8.80E+03	9.50E-08	7.71E-06			6.26E+01	1.22E-02		
VOC	1,2-Dichlorobenzene	95-50-1	D														5.52E-08							
VOC	Dichlorodifluoromethane	75-71-8															1.84E-07							
VOC	1,1-Dichloroethane	75-34-3	C														3.00E-07							
VOC	cis-1,2-Dichloroethene	156-59-2	D														2.89E-07							
VOC	Ethyl Benzene	100-41-4	D	1.11E+02	6.21E-08							2.9E-01	5.8E-05			1.94E+03	9.75E-08	1.74E-06			1.27E+00	2.48E-04		
VOC	Methyl Acetate	79-20-9															1.35E-06							
VOC	4-Methyl-2-pentanone	108-10-1	ID														4.74E-07							
VOC	Methylcyclohexane	108-87-2		1.31E+03	7.33E-07							2.9E+00	5.7E-04			2.29E+04	1.21E-07	2.54E-05			6.61E+01	1.29E-02		
VOC	Methylene Chloride	75-09-2	B2			7.5E-03				7.5E-03				4.7E-04			5.24E-07		7.5E-03				4.7E-04	
VOC	Tetrachloroethene	127-18-4	C-B2			5.2E-02				5.2E-02				3.1E-03			8.53E-08		5.2E-02				3.1E-03	
VOC	Toluene	108-88-3	D	2.12E+02	1.18E-07							7.6E-01	1.5E-04			3.70E+03	1.51E-07	5.15E-06			7.89E+00	1.54E-03		
VOC	1,2,4-Trichlorobenzene	120-82-1	D														2.70E-08							
VOC	1,1,1-Trichloroethane	71-55-6	D														1.29E-07							
VOC	1,1,2-Trichloroethane	79-00-5	C			5.7E-02				5.7E-02				1.6E-02			1.81E-07		5.7E-02				1.6E-02	
VOC	Trichloroethene	79-01-6	C-B2			1.1E-02				1.1E-02				1.7E-03			1.10E-07		1.1E-02				1.7E-03	
VOC	Trichlorofluoromethane	75-69-4															1.20E-07							
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1															5.06E-08							
VOC	Vinyl Chloride	75-01-4	A			1.4E+00				1.4E+00				8.8E-03			5.40E-07		1.4E+00				8.8E-03	
VOC	Xylenes (total)	1330-20-7	ID	5.15E+02	2.88E-07							7.8E-01	1.5E-04			8.98E+03	9.55E-08	7.91E-06			5.01E+00	9.81E-04		
SVOC	Acenaphthene	83-32-9						1.3E-01									3.57E-08							
SVOC	Benzo(a)anthracene	56-55-3	B2			7.3E-01		1.3E-01		7.3E-01				8.9E-02			4.79E-09		7.3E-01				8.9E-02	
SVOC	Benzo(a)pyrene	50-32-8	B2			7.3E+00		1.3E-01		7.3E+00				8.9E-01			2.64E-09		7.3E+00				8.9E-01	
SVOC	Benzo(b)fluoranthene	205-99-2	B2			7.3E-01		1.3E-01		7.3E-01				8.9E-02			2.46E-09		7.3E-01				8.9E-02	
SVOC	Benzo(k)fluoranthene	207-08-9	B2			7.3E-02		1.3E-01		7.3E-02				8.9E-03			2.46E-09		7.3E-02				8.9E-03	
SVOC	Biphenyl	92-52-4	D					1.0E-01									3.12E-08							
SVOC	bis(2-Chloroethoxy)methane	111-91-1	D					1.0E-01									2.46E-07							
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2			1.4E-02		1.0E-01		1.4E-02				4.0E-03			2.14E-10		1.4E-02				4.0E-03	
SVOC	Butylbenzylphthalate	85-68-7	C			1.9E-03		1.0E-01		1.9E-03				5.4E-04			5.46E-09		1.9E-03				5.4E-04	
SVOC	Chrysene	218-01-9	B2			7.3E-03		1.3E-01		7.3E-03				8.9E-04			4.79E-09		7.3E-03				8.9E-04	
SVOC	2,4-Dinitrotoluene	121-14-2	B2			6.8E-01		1.0E-01		6.8E-01							1.29E-07		6.8E-01					
SVOC	Di-n-octylphthalate	117-84-0						1.0E-01									8.83E-11							
SVOC	Fluoranthene	206-44-0	D					1.3E-01									9.90E-09							
SVOC	Fluorene	86-73-7	D					1.3E-01									2.55E-08							
SVOC	2-Methylnaphthalene	91-57-6	ID	2.83E+01	1.58E-08			1.0E-01	5.21E-09			3.9E-03	7.7E-07			4.93E+02	4.09E-08	1.86E-07			1.38E-03	2.69E-07		
SVOC	Naphthalene	91-20-3	C	4.19E+01	2.34E-08			1.3E-01	1.00E-08			1.1E-02	2.1E-06			7.30E+02	6.78E-08	4.57E-07			3.60E-03	7.04E-07		
SVOC	Phenanthrene	85-01-8	D					1.3E-01									1.94E-08							
SVOC	Pyrene	129-00-0	D					1.3E-01									9.98E-09							
PCB	PCBs (total)	1336-36-3	B2			2.0E+00		1.4E-01		2.0E+00				5.7E-01			1.05E-09		2.0E+00				5.7E-01	
INORG	Antimony	7440-36-0															2.00E-06							
INORG	Arsenic	7440-38-2	A	1.82E-01	1.02E-10	1.5E+00	2E-10	3.0E-02	1.01E-11	1.5E+00	2E-11			4.3E+00		3.17E+00	2.00E-06	5.85E-08	1.5E+00	9E-08			4.3E+00	
INORG	Barium	7440-39-3	D	3.33E-02	1.86E-11											5.81E-01	2.00E-06	1.07E-08						
INORG	Beryllium	7440-41-7	B1											2.4E+00			2.00E-06						2.4E+00	
INORG	Cadmium	7440-43-9	B1	3.53E-04	1.97E-13			1.0E-03	6.52E-16					1.8E+00		6.16E-03	2.00E-06	1.14E-10					1.8E+00	
INORG	Chromium (total)	7440-47-3		3.23E-02	1.81E-11									1.2E+01		5.63E-01	4.00E-06	2.08E-08					1.2E+01	
INORG	Cobalt	7440-48-4	B1											2.8E+00			8.00E-07						2.8E+00	
INORG	Copper	7440-50-8	D	4.84E-02	2.71E-11											8.45E-01	2.00E-06	1.56E-08						
INORG	Cyanide (total)	57-12-5	D														2.00E-06							
INORG	Lead	7439-92-1	B2	1.16E+01	6.49E-09											2.02E+02	2.00E-07	3.73E-07						
INORG	Manganese	7439-96-5	D	3.03E-03	1.69E-12											5.28E-02	2.00E-06	9.74E-10						
INORG	Mercury	7439-97-6	D														2.00E-06							

Attachment G8: Redevelopment Construction Worker Cancer Risk Calculations - AOI 09-B
GMC: NAO Flint Operations Site, Flint, Michigan

				Smear Zone Soil Ingestion				Smear Zone Soil Dermal Contact				Smear Zone Soil Vapor Inhalation				NAPL Dermal Contact					NAPL Vapor Inhalation			
Chem Group	**Chemical**	**CASRN**	**Cancer Class**	**C_{SZsoil}** (mg/kg)	**LADD** (mg/kg/d)	**SF_{oral}** $(mg/kg/d)^{-1}$	**Risk**	**AF_{derm}**	**LADD** (mg/kg/d)	**SF_{derm}** $(mg/kg/d)^{-1}$	**Risk**	**C_{air}** (mg/m^3)	**C_{exp}** (mg/m^3)	**URF** (m^3/mg)	**Risk**	**C_{NAPL}** (mg/L)	**DA** (L/cm^2)	**LADD** (mg/kg/d)	**SF_{derm}** $(mg/kg/d)^{-1}$	**Risk**	**C_{air}** (mg/m^3)	**C_{air}** (mg/m^3)	**URF** (m^3/mg)	**Risk**
INORG	Nickel	7440-02-0	A	9.59E-02	5.36E-11									2.4E-01		1.67E+00	4.00E-07	6.17E-09					2.4E-01	
INORG	Selenium	7782-49-2	D	2.07E-01	1.16E-10											3.61E+00	2.00E-06	6.66E-08						
INORG	Silver	7440-22-4	D														1.20E-06							
INORG	Thallium	7440-28-0															2.00E-06							
INORG	Vanadium	7440-62-2		8.58E-03	4.80E-12											1.50E-01	2.00E-06	2.76E-09						
INORG	Zinc	7440-66-6	D	2.37E-02	1.33E-11											4.14E-01	1.20E-06	4.58E-09						

Attachment G8: Redevelopment Construction Worker Hazard Index Calculations - AOI 09-B
GMC: NAO Flint Operations Site, Flint, Michigan

				Smear Zone Soil Ingestion				Smear Zone Soil Dermal Contact				Smear Zone Soil Vapor Inhalation				NAPL Dermal Contact					NAPL Vapor Inhalation			
Chem Group	Chemical	CASRN	Cancer Class	C_{SZsoil} (mg/kg)	ADD (mg/kg/d)	RfD_{oral} (mg/kg/d)	HQ	AF_{derm}	ADD (mg/kg/d)	RfD_{derm} (mg/kg/d)	HQ	C_{air} (mg/m^3)	C_{exp} (mg/m^3)	RfC (mg/m^3)	HQ	C_{NAPL} (mg/L)	DA (L/cm^2)	ADD (mg/kg/d)	RfD_{derm} (mg/kg/d)	HQ	C_{air} (mg/m^3)	C_{air} (mg/m^3)	RfC (mg/m^3)	HQ
VOC	Acetone	67-64-1	ID			1.0E+00				1.0E+00				3.5E+00			2.21E-06		1.0E+00				3.5E+00	
VOC	Benzene	71-43-2	A	4.69E+01	1.84E-06	4.0E-03	5E-04			4.0E-03		2.4E-01	3.3E-03	6.0E-02	5E-02	8.18E+02	2.81E-07	1.49E-05	4.0E-03	4E-03	5.89E+00	8.07E-02	6.0E-02	1E+00
VOC	2-Butanone	78-93-3	ID			2.0E+00				2.0E+00				5.0E+00			1.27E-06		2.0E+00				5.0E+00	
VOC	Carbon Disulfide	75-15-0				1.0E-01				1.0E-01				7.0E-01			3.18E-07		1.0E-01				7.0E-01	
VOC	Chloroethane	75-00-3				4.0E-01				4.0E-01				1.0E+01			5.59E-07		4.0E-01				1.0E+01	
VOC	Chloromethane	74-87-3	D											9.0E-02			4.42E-07						9.0E-02	
VOC	Cumene	98-82-8	D	3.99E+01	1.56E-06	4.0E-01	4E-06			4.0E-01		9.2E-02	1.3E-03	4.0E-01	3E-03	6.95E+02	6.51E-08	2.92E-06	4.0E-01	7E-06	1.94E-01	2.65E-03	4.0E-01	7E-03
VOC	Cyclohexane	110-82-7	ID	5.05E+02	1.97E-05							2.4E+00	3.3E-02	6.0E+00	6E-03	8.80E+03	9.50E-08	5.40E-05			6.26E+01	8.57E-01	6.0E+00	1E-01
VOC	1,2-Dichlorobenzene	95-50-1	D			9.0E-02				9.0E-02				2.0E+00			5.52E-08		9.0E-02				2.0E+00	
VOC	Dichlorodifluoromethane	75-71-8				9.0E-01				9.0E-01				2.0E+00			1.84E-07		9.0E-01				2.0E+00	
VOC	1,1-Dichloroethane	75-34-3	C			1.0E+00				1.0E+00				5.0E+00			3.00E-07		1.0E+00				5.0E+00	
VOC	cis-1,2-Dichloroethene	156-59-2	D			1.0E-01				1.0E-01				3.5E-01			2.89E-07		1.0E-01				3.5E-01	
VOC	Ethyl Benzene	100-41-4	D	1.11E+02	4.34E-06	1.0E-01	4E-05			1.0E-01		2.9E-01	4.0E-03	1.0E+00	4E-03	1.94E+03	9.75E-08	1.22E-05	1.0E-01	1E-04	1.27E+00	1.73E-02	1.0E+00	2E-02
VOC	Methyl Acetate	79-20-9				1.0E+01				1.0E+01				3.5E+01			1.35E-06		1.0E+01				3.5E+01	
VOC	4-Methyl-2-pentanone	108-10-1	ID											3.0E+00			4.74E-07						3.0E+00	
VOC	Methylcyclohexane	108-87-2		1.31E+03	5.13E-05							2.9E+00	4.0E-02	3.0E+00	1E-02	2.29E+04	1.21E-07	1.78E-04			6.61E+01	9.05E-01	3.0E+00	3E-01
VOC	Methylene Chloride	75-09-2	B2			6.0E-02				6.0E-02				3.0E+00			5.24E-07		6.0E-02				3.0E+00	
VOC	Tetrachloroethene	127-18-4	C-B2			1.0E-01				1.0E-01				4.0E-01			8.53E-08		1.0E-01				4.0E-01	
VOC	Toluene	108-88-3	D	2.12E+02	8.29E-06	8.0E-01	1E-05			8.0E-01		7.6E-01	1.0E-02	5.0E+00	2E-03	3.70E+03	1.51E-07	3.60E-05	8.0E-01	5E-05	7.89E+00	1.08E-01	5.0E+00	2E-02
VOC	1,2,4-Trichlorobenzene	120-82-1	D			1.0E-02				1.0E-02				2.0E+00			2.70E-08		1.0E-02				2.0E+00	
VOC	1,1,1-Trichloroethane	71-55-6	D			2.8E-01				2.8E-01				2.2E+01			1.29E-07		2.8E-01				2.2E+01	
VOC	1,1,2-Trichloroethane	79-00-5	C			4.0E-02				4.0E-02							1.81E-07		4.0E-02					
VOC	Trichloroethene	79-01-6	C-B2			6.0E-03				6.0E-03							1.10E-07		6.0E-03					
VOC	Trichlorofluoromethane	75-69-4				7.0E-01				7.0E-01				7.0E+00			1.20E-07		7.0E-01				7.0E+00	
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1				3.0E+01				3.0E+01				3.0E+01			5.06E-08		3.0E+01				3.0E+01	
VOC	Vinyl Chloride	75-01-4	A			3.0E-03				3.0E-03				1.0E-01			5.40E-07		3.0E-03				1.0E-01	
VOC	Xylenes (total)	1330-20-7	ID	5.15E+02	2.01E-05	4.0E-01	5E-05			4.0E-01		7.8E-01	1.1E-02	1.0E-01	1E-01	8.98E+03	9.55E-08	5.54E-05	4.0E-01	1E-04	5.01E+00	6.86E-02	1.0E-01	7E-01
SVOC	Acenaphthene	83-32-9				6.0E-01		1.30E-01		6.0E-01				2.1E+00			3.57E-08		6.0E-01				2.1E+00	
SVOC	Benzo(a)anthracene	56-55-3	B2					1.30E-01									4.79E-09							
SVOC	Benzo(a)pyrene	50-32-8	B2					1.30E-01									2.64E-09							
SVOC	Benzo(b)fluoranthene	205-99-2	B2					1.30E-01									2.46E-09							
SVOC	Benzo(k)fluoranthene	207-08-9	B2					1.30E-01									2.46E-09							
SVOC	Biphenyl	92-52-4	D			5.0E-02		1.00E-01		5.0E-02				1.8E-01			3.12E-08		5.0E-02				1.8E-01	
SVOC	bis(2-Chloroethoxy)methane	111-91-1	D					1.00E-01									2.46E-07							
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2			2.0E-02		1.00E-01		2.0E-02				2.0E-01			2.14E-10		2.0E-02				2.0E-01	
SVOC	Butylbenzylphthalate	85-68-7	C			2.0E+00		1.00E-01		2.0E+00				7.0E+00			5.46E-09		2.0E+00				7.0E+00	
SVOC	Chrysene	218-01-9	B2					1.30E-01									4.79E-09							
SVOC	2,4-Dinitrotoluene	121-14-2	B2			2.0E-03		1.00E-01		2.0E-03							1.29E-07		2.0E-03					
SVOC	Di-n-octylphthalate	117-84-0				4.0E-01		1.00E-01		4.0E-01							8.83E-11		4.0E-01					
SVOC	Fluoranthene	206-44-0	D			4.0E-01		1.30E-01		4.0E-01				1.4E+00			9.90E-09		4.0E-01				1.4E+00	
SVOC	Fluorene	86-73-7	D			4.0E-01		1.30E-01		4.0E-01				1.4E+00			2.55E-08		4.0E-01				1.4E+00	
SVOC	2-Methylnaphthalene	91-57-6	ID	2.83E+01	1.11E-06	4.0E-03	3E-04	1.00E-01	3.65E-07	4.0E-03	9E-05	3.9E-03	5.4E-05	3.0E-03	2E-02	4.93E+02	4.09E-08	1.30E-06	4.0E-03	3E-04	1.38E-03	1.89E-05	3.0E-03	6E-03
SVOC	Naphthalene	91-20-3	C	4.19E+01	1.64E-06	2.0E-01	8E-06	1.30E-01	7.03E-07	2.0E-01	4E-06	1.1E-02	1.5E-04	3.0E-03	5E-02	7.30E+02	6.78E-08	3.20E-06	2.0E-01	2E-05	3.60E-03	4.93E-05	3.0E-03	2E-02
SVOC	Phenanthrene	85-01-8	D			3.0E-01		1.30E-01		3.0E-01				1.1E+00			1.94E-08		3.0E-01				1.1E+00	
SVOC	Pyrene	129-00-0	D			3.0E-01		1.30E-01		3.0E-01				1.1E+00			9.98E-09		3.0E-01				1.1E+00	
PCB	PCBs (total)	1336-36-3	B2			5.0E-05		1.40E-01		5.0E-05							1.05E-09		5.0E-05					
INORG	Antimony	7440-36-0				4.0E-04				6.0E-05				1.4E-03			2.00E-06		6.0E-05				1.4E-03	
INORG	Arsenic	7440-38-2	A	1.82E-01	7.11E-09	5.0E-03	1E-06	3.00E-02	7.04E-10	5.0E-03	1E-07					3.17E+00	2.00E-06	4.09E-07	5.0E-03	8E-05				
INORG	Barium	7440-39-3	D	3.33E-02	1.30E-09	7.0E-02	2E-08			4.9E-03						5.81E-01	2.00E-06	7.50E-08	4.9E-03	2E-05				
INORG	Beryllium	7440-41-7	B1			2.0E-03				1.4E-05				2.0E-05			2.00E-06		1.4E-05				2.0E-05	
INORG	Cadmium	7440-43-9	B1	3.53E-04	1.38E-11	1.0E-03	1E-08	1.00E-03	4.56E-14	2.5E-05	2E-09			9.0E-04		6.16E-03	2.00E-06	7.96E-10	2.5E-05	3E-05			9.0E-04	
INORG	Chromium (total)	7440-47-3		3.23E-02	1.26E-09	2.0E-02	6E-08			5.0E-04				1.0E-04		5.63E-01	4.00E-06	1.45E-07	5.0E-04	3E-04			1.0E-04	
INORG	Cobalt	7440-48-4	B1			2.0E-02				2.0E-02				2.0E-05			8.00E-07		2.0E-02				2.0E-05	
INORG	Copper	7440-50-8	D	4.84E-02	1.90E-09	4.0E-02	5E-08			4.0E-02				1.4E-01		8.45E-01	2.00E-06	1.09E-07	4.0E-02	3E-06			1.4E-01	
INORG	Cyanide (total)	57-12-5	D			2.0E-02				2.0E-02				7.0E-02			2.00E-06		2.0E-02				7.0E-02	
INORG	Lead	7439-92-1	B2	1.16E+01	4.54E-07											2.02E+02	2.00E-07	2.61E-06						
INORG	Manganese	7439-96-5	D	3.03E-03	1.18E-10	1.4E-01	8E-10			8.4E-03				5.0E-05		5.28E-02	2.00E-06	6.82E-09	8.4E-03	8E-07			5.0E-05	
INORG	Mercury	7439-97-6	D			3.0E-04				3.0E-04				3.0E-04			2.00E-06		3.0E-04				3.0E-04	
INORG	Nickel	7440-02-0	A	9.59E-02	3.75E-09	2.0E-02	2E-07			8.0E-04						1.67E+00	4.00E-07	4.32E-08	8.0E-04	5E-05				

Attachment G8: Redevelopment Construction Worker Hazard Index Calculations - AOI 09-B
GMC: NAO Flint Operations Site, Flint, Michigan

				Smear Zone Soil Ingestion				Smear Zone Soil Dermal Contact				Smear Zone Soil Vapor Inhalation				NAPL Dermal Contact					NAPL Vapor Inhalation			
Chem Group	**Chemical**	**CASRN**	**Cancer Class**	**C_{SZsoil}** (mg/kg)	**ADD** (mg/kg/d)	**RfD_{oral}** (mg/kg/d)	**HQ**	**AF_{derm}**	**ADD** (mg/kg/d)	**RfD_{derm}** (mg/kg/d)	**HQ**	**C_{air}** (mg/m^3)	**C_{exp}** (mg/m^3)	**RfC** (mg/m^3)	**HQ**	**C_{NAPL}** (mg/L)	**DA** (L/cm^2)	**ADD** (mg/kg/d)	**RfD_{derm}** (mg/kg/d)	**HQ**	**C_{air}** (mg/m^3)	**C_{air}** (mg/m^3)	**RfC** (mg/m^3)	**HQ**
INORG	Selenium	7782-49-2	D	2.07E-01	8.10E-09	5.0E-03	2E-06			5.0E-03				1.8E-02		3.61E+00	2.00E-06	4.66E-07	5.0E-03	9E-05			1.8E-02	
INORG	Silver	7440-22-4	D			5.0E-03				2.0E-04				1.0E-05			1.20E-06		2.0E-04				1.0E-05	
INORG	Thallium	7440-28-0				7.0E-05				7.0E-05				2.5E-04			2.00E-06		7.0E-05				2.5E-04	
INORG	Vanadium	7440-62-2		8.58E-03	3.36E-10	7.0E-03	5E-08			1.8E-04				2.5E-02		1.50E-01	2.00E-06	1.93E-08	1.8E-04	1E-04			2.5E-02	
INORG	Zinc	7440-66-6	D	2.37E-02	9.28E-10	3.0E-01	3E-09			3.0E-01				1.1E+00		4.14E-01	1.20E-06	3.21E-08	3.0E-01	1E-07			1.1E+00	

Attachment G9
Exposure of Residents to Outdoor Soil

Attachment G9: Vapor Flux from Soil to Ambient Air
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	K_{oc} (L/kg)	K_d (L/kg)	H (unitless)	D_{air} (m^2/d)	D_{water} (m^2/d)	R_L (unitless)	D_G (m^2/d)	D_L (m^2/d)	D_E (m^2/d)	J_G (kg/m^2-s)
VOC	Acetone	67-64-1	5.81E-01		7.95E-04	1.07E+00	9.85E-05	7.81E-02	1.47E-01	1.21E-07	1.50E-03	7.83E-06
VOC	Benzene	71-43-2	5.82E+01		1.14E-01	7.60E-01	8.47E-05	3.00E-01	1.04E-01	1.04E-07	3.96E-02	4.03E-05
VOC	Bromodichloromethane	75-27-4	5.51E+01		3.28E-02	2.57E-01	9.16E-05	2.65E-01	3.54E-02	1.13E-07	4.38E-03	1.34E-05
VOC	2-Butanone	78-93-3	2.00E+00		1.14E-03	6.98E-01	8.47E-05	8.28E-02	9.59E-02	1.04E-07	1.32E-03	7.36E-06
VOC	Carbon Disulfide	75-15-0	4.59E+01		6.20E-01	8.99E-01	8.64E-05	4.19E-01	1.23E-01	1.06E-07	1.83E-01	8.64E-05
VOC	Carbon Tetrachloride	56-23-5	1.74E+02		6.25E-01	6.74E-01	7.60E-05	8.35E-01	9.26E-02	9.36E-08	6.93E-02	5.32E-05
VOC	Chlorobenzene	108-90-7	2.20E+02		7.60E-02	6.31E-01	7.52E-05	8.14E-01	8.66E-02	9.25E-08	8.09E-03	1.82E-05
VOC	Chloroethane	75-00-3	1.62E+01		1.80E-01	2.34E+00	9.94E-05	1.85E-01	3.22E-01	1.22E-07	3.13E-01	1.13E-04
VOC	Chloroform	67-66-3	3.97E+01		7.50E-02	8.99E-01	8.64E-05	2.28E-01	1.23E-01	1.06E-07	4.06E-02	4.07E-05
VOC	Chloromethane	74-87-3	3.97E+01		1.80E-01	1.09E+00	5.62E-05	2.61E-01	1.50E-01	6.91E-08	1.03E-01	6.50E-05
VOC	Cumene	98-82-8	7.05E+02		2.66E-01	5.62E-01	6.13E-05	2.44E+00	7.71E-02	7.55E-08	8.39E-03	1.85E-05
VOC	Cyclohexane	110-82-7	6.35E+02		3.98E+00	7.25E-01	7.86E-05	3.38E+00	9.96E-02	9.68E-08	1.17E-01	6.93E-05
VOC	Dibromochloromethane	124-48-1	6.26E+01		1.61E-02	1.69E-01	9.07E-05	2.84E-01	2.33E-02	1.12E-07	1.32E-03	7.33E-06
VOC	1,2-Dichlorobenzene	95-50-1	6.23E+02		3.90E-02	5.96E-01	6.83E-05	2.11E+00	8.19E-02	8.40E-08	1.51E-03	7.87E-06
VOC	1,3-Dichlorobenzene	541-73-1	5.69E+02		6.33E-02	5.98E-01	6.79E-05	1.94E+00	8.21E-02	8.36E-08	2.68E-03	1.05E-05
VOC	1,4-Dichlorobenzene	106-46-7	6.12E+02		4.98E-02	5.96E-01	6.83E-05	2.07E+00	8.19E-02	8.40E-08	1.97E-03	8.96E-06
VOC	Dichlorodifluoromethane	75-71-8	6.15E+01		7.01E+00	6.91E-01	6.91E-05	2.47E+00	9.49E-02	8.51E-08	2.70E-01	1.05E-04
VOC	1,1-Dichloroethane	75-34-3	3.13E+01		1.15E-01	6.41E-01	9.07E-05	2.13E-01	8.81E-02	1.12E-07	4.74E-02	4.40E-05
VOC	1,2-Dichloroethane	107-06-2	1.75E+01		2.01E-02	8.99E-01	8.55E-05	1.39E-01	1.23E-01	1.05E-07	1.78E-02	2.70E-05
VOC	1,1-Dichloroethene	75-35-4	5.82E+01		5.35E-01	7.78E-01	8.99E-05	4.32E-01	1.07E-01	1.11E-07	1.32E-01	7.35E-05
VOC	cis-1,2-Dichloroethene	156-59-2	3.56E+01		8.35E-02	6.36E-01	9.76E-05	2.17E-01	8.73E-02	1.20E-07	3.35E-02	3.70E-05
VOC	trans-1,2-Dichloroethene	156-60-5	5.22E+01		1.93E-01	6.11E-01	1.03E-04	3.05E-01	8.39E-02	1.27E-07	5.29E-02	4.65E-05
VOC	1,2-Dichloropropane	78-87-5	4.35E+01		5.75E-02	6.76E-01	7.54E-05	2.35E-01	9.28E-02	9.28E-08	2.27E-02	3.05E-05
VOC	Ethyl Benzene	100-41-4	3.67E+02		1.62E-01	6.48E-01	6.74E-05	1.32E+00	8.90E-02	8.29E-08	1.09E-02	2.11E-05
VOC	2-Hexanone	591-78-6	1.48E+01		3.58E-02							
VOC	Methyl Acetate	79-20-9	1.66E+00		1.85E-03	8.27E-01	9.50E-05	8.20E-02	1.14E-01	1.17E-07	2.57E-03	1.02E-05
VOC	Methyl tert-butyl ether	1634-04-4	1.15E+01		1.20E-02	7.42E-01	8.73E-05	1.17E-01	1.02E-01	1.07E-07	1.05E-02	2.07E-05
VOC	4-Methyl-2-pentanone	108-10-1	1.05E+01		2.82E-03	6.48E-01	6.74E-05	1.11E-01	8.90E-02	8.29E-08	2.26E-03	9.62E-06
VOC	Methylcyclohexane	108-87-2	2.66E+02		8.78E+00	6.35E-01	7.36E-05	3.68E+00	8.72E-02	9.06E-08	2.08E-01	9.22E-05

Attachment G9: Vapor Flux from Soil to Ambient Air
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	K_{oc} (L/kg)	K_d (L/kg)	H (unitless)	D_{air} (m^2/d)	D_{water} (m^2/d)	R_L (unitless)	D_G (m^2/d)	D_L (m^2/d)	D_E (m^2/d)	J_G (kg/m^2-s)
VOC	Methylene Chloride	75-09-2	1.17E+01		4.49E-02	8.73E-01	1.01E-04	1.28E-01	1.20E-01	1.24E-07	4.21E-02	4.15E-05
VOC	Styrene	100-42-5	7.77E+02		5.65E-02	6.13E-01	6.91E-05	2.61E+00	8.43E-02	8.51E-08	1.82E-03	8.63E-06
VOC	Tetrachloroethene	127-18-4	1.56E+02		3.77E-01	6.22E-01	7.08E-05	6.99E-01	8.54E-02	8.72E-08	4.61E-02	4.34E-05
VOC	Toluene	108-88-3	1.80E+02		1.36E-01	7.52E-01	7.43E-05	7.03E-01	1.03E-01	9.15E-08	2.00E-02	2.86E-05
VOC	1,2,4-Trichlorobenzene	120-82-1	1.79E+03		2.91E-02	2.59E-01	7.11E-05	5.90E+00	3.56E-02	8.75E-08	1.76E-04	2.68E-06
VOC	1,1,1-Trichloroethane	71-55-6	1.10E+02		3.53E-01	6.74E-01	7.60E-05	5.43E-01	9.26E-02	9.36E-08	6.00E-02	4.95E-05
VOC	1,1,2-Trichloroethane	79-00-5	5.03E+01		1.87E-02	6.74E-01	7.60E-05	2.45E-01	9.26E-02	9.36E-08	7.07E-03	1.70E-05
VOC	Trichloroethene	79-01-6	1.68E+02		2.11E-01	6.83E-01	7.86E-05	6.85E-01	9.37E-02	9.68E-08	2.89E-02	3.44E-05
VOC	Trichlorofluoromethane	75-69-4	1.21E+02		1.98E+00	7.52E-01	8.38E-05	1.09E+00	1.03E-01	1.03E-07	1.88E-01	8.77E-05
VOC	1,1,2-Trichloro-1,2,2-trifluoroe	76-13-1	3.81E+02		9.83E+00	6.74E-01	7.08E-05	4.38E+00	9.26E-02	8.72E-08	2.08E-01	9.21E-05
VOC	1,2,4-Trimethylbenzene	95-63-6	8.97E+02		1.26E-01	5.24E-01	6.84E-05	3.02E+00	7.19E-02	8.42E-08	2.99E-03	1.11E-05
VOC	1,3,5-Trimethylbenzene	108-67-8	1.76E+03		1.20E-01	5.20E-01	7.49E-05	5.82E+00	7.14E-02	9.22E-08	1.48E-03	7.77E-06
VOC	Vinyl Chloride	75-01-4	1.85E+01		5.55E-01	9.16E-01	1.06E-04	3.09E-01	1.26E-01	1.31E-07	2.26E-01	9.60E-05
VOC	Xylenes (total)	1330-20-7	3.86E+02		1.38E-01	6.74E-01	7.56E-05	1.37E+00	9.25E-02	9.30E-08	9.33E-03	1.95E-05
SVOC	Acenaphthene	83-32-9	7.14E+03		3.18E-03	3.64E-01	6.64E-05	2.32E+01	5.00E-02	8.18E-08	6.85E-06	5.29E-07
SVOC	Acenaphthylene	208-96-8	7.47E+03		2.31E-03	3.88E-01	6.03E-05	2.43E+01	5.33E-02	7.42E-08	5.07E-06	4.55E-07
SVOC	Acetophenone	98-86-2	3.58E+01		2.19E-04	6.91E-01	6.91E-05	1.92E-01	9.49E-02	8.51E-08	1.09E-04	2.11E-06
SVOC	Anthracene	120-12-7	2.97E+04		1.34E-03	2.80E-01	6.69E-05	9.63E+01	3.84E-02	8.23E-08	5.34E-07	1.48E-07
SVOC	Atrazine	1912-24-9	3.68E+02		1.25E-07	2.24E-01	5.76E-05	1.27E+00	3.07E-02	7.09E-08	5.89E-08	4.91E-08
SVOC	Benzaldehyde	100-52-7	2.85E+01		4.86E-04	6.23E-01	7.84E-05	1.69E-01	8.56E-02	9.65E-08	2.47E-04	3.18E-06
SVOC	Benzo(a)anthracene	56-55-3	4.01E+05		6.85E-05	4.41E-01	7.78E-05	1.30E+03	6.05E-02	9.57E-08	3.26E-09	1.15E-08
SVOC	Benzo(a)pyrene	50-32-8	1.01E+06		2.32E-05	3.72E-01	7.78E-05	3.29E+03	5.10E-02	9.57E-08	3.88E-10	3.98E-09
SVOC	Benzo(b)fluoranthene	205-99-2	1.24E+06		2.28E-03	1.95E-01	4.80E-05	4.03E+03	2.68E-02	5.91E-08	1.51E-08	2.49E-08
SVOC	Benzo(g,h,i)perylene	191-24-2	1.28E+07		2.88E-06	1.88E-01	4.54E-05	4.15E+04	2.58E-02	5.59E-08	3.14E-12	3.58E-10
SVOC	Benzo(k)fluoranthene	207-08-9	1.24E+06		1.70E-05	1.95E-01	4.80E-05	4.03E+03	2.68E-02	5.91E-08	1.28E-10	2.29E-09
SVOC	Biphenyl	92-52-4	1.05E+04		6.13E-03	3.49E-01	7.04E-05	3.41E+01	4.79E-02	8.67E-08	8.63E-06	5.94E-07
SVOC	bis(2-Chloroethoxy)methane	111-91-1	1.73E+01		3.47E-06	3.77E-01	7.31E-05	1.32E-01	5.17E-02	9.00E-08	2.04E-06	2.89E-07
SVOC	bis(2-Chloroethyl) ether	111-44-4	1.55E+01		3.69E-04	5.98E-01	6.51E-05	1.26E-01	8.21E-02	8.01E-08	2.41E-04	3.14E-06
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	1.50E+07		2.09E-06	3.03E-01	3.16E-05	4.86E+04	4.17E-02	3.89E-08	2.59E-12	3.25E-10

Attachment G9: Vapor Flux from Soil to Ambient Air
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	K_{oc} (L/kg)	K_d (L/kg)	H (unitless)	D_{air} (m^2/d)	D_{water} (m^2/d)	R_L (unitless)	D_G (m^2/d)	D_L (m^2/d)	D_E (m^2/d)	J_G (kg/m^2-s)
SVOC	Butylbenzylphthalate	85-68-7	5.73E+04		2.59E-05	1.50E-01	4.17E-05	1.86E+02	2.06E-02	5.14E-08	3.15E-09	1.14E-08
SVOC	Caprolactam	105-60-2	6.51E-01		1.03E-07	5.98E-01	7.77E-05	7.81E-02	8.21E-02	9.56E-08	1.33E-06	2.33E-07
SVOC	Carbazole	86-74-8	3.38E+03		3.13E-07	3.37E-01	6.07E-05	1.10E+01	4.63E-02	7.48E-08	8.09E-09	1.82E-08
SVOC	4-Chloro-3-methylphenol	59-50-7	1.12E+03		8.15E-06	5.24E-01	8.22E-05	3.69E+00	7.19E-02	1.01E-07	1.86E-07	8.73E-08
SVOC	2-Chloronaphthalene	91-58-7	1.12E+04		6.42E-03	4.25E-01	7.59E-05	3.65E+01	5.84E-02	9.35E-08	1.03E-05	6.48E-07
SVOC	2-Chlorophenol	95-57-8	3.88E+02		8.00E-03	4.33E-01	8.17E-05	1.34E+00	5.95E-02	1.01E-07	3.56E-04	3.82E-06
SVOC	Chrysene	218-01-9	4.01E+05		1.94E-03	2.14E-01	5.37E-05	1.30E+03	2.94E-02	6.60E-08	4.40E-08	4.24E-08
SVOC	Dibenz(a,h)anthracene	53-70-3	3.77E+06		3.02E-07	1.75E-01	4.48E-05	1.22E+04	2.40E-02	5.51E-08	5.10E-12	4.57E-10
SVOC	Dibenzofuran	132-64-9	2.07E+04		2.57E-04	2.06E-01	5.18E-05	6.71E+01	2.82E-02	6.38E-08	1.09E-07	6.69E-08
SVOC	2,4-Dichlorophenol	120-83-2	1.47E+02		6.50E-05	2.99E-01	7.58E-05	5.52E-01	4.11E-02	9.33E-08	5.00E-06	4.52E-07
SVOC	Diethylphthalate	84-66-2	2.87E+02		9.25E-06	2.21E-01	5.49E-05	1.01E+00	3.04E-02	6.75E-08	3.47E-07	1.19E-07
SVOC	2,4-Dimethylphenol	105-67-9	2.09E+02		4.10E-05	5.05E-01	7.51E-05	7.53E-01	6.93E-02	9.24E-08	3.90E-06	3.99E-07
SVOC	Dimethylphthalate	131-11-3	6.89E+01		2.15E-06	4.91E-01	5.43E-05	2.99E-01	6.74E-02	6.69E-08	7.07E-07	1.70E-07
SVOC	Di-n-butylphthalate	84-74-2	3.40E+04		1.93E-08	3.78E-01	6.79E-05	1.10E+02	5.20E-02	8.36E-08	7.67E-10	5.60E-09
SVOC	4,6-Dinitro-2-methylphenol	534-52-1	1.21E+02		8.73E-06	2.38E-01	5.97E-05	4.69E-01	3.28E-02	7.35E-08	7.65E-07	1.77E-07
SVOC	2,4-Dinitrotoluene	121-14-2	9.46E+01		1.90E-06	1.75E+00	6.10E-05	3.83E-01	2.41E-01	7.51E-08	1.39E-06	2.39E-07
SVOC	2,6-Dinitrotoluene	606-20-2	6.89E+01		1.53E-05	2.83E-01	6.27E-05	2.99E-01	3.88E-02	7.72E-08	2.24E-06	3.03E-07
SVOC	Di-n-octylphthalate	117-84-0	8.38E+07		1.37E-03	1.30E-01	3.09E-05	2.72E+05	1.79E-02	3.81E-08	9.06E-11	1.92E-09
SVOC	Fluoranthene	206-44-0	1.08E+05		3.30E-04	2.61E-01	5.49E-05	3.50E+02	3.58E-02	6.75E-08	3.40E-08	3.73E-08
SVOC	Fluorene	86-73-7	1.38E+04		1.31E-03	3.14E-01	6.81E-05	4.47E+01	4.31E-02	8.38E-08	1.26E-06	2.27E-07
SVOC	Formaldehyde	50-00-0			6.95E-06	1.56E+00	1.73E-04					
SVOC	Hexachlorobutadiene	87-68-3	5.35E+04		1.67E-01	4.85E-01	5.32E-05	1.74E+02	6.66E-02	6.55E-08	6.41E-05	1.62E-06
SVOC	Hexachlorocyclopentadiene	77-47-4	1.99E+05		5.55E-01	1.39E-01	6.23E-05	6.45E+02	1.91E-02	7.67E-08	1.64E-05	8.20E-07
SVOC	Hexachloroethane	67-72-1	1.76E+03		7.95E-02	2.16E-02	5.88E-05	5.81E+00	2.97E-03	7.23E-08	4.06E-05	1.29E-06
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	3.45E+06		3.28E-05	1.64E-01	4.89E-05	1.12E+04	2.25E-02	6.02E-08	7.16E-11	1.71E-09
SVOC	Isophorone	78-59-1	4.69E+01		1.36E-04	5.38E-01	5.84E-05	2.28E-01	7.39E-02	7.19E-08	4.44E-05	1.35E-06
SVOC	2-Methylnaphthalene	91-57-6	6.23E+03		1.06E-02	4.18E-01	6.70E-05	2.03E+01	5.74E-02	8.24E-08	3.00E-05	1.11E-06
SVOC	Methylphenol (total)	1319-77-3	8.45E+01		1.77E-05	6.39E-01	8.64E-05	3.50E-01	8.78E-02	1.06E-07	4.74E-06	4.40E-07
SVOC	Naphthalene	91-20-3	2.01E+03		9.90E-03	5.10E-01	6.48E-05	6.59E+00	7.00E-02	7.98E-08	1.05E-04	2.07E-06

Attachment G9: Vapor Flux from Soil to Ambient Air
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	K_{oc} (L/kg)	K_d (L/kg)	H (unitless)	D_{air} (m^2/d)	D_{water} (m^2/d)	R_L (unitless)	D_G (m^2/d)	D_L (m^2/d)	D_E (m^2/d)	J_G (kg/m^2-s)
SVOC	2-Nitroaniline	88-74-4	6.59E+01		3.27E-06	6.31E-01	6.91E-05	2.89E-01	8.66E-02	8.51E-08	1.27E-06	2.28E-07
SVOC	Nitrobenzene	98-95-3	6.44E+01		4.92E-04	6.57E-01	7.43E-05	2.85E-01	9.02E-02	9.15E-08	1.56E-04	2.53E-06
SVOC	2-Nitrophenol	88-75-5	5.75E+01		1.94E-04	4.66E-01	6.78E-05	2.62E-01	6.40E-02	8.35E-08	4.75E-05	1.39E-06
SVOC	4-Nitrophenol	100-02-7	7.55E+01		8.48E-09	5.40E-01	8.30E-05	3.21E-01	7.42E-02	1.02E-07	3.21E-07	1.15E-07
SVOC	N-Nitrosodiphenylamine	86-30-6	1.29E+03		1.03E-04	2.70E-01	5.49E-05	4.26E+00	3.70E-02	6.75E-08	9.08E-07	1.93E-07
SVOC	N-Nitroso-di-n-propylamine	621-64-7	2.40E+01		4.62E-05	4.71E-01	7.06E-05	1.54E-01	6.47E-02	8.69E-08	2.00E-05	9.04E-07
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	2.56E+02		2.39E-03	5.20E-01	5.54E-05	9.07E-01	7.14E-02	6.82E-08	1.88E-04	2.78E-06
SVOC	Pentachlorophenol	87-86-5	5.92E+02		5.00E-07	4.84E-01	5.27E-05	1.99E+00	6.65E-02	6.49E-08	4.92E-08	4.48E-08
SVOC	Phenanthrene	85-01-8	2.42E+04		4.76E-04	3.24E-01	6.45E-05	7.86E+01	4.45E-02	7.94E-08	2.71E-07	1.05E-07
SVOC	Phenol	108-95-2	2.88E+01		8.15E-06	7.08E-01	7.86E-05	1.69E-01	9.73E-02	9.68E-08	5.26E-06	4.64E-07
SVOC	Pyrene	129-00-0	1.06E+05		2.26E-04	2.35E-01	6.26E-05	3.42E+02	3.23E-02	7.70E-08	2.15E-08	2.97E-08
SVOC	2,4,5-Trichlorophenol	95-95-4	1.60E+03		8.90E-05	2.51E-01	6.07E-05	5.25E+00	3.45E-02	7.48E-08	6.00E-07	1.57E-07
SVOC	2,4,6-Trichlorophenol	88-06-2	3.81E+02		1.60E-04	2.75E-01	5.40E-05	1.31E+00	3.77E-02	6.65E-08	4.64E-06	4.36E-07
PCB	PCBs (total)	1336-36-3	2.45E+06		4.09E-02	1.75E-01	4.32E-05	7.95E+03	2.40E-02	5.32E-08	1.23E-07	7.10E-08
INORG	Antimony	7440-36-0		4.50E+01								
INORG	Arsenic	7440-38-2		2.90E+01								
INORG	Barium	7440-39-3		4.10E+01								
INORG	Beryllium	7440-41-7		7.90E+02								
INORG	Cadmium	7440-43-9		7.50E+01								
INORG	Chromium (total)	7440-47-3		1.90E+01								
INORG	Chromium III	16065-83-1		1.80E+06								
INORG	Chromium VI	18540-29-9		1.90E+01								
INORG	Cobalt	7440-48-4		4.50E+01								
INORG	Copper	7440-50-8		3.50E+01								
INORG	Cyanide (total)	57-12-5		9.90E+00								
INORG	Fluoride	16984-48-8										
INORG	Lead	7439-92-1		9.00E+02								
INORG	Manganese	7439-96-5		6.50E+01								
INORG	Mercury	7439-97-6		1.00E+03	1.45E-01	2.65E-01	5.44E-05	1.62E+03	3.64E-02	6.70E-08	3.26E-06	3.65E-07

Attachment G9: Vapor Flux from Soil to Ambient Air
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	K_{oc} (L/kg)	K_d (L/kg)	H (unitless)	D_{air} (m^2/d)	D_{water} (m^2/d)	R_L (unitless)	D_G (m^2/d)	D_L (m^2/d)	D_E (m^2/d)	J_G (kg/m^2-s)
INORG	Nickel	7440-02-0		6.50E+01								
INORG	Selenium	7782-49-2		5.00E+00								
INORG	Silver	7440-22-4		8.30E+00								
INORG	Thallium	7440-28-0		7.10E+01								
INORG	Vanadium	7440-62-2		1.00E+03								
INORG	Zinc	7440-66-6		6.20E+01								
Notes:	Soil bulk density	kg/L	ρ_b	1.62	*Loamy Sand*							
	Soil particle density	kg/L	ρ_s	2.65	*EPA default/MDEQ 1998*							
	Soil porosity	L/L-soil	θ	0.39	*1-(pb/ps)*							
	Soil water content	L/L-soil	θ_w	0.076	*Loamy Sand*							
	Soil air-filled porosity	L/L-soil	θ_a	0.31	*porosity-water content*							
	Soil organic carbon fraction	unitless	f_{oc}	0.002								
	Averaging period	year	**ED**	30								
		s	**ED**	9.5E+08								
	Molar Gas Constant	L-mmHg/mole-^oK	**R**	62.411								
	Temperature	^oC	**T**	12								
		K	**T**	285								

Attachment G9: Risk-Based Cancer Criteria for Exposure of Residents to Soil
GMC: NAO Flint Operations Site, Flint, Michigan

				Soil Ingestion			Soil Dermal Contact				Soil Vapor Inhalation				Soil Particulate Inhalation				
Chem Group	**Chemical**	**CASRN**	**Cancer Class**	**LADD** (mg/kg/d)	**SF_{oral}** $(mg/kg/d)^{-1}$	**RBC** (mg/kg)	**ABS_{derm}**	**LADD** (mg/kg/d)	**SF_{derm}** $(mg/kg/d)^{-1}$	**RBC** (mg/kg)	**C_{air}** (mg/m^3)	**Dose** (mg/m^3)	**URF** (m^3/mg)	**RBC** (mg/kg)	**C_{air}** (mg/m^3)	**Dose** (mg/m^3)	**URF** (m^3/mg)	**RBC** (mg/kg)	**Cancer RBC** (mg/kg)
VOC	Acetone	67-64-1	ID	1.57E-06							1.14E-04	4.67E-05			7.59E-10	3.12E-10			
VOC	Benzene	71-43-2	A	1.57E-06	5.5E-02	1.2E+02			5.5E-02		5.85E-04	2.40E-04	7.8E-03	5.3E+00	7.59E-10	3.12E-10	7.8E-03	4.1E+06	5.1E+00
VOC	Bromodichloromethane	75-27-4	B2	1.57E-06	6.2E-02	1.0E+02			6.2E-02		1.94E-04	7.99E-05	1.8E-02	7.1E+00	7.59E-10	3.12E-10	1.8E-02	1.8E+06	6.6E+00
VOC	2-Butanone	78-93-3	ID	1.57E-06							1.07E-04	4.39E-05			7.59E-10	3.12E-10			
VOC	Carbon Disulfide	75-15-0		1.57E-06							1.26E-03	5.16E-04			7.59E-10	3.12E-10			
VOC	Carbon Tetrachloride	56-23-5	B2	1.57E-06	1.3E-01	4.9E+01			1.3E-01		7.73E-04	3.18E-04	1.5E-02	2.1E+00	7.59E-10	3.12E-10	1.5E-02	2.1E+06	2.0E+00
VOC	Chlorobenzene	108-90-7	D	1.57E-06							2.64E-04	1.09E-04			7.59E-10	3.12E-10			
VOC	Chloroethane	75-00-3		1.57E-06	2.9E-03	2.2E+03			2.9E-03		1.64E-03	6.76E-04			7.59E-10	3.12E-10			
VOC	Chloroform	67-66-3	B2	1.57E-06							5.92E-04	2.43E-04	2.3E-02	1.8E+00	7.59E-10	3.12E-10	2.3E-02	1.4E+06	1.8E+00
VOC	Chloromethane	74-87-3	D	1.57E-06							9.44E-04	3.88E-04			7.59E-10	3.12E-10			
VOC	Cumene	98-82-8	D	1.57E-06							2.69E-04	1.11E-04			7.59E-10	3.12E-10			
VOC	Cyclohexane	110-82-7	ID	1.57E-06							1.01E-03	4.14E-04			7.59E-10	3.12E-10			
VOC	Dibromochloromethane	124-48-1	C	1.57E-06	8.4E-02	7.6E+01			8.4E-02		1.07E-04	4.38E-05	2.4E-02	9.5E+00	7.59E-10	3.12E-10	2.4E-02	1.3E+06	8.5E+00
VOC	1,2-Dichlorobenzene	95-50-1	D	1.57E-06							1.14E-04	4.70E-05			7.59E-10	3.12E-10			
VOC	1,3-Dichlorobenzene	541-73-1	D	1.57E-06							1.52E-04	6.25E-05			7.59E-10	3.12E-10			
VOC	1,4-Dichlorobenzene	106-46-7	C	1.57E-06	2.4E-02	2.7E+02			2.4E-02		1.30E-04	5.35E-05	6.3E-03	3.0E+01	7.59E-10	3.12E-10	6.3E-03	5.1E+06	2.7E+01
VOC	Dichlorodifluoromethane	75-71-8		1.57E-06							1.53E-03	6.27E-04			7.59E-10	3.12E-10			
VOC	1,1-Dichloroethane	75-34-3	C	1.57E-06							6.40E-04	2.63E-04			7.59E-10	3.12E-10			
VOC	1,2-Dichloroethane	107-06-2	B2	1.57E-06	9.1E-02	7.0E+01			9.1E-02		3.92E-04	1.61E-04	2.6E-02	2.4E+00	7.59E-10	3.12E-10	2.6E-02	1.2E+06	2.3E+00
VOC	1,1-Dichloroethene	75-35-4	C	1.57E-06							1.07E-03	4.39E-04			7.59E-10	3.12E-10			
VOC	cis-1,2-Dichloroethene	156-59-2	D	1.57E-06							5.38E-04	2.21E-04			7.59E-10	3.12E-10			
VOC	trans-1,2-Dichloroethene	156-60-5		1.57E-06							6.76E-04	2.78E-04			7.59E-10	3.12E-10			
VOC	1,2-Dichloropropane	78-87-5	B2	1.57E-06	6.8E-02	9.4E+01			6.8E-02		4.43E-04	1.82E-04			7.59E-10	3.12E-10			
VOC	Ethyl Benzene	100-41-4	D	1.57E-06							3.07E-04	1.26E-04			7.59E-10	3.12E-10			
VOC	2-Hexanone	591-78-6		1.57E-06											7.59E-10	3.12E-10			
VOC	Methyl Acetate	79-20-9		1.57E-06							1.49E-04	6.12E-05			7.59E-10	3.12E-10			
VOC	Methyl tert-butyl ether	1634-04-4		1.57E-06							3.00E-04	1.23E-04			7.59E-10	3.12E-10			
VOC	4-Methyl-2-pentanone	108-10-1	ID	1.57E-06							1.40E-04	5.75E-05			7.59E-10	3.12E-10			
VOC	Methylcyclohexane	108-87-2		1.57E-06							1.34E-03	5.50E-04			7.59E-10	3.12E-10			
VOC	Methylene Chloride	75-09-2	B2	1.57E-06	7.5E-03	8.5E+02			7.5E-03		6.03E-04	2.48E-04	4.7E-04	8.6E+01	7.59E-10	3.12E-10	4.7E-04	6.8E+07	7.8E+01
VOC	Styrene	100-42-5		1.57E-06							1.25E-04	5.16E-05			7.59E-10	3.12E-10			
VOC	Tetrachloroethene	127-18-4	C-B2	1.57E-06	5.2E-02	1.2E+02			5.2E-02		6.31E-04	2.59E-04	3.1E-03	1.3E+01	7.59E-10	3.12E-10	3.1E-03	1.0E+07	1.1E+01
VOC	Toluene	108-88-3	D	1.57E-06							4.15E-04	1.71E-04			7.59E-10	3.12E-10			
VOC	1,2,4-Trichlorobenzene	120-82-1	D	1.57E-06							3.89E-05	1.60E-05			7.59E-10	3.12E-10			
VOC	1,1,1-Trichloroethane	71-55-6	D	1.57E-06							7.20E-04	2.96E-04			7.59E-10	3.12E-10			
VOC	1,1,2-Trichloroethane	79-00-5	C	1.57E-06	5.7E-02	1.1E+02			5.7E-02		2.47E-04	1.02E-04	1.6E-02	6.2E+00	7.59E-10	3.12E-10	1.6E-02	2.0E+06	5.8E+00
VOC	Trichloroethene	79-01-6	C-B2	1.57E-06	1.1E-02	5.8E+02			1.1E-02		4.99E-04	2.05E-04	1.7E-03	2.9E+01	7.59E-10	3.12E-10	1.7E-03	1.9E+07	2.7E+01
VOC	Trichlorofluoromethane	75-69-4		1.57E-06							1.27E-03	5.24E-04			7.59E-10	3.12E-10			
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		1.57E-06							1.34E-03	5.50E-04			7.59E-10	3.12E-10			
VOC	1,2,4-Trimethylbenzene	95-63-6	ID	1.57E-06							1.61E-04	6.61E-05			7.59E-10	3.12E-10			
VOC	1,3,5-Trimethylbenzene	108-67-8	ID	1.57E-06							1.13E-04	4.64E-05			7.59E-10	3.12E-10			
VOC	Vinyl Chloride	75-01-4	A	1.57E-06	1.4E+00	4.6E+00			1.4E+00		1.40E-03	5.74E-04	8.8E-03	2.0E+00	7.59E-10	3.12E-10	8.8E-03	3.6E+06	1.4E+00
VOC	Xylenes (total)	1330-20-7	ID	1.57E-06							2.84E-04	1.17E-04			7.59E-10	3.12E-10			
SVOC	Acenaphthene	83-32-9		1.57E-06			1.30E-01	6.43E-07			7.69E-06	3.16E-06			7.59E-10	3.12E-10			
SVOC	Acenaphthylene	208-96-8	D	1.57E-06			1.30E-01	6.43E-07			6.62E-06	2.72E-06			7.59E-10	3.12E-10			
SVOC	Acetophenone	98-86-2	D	1.57E-06			1.00E-01	4.94E-07			3.06E-05	1.26E-05			7.59E-10	3.12E-10			
SVOC	Anthracene	120-12-7	D	1.57E-06			1.30E-01	6.43E-07			2.15E-06	8.82E-07			7.59E-10	3.12E-10			
SVOC	Atrazine	1912-24-9	C	1.57E-06	2.2E-01	2.9E+01	1.00E-01	4.94E-07	2.2E-01	9.1E+01	7.13E-07	2.93E-07	6.3E-02	5.4E+02	7.59E-10	3.12E-10	6.3E-02	5.1E+05	2.1E+01
SVOC	Benzaldehyde	100-52-7		1.57E-06			1.00E-01	4.94E-07			4.62E-05	1.90E-05			7.59E-10	3.12E-10			

Attachment G9: Risk-Based Cancer Criteria for Exposure of Residents to Soil
GMC: NAO Flint Operations Site, Flint, Michigan

				Soil Ingestion			Soil Dermal Contact				Soil Vapor Inhalation				Soil Particulate Inhalation				
Chem Group	**Chemical**	**CASRN**	**Cancer Class**	**LADD** (mg/kg/d)	**SF_{oral}** $(mg/kg/d)^{-1}$	**RBC** (mg/kg)	**ABS_{derm}**	**LADD** (mg/kg/d)	**SF_{derm}** $(mg/kg/d)^{-1}$	**RBC** (mg/kg)	**C_{air}** (mg/m^3)	**Dose** (mg/m^3)	**URF** (m^3/mg)	**RBC** (mg/kg)	**C_{air}** (mg/m^3)	**Dose** (mg/m^3)	**URF** (m^3/mg)	**RBC** (mg/kg)	**Cancer RBC** (mg/kg)
SVOC	Benzo(a)anthracene	56-55-3	B2	1.57E-06	7.3E-01	8.8E+00	1.30E-01	6.43E-07	7.3E-01	2.1E+01	1.68E-07	6.90E-08	8.9E-02	1.6E+03	7.59E-10	3.12E-10	8.9E-02	3.6E+05	6.2E+00
SVOC	Benzo(a)pyrene	50-32-8	B2	1.57E-06	7.3E+00	8.8E-01	1.30E-01	6.43E-07	7.3E+00	2.1E+00	5.79E-08	2.38E-08	8.9E-01	4.7E+02	7.59E-10	3.12E-10	8.9E-01	3.6E+04	6.2E-01
SVOC	Benzo(b)fluoranthene	205-99-2	B2	1.57E-06	7.3E-01	8.8E+00	1.30E-01	6.43E-07	7.3E-01	2.1E+01	3.62E-07	1.49E-07	8.9E-02	7.6E+02	7.59E-10	3.12E-10	8.9E-02	3.6E+05	6.2E+00
SVOC	Benzo(g,h,i)perylene	191-24-2	D	1.57E-06			1.30E-01	6.43E-07			5.20E-09	2.14E-09			7.59E-10	3.12E-10			
SVOC	Benzo(k)fluoranthene	207-08-9	B2	1.57E-06	7.3E-02	8.8E+01	1.30E-01	6.43E-07	7.3E-02	2.1E+02	3.32E-08	1.36E-08	8.9E-03	8.3E+04	7.59E-10	3.12E-10	8.9E-03	3.6E+06	6.2E+01
SVOC	Biphenyl	92-52-4	D	1.57E-06			1.00E-01	4.94E-07			8.63E-06	3.55E-06			7.59E-10	3.12E-10			
SVOC	bis(2-Chloroethoxy)methane	111-91-1	D	1.57E-06			1.00E-01	4.94E-07			4.20E-06	1.72E-06			7.59E-10	3.12E-10			
SVOC	bis(2-Chloroethyl) ether	111-44-4	B2	1.57E-06	1.1E+00	5.8E+00	1.00E-01	4.94E-07	1.1E+00	1.8E+01	4.56E-05	1.87E-05	3.3E-01	1.6E+00	7.59E-10	3.12E-10	3.3E-01	9.7E+04	1.2E+00
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2	1.57E-06	1.4E-02	4.6E+02	1.00E-01	4.94E-07	1.4E-02	1.4E+03	4.73E-09	1.94E-09	4.0E-03	1.3E+06	7.59E-10	3.12E-10	4.0E-03	8.0E+06	3.5E+02
SVOC	Butylbenzylphthalate	85-68-7	C	1.57E-06	1.9E-03	3.4E+03	1.00E-01	4.94E-07	1.9E-03	1.1E+04	1.65E-07	6.78E-08	5.4E-04	2.7E+05	7.59E-10	3.12E-10	5.4E-04	5.9E+07	2.5E+03
SVOC	Caprolactam	105-60-2		1.57E-06			1.00E-01	4.94E-07			3.39E-06	1.39E-06			7.59E-10	3.12E-10			
SVOC	Carbazole	86-74-8	B2	1.57E-06	2.0E-02	3.2E+02	1.00E-01	4.94E-07	2.0E-02	1.0E+03	2.64E-07	1.09E-07	5.7E-03	1.6E+04	7.59E-10	3.12E-10	5.7E-03	5.6E+06	2.4E+02
SVOC	4-Chloro-3-methylphenol	59-50-7		1.57E-06			1.00E-01	4.94E-07			1.27E-06	5.21E-07			7.59E-10	3.12E-10			
SVOC	2-Chloronaphthalene	91-58-7		1.57E-06			1.00E-01	4.94E-07			9.42E-06	3.87E-06			7.59E-10	3.12E-10			
SVOC	2-Chlorophenol	95-57-8		1.57E-06			1.00E-01	4.94E-07			5.55E-05	2.28E-05			7.59E-10	3.12E-10			
SVOC	Chrysene	218-01-9	B2	1.57E-06	7.3E-03	8.8E+02	1.30E-01	6.43E-07	7.3E-03	2.1E+03	6.16E-07	2.53E-07	8.9E-04	4.5E+04	7.59E-10	3.12E-10	8.9E-04	3.6E+07	6.1E+02
SVOC	Dibenz(a,h)anthracene	53-70-3	B2	1.57E-06	7.3E+00	8.8E-01	1.30E-01	6.43E-07	7.3E+00	2.1E+00	6.63E-09	2.73E-09	8.9E-01	4.1E+03	7.59E-10	3.12E-10	8.9E-01	3.6E+04	6.2E-01
SVOC	Dibenzofuran	132-64-9	D	1.57E-06			1.00E-01	4.94E-07			9.72E-07	3.99E-07			7.59E-10	3.12E-10			
SVOC	2,4-Dichlorophenol	120-83-2		1.57E-06			1.00E-01	4.94E-07			6.57E-06	2.70E-06			7.59E-10	3.12E-10			
SVOC	Diethylphthalate	84-66-2	D	1.57E-06			1.00E-01	4.94E-07			1.73E-06	7.11E-07			7.59E-10	3.12E-10			
SVOC	2,4-Dimethylphenol	105-67-9		1.57E-06			1.00E-01	4.94E-07			5.80E-06	2.38E-06			7.59E-10	3.12E-10			
SVOC	Dimethylphthalate	131-11-3	D	1.57E-06			1.00E-01	4.94E-07			2.47E-06	1.01E-06			7.59E-10	3.12E-10			
SVOC	Di-n-butylphthalate	84-74-2	D	1.57E-06			1.00E-01	4.94E-07			8.14E-08	3.34E-08			7.59E-10	3.12E-10			
SVOC	4,6-Dinitro-2-methylphenol	534-52-1		1.57E-06			1.00E-01	4.94E-07			2.57E-06	1.06E-06			7.59E-10	3.12E-10			
SVOC	2,4-Dinitrotoluene	121-14-2	B2	1.57E-06	6.8E-01	9.4E+00	1.00E-01	4.94E-07	6.8E-01	3.0E+01	3.47E-06	1.42E-06			7.59E-10	3.12E-10			7.1E+00
SVOC	2,6-Dinitrotoluene	606-20-2	B2	1.57E-06	6.8E-01	9.4E+00	1.00E-01	4.94E-07	6.8E-01	3.0E+01	4.40E-06	1.81E-06	1.9E-01	2.8E+01	7.59E-10	3.12E-10	1.9E-01	1.7E+05	5.7E+00
SVOC	Di-n-octylphthalate	117-84-0		1.57E-06			1.00E-01	4.94E-07			2.80E-08	1.15E-08			7.59E-10	3.12E-10			
SVOC	Fluoranthene	206-44-0	D	1.57E-06			1.30E-01	6.43E-07			5.42E-07	2.23E-07			7.59E-10	3.12E-10			
SVOC	Fluorene	86-73-7	D	1.57E-06			1.30E-01	6.43E-07			3.30E-06	1.36E-06			7.59E-10	3.12E-10			
SVOC	Formaldehyde	50-00-0	B1	1.57E-06									1.3E-02		7.59E-10	3.12E-10	1.3E-02	2.5E+06	2.5E+06
SVOC	Hexachlorobutadiene	87-68-3	C	1.57E-06	7.8E-02	8.2E+01	1.00E-01	4.94E-07	7.8E-02	2.6E+02	2.35E-05	9.67E-06	2.2E-02	4.7E+01	7.59E-10	3.12E-10	2.2E-02	1.5E+06	2.7E+01
SVOC	Hexachlorocyclopentadiene	77-47-4	E	1.57E-06			1.00E-01	4.94E-07			1.19E-05	4.90E-06			7.59E-10	3.12E-10			
SVOC	Hexachloroethane	67-72-1	C	1.57E-06	1.4E-02	4.6E+02	1.00E-01	4.94E-07	1.4E-02	1.4E+03	1.87E-05	7.69E-06	4.0E-03	3.2E+02	7.59E-10	3.12E-10	4.0E-03	8.0E+06	1.7E+02
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	B2	1.57E-07	7.3E-01	8.8E+00	1.30E-01	6.43E-08	7.3E-01	2.1E+01	2.49E-09	1.02E-09	8.9E-02	1.1E+04	7.59E-11	3.12E-11	8.9E-02	3.6E+05	6.2E+00
SVOC	Isophorone	78-59-1	C	1.57E-06	9.5E-04	6.7E+03	1.00E-01	4.94E-07	9.5E-04	2.1E+04	1.96E-05	8.05E-06			7.59E-10	3.12E-10			5.1E+03
SVOC	2-Methylnaphthalene	91-57-6	ID	1.57E-06			1.00E-01	4.94E-07			1.61E-05	6.61E-06			7.59E-10	3.12E-10			
SVOC	Methylphenol (total)	1319-77-3		1.57E-06			1.00E-01	4.94E-07			6.40E-06	2.63E-06			7.59E-10	3.12E-10			
SVOC	Naphthalene	91-20-3	C	1.57E-06			1.30E-01	6.43E-07			3.01E-05	1.24E-05			7.59E-10	3.12E-10			
SVOC	2-Nitroaniline	88-74-4		1.57E-06			1.00E-01	4.94E-07			3.31E-06	1.36E-06			7.59E-10	3.12E-10			
SVOC	Nitrobenzene	98-95-3	D	1.57E-06			1.00E-01	4.94E-07			3.67E-05	1.51E-05			7.59E-10	3.12E-10			
SVOC	2-Nitrophenol	88-75-5		1.57E-06			1.00E-01	4.94E-07			2.02E-05	8.32E-06			7.59E-10	3.12E-10			
SVOC	4-Nitrophenol	100-02-7		1.57E-06			1.00E-01	4.94E-07			1.66E-06	6.84E-07			7.59E-10	3.12E-10			
SVOC	N-Nitrosodiphenylamine	86-30-6	B2	1.57E-06	4.9E-03	1.3E+03	1.00E-01	4.94E-07	4.9E-03	4.1E+03	2.80E-06	1.15E-06			7.59E-10	3.12E-10			9.9E+02
SVOC	N-Nitroso-di-n-propylamine	621-64-7	B2	1.57E-06	7.0E+00	9.1E-01	1.00E-01	4.94E-07	7.0E+00	2.9E+00	1.31E-05	5.40E-06	2.0E+00	9.3E-01	7.59E-10	3.12E-10	2.0E+00	1.6E+04	4.0E-01
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	C	1.57E-06	7.0E-02	9.1E+01	1.00E-01	4.94E-07	7.0E-02	2.9E+02	4.03E-05	1.66E-05	1.0E-02	6.0E+01	7.59E-10	3.12E-10	1.0E-02	3.2E+06	3.2E+01
SVOC	Pentachlorophenol	87-86-5	B2	1.57E-06	1.2E-01	5.3E+01	2.50E-01	1.24E-06	1.2E-01	6.7E+01	6.52E-07	2.68E-07	3.4E-02	1.1E+03	7.59E-10	3.12E-10	3.4E-02	9.4E+05	2.9E+01
SVOC	Phenanthrene	85-01-8	D	1.57E-06			1.30E-01	6.43E-07			1.53E-06	6.28E-07			7.59E-10	3.12E-10			
SVOC	Phenol	108-95-2	ID	1.57E-06			1.00E-01	4.94E-07			6.74E-06	2.77E-06			7.59E-10	3.12E-10			
SVOC	Pyrene	129-00-0	D	1.57E-06			1.30E-01	6.43E-07			4.31E-07	1.77E-07			7.59E-10	3.12E-10			

Attachment G9: Risk-Based Cancer Criteria for Exposure of Residents to Soil
GMC: NAO Flint Operations Site, Flint, Michigan

				Soil Ingestion			Soil Dermal Contact				Soil Vapor Inhalation				Soil Particulate Inhalation				
Chem Group	**Chemical**	**CASRN**	**Cancer Class**	**LADD** (mg/kg/d)	**SF_{oral}** $(mg/kg/d)^{-1}$	**RBC** (mg/kg)	**ABS_{derm}**	**LADD** (mg/kg/d)	**SF_{derm}** $(mg/kg/d)^{-1}$	**RBC** (mg/kg)	**C_{air}** (mg/m^3)	**Dose** (mg/m^3)	**URF** (m^3/mg)	**RBC** (mg/kg)	**C_{air}** (mg/m^3)	**Dose** (mg/m^3)	**URF** (m^3/mg)	**RBC** (mg/kg)	**Cancer RBC** (mg/kg)
SVOC	2,4,5-Trichlorophenol	95-95-4		1.57E-06			1.00E-01	4.94E-07			2.28E-06	9.35E-07			7.59E-10	3.12E-10			
SVOC	2,4,6-Trichlorophenol	88-06-2	B2	1.57E-06	1.1E-02	5.8E+02	1.00E-01	4.94E-07	1.1E-02	1.8E+03	6.33E-06	2.60E-06	3.1E-03	1.2E+03	7.59E-10	3.12E-10	3.1E-03	1.0E+07	3.3E+02
PCB	PCBs (total)	1336-36-3	B2	1.57E-06	2.0E+00	3.2E+00	1.40E-01	6.92E-07	2.0E+00	7.2E+00	1.03E-06	4.24E-07	5.7E-01	4.1E+01	7.59E-10	3.12E-10	5.7E-01	5.6E+04	2.1E+00
INORG	Antimony	7440-36-0		1.57E-06											7.59E-10	3.12E-10			
INORG	Arsenic	7440-38-2	A	1.57E-06	1.5E+00	4.3E+00	3.00E-02	1.48E-07	1.5E+00	4.5E+01			4.3E+00		7.59E-10	3.12E-10	4.3E+00	7.5E+03	3.9E+00
INORG	Barium	7440-39-3	D	1.57E-06											7.59E-10	3.12E-10			
INORG	Beryllium	7440-41-7	B1	1.57E-06									2.4E+00		7.59E-10	3.12E-10	2.4E+00	1.3E+04	1.3E+04
INORG	Cadmium	7440-43-9	B1	1.57E-06			1.00E-03	4.94E-09					1.8E+00		7.59E-10	3.12E-10	1.8E+00	1.8E+04	1.8E+04
INORG	Chromium (total)	7440-47-3		1.57E-06									1.2E+01		7.59E-10	3.12E-10	1.2E+01	2.7E+03	2.7E+03
INORG	Chromium III	16065-83-1	D	1.57E-06											7.59E-10	3.12E-10			
INORG	Chromium VI	18540-29-9	A	1.57E-06									1.2E+01		7.59E-10	3.12E-10	1.2E+01	2.7E+03	2.7E+03
INORG	Cobalt	7440-48-4	B1	1.57E-06									2.8E+00		7.59E-10	3.12E-10	2.8E+00	1.1E+04	1.1E+04
INORG	Copper	7440-50-8	D	1.57E-06											7.59E-10	3.12E-10			
INORG	Cyanide (total)	57-12-5	D	1.57E-06											7.59E-10	3.12E-10			
INORG	Fluoride	16984-48-8		1.57E-06											7.59E-10	3.12E-10			
INORG	Lead	7439-92-1	B2	1.57E-06											7.59E-10	3.12E-10			
INORG	Manganese	7439-96-5	D	1.57E-06											7.59E-10	3.12E-10			
INORG	Mercury	7439-97-6	D	1.57E-06							5.31E-06	2.18E-06			7.59E-10	3.12E-10			
INORG	Nickel	7440-02-0	A	1.57E-06									2.4E-01		7.59E-10	3.12E-10	2.4E-01	1.3E+05	1.34E+05
INORG	Selenium	7782-49-2	D	1.57E-06											7.59E-10	3.12E-10			
INORG	Silver	7440-22-4	D	1.57E-06											7.59E-10	3.12E-10			
INORG	Thallium	7440-28-0		1.57E-06											7.59E-10	3.12E-10			
INORG	Vanadium	7440-62-2		1.57E-06											7.59E-10	3.12E-10			
INORG	Zinc	7440-66-6	D	1.57E-06											7.59E-10	3.12E-10			

Notes:

Target cancer risk of 1E-05

C/Q based on the annual maximum exposure for a 1/2 acre source area = 14.53 kg/m3 per (kg/m2-s)

PM10 flux modeled based on average wind speed in Flint

Attachment G9: Risk-Based Noncancer Criteria for Exposure of Residents to Soil
GMC: NAO Flint Operations Site, Flint, Michigan

				Soil Ingestion			Soil Dermal Contact				Soil Vapor Inhalation				Soil Particulate Inhalation				
Chem Group	Chemical	CASRN	Cancer Class	ADD (mg/kg/d)	RfD_{oral} (mg/kg/d)	RBC (mg/kg)	ABS_{derm}	ADD (mg/kg/d)	RfD_{derm} (mg/kg/d)	RBC (mg/kg)	C_{air} (mg/m^3)	Dose (mg/m^3)	RfC (mg/m^3)	RBC (mg/kg)	C_{air} (mg/m^3)	Dose (mg/m^3)	RfC (mg/m^3)	RBC (mg/kg)	Noncancer RBC (mg/kg)
VOC	Acetone	67-64-1	ID	3.65E-06	9.0E-01	2.5E+05			9.0E-01		1.14E-04	1.09E-04	3.2E+00	2.9E+04	7.59E-10	7.28E-10	3.2E+00	4.3E+09	2.6E+04
VOC	Benzene	71-43-2	A	3.65E-06	4.0E-03	1.1E+03			4.0E-03		5.85E-04	5.61E-04	3.0E-02	5.3E+01	7.59E-10	7.28E-10	3.0E-02	4.1E+07	5.1E+01
VOC	Bromodichloromethane	75-27-4	B2	3.65E-06	2.0E-02	5.5E+03			2.0E-02		1.94E-04	1.86E-04	7.0E-02	3.8E+02	7.59E-10	7.28E-10	7.0E-02	9.6E+07	3.5E+02
VOC	2-Butanone	78-93-3	ID	3.65E-06	6.0E-01	1.6E+05			6.0E-01		1.07E-04	1.03E-04	5.0E+00	4.9E+04	7.59E-10	7.28E-10	5.0E+00	6.9E+09	3.8E+04
VOC	Carbon Disulfide	75-15-0		3.65E-06	1.0E-01	2.7E+04			1.0E-01		1.26E-03	1.20E-03	7.0E-01	5.8E+02	7.59E-10	7.28E-10	7.0E-01	9.6E+08	5.7E+02
VOC	Carbon Tetrachloride	56-23-5	B2	3.65E-06	7.0E-04	1.9E+02			7.0E-04		7.73E-04	7.42E-04			7.59E-10	7.28E-10			
VOC	Chlorobenzene	108-90-7	D	3.65E-06	2.0E-02	5.5E+03			2.0E-02		2.64E-04	2.53E-04	6.0E-02	2.4E+02	7.59E-10	7.28E-10	6.0E-02	8.2E+07	2.3E+02
VOC	Chloroethane	75-00-3		3.65E-06	4.0E-01	1.1E+05			4.0E-01		1.64E-03	1.58E-03	1.0E+01	6.3E+03	7.59E-10	7.28E-10	1.0E+01	1.4E+10	6.0E+03
VOC	Chloroform	67-66-3	B2	3.65E-06	1.0E-02	2.7E+03			1.0E-02		5.92E-04	5.68E-04	5.0E-02	8.8E+01	7.59E-10	7.28E-10	5.0E-02	6.9E+07	8.5E+01
VOC	Chloromethane	74-87-3	D	3.65E-06							9.44E-04	9.05E-04	9.0E-02	9.9E+01	7.59E-10	7.28E-10	9.0E-02	1.2E+08	9.9E+01
VOC	Cumene	98-82-8	D	3.65E-06	1.0E-01	2.7E+04			1.0E-01		2.69E-04	2.58E-04	4.0E-01	1.5E+03	7.59E-10	7.28E-10	4.0E-01	5.5E+08	1.5E+03
VOC	Cyclohexane	110-82-7	ID	3.65E-06							1.01E-03	9.66E-04	6.0E+00	6.2E+03	7.59E-10	7.28E-10	6.0E+00	8.2E+09	6.2E+03
VOC	Dibromochloromethane	124-48-1	C	3.65E-06	2.0E-02	5.5E+03			2.0E-02		1.07E-04	1.02E-04	7.0E-02	6.9E+02	7.59E-10	7.28E-10	7.0E-02	9.6E+07	6.1E+02
VOC	1,2-Dichlorobenzene	95-50-1	D	3.65E-06	9.0E-02	2.5E+04			9.0E-02		1.14E-04	1.10E-04	2.0E-01	1.8E+03	7.59E-10	7.28E-10	2.0E-01	2.7E+08	1.7E+03
VOC	1,3-Dichlorobenzene	541-73-1	D	3.65E-06	9.0E-02	2.5E+04			9.0E-02		1.52E-04	1.46E-04	1.4E-01	9.6E+02	7.59E-10	7.28E-10	1.4E-01	1.9E+08	9.2E+02
VOC	1,4-Dichlorobenzene	106-46-7	C	3.65E-06	3.0E-02	8.2E+03			3.0E-02		1.30E-04	1.25E-04	8.0E-01	6.4E+03	7.59E-10	7.28E-10	8.0E-01	1.1E+09	3.6E+03
VOC	Dichlorodifluoromethane	75-71-8		3.65E-06	2.0E-01	5.5E+04			2.0E-01		1.53E-03	1.46E-03	2.0E-01	1.4E+02	7.59E-10	7.28E-10	2.0E-01	2.7E+08	1.4E+02
VOC	1,1-Dichloroethane	75-34-3	C	3.65E-06	1.0E-01	2.7E+04			1.0E-01		6.40E-04	6.14E-04	5.0E-01	8.1E+02	7.59E-10	7.28E-10	5.0E-01	6.9E+08	7.9E+02
VOC	1,2-Dichloroethane	107-06-2	B2	3.65E-06	2.0E-02	5.5E+03			2.0E-02		3.92E-04	3.76E-04	5.0E-03	1.3E+01	7.59E-10	7.28E-10	5.0E-03	6.9E+06	1.3E+01
VOC	1,1-Dichloroethene	75-35-4	C	3.65E-06	5.0E-02	1.4E+04			5.0E-02		1.07E-03	1.02E-03	2.0E-01	2.0E+02	7.59E-10	7.28E-10	2.0E-01	2.7E+08	1.9E+02
VOC	cis-1,2-Dichloroethene	156-59-2	D	3.65E-06	1.0E-02	2.7E+03			1.0E-02		5.38E-04	5.16E-04	3.5E-02	6.8E+01	7.59E-10	7.28E-10	3.5E-02	4.8E+07	6.6E+01
VOC	trans-1,2-Dichloroethene	156-60-5		3.65E-06	2.0E-02	5.5E+03			2.0E-02		6.76E-04	6.48E-04	6.0E-02	9.2E+01	7.59E-10	7.28E-10	6.0E-02	8.2E+07	9.0E+01
VOC	1,2-Dichloropropane	78-87-5	B2	3.65E-06							4.43E-04	4.25E-04	4.0E-03	9.4E+00	7.59E-10	7.28E-10	4.0E-03	5.5E+06	9.4E+00
VOC	Ethyl Benzene	100-41-4	D	3.65E-06	1.0E-01	2.7E+04			1.0E-01		3.07E-04	2.94E-04	1.0E+00	3.4E+03	7.59E-10	7.28E-10	1.0E+00	1.4E+09	3.0E+03
VOC	2-Hexanone	591-78-6		3.65E-06	4.0E-02	1.1E+04			4.0E-02				5.0E-03		7.59E-10	7.28E-10	5.0E-03	6.9E+06	1.1E+04
VOC	Methyl Acetate	79-20-9		3.65E-06	1.0E+00	2.7E+05			1.0E+00		1.49E-04	1.43E-04	3.5E+00	2.5E+04	7.59E-10	7.28E-10	3.5E+00	4.8E+09	2.2E+04
VOC	Methyl tert-butyl ether	1634-04-4		3.65E-06							3.00E-04	2.88E-04	3.0E+00	1.0E+04	7.59E-10	7.28E-10	3.0E+00	4.1E+09	1.0E+04
VOC	4-Methyl-2-pentanone	108-10-1	ID	3.65E-06							1.40E-04	1.34E-04	3.0E+00	2.2E+04	7.59E-10	7.28E-10	3.0E+00	4.1E+09	2.2E+04
VOC	Methylcyclohexane	108-87-2		3.65E-06							1.34E-03	1.28E-03	3.0E+00	2.3E+03	7.59E-10	7.28E-10	3.0E+00	4.1E+09	2.3E+03
VOC	Methylene Chloride	75-09-2	B2	3.65E-06	6.0E-02	1.6E+04			6.0E-02		6.03E-04	5.78E-04	3.0E+00	5.2E+03	7.59E-10	7.28E-10	3.0E+00	4.1E+09	3.9E+03
VOC	Styrene	100-42-5		3.65E-06	2.0E-01	5.5E+04			2.0E-01		1.25E-04	1.20E-04	1.0E+00	8.3E+03	7.59E-10	7.28E-10	1.0E+00	1.4E+09	7.2E+03
VOC	Tetrachloroethene	127-18-4	C-B2	3.65E-06	1.0E-02	2.7E+03			1.0E-02		6.31E-04	6.05E-04	4.0E-01	6.6E+02	7.59E-10	7.28E-10	4.0E-01	5.5E+08	5.3E+02
VOC	Toluene	108-88-3	D	3.65E-06	8.0E-02	2.2E+04			8.0E-02		4.15E-04	3.98E-04	5.0E+00	1.3E+04	7.59E-10	7.28E-10	5.0E+00	6.9E+09	8.0E+03
VOC	1,2,4-Trichlorobenzene	120-82-1	D	3.65E-06	1.0E-02	2.7E+03			1.0E-02		3.89E-05	3.73E-05	2.0E-01	5.4E+03	7.59E-10	7.28E-10	2.0E-01	2.7E+08	1.8E+03
VOC	1,1,1-Trichloroethane	71-55-6	D	3.65E-06	2.8E-01	7.7E+04			2.8E-01		7.20E-04	6.90E-04	2.2E+00	3.2E+03	7.59E-10	7.28E-10	2.2E+00	3.0E+09	3.1E+03
VOC	1,1,2-Trichloroethane	79-00-5	C	3.65E-06	4.0E-03	1.1E+03			4.0E-03		2.47E-04	2.37E-04			7.59E-10	7.28E-10			
VOC	Trichloroethene	79-01-6	C-B2	3.65E-06	6.0E-03	1.6E+03			6.0E-03		4.99E-04	4.79E-04			7.59E-10	7.28E-10			
VOC	Trichlorofluoromethane	75-69-4		3.65E-06	3.0E-01	8.2E+04			3.0E-01		1.27E-03	1.22E-03	7.0E-01	5.7E+02	7.59E-10	7.28E-10	7.0E-01	9.6E+08	5.7E+02
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		3.65E-06	3.0E+01	8.2E+06			3.0E+01		1.34E-03	1.28E-03	3.0E+01	2.3E+04	7.59E-10	7.28E-10	3.0E+01	4.1E+10	2.3E+04
VOC	1,2,4-Trimethylbenzene	95-63-6	ID	3.65E-06	5.0E-02	1.4E+04			5.0E-02		1.61E-04	1.54E-04	6.0E-03	3.9E+01	7.59E-10	7.28E-10	6.0E-03	8.2E+06	3.9E+01
VOC	1,3,5-Trimethylbenzene	108-67-8	ID	3.65E-06	5.0E-02	1.4E+04			5.0E-02		1.13E-04	1.08E-04	6.0E-03	5.5E+01	7.59E-10	7.28E-10	6.0E-03	8.2E+06	5.5E+01
VOC	Vinyl Chloride	75-01-4	A	3.65E-06	3.0E-03	8.2E+02			3.0E-03		1.40E-03	1.34E-03	1.0E-01	7.5E+01	7.59E-10	7.28E-10	1.0E-01	1.4E+08	6.8E+01
VOC	Xylenes (total)	1330-20-7	ID	3.65E-06	2.0E-01	5.5E+04			2.0E-01		2.84E-04	2.72E-04	1.0E-01	3.7E+02	7.59E-10	7.28E-10	1.0E-01	1.4E+08	3.6E+02
SVOC	Acenaphthene	83-32-9		3.65E-06	6.0E-02	1.6E+04	1.30E-01	1.50E-06	6.0E-02	4.0E+04	7.69E-06	7.37E-06	2.1E-01	2.8E+04	7.59E-10	7.28E-10	2.1E-01	2.9E+08	8.3E+03
SVOC	Acenaphthylene	208-96-8	D	3.65E-06	3.0E-02	8.2E+03	1.30E-01	1.50E-06	3.0E-02	2.0E+04	6.62E-06	6.34E-06	1.1E-01	1.7E+04	7.59E-10	7.28E-10	1.1E-01	1.4E+08	4.3E+03
SVOC	Acetophenone	98-86-2	D	3.65E-06	1.0E-01	2.7E+04	1.00E-01	1.15E-06	1.0E-01	8.7E+04	3.06E-05	2.94E-05	3.5E-01	1.2E+04	7.59E-10	7.28E-10	3.5E-01	4.8E+08	7.6E+03
SVOC	Anthracene	120-12-7	D	3.65E-06	3.0E-01	8.2E+04	1.30E-01	1.50E-06	3.0E-01	2.0E+05	2.15E-06	2.06E-06			7.59E-10	7.28E-10			5.8E+04
SVOC	Atrazine	1912-24-9	C	3.65E-06	3.5E-02	9.6E+03	1.00E-01	1.15E-06	3.5E-02	3.0E+04	7.13E-07	6.84E-07	1.2E-01	1.8E+05	7.59E-10	7.28E-10	1.2E-01	1.7E+08	7.0E+03
SVOC	Benzaldehyde	100-52-7		3.65E-06	1.0E-01	2.7E+04	1.00E-01	1.15E-06	1.0E-01	8.7E+04	4.62E-05	4.43E-05	3.5E-01	7.9E+03	7.59E-10	7.28E-10	3.5E-01	4.8E+08	5.7E+03

Attachment G9: Risk-Based Noncancer Criteria for Exposure of Residents to Soil
GMC: NAO Flint Operations Site, Flint, Michigan

				Soil Ingestion			Soil Dermal Contact				Soil Vapor Inhalation				Soil Particulate Inhalation				
Chem Group	Chemical	CASRN	Cancer Class	ADD (mg/kg/d)	RfD_{oral} (mg/kg/d)	RBC (mg/kg)	ABS_{derm}	ADD (mg/kg/d)	RfD_{derm} (mg/kg/d)	RBC (mg/kg)	C_{air} (mg/m^3)	Dose (mg/m^3)	RfC (mg/m^3)	RBC (mg/kg)	C_{air} (mg/m^3)	Dose (mg/m^3)	RfC (mg/m^3)	RBC (mg/kg)	Noncancer RBC (mg/kg)
SVOC	Benzo(a)anthracene	56-55-3	B2	3.65E-06			1.30E-01	1.50E-06			1.68E-07	1.61E-07			7.59E-10	7.28E-10			
SVOC	Benzo(a)pyrene	50-32-8	B2	3.65E-06			1.30E-01	1.50E-06			5.79E-08	5.55E-08			7.59E-10	7.28E-10			
SVOC	Benzo(b)fluoranthene	205-99-2	B2	3.65E-06			1.30E-01	1.50E-06			3.62E-07	3.47E-07			7.59E-10	7.28E-10			
SVOC	Benzo(g,h,i)perylene	191-24-2	D	3.65E-06	3.0E-02	8.2E+03	1.30E-01	1.50E-06	3.0E-02	2.0E+04	5.20E-09	4.99E-09	1.1E-01	2.1E+07	7.59E-10	7.28E-10	1.1E-01	1.4E+08	5.8E+03
SVOC	Benzo(k)fluoranthene	207-08-9	B2	3.65E-06			1.30E-01	1.50E-06			3.32E-08	3.18E-08			7.59E-10	7.28E-10			
SVOC	Biphenyl	92-52-4	D	3.65E-06	5.0E-02	1.4E+04	1.00E-01	1.15E-06	5.0E-02	4.3E+04	8.63E-06	8.28E-06	1.8E-01	2.1E+04	7.59E-10	7.28E-10	1.8E-01	2.4E+08	7.0E+03
SVOC	bis(2-Chloroethoxy)methane	111-91-1	D	3.65E-06			1.00E-01	1.15E-06			4.20E-06	4.02E-06			7.59E-10	7.28E-10			
SVOC	bis(2-Chloroethyl) ether	111-44-4	B2	3.65E-06			1.00E-01	1.15E-06			4.56E-05	4.37E-05			7.59E-10	7.28E-10			
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2	3.65E-06	2.0E-02	5.5E+03	1.00E-01	1.15E-06	2.0E-02	1.7E+04	4.73E-09	4.54E-09	7.0E-02	1.5E+07	7.59E-10	7.28E-10	7.0E-02	9.6E+07	4.2E+03
SVOC	Butylbenzylphthalate	85-68-7	C	3.65E-06	2.0E-01	5.5E+04	1.00E-01	1.15E-06	2.0E-01	1.7E+05	1.65E-07	1.58E-07	7.0E-01	4.4E+06	7.59E-10	7.28E-10	7.0E-01	9.6E+08	4.1E+04
SVOC	Caprolactam	105-60-2		3.65E-06	5.0E-01	1.4E+05	1.00E-01	1.15E-06	5.0E-01	4.3E+05	3.39E-06	3.25E-06	1.8E+00	5.4E+05	7.59E-10	7.28E-10	1.8E+00	2.4E+09	8.7E+04
SVOC	Carbazole	86-74-8	B2	3.65E-06			1.00E-01	1.15E-06			2.64E-07	2.53E-07			7.59E-10	7.28E-10			
SVOC	4-Chloro-3-methylphenol	59-50-7		3.65E-06			1.00E-01	1.15E-06			1.27E-06	1.22E-06			7.59E-10	7.28E-10			
SVOC	2-Chloronaphthalene	91-58-7		3.65E-06	8.0E-02	2.2E+04	1.00E-01	1.15E-06	8.0E-02	6.9E+04	9.42E-06	9.03E-06	2.8E-01	3.1E+04	7.59E-10	7.28E-10	2.8E-01	3.8E+08	1.1E+04
SVOC	2-Chlorophenol	95-57-8		3.65E-06	5.0E-03	1.4E+03	1.00E-01	1.15E-06	5.0E-03	4.3E+03	5.55E-05	5.32E-05	1.8E-02	3.3E+02	7.59E-10	7.28E-10	1.8E-02	2.4E+07	2.5E+02
SVOC	Chrysene	218-01-9	B2	3.65E-06			1.30E-01	1.50E-06			6.16E-07	5.91E-07			7.59E-10	7.28E-10			
SVOC	Dibenz(a,h)anthracene	53-70-3	B2	3.65E-06			1.30E-01	1.50E-06			6.63E-09	6.36E-09			7.59E-10	7.28E-10			
SVOC	Dibenzofuran	132-64-9	D	3.65E-06	2.0E-03	5.5E+02	1.00E-01	1.15E-06	2.0E-03	1.7E+03	9.72E-07	9.32E-07	7.0E-03	7.5E+03	7.59E-10	7.28E-10	7.0E-03	9.6E+06	3.9E+02
SVOC	2,4-Dichlorophenol	120-83-2		3.65E-06	3.0E-03	8.2E+02	1.00E-01	1.15E-06	3.0E-03	2.6E+03	6.57E-06	6.30E-06	1.1E-02	1.7E+03	7.59E-10	7.28E-10	1.1E-02	1.4E+07	4.5E+02
SVOC	Diethylphthalate	84-66-2	D	3.65E-06	8.0E-01	2.2E+05	1.00E-01	1.15E-06	8.0E-01	6.9E+05	1.73E-06	1.66E-06	2.8E+00	1.7E+06	7.59E-10	7.28E-10	2.8E+00	3.8E+09	1.5E+05
SVOC	2,4-Dimethylphenol	105-67-9		3.65E-06	2.0E-02	5.5E+03	1.00E-01	1.15E-06	2.0E-02	1.7E+04	5.80E-06	5.56E-06	7.0E-02	1.3E+04	7.59E-10	7.28E-10	7.0E-02	9.6E+07	3.1E+03
SVOC	Dimethylphthalate	131-11-3	D	3.65E-06			1.00E-01	1.15E-06			2.47E-06	2.37E-06			7.59E-10	7.28E-10			
SVOC	Di-n-butylphthalate	84-74-2	D	3.65E-06	1.0E-01	2.7E+04	1.00E-01	1.15E-06	1.0E-01	8.7E+04	8.14E-08	7.80E-08			7.59E-10	7.28E-10			2.1E+04
SVOC	4,6-Dinitro-2-methylphenol	534-52-1		3.65E-06	1.0E-04	2.7E+01	1.00E-01	1.15E-06	1.0E-04	8.7E+01	2.57E-06	2.47E-06	3.5E-04	1.4E+02	7.59E-10	7.28E-10	3.5E-04	4.8E+05	1.8E+01
SVOC	2,4-Dinitrotoluene	121-14-2	B2	3.65E-06	2.0E-03	5.5E+02	1.00E-01	1.15E-06	2.0E-03	1.7E+03	3.47E-06	3.32E-06			7.59E-10	7.28E-10			4.2E+02
SVOC	2,6-Dinitrotoluene	606-20-2	B2	3.65E-06	1.0E-03	2.7E+02	1.00E-01	1.15E-06	1.0E-03	8.7E+02	4.40E-06	4.22E-06	3.5E-03	8.3E+02	7.59E-10	7.28E-10	3.5E-03	4.8E+06	1.7E+02
SVOC	Di-n-octylphthalate	117-84-0		3.65E-06	4.0E-02	1.1E+04	1.00E-01	1.15E-06	4.0E-02	3.5E+04	2.80E-08	2.68E-08			7.59E-10	7.28E-10			8.3E+03
SVOC	Fluoranthene	206-44-0	D	3.65E-06	4.0E-02	1.1E+04	1.30E-01	1.50E-06	4.0E-02	2.7E+04	5.42E-07	5.20E-07	1.4E-01	2.7E+05	7.59E-10	7.28E-10	1.4E-01	1.9E+08	7.5E+03
SVOC	Fluorene	86-73-7	D	3.65E-06	4.0E-02	1.1E+04	1.30E-01	1.50E-06	4.0E-02	2.7E+04	3.30E-06	3.16E-06	1.4E-01	4.4E+04	7.59E-10	7.28E-10	1.4E-01	1.9E+08	6.6E+03
SVOC	Formaldehyde	50-00-0	B1	3.65E-06	2.0E-01	5.5E+04			2.0E-01						7.59E-10	7.28E-10			
SVOC	Hexachlorobutadiene	87-68-3	C	3.65E-06	2.0E-04	5.5E+01	1.00E-01	1.15E-06	2.0E-04	1.7E+02	2.35E-05	2.26E-05			7.59E-10	7.28E-10			4.2E+01
SVOC	Hexachlorocyclopentadiene	77-47-4	E	3.65E-06	6.0E-03	1.6E+03	1.00E-01	1.15E-06	6.0E-03	5.2E+03	1.19E-05	1.14E-05	2.0E-04	1.8E+01	7.59E-10	7.28E-10	2.0E-04	2.7E+05	1.7E+01
SVOC	Hexachloroethane	67-72-1	C	3.65E-06	1.0E-03	2.7E+02	1.00E-01	1.15E-06	1.0E-03	8.7E+02	1.87E-05	1.80E-05			7.59E-10	7.28E-10			2.1E+02
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	B2	3.65E-07			1.30E-01	1.50E-07			2.49E-09	2.38E-09			7.59E-11	7.28E-11			
SVOC	Isophorone	78-59-1	C	3.65E-06	2.0E-01	5.5E+04	1.00E-01	1.15E-06	2.0E-01	1.7E+05	1.96E-05	1.88E-05			7.59E-10	7.28E-10			4.2E+04
SVOC	2-Methylnaphthalene	91-57-6	ID	3.65E-06	4.0E-03	1.1E+03	1.00E-01	1.15E-06	4.0E-03	3.5E+03	1.61E-05	1.54E-05	3.0E-03	1.9E+02	7.59E-10	7.28E-10	3.0E-03	4.1E+06	1.6E+02
SVOC	Methylphenol (total)	1319-77-3		3.65E-06	5.0E-02	1.4E+04	1.00E-01	1.15E-06	5.0E-02	4.3E+04	6.40E-06	6.13E-06			7.59E-10	7.28E-10			1.0E+04
SVOC	Naphthalene	91-20-3	C	3.65E-06	2.0E-02	5.5E+03	1.30E-01	1.50E-06	2.0E-02	1.3E+04	3.01E-05	2.89E-05	3.0E-03	1.0E+02	7.59E-10	7.28E-10	3.0E-03	4.1E+06	1.0E+02
SVOC	2-Nitroaniline	88-74-4		3.65E-06	3.0E-03	8.2E+02	1.00E-01	1.15E-06	3.0E-03	2.6E+03	3.31E-06	3.18E-06	2.0E-04	6.3E+01	7.59E-10	7.28E-10	2.0E-04	2.7E+05	5.7E+01
SVOC	Nitrobenzene	98-95-3	D	3.65E-06	5.0E-04	1.4E+02	1.00E-01	1.15E-06	5.0E-04	4.3E+02	3.67E-05	3.52E-05	2.0E-03	5.7E+01	7.59E-10	7.28E-10	2.0E-03	2.7E+06	3.7E+01
SVOC	2-Nitrophenol	88-75-5		3.65E-06			1.00E-01	1.15E-06			2.02E-05	1.94E-05			7.59E-10	7.28E-10			
SVOC	4-Nitrophenol	100-02-7		3.65E-06			1.00E-01	1.15E-06			1.66E-06	1.60E-06			7.59E-10	7.28E-10			
SVOC	N-Nitrosodiphenylamine	86-30-6	B2	3.65E-06	2.0E-02	5.5E+03	1.00E-01	1.15E-06	2.0E-02	1.7E+04	2.80E-06	2.68E-06			7.59E-10	7.28E-10			4.2E+03
SVOC	N-Nitroso-di-n-propylamine	621-64-7	B2	3.65E-06			1.00E-01	1.15E-06			1.31E-05	1.26E-05			7.59E-10	7.28E-10			
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	C	3.65E-06	4.0E-02	1.1E+04	1.00E-01	1.15E-06	4.0E-02	3.5E+04	4.03E-05	3.87E-05			7.59E-10	7.28E-10			8.3E+03
SVOC	Pentachlorophenol	87-86-5	B2	3.65E-06	3.0E-02	8.2E+03	2.50E-01	2.88E-06	3.0E-02	1.0E+04	6.52E-07	6.25E-07	1.1E-01	1.7E+05	7.59E-10	7.28E-10	1.1E-01	1.4E+08	4.5E+03
SVOC	Phenanthrene	85-01-8	D	3.65E-06	3.0E-02	8.2E+03	1.30E-01	1.50E-06	3.0E-02	2.0E+04	1.53E-06	1.47E-06	1.1E-01	7.2E+04	7.59E-10	7.28E-10	1.1E-01	1.4E+08	5.4E+03
SVOC	Phenol	108-95-2	ID	3.65E-06	3.0E-01	8.2E+04	1.00E-01	1.15E-06	3.0E-01	2.6E+05	6.74E-06	6.46E-06			7.59E-10	7.28E-10			6.2E+04
SVOC	Pyrene	129-00-0	D	3.65E-06	3.0E-02	8.2E+03	1.30E-01	1.50E-06	3.0E-02	2.0E+04	4.31E-07	4.13E-07	1.1E-01	2.5E+05	7.59E-10	7.28E-10	1.1E-01	1.4E+08	5.7E+03

Attachment G9: Risk-Based Noncancer Criteria for Exposure of Residents to Soil
GMC: NAO Flint Operations Site, Flint, Michigan

				Soil Ingestion			Soil Dermal Contact				Soil Vapor Inhalation				Soil Particulate Inhalation				
Chem Group	Chemical	CASRN	Cancer Class	ADD (mg/kg/d)	RfD_{oral} (mg/kg/d)	RBC (mg/kg)	ABS_{derm}	ADD (mg/kg/d)	RfD_{derm} (mg/kg/d)	RBC (mg/kg)	C_{air} (mg/m^3)	Dose (mg/m^3)	RfC (mg/m^3)	RBC (mg/kg)	C_{air} (mg/m^3)	Dose (mg/m^3)	RfC (mg/m^3)	RBC (mg/kg)	Noncancer RBC (mg/kg)
SVOC	2,4,5-Trichlorophenol	95-95-4		3.65E-06	1.0E-01	2.7E+04	1.00E-01	1.15E-06	1.0E-01	8.7E+04	2.28E-06	2.18E-06			7.59E-10	7.28E-10			2.1E+04
SVOC	2,4,6-Trichlorophenol	88-06-2	B2	3.65E-06	1.0E-04	2.7E+01	1.00E-01	1.15E-06	1.0E-04	8.7E+01	6.33E-06	6.07E-06			7.59E-10	7.28E-10			2.1E+01
PCB	PCBs (total)	1336-36-3	B2	3.65E-06	2.0E-05	5.5E+00	1.40E-01	1.61E-06	2.0E-05	1.2E+01	1.03E-06	9.89E-07			7.59E-10	7.28E-10			3.8E+00
INORG	Antimony	7440-36-0		3.65E-06	4.0E-04	1.1E+02			6.0E-05				1.4E-03		7.59E-10	7.28E-10	1.4E-03	1.9E+06	1.1E+02
INORG	Arsenic	7440-38-2	A	3.65E-06	3.0E-04	8.2E+01	3.00E-02	3.46E-07	3.0E-04	8.7E+02					7.59E-10	7.28E-10			7.5E+01
INORG	Barium	7440-39-3	D	3.65E-06	7.0E-02	1.9E+04			4.9E-03						7.59E-10	7.28E-10			
INORG	Beryllium	7440-41-7	B1	3.65E-06	2.0E-03	5.5E+02			1.4E-05				2.0E-05		7.59E-10	7.28E-10	2.0E-05	2.7E+04	5.4E+02
INORG	Cadmium	7440-43-9	B1	3.65E-06	1.0E-03	2.7E+02	1.00E-03	1.15E-08	2.5E-05	2.2E+03			2.0E-04		7.59E-10	7.28E-10	2.0E-04	2.7E+05	2.4E+02
INORG	Chromium (total)	7440-47-3		3.65E-06	3.0E-03	8.2E+02			7.5E-05				1.0E-04		7.59E-10	7.28E-10	1.0E-04	1.4E+05	8.2E+02
INORG	Chromium III	16065-83-1	D	3.65E-06	1.5E+00	4.1E+05			2.0E-02				5.3E+00		7.59E-10	7.28E-10	5.3E+00	7.2E+09	4.1E+05
INORG	Chromium VI	18540-29-9	A	3.65E-06	3.0E-03	8.2E+02			7.5E-05				1.0E-04		7.59E-10	7.28E-10	1.0E-04	1.4E+05	8.2E+02
INORG	Cobalt	7440-48-4	B1	3.65E-06	2.0E-02	5.5E+03			2.0E-02				2.0E-05		7.59E-10	7.28E-10	2.0E-05	2.7E+04	4.6E+03
INORG	Copper	7440-50-8	D	3.65E-06	4.0E-02	1.1E+04			4.0E-02				1.4E-01		7.59E-10	7.28E-10	1.4E-01	1.9E+08	1.1E+04
INORG	Cyanide (total)	57-12-5	D	3.65E-06	2.0E-02	5.5E+03			2.0E-02				7.0E-02		7.59E-10	7.28E-10	7.0E-02	9.6E+07	5.5E+03
INORG	Fluoride	16984-48-8		3.65E-06											7.59E-10	7.28E-10			
INORG	Lead	7439-92-1	B2	3.65E-06											7.59E-10	7.28E-10			
INORG	Manganese	7439-96-5	D	3.65E-06	1.4E-01	3.8E+04			8.4E-03				5.0E-05		7.59E-10	7.28E-10	5.0E-05	6.9E+04	2.5E+04
INORG	Mercury	7439-97-6	D	3.65E-06	3.0E-04	8.2E+01			3.0E-04		5.31E-06	5.09E-06	3.0E-04	5.9E+01	7.59E-10	7.28E-10	3.0E-04	4.1E+05	3.4E+01
INORG	Nickel	7440-02-0	A	3.65E-06	2.0E-02	5.5E+03			8.0E-04						7.59E-10	7.28E-10			
INORG	Selenium	7782-49-2	D	3.65E-06	5.0E-03	1.4E+03			5.0E-03				1.8E-02		7.59E-10	7.28E-10	1.8E-02	2.4E+07	1.4E+03
INORG	Silver	7440-22-4	D	3.65E-06	5.0E-03	1.4E+03			2.0E-04				1.0E-05		7.59E-10	7.28E-10	1.0E-05	1.4E+04	1.2E+03
INORG	Thallium	7440-28-0		3.65E-06	7.0E-05	1.9E+01			7.0E-05				2.5E-04		7.59E-10	7.28E-10	2.5E-04	3.4E+05	1.9E+01
INORG	Vanadium	7440-62-2		3.65E-06	7.0E-03	1.9E+03			1.8E-04				2.5E-02		7.59E-10	7.28E-10	2.5E-02	3.4E+07	1.9E+03
INORG	Zinc	7440-66-6	D	3.65E-06	3.0E-01	8.2E+04			3.0E-01				1.1E+00		7.59E-10	7.28E-10	1.1E+00	1.4E+09	8.2E+04

Notes:

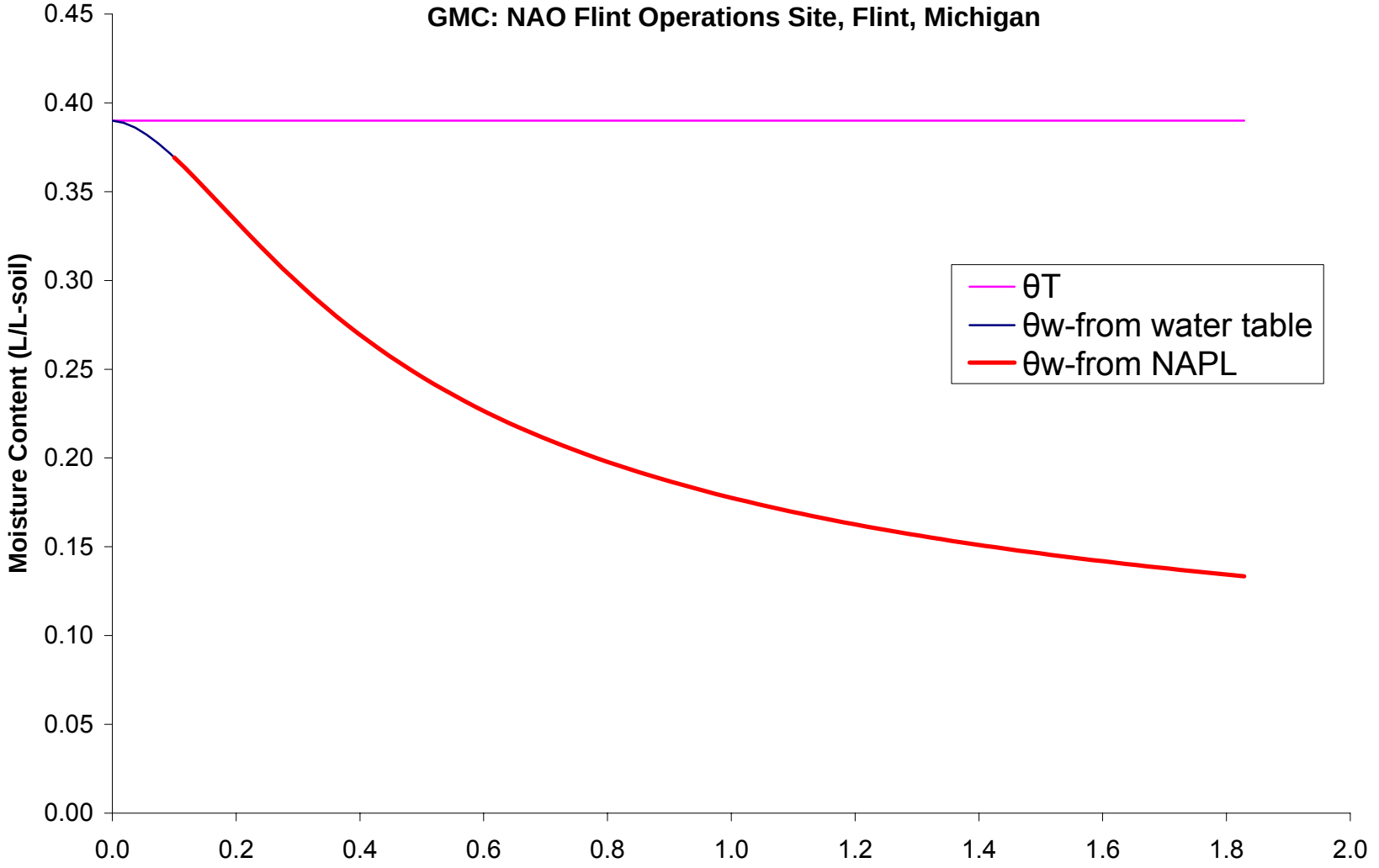
Target hazard index of 1

C/Q based on the annual maximum exposure for a 1/2 acre source area = 14.53 kg/m3 per (kg/m2-s)

PM10 flux modeled based on average wind speed in Flint

Attachment G10
Exposure of Residents via Vapor Intrusion
from Soil, Groundwater, and LNAPL

Attachment G10: Soil Moisture Profile
Vapor Intrusion into Slab on Grade Building
GMC: NAO Flint Operations Site, Flint, Michigan



Attachment G10: Vapor Intrusion into Residential Slab on Grade Building from Subsurface Soil
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	D_{air} (m^2/d)	D_{water} (m^2/d)	H (unitless)	D_{crack} (m^2/d)	D_{eff}^T (m^2/d)	α_∞ (unitless)	K_{oc} (L/kg)	K_d (L/kg)	$C_{s,\ vap}$ (kg-soil/m^3)	α_{ML} (unitless)	α (unitless)	C_{bldg} (kg-soil/m^3)
VOC	Acetone	67-64-1	1.07E+00	9.85E-05	7.95E-04	7.17E-02	7.17E-02	2.03E-05	5.81E-01	1.16E-03	9.15E+00	6.73E-04	2.03E-05	1.86E-04
VOC	Benzene	71-43-2	7.60E-01	8.47E-05	1.14E-01	5.01E-02	5.01E-02	2.03E-05	5.82E+01	1.16E-01	5.19E+02	1.19E-05	1.19E-05	6.16E-03
VOC	Bromodichloromethane	75-27-4	2.57E-01	9.16E-05	3.28E-02	1.70E-02	1.70E-02	2.00E-05	5.51E+01	1.10E-01	1.63E+02	3.77E-05	2.00E-05	3.27E-03
VOC	2-Butanone	78-93-3	6.98E-01	8.47E-05	1.14E-03	4.67E-02	4.67E-02	2.03E-05	2.00E+00	3.99E-03	1.27E+01	4.84E-04	2.03E-05	2.58E-04
VOC	Carbon Disulfide	75-15-0	8.99E-01	8.64E-05	6.20E-01	5.92E-02	5.92E-02	2.03E-05	4.59E+01	9.19E-02	2.27E+03	2.72E-06	2.72E-06	6.16E-03
VOC	Carbon Tetrachloride	56-23-5	6.74E-01	7.60E-05	6.25E-01	4.44E-02	4.44E-02	2.03E-05	1.74E+02	3.48E-01	1.18E+03	5.23E-06	5.23E-06	6.16E-03
VOC	Chlorobenzene	108-90-7	6.31E-01	7.52E-05	7.60E-02	4.16E-02	4.16E-02	2.03E-05	2.20E+02	4.41E-01	1.41E+02	4.36E-05	2.03E-05	2.86E-03
VOC	Chloroethane	75-00-3	2.34E+00	9.94E-05	1.80E-01	1.54E-01	1.54E-01	2.04E-05	1.62E+01	3.25E-02	1.23E+03	4.99E-06	4.99E-06	6.16E-03
VOC	Chloroform	67-66-3	8.99E-01	8.64E-05	7.50E-02	5.92E-02	5.92E-02	2.03E-05	3.97E+01	7.94E-02	4.25E+02	1.45E-05	1.45E-05	6.16E-03
VOC	Chloromethane	74-87-3	1.09E+00	5.62E-05	1.80E-01	7.17E-02	7.17E-02	2.03E-05	3.97E+01	7.94E-02	9.34E+02	6.60E-06	6.60E-06	6.16E-03
VOC	Cumene	98-82-8	5.62E-01	6.13E-05	2.66E-01	3.70E-02	3.70E-02	2.02E-05	7.05E+02	1.41E+00	1.73E+02	3.56E-05	2.02E-05	3.50E-03
VOC	Cyclohexane	110-82-7	7.25E-01	7.86E-05	3.98E+00	4.78E-02	4.78E-02	2.03E-05	6.35E+02	1.27E+00	2.02E+03	3.05E-06	3.05E-06	6.16E-03
VOC	Dibromochloromethane	124-48-1	1.69E-01	9.07E-05	1.61E-02	1.12E-02	1.12E-02	1.98E-05	6.26E+01	1.25E-01	7.52E+01	8.19E-05	1.98E-05	1.49E-03
VOC	1,2-Dichlorobenzene	95-50-1	5.96E-01	6.83E-05	3.90E-02	3.93E-02	3.93E-02	2.03E-05	6.23E+02	1.25E+00	2.91E+01	2.12E-04	2.03E-05	5.90E-04
VOC	1,3-Dichlorobenzene	541-73-1	5.98E-01	6.79E-05	6.33E-02	3.94E-02	3.94E-02	2.03E-05	5.69E+02	1.14E+00	5.14E+01	1.20E-04	2.03E-05	1.04E-03
VOC	1,4-Dichlorobenzene	106-46-7	5.96E-01	6.83E-05	4.98E-02	3.93E-02	3.93E-02	2.03E-05	6.12E+02	1.22E+00	3.78E+01	1.63E-04	2.03E-05	7.66E-04
VOC	Dichlorodifluoromethane	75-71-8	6.91E-01	6.91E-05	7.01E+00	4.55E-02	4.55E-02	2.03E-05	6.15E+01	1.23E-01	5.41E+03	1.14E-06	1.14E-06	6.16E-03
VOC	1,1-Dichloroethane	75-34-3	6.41E-01	9.07E-05	1.15E-01	4.22E-02	4.22E-02	2.03E-05	3.13E+01	6.27E-02	6.92E+02	8.90E-06	8.90E-06	6.16E-03
VOC	1,2-Dichloroethane	107-06-2	8.99E-01	8.55E-05	2.01E-02	5.92E-02	5.92E-02	2.03E-05	1.75E+01	3.50E-02	1.62E+02	3.80E-05	2.03E-05	3.29E-03
VOC	1,1-Dichloroethene	75-35-4	7.78E-01	8.99E-05	5.35E-01	5.12E-02	5.12E-02	2.03E-05	5.82E+01	1.16E-01	1.88E+03	3.28E-06	3.28E-06	6.16E-03
VOC	cis-1,2-Dichloroethene	156-59-2	6.36E-01	9.76E-05	8.35E-02	4.19E-02	4.19E-02	2.03E-05	3.56E+01	7.12E-02	4.92E+02	1.25E-05	1.25E-05	6.16E-03
VOC	trans-1,2-Dichloroethene	156-60-5	6.11E-01	1.03E-04	1.93E-01	4.02E-02	4.02E-02	2.03E-05	5.22E+01	1.04E-01	8.76E+02	7.04E-06	7.04E-06	6.16E-03
VOC	1,2-Dichloropropane	78-87-5	6.76E-01	7.54E-05	5.75E-02	4.45E-02	4.45E-02	2.03E-05	4.35E+01	8.70E-02	3.17E+02	1.94E-05	1.94E-05	6.16E-03
VOC	Ethyl Benzene	100-41-4	6.48E-01	6.74E-05	1.62E-01	4.27E-02	4.27E-02	2.03E-05	3.67E+02	7.35E-01	1.91E+02	3.22E-05	2.03E-05	3.87E-03
VOC	2-Hexanone	591-78-6			3.58E-02				1.48E+01	2.97E-02	2.96E+02	2.08E-05	2.08E-05	6.16E-03
VOC	Methyl Acetate	79-20-9	8.27E-01	9.50E-05	1.85E-03	5.49E-02	5.49E-02	2.03E-05	1.66E+00	3.33E-03	2.08E+01	2.96E-04	2.03E-05	4.22E-04
VOC	Methyl tert-butyl ether	1634-04-4	7.42E-01	8.73E-05	1.20E-02	4.90E-02	4.90E-02	2.03E-05	1.15E+01	2.30E-02	1.09E+02	5.67E-05	2.03E-05	2.20E-03
VOC	4-Methyl-2-pentanone	108-10-1	6.48E-01	6.74E-05	2.82E-03	4.29E-02	4.29E-02	2.03E-05	1.05E+01	2.10E-02	2.64E+01	2.34E-04	2.03E-05	5.34E-04
VOC	Methylcyclohexane	108-87-2	6.35E-01	7.36E-05	8.78E+00	4.18E-02	4.18E-02	2.03E-05	2.66E+02	5.33E-01	4.43E+03	1.39E-06	1.39E-06	6.16E-03
VOC	Methylene Chloride	75-09-2	8.73E-01	1.01E-04	4.49E-02	5.75E-02	5.75E-02	2.03E-05	1.17E+01	2.34E-02	3.87E+02	1.59E-05	1.59E-05	6.16E-03
VOC	Styrene	100-42-5	6.13E-01	6.91E-05	5.65E-02	4.04E-02	4.04E-02	2.03E-05	7.77E+02	1.55E+00	3.43E+01	1.80E-04	2.03E-05	6.95E-04
VOC	Tetrachloroethene	127-18-4	6.22E-01	7.08E-05	3.77E-01	4.10E-02	4.10E-02	2.03E-05	1.56E+02	3.12E-01	8.27E+02	7.45E-06	7.45E-06	6.16E-03
VOC	Toluene	108-88-3	7.52E-01	7.43E-05	1.36E-01	4.95E-02	4.95E-02	2.03E-05	1.80E+02	3.61E-01	2.91E+02	2.12E-05	2.03E-05	5.91E-03
VOC	1,2,4-Trichlorobenzene	120-82-1	2.59E-01	7.11E-05	2.91E-02	1.71E-02	1.71E-02	2.00E-05	1.79E+03	3.59E+00	7.91E+00	7.79E-04	2.00E-05	1.58E-04
VOC	1,1,1-Trichloroethane	71-55-6	6.74E-01	7.60E-05	3.53E-01	4.44E-02	4.44E-02	2.03E-05	1.10E+02	2.20E-01	9.77E+02	6.30E-06	6.30E-06	6.16E-03
VOC	1,1,2-Trichloroethane	79-00-5	6.74E-01	7.60E-05	1.87E-02	4.44E-02	4.44E-02	2.03E-05	5.03E+01	1.01E-01	9.89E+01	6.23E-05	2.03E-05	2.00E-03
VOC	Trichloroethene	79-01-6	6.83E-01	7.86E-05	2.11E-01	4.50E-02	4.50E-02	2.03E-05	1.68E+02	3.35E-01	4.65E+02	1.32E-05	1.32E-05	6.16E-03
VOC	Trichlorofluoromethane	75-69-4	7.52E-01	8.38E-05	1.98E+00	4.95E-02	4.95E-02	2.03E-05	1.21E+02	2.42E-01	3.12E+03	1.97E-06	1.97E-06	6.16E-03
VOC	1,1,2-Trichloro-1,2,2-trifluoroet	76-13-1	6.74E-01	7.08E-05	9.83E+00	4.44E-02	4.44E-02	2.03E-05	3.81E+02	7.62E-01	4.14E+03	1.49E-06	1.49E-06	6.16E-03
VOC	1,2,4-Trimethylbenzene	95-63-6	5.24E-01	6.84E-05	1.26E-01	3.45E-02	3.45E-02	2.02E-05	8.97E+02	1.79E+00	6.63E+01	9.30E-05	2.02E-05	1.34E-03
VOC	1,3,5-Trimethylbenzene	108-67-8	5.20E-01	7.49E-05	1.20E-01	3.43E-02	3.43E-02	2.02E-05	1.76E+03	3.52E+00	3.31E+01	1.86E-04	2.02E-05	6.71E-04
VOC	Vinyl Chloride	75-01-4	9.16E-01	1.06E-04	5.55E-01	6.03E-02	6.03E-02	2.03E-05	1.85E+01	3.69E-02	2.66E+03	2.32E-06	2.32E-06	6.16E-03
VOC	Xylenes (total)	1330-20-7	6.74E-01	7.56E-05	1.38E-01	4.44E-02	4.44E-02	2.03E-05	3.86E+02	7.71E-01	1.57E+02	3.92E-05	2.03E-05	3.19E-03
SVOC	Acenaphthene	83-32-9	3.64E-01	6.64E-05	3.18E-03	2.42E-02	2.42E-02	2.01E-05	7.14E+03	1.43E+01	2.21E-01	2.78E-02	2.01E-05	4.46E-06
SVOC	Acenaphthylene	208-96-8	3.88E-01	6.03E-05	2.31E-03	2.58E-02	2.58E-02	2.02E-05	7.47E+03	1.49E+01	1.54E-01	4.01E-02	2.02E-05	3.10E-06
SVOC	Acetophenone	98-86-2	6.91E-01	6.91E-05	2.19E-04	4.84E-02	4.84E-02	2.03E-05	3.58E+01	7.15E-02	1.39E+00	4.43E-03	2.03E-05	2.82E-05
SVOC	Anthracene	120-12-7	2.80E-01	6.69E-05	1.34E-03	1.89E-02	1.89E-02	2.01E-05	2.97E+04	5.94E+01	2.24E-02	2.75E-01	2.01E-05	4.50E-07
SVOC	Atrazine	1912-24-9	2.24E-01	5.76E-05	1.25E-07	4.20E+00	4.20E+00	5.63E-05	3.68E+02	7.36E-01	1.52E-04	4.05E+01	5.63E-05	8.55E-09

Attachment G10: Vapor Intrusion into Residential Slab on Grade Building from Subsurface Soil GMC: NAO Flint Operations Site, Flint, Michigan														
Chem Group	Chemical	CASRN	D_{air} (m^2/d)	D_{water} (m^2/d)	H (unitless)	D_{crack} (m^2/d)	D_{eff}^T (m^2/d)	α_∞ (unitless)	K_{oc} (L/kg)	K_d (L/kg)	$C_{s,\ vap}$ (kg-soil/m^3)	α_{ML} (unitless)	α (unitless)	C_{bldg} (kg-soil/m^3)
SVOC	Benzaldehyde	100-52-7	6.23E-01	7.84E-05	4.86E-04	4.25E-02	4.25E-02	2.03E-05	2.85E+01	5.70E-02	3.41E+00	1.81E-03	2.03E-05	6.91E-05
SVOC	Benzo(a)anthracene	56-55-3	4.41E-01	7.78E-05	6.85E-05	3.93E-02	3.93E-02	2.03E-05	4.01E+05	8.02E+02	8.54E-05	7.22E+01	2.03E-05	1.73E-09
SVOC	Benzo(a)pyrene	50-32-8	3.72E-01	7.78E-05	2.32E-05	5.49E-02	5.49E-02	2.03E-05	1.01E+06	2.03E+03	1.14E-05	5.40E+02	2.03E-05	2.32E-10
SVOC	Benzo(b)fluoranthene	205-99-2	1.95E-01	4.80E-05	2.28E-03	1.31E-02	1.31E-02	1.99E-05	1.24E+06	2.49E+03	9.14E-04	6.74E+00	1.99E-05	1.82E-08
SVOC	Benzo(g,h,i)perylene	191-24-2	1.88E-01	4.54E-05	2.88E-06	1.55E-01	1.55E-01	2.04E-05	1.28E+07	2.56E+04	1.13E-07	5.48E+04	2.04E-05	2.29E-12
SVOC	Benzo(k)fluoranthene	207-08-9	1.95E-01	4.80E-05	1.70E-05	3.85E-02	3.85E-02	2.03E-05	1.24E+06	2.49E+03	6.83E-06	9.02E+02	2.03E-05	1.38E-10
SVOC	Biphenyl	92-52-4	3.49E-01	7.04E-05	6.13E-03	2.31E-02	2.31E-02	2.01E-05	1.05E+04	2.10E+01	2.91E-01	2.12E-02	2.01E-05	5.86E-06
SVOC	bis(2-Chloroethoxy)methane	111-91-1	3.77E-01	7.31E-05	3.47E-06	2.16E-01	2.16E-01	2.04E-05	1.73E+01	3.47E-02	2.89E-02	2.13E-01	2.04E-05	5.90E-07
SVOC	bis(2-Chloroethyl) ether	111-44-4	5.98E-01	6.51E-05	3.69E-04	4.10E-02	4.10E-02	2.03E-05	1.55E+01	3.10E-02	3.16E+00	1.95E-03	2.03E-05	6.41E-05
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	3.03E-01	3.16E-05	2.09E-06	1.57E-01	1.57E-01	2.04E-05	1.50E+07	3.00E+04	6.97E-08	8.84E+04	2.04E-05	1.42E-12
SVOC	Butylbenzylphthalate	85-68-7	1.50E-01	4.17E-05	2.59E-05	2.45E-02	2.45E-02	2.01E-05	5.73E+04	1.15E+02	2.25E-04	2.73E+01	2.01E-05	4.54E-09
SVOC	Caprolactam	105-60-2	5.98E-01	7.77E-05	1.03E-07	6.88E+00	6.88E+00	8.49E-05	6.51E-01	1.30E-03	1.19E-03	5.20E+00	8.49E-05	1.01E-07
SVOC	Carbazole	86-74-8	3.37E-01	6.07E-05	3.13E-07	1.78E+00	1.78E+00	3.12E-05	3.38E+03	6.77E+00	4.57E-05	1.35E+02	3.12E-05	1.43E-09
SVOC	4-Chloro-3-methylphenol	59-50-7	5.24E-01	8.22E-05	8.15E-06	1.26E-01	1.26E-01	2.04E-05	1.12E+03	2.23E+00	3.52E-03	1.75E+00	2.04E-05	7.17E-08
SVOC	2-Chloronaphthalene	91-58-7	4.25E-01	7.59E-05	6.42E-03	2.81E-02	2.81E-02	2.02E-05	1.12E+04	2.25E+01	2.85E-01	2.16E-02	2.02E-05	5.75E-06
SVOC	2-Chlorophenol	95-57-8	4.33E-01	8.17E-05	8.00E-03	2.86E-02	2.86E-02	2.02E-05	3.88E+02	7.76E-01	9.27E+00	6.64E-04	2.02E-05	1.87E-04
SVOC	Chrysene	218-01-9	2.14E-01	5.37E-05	1.94E-03	1.44E-02	1.44E-02	1.99E-05	4.01E+05	8.02E+02	2.42E-03	2.55E+00	1.99E-05	4.82E-08
SVOC	Dibenz(a,h)anthracene	53-70-3	1.75E-01	4.48E-05	3.02E-07	1.36E+00	1.36E+00	2.72E-05	3.77E+06	7.54E+03	4.00E-08	1.54E+05	2.72E-05	1.09E-12
SVOC	Dibenzofuran	132-64-9	2.06E-01	5.18E-05	2.57E-04	1.54E-02	1.54E-02	2.00E-05	2.07E+04	4.14E+01	6.21E-03	9.92E-01	2.00E-05	1.24E-07
SVOC	2,4-Dichlorophenol	120-83-2	2.99E-01	7.58E-05	6.50E-05	3.03E-02	3.03E-02	2.02E-05	1.47E+02	2.94E-01	1.71E-01	3.60E-02	2.02E-05	3.46E-06
SVOC	Diethylphthalate	84-66-2	2.21E-01	5.49E-05	9.25E-06	6.84E-02	6.84E-02	2.03E-05	2.87E+02	5.74E-01	1.40E-02	4.39E-01	2.03E-05	2.85E-07
SVOC	2,4-Dimethylphenol	105-67-9	5.05E-01	7.51E-05	4.10E-05	4.99E-02	4.99E-02	2.03E-05	2.09E+02	4.18E-01	8.14E-02	7.57E-02	2.03E-05	1.65E-06
SVOC	Dimethylphthalate	131-11-3	4.91E-01	5.43E-05	2.15E-06	2.62E-01	2.62E-01	2.04E-05	6.89E+01	1.38E-01	9.60E-03	6.42E-01	2.04E-05	1.96E-07
SVOC	Di-n-butylphthalate	84-74-2	3.78E-01	6.79E-05	1.93E-08	3.20E+01	3.20E+01	3.55E-04	3.40E+04	6.81E+01	2.82E-07	2.18E+04	3.55E-04	1.00E-10
SVOC	4,6-Dinitro-2-methylphenol	534-52-1	2.38E-01	5.97E-05	8.73E-06	7.78E-02	7.78E-02	2.03E-05	1.21E+02	2.43E-01	2.66E-02	2.32E-01	2.03E-05	5.41E-07
SVOC	2,4-Dinitrotoluene	121-14-2	1.75E+00	6.10E-05	1.90E-06	4.07E-01	4.07E-01	2.06E-05	9.46E+01	1.89E-01	6.91E-03	8.91E-01	2.06E-05	1.43E-07
SVOC	2,6-Dinitrotoluene	606-20-2	2.83E-01	6.27E-05	1.53E-05	5.58E-02	5.58E-02	2.03E-05	6.89E+01	1.38E-01	6.85E-02	9.00E-02	2.03E-05	1.39E-06
SVOC	Di-n-octylphthalate	117-84-0	1.30E-01	3.09E-05	1.37E-03	8.80E-03	8.80E-03	1.96E-05	8.38E+07	1.68E+05	8.17E-06	7.54E+02	1.96E-05	1.61E-10
SVOC	Fluoranthene	206-44-0	2.61E-01	5.49E-05	3.30E-04	1.87E-02	1.87E-02	2.01E-05	1.08E+05	2.16E+02	1.53E-03	4.03E+00	2.01E-05	3.06E-08
SVOC	Fluorene	86-73-7	3.14E-01	6.81E-05	1.31E-03	2.11E-02	2.11E-02	2.01E-05	1.38E+04	2.75E+01	4.73E-02	1.30E-01	2.01E-05	9.50E-07
SVOC	Formaldehyde	50-00-0	1.56E+00	1.73E-04	6.95E-06	3.28E-01	3.28E-01	2.05E-05					2.05E-05	
SVOC	Hexachlorobutadiene	87-68-3	4.85E-01	5.32E-05	1.67E-01	3.19E-02	3.19E-02	2.02E-05	5.35E+04	1.07E+02	1.56E+00	3.95E-03	2.02E-05	3.15E-05
SVOC	Hexachlorocyclopentadiene	77-47-4	1.39E-01	6.23E-05	5.55E-01	9.16E-03	9.16E-03	1.97E-05	1.99E+05	3.98E+02	1.39E+00	4.42E-03	1.97E-05	2.74E-05
SVOC	Hexachloroethane	67-72-1	2.16E-02	5.88E-05	7.95E-02	1.43E-03	1.43E-03	1.63E-05	1.76E+03	3.52E+00	2.19E+01	2.81E-04	1.63E-05	3.59E-04
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	1.64E-01	4.89E-05	3.28E-05	2.43E-02	2.43E-02	2.01E-05	3.45E+06	6.89E+03	4.76E-06	1.29E+03	2.01E-05	9.59E-11
SVOC	Isophorone	78-59-1	5.38E-01	5.84E-05	1.36E-04	3.94E-02	3.94E-02	2.03E-05	4.69E+01	9.38E-02	7.58E-01	8.13E-03	2.03E-05	1.54E-05
SVOC	2-Methylnaphthalene	91-57-6	4.18E-01	6.70E-05	1.06E-02	2.76E-02	2.76E-02	2.02E-05	6.23E+03	1.25E+01	8.43E-01	7.30E-03	2.02E-05	1.70E-05
SVOC	Methylphenol (total)	1319-77-3	6.39E-01	8.64E-05	1.77E-05	8.65E-02	8.65E-02	2.04E-05	8.45E+01	1.69E-01	6.94E-02	8.87E-02	2.04E-05	1.41E-06
SVOC	Naphthalene	91-20-3	5.10E-01	6.48E-05	9.90E-03	3.36E-02	3.36E-02	2.02E-05	2.01E+03	4.02E+00	2.41E+00	2.56E-03	2.02E-05	4.88E-05
SVOC	2-Nitroaniline	88-74-4	6.31E-01	6.91E-05	3.27E-06	2.34E-01	2.34E-01	2.04E-05	6.59E+01	1.32E-01	1.50E-02	4.10E-01	2.04E-05	3.07E-07
SVOC	Nitrobenzene	98-95-3	6.57E-01	7.43E-05	4.92E-04	4.46E-02	4.46E-02	2.03E-05	6.44E+01	1.29E-01	2.29E+00	2.69E-03	2.03E-05	4.65E-05
SVOC	2-Nitrophenol	88-75-5	4.66E-01	6.78E-05	1.94E-04	3.39E-02	3.39E-02	2.02E-05	5.75E+01	1.15E-01	9.64E-01	6.39E-03	2.02E-05	1.95E-05
SVOC	4-Nitrophenol	100-02-7	5.40E-01	8.30E-05	8.48E-09	8.89E+01	8.89E+01	9.67E-04	7.55E+01	1.51E-01	3.59E-05	1.72E+02	9.67E-04	3.47E-08
SVOC	N-Nitrosodiphenylamine	86-30-6	2.70E-01	5.49E-05	1.03E-04	2.26E-02	2.26E-02	2.01E-05	1.29E+03	2.58E+00	3.85E-02	1.60E-01	2.01E-05	7.74E-07
SVOC	N-Nitroso-di-n-propylamine	621-64-7	4.71E-01	7.06E-05	4.62E-05	4.49E-02	4.49E-02	2.03E-05	2.40E+01	4.80E-02	3.45E-01	1.78E-02	2.03E-05	7.01E-06
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	5.20E-01	5.54E-05	2.39E-03	3.45E-02	3.45E-02	2.02E-05	2.56E+02	5.12E-01	4.00E+00	1.54E-03	2.02E-05	8.08E-05
SVOC	Pentachlorophenol	87-86-5	4.84E-01	5.27E-05	5.00E-07	9.88E-01	9.88E-01	2.39E-05	5.92E+02	1.18E+00	3.94E-04	1.56E+01	2.39E-05	9.43E-09
SVOC	Phenanthrene	85-01-8	3.24E-01	6.45E-05	4.76E-04	2.26E-02	2.26E-02	2.01E-05	2.42E+04	4.85E+01	9.81E-03	6.28E-01	2.01E-05	1.97E-07

Attachment G10: Vapor Intrusion into Residential Slab on Grade Building from Subsurface Soil GMC: NAO Flint Operations Site, Flint, Michigan														
Chem Group	**Chemical**	**CASRN**	**D_{air}** (m^2/d)	**D_{water}** (m^2/d)	**H** (unitless)	**D_{crack}** (m^2/d)	**D_{eff}^T** (m^2/d)	**α_∞** (unitless)	**K_{oc}** (L/kg)	**K_d** (L/kg)	**$C_{s,\ vap}$** (kg-soil/m^3)	**α_{ML}** (unitless)	**α** (unitless)	**C_{bldg}** (kg-soil/m^3)
SVOC	Phenol	108-95-2	7.08E-01	7.86E-05	8.15E-06	1.34E-01	1.34E-01	2.04E-05	2.88E+01	5.76E-02	5.69E-02	1.08E-01	2.04E-05	1.16E-06
SVOC	Pyrene	129-00-0	2.35E-01	6.26E-05	2.26E-04	1.80E-02	1.80E-02	2.00E-05	1.06E+05	2.11E+02	1.07E-03	5.77E+00	2.00E-05	2.14E-08
SVOC	2,4,5-Trichlorophenol	95-95-4	2.51E-01	6.07E-05	8.90E-05	2.28E-02	2.28E-02	2.01E-05	1.60E+03	3.19E+00	2.71E-02	2.27E-01	2.01E-05	5.46E-07
SVOC	2,4,6-Trichlorophenol	88-06-2	2.75E-01	5.40E-05	1.60E-04	2.12E-02	2.12E-02	2.01E-05	3.81E+02	7.62E-01	1.88E-01	3.27E-02	2.01E-05	3.78E-06
PCB	PCBs (total)	1336-36-3	1.75E-01	4.32E-05	4.09E-02	1.15E-02	1.15E-02	1.98E-05	2.45E+06	4.91E+03	8.33E-03	7.40E-01	1.98E-05	1.65E-07
INORG	Antimony	7440-36-0								4.50E+01				
INORG	Arsenic	7440-38-2								2.90E+01				
INORG	Barium	7440-39-3								4.10E+01				
INORG	Beryllium	7440-41-7								7.90E+02				
INORG	Cadmium	7440-43-9								7.50E+01				
INORG	Chromium (total)	7440-47-3								1.90E+01				
INORG	Chromium III	16065-83-1								1.80E+06				
INORG	Chromium VI	18540-29-9								1.90E+01				
INORG	Cobalt	7440-48-4								4.50E+01				
INORG	Copper	7440-50-8								3.50E+01				
INORG	Cyanide (total)	57-12-5								9.90E+00				
INORG	Fluoride	16984-48-8												
INORG	Lead	7439-92-1								9.00E+02				
INORG	Manganese	7439-96-5								6.50E+01				
INORG	Mercury	7439-97-6	2.65E-01	5.44E-05	1.45E-01	1.75E-02	1.75E-02	2.00E-05		1.00E+03	1.45E-01	4.25E-02	2.00E-05	2.91E-06
INORG	Nickel	7440-02-0								6.50E+01				
INORG	Selenium	7782-49-2								5.00E+00				
INORG	Silver	7440-22-4								8.30E+00				
INORG	Thallium	7440-28-0								7.10E+01				
INORG	Vanadium	7440-62-2								1.00E+03				
INORG	Zinc	7440-66-6								6.20E+01				
Notes:	**Soil and Building Characteristics**													
	SCS Soil texture class		Loamy Sand											
	Bulk density	kg/L	**ρ_b**	1.62										
	Total porosity	L/L-soil	**θ**	0.390										
	Water-filled porosity	L/L-soil	**θ_w**	0.139										
	Air-filled porosity	L/L-soil	**θ_a**	0.251										
	Organic carbon fraction	unitless	**f_{oc}**	0.002										
	Residual saturation	L/L-soil	**θ_r**	0.0490										
	Hydraulic conductivity	cm/s	**K**	1.2E-03										
	Dynamic viscosity of water	g/cm-s	**μ**	0.01307										
	Density of water	g/cm^3	**ρ_w**	1.0										
	Gravitational acceleration	cm/s^2	**g**	980.7										
	Intrinsic permeability	cm^2	**k**	1.62E-08										
	Relative saturation	unitless	**S_e**	0.263										
	van Genuchten N	unitless	**N**	1.746										
	van Genuchten M	unitless	**M**	0.427										
	Relative air permeability	unitless	**k_{rg}**	0.826										
	Permeability to vapor	cm^2	**k_v**	1.34E-08										

Attachment G10: Vapor Intrusion into Residential Slab on Grade Building from Subsurface Soil GMC: NAO Flint Operations Site, Flint, Michigan														
Chem Group	**Chemical**	**CASRN**	**D_{air}** (m^2/d)	**D_{water}** (m^2/d)	**H** (unitless)	**D_{crack}** (m^2/d)	**D_{eff}^T** (m^2/d)	**α_∞** (unitless)	**K_{oc}** (L/kg)	**K_d** (L/kg)	**$C_{s,\ vap}$** (kg-soil/m^3)	**α_{ML}** (unitless)	**α** (unitless)	**C_{bldg}** (kg-soil/m^3)
	Distance from building foundation to source	m	**L_T**	0.15										
	Bldg foundation thickness	m	**L_{crack}**	0.15										
	Bldg foundation length	m		10.56										
	Bldg foundation width	m		10.56										
	Bldg occupied height	m		4.88										
	Bldg occupied volume	m^3		544.19										
	Occupied depth below ground	m		0.0										
	Bldg area for vapor intrusion	m^2	**A_B**	111.5										
	Ratio of A_{crack} to A_B		**η**	2E-04										
	Area of cracks	m^2	**A_{crack}**	2.11E-02										
	Air exchange rate	$hour^{-1}$	**ac/h**	1.0										
	Building ventilation rate	m^3/d	**Q_{bldg}**	1.31E+04										
	Pressure difference between outdoors-indoors	kg/m-s^2	**ΔP**	1.0										
	Air viscosity	kg/m-s	**μ**	1.8E-05										
	Crack length (bldg perimeter)	m	**X_{crack}**	42.24										
	Crack depth below ground	m	**Z_{crack}**	0.15										
	Crack radius	m	**r_{crack}**	5E-04										
	Soil gas flow rate into bldg	m^3/d	**Q_{soil}**	2.67E-01										
	Averaging period	s	**T**	9.46E+08										
	Contaminant thickness	m	**ΔH**	4.88										

Attachment G10: Risk-Based Cancer Criteria for Resident Exposure to Soil Vapor Intrusion (Residential Slab on Grade Building)
GMC: NAO Flint Operations Site, Flint, Michigan

				Vapor Inhalation		
Chem Group	**Chemical**	**CASRN**	**Carc Class**	**C_{air}** (mg/m^3)	**URF** (m^3/mg)	**RBC** (mg/kg)
VOC	Acetone	67-64-1	ID	1.86E-04		
VOC	Benzene	71-43-2	A	6.16E-03	7.8E-03	5.1E-01
VOC	Bromodichloromethane	75-27-4	B2	3.27E-03	1.8E-02	4.2E-01
VOC	2-Butanone	78-93-3	ID	2.58E-04		
VOC	Carbon Disulfide	75-15-0		6.16E-03		
VOC	Carbon Tetrachloride	56-23-5	B2	6.16E-03	1.5E-02	2.6E-01
VOC	Chlorobenzene	108-90-7	D	2.86E-03		
VOC	Chloroethane	75-00-3		6.16E-03		
VOC	Chloroform	67-66-3	B2	6.16E-03	2.3E-02	1.7E-01
VOC	Chloromethane	74-87-3	D	6.16E-03		
VOC	Cumene	98-82-8	D	3.50E-03		
VOC	Cyclohexane	110-82-7	ID	6.16E-03		
VOC	Dibromochloromethane	124-48-1	C	1.49E-03	2.4E-02	6.8E-01
VOC	1,2-Dichlorobenzene	95-50-1	D	5.90E-04		
VOC	1,3-Dichlorobenzene	541-73-1	D	1.04E-03		
VOC	1,4-Dichlorobenzene	106-46-7	C	7.66E-04	6.3E-03	5.1E+00
VOC	Dichlorodifluoromethane	75-71-8		6.16E-03		
VOC	1,1-Dichloroethane	75-34-3	C	6.16E-03		
VOC	1,2-Dichloroethane	107-06-2	B2	3.29E-03	2.6E-02	2.8E-01
VOC	1,1-Dichloroethene	75-35-4	C	6.16E-03		
VOC	cis-1,2-Dichloroethene	156-59-2	D	6.16E-03		
VOC	trans-1,2-Dichloroethene	156-60-5		6.16E-03		
VOC	1,2-Dichloropropane	78-87-5	B2	6.16E-03		
VOC	Ethyl Benzene	100-41-4	D	3.87E-03		
VOC	2-Hexanone	591-78-6		6.16E-03		
VOC	Methyl Acetate	79-20-9		4.22E-04		
VOC	Methyl tert-butyl ether	1634-04-4		2.20E-03		
VOC	4-Methyl-2-pentanone	108-10-1	ID	5.34E-04		
VOC	Methylcyclohexane	108-87-2		6.16E-03		
VOC	Methylene Chloride	75-09-2	B2	6.16E-03	4.7E-04	8.4E+00
VOC	Styrene	100-42-5		6.95E-04		
VOC	Tetrachloroethene	127-18-4	C-B2	6.16E-03	3.1E-03	1.3E+00
VOC	Toluene	108-88-3	D	5.91E-03		
VOC	1,2,4-Trichlorobenzene	120-82-1	D	1.58E-04		
VOC	1,1,1-Trichloroethane	71-55-6	D	6.16E-03		
VOC	1,1,2-Trichloroethane	79-00-5	C	2.00E-03	1.6E-02	7.6E-01
VOC	Trichloroethene	79-01-6	C-B2	6.16E-03	1.7E-03	2.3E+00
VOC	Trichlorofluoromethane	75-69-4		6.16E-03		
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		6.16E-03		
VOC	1,2,4-Trimethylbenzene	95-63-6	ID	1.34E-03		
VOC	1,3,5-Trimethylbenzene	108-67-8	ID	6.71E-04		
VOC	Vinyl Chloride	75-01-4	A	6.16E-03	8.8E-03	4.5E-01
VOC	Xylenes (total)	1330-20-7	ID	3.19E-03		
SVOC	Acenaphthene	83-32-9		4.46E-06		
SVOC	Acenaphthylene	208-96-8	D	3.10E-06		
SVOC	Acetophenone	98-86-2	D	2.82E-05		
SVOC	Anthracene	120-12-7	D	4.50E-07		
SVOC	Atrazine	1912-24-9	C	8.55E-09	6.3E-02	4.5E+04

Attachment G10: Risk-Based Cancer Criteria for Resident Exposure to Soil Vapor Intrusion (Residential Slab on Grade Building)
GMC: NAO Flint Operations Site, Flint, Michigan

				Vapor Inhalation		
Chem Group	**Chemical**	**CASRN**	**Carc Class**	**C_{air}** (mg/m^3)	**URF** (m^3/mg)	**RBC** (mg/kg)
SVOC	Benzaldehyde	100-52-7		6.91E-05		
SVOC	Benzo(a)anthracene	56-55-3	B2	1.73E-09	8.9E-02	1.6E+05
SVOC	Benzo(a)pyrene	50-32-8	B2	2.32E-10	8.9E-01	1.2E+05
SVOC	Benzo(b)fluoranthene	205-99-2	B2	1.82E-08	8.9E-02	1.5E+04
SVOC	Benzo(g,h,i)perylene	191-24-2	D	2.29E-12		
SVOC	Benzo(k)fluoranthene	207-08-9	B2	1.38E-10	8.9E-03	2.0E+07
SVOC	Biphenyl	92-52-4	D	5.86E-06		
SVOC	bis(2-Chloroethoxy)methane	111-91-1	D	5.90E-07		
SVOC	bis(2-Chloroethyl) ether	111-44-4	B2	6.41E-05	3.3E-01	1.1E+00
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2	1.42E-12	4.0E-03	4.3E+09
SVOC	Butylbenzylphthalate	85-68-7	C	4.54E-09	5.4E-04	9.9E+06
SVOC	Caprolactam	105-60-2		1.01E-07		
SVOC	Carbazole	86-74-8	B2	1.43E-09	5.7E-03	3.0E+06
SVOC	4-Chloro-3-methylphenol	59-50-7		7.17E-08		
SVOC	2-Chloronaphthalene	91-58-7		5.75E-06		
SVOC	2-Chlorophenol	95-57-8		1.87E-04		
SVOC	Chrysene	218-01-9	B2	4.82E-08	8.9E-04	5.7E+05
SVOC	Dibenz(a,h)anthracene	53-70-3	B2	1.09E-12	8.9E-01	2.5E+07
SVOC	Dibenzofuran	132-64-9	D	1.24E-07		
SVOC	2,4-Dichlorophenol	120-83-2		3.46E-06		
SVOC	Diethylphthalate	84-66-2	D	2.85E-07		
SVOC	2,4-Dimethylphenol	105-67-9		1.65E-06		
SVOC	Dimethylphthalate	131-11-3	D	1.96E-07		
SVOC	Di-n-butylphthalate	84-74-2	D	1.00E-10		
SVOC	4,6-Dinitro-2-methylphenol	534-52-1		5.41E-07		
SVOC	2,4-Dinitrotoluene	121-14-2	B2	1.43E-07		
SVOC	2,6-Dinitrotoluene	606-20-2	B2	1.39E-06	1.9E-01	9.0E+01
SVOC	Di-n-octylphthalate	117-84-0		1.61E-10		
SVOC	Fluoranthene	206-44-0	D	3.06E-08		
SVOC	Fluorene	86-73-7	D	9.50E-07		
SVOC	Formaldehyde	50-00-0	B1		1.3E-02	
SVOC	Hexachlorobutadiene	87-68-3	C	3.15E-05	2.2E-02	3.5E+01
SVOC	Hexachlorocyclopentadiene	77-47-4	E	2.74E-05		
SVOC	Hexachloroethane	67-72-1	C	3.59E-04	4.0E-03	1.7E+01
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	B2	9.59E-11	8.9E-02	2.9E+06
SVOC	Isophorone	78-59-1	C	1.54E-05		
SVOC	2-Methylnaphthalene	91-57-6	ID	1.70E-05		
SVOC	Methylphenol (total)	1319-77-3		1.41E-06		
SVOC	Naphthalene	91-20-3	C	4.88E-05		
SVOC	2-Nitroaniline	88-74-4		3.07E-07		
SVOC	Nitrobenzene	98-95-3	D	4.65E-05		
SVOC	2-Nitrophenol	88-75-5		1.95E-05		
SVOC	4-Nitrophenol	100-02-7		3.47E-08		
SVOC	N-Nitrosodiphenylamine	86-30-6	B2	7.74E-07		
SVOC	N-Nitroso-di-n-propylamine	621-64-7	B2	7.01E-06	2.0E+00	1.7E+00
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	C	8.08E-05	1.0E-02	3.0E+01
SVOC	Pentachlorophenol	87-86-5	B2	9.43E-09	3.4E-02	7.5E+04
SVOC	Phenanthrene	85-01-8	D	1.97E-07		

Attachment G10: Risk-Based Cancer Criteria for Resident Exposure to Soil Vapor Intrusion (Residential Slab on Grade Building)
GMC: NAO Flint Operations Site, Flint, Michigan

				Vapor Inhalation		
Chem Group	**Chemical**	**CASRN**	**Carc Class**	**C_{air}** (mg/m^3)	**URF** (m^3/mg)	**RBC** (mg/kg)
SVOC	Phenol	108-95-2	ID	1.16E-06		
SVOC	Pyrene	129-00-0	D	2.14E-08		
SVOC	2,4,5-Trichlorophenol	95-95-4		5.46E-07		
SVOC	2,4,6-Trichlorophenol	88-06-2	B2	3.78E-06	3.1E-03	2.1E+03
PCB	PCBs (total)	1336-36-3	B2	1.65E-07	5.7E-01	2.6E+02
INORG	Antimony	7440-36-0				
INORG	Arsenic	7440-38-2	A		4.3E+00	
INORG	Barium	7440-39-3	D			
INORG	Beryllium	7440-41-7	B1		2.4E+00	
INORG	Cadmium	7440-43-9	B1		1.8E+00	
INORG	Chromium (total)	7440-47-3			1.2E+01	
INORG	Chromium III	16065-83-1	D			
INORG	Chromium VI	18540-29-9	A		1.2E+01	
INORG	Cobalt	7440-48-4	B1		2.8E+00	
INORG	Copper	7440-50-8	D			
INORG	Cyanide (total)	57-12-5	D			
INORG	Fluoride	16984-48-8				
INORG	Lead	7439-92-1	B2			
INORG	Manganese	7439-96-5	D			
INORG	Mercury	7439-97-6	D	2.91E-06		
INORG	Nickel	7440-02-0	A		2.4E-01	
INORG	Selenium	7782-49-2	D			
INORG	Silver	7440-22-4	D			
INORG	Thallium	7440-28-0				
INORG	Vanadium	7440-62-2				
INORG	Zinc	7440-66-6	D			
Note:						
Target cancer risk of 1E-05						

Attachment G10: Risk-Based Noncancer Criteria for Resident Exposure to Soil Vapor Intrusion (Residential Slab on Grade Building)
GMC: NAO Flint Operations Site, Flint, Michigan

				Vapor Inhalation		
Chem Group	**Chemical**	**CASRN**	**Carc Class**	**C_{air} (mg/m^3)**	**RfC (mg/m^3)**	**RBC (mg/kg)**
VOC	Acetone	67-64-1	ID	1.86E-04	3.2E+00	1.8E+04
VOC	Benzene	71-43-2	A	6.16E-03	3.0E-02	5.1E+00
VOC	Bromodichloromethane	75-27-4	B2	3.27E-03	7.0E-02	2.2E+01
VOC	2-Butanone	78-93-3	ID	2.58E-04	5.0E+00	2.0E+04
VOC	Carbon Disulfide	75-15-0		6.16E-03	7.0E-01	1.2E+02
VOC	Carbon Tetrachloride	56-23-5	B2	6.16E-03		
VOC	Chlorobenzene	108-90-7	D	2.86E-03	6.0E-02	2.2E+01
VOC	Chloroethane	75-00-3		6.16E-03	1.0E+01	1.7E+03
VOC	Chloroform	67-66-3	B2	6.16E-03	5.0E-02	8.5E+00
VOC	Chloromethane	74-87-3	D	6.16E-03	9.0E-02	1.5E+01
VOC	Cumene	98-82-8	D	3.50E-03	4.0E-01	1.2E+02
VOC	Cyclohexane	110-82-7	ID	6.16E-03	6.0E+00	1.0E+03
VOC	Dibromochloromethane	124-48-1	C	1.49E-03	7.0E-02	4.9E+01
VOC	1,2-Dichlorobenzene	95-50-1	D	5.90E-04	2.0E-01	3.5E+02
VOC	1,3-Dichlorobenzene	541-73-1	D	1.04E-03	1.4E-01	1.4E+02
VOC	1,4-Dichlorobenzene	106-46-7	C	7.66E-04	8.0E-01	1.1E+03
VOC	Dichlorodifluoromethane	75-71-8		6.16E-03	2.0E-01	3.4E+01
VOC	1,1-Dichloroethane	75-34-3	C	6.16E-03	5.0E-01	8.5E+01
VOC	1,2-Dichloroethane	107-06-2	B2	3.29E-03	5.0E-03	1.6E+00
VOC	1,1-Dichloroethene	75-35-4	C	6.16E-03	2.0E-01	3.4E+01
VOC	cis-1,2-Dichloroethene	156-59-2	D	6.16E-03	3.5E-02	5.9E+00
VOC	trans-1,2-Dichloroethene	156-60-5		6.16E-03	6.0E-02	1.0E+01
VOC	1,2-Dichloropropane	78-87-5	B2	6.16E-03	4.0E-03	6.8E-01
VOC	Ethyl Benzene	100-41-4	D	3.87E-03	1.0E+00	2.7E+02
VOC	2-Hexanone	591-78-6		6.16E-03	5.0E-03	8.5E-01
VOC	Methyl Acetate	79-20-9		4.22E-04	3.5E+00	8.6E+03
VOC	Methyl tert-butyl ether	1634-04-4		2.20E-03	3.0E+00	1.4E+03
VOC	4-Methyl-2-pentanone	108-10-1	ID	5.34E-04	3.0E+00	5.9E+03
VOC	Methylcyclohexane	108-87-2		6.16E-03	3.0E+00	5.1E+02
VOC	Methylene Chloride	75-09-2	B2	6.16E-03	3.0E+00	5.1E+02
VOC	Styrene	100-42-5		6.95E-04	1.0E+00	1.5E+03
VOC	Tetrachloroethene	127-18-4	C-B2	6.16E-03	4.0E-01	6.8E+01
VOC	Toluene	108-88-3	D	5.91E-03	5.0E+00	8.8E+02
VOC	1,2,4-Trichlorobenzene	120-82-1	D	1.58E-04	2.0E-01	1.3E+03
VOC	1,1,1-Trichloroethane	71-55-6	D	6.16E-03	2.2E+00	3.7E+02
VOC	1,1,2-Trichloroethane	79-00-5	C	2.00E-03		
VOC	Trichloroethene	79-01-6	C-B2	6.16E-03		
VOC	Trichlorofluoromethane	75-69-4		6.16E-03	7.0E-01	1.2E+02
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		6.16E-03	3.0E+01	5.1E+03
VOC	1,2,4-Trimethylbenzene	95-63-6	ID	1.34E-03	6.0E-03	4.7E+00
VOC	1,3,5-Trimethylbenzene	108-67-8	ID	6.71E-04	6.0E-03	9.3E+00
VOC	Vinyl Chloride	75-01-4	A	6.16E-03	1.0E-01	1.7E+01
VOC	Xylenes (total)	1330-20-7	ID	3.19E-03	1.0E-01	3.3E+01
SVOC	Acenaphthene	83-32-9		4.46E-06	2.1E-01	4.9E+04
SVOC	Acenaphthylene	208-96-8	D	3.10E-06	1.1E-01	3.5E+04
SVOC	Acetophenone	98-86-2	D	2.82E-05	3.5E-01	1.3E+04
SVOC	Anthracene	120-12-7	D	4.50E-07		
SVOC	Atrazine	1912-24-9	C	8.55E-09	1.2E-01	1.5E+07
SVOC	Benzaldehyde	100-52-7		6.91E-05	3.5E-01	5.3E+03

Attachment G10: Risk-Based Noncancer Criteria for Resident Exposure to Soil Vapor Intrusion (Residential Slab on Grade Building)
GMC: NAO Flint Operations Site, Flint, Michigan

				Vapor Inhalation		
Chem Group	**Chemical**	**CASRN**	**Carc Class**	**C_{air} (mg/m^3)**	**RfC (mg/m^3)**	**RBC (mg/kg)**
SVOC	Benzo(a)anthracene	56-55-3	B2	1.73E-09		
SVOC	Benzo(a)pyrene	50-32-8	B2	2.32E-10		
SVOC	Benzo(b)fluoranthene	205-99-2	B2	1.82E-08		
SVOC	Benzo(g,h,i)perylene	191-24-2	D	2.29E-12	1.1E-01	4.8E+10
SVOC	Benzo(k)fluoranthene	207-08-9	B2	1.38E-10		
SVOC	Biphenyl	92-52-4	D	5.86E-06	1.8E-01	3.1E+04
SVOC	bis(2-Chloroethoxy)methane	111-91-1	D	5.90E-07		
SVOC	bis(2-Chloroethyl) ether	111-44-4	B2	6.41E-05		
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2	1.42E-12	7.0E-02	5.1E+10
SVOC	Butylbenzylphthalate	85-68-7	C	4.54E-09	7.0E-01	1.6E+08
SVOC	Caprolactam	105-60-2		1.01E-07	1.8E+00	1.8E+07
SVOC	Carbazole	86-74-8	B2	1.43E-09		
SVOC	4-Chloro-3-methylphenol	59-50-7		7.17E-08		
SVOC	2-Chloronaphthalene	91-58-7		5.75E-06	2.8E-01	5.1E+04
SVOC	2-Chlorophenol	95-57-8		1.87E-04	1.8E-02	9.7E+01
SVOC	Chrysene	218-01-9	B2	4.82E-08		
SVOC	Dibenz(a,h)anthracene	53-70-3	B2	1.09E-12		
SVOC	Dibenzofuran	132-64-9	D	1.24E-07	7.0E-03	5.9E+04
SVOC	2,4-Dichlorophenol	120-83-2		3.46E-06	1.1E-02	3.2E+03
SVOC	Diethylphthalate	84-66-2	D	2.85E-07	2.8E+00	1.0E+07
SVOC	2,4-Dimethylphenol	105-67-9		1.65E-06	7.0E-02	4.4E+04
SVOC	Dimethylphthalate	131-11-3	D	1.96E-07		
SVOC	Di-n-butylphthalate	84-74-2	D	1.00E-10		
SVOC	4,6-Dinitro-2-methylphenol	534-52-1		5.41E-07	3.5E-04	6.8E+02
SVOC	2,4-Dinitrotoluene	121-14-2	B2	1.43E-07		
SVOC	2,6-Dinitrotoluene	606-20-2	B2	1.39E-06	3.5E-03	2.6E+03
SVOC	Di-n-octylphthalate	117-84-0		1.61E-10		
SVOC	Fluoranthene	206-44-0	D	3.06E-08	1.4E-01	4.8E+06
SVOC	Fluorene	86-73-7	D	9.50E-07	1.4E-01	1.5E+05
SVOC	Formaldehyde	50-00-0	B1			
SVOC	Hexachlorobutadiene	87-68-3	C	3.15E-05		
SVOC	Hexachlorocyclopentadiene	77-47-4	E	2.74E-05	2.0E-04	7.6E+00
SVOC	Hexachloroethane	67-72-1	C	3.59E-04		
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	B2	9.59E-11		
SVOC	Isophorone	78-59-1	C	1.54E-05		
SVOC	2-Methylnaphthalene	91-57-6	ID	1.70E-05	3.0E-03	1.8E+02
SVOC	Methylphenol (total)	1319-77-3		1.41E-06		
SVOC	Naphthalene	91-20-3	C	4.88E-05	3.0E-03	6.4E+01
SVOC	2-Nitroaniline	88-74-4		3.07E-07	2.0E-04	6.8E+02
SVOC	Nitrobenzene	98-95-3	D	4.65E-05	2.0E-03	4.5E+01
SVOC	2-Nitrophenol	88-75-5		1.95E-05		
SVOC	4-Nitrophenol	100-02-7		3.47E-08		
SVOC	N-Nitrosodiphenylamine	86-30-6	B2	7.74E-07		
SVOC	N-Nitroso-di-n-propylamine	621-64-7	B2	7.01E-06		
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	C	8.08E-05		
SVOC	Pentachlorophenol	87-86-5	B2	9.43E-09	1.1E-01	1.2E+07
SVOC	Phenanthrene	85-01-8	D	1.97E-07	1.1E-01	5.5E+05
SVOC	Phenol	108-95-2	ID	1.16E-06		
SVOC	Pyrene	129-00-0	D	2.14E-08	1.1E-01	5.1E+06

Attachment G10: Risk-Based Noncancer Criteria for Resident Exposure to Soil Vapor Intrusion (Residential Slab on Grade Building)
GMC: NAO Flint Operations Site, Flint, Michigan

				Vapor Inhalation		
Chem Group	**Chemical**	**CASRN**	**Carc Class**	**C_{air}** (mg/m^3)	**RfC** (mg/m^3)	**RBC** (mg/kg)
SVOC	2,4,5-Trichlorophenol	95-95-4		5.46E-07		
SVOC	2,4,6-Trichlorophenol	88-06-2	B2	3.78E-06		
PCB	PCBs (total)	1336-36-3	B2	1.65E-07		
INORG	Antimony	7440-36-0			1.4E-03	
INORG	Arsenic	7440-38-2	A			
INORG	Barium	7440-39-3	D			
INORG	Beryllium	7440-41-7	B1		2.0E-05	
INORG	Cadmium	7440-43-9	B1		2.0E-04	
INORG	Chromium (total)	7440-47-3			1.0E-04	
INORG	Chromium III	16065-83-1	D		5.3E+00	
INORG	Chromium VI	18540-29-9	A		1.0E-04	
INORG	Cobalt	7440-48-4	B1		2.0E-05	
INORG	Copper	7440-50-8	D		1.4E-01	
INORG	Cyanide (total)	57-12-5	D		7.0E-02	
INORG	Fluoride	16984-48-8				
INORG	Lead	7439-92-1	B2			
INORG	Manganese	7439-96-5	D		5.0E-05	
INORG	Mercury	7439-97-6	D	2.91E-06	3.0E-04	1.1E+02
INORG	Nickel	7440-02-0	A			
INORG	Selenium	7782-49-2	D		1.8E-02	
INORG	Silver	7440-22-4	D		1.0E-05	
INORG	Thallium	7440-28-0			2.5E-04	
INORG	Vanadium	7440-62-2			2.5E-02	
INORG	Zinc	7440-66-6	D		1.1E+00	
Note:						
Target hazard quotient of 1						

Attachment G10: Vapor Intrusion into Residential Slab on Grade Building from Groundwater
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	D_{air} (m^2/d)	D_{water} (m^2/d)	H (unitless)	D_{crack} (m^2/d)	D_{eff}^T (m^2/d)	α_∞	C_{bldg} (L-water/m^3)
VOC	Acetone	67-64-1	1.07E+00	9.85E-05	7.95E-04	7.17E-02	3.12E-02	1.81E-05	1.44E-05
VOC	Benzene	71-43-2	7.60E-01	8.47E-05	1.14E-01	5.01E-02	1.52E-03	5.61E-06	6.39E-04
VOC	Bromodichloromethane	75-27-4	2.57E-01	9.16E-05	3.28E-02	1.70E-02	2.36E-03	7.57E-06	2.48E-04
VOC	2-Butanone	78-93-3	6.98E-01	8.47E-05	1.14E-03	4.67E-02	1.96E-02	1.70E-05	1.94E-05
VOC	Carbon Disulfide	75-15-0	8.99E-01	8.64E-05	6.20E-01	5.92E-02	4.68E-04	2.13E-06	1.32E-03
VOC	Carbon Tetrachloride	56-23-5	6.74E-01	7.60E-05	6.25E-01	4.44E-02	3.94E-04	1.82E-06	1.14E-03
VOC	Chlorobenzene	108-90-7	6.31E-01	7.52E-05	7.60E-02	4.16E-02	1.74E-03	6.18E-06	4.70E-04
VOC	Chloroethane	75-00-3	2.34E+00	9.94E-05	1.80E-01	1.54E-01	1.67E-03	6.00E-06	1.08E-03
VOC	Chloroform	67-66-3	8.99E-01	8.64E-05	7.50E-02	5.92E-02	2.17E-03	7.16E-06	5.37E-04
VOC	Chloromethane	74-87-3	1.09E+00	5.62E-05	1.80E-01	7.17E-02	8.98E-04	3.73E-06	6.73E-04
VOC	Cumene	98-82-8	5.62E-01	6.13E-05	2.66E-01	3.70E-02	6.04E-04	2.67E-06	7.10E-04
VOC	Cyclohexane	110-82-7	7.25E-01	7.86E-05	3.98E+00	4.78E-02	9.88E-05	4.91E-07	1.96E-03
VOC	Dibromochloromethane	124-48-1	1.69E-01	9.07E-05	1.61E-02	1.12E-02	2.80E-03	8.39E-06	1.35E-04
VOC	1,2-Dichlorobenzene	95-50-1	5.96E-01	6.83E-05	3.90E-02	3.93E-02	2.49E-03	7.83E-06	3.05E-04
VOC	1,3-Dichlorobenzene	541-73-1	5.98E-01	6.79E-05	6.33E-02	3.94E-02	1.81E-03	6.34E-06	4.02E-04
VOC	1,4-Dichlorobenzene	106-46-7	5.96E-01	6.83E-05	4.98E-02	3.93E-02	2.13E-03	7.07E-06	3.52E-04
VOC	Dichlorodifluoromethane	75-71-8	6.91E-01	6.91E-05	7.01E+00	4.55E-02	5.68E-05	2.85E-07	2.00E-03
VOC	1,1-Dichloroethane	75-34-3	6.41E-01	9.07E-05	1.15E-01	4.22E-02	1.50E-03	5.56E-06	6.40E-04
VOC	1,2-Dichloroethane	107-06-2	8.99E-01	8.55E-05	2.01E-02	5.92E-02	5.08E-03	1.14E-05	2.29E-04
VOC	1,1-Dichloroethene	75-35-4	7.78E-01	8.99E-05	5.35E-01	5.12E-02	5.20E-04	2.34E-06	1.25E-03
VOC	cis-1,2-Dichloroethene	156-59-2	6.36E-01	9.76E-05	8.35E-02	4.19E-02	1.96E-03	6.69E-06	5.59E-04
VOC	trans-1,2-Dichloroethene	156-60-5	6.11E-01	1.03E-04	1.93E-01	4.02E-02	1.13E-03	4.48E-06	8.63E-04
VOC	1,2-Dichloropropane	78-87-5	6.76E-01	7.54E-05	5.75E-02	4.45E-02	2.16E-03	7.14E-06	4.10E-04
VOC	Ethyl Benzene	100-41-4	6.48E-01	6.74E-05	1.62E-01	4.27E-02	9.64E-04	3.96E-06	6.39E-04
VOC	2-Hexanone	591-78-6			3.58E-02				
VOC	Methyl Acetate	79-20-9	8.27E-01	9.50E-05	1.85E-03	5.49E-02	1.83E-02	1.68E-05	3.11E-05
VOC	Methyl tert-butyl ether	1634-04-4	7.42E-01	8.73E-05	1.20E-02	4.90E-02	6.44E-03	1.26E-05	1.51E-04
VOC	4-Methyl-2-pentanone	108-10-1	6.48E-01	6.74E-05	2.82E-03	4.29E-02	1.12E-02	1.51E-05	4.25E-05
VOC	Methylcyclohexane	108-87-2	6.35E-01	7.36E-05	8.78E+00	4.18E-02	4.91E-05	2.47E-07	2.16E-03
VOC	Methylene Chloride	75-09-2	8.73E-01	1.01E-04	4.49E-02	5.75E-02	3.36E-03	9.30E-06	4.18E-04
VOC	Styrene	100-42-5	6.13E-01	6.91E-05	5.65E-02	4.04E-02	1.99E-03	6.77E-06	3.83E-04
VOC	Tetrachloroethene	127-18-4	6.22E-01	7.08E-05	3.77E-01	4.10E-02	5.34E-04	2.40E-06	9.04E-04
VOC	Toluene	108-88-3	7.52E-01	7.43E-05	1.36E-01	4.95E-02	1.22E-03	4.76E-06	6.47E-04

Attachment G10: Vapor Intrusion into Residential Slab on Grade Building from Groundwater GMC: NAO Flint Operations Site, Flint, Michigan									
Chem Group	**Chemical**	**CASRN**	**D_{air}** (m^2/d)	**D_{water}** (m^2/d)	**H** (unitless)	**D_{crack}** (m^2/d)	**D_{eff}^T** (m^2/d)	**α_∞**	**C_{bldg}** (L-water/m^3)
VOC	1,2,4-Trichlorobenzene	120-82-1	2.59E-01	7.11E-05	2.91E-02	1.71E-02	2.20E-03	7.23E-06	2.10E-04
VOC	1,1,1-Trichloroethane	71-55-6	6.74E-01	7.60E-05	3.53E-01	4.44E-02	6.04E-04	2.67E-06	9.41E-04
VOC	1,1,2-Trichloroethane	79-00-5	6.74E-01	7.60E-05	1.87E-02	4.44E-02	4.40E-03	1.07E-05	2.00E-04
VOC	Trichloroethene	79-01-6	6.83E-01	7.86E-05	2.11E-01	4.50E-02	9.02E-04	3.75E-06	7.91E-04
VOC	Trichlorofluoromethane	75-69-4	7.52E-01	8.38E-05	1.98E+00	4.95E-02	1.80E-04	8.78E-07	1.74E-03
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	6.74E-01	7.08E-05	9.83E+00	4.44E-02	4.41E-05	2.22E-07	2.18E-03
VOC	1,2,4-Trimethylbenzene	95-63-6	5.24E-01	6.84E-05	1.26E-01	3.45E-02	1.09E-03	4.36E-06	5.49E-04
VOC	1,3,5-Trimethylbenzene	108-67-8	5.20E-01	7.49E-05	1.20E-01	3.43E-02	1.20E-03	4.69E-06	5.64E-04
VOC	Vinyl Chloride	75-01-4	9.16E-01	1.06E-04	5.55E-01	6.03E-02	5.98E-04	2.65E-06	1.47E-03
VOC	Xylenes (total)	1330-20-7	6.74E-01	7.56E-05	1.38E-01	4.44E-02	1.18E-03	4.65E-06	6.41E-04
SVOC	Acenaphthene	83-32-9	3.64E-01	6.64E-05	3.18E-03	2.42E-02	7.77E-03	1.35E-05	4.28E-05
SVOC	Acenaphthylene	208-96-8	3.88E-01	6.03E-05	2.31E-03	2.58E-02	8.90E-03	1.41E-05	3.25E-05
SVOC	Acetophenone	98-86-2	6.91E-01	6.91E-05	2.19E-04	4.84E-02	3.61E-02	1.84E-05	4.02E-06
SVOC	Anthracene	120-12-7	2.80E-01	6.69E-05	1.34E-03	1.89E-02	9.82E-03	1.45E-05	1.94E-05
SVOC	Atrazine	1912-24-9	2.24E-01	5.76E-05	1.25E-07	4.20E+00	1.07E+01	5.62E-05	7.02E-09
SVOC	Benzaldehyde	100-52-7	6.23E-01	7.84E-05	4.86E-04	4.25E-02	2.55E-02	1.77E-05	8.59E-06
SVOC	Benzo(a)anthracene	56-55-3	4.41E-01	7.78E-05	6.85E-05	3.93E-02	5.37E-02	1.90E-05	1.30E-06
SVOC	Benzo(a)pyrene	50-32-8	3.72E-01	7.78E-05	2.32E-05	5.49E-02	1.05E-01	1.97E-05	4.56E-07
SVOC	Benzo(b)fluoranthene	205-99-2	1.95E-01	4.80E-05	2.28E-03	1.31E-02	5.53E-03	1.18E-05	2.69E-05
SVOC	Benzo(g,h,i)perylene	191-24-2	1.88E-01	4.54E-05	2.88E-06	1.55E-01	3.80E-01	2.02E-05	5.83E-08
SVOC	Benzo(k)fluoranthene	207-08-9	1.95E-01	4.80E-05	1.70E-05	3.85E-02	8.03E-02	1.95E-05	3.31E-07
SVOC	Biphenyl	92-52-4	3.49E-01	7.04E-05	6.13E-03	2.31E-02	5.73E-03	1.20E-05	7.36E-05
SVOC	bis(2-Chloroethoxy)methane	111-91-1	3.77E-01	7.31E-05	3.47E-06	2.16E-01	5.17E-01	2.03E-05	7.05E-08
SVOC	bis(2-Chloroethyl) ether	111-44-4	5.98E-01	6.51E-05	3.69E-04	4.10E-02	2.59E-02	1.77E-05	6.53E-06
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	3.03E-01	3.16E-05	2.09E-06	1.57E-01	3.74E-01	2.02E-05	4.23E-08
SVOC	Butylbenzylphthalate	85-68-7	1.50E-01	4.17E-05	2.59E-05	2.45E-02	4.86E-02	1.89E-05	4.88E-07
SVOC	Caprolactam	105-60-2	5.98E-01	7.77E-05	1.03E-07	6.88E+00	1.75E+01	8.48E-05	8.73E-09
SVOC	Carbazole	86-74-8	3.37E-01	6.07E-05	3.13E-07	1.78E+00	4.51E+00	3.12E-05	9.76E-09
SVOC	4-Chloro-3-methylphenol	59-50-7	5.24E-01	8.22E-05	8.15E-06	1.26E-01	2.74E-01	2.01E-05	1.64E-07
SVOC	2-Chloronaphthalene	91-58-7	4.25E-01	7.59E-05	6.42E-03	2.81E-02	6.42E-03	1.26E-05	8.07E-05
SVOC	2-Chlorophenol	95-57-8	4.33E-01	8.17E-05	8.00E-03	2.86E-02	6.02E-03	1.23E-05	9.81E-05
SVOC	Chrysene	218-01-9	2.14E-01	5.37E-05	1.94E-03	1.44E-02	6.54E-03	1.27E-05	2.46E-05
SVOC	Dibenz(a,h)anthracene	53-70-3	1.75E-01	4.48E-05	3.02E-07	1.36E+00	3.44E+00	2.71E-05	8.18E-09

Attachment G10: Vapor Intrusion into Residential Slab on Grade Building from Groundwater GMC: NAO Flint Operations Site, Flint, Michigan									
Chem Group	**Chemical**	**CASRN**	**D_{air}** (m^2/d)	**D_{water}** (m^2/d)	**H** (unitless)	**D_{crack}** (m^2/d)	**D_{eff}^T** (m^2/d)	**α_∞**	**C_{bldg}** (L-water/m^3)
SVOC	Dibenzofuran	132-64-9	2.06E-01	5.18E-05	2.57E-04	1.54E-02	1.51E-02	1.62E-05	4.16E-06
SVOC	2,4-Dichlorophenol	120-83-2	2.99E-01	7.58E-05	6.50E-05	3.03E-02	4.69E-02	1.88E-05	1.22E-06
SVOC	Diethylphthalate	84-66-2	2.21E-01	5.49E-05	9.25E-06	6.84E-02	1.55E-01	1.99E-05	1.84E-07
SVOC	2,4-Dimethylphenol	105-67-9	5.05E-01	7.51E-05	4.10E-05	4.99E-02	7.56E-02	1.94E-05	7.96E-07
SVOC	Dimethylphthalate	131-11-3	4.91E-01	5.43E-05	2.15E-06	2.62E-01	6.25E-01	2.03E-05	4.36E-08
SVOC	Di-n-butylphthalate	84-74-2	3.78E-01	6.79E-05	1.93E-08	3.20E+01	8.16E+01	3.55E-04	6.84E-09
SVOC	4,6-Dinitro-2-methylphenol	534-52-1	2.38E-01	5.97E-05	8.73E-06	7.78E-02	1.77E-01	2.00E-05	1.74E-07
SVOC	2,4-Dinitrotoluene	121-14-2	1.75E+00	6.10E-05	1.90E-06	4.07E-01	8.78E-01	2.05E-05	3.90E-08
SVOC	2,6-Dinitrotoluene	606-20-2	2.83E-01	6.27E-05	1.53E-05	5.58E-02	1.16E-01	1.98E-05	3.02E-07
SVOC	Di-n-octylphthalate	117-84-0	1.30E-01	3.09E-05	1.37E-03	8.80E-03	4.51E-03	1.08E-05	1.48E-05
SVOC	Fluoranthene	206-44-0	2.61E-01	5.49E-05	3.30E-04	1.87E-02	1.58E-02	1.63E-05	5.38E-06
SVOC	Fluorene	86-73-7	3.14E-01	6.81E-05	1.31E-03	2.11E-02	1.07E-02	1.48E-05	1.94E-05
SVOC	Formaldehyde	50-00-0	1.56E+00	1.73E-04	6.95E-06	3.28E-01	6.95E-01	2.04E-05	1.42E-07
SVOC	Hexachlorobutadiene	87-68-3	4.85E-01	5.32E-05	1.67E-01	3.19E-02	7.32E-04	3.15E-06	5.26E-04
SVOC	Hexachlorocyclopentadiene	77-47-4	1.39E-01	6.23E-05	5.55E-01	9.16E-03	2.43E-04	1.17E-06	6.47E-04
SVOC	Hexachloroethane	67-72-1	2.16E-02	5.88E-05	7.95E-02	1.43E-03	3.61E-04	1.69E-06	1.34E-04
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	1.64E-01	4.89E-05	3.28E-05	2.43E-02	4.66E-02	1.88E-05	6.17E-07
SVOC	Isophorone	78-59-1	5.38E-01	5.84E-05	1.36E-04	3.94E-02	3.60E-02	1.84E-05	2.50E-06
SVOC	2-Methylnaphthalene	91-57-6	4.18E-01	6.70E-05	1.06E-02	2.76E-02	4.61E-03	1.09E-05	1.16E-04
SVOC	Methylphenol (total)	1319-77-3	6.39E-01	8.64E-05	1.77E-05	8.65E-02	1.59E-01	1.99E-05	3.52E-07
SVOC	Naphthalene	91-20-3	5.10E-01	6.48E-05	9.90E-03	3.36E-02	5.14E-03	1.15E-05	1.14E-04
SVOC	2-Nitroaniline	88-74-4	6.31E-01	6.91E-05	3.27E-06	2.34E-01	5.39E-01	2.03E-05	6.63E-08
SVOC	Nitrobenzene	98-95-3	6.57E-01	7.43E-05	4.92E-04	4.46E-02	2.56E-02	1.77E-05	8.69E-06
SVOC	2-Nitrophenol	88-75-5	4.66E-01	6.78E-05	1.94E-04	3.39E-02	3.03E-02	1.81E-05	3.49E-06
SVOC	4-Nitrophenol	100-02-7	5.40E-01	8.30E-05	8.48E-09	8.89E+01	2.26E+02	9.66E-04	8.20E-09
SVOC	N-Nitrosodiphenylamine	86-30-6	2.70E-01	5.49E-05	1.03E-04	2.26E-02	2.84E-02	1.79E-05	1.84E-06
SVOC	N-Nitroso-di-n-propylamine	621-64-7	4.71E-01	7.06E-05	4.62E-05	4.49E-02	6.59E-02	1.93E-05	8.89E-07
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	5.20E-01	5.54E-05	2.39E-03	3.45E-02	9.87E-03	1.45E-05	3.47E-05
SVOC	Pentachlorophenol	87-86-5	4.84E-01	5.27E-05	5.00E-07	9.88E-01	2.48E+00	2.39E-05	1.20E-08
SVOC	Phenanthrene	85-01-8	3.24E-01	6.45E-05	4.76E-04	2.26E-02	1.63E-02	1.64E-05	7.81E-06
SVOC	Phenol	108-95-2	7.08E-01	7.86E-05	8.15E-06	1.34E-01	2.77E-01	2.02E-05	1.64E-07
SVOC	Pyrene	129-00-0	2.35E-01	6.26E-05	2.26E-04	1.80E-02	1.89E-02	1.69E-05	3.80E-06
SVOC	2,4,5-Trichlorophenol	95-95-4	2.51E-01	6.07E-05	8.90E-05	2.28E-02	3.16E-02	1.81E-05	1.61E-06

Attachment G10: Vapor Intrusion into Residential Slab on Grade Building from Groundwater
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	D_{air} (m^2/d)	D_{water} (m^2/d)	H (unitless)	D_{crack} (m^2/d)	D_{eff}^T (m^2/d)	α_∞	C_{bldg} (L-water/m^3)
SVOC	2,4,6-Trichlorophenol	88-06-2	2.75E-01	5.40E-05	1.60E-04	2.12E-02	2.26E-02	1.74E-05	2.77E-06
PCB	PCBs (total)	1336-36-3	1.75E-01	4.32E-05	4.09E-02	1.15E-02	1.14E-03	4.53E-06	1.85E-04
INORG	Antimony	7440-36-0							
INORG	Arsenic	7440-38-2							
INORG	Barium	7440-39-3							
INORG	Beryllium	7440-41-7							
INORG	Cadmium	7440-43-9							
INORG	Chromium (total)	7440-47-3							
INORG	Chromium III	16065-83-1							
INORG	Chromium VI	18540-29-9							
INORG	Cobalt	7440-48-4							
INORG	Copper	7440-50-8							
INORG	Cyanide (total)	57-12-5							
INORG	Fluoride	16984-48-8							
INORG	Lead	7439-92-1							
INORG	Manganese	7439-96-5							
INORG	Mercury	7439-97-6	2.65E-01	5.44E-05	1.45E-01	1.75E-02	6.84E-04	2.97E-06	4.31E-04
INORG	Nickel	7440-02-0							
INORG	Selenium	7782-49-2							
INORG	Silver	7440-22-4							
INORG	Thallium	7440-28-0							
INORG	Vanadium	7440-62-2							
INORG	Zinc	7440-66-6							
Notes:	**Crack Soil and Building Characteristics**								
	SCS Soil texture class	Loamy Sand							
	Bulk density	kg/L	ρ_b	1.62					
	Total porosity	L/L-soil	θ	0.390					
	Water-filled porosity	L/L-soil	θ_w	0.139					
	Air-filled porosity	L/L-soil	θ_a	0.251					
	Residual saturation	L/L-soil	θ_r	0.049					

Attachment G10: Vapor Intrusion into Residential Slab on Grade Building from Groundwater GMC: NAO Flint Operations Site, Flint, Michigan									
Chem Group	**Chemical**	**CASRN**	**D_{air}** (m^2/d)	**D_{water}** (m^2/d)	**H** (unitless)	**D_{crack}** (m^2/d)	**D_{eff}^T** (m^2/d)	**α_∞**	**C_{bldg}** (L-water/m^3)
	Hydraulic conductivity	cm/s	**K**	1.2E-03					
	Dynamic viscosity of water	g/cm-s	**μ**	0.01307					
	Density of water	g/cm^3	**ρ_w**	1.0					
	Gravitational acceleration	cm/s^2	**g**	980.7					
	Intrinsic permeability	cm^2	**k**	1.6E-08					
	Relative saturation	unitless	**S_e**	0.263					
	van Genuchten N	unitless	**N**	1.746					
	van Genuchten M	unitless	**M**	0.427					
	Relative air permeability	unitless	**k_{rg}**	0.826					
	Permeability to vapor	cm^2	**k_v**	1.3E-08					
	Distance from building foundation to source	m	**L_T**	1.68					
	Bldg foundation thickness	m	**L_{crack}**	0.15					
	Bldg foundation length	m		10.56					
	Bldg foundation width	m		10.56					
	Bldg occupied height	m		4.88					
	Bldg occupied volume	m^3		544.19					
	Occupied depth below ground	m		0.0					
	Bldg area for vapor intrusion	m^2	**A_B**	111.5					
	Ratio of A_{crack} to A_B		**η**	2E-04					
	Area of cracks	m^2	**A_{crack}**	2.11E-02					
	Air exchange rate	$hour^{-1}$	**ac/h**	1.0					
	Building ventilation rate	m^3/d	**Q_{bldg}**	1.31E+04					
	Pressure difference between outdoors-indoors	kg/m-s^2	**ΔP**	1.0					
	Air viscosity	kg/m-s	**μ**	1.8E-05					
	Crack length (bldg perimeter)	m	**X_{crack}**	42.24					
	Crack depth below ground	m	**Z_{crack}**	0.15					
	Crack radius	m	**r_{crack}**	5E-04					
	Soil gas flow rate into bldg	m^3/d	**Q_{soil}**	2.67E-01					

Attachment G10: Risk-Based Cancer Criteria for Resident Exposure to Groundwater Vapor Intrusion (Residential Slab on Grade Building)
GMC: NAO Flint Operations Site, Flint, Michigan

				Vapor Inhalation		
Chem Group	**Chemical**	**CASRN**	**Carc Class**	**C_{air}** (mg/m^3)	**URF** (m^3/mg)	**RBC** (mg/l)
VOC	Acetone	67-64-1	ID	1.44E-05		
VOC	Benzene	71-43-2	A	6.39E-04	7.8E-03	4.9E+00
VOC	Bromodichloromethane	75-27-4	B2	2.48E-04	1.8E-02	5.5E+00
VOC	2-Butanone	78-93-3	ID	1.94E-05		
VOC	Carbon Disulfide	75-15-0		1.32E-03		
VOC	Carbon Tetrachloride	56-23-5	B2	1.14E-03	1.5E-02	1.4E+00
VOC	Chlorobenzene	108-90-7	D	4.70E-04		
VOC	Chloroethane	75-00-3		1.08E-03		
VOC	Chloroform	67-66-3	B2	5.37E-04	2.3E-02	2.0E+00
VOC	Chloromethane	74-87-3	D	6.73E-04		
VOC	Cumene	98-82-8	D	7.10E-04		
VOC	Cyclohexane	110-82-7	ID	1.96E-03		
VOC	Dibromochloromethane	124-48-1	C	1.35E-04	2.4E-02	7.5E+00
VOC	1,2-Dichlorobenzene	95-50-1	D	3.05E-04		
VOC	1,3-Dichlorobenzene	541-73-1	D	4.02E-04		
VOC	1,4-Dichlorobenzene	106-46-7	C	3.52E-04	6.3E-03	1.1E+01
VOC	Dichlorodifluoromethane	75-71-8		2.00E-03		
VOC	1,1-Dichloroethane	75-34-3	C	6.40E-04		
VOC	1,2-Dichloroethane	107-06-2	B2	2.29E-04	2.6E-02	4.1E+00
VOC	1,1-Dichloroethene	75-35-4	C	1.25E-03		
VOC	cis-1,2-Dichloroethene	156-59-2	D	5.59E-04		
VOC	trans-1,2-Dichloroethene	156-60-5		8.63E-04		
VOC	1,2-Dichloropropane	78-87-5	B2	4.10E-04		
VOC	Ethyl Benzene	100-41-4	D	6.39E-04		
VOC	2-Hexanone	591-78-6				
VOC	Methyl Acetate	79-20-9		3.11E-05		
VOC	Methyl tert-butyl ether	1634-04-4		1.51E-04		
VOC	4-Methyl-2-pentanone	108-10-1	ID	4.25E-05		
VOC	Methylcyclohexane	108-87-2		2.16E-03		
VOC	Methylene Chloride	75-09-2	B2	4.18E-04	4.7E-04	1.2E+02
VOC	Styrene	100-42-5		3.83E-04		
VOC	Tetrachloroethene	127-18-4	C-B2	9.04E-04	3.1E-03	8.8E+00
VOC	Toluene	108-88-3	D	6.47E-04		
VOC	1,2,4-Trichlorobenzene	120-82-1	D	2.10E-04		
VOC	1,1,1-Trichloroethane	71-55-6	D	9.41E-04		
VOC	1,1,2-Trichloroethane	79-00-5	C	2.00E-04	1.6E-02	7.6E+00
VOC	Trichloroethene	79-01-6	C-B2	7.91E-04	1.7E-03	1.8E+01
VOC	Trichlorofluoromethane	75-69-4		1.74E-03		
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		2.18E-03		
VOC	1,2,4-Trimethylbenzene	95-63-6	ID	5.49E-04		
VOC	1,3,5-Trimethylbenzene	108-67-8	ID	5.64E-04		
VOC	Vinyl Chloride	75-01-4	A	1.47E-03	8.8E-03	1.9E+00
VOC	Xylenes (total)	1330-20-7	ID	6.41E-04		
SVOC	Acenaphthene	83-32-9		4.28E-05		
SVOC	Acenaphthylene	208-96-8	D	3.25E-05		
SVOC	Acetophenone	98-86-2	D	4.02E-06		
SVOC	Anthracene	120-12-7	D	1.94E-05		
SVOC	Atrazine	1912-24-9	C	7.02E-09	6.3E-02	5.5E+04

Attachment G10: Risk-Based Cancer Criteria for Resident Exposure to Groundwater Vapor Intrusion (Residential Slab on Grade Building)
GMC: NAO Flint Operations Site, Flint, Michigan

				Vapor Inhalation		
Chem Group	**Chemical**	**CASRN**	**Carc Class**	**C_{air}** (mg/m^3)	**URF** (m^3/mg)	**RBC** (mg/l)
SVOC	Benzaldehyde	100-52-7		8.59E-06		
SVOC	Benzo(a)anthracene	56-55-3	B2	1.30E-06	8.9E-02	2.1E+02
SVOC	Benzo(a)pyrene	50-32-8	B2	4.56E-07	8.9E-01	6.0E+01
SVOC	Benzo(b)fluoranthene	205-99-2	B2	2.69E-05	8.9E-02	1.0E+01
SVOC	Benzo(g,h,i)perylene	191-24-2	D	5.83E-08		
SVOC	Benzo(k)fluoranthene	207-08-9	B2	3.31E-07	8.9E-03	8.3E+03
SVOC	Biphenyl	92-52-4	D	7.36E-05		
SVOC	bis(2-Chloroethoxy)methane	111-91-1	D	7.05E-08		
SVOC	bis(2-Chloroethyl) ether	111-44-4	B2	6.53E-06	3.3E-01	1.1E+01
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2	4.23E-08	4.0E-03	1.4E+05
SVOC	Butylbenzylphthalate	85-68-7	C	4.88E-07	5.4E-04	9.2E+04
SVOC	Caprolactam	105-60-2		8.73E-09		
SVOC	Carbazole	86-74-8	B2	9.76E-09	5.7E-03	4.4E+05
SVOC	4-Chloro-3-methylphenol	59-50-7		1.64E-07		
SVOC	2-Chloronaphthalene	91-58-7		8.07E-05		
SVOC	2-Chlorophenol	95-57-8		9.81E-05		
SVOC	Chrysene	218-01-9	B2	2.46E-05	8.9E-04	1.1E+03
SVOC	Dibenz(a,h)anthracene	53-70-3	B2	8.18E-09	8.9E-01	3.4E+03
SVOC	Dibenzofuran	132-64-9	D	4.16E-06		
SVOC	2,4-Dichlorophenol	120-83-2		1.22E-06		
SVOC	Diethylphthalate	84-66-2	D	1.84E-07		
SVOC	2,4-Dimethylphenol	105-67-9		7.96E-07		
SVOC	Dimethylphthalate	131-11-3	D	4.36E-08		
SVOC	Di-n-butylphthalate	84-74-2	D	6.84E-09		
SVOC	4,6-Dinitro-2-methylphenol	534-52-1		1.74E-07		
SVOC	2,4-Dinitrotoluene	121-14-2	B2	3.90E-08		
SVOC	2,6-Dinitrotoluene	606-20-2	B2	3.02E-07	1.9E-01	4.1E+02
SVOC	Di-n-octylphthalate	117-84-0		1.48E-05		
SVOC	Fluoranthene	206-44-0	D	5.38E-06		
SVOC	Fluorene	86-73-7	D	1.94E-05		
SVOC	Formaldehyde	50-00-0	B1	1.42E-07	1.3E-02	1.3E+04
SVOC	Hexachlorobutadiene	87-68-3	C	5.26E-04	2.2E-02	2.1E+00
SVOC	Hexachlorocyclopentadiene	77-47-4	E	6.47E-04		
SVOC	Hexachloroethane	67-72-1	C	1.34E-04	4.0E-03	4.5E+01
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	B2	6.17E-07	8.9E-02	4.5E+02
SVOC	Isophorone	78-59-1	C	2.50E-06		
SVOC	2-Methylnaphthalene	91-57-6	ID	1.16E-04		
SVOC	Methylphenol (total)	1319-77-3		3.52E-07		
SVOC	Naphthalene	91-20-3	C	1.14E-04		
SVOC	2-Nitroaniline	88-74-4		6.63E-08		

Attachment G10: Risk-Based Cancer Criteria for Resident Exposure to Groundwater Vapor Intrusion (Residential Slab on Grade Building)
GMC: NAO Flint Operations Site, Flint, Michigan

				Vapor Inhalation		
Chem Group	**Chemical**	**CASRN**	**Carc Class**	**C_{air}** (mg/m^3)	**URF** (m^3/mg)	**RBC** (mg/l)
SVOC	Nitrobenzene	98-95-3	D	8.69E-06		
SVOC	2-Nitrophenol	88-75-5		3.49E-06		
SVOC	4-Nitrophenol	100-02-7		8.20E-09		
SVOC	N-Nitrosodiphenylamine	86-30-6	B2	1.84E-06		
SVOC	N-Nitroso-di-n-propylamine	621-64-7	B2	8.89E-07	2.0E+00	1.4E+01
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	C	3.47E-05	1.0E-02	7.0E+01
SVOC	Pentachlorophenol	87-86-5	B2	1.20E-08	3.4E-02	5.9E+04
SVOC	Phenanthrene	85-01-8	D	7.81E-06		
SVOC	Phenol	108-95-2	ID	1.64E-07		
SVOC	Pyrene	129-00-0	D	3.80E-06		
SVOC	2,4,5-Trichlorophenol	95-95-4		1.61E-06		
SVOC	2,4,6-Trichlorophenol	88-06-2	B2	2.77E-06	3.1E-03	2.8E+03
PCB	PCBs (total)	1336-36-3	B2	1.85E-04	5.7E-01	2.3E-01
INORG	Antimony	7440-36-0				
INORG	Arsenic	7440-38-2	A		4.3E+00	
INORG	Barium	7440-39-3	D			
INORG	Beryllium	7440-41-7	B1		2.4E+00	
INORG	Cadmium	7440-43-9	B1		1.8E+00	
INORG	Chromium (total)	7440-47-3			1.2E+01	
INORG	Chromium III	16065-83-1	D			
INORG	Chromium VI	18540-29-9	A		1.2E+01	
INORG	Cobalt	7440-48-4	B1		2.8E+00	
INORG	Copper	7440-50-8	D			
INORG	Cyanide (total)	57-12-5	D			
INORG	Fluoride	16984-48-8				
INORG	Lead	7439-92-1	B2			
INORG	Manganese	7439-96-5	D			
INORG	Mercury	7439-97-6	D	4.31E-04		
INORG	Nickel	7440-02-0	A		2.4E-01	
INORG	Selenium	7782-49-2	D			
INORG	Silver	7440-22-4	D			
INORG	Thallium	7440-28-0				
INORG	Vanadium	7440-62-2				
INORG	Zinc	7440-66-6	D			
Note:						
Target cancer risk of 1E-05						

Attachment G10: Risk-Based Noncancer Criteria for Resident Exposure to Groundwater Vapor Intrusion
(Residential Slab on Grade Building)
GMC: NAO Flint Operations Site, Flint, Michigan

				Vapor Inhalation		
Chem Group	**Chemical**	**CASRN**	**Carc Class**	**C_{air} (mg/m^3)**	**RfC (mg/m^3)**	**RBC (mg/l)**
VOC	Acetone	67-64-1	ID	1.44E-05	3.2E+00	2.3E+05
VOC	Benzene	71-43-2	A	6.39E-04	3.0E-02	4.9E+01
VOC	Bromodichloromethane	75-27-4	B2	2.48E-04	7.0E-02	2.9E+02
VOC	2-Butanone	78-93-3	ID	1.94E-05	5.0E+00	2.7E+05
VOC	Carbon Disulfide	75-15-0		1.32E-03	7.0E-01	5.5E+02
VOC	Carbon Tetrachloride	56-23-5	B2	1.14E-03		
VOC	Chlorobenzene	108-90-7	D	4.70E-04	6.0E-02	1.3E+02
VOC	Chloroethane	75-00-3		1.08E-03	1.0E+01	9.6E+03
VOC	Chloroform	67-66-3	B2	5.37E-04	5.0E-02	9.7E+01
VOC	Chloromethane	74-87-3	D	6.73E-04	9.0E-02	1.4E+02
VOC	Cumene	98-82-8	D	7.10E-04	4.0E-01	5.9E+02
VOC	Cyclohexane	110-82-7	ID	1.96E-03	6.0E+00	3.2E+03
VOC	Dibromochloromethane	124-48-1	C	1.35E-04	7.0E-02	5.4E+02
VOC	1,2-Dichlorobenzene	95-50-1	D	3.05E-04	2.0E-01	6.8E+02
VOC	1,3-Dichlorobenzene	541-73-1	D	4.02E-04	1.4E-01	3.6E+02
VOC	1,4-Dichlorobenzene	106-46-7	C	3.52E-04	8.0E-01	2.4E+03
VOC	Dichlorodifluoromethane	75-71-8		2.00E-03	2.0E-01	1.0E+02
VOC	1,1-Dichloroethane	75-34-3	C	6.40E-04	5.0E-01	8.2E+02
VOC	1,2-Dichloroethane	107-06-2	B2	2.29E-04	5.0E-03	2.3E+01
VOC	1,1-Dichloroethene	75-35-4	C	1.25E-03	2.0E-01	1.7E+02
VOC	cis-1,2-Dichloroethene	156-59-2	D	5.59E-04	3.5E-02	6.5E+01
VOC	trans-1,2-Dichloroethene	156-60-5		8.63E-04	6.0E-02	7.2E+01
VOC	1,2-Dichloropropane	78-87-5	B2	4.10E-04	4.0E-03	1.0E+01
VOC	Ethyl Benzene	100-41-4	D	6.39E-04	1.0E+00	1.6E+03
VOC	2-Hexanone	591-78-6			5.0E-03	
VOC	Methyl Acetate	79-20-9		3.11E-05	3.5E+00	1.2E+05
VOC	Methyl tert-butyl ether	1634-04-4		1.51E-04	3.0E+00	2.1E+04
VOC	4-Methyl-2-pentanone	108-10-1	ID	4.25E-05	3.0E+00	7.4E+04
VOC	Methylcyclohexane	108-87-2		2.16E-03	3.0E+00	1.4E+03
VOC	Methylene Chloride	75-09-2	B2	4.18E-04	3.0E+00	7.5E+03
VOC	Styrene	100-42-5		3.83E-04	1.0E+00	2.7E+03
VOC	Tetrachloroethene	127-18-4	C-B2	9.04E-04	4.0E-01	4.6E+02
VOC	Toluene	108-88-3	D	6.47E-04	5.0E+00	8.1E+03
VOC	1,2,4-Trichlorobenzene	120-82-1	D	2.10E-04	2.0E-01	9.9E+02
VOC	1,1,1-Trichloroethane	71-55-6	D	9.41E-04	2.2E+00	2.4E+03
VOC	1,1,2-Trichloroethane	79-00-5	C	2.00E-04		
VOC	Trichloroethene	79-01-6	C-B2	7.91E-04		
VOC	Trichlorofluoromethane	75-69-4		1.74E-03	7.0E-01	4.2E+02
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		2.18E-03	3.0E+01	1.4E+04
VOC	1,2,4-Trimethylbenzene	95-63-6	ID	5.49E-04	6.0E-03	1.1E+01
VOC	1,3,5-Trimethylbenzene	108-67-8	ID	5.64E-04	6.0E-03	1.1E+01
VOC	Vinyl Chloride	75-01-4	A	1.47E-03	1.0E-01	7.1E+01
VOC	Xylenes (total)	1330-20-7	ID	6.41E-04	1.0E-01	1.6E+02
SVOC	Acenaphthene	83-32-9		4.28E-05	2.1E-01	5.1E+03
SVOC	Acenaphthylene	208-96-8	D	3.25E-05	1.1E-01	3.4E+03
SVOC	Acetophenone	98-86-2	D	4.02E-06	3.5E-01	9.1E+04
SVOC	Anthracene	120-12-7	D	1.94E-05		

Attachment G10: Risk-Based Noncancer Criteria for Resident Exposure to Groundwater Vapor Intrusion
(Residential Slab on Grade Building)
GMC: NAO Flint Operations Site, Flint, Michigan

				Vapor Inhalation		
Chem Group	**Chemical**	**CASRN**	**Carc Class**	**C_{air} (mg/m^3)**	**RfC (mg/m^3)**	**RBC (mg/l)**
SVOC	Atrazine	1912-24-9	C	7.02E-09	1.2E-01	1.8E+07
SVOC	Benzaldehyde	100-52-7		8.59E-06	3.5E-01	4.2E+04
SVOC	Benzo(a)anthracene	56-55-3	B2	1.30E-06		
SVOC	Benzo(a)pyrene	50-32-8	B2	4.56E-07		
SVOC	Benzo(b)fluoranthene	205-99-2	B2	2.69E-05		
SVOC	Benzo(g,h,i)perylene	191-24-2	D	5.83E-08	1.1E-01	1.9E+06
SVOC	Benzo(k)fluoranthene	207-08-9	B2	3.31E-07		
SVOC	Biphenyl	92-52-4	D	7.36E-05	1.8E-01	2.5E+03
SVOC	bis(2-Chloroethoxy)methane	111-91-1	D	7.05E-08		
SVOC	bis(2-Chloroethyl) ether	111-44-4	B2	6.53E-06		
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2	4.23E-08	7.0E-02	1.7E+06
SVOC	Butylbenzylphthalate	85-68-7	C	4.88E-07	7.0E-01	1.5E+06
SVOC	Caprolactam	105-60-2		8.73E-09	1.8E+00	2.1E+08
SVOC	Carbazole	86-74-8	B2	9.76E-09		
SVOC	4-Chloro-3-methylphenol	59-50-7		1.64E-07		
SVOC	2-Chloronaphthalene	91-58-7		8.07E-05	2.8E-01	3.6E+03
SVOC	2-Chlorophenol	95-57-8		9.81E-05	1.8E-02	1.9E+02
SVOC	Chrysene	218-01-9	B2	2.46E-05		
SVOC	Dibenz(a,h)anthracene	53-70-3	B2	8.18E-09		
SVOC	Dibenzofuran	132-64-9	D	4.16E-06	7.0E-03	1.8E+03
SVOC	2,4-Dichlorophenol	120-83-2		1.22E-06	1.1E-02	8.9E+03
SVOC	Diethylphthalate	84-66-2	D	1.84E-07	2.8E+00	1.6E+07
SVOC	2,4-Dimethylphenol	105-67-9		7.96E-07	7.0E-02	9.2E+04
SVOC	Dimethylphthalate	131-11-3	D	4.36E-08		
SVOC	Di-n-butylphthalate	84-74-2	D	6.84E-09		
SVOC	4,6-Dinitro-2-methylphenol	534-52-1		1.74E-07	3.5E-04	2.1E+03
SVOC	2,4-Dinitrotoluene	121-14-2	B2	3.90E-08		
SVOC	2,6-Dinitrotoluene	606-20-2	B2	3.02E-07	3.5E-03	1.2E+04
SVOC	Di-n-octylphthalate	117-84-0		1.48E-05		
SVOC	Fluoranthene	206-44-0	D	5.38E-06	1.4E-01	2.7E+04
SVOC	Fluorene	86-73-7	D	1.94E-05	1.4E-01	7.5E+03
SVOC	Formaldehyde	50-00-0	B1	1.42E-07		
SVOC	Hexachlorobutadiene	87-68-3	C	5.26E-04		
SVOC	Hexachlorocyclopentadiene	77-47-4	E	6.47E-04	2.0E-04	3.2E-01
SVOC	Hexachloroethane	67-72-1	C	1.34E-04		
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	B2	6.17E-07		
SVOC	Isophorone	78-59-1	C	2.50E-06		
SVOC	2-Methylnaphthalene	91-57-6	ID	1.16E-04	3.0E-03	2.7E+01
SVOC	Methylphenol (total)	1319-77-3		3.52E-07		
SVOC	Naphthalene	91-20-3	C	1.14E-04	3.0E-03	2.8E+01
SVOC	2-Nitroaniline	88-74-4		6.63E-08	2.0E-04	3.1E+03
SVOC	Nitrobenzene	98-95-3	D	8.69E-06	2.0E-03	2.4E+02
SVOC	2-Nitrophenol	88-75-5		3.49E-06		
SVOC	4-Nitrophenol	100-02-7		8.20E-09		
SVOC	N-Nitrosodiphenylamine	86-30-6	B2	1.84E-06		
SVOC	N-Nitroso-di-n-propylamine	621-64-7	B2	8.89E-07		
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	C	3.47E-05		

Attachment G10: Risk-Based Noncancer Criteria for Resident Exposure to Groundwater Vapor Intrusion (Residential Slab on Grade Building) GMC: NAO Flint Operations Site, Flint, Michigan

				Vapor Inhalation		
Chem Group	**Chemical**	**CASRN**	**Carc Class**	**C_{air}** (mg/m^3)	**RfC** (mg/m^3)	**RBC** (mg/l)
SVOC	Pentachlorophenol	87-86-5	B2	1.20E-08	1.1E-01	9.2E+06
SVOC	Phenanthrene	85-01-8	D	7.81E-06	1.1E-01	1.4E+04
SVOC	Phenol	108-95-2	ID	1.64E-07		
SVOC	Pyrene	129-00-0	D	3.80E-06	1.1E-01	2.9E+04
SVOC	2,4,5-Trichlorophenol	95-95-4		1.61E-06		
SVOC	2,4,6-Trichlorophenol	88-06-2	B2	2.77E-06		
PCB	PCBs (total)	1336-36-3	B2	1.85E-04		
INORG	Antimony	7440-36-0			1.4E-03	
INORG	Arsenic	7440-38-2	A			
INORG	Barium	7440-39-3	D			
INORG	Beryllium	7440-41-7	B1		2.0E-05	
INORG	Cadmium	7440-43-9	B1		2.0E-04	
INORG	Chromium (total)	7440-47-3			1.0E-04	
INORG	Chromium III	16065-83-1	D		5.3E+00	
INORG	Chromium VI	18540-29-9	A		1.0E-04	
INORG	Cobalt	7440-48-4	B1		2.0E-05	
INORG	Copper	7440-50-8	D		1.4E-01	
INORG	Cyanide (total)	57-12-5	D		7.0E-02	
INORG	Fluoride	16984-48-8				
INORG	Lead	7439-92-1	B2			
INORG	Manganese	7439-96-5	D		5.0E-05	
INORG	Mercury	7439-97-6	D	4.31E-04	3.0E-04	7.3E-01
INORG	Nickel	7440-02-0	A			
INORG	Selenium	7782-49-2	D		1.8E-02	
INORG	Silver	7440-22-4	D		1.0E-05	
INORG	Thallium	7440-28-0			2.5E-04	
INORG	Vanadium	7440-62-2			2.5E-02	
INORG	Zinc	7440-66-6	D		1.1E+00	
Note:						
Target hazard quotient of 1						

Attachment G10: Vapor Intrusion into Residential Slab on Grade Building from NAPL at AOI 09-B
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	D_{air} (m^2/d)	D_{water} (m^2/d)	H (unitless)	D_{crack} (m^2/d)	D_{eff}^T (m^2/d)	α_∞
VOC	Acetone	67-64-1	2.30E+02	1.07E+00	7.95E-04	2.72E+01	2.71E+01	3.04E-04
VOC	Benzene	71-43-2	9.50E+01	7.60E-01	1.14E-01	8.75E+00	7.44E+00	1.06E-04
VOC	2-Butanone	78-93-3	9.53E+01	6.98E-01	1.14E-03	1.15E+01	1.16E+01	1.35E-04
VOC	Carbon Disulfide	75-15-0	3.59E+02	8.99E-01	6.20E-01	3.30E+01	2.80E+01	3.66E-04
VOC	Chloroethane	75-00-3	1.01E+03	2.34E+00	1.80E-01	9.26E+01	7.86E+01	1.01E-03
VOC	Chloromethane	74-87-3	4.30E+03	1.09E+00	1.80E-01	3.95E+02	3.35E+02	4.24E-03
VOC	Cumene	98-82-8	4.50E+00	5.62E-01	2.66E-01	4.23E-01	3.65E-01	2.20E-05
VOC	Cyclohexane	110-82-7	9.69E+01	7.25E-01	3.98E+00	8.90E+00	7.54E+00	1.07E-04
VOC	1,2-Dichlorobenzene	95-50-1	1.36E+00	5.96E-01	3.90E-02	1.94E-01	2.09E-01	2.17E-05
VOC	Dichlorodifluoromethane	75-71-8	4.85E+03	6.91E-01	7.01E+00	4.45E+02	3.77E+02	4.78E-03
VOC	1,1-Dichloroethane	75-34-3	2.27E+02	6.41E-01	1.15E-01	2.09E+01	1.77E+01	2.36E-04
VOC	cis-1,2-Dichloroethene	156-59-2	2.03E+02	6.36E-01	8.35E-02	1.87E+01	1.58E+01	2.12E-04
VOC	Ethyl Benzene	100-41-4	9.60E+00	6.48E-01	1.62E-01	9.00E-01	7.76E-01	2.44E-05
VOC	Methyl Acetate	79-20-9	2.16E+02	8.27E-01	1.85E-03	2.19E+01	2.00E+01	2.46E-04
VOC	4-Methyl-2-pentanone	108-10-1	1.99E+01	6.48E-01	2.82E-03	2.86E+00	3.09E+00	4.30E-05
VOC	Methylcyclohexane	108-87-2	4.30E+01	6.35E-01	8.78E+00	3.95E+00	3.35E+00	5.44E-05
VOC	Methylene Chloride	75-09-2	4.33E+02	8.73E-01	4.49E-02	3.99E+01	3.39E+01	4.40E-04
VOC	Tetrachloroethene	127-18-4	1.86E+01	6.22E-01	3.77E-01	1.71E+00	1.46E+00	3.15E-05
VOC	Toluene	108-88-3	2.84E+01	7.52E-01	1.36E-01	2.63E+00	2.25E+00	4.07E-05
VOC	1,2,4-Trichlorobenzene	120-82-1	4.31E-01	2.59E-01	2.91E-02	7.96E-02	9.24E-02	2.13E-05
VOC	1,1,1-Trichloroethane	71-55-6	1.24E+02	6.74E-01	3.53E-01	1.14E+01	9.65E+00	1.34E-04
VOC	1,1,2-Trichloroethane	79-00-5	2.33E+01	6.74E-01	1.87E-02	2.30E+00	2.06E+00	3.73E-05
VOC	Trichloroethene	79-01-6	7.35E+01	6.83E-01	2.11E-01	6.76E+00	5.74E+00	8.42E-05
VOC	Trichlorofluoromethane	75-69-4	8.03E+02	7.52E-01	1.98E+00	7.37E+01	6.25E+01	8.04E-04
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	3.32E+02	6.74E-01	9.83E+00	3.05E+01	2.58E+01	3.39E-04
VOC	Vinyl Chloride	75-01-4	2.98E+03	9.16E-01	5.55E-01	2.74E+02	2.32E+02	2.95E-03
VOC	Xylenes (total)	1330-20-7	7.99E+00	6.74E-01	1.38E-01	7.55E-01	6.57E-01	2.34E-05
SVOC	Acenaphthene	83-32-9	2.50E-03	3.64E-01	3.18E-03	5.15E-01	7.26E-01	2.23E-05
SVOC	Benzo(a)anthracene	56-55-3	1.05E-07	4.41E-01	6.85E-05	2.89E+01	4.08E+01	3.22E-04
SVOC	Benzo(a)pyrene	50-32-8	5.49E-09	3.72E-01	2.32E-05	7.22E+01	1.02E+02	7.87E-04
SVOC	Benzo(b)fluoranthene	205-99-2	5.00E-07	1.95E-01	2.28E-03	3.86E-01	5.45E-01	2.19E-05
SVOC	Benzo(k)fluoranthene	207-08-9	2.00E-09	1.95E-01	1.70E-05	5.16E+01	7.29E+01	5.67E-04
SVOC	Biphenyl	92-52-4	9.64E-03	3.49E-01	6.13E-03	2.57E-01	3.62E-01	2.18E-05
SVOC	bis(2-Chloroethoxy)methane	111-91-1	1.40E-04	3.77E-01	3.47E-06	4.87E+02	6.88E+02	5.23E-03
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	6.45E-06	3.03E-01	2.09E-06	6.52E+02	9.21E+02	6.99E-03
SVOC	Butylbenzylphthalate	85-68-7	8.25E-06	1.50E-01	2.59E-05	2.61E+01	3.69E+01	2.93E-04
SVOC	Chrysene	218-01-9	6.23E-09	2.14E-01	1.94E-03	4.97E-01	7.01E-01	2.22E-05
SVOC	2,4-Dinitrotoluene	121-14-2	1.47E-04	1.75E+00	1.90E-06	4.15E+03	5.86E+03	4.28E-02
SVOC	Di-n-octylphthalate	117-84-0	2.60E-06	1.30E-01	1.37E-03	4.28E-01	6.04E-01	2.20E-05
SVOC	Fluoranthene	206-44-0	7.80E-06	2.61E-01	3.30E-04	3.55E+00	5.02E+00	5.03E-05
SVOC	Fluorene	86-73-7	6.33E-04	3.14E-01	1.31E-03	1.08E+00	1.52E+00	2.58E-05
SVOC	2-Methylnaphthalene	91-57-6	5.50E-02	4.18E-01	1.06E-02	1.83E-01	2.55E-01	2.17E-05
SVOC	Naphthalene	91-20-3	8.50E-02	5.10E-01	9.90E-03	2.39E-01	3.34E-01	2.18E-05
SVOC	Phenanthrene	85-01-8	1.12E-04	3.24E-01	4.76E-04	3.06E+00	4.32E+00	4.51E-05
SVOC	Pyrene	129-00-0	4.59E-06	2.35E-01	2.26E-04	4.69E+00	6.61E+00	6.22E-05
PCB	PCBs (total)	1336-36-3	7.71E-05	1.75E-01	4.09E-02	1.92E-02	2.71E-02	1.98E-05
INORG	Antimony	7440-36-0						
INORG	Arsenic	7440-38-2						
INORG	Barium	7440-39-3						
INORG	Beryllium	7440-41-7						
INORG	Cadmium	7440-43-9						
INORG	Chromium (total)	7440-47-3						
INORG	Cobalt	7440-48-4						
INORG	Copper	7440-50-8						
INORG	Cyanide (total)	57-12-5						

Attachment G10: Vapor Intrusion into Residential Slab on Grade Building from NAPL at AOI 09-B
GMC: NAO Flint Operations Site, Flint, Michigan

Chem Group	Chemical	CASRN	D_{air} (m^2/d)	D_{water} (m^2/d)	H (unitless)	D_{crack} (m^2/d)	D_{eff}^T (m^2/d)	α_∞
INORG	Lead	7439-92-1						
INORG	Manganese	7439-96-5						
INORG	Mercury	7439-97-6	1.96E-03	2.65E-01	1.45E-01	8.40E-03	1.18E-02	1.76E-05
INORG	Nickel	7440-02-0						
INORG	Selenium	7782-49-2						
INORG	Silver	7440-22-4						
INORG	Thallium	7440-28-0						
INORG	Vanadium	7440-62-2						
INORG	Zinc	7440-66-6						
Notes:	**Crack Soil and Building Characteristics**							
	SCS Soil texture class		Loamy Sand					
	Bulk density	kg/L	ρ_b	1.62				
	Total porosity	L/L-soil	θ	0.390				
	Water-filled porosity	L/L-soil	θ_w	0.112				
	Air-filled porosity	L/L-soil	θ_a	0.278				
	Residual saturation	L/L-soil	θ_r	0.049				
	Hydraulic conductivity	cm/s	K	1.2E-03				
	Dynamic viscosity of water	g/cm-s	μ	0.01307				
	Density of water	g/cm^3	ρ_w	1.0				
	Gravitational acceleration	cm/s^2	g	980.7				
	Intrinsic permeability	cm^2	k	1.6E-08				
	Relative saturation	unitless	S_e	0.186				
	van Genuchten N	unitless	N	1.746				
	van Genuchten M	unitless	M	0.427				
	Relative air permeability	unitless	k_{rg}	0.887				
	Permeability to vapor	cm^2	k_v	1.4E-08				
	Distance from building foundation to source	m	L_T	1.15				
	Bldg foundation thickness	m	L_{crack}	0.15				
	Bldg foundation length	m		10.56				
	Bldg foundation width	m		10.56				
	Bldg occupied height	m		4.88				
	Bldg occupied volume	m^3		544.19				
	Occupied depth below ground	m		0.0				
	Bldg area for vapor intrusion	m^2	A_B	111.5				
	Ratio of A_{crack} to A_B		η	2E-04				
	Area of cracks	m^2	A_{crack}	2.11E-02				
	Air exchange rate	$hour^{-1}$	ac/h	1.0				
	Building ventilation rate	m^3/d	Q_{bldg}	1.31E+04				
	Pressure difference between outdoors indoors	$kg/m\text{-}s^2$	ΔP	1.0				
	Air viscosity	kg/m-s	μ	1.8E-05				
	Crack length (bldg perimeter)	m	X_{crack}	42.24				
	Crack depth below ground	m	Z_{crack}	0.15				
	Crack radius	m	r_{crack}	5E-04				
	Soil gas flow rate into bldg	m^3/d	Q_{soil}	2.87E-01				

Attachment G10: Risk Calculations for Residential Exposure to LNAPL via Vapor Intrusion at AOI 09-B
GMC: NAO Flint Operations Site, Flint, Michigan

								LNAPL Indoor Vapor Inhalation								
Chem Group	**Chemical**	**CASRN**	**Carc Class**	**C_{LNAPL}** (mg/kg)	**VP** (mmHg)	**v*** (mg/m^3)	**α_∞**	**$C_{indoor\ air}$** (mg/m^3)	**URF** (m^3/mg)	**Risk**		**RfC** (mg/m^3)	**HQ**		**Occupational Air Concentration Limit** (mg/m^3)	**Ratio**
VOC	Acetone	67-64-1	ID		2.30E+02		3.04E-04					3.2E+00			1.8E+03	
VOC	Benzene	71-43-2	A	9.30E+02	9.50E+01	1.48E+03	1.06E-04	1.56E-01	7.8E-03	5E-04		3.0E-02	5E+00		3.2E+00	5E-02
VOC	2-Butanone	78-93-3	ID		9.53E+01		1.35E-04					5.0E+00			5.9E+02	
VOC	Carbon Disulfide	75-15-0			3.59E+02		3.66E-04					7.0E-01			1.2E+01	
VOC	Chloroethane	75-00-3			1.01E+03		1.01E-03					1.0E+01			2.6E+03	
VOC	Chloromethane	74-87-3	D		4.30E+03		4.24E-03					9.0E-02			1.0E+02	
VOC	Cumene	98-82-8	D	7.90E+02	4.50E+00	5.94E+01	2.20E-05	1.31E-03				4.0E-01	3E-03		2.5E+02	5E-06
VOC	Cyclohexane	110-82-7	ID	1.00E+04	9.69E+01	1.62E+04	1.07E-04	1.73E+00				6.0E+00	3E-01		1.1E+03	2E-03
VOC	1,2-Dichlorobenzene	95-50-1	D		1.36E+00		2.17E-05					2.0E-01			1.5E+02	
VOC	Dichlorodifluoromethane	75-71-8			4.85E+03		4.78E-03					2.0E-01			5.0E+03	
VOC	1,1-Dichloroethane	75-34-3	C		2.27E+02		2.36E-04					5.0E-01			4.0E+02	
VOC	cis-1,2-Dichloroethene	156-59-2	D		2.03E+02		2.12E-04					3.5E-02			7.9E+02	
VOC	Ethyl Benzene	100-41-4	D	2.20E+03	9.60E+00	3.53E+02	2.44E-05	8.62E-03				1.0E+00	8E-03		4.4E+02	2E-05
VOC	Methyl Acetate	79-20-9			2.16E+02		2.46E-04					3.5E+00			6.1E+02	
VOC	4-Methyl-2-pentanone	108-10-1	ID		1.99E+01		4.30E-05					3.0E+00			4.1E+02	
VOC	Methylcyclohexane	108-87-2		2.60E+04	4.30E+01	1.87E+04	5.44E-05	1.02E+00				3.0E+00	3E-01		2.0E+03	5E-04
VOC	Methylene Chloride	75-09-2	B2		4.33E+02		4.40E-04		4.7E-04			3.0E+00			8.7E+01	
VOC	Tetrachloroethene	127-18-4	C-B2		1.86E+01		3.15E-05		3.1E-03			4.0E-01			1.7E+02	
VOC	Toluene	108-88-3	D	4.20E+03	2.84E+01	1.99E+03	4.07E-05	8.11E-02				5.0E+00	2E-02		3.8E+02	2E-04
VOC	1,2,4-Trichlorobenzene	120-82-1	D		4.31E-01		2.13E-05					2.0E-01				
VOC	1,1,1-Trichloroethane	71-55-6	D		1.24E+02		1.34E-04					2.2E+00			1.9E+03	
VOC	1,1,2-Trichloroethane	79-00-5	C		2.33E+01		3.73E-05		1.6E-02						4.5E+01	
VOC	Trichloroethene	79-01-6	C-B2		7.35E+01		8.42E-05		1.7E-03						2.7E+02	
VOC	Trichlorofluoromethane	75-69-4			8.03E+02		8.04E-04					7.0E-01			5.6E+03	
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1			3.32E+02		3.39E-04					3.0E+01			7.6E+03	
VOC	Vinyl Chloride	75-01-4	A		2.98E+03		2.95E-03		8.8E-03			1.0E-01			2.5E+00	
VOC	Xylenes (total)	1330-20-7	ID	1.02E+04	7.99E+00	1.36E+03	2.34E-05	3.19E-02				1.0E-01	3E-01		4.4E+02	7E-05
SVOC	Acenaphthene	83-32-9			2.50E-03		2.23E-05					2.1E-01				
SVOC	Benzo(a)anthracene	56-55-3	B2		1.05E-07		3.22E-04		8.9E-02							
SVOC	Benzo(a)pyrene	50-32-8	B2		5.49E-09		7.87E-04		8.9E-01							
SVOC	Benzo(b)fluoranthene	205-99-2	B2		5.00E-07		2.19E-05		8.9E-02							
SVOC	Benzo(k)fluoranthene	207-08-9	B2		2.00E-09		5.67E-04		8.9E-03							
SVOC	Biphenyl	92-52-4	D		9.64E-03		2.18E-05					1.8E-01			1.0E+00	
SVOC	bis(2-Chloroethoxy)methane	111-91-1	D		1.40E-04		5.23E-03									
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2		6.45E-06		6.99E-03		4.0E-03			7.0E-02			5.0E+00	
SVOC	Butylbenzylphthalate	85-68-7	C		8.25E-06		2.93E-04		5.4E-04			7.0E-01				
SVOC	Chrysene	218-01-9	B2		6.23E-09		2.22E-05		8.9E-04							
SVOC	2,4-Dinitrotoluene	121-14-2	B2		1.47E-04		4.28E-02									
SVOC	Di-n-octylphthalate	117-84-0			2.60E-06		2.20E-05									
SVOC	Fluoranthene	206-44-0	D		7.80E-06		5.03E-05					1.4E-01				
SVOC	Fluorene	86-73-7	D		6.33E-04		2.58E-05					1.4E-01				
SVOC	2-Methylnaphthalene	91-57-6	ID	5.60E+02	5.50E-02	5.15E-01	2.17E-05	1.12E-05				3.0E-03	4E-03			

Attachment G10: Risk Calculations for Residential Exposure to LNAPL via Vapor Intrusion at AOI 09-B
GMC: NAO Flint Operations Site, Flint, Michigan

								LNAPL Indoor Vapor Inhalation								
Chem Group	**Chemical**	**CASRN**	**Carc Class**	**C_{LNAPL}** (mg/kg)	**VP** (mmHg)	**v*** (mg/m^3)	**α_∞**	**$C_{indoor\ air}$** (mg/m^3)	**URF** (m^3/mg)	**Risk**		**RfC** (mg/m^3)	**HQ**		**Occupational Air Concentration Limit** (mg/m^3)	**Ratio**
SVOC	Naphthalene	91-20-3	C	8.30E+02	8.50E-02	1.18E+00	2.18E-05	2.57E-05				3.0E-03	8E-03		5.0E+01	5E-07
SVOC	Phenanthrene	85-01-8	D		1.12E-04		4.51E-05					1.1E-01				
SVOC	Pyrene	129-00-0	D		4.59E-06		6.22E-05					1.1E-01				
PCB	PCBs (total)	1336-36-3	B2		7.71E-05		1.98E-05		5.7E-01						5.0E-01	
INORG	Antimony	7440-36-0										1.4E-03			5.0E-01	
INORG	Arsenic	7440-38-2	A	3.60E+00					4.3E+00						5.0E-01	
INORG	Barium	7440-39-3	D	6.60E-01											5.0E-01	
INORG	Beryllium	7440-41-7	B1						2.4E+00			2.0E-05			2.0E-03	
INORG	Cadmium	7440-43-9	B1	7.00E-03					1.8E+00			2.0E-04			5.0E-03	
INORG	Chromium (total)	7440-47-3		6.40E-01					1.2E+01			1.0E-04			1.0E+00	
INORG	Cobalt	7440-48-4	B1						2.8E+00			2.0E-05			5.0E-02	
INORG	Copper	7440-50-8	D	9.60E-01								1.4E-01			1.0E+00	
INORG	Cyanide (total)	57-12-5	D									7.0E-02			5.0E+00	
INORG	Lead	7439-92-1	B2	2.30E+02											5.0E-02	
INORG	Manganese	7439-96-5	D	6.00E-02								5.0E-05			2.0E-01	
INORG	Mercury	7439-97-6	D		1.96E-03		1.76E-05					3.0E-04			5.0E-02	
INORG	Nickel	7440-02-0	A	1.90E+00					2.4E-01						1.0E+00	
INORG	Selenium	7782-49-2	D	4.10E+00								1.8E-02			2.0E-01	
INORG	Silver	7440-22-4	D									1.0E-05			1.0E-02	
INORG	Thallium	7440-28-0										2.5E-04			1.0E-01	
INORG	Vanadium	7440-62-2		1.70E-01								2.5E-02				
INORG	Zinc	7440-66-6	D	4.70E-01								1.1E+00				
									Cumulative Risk:	**5E-04**		**Cumulative HI:**	**6E+00**		**Sum of ratios:**	**5E-02**

Attachment G11
Exposure of Recreational Users to Surface Water

Attachment G11: Estimated Surface Water Concetrations Resulting from Outfall Discharge
GMC: NAO Flint Operations Site, Flint, Michigan

	Mass Loading (g/day)[1]							
Constituent	Outfall 002 (2-20)	Outfall 003 (3-15)	Outfall 003 (3-65)	Outfall 003 (combined)	Outfall 004 (4-8)	Outfall 005 (5-5)	Outfall 011 (11-3)	Sum of Outfalls
1,1,1-trichloroethane	6.0E-03						4.4E-02	5.0E-02
1,1-dicholorethane	2.5E-02	1.0E+00		1.0E+00				1.0E+00
chloroethane	1.8E-02				5.2E-02			7.0E-02
cis-1,2-dichloroethene	6.2E-01	5.2E-01	1.0E+00	1.5E+00	2.2E-01	1.2E-01		2.5E+00
trans-1,2-dichlorethene	2.6E-02		2.0E-01	2.0E-01				2.3E-01
tricholorethene	1.9E-02	1.3E+00	8.9E-02	1.3E+00	3.4E-01	3.3E-01	5.2E-02	2.1E+00
vinyl chloride	8.0E-01	3.6E-01	1.4E+00	1.7E+00	4.2E-01			2.9E+00
PCBs				4.6E+00	3.2E-02			4.7E+00
	Estimated Concentration (ug/L) in River Resulting from Outfall Discharge[2]							
Constituent	Outfall 002 (2-20)	Outfall 003 (3-15)	Outfall 003 (3-65)	Outfall 003 (combined)	Outfall 004 (4-8)	Outfall 005 (5-5)	Outfall 011 (11-3)	Sum of Outfalls
1,1,1-trichloroethane	2.7E-05						2.0E-04	**2.3E-04**
1,1-dicholorethane	1.1E-04	4.7E-03		4.7E-03				**4.8E-03**
chloroethane	8.2E-05				2.4E-04			**3.2E-04**
cis-1,2-dichloroethene	2.8E-03	2.4E-03	4.6E-03	7.0E-03	9.9E-04	5.4E-04		**1.1E-02**
trans-1,2-dichlorethene	1.2E-04		9.1E-04	9.1E-04				**1.0E-03**
tricholorethene	8.7E-05	5.7E-03	4.1E-04	6.1E-03	1.5E-03	1.5E-03	2.4E-04	**9.5E-03**
vinyl chloride	3.7E-03	1.7E-03	6.2E-03	7.8E-03	1.9E-03			**1.3E-02**
PCBs[3]				2.5E-02				**2.5E-02**
Notes:								

1. Estimates from mass loading data collected during RFI investigation, except for PCBs from Outfall 003, which is calculated from the effluent quality data from March 1998 to March 1999. (Source: MDEQ Discharge Permit No. MI0001597, September 25, 2002)

2. The mixing zone calculation is based on 25% of the harmonic mean river flow rate of 358 ft^3/s for the Flint River from 1970 to 2000 (Source: USGS Station 04148500 Flint River Near Flint, MI), except for the PCB concentration estimate at Outfall 003, which is based on a harmonic mean flow rate of 300 ft3/s. (Source: MDEQ Discharge Permit No. MI0001597, September 25, 2002).

3. The Michigan Water Quality Standard and Federal AWQC for PCBs are below the analytical Target Detection Limit (TDL) of 0.2 ug/L.

Attachment G11: Estimated Surface Water Concentrations Resulting from Groundwater Migration to Flint River
GMC: NAO Flint Operations Site, Flint, Michigan

Location	Chemical	CASRN	Conc (mg/L)	MDL (mg/L)	Total Distance of GSI Locations Along River (ft)	Area of Groundwater Discharge (ft^2)	Q_{gw} Max (ft^3/d)	C_{sw} Max (mg/L)
RFI-09-13	Xylenes (total)	1330-20-7	5.80E-02	2.65E-04	2.9E+03	2.6E+04	3.1E+03	2.35E-05
RFI-09-13	Benzene	71-43-2	1.21E+00	1.07E-04	2.9E+03	2.6E+04	3.1E+03	4.90E-04
RFI-17-02-ULF	Selenium	7782-49-2	7.30E-03	3.80E-04	2.9E+03	2.6E+04	3.1E+03	2.96E-06
RFI-17-02	Silver	7440-22-4	4.50E-04	8.00E-05	2.9E+03	2.6E+04	3.1E+03	1.82E-07
RFI-84-06R	Cyanide (total)	57-12-5	7.10E-02	2.00E-03	2.9E+03	2.6E+04	3.1E+03	2.87E-05
RFI-94-02R	Trichloroethene	79-01-6	9.50E-01	1.49E-03	2.9E+03	2.6E+04	3.1E+03	3.85E-04
RFI-84-02	bis(2-Ethylhexyl)phthalate[1]	117-81-7	5.77E-01	4.50E-03	2.9E+03	2.6E+04	3.1E+03	2.34E-04
RFI-94-01	Di-n-butylphthalate[1]	84-74-2	1.28E-02	1.40E-03	2.9E+03	2.6E+04	3.1E+03	5.18E-06
RFI-17-02	3,3'-Dichlorobenzidine[2]	91-94-1		8.00E-03	2.9E+03	2.6E+04	3.1E+03	3.24E-06
RFI-84-06R	Mercury[3]	7439-97-6		1.20E-04	2.9E+03	2.6E+04	3.1E+03	4.86E-08

Notes:								
Depth of Flint River (ft)	9	Source: USGS Station 04147500 Flint River Near Otisville, MI						
Harmonic Mean Flow (ft^3/s)	358	Source: USGS Station 04148500 Flint River Near Flint, MI						
Q_{sw} (ft^3/day)	3.09E+07							
i	0.02	Hydraulic Gradient						
K_h (ft/day)	6	Horizontal Hydraulic Conductivity (max)						
Mixing Zone Factor	0.25	Source: MDEQ Water Quality Standards Part 4 R 323.1082(2)						

1. Bis(2-Ethylhexyl)phthalate and Di-n-butylphthalate were detected in borehole water at concentrations that exceed the MDEQ GSI screening criteria, and thus included in the list.
2. The detection limit for 3,3'-Dichlorobenzidine exceeds the MDEQ GSI screening criteria. This chemical was not detected in any matrix at the Site.
3. The detection limit for Mercury is above the MDEQ GSI criteria, thus the maximum detection limit is used as the estimated concentration.

Attachment G12
Incremental Risk and HQ Summary

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
02-A	SVOC	Benzo(a)pyrene	50-32-8	5.29E-02	5.29E-02		1E-12		4E-12		3E-09		9E-07		2E-07		2E-08	
02-A	SVOC	Benzo(k)fluoranthene	207-08-9	4.64E-02	4.64E-02		8E-15		2E-14		3E-11		7E-09		2E-09		1E-10	
02-A	INORG	Antimony	7440-36-0	4.70E-01	3.84E-01							4E-05		4E-03		5E-04		2E-03
02-A	INORG	Arsenic	7440-38-2	7.50E+00														
02-A	INORG	Barium	7440-39-3	1.60E+02	6.43E+01													
02-A	INORG	Beryllium	7440-41-7	1.90E+00	1.31E+00						9E-10	2E-04	1E-09	2E-03	6E-10	4E-04	2E-09	4E-03
02-A	INORG	Cadmium	7440-43-9	1.00E+00	4.12E-01						2E-10	2E-05	2E-10	2E-03	1E-10	3E-04	4E-10	9E-04
02-A	INORG	Chromium (total)	7440-47-3	1.80E+01														
02-A	INORG	Cobalt	7440-48-4	9.00E+00	1.95E+00						2E-09	2E-04	2E-09	4E-04	1E-09	1E-04	3E-09	4E-03
02-A	INORG	Copper	7440-50-8	9.70E+02	9.42E+02							9E-04		9E-02		1E-02		5E-02
02-A	INORG	Cyanide (total)	57-12-5	1.00E+00	1.00E+00							2E-06		2E-04		2E-05		1E-04
02-A	INORG	Lead	7439-92-1	7.70E+02	7.70E+02													
02-A	INORG	Manganese	7439-96-5	4.60E+02														
02-A	INORG	Mercury	7439-97-6	4.56E-02														
02-A	INORG	Nickel	7440-02-0	4.50E+01	2.50E+01						2E-09		2E-09		1E-09		3E-09	
02-A	INORG	Selenium	7782-49-2	6.20E-01	1.01E-01							8E-07		7E-05		1E-05		4E-05
02-A	INORG	Silver	7440-22-4	4.20E-01	2.32E-01							5E-05		2E-04		3E-05		9E-04
02-A	INORG	Thallium	7440-28-0	2.20E-01	2.35E-02							1E-05		1E-03		2E-04		7E-04
02-A	INORG	Vanadium	7440-62-2	2.40E+01														
02-A	INORG	Zinc	7440-66-6	2.20E+02	1.10E+02							1E-05		1E-03		2E-04		7E-04
02-B	VOC	Acetone	67-64-1	6.00E-01	6.00E-01	3E-08		1E-05		3E-05		4E-07		2E-05		2E-05		1E-04
02-B	VOC	Benzene	71-43-2	9.00E-03	9.00E-03	2E-05	1E-07	1E-03	2E-07	2E-03	1E-10	3E-06	2E-08	2E-04	1E-08	1E-04	4E-09	6E-04
02-B	VOC	Ethyl Benzene	100-41-4	5.00E-02	5.00E-02	2E-07		7E-05		2E-04		3E-07		2E-05		1E-05		1E-04
02-B	VOC	Methyl Acetate	79-20-9	3.00E-01	3.00E-01	1E-07		1E-05		3E-05		2E-07		1E-05		1E-05		9E-06
02-B	VOC	Methylcyclohexane	108-87-2	7.00E-02	7.00E-02	3E-07		1E-04		1E-04		6E-07		3E-05		2E-05		2E-04
02-B	VOC	Toluene	108-88-3	1.36E+00	1.36E+00	1E-05		6E-04		2E-03		3E-06		2E-04		9E-05		8E-04
02-B	VOC	1,1,1-Trichloroethane	71-55-6	2.00E-02	2.00E-02	8E-08		5E-05		5E-05		1E-07		7E-06		5E-06		5E-06
02-B	VOC	Trichloroethene	79-01-6	2.00E-02	2.00E-02	4E-07	4E-08		9E-08		4E-11		7E-09		5E-09		2E-09	
02-B	VOC	Xylenes (total)	1330-20-7	2.20E-01	2.20E-01	9E-07		3E-03		7E-03		1E-05		6E-04		5E-04		4E-03
02-B	SVOC	Acenaphthene	83-32-9	5.00E-01	5.00E-01			4E-06		1E-05		8E-07		6E-05		2E-05		2E-05
02-B	SVOC	Acenaphthylene	208-96-8	2.00E-02	2.00E-02			2E-07		6E-07		6E-08		5E-06		2E-06		1E-06
02-B	SVOC	Anthracene	120-12-7	4.00E-01	4.00E-01							7E-08		7E-06		2E-06		4E-07
02-B	SVOC	Benzo(a)anthracene	56-55-3	7.00E-01	7.00E-01		1E-11		4E-11		4E-09		1E-06		2E-07		2E-08	
02-B	SVOC	Benzo(a)pyrene	50-32-8	9.00E-01	9.00E-01		2E-11		8E-11		5E-08		1E-05		3E-06		3E-07	
02-B	SVOC	Benzo(b)fluoranthene	205-99-2	9.00E-01	9.00E-01		2E-10		6E-10		5E-09		1E-06		3E-07		3E-08	
02-B	SVOC	Benzo(g,h,i)perylene	191-24-2	6.00E-01	6.00E-01			5E-12		1E-11		1E-06		1E-04		3E-05		6E-06
02-B	SVOC	Benzo(k)fluoranthene	207-08-9	7.00E-01	7.00E-01		1E-13		4E-13		4E-10		1E-07		2E-08		2E-09	
02-B	SVOC	Biphenyl	92-52-4	9.00E-02	9.00E-02	3E-07		1E-06		3E-06		2E-07		1E-05		5E-06		4E-05
02-B	SVOC	Carbazole	86-74-8	1.00E-01	1.00E-01		1E-13		3E-13		2E-11		4E-09		9E-10		9E-11	
02-B	SVOC	Chrysene	218-01-9	1.30E+00	1.30E+00		8E-12		2E-11		8E-11		2E-08		5E-09		5E-10	
02-B	SVOC	Dibenzofuran	132-64-9	3.00E-01	3.00E-01			2E-06		5E-06		9E-06		8E-04		2E-04		7E-04
02-B	SVOC	Fluoranthene	206-44-0	1.90E+00	1.90E+00			2E-07		4E-07		3E-06		3E-04		7E-05		2E-05
02-B	SVOC	Fluorene	86-73-7	5.00E-01	5.00E-01			1E-06		3E-06		9E-07		8E-05		3E-05		1E-05
02-B	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	6.00E-01	6.00E-01		7E-13		2E-12		4E-09		1E-06		2E-07		2E-08	
02-B	SVOC	2-Methylnaphthalene	91-57-6	3.00E-01	3.00E-01			6E-04		2E-03		3E-05		2E-03		1E-03		1E-02
02-B	SVOC	Naphthalene	91-20-3	2.00E-01	2.00E-01	1E-07		1E-03		3E-03		4E-05		2E-03		2E-03		1E-02
02-B	SVOC	Phenanthrene	85-01-8	2.00E+00	2.00E+00			1E-06		4E-06		4E-06		4E-04		1E-04		4E-05
02-B	SVOC	Pyrene	129-00-0	1.40E+00	1.40E+00			1E-07		3E-07		3E-06		2E-04		7E-05		2E-05
02-B	INORG	Antimony	7440-36-0	1.45E+00	1.36E+00							1E-04		1E-02		2E-03		7E-03
02-B	INORG	Arsenic	7440-38-2	1.00E+01	1.88E+00						2E-08	3E-04	5E-06	3E-02	7E-07	4E-03	9E-08	8E-04
02-B	INORG	Barium	7440-39-3	3.67E+02	2.71E+02													
02-B	INORG	Beryllium	7440-41-7	2.40E+00	1.81E+00						1E-09	2E-04	1E-09	3E-03	8E-10	5E-04	2E-09	5E-03
02-B	INORG	Cadmium	7440-43-9	1.57E+00	9.82E-01						5E-10	5E-05	6E-10	4E-03	3E-10	7E-04	9E-10	2E-03

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
02-B	INORG	Chromium (total)	7440-47-3	3.10E+01														
02-B	INORG	Cobalt	7440-48-4	1.61E+01	9.05E+00						7E-09	9E-04	8E-09	2E-03	5E-09	5E-04	1E-08	2E-02
02-B	INORG	Copper	7440-50-8	1.42E+02	1.14E+02							1E-04		1E-02		1E-03		6E-03
02-B	INORG	Cyanide (total)	57-12-5	8.50E-02	8.50E-02							2E-07		2E-05		2E-06		8E-06
02-B	INORG	Lead	7439-92-1	8.79E+02	8.79E+02													
02-B	INORG	Manganese	7439-96-5	9.40E+02	4.63E+02							2E-02		2E-02		6E-03		3E-01
02-B	INORG	Mercury	7439-97-6	1.41E+00	1.36E+00	4E-05		5E-03		1E-02		6E-04		4E-02		2E-02		2E-01
02-B	INORG	Nickel	7440-02-0	5.10E+01	3.10E+01						2E-09		2E-09		1E-09		4E-09	
02-B	INORG	Selenium	7782-49-2	8.70E-01	3.51E-01							3E-06		3E-04		3E-05		1E-04
02-B	INORG	Silver	7440-22-4	2.40E-01	5.23E-02							1E-05		4E-05		8E-06		2E-04
02-B	INORG	Thallium	7440-28-0	1.65E+00	1.45E+00							8E-04		8E-02		1E-02		4E-02
02-B	INORG	Vanadium	7440-62-2	5.20E+01	2.71E+01							2E-04		1E-02		2E-03		8E-03
02-B	INORG	Zinc	7440-66-6	4.12E+02	3.02E+02							4E-05		4E-03		5E-04		2E-03
02-C	SVOC	Chrysene	218-01-9	4.22E-02	4.22E-02		2E-13		7E-13		3E-12		7E-10		2E-10		1E-11	
02-C	SVOC	Fluoranthene	206-44-0	5.59E-02	5.59E-02			5E-09		1E-08		8E-08		7E-06		2E-06		5E-07
02-C	SVOC	Phenanthrene	85-01-8	4.06E-02	4.06E-02			3E-08		7E-08		9E-08		8E-06		2E-06		8E-07
02-C	INORG	Antimony	7440-36-0	2.50E-01	1.64E-01							2E-05		1E-03		2E-04		8E-04
02-C	INORG	Arsenic	7440-38-2	8.20E+00	7.69E-02						8E-10	1E-05	2E-07	1E-03	3E-08	2E-04	4E-09	3E-05
02-C	INORG	Barium	7440-39-3	1.20E+02	2.43E+01													
02-C	INORG	Beryllium	7440-41-7	2.90E+00	2.31E+00						2E-09	3E-04	2E-09	4E-03	1E-09	6E-04	3E-09	6E-03
02-C	INORG	Cadmium	7440-43-9	3.10E-01														
02-C	INORG	Chromium (total)	7440-47-3	3.90E+02	3.58E+02						1E-06	1E-02	1E-06	4E-01	8E-07	6E-02	2E-06	2E-01
02-C	INORG	Chromium III	16065-83-1	2.26E+01	2.26E+01							6E-07		6E-05		7E-06		3E-05
02-C	INORG	Cobalt	7440-48-4	1.00E+01	2.95E+00						2E-09	3E-04	3E-09	6E-04	2E-09	1E-04	4E-09	5E-03
02-C	INORG	Copper	7440-50-8	1.50E+02	1.22E+02							1E-04		1E-02		1E-03		6E-03
02-C	INORG	Cyanide (total)	57-12-5	3.60E-02	3.60E-02							7E-08		7E-06		9E-07		4E-06
02-C	INORG	Lead	7439-92-1	2.00E+03	2.00E+03													
02-C	INORG	Manganese	7439-96-5	3.90E+02														
02-C	INORG	Mercury	7439-97-6	4.99E-02														
02-C	INORG	Nickel	7440-02-0	4.40E+01	2.40E+01						2E-09		2E-09		1E-09		3E-09	
02-C	INORG	Selenium	7782-49-2	8.40E-01	3.21E-01							3E-06		2E-04		3E-05		1E-04
02-C	INORG	Silver	7440-22-4	3.90E-01	2.02E-01							4E-05		2E-04		3E-05		8E-04
02-C	INORG	Thallium	7440-28-0	2.80E-01	8.35E-02							5E-05		4E-03		6E-04		2E-03
02-C	INORG	Vanadium	7440-62-2	3.30E+01	8.13E+00							5E-05		4E-03		6E-04		2E-03
02-C	INORG	Zinc	7440-66-6	1.10E+02														
02-D	VOC	Methyl Acetate	79-20-9	1.20E-01	1.20E-01	5E-08		5E-06		1E-05		1E-07		5E-06		4E-06		4E-06
02-D	VOC	Xylenes (total)	1330-20-7	6.85E-02	6.85E-02	3E-07		8E-04		2E-03		3E-06		2E-04		1E-04		1E-03
02-D	SVOC	Acenaphthene	83-32-9	8.00E-01	8.00E-01			6E-06		2E-05		1E-06		1E-04		4E-05		2E-05
02-D	SVOC	Acenaphthylene	208-96-8	1.10E-01	1.10E-01			1E-06		3E-06		3E-07		3E-05		1E-05		6E-06
02-D	SVOC	Anthracene	120-12-7	1.40E+00	1.40E+00							3E-07		2E-05		6E-06		1E-06
02-D	SVOC	Benzo(a)anthracene	56-55-3	4.40E+00	4.40E+00		9E-11		3E-10		3E-08		7E-06		2E-06		1E-07	
02-D	SVOC	Benzo(a)pyrene	50-32-8	5.14E+00	5.14E+00		1E-10		4E-10		3E-07		8E-05		2E-05		2E-06	
02-D	SVOC	Benzo(b)fluoranthene	205-99-2	7.50E+00	7.50E+00		2E-09		5E-09		4E-08		1E-05		3E-06		2E-07	
02-D	SVOC	Benzo(g,h,i)perylene	191-24-2	2.00E+00	2.00E+00			2E-11		4E-11		4E-06		3E-04		9E-05		2E-05
02-D	SVOC	Benzo(k)fluoranthene	207-08-9	3.60E+00	3.60E+00		6E-13		2E-12		2E-09		6E-07		1E-07		1E-08	
02-D	SVOC	Carbazole	86-74-8	1.10E+00	1.10E+00		1E-12		4E-12		2E-10		5E-08		9E-09		1E-09	
02-D	SVOC	Chrysene	218-01-9	5.21E+00	5.21E+00		3E-11		9E-11		3E-10		9E-08		2E-08		2E-09	
02-D	SVOC	Dibenz(a,h)anthracene	53-70-3	6.60E-01	6.60E-01		8E-14		3E-13		4E-08		1E-05		2E-06		2E-07	
02-D	SVOC	Dibenzofuran	132-64-9	3.00E-01	3.00E-01			2E-06		5E-06		9E-06		8E-04		2E-04		7E-04
02-D	SVOC	Diethylphthalate	84-66-2	5.78E-02	5.78E-02	2E-09		2E-09		6E-09		4E-09		4E-07		1E-07		4E-08
02-D	SVOC	Fluoranthene	206-44-0	1.37E+01	1.37E+01			1E-06		3E-06		2E-05		2E-03		5E-04		1E-04
02-D	SVOC	Fluorene	86-73-7	6.20E-01	6.20E-01			2E-06		4E-06		1E-06		9E-05		3E-05		1E-05
02-D	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	2.10E+00	2.10E+00		2E-12		7E-12		1E-08		3E-06		7E-07		6E-08	

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
02-D	SVOC	Naphthalene	91-20-3	1.50E-01	1.50E-01	8E-08		9E-04		2E-03		3E-05		1E-03		1E-03		1E-02
02-D	SVOC	Phenanthrene	85-01-8	7.38E+00	7.38E+00			5E-06		1E-05		2E-05		1E-03		4E-04		1E-04
02-D	SVOC	Pyrene	129-00-0	1.11E+01	1.11E+01			9E-07		2E-06		2E-05		2E-03		5E-04		1E-04
02-D	INORG	Antimony	7440-36-0	1.50E-01	6.36E-02							6E-06		6E-04		8E-05		3E-04
02-D	INORG	Arsenic	7440-38-2	8.40E+00	2.77E-01						3E-09	4E-05	7E-07	4E-03	1E-07	6E-04	1E-08	1E-04
02-D	INORG	Barium	7440-39-3	5.30E+01														
02-D	INORG	Beryllium	7440-41-7	4.70E-01														
02-D	INORG	Cadmium	7440-43-9	3.00E-01														
02-D	INORG	Chromium (total)	7440-47-3	1.90E+01														
02-D	INORG	Cobalt	7440-48-4	7.30E+00	2.46E-01						2E-10	3E-05	2E-10	5E-05	1E-10	1E-05	3E-10	4E-04
02-D	INORG	Copper	7440-50-8	4.10E+01	1.25E+01							1E-05		1E-03		2E-04		6E-04
02-D	INORG	Cyanide (total)	57-12-5	2.70E-01	2.70E-01							5E-07		5E-05		7E-06		3E-05
02-D	INORG	Lead	7439-92-1	4.20E+01	4.20E+01													
02-D	INORG	Manganese	7439-96-5	3.70E+02														
02-D	INORG	Mercury	7439-97-6	9.07E-02	3.83E-02	1E-06		1E-04		4E-04		2E-05		1E-03		6E-04		5E-03
02-D	INORG	Nickel	7440-02-0	1.80E+01														
02-D	INORG	Selenium	7782-49-2	6.70E-01	1.51E-01							1E-06		1E-04		1E-05		6E-05
02-D	INORG	Silver	7440-22-4	1.70E-01														
02-D	INORG	Vanadium	7440-62-2	2.50E+01	1.29E-01							7E-07		7E-05		9E-06		4E-05
02-D	INORG	Zinc	7440-66-6	6.60E+01														
02-E	VOC	Acetone	67-64-1	1.70E-01	1.70E-01	1E-08		4E-06		1E-05		1E-07		7E-06		5E-06		4E-05
02-E	VOC	Benzene	71-43-2	4.80E-02	4.80E-02	9E-05	5E-07	6E-03	9E-07	9E-03	6E-10	2E-05	9E-08	9E-04	6E-08	7E-04	2E-08	3E-03
02-E	VOC	2-Butanone	78-93-3	8.80E-02	8.80E-02	2E-08		2E-06		4E-06		4E-08		2E-06		1E-06		1E-05
02-E	VOC	Cumene	98-82-8	3.80E-02	3.80E-02	3E-07		1E-04		3E-04		5E-07		3E-05		2E-05		2E-04
02-E	VOC	Cyclohexane	110-82-7	1.10E-01	1.10E-01	8E-07		9E-05		1E-04		3E-07		2E-05		1E-05		1E-04
02-E	VOC	Ethyl Benzene	100-41-4	1.40E-01	1.40E-01	7E-07		2E-04		5E-04		8E-07		5E-05		3E-05		3E-04
02-E	VOC	Methyl Acetate	79-20-9	2.30E-01	2.30E-01	9E-08		1E-05		3E-05		2E-07		1E-05		7E-06		7E-06
02-E	VOC	Methylcyclohexane	108-87-2	3.80E-01	3.80E-01	1E-06		6E-04		7E-04		3E-06		2E-04		1E-04		1E-03
02-E	VOC	Toluene	108-88-3	3.70E-01	3.70E-01	3E-06		2E-04		4E-04		7E-07		5E-05		3E-05		2E-04
02-E	VOC	Xylenes (total)	1330-20-7	1.02E+00	1.02E+00	4E-06		1E-02		3E-02		5E-05		3E-03		2E-03		2E-02
02-E	SVOC	Anthracene	120-12-7	5.11E-02	5.11E-02							1E-08		9E-07		2E-07		5E-08
02-E	SVOC	Benzo(a)anthracene	56-55-3	7.89E-02	7.89E-02		2E-12		5E-12		5E-10		1E-07		3E-08		2E-09	
02-E	SVOC	Benzo(a)pyrene	50-32-8	6.34E-01	6.34E-01		2E-11		5E-11		4E-08		1E-05		2E-06		2E-07	
02-E	SVOC	Benzo(b)fluoranthene	205-99-2	5.65E-02	5.65E-02		1E-11		4E-11		3E-10		9E-08		2E-08		2E-09	
02-E	SVOC	Benzo(k)fluoranthene	207-08-9	4.53E-02	4.53E-02		7E-15		2E-14		3E-11		7E-09		2E-09		1E-10	
02-E	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	1.43E+00	1.43E+00	2E-13	1E-15	1E-11	3E-15	3E-11	2E-10	4E-06	4E-08	3E-04	8E-09	8E-05	7E-10	2E-04
02-E	SVOC	Chrysene	218-01-9	9.03E-02	9.03E-02		5E-13		2E-12		5E-12		1E-09		3E-10		3E-11	
02-E	SVOC	Dibenzofuran	132-64-9	8.30E-02	8.30E-02			6E-07		1E-06		2E-06		2E-04		6E-05		2E-04
02-E	SVOC	Di-n-butylphthalate	84-74-2	6.98E-02	6.98E-02	8E-13						4E-08		3E-06		8E-07		2E-07
02-E	SVOC	Fluoranthene	206-44-0	1.35E-01	1.35E-01			1E-08		3E-08		2E-07		2E-05		5E-06		1E-06
02-E	SVOC	Naphthalene	91-20-3	1.10E-01	1.10E-01	6E-08		7E-04		2E-03		2E-05		1E-03		8E-04		8E-03
02-E	SVOC	Phenanthrene	85-01-8	3.89E-01	3.89E-01			3E-07		7E-07		8E-07		7E-05		2E-05		8E-06
02-E	SVOC	Pyrene	129-00-0	1.39E-01	1.39E-01			1E-08		3E-08		3E-07		2E-05		7E-06		2E-06
02-E	INORG	Antimony	7440-36-0	4.50E-01	3.64E-01							4E-05		3E-03		4E-04		2E-03
02-E	INORG	Arsenic	7440-38-2	6.80E+00														
02-E	INORG	Barium	7440-39-3	8.80E+01														
02-E	INORG	Beryllium	7440-41-7	3.30E+00	2.71E+00						2E-09	3E-04	2E-09	5E-03	1E-09	7E-04	3E-09	7E-03
02-E	INORG	Cadmium	7440-43-9	3.90E-01														
02-E	INORG	Chromium (total)	7440-47-3	1.10E+01														
02-E	INORG	Cobalt	7440-48-4	8.20E+00	1.15E+00						9E-10	1E-04	1E-09	3E-04	6E-10	6E-05	2E-09	2E-03
02-E	INORG	Copper	7440-50-8	6.40E+02	6.12E+02							6E-04		6E-02		7E-03		3E-02
02-E	INORG	Cyanide (total)	57-12-5	4.80E-01	4.80E-01							1E-06		9E-05		1E-05		5E-05
02-E	INORG	Lead	7439-92-1	1.20E+02	1.20E+02													

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
02-E	INORG	Manganese	7439-96-5	3.40E+02														
02-E	INORG	Mercury	7439-97-6	4.25E-02														
02-E	INORG	Nickel	7440-02-0	3.70E+01	1.70E+01						1E-09		1E-09		8E-10		2E-09	
02-E	INORG	Selenium	7782-49-2	5.70E-01	5.06E-02							4E-07		4E-05		5E-06		2E-05
02-E	INORG	Silver	7440-22-4	3.50E-01	1.62E-01							3E-05		1E-04		2E-05		6E-04
02-E	INORG	Thallium	7440-28-0	2.10E-01	1.35E-02							8E-06		7E-04		9E-05		4E-04
02-E	INORG	Vanadium	7440-62-2	2.40E+01														
02-E	INORG	Zinc	7440-66-6	1.40E+02	2.95E+01							4E-06		4E-04		5E-05		2E-04
02-F	VOC	Acetone	67-64-1	1.80E-01	1.80E-01	1E-08		4E-06		1E-05		1E-07		7E-06		5E-06		4E-05
02-F	VOC	Carbon Disulfide	75-15-0	9.30E-02	9.30E-02	6E-05		7E-04		8E-04		3E-06		2E-04		1E-04		1E-03
02-F	VOC	Methyl Acetate	79-20-9	1.90E-01	1.90E-01	7E-08		9E-06		2E-05		2E-07		8E-06		6E-06		6E-06
02-F	VOC	Xylenes (total)	1330-20-7	1.02E-01	1.02E-01	4E-07		1E-03		3E-03		5E-06		3E-04		2E-04		2E-03
02-F	SVOC	Anthracene	120-12-7	2.64E-01	2.64E-01							5E-08		5E-06		1E-06		2E-07
02-F	SVOC	Benzo(a)anthracene	56-55-3	4.21E-02	4.21E-02		9E-13		3E-12		2E-10		7E-08		1E-08		1E-09	
02-F	SVOC	Benzo(a)pyrene	50-32-8	4.67E-02	4.67E-02		1E-12		4E-12		3E-09		8E-07		2E-07		1E-08	
02-F	SVOC	Benzo(b)fluoranthene	205-99-2	4.59E-02	4.59E-02		1E-11		3E-11		3E-10		7E-08		2E-08		1E-09	
02-F	SVOC	Benzo(k)fluoranthene	207-08-9	4.13E-02	4.13E-02		7E-15		2E-14		2E-11		7E-09		1E-09		1E-10	
02-F	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	2.82E-01	2.82E-01	4E-14	2E-16	2E-12	7E-16	5E-12	3E-11	7E-07	8E-09	7E-05	2E-09	2E-05	1E-10	4E-05
02-F	SVOC	Chrysene	218-01-9	2.84E-01	2.84E-01		2E-12		5E-12		2E-11		5E-09		1E-09		1E-10	
02-F	SVOC	Fluoranthene	206-44-0	6.62E-01	6.62E-01			5E-08		1E-07		1E-06		9E-05		2E-05		6E-06
02-F	SVOC	Fluorene	86-73-7	4.32E-01	4.32E-01			1E-06		3E-06		8E-07		7E-05		2E-05		1E-05
02-F	SVOC	2-Methylnaphthalene	91-57-6	8.64E-02	8.64E-02			2E-04		5E-04		9E-06		5E-04		4E-04		3E-03
02-F	SVOC	Naphthalene	91-20-3	3.23E-01	3.23E-01	2E-07		2E-03		5E-03		6E-05		3E-03		2E-03		2E-02
02-F	SVOC	Phenanthrene	85-01-8	1.63E+00	1.63E+00			1E-06		3E-06		3E-06		3E-04		9E-05		3E-05
02-F	SVOC	Pyrene	129-00-0	8.81E-01	8.81E-01			7E-08		2E-07		2E-06		2E-04		4E-05		1E-05
02-F	INORG	Arsenic	7440-38-2	8.50E+00	3.77E-01						4E-09	5E-05	1E-06	5E-03	1E-07	9E-04	2E-08	2E-04
02-F	INORG	Barium	7440-39-3	1.50E+02	5.43E+01													
02-F	INORG	Beryllium	7440-41-7	1.20E+00	6.10E-01						4E-10	7E-05	5E-10	1E-03	3E-10	2E-04	7E-10	2E-03
02-F	INORG	Cadmium	7440-43-9	3.10E-01														
02-F	INORG	Chromium (total)	7440-47-3	4.30E+01	1.10E+01						4E-08	4E-04	4E-08	1E-02	2E-08	2E-03	6E-08	5E-03
02-F	INORG	Cobalt	7440-48-4	2.10E+01	1.39E+01						1E-08	1E-03	1E-08	3E-03	7E-09	7E-04	2E-08	3E-02
02-F	INORG	Copper	7440-50-8	4.40E+01	1.55E+01							2E-05		1E-03		2E-04		8E-04
02-F	INORG	Cyanide (total)	57-12-5	1.90E-01	1.90E-01							4E-07		3E-05		5E-06		2E-05
02-F	INORG	Lead	7439-92-1	3.90E+01	3.90E+01													
02-F	INORG	Manganese	7439-96-5	7.10E+02	2.33E+02							1E-02		9E-03		3E-03		2E-01
02-F	INORG	Mercury	7439-97-6	3.61E-02														
02-F	INORG	Nickel	7440-02-0	4.60E+01	2.60E+01						2E-09		2E-09		1E-09		3E-09	
02-F	INORG	Selenium	7782-49-2	5.70E-02														
02-F	INORG	Silver	7440-22-4	2.20E-01	3.23E-02							7E-06		3E-05		5E-06		1E-04
02-F	INORG	Thallium	7440-28-0	2.20E-01	2.35E-02							1E-05		1E-03		2E-04		7E-04
02-F	INORG	Vanadium	7440-62-2	4.70E+01	2.21E+01							1E-04		1E-02		2E-03		6E-03
02-F	INORG	Zinc	7440-66-6	6.50E+01														
03-1	VOC	Benzene	71-43-2	5.30E-02	5.30E-02	1E-04	6E-07	7E-03	1E-06	1E-02	6E-10	2E-05	1E-07	1E-03	7E-08	8E-04	2E-08	4E-03
03-1	VOC	2-Butanone	78-93-3	6.60E-02	6.60E-02	2E-08		1E-06		3E-06		3E-08		2E-06		1E-06		1E-05
03-1	VOC	Carbon Disulfide	75-15-0	3.00E-02	3.00E-02	2E-05		2E-04		3E-04		1E-06		5E-05		4E-05		4E-04
03-1	VOC	Cyclohexane	110-82-7	5.50E-02	5.50E-02	4E-07		5E-05		5E-05		2E-07		9E-06		7E-06		6E-05
03-1	VOC	1,4-Dichlorobenzene	106-46-7	1.30E-01	1.30E-01	1E-07	8E-08	5E-05	3E-07	1E-04	3E-10	5E-07	5E-08	4E-05	3E-08	2E-05	1E-08	6E-05
03-1	VOC	1,1-Dichloroethane	75-34-3	8.40E-02	8.40E-02	2E-06		9E-04		1E-03		2E-06		1E-04		8E-05		8E-05
03-1	VOC	Methyl Acetate	79-20-9	8.80E-02	8.80E-02	3E-08		4E-06		1E-05		7E-08		4E-06		3E-06		3E-06
03-1	VOC	Methylcyclohexane	108-87-2	1.40E-01	1.40E-01	5E-07		2E-04		3E-04		1E-06		6E-05		5E-05		4E-04
03-1	VOC	Methylene Chloride	75-09-2	4.00E-02	4.00E-02	2E-06	2E-08	4E-05	5E-08	8E-05	3E-11	2E-07	5E-09	1E-05	3E-09	6E-06	1E-09	6E-05
03-1	VOC	Toluene	108-88-3	8.40E-02	8.40E-02	7E-07		4E-05		1E-04		2E-07		1E-05		6E-06		5E-05
03-1	VOC	1,1,1-Trichloroethane	71-55-6	1.00E+00	1.00E+00	4E-06		2E-03		3E-03		6E-06		3E-04		2E-04		2E-04

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
03-1	VOC	Trichloroethene	79-01-6	8.40E-01	8.40E-01	2E-05	2E-06		4E-06		2E-09		3E-07		2E-07		7E-08	
03-1	VOC	Xylenes (total)	1330-20-7	1.42E-01	1.42E-01	6E-07		2E-03		4E-03		7E-06		4E-04		3E-04		3E-03
03-1	SVOC	Anthracene	120-12-7	1.39E+00	1.39E+00							3E-07		2E-05		6E-06		1E-06
03-1	SVOC	Benzo(a)anthracene	56-55-3	8.44E+00	8.44E+00		2E-10		5E-10		5E-08		1E-05		3E-06		3E-07	
03-1	SVOC	Benzo(a)pyrene	50-32-8	1.31E+01	1.31E+01		4E-10		1E-09		8E-07		2E-04		5E-05		4E-06	
03-1	SVOC	Benzo(b)fluoranthene	205-99-2	1.96E+01	1.96E+01		4E-09		1E-08		1E-07		3E-05		7E-06		6E-07	
03-1	SVOC	Benzo(g,h,i)perylene	191-24-2	6.72E+00	6.72E+00			6E-11		1E-10		1E-05		1E-03		3E-04		6E-05
03-1	SVOC	Benzo(k)fluoranthene	207-08-9	8.91E+00	8.91E+00		1E-12		4E-12		5E-09		1E-06		3E-07		3E-08	
03-1	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	5.95E-01	5.95E-01	9E-14	5E-16	5E-12	1E-15	1E-11	6E-11	2E-06	2E-08	1E-04	3E-09	3E-05	3E-10	8E-05
03-1	SVOC	Butylbenzylphthalate	85-68-7	1.00E+00	1.00E+00		3E-13	2E-09	1E-12	6E-09	1E-11	3E-07	4E-09	2E-05	8E-10	6E-06	8E-11	1E-06
03-1	SVOC	Carbazole	86-74-8	6.17E-01	6.17E-01		7E-13		2E-12		1E-10		3E-08		5E-09		6E-10	
03-1	SVOC	Chrysene	218-01-9	1.14E+01	1.14E+01		7E-11		2E-10		7E-10		2E-07		4E-08		4E-09	
03-1	SVOC	Dibenz(a,h)anthracene	53-70-3	5.12E-01	5.12E-01		7E-14		2E-13		3E-08		8E-06		2E-06		1E-07	
03-1	SVOC	Dibenzofuran	132-64-9	1.04E-01	1.04E-01			7E-07		2E-06		3E-06		3E-04		7E-05		2E-04
03-1	SVOC	4,6-Dinitro-2-methylphenol	534-52-1	6.22E-01	6.22E-01	9E-07		4E-04		9E-04		4E-04		3E-02		1E-02		5E-02
03-1	SVOC	Fluoranthene	206-44-0	1.09E+01	1.09E+01			9E-07		2E-06		2E-05		1E-03		4E-04		1E-04
03-1	SVOC	Fluorene	86-73-7	1.60E-01	1.60E-01			4E-07		1E-06		3E-07		2E-05		8E-06		4E-06
03-1	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	6.24E+00	6.24E+00		7E-12		2E-11		4E-08		1E-05		2E-06		2E-07	
03-1	SVOC	2-Methylnaphthalene	91-57-6	1.47E-01	1.47E-01			3E-04		8E-04		2E-05		9E-04		6E-04		6E-03
03-1	SVOC	Naphthalene	91-20-3	4.89E-01	4.89E-01	3E-07		3E-03		8E-03		9E-05		5E-03		4E-03		3E-02
03-1	SVOC	N-Nitroso-di-n-propylamine	621-64-7	7.25E-01	7.25E-01		1E-06		4E-06		9E-08		2E-05		7E-06		2E-06	
03-1	SVOC	Phenanthrene	85-01-8	3.71E+00	3.71E+00			3E-06		7E-06		8E-06		7E-04		2E-04		7E-05
03-1	SVOC	Phenol	108-95-2	2.42E-01	2.42E-01	8E-09						4E-08		4E-06		9E-07		2E-06
03-1	SVOC	Pyrene	129-00-0	1.27E+01	1.27E+01			1E-06		2E-06		2E-05		2E-03		6E-04		2E-04
03-1	PCB	PCBs (total)	1336-36-3	2.70E-01	2.70E-01	5E-08	3E-09		1E-08		5E-09	8E-04	1E-06	7E-02	3E-07	2E-02	4E-08	2E-02
03-1	INORG	Antimony	7440-36-0	7.20E-01	6.34E-01							6E-05		6E-03		8E-04		3E-03
03-1	INORG	Arsenic	7440-38-2	6.80E+00														
03-1	INORG	Barium	7440-39-3	5.80E+02	4.84E+02													
03-1	INORG	Beryllium	7440-41-7	1.30E+00	7.10E-01						5E-10	9E-05	5E-10	1E-03	3E-10	2E-04	8E-10	2E-03
03-1	INORG	Cadmium	7440-43-9	3.80E+00	3.21E+00						2E-09	2E-04	2E-09	1E-02	1E-09	2E-03	3E-09	7E-03
03-1	INORG	Chromium (total)	7440-47-3	1.60E+02	1.28E+02						5E-07	4E-03	5E-07	2E-01	3E-07	2E-02	8E-07	6E-02
03-1	INORG	Cobalt	7440-48-4	8.00E+00	9.46E-01						8E-10	1E-04	8E-10	2E-04	5E-10	5E-05	1E-09	2E-03
03-1	INORG	Copper	7440-50-8	2.30E+03	2.27E+03							2E-03		2E-01		3E-02		1E-01
03-1	INORG	Cyanide (total)	57-12-5	9.20E-02	9.20E-02							2E-07		2E-05		2E-06		9E-06
03-1	INORG	Lead	7439-92-1	7.00E+02	7.00E+02													
03-1	INORG	Manganese	7439-96-5	4.70E+03	4.22E+03							2E-01		2E-01		6E-02		3E+00
03-1	INORG	Mercury	7439-97-6	4.67E-01	4.15E-01	1E-05		2E-03		4E-03		2E-04		1E-02		6E-03		5E-02
03-1	INORG	Nickel	7440-02-0	7.20E+01	5.20E+01						4E-09		4E-09		2E-09		6E-09	
03-1	INORG	Selenium	7782-49-2	1.30E+00	7.81E-01							6E-06		6E-04		8E-05		3E-04
03-1	INORG	Silver	7440-22-4	1.10E+00	9.12E-01							2E-04		7E-04		1E-04		3E-03
03-1	INORG	Thallium	7440-28-0	1.80E-01														
03-1	INORG	Vanadium	7440-62-2	2.10E+01														
03-1	INORG	Zinc	7440-66-6	5.50E+02	4.40E+02							6E-05		5E-03		7E-04		3E-03
04-A	VOC	2-Butanone	78-93-3	3.10E-02	3.10E-02	7E-09		6E-07		2E-06		1E-08		8E-07		5E-07		5E-06
04-A	VOC	1,1-Dichloroethane	75-34-3	5.10E-01	5.10E-01	9E-06		5E-03		6E-03		1E-05		6E-04		5E-04		5E-04
04-A	VOC	cis-1,2-Dichloroethene	156-59-2	8.10E-02	8.10E-02	6E-07		9E-03		1E-02		2E-05		1E-03		9E-04		9E-04
04-A	VOC	trans-1,2-Dichloroethene	156-60-5	2.60E-02	2.60E-02	2E-07		2E-03		3E-03		5E-06		3E-04		2E-04		2E-03
04-A	VOC	Methyl Acetate	79-20-9	7.80E-02	7.80E-02	3E-08		4E-06		9E-06		6E-08		3E-06		3E-06		2E-06
04-A	VOC	1,1,1-Trichloroethane	71-55-6	1.50E-01	1.50E-01	6E-07		3E-04		4E-04		9E-07		5E-05		4E-05		4E-05
04-A	VOC	Trichloroethene	79-01-6	2.80E-01	2.80E-01	5E-06	6E-07		1E-06		6E-10		1E-07		6E-08		2E-08	
04-A	SVOC	Anthracene	120-12-7	2.61E-01	2.61E-01							5E-08		4E-06		1E-06		2E-07
04-A	SVOC	Benzo(a)anthracene	56-55-3	1.47E+00	1.47E+00		3E-11		9E-11		9E-09		2E-06		5E-07		5E-08	
04-A	SVOC	Benzo(a)pyrene	50-32-8	1.50E+00	1.50E+00		4E-11		1E-10		9E-08		2E-05		5E-06		4E-07	

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
04-A	SVOC	Benzo(b)fluoranthene	205-99-2	1.40E+00	1.40E+00		3E-10		9E-10		8E-09		2E-06		5E-07		5E-08	
04-A	SVOC	Benzo(g,h,i)perylene	191-24-2	1.87E+00	1.87E+00			2E-11		4E-11		4E-06		3E-04		8E-05		2E-05
04-A	SVOC	Benzo(k)fluoranthene	207-08-9	1.44E+00	1.44E+00		2E-13		7E-13		8E-10		2E-07		5E-08		4E-09	
04-A	SVOC	Chrysene	218-01-9	1.85E+00	1.85E+00		1E-11		3E-11		1E-10		3E-08		7E-09		6E-10	
04-A	SVOC	Fluoranthene	206-44-0	3.46E+00	3.46E+00			3E-07		7E-07		5E-06		5E-04		1E-04		3E-05
04-A	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	1.41E+00	1.41E+00		2E-12		5E-12		8E-09		2E-06		5E-07		4E-08	
04-A	SVOC	Phenanthrene	85-01-8	1.37E+00	1.37E+00			1E-06		2E-06		3E-06		3E-04		8E-05		3E-05
04-A	SVOC	Pyrene	129-00-0	3.79E+00	3.79E+00			3E-07		7E-07		7E-06		7E-04		2E-04		5E-05
04-A	INORG	Arsenic	7440-38-2	2.90E+00														
04-A	INORG	Barium	7440-39-3	8.70E+01														
04-A	INORG	Beryllium	7440-41-7	1.20E-01														
04-A	INORG	Cadmium	7440-43-9	1.80E-01														
04-A	INORG	Chromium (total)	7440-47-3	3.30E+01	1.04E+00						4E-09	4E-05	4E-09	1E-03	2E-09	2E-04	6E-09	5E-04
04-A	INORG	Cobalt	7440-48-4	2.70E+00														
04-A	INORG	Copper	7440-50-8	9.00E+01	6.15E+01							6E-05		6E-03		8E-04		3E-03
04-A	INORG	Cyanide (total)	57-12-5	7.30E-02	7.30E-02							1E-07		1E-05		2E-06		7E-06
04-A	INORG	Lead	7439-92-1	3.20E+01	3.20E+01													
04-A	INORG	Manganese	7439-96-5	2.50E+02														
04-A	INORG	Mercury	7439-97-6	1.86E-02														
04-A	INORG	Nickel	7440-02-0	7.00E+01	5.00E+01						4E-09		4E-09		2E-09		6E-09	
04-A	INORG	Silver	7440-22-4	1.30E-01														
04-A	INORG	Vanadium	7440-62-2	7.20E+00														
04-A	INORG	Zinc	7440-66-6	5.00E+01														
04-B	VOC	2-Butanone	78-93-3	3.50E-02	3.50E-02	8E-09		7E-07		2E-06		2E-08		9E-07		6E-07		5E-06
04-B	VOC	Methyl Acetate	79-20-9	4.80E-01	4.80E-01	2E-07		2E-05		6E-05		4E-07		2E-05		2E-05		1E-05
04-B	VOC	Methylcyclohexane	108-87-2	4.40E-02	4.40E-02	2E-07		7E-05		9E-05		4E-07		2E-05		1E-05		1E-04
04-B	VOC	Trichloroethene	79-01-6	4.60E-02	4.60E-02	9E-07	1E-07		2E-07		1E-10		2E-08		1E-08		4E-09	
04-B	SVOC	Acenaphthene	83-32-9	9.94E-02	9.94E-02			8E-07		2E-06		2E-07		1E-05		5E-06		3E-06
04-B	SVOC	Anthracene	120-12-7	4.23E-01	4.23E-01							8E-08		7E-06		2E-06		4E-07
04-B	SVOC	Benzo(a)anthracene	56-55-3	7.00E-01	7.00E-01		1E-11		4E-11		4E-09		1E-06		2E-07		2E-08	
04-B	SVOC	Benzo(a)pyrene	50-32-8	5.97E-01	5.97E-01		2E-11		5E-11		4E-08		1E-05		2E-06		2E-07	
04-B	SVOC	Benzo(b)fluoranthene	205-99-2	4.46E-01	4.46E-01		1E-10		3E-10		3E-09		7E-07		2E-07		1E-08	
04-B	SVOC	Benzo(g,h,i)perylene	191-24-2	6.77E-01	6.77E-01			6E-12		1E-11		1E-06		1E-04		3E-05		6E-06
04-B	SVOC	Benzo(k)fluoranthene	207-08-9	4.35E-01	4.35E-01		7E-14		2E-13		3E-10		7E-08		2E-08		1E-09	
04-B	SVOC	Biphenyl	92-52-4	5.00E-02	5.00E-02	2E-07		6E-07		2E-06		1E-07		7E-06		3E-06		2E-05
04-B	SVOC	Carbazole	86-74-8	1.14E-01	1.14E-01		1E-13		4E-13		2E-11		5E-09		1E-09		1E-10	
04-B	SVOC	Chrysene	218-01-9	6.97E-01	6.97E-01		4E-12		1E-11		4E-11		1E-08		3E-09		2E-10	
04-B	SVOC	Dibenzofuran	132-64-9	1.72E-01	1.72E-01			1E-06		3E-06		5E-06		4E-04		1E-04		4E-04
04-B	SVOC	Fluoranthene	206-44-0	1.69E+00	1.69E+00			1E-07		4E-07		3E-06		2E-04		6E-05		2E-05
04-B	SVOC	Fluorene	86-73-7	1.02E-01	1.02E-01			3E-07		7E-07		2E-07		2E-05		5E-06		2E-06
04-B	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	5.16E-01	5.16E-01		6E-13		2E-12		3E-09		8E-07		2E-07		2E-08	
04-B	SVOC	2-Methylnaphthalene	91-57-6	1.41E-01	1.41E-01			3E-04		8E-04		2E-05		9E-04		6E-04		5E-03
04-B	SVOC	Naphthalene	91-20-3	1.41E-01	1.41E-01	8E-08		9E-04		2E-03		3E-05		1E-03		1E-03		1E-02
04-B	SVOC	Phenanthrene	85-01-8	1.56E+00	1.56E+00			1E-06		3E-06		3E-06		3E-04		9E-05		3E-05
04-B	SVOC	Pyrene	129-00-0	1.68E+00	1.68E+00			1E-07		3E-07		3E-06		3E-04		8E-05		2E-05
04-B	INORG	Antimony	7440-36-0	4.20E-01	3.34E-01							3E-05		3E-03		4E-04		2E-03
04-B	INORG	Arsenic	7440-38-2	7.00E+00														
04-B	INORG	Barium	7440-39-3	7.70E+01														
04-B	INORG	Beryllium	7440-41-7	5.00E-01														
04-B	INORG	Cadmium	7440-43-9	3.50E-01														
04-B	INORG	Chromium (total)	7440-47-3	1.60E+01														
04-B	INORG	Cobalt	7440-48-4	1.00E+01	2.95E+00						2E-09	3E-04	3E-09	6E-04	2E-09	1E-04	4E-09	5E-03
04-B	INORG	Copper	7440-50-8	6.50E+01	3.65E+01							4E-05		3E-03		4E-04		2E-03

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
04-B	INORG	Cyanide (total)	57-12-5	5.50E+00	5.50E+00							1E-05		1E-03		1E-04		5E-04
04-B	INORG	Lead	7439-92-1	5.20E+01	5.20E+01													
04-B	INORG	Manganese	7439-96-5	6.50E+02	1.73E+02							7E-03		7E-03		2E-03		1E-01
04-B	INORG	Mercury	7439-97-6	2.77E-02														
04-B	INORG	Nickel	7440-02-0	3.60E+01	1.60E+01						1E-09		1E-09		7E-10		2E-09	
04-B	INORG	Silver	7440-22-4	1.20E-01														
04-B	INORG	Thallium	7440-28-0	4.50E-01	2.53E-01							1E-04		1E-02		2E-03		7E-03
04-B	INORG	Vanadium	7440-62-2	1.80E+01														
04-B	INORG	Zinc	7440-66-6	5.40E+01														
04-C	VOC	Methyl Acetate	79-20-9	3.00E-01	3.00E-01	1E-07		1E-05		3E-05		2E-07		1E-05		1E-05		9E-06
04-C	VOC	Methylene Chloride	75-09-2	3.40E-02	3.40E-02	2E-06	2E-08	3E-05	4E-08	7E-05	3E-11	1E-07	4E-09	9E-06	3E-09	5E-06	1E-09	5E-05
04-C	VOC	Trichloroethene	79-01-6	1.10E-01	1.10E-01	2E-06	2E-07		5E-07		2E-10		4E-08		3E-08		9E-09	
04-C	SVOC	Benzo(a)anthracene	56-55-3	7.06E-02	7.06E-02		1E-12		4E-12		4E-10		1E-07		2E-08		2E-09	
04-C	SVOC	Benzo(a)pyrene	50-32-8	3.97E-02	3.97E-02		1E-12		3E-12		2E-09		6E-07		1E-07		1E-08	
04-C	SVOC	Benzo(b)fluoranthene	205-99-2	6.65E-02	6.65E-02		1E-11		4E-11		4E-10		1E-07		2E-08		2E-09	
04-C	SVOC	Benzo(k)fluoranthene	207-08-9	5.46E-02	5.46E-02		9E-15		3E-14		3E-11		9E-09		2E-09		2E-10	
04-C	SVOC	Butylbenzylphthalate	85-68-7	8.87E-02	8.87E-02		3E-14	2E-10	9E-14	6E-10	1E-12	2E-08	4E-10	2E-06	7E-11	5E-07	7E-12	1E-07
04-C	SVOC	Chrysene	218-01-9	9.12E-02	9.12E-02		5E-13		2E-12		5E-12		1E-09		3E-10		3E-11	
04-C	SVOC	Fluoranthene	206-44-0	1.74E-01	1.74E-01			1E-08		4E-08		3E-07		2E-05		6E-06		2E-06
04-C	SVOC	Phenanthrene	85-01-8	1.15E-01	1.15E-01			8E-08		2E-07		2E-07		2E-05		6E-06		2E-06
04-C	SVOC	Pyrene	129-00-0	1.44E-01	1.44E-01			1E-08		3E-08		3E-07		3E-05		7E-06		2E-06
04-C	PCB	PCBs (total)	1336-36-3	1.41E-01	1.41E-01	3E-08	2E-09		5E-09		3E-09	4E-04	7E-07	4E-02	2E-07	1E-02	2E-08	8E-03
04-C	INORG	Arsenic	7440-38-2	4.10E+00														
04-C	INORG	Barium	7440-39-3	1.80E+01														
04-C	INORG	Beryllium	7440-41-7	2.80E-01														
04-C	INORG	Cadmium	7440-43-9	1.90E-01														
04-C	INORG	Chromium (total)	7440-47-3	2.10E+01														
04-C	INORG	Cobalt	7440-48-4	3.50E+00														
04-C	INORG	Copper	7440-50-8	2.40E+01														
04-C	INORG	Lead	7439-92-1	8.70E+00	8.70E+00													
04-C	INORG	Manganese	7439-96-5	2.60E+02														
04-C	INORG	Mercury	7439-97-6	2.42E-02														
04-C	INORG	Nickel	7440-02-0	1.30E+01														
04-C	INORG	Silver	7440-22-4	1.30E-01														
04-C	INORG	Thallium	7440-28-0	1.40E-01														
04-C	INORG	Vanadium	7440-62-2	7.50E+00														
04-C	INORG	Zinc	7440-66-6	3.30E+01														
05-1	VOC	Acetone	67-64-1	3.90E-01	3.90E-01	2E-08		9E-06		2E-05		3E-07		2E-05		1E-05		9E-05
05-1	VOC	2-Butanone	78-93-3	4.90E-02	4.90E-02	1E-08		1E-06		2E-06		2E-08		1E-06		8E-07		7E-06
05-1	VOC	Cyclohexane	110-82-7	3.30E-02	3.30E-02	2E-07		3E-05		3E-05		1E-07		5E-06		4E-06		4E-05
05-1	VOC	cis-1,2-Dichloroethene	156-59-2	2.00E-01	2.00E-01	1E-06		2E-02		3E-02		6E-05		3E-03		2E-03		2E-03
05-1	VOC	Methyl Acetate	79-20-9	1.00E-01	1.00E-01	4E-08		5E-06		1E-05		8E-08		4E-06		3E-06		3E-06
05-1	VOC	Methylcyclohexane	108-87-2	8.00E-02	8.00E-02	3E-07		1E-04		2E-04		6E-07		3E-05		3E-05		2E-04
05-1	VOC	Methylene Chloride	75-09-2	3.20E-02	3.20E-02	2E-06	2E-08	3E-05	4E-08	6E-05	2E-11	1E-07	4E-09	8E-06	2E-09	5E-06	9E-10	5E-05
05-1	VOC	Toluene	108-88-3	4.30E-02	4.30E-02	4E-07		2E-05		5E-05		8E-08		5E-06		3E-06		3E-05
05-1	VOC	Trichloroethene	79-01-6	1.90E+00	1.90E+00	4E-05	4E-06		8E-06		4E-09		7E-07		4E-07		2E-07	
05-1	VOC	Xylenes (total)	1330-20-7	7.30E-02	7.30E-02	3E-07		9E-04		2E-03		4E-06		2E-04		2E-04		1E-03
05-1	SVOC	Acenaphthene	83-32-9	3.21E-01	3.21E-01			3E-06		7E-06		5E-07		4E-05		2E-05		1E-05
05-1	SVOC	Acenaphthylene	208-96-8	9.35E-02	9.35E-02			1E-06		3E-06		3E-07		2E-05		9E-06		5E-06
05-1	SVOC	Acetophenone	98-86-2	4.35E-02	4.35E-02	1E-08		1E-06		3E-06		9E-08		6E-06		3E-06		3E-06
05-1	SVOC	Anthracene	120-12-7	9.13E-01	9.13E-01							2E-07		2E-05		4E-06		9E-07
05-1	SVOC	Benzo(a)anthracene	56-55-3	2.47E+00	2.47E+00		5E-11		2E-10		1E-08		4E-06		9E-07		8E-08	
05-1	SVOC	Benzo(a)pyrene	50-32-8	2.06E+00	2.06E+00		6E-11		2E-10		1E-07		3E-05		7E-06		6E-07	

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
05-1	SVOC	Benzo(b)fluoranthene	205-99-2	2.57E+00	2.57E+00		6E-10		2E-09		2E-08		4E-06		9E-07		8E-08	
05-1	SVOC	Benzo(g,h,i)perylene	191-24-2	1.03E+00	1.03E+00			8E-12		2E-11		2E-06		2E-04		5E-05		1E-05
05-1	SVOC	Benzo(k)fluoranthene	207-08-9	2.97E+00	2.97E+00		5E-13		1E-12		2E-09		5E-07		1E-07		9E-09	
05-1	SVOC	Biphenyl	92-52-4	1.80E-01	1.80E-01	6E-07		2E-06		6E-06		3E-07		3E-05		1E-05		7E-05
05-1	SVOC	Butylbenzylphthalate	85-68-7	4.81E-02	4.81E-02		2E-14	1E-10	5E-14	3E-10	7E-13	1E-08	2E-10	1E-06	4E-11	3E-07	4E-12	7E-08
05-1	SVOC	Carbazole	86-74-8	1.38E+00	1.38E+00		2E-12		5E-12		2E-10		6E-08		1E-08		1E-09	
05-1	SVOC	2-Chloronaphthalene	91-58-7	9.86E-02	9.86E-02			8E-07		2E-06		1E-07		9E-06		4E-06		3E-05
05-1	SVOC	Chrysene	218-01-9	2.69E+00	2.69E+00		2E-11		5E-11		2E-10		4E-08		1E-08		9E-10	
05-1	SVOC	Dibenzofuran	132-64-9	1.96E-01	1.96E-01			1E-06		3E-06		6E-06		5E-04		1E-04		4E-04
05-1	SVOC	Diethylphthalate	84-66-2	9.13E-02	9.13E-02	3E-09		3E-09		9E-09		7E-09		6E-07		2E-07		7E-08
05-1	SVOC	Di-n-butylphthalate	84-74-2	5.11E-02	5.11E-02	6E-13						3E-08		2E-06		6E-07		1E-07
05-1	SVOC	Fluoranthene	206-44-0	2.95E+00	2.95E+00			2E-07		6E-07		4E-06		4E-04		1E-04		3E-05
05-1	SVOC	Fluorene	86-73-7	4.58E-01	4.58E-01			1E-06		3E-06		8E-07		7E-05		2E-05		1E-05
05-1	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	9.19E-01	9.19E-01		1E-12		3E-12		5E-09		1E-06		3E-07		3E-08	
05-1	SVOC	2-Methylnaphthalene	91-57-6	5.46E-01	5.46E-01			1E-03		3E-03		6E-05		3E-03		2E-03		2E-02
05-1	SVOC	Naphthalene	91-20-3	3.13E-01	3.13E-01	2E-07		2E-03		5E-03		6E-05		3E-03		2E-03		2E-02
05-1	SVOC	Phenanthrene	85-01-8	3.42E+00	3.42E+00			2E-06		6E-06		7E-06		6E-04		2E-04		7E-05
05-1	SVOC	Pyrene	129-00-0	4.99E+00	4.99E+00			4E-07		1E-06		1E-05		9E-04		2E-04		6E-05
05-1	PCB	PCBs (total)	1336-36-3	7.19E-01	7.19E-01	1E-07	9E-09		3E-08		1E-08	2E-03	3E-06	2E-01	8E-07	5E-02	1E-07	4E-02
05-1	INORG	Antimony	7440-36-0	2.70E-01	1.84E-01							2E-05		2E-03		2E-04		9E-04
05-1	INORG	Arsenic	7440-38-2	1.20E+01	3.88E+00						4E-08	6E-04	1E-05	5E-02	1E-06	9E-03	2E-07	2E-03
05-1	INORG	Barium	7440-39-3	1.70E+02	7.43E+01													
05-1	INORG	Beryllium	7440-41-7	1.00E+00	4.10E-01						3E-10	5E-05	3E-10	8E-04	2E-10	1E-04	5E-10	1E-03
05-1	INORG	Cadmium	7440-43-9	7.70E-01	1.82E-01						1E-10	1E-05	1E-10	8E-04	6E-11	1E-04	2E-10	4E-04
05-1	INORG	Chromium (total)	7440-47-3	7.60E+01	4.40E+01						2E-07	1E-03	2E-07	5E-02	1E-07	7E-03	3E-07	2E-02
05-1	INORG	Cobalt	7440-48-4	6.50E+00														
05-1	INORG	Copper	7440-50-8	2.10E+04	2.10E+04							2E-02		2E+00		3E-01		1E+00
05-1	INORG	Cyanide (total)	57-12-5	2.70E-01	2.70E-01							5E-07		5E-05		7E-06		3E-05
05-1	INORG	Lead	7439-92-1	3.10E+03	3.10E+03													
05-1	INORG	Manganese	7439-96-5	2.40E+03	1.92E+03							8E-02		8E-02		3E-02		1E+00
05-1	INORG	Mercury	7439-97-6	1.40E+00	1.35E+00	4E-05		5E-03		1E-02		6E-04		4E-02		2E-02		2E-01
05-1	INORG	Nickel	7440-02-0	8.90E+01	6.90E+01						5E-09		5E-09		3E-09		8E-09	
05-1	INORG	Selenium	7782-49-2	5.30E-01	1.06E-02							8E-08		8E-06		1E-06		4E-06
05-1	INORG	Silver	7440-22-4	9.80E+00	9.61E+00							2E-03		8E-03		1E-03		4E-02
05-1	INORG	Thallium	7440-28-0	1.40E-01														
05-1	INORG	Vanadium	7440-62-2	3.10E+01	6.13E+00							3E-05		3E-03		4E-04		2E-03
05-1	INORG	Zinc	7440-66-6	1.80E+02	6.95E+01							9E-06		8E-04		1E-04		5E-04
05-2	VOC	Acetone	67-64-1	3.60E-01	3.60E-01	2E-08		8E-06		2E-05		2E-07		1E-05		1E-05		8E-05
05-2	VOC	Xylenes (total)	1330-20-7	1.08E-01	1.08E-01	4E-07		1E-03		3E-03		5E-06		3E-04		2E-04		2E-03
05-2	SVOC	Benzo(a)anthracene	56-55-3	2.01E-01	2.01E-01		4E-12		1E-11		1E-09		3E-07		7E-08		6E-09	
05-2	SVOC	Benzo(a)pyrene	50-32-8	2.64E-01	2.64E-01		7E-12		2E-11		2E-08		4E-06		9E-07		8E-08	
05-2	SVOC	Benzo(b)fluoranthene	205-99-2	2.08E-01	2.08E-01		5E-11		1E-10		1E-09		3E-07		7E-08		7E-09	
05-2	SVOC	Benzo(g,h,i)perylene	191-24-2	3.68E-01	3.68E-01			3E-12		8E-12		7E-07		6E-05		2E-05		3E-06
05-2	SVOC	Benzo(k)fluoranthene	207-08-9	2.91E-01	2.91E-01		5E-14		1E-13		2E-10		5E-08		1E-08		9E-10	
05-2	SVOC	Chrysene	218-01-9	2.12E-01	2.12E-01		1E-12		4E-12		1E-11		3E-09		8E-10		7E-11	
05-2	SVOC	Fluoranthene	206-44-0	2.76E-01	2.76E-01			2E-08		6E-08		4E-07		4E-05		1E-05		3E-06
05-2	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	2.70E-01	2.70E-01		3E-13		9E-13		2E-09		4E-07		9E-08		8E-09	
05-2	SVOC	Phenanthrene	85-01-8	4.85E-02	4.85E-02			3E-08		9E-08		1E-07		9E-06		3E-06		9E-07
05-2	SVOC	Pyrene	129-00-0	4.48E-01	4.48E-01			3E-08		9E-08		9E-07		8E-05		2E-05		5E-06
05-2	INORG	Arsenic	7440-38-2	7.55E+00														
05-2	INORG	Barium	7440-39-3	4.41E+01														
05-2	INORG	Beryllium	7440-41-7	1.60E-01														
05-2	INORG	Cadmium	7440-43-9	1.44E-01														

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
05-2	INORG	Chromium (total)	7440-47-3	1.34E+01														
05-2	INORG	Cobalt	7440-48-4	2.70E+00														
05-2	INORG	Copper	7440-50-8	5.10E+00														
05-2	INORG	Cyanide (total)	57-12-5	4.70E-02	4.70E-02							9E-08		9E-06		1E-06		5E-06
05-2	INORG	Lead	7439-92-1	7.13E+00	7.13E+00													
05-2	INORG	Manganese	7439-96-5	1.50E+02														
05-2	INORG	Mercury	7439-97-6	4.28E-02														
05-2	INORG	Nickel	7440-02-0	5.90E+00														
05-2	INORG	Selenium	7782-49-2	2.60E-01														
05-2	INORG	Silver	7440-22-4	2.70E-02														
05-2	INORG	Thallium	7440-28-0	4.90E-02														
05-2	INORG	Vanadium	7440-62-2	1.10E+01														
05-2	INORG	Zinc	7440-66-6	2.70E+01														
05-3	VOC	Acetone	67-64-1	3.50E-01	3.50E-01	2E-08		8E-06		2E-05		2E-07		1E-05		1E-05		8E-05
05-3	VOC	2-Butanone	78-93-3	2.90E-02	2.90E-02	7E-09		6E-07		1E-06		1E-08		8E-07		5E-07		4E-06
05-3	VOC	Cyclohexane	110-82-7	3.70E-02	3.70E-02	3E-07		3E-05		4E-05		1E-07		6E-06		5E-06		4E-05
05-3	VOC	Methyl Acetate	79-20-9	5.20E-02	5.20E-02	2E-08		2E-06		6E-06		4E-08		2E-06		2E-06		2E-06
05-3	VOC	Methylcyclohexane	108-87-2	8.60E-02	8.60E-02	3E-07		1E-04		2E-04		7E-07		4E-05		3E-05		3E-04
05-3	VOC	1,1,1-Trichloroethane	71-55-6	2.30E+00	2.30E+00	9E-06		5E-03		6E-03		1E-05		8E-04		6E-04		5E-04
05-3	VOC	Trichloroethene	79-01-6	2.30E-01	2.30E-01	4E-06	5E-07		1E-06		5E-10		8E-08		5E-08		2E-08	
05-3	VOC	Xylenes (total)	1330-20-7	1.23E-01	1.23E-01	5E-07		1E-03		4E-03		6E-06		3E-04		3E-04		2E-03
05-3	SVOC	Benzo(a)anthracene	56-55-3	2.60E-01	2.60E-01		5E-12		2E-11		2E-09		4E-07		9E-08		8E-09	
05-3	SVOC	Benzo(a)pyrene	50-32-8	2.80E-01	2.80E-01		8E-12		2E-11		2E-08		5E-06		1E-06		8E-08	
05-3	SVOC	Benzo(b)fluoranthene	205-99-2	4.15E-01	4.15E-01		9E-11		3E-10		2E-09		7E-07		1E-07		1E-08	
05-3	SVOC	Benzo(g,h,i)perylene	191-24-2	7.50E-02	7.50E-02			6E-13		2E-12		1E-07		1E-05		3E-06		7E-07
05-3	SVOC	Benzo(k)fluoranthene	207-08-9	2.79E-01	2.79E-01		5E-14		1E-13		2E-10		5E-08		1E-08		8E-10	
05-3	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	2.30E-01	2.30E-01	4E-14	2E-16	2E-12	5E-16	4E-12	2E-11	6E-07	7E-09	6E-05	1E-09	1E-05	1E-10	3E-05
05-3	SVOC	Butylbenzylphthalate	85-68-7	7.67E-02	7.67E-02		3E-14	2E-10	8E-14	5E-10	1E-12	2E-08	3E-10	2E-06	6E-11	4E-07	6E-12	1E-07
05-3	SVOC	Chrysene	218-01-9	2.80E-01	2.80E-01		2E-12		5E-12		2E-11		5E-09		1E-09		1E-10	
05-3	SVOC	Di-n-butylphthalate	84-74-2	9.60E-02	9.60E-02	1E-12						5E-08		5E-06		1E-06		2E-07
05-3	SVOC	Fluoranthene	206-44-0	5.80E-01	5.80E-01			5E-08		1E-07		9E-07		8E-05		2E-05		6E-06
05-3	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	9.64E-02	9.64E-02		1E-13		3E-13		6E-10		2E-07		3E-08		3E-09	
05-3	SVOC	Naphthalene	91-20-3	5.60E-02	5.60E-02	3E-08		3E-04		9E-04		1E-05		6E-04		4E-04		4E-03
05-3	SVOC	Phenanthrene	85-01-8	5.00E-01	5.00E-01			4E-07		9E-07		1E-06		9E-05		3E-05		1E-05
05-3	SVOC	Pyrene	129-00-0	5.30E-01	5.30E-01			4E-08		1E-07		1E-06		9E-05		3E-05		6E-06
05-3	PCB	PCBs (total)	1336-36-3	1.69E-01	1.69E-01	3E-08	2E-09		7E-09		3E-09	5E-04	8E-07	4E-02	2E-07	1E-02	2E-08	1E-02
05-3	INORG	Antimony	7440-36-0	1.10E-01	2.36E-02							2E-06		2E-04		3E-05		1E-04
05-3	INORG	Arsenic	7440-38-2	1.07E+01	2.58E+00						3E-08	4E-04	7E-06	3E-02	9E-07	6E-03	1E-07	1E-03
05-3	INORG	Barium	7440-39-3	7.65E+01														
05-3	INORG	Beryllium	7440-41-7	3.20E-01														
05-3	INORG	Cadmium	7440-43-9	4.50E-01														
05-3	INORG	Chromium (total)	7440-47-3	3.60E+01	4.04E+00						1E-08	1E-04	2E-08	5E-03	9E-09	7E-04	2E-08	2E-03
05-3	INORG	Cobalt	7440-48-4	4.60E+00														
05-3	INORG	Copper	7440-50-8	1.50E+02	1.22E+02							1E-04		1E-02		1E-03		6E-03
05-3	INORG	Cyanide (total)	57-12-5	1.80E-02	1.80E-02							4E-08		3E-06		4E-07		2E-06
05-3	INORG	Lead	7439-92-1	4.00E+02	4.00E+02													
05-3	INORG	Manganese	7439-96-5	6.00E+02	1.23E+02							5E-03		5E-03		2E-03		9E-02
05-3	INORG	Mercury	7439-97-6	5.69E-02	4.53E-03	1E-07		2E-05		4E-05		2E-06		1E-04		7E-05		6E-04
05-3	INORG	Nickel	7440-02-0	2.10E+01	1.04E+00						7E-11		8E-11		5E-11		1E-10	
05-3	INORG	Selenium	7782-49-2	1.96E-01														
05-3	INORG	Silver	7440-22-4	2.60E-01	7.23E-02							2E-05		6E-05		1E-05		3E-04
05-3	INORG	Thallium	7440-28-0	1.20E-01														
05-3	INORG	Vanadium	7440-62-2	1.70E+01														

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
05-3	INORG	Zinc	7440-66-6	6.10E+01														
05-4	VOC	Acetone	67-64-1	3.20E-01	3.20E-01	2E-08		7E-06		2E-05		2E-07		1E-05		9E-06		7E-05
05-4	VOC	cis-1,2-Dichloroethene	156-59-2	4.80E-02	4.80E-02	3E-07		5E-03		8E-03		1E-05		7E-04		6E-04		5E-04
05-4	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	4.40E-01	4.40E-01	7E-14	3E-16	3E-12	1E-15	9E-12	5E-11	1E-06	1E-08	1E-04	2E-09	2E-05	2E-10	6E-05
05-4	INORG	Arsenic	7440-38-2	1.04E+01	2.28E+00						2E-08	3E-04	6E-06	3E-02	8E-07	5E-03	1E-07	1E-03
05-4	INORG	Barium	7440-39-3	4.75E+01														
05-4	INORG	Cadmium	7440-43-9	2.21E-01														
05-4	INORG	Chromium (total)	7440-47-3	1.14E+01														
05-4	INORG	Lead	7439-92-1	1.08E+01	1.08E+01													
05-4	INORG	Selenium	7782-49-2	1.87E-01														
05-5	VOC	Acetone	67-64-1	4.00E-01	4.00E-01	2E-08		9E-06		2E-05		3E-07		2E-05		1E-05		9E-05
05-5	VOC	Benzene	71-43-2	4.30E-02	4.30E-02	8E-05	5E-07	6E-03	8E-07	8E-03	5E-10	2E-05	8E-08	8E-04	5E-08	6E-04	2E-08	3E-03
05-5	VOC	2-Butanone	78-93-3	3.70E-02	3.70E-02	9E-09		7E-07		2E-06		2E-08		1E-06		6E-07		6E-06
05-5	VOC	Cyclohexane	110-82-7	1.40E-01	1.40E-01	1E-06		1E-04		1E-04		4E-07		2E-05		2E-05		2E-04
05-5	VOC	Ethyl Benzene	100-41-4	3.00E-02	3.00E-02	1E-07		4E-05		1E-04		2E-07		1E-05		7E-06		6E-05
05-5	VOC	Methyl Acetate	79-20-9	4.40E-02	4.40E-02	2E-08		2E-06		5E-06		4E-08		2E-06		1E-06		1E-06
05-5	VOC	Methylcyclohexane	108-87-2	2.60E-01	2.60E-01	1E-06		4E-04		5E-04		2E-06		1E-04		9E-05		8E-04
05-5	VOC	Methylene Chloride	75-09-2	3.50E-02	3.50E-02	2E-06	2E-08	3E-05	4E-08	7E-05	3E-11	1E-07	4E-09	9E-06	3E-09	6E-06	1E-09	5E-05
05-5	VOC	Toluene	108-88-3	2.60E-01	2.60E-01	2E-06		1E-04		3E-04		5E-07		3E-05		2E-05		2E-04
05-5	VOC	Trichloroethene	79-01-6	5.70E-01	5.70E-01	1E-05	1E-06		2E-06		1E-09		2E-07		1E-07		5E-08	
05-5	VOC	Xylenes (total)	1330-20-7	2.94E-01	2.94E-01	1E-06		4E-03		9E-03		1E-05		8E-04		6E-04		6E-03
05-5	SVOC	Atrazine	1912-24-9	5.09E-02	5.09E-02	5E-11	4E-12	1E-09	1E-11	3E-09	9E-11	8E-08	2E-08	7E-06	5E-09	2E-06	7E-10	6E-06
05-5	SVOC	Benzo(a)anthracene	56-55-3	5.54E-02	5.54E-02		1E-12		3E-12		3E-10		9E-08		2E-08		2E-09	
05-5	SVOC	Benzo(b)fluoranthene	205-99-2	6.95E-02	6.95E-02		2E-11		5E-11		4E-10		1E-07		2E-08		2E-09	
05-5	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	5.30E-01	5.30E-01	8E-14	4E-16	4E-12	1E-15	1E-11	6E-11	1E-06	2E-08	1E-04	3E-09	3E-05	3E-10	7E-05
05-5	SVOC	Chrysene	218-01-9	2.19E-01	2.19E-01		1E-12		4E-12		1E-11		4E-09		8E-10		8E-11	
05-5	SVOC	Fluoranthene	206-44-0	2.10E-01	2.10E-01			2E-08		4E-08		3E-07		3E-05		8E-06		2E-06
05-5	SVOC	Fluorene	86-73-7	1.46E-01	1.46E-01			4E-07		1E-06		3E-07		2E-05		7E-06		3E-06
05-5	SVOC	2-Methylnaphthalene	91-57-6	1.22E-01	1.22E-01			3E-04		7E-04		1E-05		8E-04		5E-04		5E-03
05-5	SVOC	Naphthalene	91-20-3	5.44E-02	5.44E-02	3E-08		3E-04		8E-04		1E-05		5E-04		4E-04		4E-03
05-5	SVOC	Pentachlorophenol	87-86-5	2.80E-01	2.80E-01	3E-09	1E-11	9E-09	4E-11	2E-08	4E-10	7E-07	1E-07	6E-05	3E-08	2E-05	2E-09	5E-05
05-5	SVOC	Phenanthrene	85-01-8	5.60E+00	5.60E+00			4E-06		1E-05		1E-05		1E-03		3E-04		1E-04
05-5	SVOC	Pyrene	129-00-0	4.77E-01	4.77E-01			4E-08		9E-08		9E-07		8E-05		2E-05		6E-06
05-5	PCB	PCBs (total)	1336-36-3	1.66E-01	1.66E-01	3E-08	2E-09		6E-09		3E-09	5E-04	8E-07	4E-02	2E-07	1E-02	2E-08	9E-03
05-5	INORG	Arsenic	7440-38-2	6.90E+00														
05-5	INORG	Barium	7440-39-3	7.30E+01														
05-5	INORG	Beryllium	7440-41-7	5.50E-01														
05-5	INORG	Cadmium	7440-43-9	3.01E-01														
05-5	INORG	Chromium (total)	7440-47-3	4.50E+01	1.30E+01						5E-08	4E-04	5E-08	2E-02	3E-08	2E-03	8E-08	6E-03
05-5	INORG	Cobalt	7440-48-4	7.60E+00	5.46E-01						4E-10	6E-05	5E-10	1E-04	3E-10	3E-05	7E-10	1E-03
05-5	INORG	Copper	7440-50-8	1.60E+01														
05-5	INORG	Cyanide (total)	57-12-5	7.80E-02	7.80E-02							2E-07		1E-05		2E-06		8E-06
05-5	INORG	Lead	7439-92-1	5.70E+01	5.70E+01													
05-5	INORG	Manganese	7439-96-5	1.20E+03	7.23E+02							3E-02		3E-02		1E-02		5E-01
05-5	INORG	Mercury	7439-97-6	6.57E-02	1.33E-02	4E-07		5E-05		1E-04		6E-06		4E-04		2E-04		2E-03
05-5	INORG	Nickel	7440-02-0	1.80E+01														
05-5	INORG	Selenium	7782-49-2	2.96E-01														
05-5	INORG	Silver	7440-22-4	3.37E-01	1.49E-01							3E-05		1E-04		2E-05		6E-04
05-5	INORG	Thallium	7440-28-0	1.30E-01														
05-5	INORG	Vanadium	7440-62-2	1.90E+01														
05-5	INORG	Zinc	7440-66-6	6.10E+01														
05-6	VOC	Acetone	67-64-1	8.90E-02	8.90E-02	5E-09		2E-06		5E-06		6E-08		3E-06		2E-06		2E-05
05-6	VOC	2-Butanone	78-93-3	8.10E-02	8.10E-02	2E-08		2E-06		4E-06		4E-08		2E-06		1E-06		1E-05

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
05-6	VOC	Cyclohexane	110-82-7	3.60E-02	3.60E-02	3E-07		3E-05		4E-05		1E-07		6E-06		5E-06		4E-05
05-6	VOC	Methyl Acetate	79-20-9	5.60E-01	5.60E-01	2E-07		3E-05		6E-05		4E-07		2E-05		2E-05		2E-05
05-6	VOC	4-Methyl-2-pentanone	108-10-1	6.30E-02	6.30E-02	5E-08		4E-06		1E-05		5E-08		3E-06		2E-06		2E-05
05-6	VOC	Methylcyclohexane	108-87-2	6.80E-02	6.80E-02	3E-07		1E-04		1E-04		5E-07		3E-05		2E-05		2E-04
05-6	VOC	Methylene Chloride	75-09-2	5.80E-02	5.80E-02	3E-06	3E-08	6E-05	7E-08	1E-04	4E-11	2E-07	7E-09	1E-05	4E-09	9E-06	2E-09	8E-05
05-6	VOC	Toluene	108-88-3	4.00E-02	4.00E-02	3E-07		2E-05		5E-05		8E-08		5E-06		3E-06		2E-05
05-6	VOC	Trichloroethene	79-01-6	1.60E-01	1.60E-01	3E-06	3E-07		7E-07		4E-10		6E-08		4E-08		1E-08	
05-6	VOC	Xylenes (total)	1330-20-7	6.20E-02	6.20E-02	2E-07		7E-04		2E-03		3E-06		2E-04		1E-04		1E-03
05-6	SVOC	Acenaphthene	83-32-9	1.40E-01	1.40E-01			1E-06		3E-06		2E-07		2E-05		7E-06		4E-06
05-6	SVOC	Acenaphthylene	208-96-8	1.97E-01	1.97E-01			2E-06		6E-06		6E-07		5E-05		2E-05		1E-05
05-6	SVOC	Anthracene	120-12-7	2.47E-01	2.47E-01							5E-08		4E-06		1E-06		2E-07
05-6	SVOC	Benzaldehyde	100-52-7	8.93E-02	8.93E-02			7E-06		2E-05		3E-07		2E-05		1E-05		8E-05
05-6	SVOC	Benzo(a)anthracene	56-55-3	1.58E+00	1.58E+00		3E-11		1E-10		9E-09		3E-06		6E-07		5E-08	
05-6	SVOC	Benzo(a)pyrene	50-32-8	1.82E+00	1.82E+00		5E-11		2E-10		1E-07		3E-05		6E-06		5E-07	
05-6	SVOC	Benzo(b)fluoranthene	205-99-2	1.80E+00	1.80E+00		4E-10		1E-09		1E-08		3E-06		6E-07		6E-08	
05-6	SVOC	Benzo(g,h,i)perylene	191-24-2	1.49E+00	1.49E+00			1E-11		3E-11		3E-06		3E-04		7E-05		1E-05
05-6	SVOC	Benzo(k)fluoranthene	207-08-9	1.89E+00	1.89E+00		3E-13		1E-12		1E-09		3E-07		7E-08		6E-09	
05-6	SVOC	Biphenyl	92-52-4	4.12E-01	4.12E-01	1E-06		5E-06		1E-05		8E-07		6E-05		2E-05		2E-04
05-6	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	7.06E-01	7.06E-01	1E-13	5E-16	5E-12	2E-15	1E-11	7E-11	2E-06	2E-08	2E-04	4E-09	4E-05	4E-10	9E-05
05-6	SVOC	Butylbenzylphthalate	85-68-7	4.33E-02	4.33E-02		1E-14	1E-10	4E-14	3E-10	6E-13	1E-08	2E-10	1E-06	3E-11	3E-07	3E-12	6E-08
05-6	SVOC	Carbazole	86-74-8	2.61E-01	2.61E-01		3E-13		9E-13		4E-11		1E-08		2E-09		2E-10	
05-6	SVOC	Chrysene	218-01-9	2.05E+00	2.05E+00		1E-11		4E-11		1E-10		3E-08		7E-09		7E-10	
05-6	SVOC	Dibenzofuran	132-64-9	1.56E-01	1.56E-01			1E-06		3E-06		4E-06		4E-04		1E-04		4E-04
05-6	SVOC	Diethylphthalate	84-66-2	1.53E-01	1.53E-01	5E-09		6E-09		1E-08		1E-08		1E-06		3E-07		1E-07
05-6	SVOC	Fluoranthene	206-44-0	3.24E+00	3.24E+00			3E-07		7E-07		5E-06		4E-04		1E-04		3E-05
05-6	SVOC	Fluorene	86-73-7	1.66E-01	1.66E-01			4E-07		1E-06		3E-07		3E-05		8E-06		4E-06
05-6	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	9.95E-01	9.95E-01		1E-12		3E-12		6E-09		2E-06		3E-07		3E-08	
05-6	SVOC	2-Methylnaphthalene	91-57-6	6.84E-01	6.84E-01			1E-03		4E-03		8E-05		4E-03		3E-03		3E-02
05-6	SVOC	Methylphenol (total)	1319-77-3	1.23E-01	1.23E-01	4E-09						1E-07		1E-05		3E-06		6E-07
05-6	SVOC	Naphthalene	91-20-3	4.71E-01	4.71E-01	3E-07		3E-03		7E-03		9E-05		5E-03		4E-03		3E-02
05-6	SVOC	Pentachlorophenol	87-86-5	1.03E-01	1.03E-01	1E-09	4E-12	3E-09	1E-11	9E-09	1E-10	3E-07	4E-08	2E-05	1E-08	8E-06	9E-10	2E-05
05-6	SVOC	Phenanthrene	85-01-8	3.18E+00	3.18E+00			2E-06		6E-06		7E-06		6E-04		2E-04		6E-05
05-6	SVOC	Pyrene	129-00-0	5.18E+00	5.18E+00			4E-07		1E-06		1E-05		9E-04		2E-04		6E-05
05-6	PCB	PCBs (total)	1336-36-3	3.99E-01	3.99E-01	7E-08	5E-09		2E-08		7E-09	1E-03	2E-06	1E-01	5E-07	3E-02	6E-08	2E-02
05-6	INORG	Antimony	7440-36-0	3.60E-02														
05-6	INORG	Arsenic	7440-38-2	9.50E+00	1.38E+00						1E-08	2E-04	4E-06	2E-02	5E-07	3E-03	7E-08	6E-04
05-6	INORG	Barium	7440-39-3	3.30E+02	2.34E+02													
05-6	INORG	Beryllium	7440-41-7	1.60E+00	1.01E+00						7E-10	1E-04	8E-10	2E-03	4E-10	3E-04	1E-09	3E-03
05-6	INORG	Cadmium	7440-43-9	5.10E-01														
05-6	INORG	Chromium (total)	7440-47-3	5.60E+01	2.40E+01						8E-08	8E-04	9E-08	3E-02	5E-08	4E-03	1E-07	1E-02
05-6	INORG	Cobalt	7440-48-4	7.20E+00	1.46E-01						1E-10	2E-05	1E-10	3E-05	8E-11	7E-06	2E-10	3E-04
05-6	INORG	Copper	7440-50-8	9.30E+01	6.45E+01							6E-05		6E-03		8E-04		3E-03
05-6	INORG	Cyanide (total)	57-12-5	1.60E-01	1.60E-01							3E-07		3E-05		4E-06		2E-05
05-6	INORG	Lead	7439-92-1	3.50E+03	3.50E+03													
05-6	INORG	Manganese	7439-96-5	4.40E+02														
05-6	INORG	Mercury	7439-97-6	8.07E-02	2.83E-02	9E-07		1E-04		3E-04		1E-05		8E-04		4E-04		4E-03
05-6	INORG	Nickel	7440-02-0	2.80E+01	8.04E+00						6E-10		6E-10		4E-10		9E-10	
05-6	INORG	Selenium	7782-49-2	3.00E-01														
05-6	INORG	Silver	7440-22-4	2.20E-01	3.23E-02							7E-06		3E-05		5E-06		1E-04
05-6	INORG	Thallium	7440-28-0	1.90E-01														
05-6	INORG	Vanadium	7440-62-2	2.30E+01														
05-6	INORG	Zinc	7440-66-6	1.90E+02	7.95E+01							1E-05		1E-03		1E-04		5E-04
07-1	VOC	Acetone	67-64-1	1.30E-01	1.30E-01	7E-09		3E-06		7E-06		9E-08		5E-06		4E-06		3E-05

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
07-1	VOC	Benzene	71-43-2	2.00E-01	2.00E-01	4E-04	2E-06	3E-02	4E-06	4E-02	2E-09	7E-05	4E-07	4E-03	2E-07	3E-03	9E-08	1E-02
07-1	VOC	2-Butanone	78-93-3	2.00E-01	2.00E-01	5E-08		4E-06		1E-05		9E-08		5E-06		3E-06		3E-05
07-1	VOC	Cumene	98-82-8	1.20E-01	1.20E-01	9E-07		4E-04		1E-03		1E-06		8E-05		6E-05		6E-04
07-1	VOC	Cyclohexane	110-82-7	8.60E-01	8.60E-01	6E-06		7E-04		8E-04		3E-06		1E-04		1E-04		1E-03
07-1	VOC	Ethyl Benzene	100-41-4	3.50E-01	3.50E-01	2E-06		5E-04		1E-03		2E-06		1E-04		8E-05		8E-04
07-1	VOC	Methyl Acetate	79-20-9	3.10E-01	3.10E-01	1E-07		1E-05		4E-05		2E-07		1E-05		1E-05		9E-06
07-1	VOC	Methylcyclohexane	108-87-2	2.50E+00	2.50E+00	9E-06		4E-03		5E-03		2E-05		1E-03		8E-04		8E-03
07-1	VOC	Methylene Chloride	75-09-2	1.00E-01	1.00E-01	5E-06	5E-08	1E-04	1E-07	2E-04	8E-11	4E-07	1E-08	3E-05	8E-09	2E-05	3E-09	1E-04
07-1	VOC	Toluene	108-88-3	1.10E+00	1.10E+00	1E-05		5E-04		1E-03		2E-06		1E-04		8E-05		6E-04
07-1	VOC	Xylenes (total)	1330-20-7	2.50E+00	2.50E+00	1E-05		3E-02		8E-02		1E-04		7E-03		5E-03		5E-02
07-1	SVOC	Acenaphthene	83-32-9	1.16E+00	1.16E+00			9E-06		2E-05		2E-06		1E-04		6E-05		4E-05
07-1	SVOC	Anthracene	120-12-7	2.31E+00	2.31E+00							4E-07		4E-05		1E-05		2E-06
07-1	SVOC	Benzo(a)anthracene	56-55-3	4.07E+00	4.07E+00		8E-11		3E-10		2E-08		7E-06		1E-06		1E-07	
07-1	SVOC	Benzo(a)pyrene	50-32-8	4.04E+00	4.04E+00		1E-10		3E-10		2E-07		7E-05		1E-05		1E-06	
07-1	SVOC	Benzo(b)fluoranthene	205-99-2	3.94E+00	3.94E+00		9E-10		3E-09		2E-08		6E-06		1E-06		1E-07	
07-1	SVOC	Benzo(g,h,i)perylene	191-24-2	2.48E+00	2.48E+00			2E-11		5E-11		5E-06		4E-04		1E-04		2E-05
07-1	SVOC	Benzo(k)fluoranthene	207-08-9	3.59E+00	3.59E+00		6E-13		2E-12		2E-09		6E-07		1E-07		1E-08	
07-1	SVOC	Biphenyl	92-52-4	1.15E-01	1.15E-01	4E-07		1E-06		4E-06		2E-07		2E-05		7E-06		5E-05
07-1	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	9.65E-01	9.65E-01	2E-13	7E-16	7E-12	2E-15	2E-11	1E-10	3E-06	3E-08	2E-04	5E-09	5E-05	5E-10	1E-04
07-1	SVOC	Butylbenzylphthalate	85-68-7	9.54E-02	9.54E-02		3E-14	2E-10	1E-13	6E-10	1E-12	3E-08	4E-10	2E-06	8E-11	6E-07	8E-12	1E-07
07-1	SVOC	Carbazole	86-74-8	1.16E+00	1.16E+00		1E-12		4E-12		2E-10		5E-08		1E-08		1E-09	
07-1	SVOC	Chrysene	218-01-9	4.03E+00	4.03E+00		2E-11		7E-11		2E-10		7E-08		1E-08		1E-09	
07-1	SVOC	Dibenz(a,h)anthracene	53-70-3	1.64E-01	1.64E-01		2E-14		6E-14		1E-08		3E-06		6E-07		5E-08	
07-1	SVOC	Dibenzofuran	132-64-9	7.24E-01	7.24E-01			5E-06		1E-05		2E-05		2E-03		5E-04		2E-03
07-1	SVOC	Fluoranthene	206-44-0	6.56E+00	6.56E+00			5E-07		1E-06		1E-05		9E-04		2E-04		6E-05
07-1	SVOC	Fluorene	86-73-7	1.00E+00	1.00E+00			3E-06		7E-06		2E-06		2E-04		5E-05		2E-05
07-1	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	2.09E+00	2.09E+00		2E-12		7E-12		1E-08		3E-06		7E-07		6E-08	
07-1	SVOC	2-Methylnaphthalene	91-57-6	6.08E-01	6.08E-01			1E-03		3E-03		7E-05		4E-03		3E-03		2E-02
07-1	SVOC	Naphthalene	91-20-3	3.74E-01	3.74E-01	2E-07		2E-03		6E-03		7E-05		4E-03		3E-03		3E-02
07-1	SVOC	Phenanthrene	85-01-8	6.68E+00	6.68E+00			5E-06		1E-05		1E-05		1E-03		4E-04		1E-04
07-1	SVOC	Pyrene	129-00-0	7.86E+00	7.86E+00			6E-07		2E-06		2E-05		1E-03		4E-04		1E-04
07-1	INORG	Antimony	7440-36-0	2.00E-01	1.14E-01							1E-05		1E-03		1E-04		6E-04
07-1	INORG	Arsenic	7440-38-2	1.80E+01	9.88E+00						1E-07	1E-03	3E-05	1E-01	4E-06	2E-02	5E-07	4E-03
07-1	INORG	Barium	7440-39-3	1.60E+02	6.43E+01													
07-1	INORG	Beryllium	7440-41-7	1.10E+00	5.10E-01						4E-10	6E-05	4E-10	1E-03	2E-10	1E-04	6E-10	1E-03
07-1	INORG	Cadmium	7440-43-9	8.30E-01	2.42E-01						1E-10	1E-05	1E-10	1E-03	8E-11	2E-04	2E-10	5E-04
07-1	INORG	Chromium (total)	7440-47-3	4.50E+01	1.30E+01						5E-08	4E-04	5E-08	2E-02	3E-08	2E-03	8E-08	6E-03
07-1	INORG	Cobalt	7440-48-4	2.80E+01	2.09E+01						2E-08	2E-03	2E-08	5E-03	1E-08	1E-03	3E-08	4E-02
07-1	INORG	Copper	7440-50-8	3.80E+01	9.54E+00							9E-06		9E-04		1E-04		5E-04
07-1	INORG	Cyanide (total)	57-12-5	2.90E+00	2.90E+00							6E-06		5E-04		7E-05		3E-04
07-1	INORG	Lead	7439-92-1	2.00E+02	2.00E+02													
07-1	INORG	Manganese	7439-96-5	9.00E+02	4.23E+02							2E-02		2E-02		6E-03		3E-01
07-1	INORG	Mercury	7439-97-6	9.60E-02	4.36E-02	1E-06		2E-04		4E-04		2E-05		1E-03		7E-04		6E-03
07-1	INORG	Nickel	7440-02-0	3.70E+01	1.70E+01						1E-09		1E-09		8E-10		2E-09	
07-1	INORG	Selenium	7782-49-2	1.50E+00	9.81E-01							8E-06		7E-04		1E-04		4E-04
07-1	INORG	Silver	7440-22-4	2.20E-01	3.23E-02							7E-06		3E-05		5E-06		1E-04
07-1	INORG	Thallium	7440-28-0	3.40E-01	1.43E-01							8E-05		7E-03		1E-03		4E-03
07-1	INORG	Vanadium	7440-62-2	4.80E+01	2.31E+01							1E-04		1E-02		2E-03		6E-03
07-1	INORG	Zinc	7440-66-6	2.00E+02	8.95E+01							1E-05		1E-03		1E-04		6E-04
07-2	SVOC	Benzo(a)anthracene	56-55-3	3.91E-02	3.91E-02		8E-13		2E-12		2E-10		6E-08		1E-08		1E-09	
07-2	SVOC	Benzo(a)pyrene	50-32-8	3.77E-02	3.77E-02		1E-12		3E-12		2E-09		6E-07		1E-07		1E-08	
07-2	SVOC	Benzo(b)fluoranthene	205-99-2	1.28E-01	1.28E-01		3E-11		8E-11		8E-10		2E-07		5E-08		4E-09	
07-2	SVOC	Benzo(k)fluoranthene	207-08-9	1.30E-01	1.30E-01		2E-14		7E-14		8E-11		2E-08		5E-09		4E-10	

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
07-2	SVOC	Chrysene	218-01-9	4.22E-02	4.22E-02		2E-13		7E-13		3E-12		7E-10		2E-10		1E-11	
07-2	SVOC	Fluoranthene	206-44-0	5.96E-02	5.96E-02			5E-09		1E-08		9E-08		8E-06		2E-06		6E-07
07-2	SVOC	Phenanthrene	85-01-8	3.91E-02	3.91E-02			3E-08		7E-08		8E-08		7E-06		2E-06		8E-07
07-2	SVOC	Pyrene	129-00-0	6.76E-02	6.76E-02			5E-09		1E-08		1E-07		1E-05		3E-06		8E-07
07-2	INORG	Antimony	7440-36-0	1.30E-01	4.36E-02							4E-06		4E-04		5E-05		2E-04
07-2	INORG	Arsenic	7440-38-2	5.70E+00														
07-2	INORG	Barium	7440-39-3	2.10E+01														
07-2	INORG	Beryllium	7440-41-7	1.80E-01														
07-2	INORG	Cadmium	7440-43-9	2.20E-01														
07-2	INORG	Chromium (total)	7440-47-3	9.60E+00														
07-2	INORG	Cobalt	7440-48-4	3.30E+00														
07-2	INORG	Copper	7440-50-8	1.00E+01														
07-2	INORG	Cyanide (total)	57-12-5	8.00E-02	8.00E-02							2E-07		1E-05		2E-06		8E-06
07-2	INORG	Lead	7439-92-1	1.40E+01	1.40E+01													
07-2	INORG	Manganese	7439-96-5	2.90E+02														
07-2	INORG	Nickel	7440-02-0	1.30E+01														
07-2	INORG	Selenium	7782-49-2	4.40E-01														
07-2	INORG	Thallium	7440-28-0	1.30E-01														
07-2	INORG	Vanadium	7440-62-2	1.20E+01														
07-2	INORG	Zinc	7440-66-6	4.00E+01														
07-3	VOC	2-Butanone	78-93-3	2.60E-02	2.60E-02	6E-09		5E-07		1E-06		1E-08		7E-07		4E-07		4E-06
07-3	VOC	Methyl Acetate	79-20-9	5.30E-02	5.30E-02	2E-08		2E-06		6E-06		4E-08		2E-06		2E-06		2E-06
07-3	VOC	Methylcyclohexane	108-87-2	8.30E-02	8.30E-02	3E-07		1E-04		2E-04		7E-07		4E-05		3E-05		3E-04
07-3	VOC	Tetrachloroethene	127-18-4	2.30E-01	2.30E-01	1E-05	1E-06	3E-03	2E-06	3E-03	1E-09	7E-06	2E-07	4E-04	1E-07	3E-04	4E-08	3E-03
07-3	VOC	Xylenes (total)	1330-20-7	5.90E-02	5.90E-02	2E-07		7E-04		2E-03		3E-06		2E-04		1E-04		1E-03
07-3	SVOC	Acetophenone	98-86-2	2.99E-02	2.99E-02	9E-09		9E-07		2E-06		6E-08		4E-06		2E-06		2E-06
07-3	SVOC	Benzo(a)anthracene	56-55-3	4.24E-02	4.24E-02		9E-13		3E-12		3E-10		7E-08		1E-08		1E-09	
07-3	SVOC	Benzo(a)pyrene	50-32-8	4.75E-02	4.75E-02		1E-12		4E-12		3E-09		8E-07		2E-07		1E-08	
07-3	SVOC	Benzo(b)fluoranthene	205-99-2	4.89E-02	4.89E-02		1E-11		3E-11		3E-10		8E-08		2E-08		2E-09	
07-3	SVOC	Benzo(k)fluoranthene	207-08-9	5.99E-02	5.99E-02		1E-14		3E-14		4E-11		1E-08		2E-09		2E-10	
07-3	SVOC	Biphenyl	92-52-4	1.78E-01	1.78E-01	6E-07		2E-06		6E-06		3E-07		3E-05		1E-05		7E-05
07-3	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	5.79E-02	5.79E-02	9E-15	4E-17	4E-13	1E-16	1E-12	6E-12	2E-07	2E-09	1E-05	3E-10	3E-06	3E-11	8E-06
07-3	SVOC	Chrysene	218-01-9	5.72E-02	5.72E-02		3E-13		1E-12		3E-12		9E-10		2E-10		2E-11	
07-3	SVOC	2,4-Dichlorophenol	120-83-2	3.41E-02	3.41E-02			4E-06		1E-05		1E-06		8E-05		3E-05		2E-04
07-3	SVOC	Diethylphthalate	84-66-2	1.36E+00	1.36E+00	4E-08		5E-08		1E-07		1E-07		9E-06		3E-06		1E-06
07-3	SVOC	2,4-Dimethylphenol	105-67-9	2.99E-02	2.99E-02			3E-07		7E-07		1E-07		1E-05		4E-06		2E-06
07-3	SVOC	Fluoranthene	206-44-0	1.04E-01	1.04E-01			9E-09		2E-08		2E-07		1E-05		4E-06		1E-06
07-3	SVOC	Methylphenol (total)	1319-77-3	2.51E-01	2.51E-01	9E-09						3E-07		2E-05		6E-06		1E-06
07-3	SVOC	Naphthalene	91-20-3	2.29E-02	2.29E-02	1E-08		1E-04		4E-04		4E-06		2E-04		2E-04		2E-03
07-3	SVOC	2-Nitrophenol	88-75-5	2.87E-02	2.87E-02													
07-3	SVOC	Phenanthrene	85-01-8	4.75E-02	4.75E-02			3E-08		9E-08		1E-07		9E-06		3E-06		9E-07
07-3	SVOC	Pyrene	129-00-0	8.75E-02	8.75E-02			7E-09		2E-08		2E-07		2E-05		4E-06		1E-06
07-3	PCB	PCBs (total)	1336-36-3	8.10E-02	8.10E-02	1E-08	1E-09		3E-09		1E-09	2E-04	4E-07	2E-02	9E-08	6E-03	1E-08	5E-03
07-3	INORG	Antimony	7440-36-0	1.40E-01	5.36E-02							5E-06		5E-04		7E-05		3E-04
07-3	INORG	Arsenic	7440-38-2	2.80E+01	1.99E+01						2E-07	3E-03	5E-05	3E-01	7E-06	5E-02	1E-06	9E-03
07-3	INORG	Barium	7440-39-3	5.60E+01														
07-3	INORG	Beryllium	7440-41-7	3.50E-01														
07-3	INORG	Cadmium	7440-43-9	3.50E-01														
07-3	INORG	Chromium (total)	7440-47-3	2.70E+01														
07-3	INORG	Cobalt	7440-48-4	5.30E+00														
07-3	INORG	Copper	7440-50-8	1.30E+01														
07-3	INORG	Cyanide (total)	57-12-5	3.90E-02	3.90E-02							8E-08		7E-06		1E-06		4E-06
07-3	INORG	Lead	7439-92-1	3.60E+01	3.60E+01													

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
07-3	INORG	Manganese	7439-96-5	7.30E+02	2.53E+02							1E-02		1E-02		4E-03		2E-01
07-3	INORG	Mercury	7439-97-6	3.58E-02														
07-3	INORG	Nickel	7440-02-0	1.30E+01														
07-3	INORG	Selenium	7782-49-2	5.00E-01														
07-3	INORG	Silver	7440-22-4	1.10E-01														
07-3	INORG	Thallium	7440-28-0	1.20E-01														
07-3	INORG	Vanadium	7440-62-2	2.30E+01														
07-3	INORG	Zinc	7440-66-6	5.60E+01														
09-A	VOC	Acetone	67-64-1	2.90E-01	2.90E-01	2E-08		6E-06		2E-05		2E-07		1E-05		8E-06		7E-05
09-A	VOC	Benzene	71-43-2	1.20E-01	1.20E-01	2E-04	1E-06	2E-02	2E-06	2E-02	1E-09	4E-05	2E-07	2E-03	1E-07	2E-03	5E-08	8E-03
09-A	VOC	2-Butanone	78-93-3	7.20E-02	7.20E-02	2E-08		1E-06		4E-06		3E-08		2E-06		1E-06		1E-05
09-A	VOC	Carbon Tetrachloride	56-23-5	2.40E-01	2.40E-01	1E-04	7E-06		9E-06		7E-09		1E-06		8E-07		3E-07	
09-A	VOC	Chlorobenzene	108-90-7	1.70E-02	1.70E-02	8E-08		3E-04		8E-04		1E-06		7E-05		6E-05		5E-04
09-A	VOC	Chloroform	67-66-3	7.90E-02	7.90E-02	4E-05	2E-06	5E-03	5E-06	9E-03	3E-09	2E-05	4E-07	9E-04	3E-07	7E-04	1E-07	7E-03
09-A	VOC	Chloromethane	74-87-3	3.30E-02	3.30E-02	2E-06		2E-03		2E-03		6E-06		3E-04		3E-04		2E-03
09-A	VOC	Cumene	98-82-8	1.90E-01	1.90E-01	1E-06		6E-04		2E-03		2E-06		1E-04		1E-04		9E-04
09-A	VOC	Cyclohexane	110-82-7	2.10E-01	2.10E-01	1E-06		2E-04		2E-04		6E-07		3E-05		3E-05		2E-04
09-A	VOC	1,2-Dichlorobenzene	95-50-1	8.60E-03	8.60E-03	2E-08		1E-05		2E-05		9E-08		5E-06		4E-06		4E-06
09-A	VOC	1,3-Dichlorobenzene	541-73-1	4.40E-01	4.40E-01			1E-03		3E-03		9E-06		5E-04		4E-04		3E-03
09-A	VOC	1,4-Dichlorobenzene	106-46-7	7.10E-01	7.10E-01	7E-07	5E-07	3E-04	1E-06	7E-04	2E-09	3E-06	3E-07	2E-04	2E-07	1E-04	6E-08	3E-04
09-A	VOC	1,2-Dichloroethane	107-06-2	1.50E-02	1.50E-02	7E-06	2E-07	4E-03	5E-07	9E-03	4E-10	2E-05	6E-08	1E-03	4E-08	9E-04	2E-08	8E-03
09-A	VOC	cis-1,2-Dichloroethene	156-59-2	1.10E-01	1.10E-01	8E-07		1E-02		2E-02		3E-05		2E-03		1E-03		1E-03
09-A	VOC	trans-1,2-Dichloroethene	156-60-5	9.10E-03	9.10E-03	8E-08		8E-04		9E-04		2E-06		1E-04		8E-05		7E-04
09-A	VOC	Ethyl Benzene	100-41-4	3.10E-01	3.10E-01	2E-06		5E-04		1E-03		2E-06		1E-04		7E-05		7E-04
09-A	VOC	Methyl Acetate	79-20-9	4.00E-01	4.00E-01	2E-07		2E-05		5E-05		3E-07		2E-05		1E-05		1E-05
09-A	VOC	Methylcyclohexane	108-87-2	1.56E+00	1.56E+00	6E-06		3E-03		3E-03		1E-05		7E-04		5E-04		5E-03
09-A	VOC	Methylene Chloride	75-09-2	9.80E-02	9.80E-02	5E-06	5E-08	1E-04	1E-07	2E-04	8E-11	4E-07	1E-08	2E-05	8E-09	2E-05	3E-09	1E-04
09-A	VOC	Tetrachloroethene	127-18-4	3.20E-01	3.20E-01	1E-05	2E-06	4E-03	2E-06	5E-03	2E-09	1E-05	3E-07	6E-04	2E-07	4E-04	6E-08	4E-03
09-A	VOC	Toluene	108-88-3	7.50E-01	7.50E-01	6E-06		3E-04		8E-04		1E-06		9E-05		5E-05		4E-04
09-A	VOC	1,2,4-Trichlorobenzene	120-82-1	3.90E+00	3.90E+00			1E-03		3E-03		3E-05		2E-03		8E-04		1E-03
09-A	VOC	1,1,1-Trichloroethane	71-55-6	4.40E-01	4.40E-01	2E-06		1E-03		1E-03		3E-06		1E-04		1E-04		1E-04
09-A	VOC	Trichloroethene	79-01-6	2.22E+00	2.22E+00	4E-05	5E-06		1E-05		5E-09		8E-07		5E-07		2E-07	
09-A	VOC	Trichlorofluoromethane	75-69-4	2.60E-02	2.60E-02	3E-08		2E-04		2E-04		9E-07		5E-05		4E-05		3E-05
09-A	VOC	Vinyl Chloride	75-01-4	4.70E-02	4.70E-02	1E-04	7E-07	2E-03	1E-06	3E-03	2E-09	1E-05	3E-07	7E-04	2E-07	5E-04	6E-08	5E-03
09-A	VOC	Xylenes (total)	1330-20-7	2.10E+00	2.10E+00	8E-06		3E-02		6E-02		1E-04		6E-03		4E-03		4E-02
09-A	SVOC	Acenaphthene	83-32-9	2.31E+00	2.31E+00			2E-05		5E-05		4E-06		3E-04		1E-04		7E-05
09-A	SVOC	Acenaphthylene	208-96-8	1.11E-01	1.11E-01			1E-06		3E-06		3E-07		3E-05		1E-05		6E-06
09-A	SVOC	Anthracene	120-12-7	1.58E+01	1.58E+01							3E-06		3E-04		7E-05		1E-05
09-A	SVOC	Benzo(a)anthracene	56-55-3	5.02E+01	5.02E+01		1E-09		3E-09		3E-07		8E-05		2E-05		2E-06	
09-A	SVOC	Benzo(a)pyrene	50-32-8	5.65E+01	5.65E+01		2E-09		5E-09		3E-06		9E-04		2E-04		2E-05	
09-A	SVOC	Benzo(b)fluoranthene	205-99-2	5.69E+01	5.69E+01		1E-08		4E-08		3E-07		9E-05		2E-05		2E-06	
09-A	SVOC	Benzo(g,h,i)perylene	191-24-2	2.05E+01	2.05E+01			2E-10		4E-10		4E-05		4E-03		9E-04		2E-04
09-A	SVOC	Benzo(k)fluoranthene	207-08-9	5.25E+01	5.25E+01		9E-12		3E-11		3E-08		8E-06		2E-06		2E-07	
09-A	SVOC	Biphenyl	92-52-4	7.56E-02	7.56E-02	2E-07		1E-06		2E-06		1E-07		1E-05		5E-06		3E-05
09-A	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	1.31E+00	1.31E+00	2E-13	1E-15	1E-11	3E-15	3E-11	1E-10	3E-06	4E-08	3E-04	7E-09	7E-05	7E-10	2E-04
09-A	SVOC	Butylbenzylphthalate	85-68-7	7.00E-01	7.00E-01		2E-13	2E-09	7E-13	4E-09	1E-11	2E-07	3E-09	2E-05	6E-10	4E-06	6E-11	1E-06
09-A	SVOC	Carbazole	86-74-8	2.25E+00	2.25E+00		2E-12		8E-12		3E-10		9E-08		2E-08		2E-09	
09-A	SVOC	Chrysene	218-01-9	4.94E+01	4.94E+01		3E-10		9E-10		3E-09		8E-07		2E-07		2E-08	
09-A	SVOC	Dibenz(a,h)anthracene	53-70-3	1.10E+01	1.10E+01		1E-12		4E-12		6E-07		2E-04		4E-05		3E-06	
09-A	SVOC	Dibenzofuran	132-64-9	4.55E-01	4.55E-01			3E-06		8E-06		1E-05		1E-03		3E-04		1E-03
09-A	SVOC	Di-n-butylphthalate	84-74-2	5.00E-02	5.00E-02	5E-13						3E-08		2E-06		6E-07		1E-07
09-A	SVOC	Fluoranthene	206-44-0	1.10E+02	1.10E+02			9E-06		2E-05		2E-04		1E-02		4E-03		1E-03
09-A	SVOC	Fluorene	86-73-7	3.06E+00	3.06E+00			8E-06		2E-05		6E-06		5E-04		2E-04		7E-05

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
09-A	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	2.22E+01	2.22E+01		3E-11		8E-11		1E-07		4E-05		8E-06		7E-07	
09-A	SVOC	2-Methylnaphthalene	91-57-6	3.64E-01	3.64E-01			8E-04		2E-03		4E-05		2E-03		2E-03		1E-02
09-A	SVOC	Naphthalene	91-20-3	2.65E-01	2.65E-01	1E-07		2E-03		4E-03		5E-05		3E-03		2E-03		2E-02
09-A	SVOC	Phenanthrene	85-01-8	4.55E+01	4.55E+01			3E-05		8E-05		1E-04		8E-03		3E-03		9E-04
09-A	SVOC	Pyrene	129-00-0	1.09E+02	1.09E+02			8E-06		2E-05		2E-04		2E-02		5E-03		1E-03
09-A	PCB	PCBs (total)	1336-36-3	8.16E+00	8.16E+00	1E-06	1E-07		3E-07		1E-07	2E-02	4E-05	2E+00	9E-06	6E-01	1E-06	5E-01
09-A	INORG	Antimony	7440-36-0	8.54E+00	8.45E+00							8E-04		8E-02		1E-02		4E-02
09-A	INORG	Arsenic	7440-38-2	1.04E+01	2.28E+00						2E-08	3E-04	6E-06	3E-02	8E-07	5E-03	1E-07	1E-03
09-A	INORG	Barium	7440-39-3	2.70E+02	1.74E+02													
09-A	INORG	Beryllium	7440-41-7	1.20E+00	6.10E-01						4E-10	7E-05	5E-10	1E-03	3E-10	2E-04	7E-10	2E-03
09-A	INORG	Cadmium	7440-43-9	5.70E+00	5.11E+00						3E-09	3E-04	3E-09	2E-02	2E-09	4E-03	5E-09	1E-02
09-A	INORG	Chromium (total)	7440-47-3	9.90E+01	6.70E+01						2E-07	2E-03	3E-07	8E-02	1E-07	1E-02	4E-07	3E-02
09-A	INORG	Cobalt	7440-48-4	1.20E+01	4.95E+00						4E-09	5E-04	4E-09	1E-03	3E-09	2E-04	7E-09	9E-03
09-A	INORG	Copper	7440-50-8	2.50E+03	2.47E+03							2E-03		2E-01		3E-02		1E-01
09-A	INORG	Cyanide (total)	57-12-5	2.60E+00	2.60E+00							5E-06		5E-04		6E-05		3E-04
09-A	INORG	Lead	7439-92-1	1.20E+05	1.20E+05													
09-A	INORG	Manganese	7439-96-5	8.30E+03	7.82E+03							3E-01		3E-01		1E-01		5E+00
09-A	INORG	Mercury	7439-97-6	2.30E+00	2.25E+00	7E-05		8E-03		2E-02		1E-03		7E-02		3E-02		3E-01
09-A	INORG	Nickel	7440-02-0	4.00E+01	2.00E+01						1E-09		1E-09		9E-10		2E-09	
09-A	INORG	Selenium	7782-49-2	9.90E-01	4.71E-01							4E-06		3E-04		5E-05		2E-04
09-A	INORG	Silver	7440-22-4	6.70E+00	6.51E+00							1E-03		5E-03		1E-03		2E-02
09-A	INORG	Thallium	7440-28-0	3.11E+00	2.91E+00							2E-03		2E-01		2E-02		8E-02
09-A	INORG	Vanadium	7440-62-2	2.50E+01	1.29E-01							7E-07		7E-05		9E-06		4E-05
09-A	INORG	Zinc	7440-66-6	1.60E+03	1.49E+03							2E-04		2E-02		2E-03		1E-02
09-B	VOC	Acetone	67-64-1	7.40E-02	7.40E-02	4E-09		2E-06		4E-06		5E-08		3E-06		2E-06		2E-05
09-B	VOC	Benzene	71-43-2	5.50E-01	5.50E-01	1E-03	6E-06	7E-02	1E-05	1E-01	7E-09	2E-04	1E-06	1E-02	7E-07	8E-03	3E-07	4E-02
09-B	VOC	2-Butanone	78-93-3	4.90E-02	4.90E-02	1E-08		1E-06		2E-06		2E-08		1E-06		8E-07		7E-06
09-B	VOC	Chloromethane	74-87-3	3.60E-02	3.60E-02	3E-06		2E-03		2E-03		7E-06		4E-04		3E-04		3E-03
09-B	VOC	Cumene	98-82-8	8.20E-01	8.20E-01	6E-06		3E-03		7E-03		1E-05		6E-04		4E-04		4E-03
09-B	VOC	Cyclohexane	110-82-7	1.30E+01	1.30E+01	9E-05		1E-02		1E-02		4E-05		2E-03		2E-03		2E-02
09-B	VOC	1,2-Dichloroethane	107-06-2	2.20E-02	2.20E-02	1E-05	3E-07	5E-03	8E-07	1E-02	6E-10	3E-05	1E-07	2E-03	6E-08	1E-03	2E-08	1E-02
09-B	VOC	cis-1,2-Dichloroethene	156-59-2	2.60E-02	2.60E-02	2E-07		3E-03		4E-03		7E-06		4E-04		3E-04		3E-04
09-B	VOC	Ethyl Benzene	100-41-4	1.00E+00	1.00E+00	5E-06		1E-03		4E-03		6E-06		3E-04		2E-04		2E-03
09-B	VOC	Methyl Acetate	79-20-9	2.00E-01	2.00E-01	8E-08		9E-06		2E-05		2E-07		9E-06		6E-06		6E-06
09-B	VOC	4-Methyl-2-pentanone	108-10-1	6.30E-02	6.30E-02	5E-08		4E-06		1E-05		5E-08		3E-06		2E-06		2E-05
09-B	VOC	Methylcyclohexane	108-87-2	3.70E+01	3.70E+01	1E-04		6E-02		7E-02		3E-04		2E-02		1E-02		1E-01
09-B	VOC	Methylene Chloride	75-09-2	1.30E-01	1.30E-01	6E-06	6E-08	1E-04	2E-07	3E-04	1E-10	6E-07	2E-08	3E-05	1E-08	2E-05	4E-09	2E-04
09-B	VOC	Tetrachloroethene	127-18-4	4.40E-02	4.40E-02	2E-06	2E-07	6E-04	3E-07	6E-04	2E-10	1E-06	4E-08	8E-05	2E-08	5E-05	9E-09	5E-04
09-B	VOC	Toluene	108-88-3	7.00E-01	7.00E-01	6E-06		3E-04		8E-04		1E-06		9E-05		5E-05		4E-04
09-B	VOC	1,2,4-Trichlorobenzene	120-82-1	4.10E-02	4.10E-02			1E-05		3E-05		3E-07		2E-05		8E-06		1E-05
09-B	VOC	Trichloroethene	79-01-6	2.30E-01	2.30E-01	4E-06	5E-07		1E-06		5E-10		8E-08		5E-08		2E-08	
09-B	VOC	Trichlorofluoromethane	75-69-4	2.80E-02	2.80E-02	4E-08		2E-04		2E-04		9E-07		5E-05		4E-05		4E-05
09-B	VOC	Xylenes (total)	1330-20-7	2.23E+00	2.23E+00	9E-06		3E-02		7E-02		1E-04		6E-03		5E-03		4E-02
09-B	SVOC	Acenaphthene	83-32-9	3.48E+00	3.48E+00			3E-05		7E-05		6E-06		4E-04		2E-04		1E-04
09-B	SVOC	Acenaphthylene	208-96-8	1.87E-01	1.87E-01			2E-06		5E-06		6E-07		4E-05		2E-05		1E-05
09-B	SVOC	Anthracene	120-12-7	9.80E+00	9.80E+00							2E-06		2E-04		4E-05		9E-06
09-B	SVOC	Benzo(a)anthracene	56-55-3	1.41E+01	1.41E+01		3E-10		9E-10		8E-08		2E-05		5E-06		4E-07	
09-B	SVOC	Benzo(a)pyrene	50-32-8	1.33E+01	1.33E+01		4E-10		1E-09		8E-07		2E-04		5E-05		4E-06	
09-B	SVOC	Benzo(b)fluoranthene	205-99-2	1.19E+01	1.19E+01		3E-09		8E-09		7E-08		2E-05		4E-06		4E-07	
09-B	SVOC	Benzo(g,h,i)perylene	191-24-2	8.71E+00	8.71E+00			7E-11		2E-10		2E-05		1E-03		4E-04		8E-05
09-B	SVOC	Benzo(k)fluoranthene	207-08-9	1.22E+01	1.22E+01		2E-12		6E-12		7E-09		2E-06		4E-07		4E-08	
09-B	SVOC	Biphenyl	92-52-4	1.96E-01	1.96E-01	6E-07		2E-06		6E-06		4E-07		3E-05		1E-05		8E-05
09-B	SVOC	bis(2-Chloroethyl) ether	111-44-4	3.07E-02	3.07E-02	4E-08	9E-08		3E-07		1E-09		3E-07		1E-07		5E-08	

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
09-B	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	1.80E-01	1.80E-01	3E-14	1E-16	1E-12	4E-16	4E-12	2E-11	5E-07	5E-09	4E-05	1E-09	1E-05	9E-11	2E-05
09-B	SVOC	Butylbenzylphthalate	85-68-7	1.08E+00	1.08E+00		4E-13	3E-09	1E-12	7E-09	2E-11	3E-07	4E-09	3E-05	9E-10	6E-06	9E-11	2E-06
09-B	SVOC	Carbazole	86-74-8	4.56E+00	4.56E+00		5E-12		2E-11		7E-10		2E-07		4E-08		4E-09	
09-B	SVOC	Chrysene	218-01-9	1.41E+01	1.41E+01		8E-11		2E-10		8E-10		2E-07		5E-08		5E-09	
09-B	SVOC	Dibenz(a,h)anthracene	53-70-3	1.91E+00	1.91E+00		2E-13		8E-13		1E-07		3E-05		7E-06		6E-07	
09-B	SVOC	Dibenzofuran	132-64-9	3.36E+00	3.36E+00			2E-05		6E-05		1E-04		9E-03		2E-03		8E-03
09-B	SVOC	Diethylphthalate	84-66-2	1.21E-01	1.21E-01	4E-09		5E-09		1E-08		9E-09		8E-07		2E-07		9E-08
09-B	SVOC	Di-n-butylphthalate	84-74-2	5.99E-02	5.99E-02	7E-13						3E-08		3E-06		7E-07		2E-07
09-B	SVOC	Fluoranthene	206-44-0	3.36E+01	3.36E+01			3E-06		7E-06		5E-05		4E-03		1E-03		3E-04
09-B	SVOC	Fluorene	86-73-7	5.31E+00	5.31E+00			1E-05		3E-05		1E-05		8E-04		3E-04		1E-04
09-B	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	7.83E+00	7.83E+00		9E-12		3E-11		5E-08		1E-05		3E-06		2E-07	
09-B	SVOC	Isophorone	78-59-1	5.03E-02	5.03E-02	2E-08					4E-13	1E-08	1E-10	1E-06	2E-11	3E-07	2E-12	7E-08
09-B	SVOC	2-Methylnaphthalene	91-57-6	2.21E+00	2.21E+00			5E-03		1E-02		2E-04		1E-02		1E-02		8E-02
09-B	SVOC	Naphthalene	91-20-3	4.49E+00	4.49E+00	2E-06		3E-02		7E-02		8E-04		4E-02		3E-02		3E-01
09-B	SVOC	Phenanthrene	85-01-8	3.52E+01	3.52E+01			2E-05		6E-05		8E-05		7E-03		2E-03		7E-04
09-B	SVOC	Pyrene	129-00-0	2.82E+01	2.82E+01			2E-06		6E-06		6E-05		5E-03		1E-03		3E-04
09-B	PCB	PCBs (total)	1336-36-3	1.05E+01	1.05E+01	2E-06	1E-07		4E-07		2E-07	3E-02	5E-05	3E+00	1E-05	7E-01	1E-06	6E-01
09-B	INORG	Antimony	7440-36-0	1.20E+00	1.11E+00							1E-04		1E-02		1E-03		5E-03
09-B	INORG	Arsenic	7440-38-2	1.40E+01	5.88E+00						6E-08	8E-04	2E-05	8E-02	2E-06	1E-02	3E-07	3E-03
09-B	INORG	Barium	7440-39-3	1.70E+02	7.43E+01													
09-B	INORG	Beryllium	7440-41-7	3.30E+00	2.71E+00						2E-09	3E-04	2E-09	5E-03	1E-09	7E-04	3E-09	7E-03
09-B	INORG	Cadmium	7440-43-9	2.60E+00	2.01E+00						1E-09	1E-04	1E-09	8E-03	7E-10	2E-03	2E-09	5E-03
09-B	INORG	Chromium (total)	7440-47-3	1.80E+02	1.48E+02						5E-07	5E-03	6E-07	2E-01	3E-07	2E-02	9E-07	7E-02
09-B	INORG	Cobalt	7440-48-4	1.10E+01	3.95E+00						3E-09	4E-04	3E-09	9E-04	2E-09	2E-04	5E-09	7E-03
09-B	INORG	Copper	7440-50-8	4.10E+02	3.82E+02							4E-04		3E-02		5E-03		2E-02
09-B	INORG	Cyanide (total)	57-12-5	8.40E-01	8.40E-01							2E-06		2E-04		2E-05		8E-05
09-B	INORG	Lead	7439-92-1	1.20E+03	1.20E+03													
09-B	INORG	Manganese	7439-96-5	1.80E+03	1.32E+03							5E-02		5E-02		2E-02		9E-01
09-B	INORG	Mercury	7439-97-6	2.77E+00	2.72E+00	9E-05		1E-02		3E-02		1E-03		8E-02		4E-02		4E-01
09-B	INORG	Nickel	7440-02-0	8.70E+01	6.70E+01						5E-09		5E-09		3E-09		8E-09	
09-B	INORG	Selenium	7782-49-2	8.20E-01	3.01E-01							2E-06		2E-04		3E-05		1E-04
09-B	INORG	Silver	7440-22-4	1.50E+00	1.31E+00							3E-04		1E-03		2E-04		5E-03
09-B	INORG	Thallium	7440-28-0	7.90E-01	5.93E-01							3E-04		3E-02		4E-03		2E-02
09-B	INORG	Vanadium	7440-62-2	3.70E+01	1.21E+01							7E-05		6E-03		8E-04		3E-03
09-B	INORG	Zinc	7440-66-6	1.50E+02	3.95E+01							5E-06		5E-04		6E-05		3E-04
10-1	VOC	Benzene	71-43-2	8.30E-02	8.30E-02	2E-04	9E-07	1E-02	2E-06	2E-02	1E-09	3E-05	2E-07	2E-03	1E-07	1E-03	4E-08	6E-03
10-1	VOC	2-Butanone	78-93-3	4.50E-02	4.50E-02	1E-08		9E-07		2E-06		2E-08		1E-06		8E-07		7E-06
10-1	VOC	Carbon Disulfide	75-15-0	3.80E-02	3.80E-02	2E-05		3E-04		3E-04		1E-06		7E-05		5E-05		5E-04
10-1	VOC	Chloroethane	75-00-3	3.70E-01	3.70E-01	1E-06		2E-04		2E-04		1E-06		6E-05		5E-05		4E-04
10-1	VOC	Chloromethane	74-87-3	1.00E-01	1.00E-01	7E-06		6E-03		7E-03		2E-05		1E-03		8E-04		7E-03
10-1	VOC	Cumene	98-82-8	8.10E-02	8.10E-02	6E-07		3E-04		7E-04		1E-06		6E-05		4E-05		4E-04
10-1	VOC	Cyclohexane	110-82-7	3.50E-01	3.50E-01	2E-06		3E-04		3E-04		1E-06		6E-05		4E-05		4E-04
10-1	VOC	1,1-Dichloroethane	75-34-3	6.00E-01	6.00E-01	1E-05		6E-03		7E-03		1E-05		8E-04		6E-04		5E-04
10-1	VOC	Ethyl Benzene	100-41-4	1.80E-01	1.80E-01	9E-07		3E-04		7E-04		1E-06		6E-05		4E-05		4E-04
10-1	VOC	Methyl Acetate	79-20-9	3.10E-01	3.10E-01	1E-07		1E-05		4E-05		2E-07		1E-05		1E-05		9E-06
10-1	VOC	Methylcyclohexane	108-87-2	1.40E+00	1.40E+00	5E-06		2E-03		3E-03		1E-05		6E-04		5E-04		4E-03
10-1	VOC	Methylene Chloride	75-09-2	3.60E-02	3.60E-02	2E-06	2E-08	4E-05	4E-08	7E-05	3E-11	2E-07	5E-09	9E-06	3E-09	6E-06	1E-09	5E-05
10-1	VOC	Toluene	108-88-3	6.50E-01	6.50E-01	6E-06		3E-04		7E-04		1E-06		8E-05		4E-05		4E-04
10-1	VOC	1,1,1-Trichloroethane	71-55-6	1.20E-01	1.20E-01	5E-07		3E-04		3E-04		7E-07		4E-05		3E-05		3E-05
10-1	VOC	Xylenes (total)	1330-20-7	1.32E+00	1.32E+00	5E-06		2E-02		4E-02		7E-05		4E-03		3E-03		3E-02
10-1	SVOC	Acenaphthene	83-32-9	8.91E-01	8.91E-01			7E-06		2E-05		1E-06		1E-04		4E-05		3E-05
10-1	SVOC	Acetophenone	98-86-2	2.43E-01	2.43E-01	8E-08		7E-06		2E-05		5E-07		3E-05		2E-05		2E-05
10-1	SVOC	Anthracene	120-12-7	4.84E-01	4.84E-01							9E-08		8E-06		2E-06		5E-07

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
10-1	SVOC	Benzo(a)anthracene	56-55-3	1.51E+00	1.51E+00		3E-11		1E-10		9E-09		2E-06		5E-07		5E-08	
10-1	SVOC	Benzo(a)pyrene	50-32-8	1.23E-01	1.23E-01		3E-12		1E-11		7E-09		2E-06		4E-07		4E-08	
10-1	SVOC	Benzo(b)fluoranthene	205-99-2	1.68E+00	1.68E+00		4E-10		1E-09		1E-08		3E-06		6E-07		5E-08	
10-1	SVOC	Benzo(k)fluoranthene	207-08-9	9.23E-01	9.23E-01		2E-13		5E-13		5E-10		1E-07		3E-08		3E-09	
10-1	SVOC	Chrysene	218-01-9	2.16E+00	2.16E+00		1E-11		4E-11		1E-10		4E-08		8E-09		7E-10	
10-1	SVOC	Dibenz(a,h)anthracene	53-70-3	1.92E-01	1.92E-01		2E-14		8E-14		1E-08		3E-06		7E-07		6E-08	
10-1	SVOC	Diethylphthalate	84-66-2	7.59E-02	7.59E-02	2E-09		3E-09		7E-09		6E-09		5E-07		1E-07		6E-08
10-1	SVOC	Fluoranthene	206-44-0	2.97E+00	2.97E+00			2E-07		6E-07		4E-06		4E-04		1E-04		3E-05
10-1	SVOC	Fluorene	86-73-7	1.07E+00	1.07E+00			3E-06		7E-06		2E-06		2E-04		5E-05		3E-05
10-1	SVOC	2-Methylnaphthalene	91-57-6	3.69E-01	3.69E-01			8E-04		2E-03		4E-05		2E-03		2E-03		1E-02
10-1	SVOC	Naphthalene	91-20-3	2.17E-01	2.17E-01	1E-07		1E-03		3E-03		4E-05		2E-03		2E-03		2E-02
10-1	SVOC	Phenanthrene	85-01-8	1.80E+00	1.80E+00			1E-06		3E-06		4E-06		3E-04		1E-04		4E-05
10-1	SVOC	Pyrene	129-00-0	9.13E+00	9.13E+00			7E-07		2E-06		2E-05		2E-03		4E-04		1E-04
10-1	PCB	PCBs (total)	1336-36-3	3.40E-01	3.40E-01	6E-08	4E-09		1E-08		6E-09	1E-03	2E-06	9E-02	4E-07	2E-02	5E-08	2E-02
10-1	INORG	Antimony	7440-36-0	3.30E-01	2.44E-01							2E-05		2E-03		3E-04		1E-03
10-1	INORG	Arsenic	7440-38-2	4.00E+01	3.19E+01						3E-07	5E-03	8E-05	4E-01	1E-05	7E-02	2E-06	1E-02
10-1	INORG	Barium	7440-39-3	2.80E+02	1.84E+02													
10-1	INORG	Beryllium	7440-41-7	8.70E-01	2.80E-01						2E-10	3E-05	2E-10	5E-04	1E-10	8E-05	3E-10	8E-04
10-1	INORG	Cadmium	7440-43-9	7.50E-01	1.62E-01						9E-11	9E-06	9E-11	7E-04	5E-11	1E-04	1E-10	4E-04
10-1	INORG	Chromium (total)	7440-47-3	7.50E+02	7.18E+02						3E-06	2E-02	3E-06	9E-01	2E-06	1E-01	4E-06	3E-01
10-1	INORG	Cobalt	7440-48-4	3.80E+01	3.09E+01						3E-08	3E-03	3E-08	7E-03	2E-08	2E-03	4E-08	6E-02
10-1	INORG	Copper	7440-50-8	6.90E+02	6.62E+02							7E-04		6E-02		8E-03		3E-02
10-1	INORG	Cyanide (total)	57-12-5	1.20E+00	1.20E+00							2E-06		2E-04		3E-05		1E-04
10-1	INORG	Lead	7439-92-1	3.80E+02	3.80E+02													
10-1	INORG	Manganese	7439-96-5	3.00E+03	2.52E+03							1E-01		1E-01		4E-02		2E+00
10-1	INORG	Mercury	7439-97-6	1.46E-01	9.36E-02	3E-06		3E-04		9E-04		4E-05		3E-03		1E-03		1E-02
10-1	INORG	Nickel	7440-02-0	3.40E+02	3.20E+02						2E-08		2E-08		1E-08		4E-08	
10-1	INORG	Selenium	7782-49-2	6.80E-01	1.61E-01							1E-06		1E-04		2E-05		6E-05
10-1	INORG	Silver	7440-22-4	3.20E-01	1.32E-01							3E-05		1E-04		2E-05		5E-04
10-1	INORG	Thallium	7440-28-0	1.60E-01														
10-1	INORG	Vanadium	7440-62-2	4.40E+01	1.91E+01							1E-04		1E-02		1E-03		5E-03
10-1	INORG	Zinc	7440-66-6	1.10E+02														
10-2	VOC	Acetone	67-64-1	1.50E-01	1.50E-01	9E-09		3E-06		8E-06		1E-07		6E-06		4E-06		3E-05
10-2	VOC	Benzene	71-43-2	9.10E-02	9.10E-02	2E-04	1E-06	1E-02	2E-06	2E-02	1E-09	3E-05	2E-07	2E-03	1E-07	1E-03	4E-08	6E-03
10-2	VOC	2-Butanone	78-93-3	5.50E-02	5.50E-02	1E-08		1E-06		3E-06		2E-08		1E-06		9E-07		8E-06
10-2	VOC	Chloromethane	74-87-3	6.60E-02	6.60E-02	5E-06		4E-03		4E-03		1E-05		7E-04		5E-04		5E-03
10-2	VOC	Cumene	98-82-8	6.90E-02	6.90E-02	5E-07		2E-04		6E-04		9E-07		5E-05		4E-05		3E-04
10-2	VOC	Cyclohexane	110-82-7	2.60E-01	2.60E-01	2E-06		2E-04		3E-04		8E-07		4E-05		3E-05		3E-04
10-2	VOC	1,4-Dichlorobenzene	106-46-7	3.30E-02	3.30E-02	3E-08	2E-08	1E-05	7E-08	3E-05	7E-11	1E-07	1E-08	9E-06	7E-09	5E-06	3E-09	1E-05
10-2	VOC	1,1-Dichloroethane	75-34-3	2.90E+00	2.90E+00	5E-05		3E-02		3E-02		7E-05		4E-03		3E-03		3E-03
10-2	VOC	cis-1,2-Dichloroethene	156-59-2	2.10E+00	2.10E+00	1E-05		2E-01		4E-01		6E-04		3E-02		2E-02		2E-02
10-2	VOC	trans-1,2-Dichloroethene	156-60-5	3.80E-02	3.80E-02	4E-07		3E-03		4E-03		8E-06		4E-04		3E-04		3E-03
10-2	VOC	Ethyl Benzene	100-41-4	1.20E-01	1.20E-01	6E-07		2E-04		4E-04		7E-07		4E-05		3E-05		3E-04
10-2	VOC	Methyl Acetate	79-20-9	3.00E+00	3.00E+00	1E-06		1E-04		3E-04		2E-06		1E-04		1E-04		9E-05
10-2	VOC	Methylcyclohexane	108-87-2	8.80E-01	8.80E-01	3E-06		1E-03		2E-03		7E-06		4E-04		3E-04		3E-03
10-2	VOC	Methylene Chloride	75-09-2	2.80E-02	2.80E-02	1E-06	1E-08	3E-05	3E-08	6E-05	2E-11	1E-07	4E-09	7E-06	2E-09	4E-06	8E-10	4E-05
10-2	VOC	Tetrachloroethene	127-18-4	9.10E-02	9.10E-02	4E-06	5E-07	1E-03	7E-07	1E-03	5E-10	3E-06	8E-08	2E-04	5E-08	1E-04	2E-08	1E-03
10-2	VOC	Toluene	108-88-3	5.30E-01	5.30E-01	5E-06		2E-04		6E-04		1E-06		7E-05		4E-05		3E-04
10-2	VOC	1,1,1-Trichloroethane	71-55-6	1.50E-01	1.50E-01	6E-07		3E-04		4E-04		9E-07		5E-05		4E-05		4E-05
10-2	VOC	Trichloroethene	79-01-6	2.60E+00	2.60E+00	5E-05	6E-06		1E-05		6E-09		1E-06		6E-07		2E-07	
10-2	VOC	Xylenes (total)	1330-20-7	9.60E-01	9.60E-01	4E-06		1E-02		3E-02		5E-05		3E-03		2E-03		2E-02
10-2	SVOC	Acenaphthene	83-32-9	2.37E+00	2.37E+00			2E-05		5E-05		4E-06		3E-04		1E-04		7E-05
10-2	SVOC	Anthracene	120-12-7	2.96E+00	2.96E+00							6E-07		5E-05		1E-05		3E-06

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
10-2	SVOC	Benzo(a)anthracene	56-55-3	6.99E+00	6.99E+00		1E-10		4E-10		4E-08		1E-05		2E-06		2E-07	
10-2	SVOC	Benzo(a)pyrene	50-32-8	7.89E+00	7.89E+00		2E-10		7E-10		5E-07		1E-04		3E-05		2E-06	
10-2	SVOC	Benzo(b)fluoranthene	205-99-2	7.53E+00	7.53E+00		2E-09		5E-09		4E-08		1E-05		3E-06		2E-07	
10-2	SVOC	Benzo(g,h,i)perylene	191-24-2	7.88E+00	7.88E+00			6E-11		2E-10		1E-05		1E-03		3E-04		7E-05
10-2	SVOC	Benzo(k)fluoranthene	207-08-9	6.44E+00	6.44E+00		1E-12		3E-12		4E-09		1E-06		2E-07		2E-08	
10-2	SVOC	Biphenyl	92-52-4	3.18E-01	3.18E-01	1E-06		4E-06		1E-05		6E-07		5E-05		2E-05		1E-04
10-2	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	1.41E+00	1.41E+00	2E-13	1E-15	1E-11	3E-15	3E-11	1E-10	4E-06	4E-08	3E-04	8E-09	8E-05	7E-10	2E-04
10-2	SVOC	Butylbenzylphthalate	85-68-7	7.62E-01	7.62E-01		3E-13	2E-09	8E-13	5E-09	1E-11	2E-07	3E-09	2E-05	6E-10	4E-06	6E-11	1E-06
10-2	SVOC	Caprolactam	105-60-2	1.52E+00	1.52E+00	2E-08		3E-08		8E-08		2E-07		2E-05		6E-06		3E-05
10-2	SVOC	Carbazole	86-74-8	9.39E-01	9.39E-01		1E-12		3E-12		1E-10		4E-08		8E-09		8E-10	
10-2	SVOC	Chrysene	218-01-9	6.99E+00	6.99E+00		4E-11		1E-10		4E-10		1E-07		3E-08		2E-09	
10-2	SVOC	Dibenzofuran	132-64-9	1.97E+00	1.97E+00			1E-05		3E-05		6E-05		5E-03		1E-03		4E-03
10-2	SVOC	Diethylphthalate	84-66-2	5.79E-02	5.79E-02	2E-09		2E-09		6E-09		4E-09		4E-07		1E-07		4E-08
10-2	SVOC	Di-n-butylphthalate	84-74-2	3.00E-01	3.00E-01	3E-12						2E-07		1E-05		3E-06		8E-07
10-2	SVOC	Di-n-octylphthalate	117-84-0	1.57E-01	1.57E-01							2E-07		2E-05		4E-06		1E-06
10-2	SVOC	Fluoranthene	206-44-0	1.20E+01	1.20E+01			1E-06		3E-06		2E-05		2E-03		4E-04		1E-04
10-2	SVOC	Fluorene	86-73-7	2.20E+00	2.20E+00			6E-06		1E-05		4E-06		3E-04		1E-04		5E-05
10-2	SVOC	Hexachlorocyclopentadiene	77-47-4	1.45E-01	1.45E-01	2E-05		8E-03		2E-02		2E-04		8E-03		7E-03		2E-02
10-2	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	5.94E+00	5.94E+00		7E-12		2E-11		3E-08		1E-05		2E-06		2E-07	
10-2	SVOC	2-Methylnaphthalene	91-57-6	7.80E-01	7.80E-01			2E-03		4E-03		9E-05		5E-03		3E-03		3E-02
10-2	SVOC	Naphthalene	91-20-3	9.34E-01	9.34E-01	5E-07		6E-03		1E-02		2E-04		9E-03		7E-03		7E-02
10-2	SVOC	N-Nitrosodiphenylamine	86-30-6	8.73E-01	8.73E-01						3E-11	2E-06	9E-09	2E-04	2E-09	5E-05	2E-10	1E-04
10-2	SVOC	N-Nitroso-di-n-propylamine	621-64-7	3.89E-01	3.89E-01		7E-07		2E-06		5E-08		1E-05		4E-06		1E-06	
10-2	SVOC	Phenanthrene	85-01-8	1.63E+01	1.63E+01			1E-05		3E-05		3E-05		3E-03		9E-04		3E-04
10-2	SVOC	Pyrene	129-00-0	2.69E+01	2.69E+01			2E-06		5E-06		5E-05		5E-03		1E-03		3E-04
10-2	PCB	PCBs (total)	1336-36-3	4.80E+00	4.80E+00	9E-07	6E-08		2E-07		9E-08	1E-02	2E-05	1E+00	6E-06	3E-01	7E-07	3E-01
10-2	INORG	Antimony	7440-36-0	4.60E-01	3.74E-01							4E-05		3E-03		5E-04		2E-03
10-2	INORG	Arsenic	7440-38-2	2.00E+01	1.19E+01						1E-07	2E-03	3E-05	2E-01	4E-06	3E-02	6E-07	5E-03
10-2	INORG	Barium	7440-39-3	2.60E+02	1.64E+02													
10-2	INORG	Beryllium	7440-41-7	1.90E+00	1.31E+00						9E-10	2E-04	1E-09	2E-03	6E-10	4E-04	2E-09	4E-03
10-2	INORG	Cadmium	7440-43-9	9.00E-01	3.12E-01						2E-10	2E-05	2E-10	1E-03	1E-10	2E-04	3E-10	7E-04
10-2	INORG	Chromium (total)	7440-47-3	1.00E+02	6.80E+01						2E-07	2E-03	3E-07	8E-02	2E-07	1E-02	4E-07	3E-02
10-2	INORG	Cobalt	7440-48-4	1.20E+01	4.95E+00						4E-09	5E-04	4E-09	1E-03	3E-09	2E-04	7E-09	9E-03
10-2	INORG	Copper	7440-50-8	8.50E+01	5.65E+01							6E-05		5E-03		7E-04		3E-03
10-2	INORG	Cyanide (total)	57-12-5	2.00E+00	2.00E+00							4E-06		4E-04		5E-05		2E-04
10-2	INORG	Lead	7439-92-1	1.57E+02	1.57E+02													
10-2	INORG	Manganese	7439-96-5	1.80E+03	1.32E+03							5E-02		5E-02		2E-02		9E-01
10-2	INORG	Mercury	7439-97-6	1.68E-01	1.16E-01	4E-06		4E-04		1E-03		5E-05		3E-03		2E-03		2E-02
10-2	INORG	Nickel	7440-02-0	3.90E+01	1.90E+01						1E-09		1E-09		8E-10		2E-09	
10-2	INORG	Selenium	7782-49-2	7.10E-01	1.91E-01							2E-06		1E-04		2E-05		7E-05
10-2	INORG	Silver	7440-22-4	4.10E-01	2.22E-01							5E-05		2E-04		3E-05		8E-04
10-2	INORG	Thallium	7440-28-0	2.20E-01	2.35E-02							1E-05		1E-03		2E-04		7E-04
10-2	INORG	Vanadium	7440-62-2	3.20E+01	7.13E+00							4E-05		4E-03		5E-04		2E-03
10-2	INORG	Zinc	7440-66-6	1.60E+02	4.95E+01							7E-06		6E-04		8E-05		3E-04
10-3	VOC	Acetone	67-64-1	4.10E-01	4.10E-01	2E-08		9E-06		2E-05		3E-07		2E-05		1E-05		9E-05
10-3	VOC	Benzene	71-43-2	1.20E-01	1.20E-01	2E-04	1E-06	2E-02	2E-06	2E-02	1E-09	4E-05	2E-07	2E-03	1E-07	2E-03	5E-08	8E-03
10-3	VOC	2-Butanone	78-93-3	4.50E-01	4.50E-01	1E-07		9E-06		2E-05		2E-07		1E-05		8E-06		7E-05
10-3	VOC	Cumene	98-82-8	5.90E-01	5.90E-01	5E-06		2E-03		5E-03		7E-06		4E-04		3E-04		3E-03
10-3	VOC	Cyclohexane	110-82-7	2.80E+00	2.80E+00	2E-05		2E-03		3E-03		8E-06		5E-04		4E-04		3E-03
10-3	VOC	1,1-Dichloroethane	75-34-3	3.20E-01	3.20E-01	6E-06		3E-03		4E-03		7E-06		4E-04		3E-04		3E-04
10-3	VOC	1,1-Dichloroethene	75-35-4	7.70E-02	7.70E-02	3E-05		2E-03		2E-03		7E-06		4E-04		3E-04		3E-03
10-3	VOC	Ethyl Benzene	100-41-4	5.90E-01	5.90E-01	3E-06		9E-04		2E-03		3E-06		2E-04		1E-04		1E-03
10-3	VOC	Methyl Acetate	79-20-9	1.10E-01	1.10E-01	4E-08		5E-06		1E-05		9E-08		5E-06		4E-06		3E-06

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
10-3	VOC	Methylcyclohexane	108-87-2	1.40E+01	1.40E+01	5E-05		2E-02		3E-02		1E-04		6E-03		5E-03		4E-02
10-3	VOC	Methylene Chloride	75-09-2	5.50E-02	5.50E-02	3E-06	3E-08	5E-05	7E-08	1E-04	4E-11	2E-07	7E-09	1E-05	4E-09	9E-06	2E-09	8E-05
10-3	VOC	Tetrachloroethene	127-18-4	5.00E-02	5.00E-02	2E-06	3E-07	6E-04	4E-07	7E-04	3E-10	2E-06	4E-08	9E-05	3E-08	6E-05	1E-08	6E-04
10-3	VOC	Toluene	108-88-3	1.40E+00	1.40E+00	1E-05		6E-04		2E-03		3E-06		2E-04		1E-04		8E-04
10-3	VOC	1,1,1-Trichloroethane	71-55-6	2.70E+00	2.70E+00	1E-05		6E-03		7E-03		2E-05		9E-04		7E-04		6E-04
10-3	VOC	Trichloroethene	79-01-6	3.40E-01	3.40E-01	7E-06	7E-07		1E-06		8E-10		1E-07		8E-08		3E-08	
10-3	VOC	Xylenes (total)	1330-20-7	5.50E+00	5.50E+00	2E-05		7E-02		2E-01		3E-04		2E-02		1E-02		1E-01
10-3	SVOC	Acenaphthene	83-32-9	1.08E-01	1.08E-01			9E-07		2E-06		2E-07		1E-05		5E-06		3E-06
10-3	SVOC	Acenaphthylene	208-96-8	4.85E-01	4.85E-01			5E-06		1E-05		1E-06		1E-04		4E-05		3E-05
10-3	SVOC	Anthracene	120-12-7	4.01E-01	4.01E-01							7E-08		7E-06		2E-06		4E-07
10-3	SVOC	Benzaldehyde	100-52-7	1.05E-01	1.05E-01			8E-06		2E-05		3E-07		2E-05		1E-05		1E-04
10-3	SVOC	Benzo(a)anthracene	56-55-3	1.95E+00	1.95E+00		4E-11		1E-10		1E-08		3E-06		7E-07		6E-08	
10-3	SVOC	Benzo(a)pyrene	50-32-8	2.75E+00	2.75E+00		8E-11		2E-10		2E-07		4E-05		1E-05		8E-07	
10-3	SVOC	Benzo(b)fluoranthene	205-99-2	3.64E+00	3.64E+00		8E-10		2E-09		2E-08		6E-06		1E-06		1E-07	
10-3	SVOC	Benzo(g,h,i)perylene	191-24-2	1.74E+00	1.74E+00			1E-11		4E-11		3E-06		3E-04		8E-05		2E-05
10-3	SVOC	Benzo(k)fluoranthene	207-08-9	3.76E+00	3.76E+00		6E-13		2E-12		2E-09		6E-07		1E-07		1E-08	
10-3	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	7.76E-02	7.76E-02	1E-14	6E-17	6E-13	2E-16	2E-12	8E-12	2E-07	2E-09	2E-05	4E-10	4E-06	4E-11	1E-05
10-3	SVOC	Butylbenzylphthalate	85-68-7	1.08E+00	1.08E+00		4E-13	3E-09	1E-12	7E-09	2E-11	3E-07	4E-09	3E-05	9E-10	6E-06	9E-11	2E-06
10-3	SVOC	Carbazole	86-74-8	2.84E-01	2.84E-01		3E-13		1E-12		4E-11		1E-08		2E-09		3E-10	
10-3	SVOC	Chrysene	218-01-9	2.77E+00	2.77E+00		2E-11		5E-11		2E-10		5E-08		1E-08		1E-09	
10-3	SVOC	Dibenzofuran	132-64-9	3.30E-01	3.30E-01			2E-06		6E-06		1E-05		8E-04		2E-04		8E-04
10-3	SVOC	Diethylphthalate	84-66-2	7.49E-02	7.49E-02	2E-09		3E-09		7E-09		6E-09		5E-07		1E-07		6E-08
10-3	SVOC	Fluoranthene	206-44-0	3.86E+00	3.86E+00			3E-07		8E-07		6E-06		5E-04		1E-04		4E-05
10-3	SVOC	Fluorene	86-73-7	1.33E-01	1.33E-01			3E-07		9E-07		2E-07		2E-05		7E-06		3E-06
10-3	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	1.42E+00	1.42E+00		2E-12		5E-12		8E-09		2E-06		5E-07		4E-08	
10-3	SVOC	2-Methylnaphthalene	91-57-6	1.11E+00	1.11E+00			2E-03		6E-03		1E-04		7E-03		5E-03		4E-02
10-3	SVOC	Naphthalene	91-20-3	8.02E-01	8.02E-01	4E-07		5E-03		1E-02		1E-04		8E-03		6E-03		6E-02
10-3	SVOC	Phenanthrene	85-01-8	1.72E+00	1.72E+00			1E-06		3E-06		4E-06		3E-04		9E-05		3E-05
10-3	SVOC	Pyrene	129-00-0	4.17E+00	4.17E+00			3E-07		8E-07		8E-06		7E-04		2E-04		5E-05
10-3	PCB	PCBs (total)	1336-36-3	4.48E-01	4.48E-01	8E-08	6E-09		2E-08		8E-09	1E-03	2E-06	1E-01	5E-07	3E-02	6E-08	3E-02
10-3	INORG	Antimony	7440-36-0	1.40E-01	5.36E-02							5E-06		5E-04		7E-05		3E-04
10-3	INORG	Arsenic	7440-38-2	1.00E+01	1.88E+00						2E-08	3E-04	5E-06	3E-02	7E-07	4E-03	9E-08	8E-04
10-3	INORG	Barium	7440-39-3	1.30E+02	3.43E+01													
10-3	INORG	Beryllium	7440-41-7	1.40E+00	8.10E-01						6E-10	1E-04	6E-10	2E-03	4E-10	2E-04	1E-09	2E-03
10-3	INORG	Cadmium	7440-43-9	7.50E-01	1.62E-01						9E-11	9E-06	9E-11	7E-04	5E-11	1E-04	1E-10	4E-04
10-3	INORG	Chromium (total)	7440-47-3	9.80E+01	6.60E+01						2E-07	2E-03	2E-07	8E-02	1E-07	1E-02	4E-07	3E-02
10-3	INORG	Cobalt	7440-48-4	7.70E+00	6.46E-01						5E-10	7E-05	6E-10	1E-04	3E-10	3E-05	9E-10	1E-03
10-3	INORG	Copper	7440-50-8	1.20E+02	9.15E+01							9E-05		8E-03		1E-03		5E-03
10-3	INORG	Cyanide (total)	57-12-5	2.60E-01	2.60E-01							5E-07		5E-05		6E-06		3E-05
10-3	INORG	Lead	7439-92-1	1.60E+02	1.60E+02													
10-3	INORG	Manganese	7439-96-5	2.50E+03	2.02E+03							8E-02		8E-02		3E-02		1E+00
10-3	INORG	Mercury	7439-97-6	1.35E-01	8.26E-02	3E-06		3E-04		8E-04		4E-05		2E-03		1E-03		1E-02
10-3	INORG	Nickel	7440-02-0	2.10E+01	1.04E+00						7E-11		8E-11		5E-11		1E-10	
10-3	INORG	Selenium	7782-49-2	8.70E-01	3.51E-01							3E-06		3E-04		3E-05		1E-04
10-3	INORG	Silver	7440-22-4	4.00E-01	2.12E-01							5E-05		2E-04		3E-05		8E-04
10-3	INORG	Thallium	7440-28-0	1.60E-01														
10-3	INORG	Vanadium	7440-62-2	2.20E+01														
10-3	INORG	Zinc	7440-66-6	1.50E+03	1.39E+03							2E-04		2E-02		2E-03		9E-03
10-4	INORG	Arsenic	7440-38-2	4.40E+00														
10-4	INORG	Barium	7440-39-3	9.30E+00														
10-4	INORG	Beryllium	7440-41-7	1.00E-01														
10-4	INORG	Cadmium	7440-43-9	1.30E-01														
10-4	INORG	Chromium (total)	7440-47-3	5.90E+00														

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
10-4	INORG	Cobalt	7440-48-4	2.50E+00														
10-4	INORG	Copper	7440-50-8	7.40E+00														
10-4	INORG	Lead	7439-92-1	6.00E+00	6.00E+00													
10-4	INORG	Manganese	7439-96-5	1.30E+02														
10-4	INORG	Mercury	7439-97-6	1.94E-02														
10-4	INORG	Nickel	7440-02-0	6.90E+00														
10-4	INORG	Selenium	7782-49-2	2.40E-01														
10-4	INORG	Silver	7440-22-4	3.60E-02														
10-4	INORG	Thallium	7440-28-0	5.90E-02														
10-4	INORG	Vanadium	7440-62-2	9.80E+00														
10-4	INORG	Zinc	7440-66-6	2.80E+01														
12-A	VOC	Acetone	67-64-1	1.70E-01	1.70E-01	1E-08		4E-06		1E-05		1E-07		7E-06		5E-06		4E-05
12-A	VOC	Benzene	71-43-2	4.30E-02	4.30E-02	8E-05	5E-07	6E-03	8E-07	8E-03	5E-10	2E-05	8E-08	8E-04	5E-08	6E-04	2E-08	3E-03
12-A	VOC	2-Butanone	78-93-3	8.80E-02	8.80E-02	2E-08		2E-06		4E-06		4E-08		2E-06		1E-06		1E-05
12-A	VOC	Chloromethane	74-87-3	2.80E-02	2.80E-02	2E-06		2E-03		2E-03		5E-06		3E-04		2E-04		2E-03
12-A	VOC	Cumene	98-82-8	1.70E-01	1.70E-01	1E-06		6E-04		1E-03		2E-06		1E-04		9E-05		8E-04
12-A	VOC	Cyclohexane	110-82-7	1.20E-01	1.20E-01	8E-07		1E-04		1E-04		4E-07		2E-05		2E-05		1E-04
12-A	VOC	Dichlorodifluoromethane	75-71-8	9.40E-01	9.40E-01	1E-06		2E-02		3E-02		1E-04		7E-03		5E-03		5E-03
12-A	VOC	1,2-Dichloroethane	107-06-2	1.50E-02	1.50E-02	7E-06	2E-07	4E-03	5E-07	9E-03	4E-10	2E-05	6E-08	1E-03	4E-08	9E-04	2E-08	8E-03
12-A	VOC	cis-1,2-Dichloroethene	156-59-2	9.30E-02	9.30E-02	6E-07		1E-02		2E-02		3E-05		1E-03		1E-03		1E-03
12-A	VOC	Ethyl Benzene	100-41-4	3.90E-01	3.90E-01	2E-06		6E-04		1E-03		2E-06		1E-04		9E-05		8E-04
12-A	VOC	Methyl Acetate	79-20-9	2.30E+00	2.30E+00	9E-07		1E-04		3E-04		2E-06		1E-04		7E-05		7E-05
12-A	VOC	Methylcyclohexane	108-87-2	6.50E-01	6.50E-01	2E-06		1E-03		1E-03		5E-06		3E-04		2E-04		2E-03
12-A	VOC	Methylene Chloride	75-09-2	1.20E-01	1.20E-01	6E-06	6E-08	1E-04	1E-07	2E-04	9E-11	5E-07	2E-08	3E-05	9E-09	2E-05	3E-09	2E-04
12-A	VOC	Styrene	100-42-5	6.70E-01	6.70E-01	1E-06		2E-04		4E-04		2E-06		9E-05		6E-05		2E-04
12-A	VOC	Tetrachloroethene	127-18-4	4.00E-01	4.00E-01	2E-05	2E-06	5E-03	3E-06	6E-03	2E-09	1E-05	3E-07	8E-04	2E-07	5E-04	8E-08	4E-03
12-A	VOC	Toluene	108-88-3	2.80E-01	2.80E-01	2E-06		1E-04		3E-04		6E-07		4E-05		2E-05		2E-04
12-A	VOC	1,1,1-Trichloroethane	71-55-6	2.40E-01	2.40E-01	9E-07		6E-04		6E-04		1E-06		8E-05		6E-05		6E-05
12-A	VOC	Trichloroethene	79-01-6	5.60E-02	5.60E-02	1E-06	1E-07		2E-07		1E-10		2E-08		1E-08		5E-09	
12-A	VOC	Xylenes (total)	1330-20-7	7.70E+00	7.70E+00	3E-05		9E-02		2E-01		4E-04		2E-02		2E-02		2E-01
12-A	SVOC	Acenaphthene	83-32-9	3.26E+00	3.26E+00			3E-05		7E-05		5E-06		4E-04		2E-04		1E-04
12-A	SVOC	Acenaphthylene	208-96-8	7.41E-02	7.41E-02			8E-07		2E-06		2E-07		2E-05		7E-06		4E-06
12-A	SVOC	Anthracene	120-12-7	1.27E+00	1.27E+00							2E-07		2E-05		6E-06		1E-06
12-A	SVOC	Benzo(a)anthracene	56-55-3	2.98E+00	2.98E+00		6E-11		2E-10		2E-08		5E-06		1E-06		9E-08	
12-A	SVOC	Benzo(a)pyrene	50-32-8	2.95E+00	2.95E+00		8E-11		2E-10		2E-07		5E-05		1E-05		9E-07	
12-A	SVOC	Benzo(b)fluoranthene	205-99-2	3.76E+00	3.76E+00		8E-10		2E-09		2E-08		6E-06		1E-06		1E-07	
12-A	SVOC	Benzo(g,h,i)perylene	191-24-2	8.87E-01	8.87E-01			7E-12		2E-11		2E-06		2E-04		4E-05		8E-06
12-A	SVOC	Benzo(k)fluoranthene	207-08-9	2.49E+00	2.49E+00		4E-13		1E-12		1E-09		4E-07		9E-08		7E-09	
12-A	SVOC	Biphenyl	92-52-4	6.13E-01	6.13E-01	2E-06		8E-06		2E-05		1E-06		9E-05		4E-05		2E-04
12-A	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	5.10E-01	5.10E-01	8E-14	4E-16	4E-12	1E-15	1E-11	5E-11	1E-06	1E-08	1E-04	3E-09	3E-05	3E-10	7E-05
12-A	SVOC	Butylbenzylphthalate	85-68-7	1.27E+01	1.27E+01		4E-12	3E-08	1E-11	8E-08	2E-10	3E-06	5E-08	3E-04	1E-08	7E-05	1E-09	2E-05
12-A	SVOC	Carbazole	86-74-8	1.13E+00	1.13E+00		1E-12		4E-12		2E-10		5E-08		1E-08		1E-09	
12-A	SVOC	Chrysene	218-01-9	3.82E+00	3.82E+00		2E-11		7E-11		2E-10		6E-08		1E-08		1E-09	
12-A	SVOC	Dibenz(a,h)anthracene	53-70-3	5.45E-01	5.45E-01		7E-14		2E-13		3E-08		9E-06		2E-06		2E-07	
12-A	SVOC	Dibenzofuran	132-64-9	1.83E+00	1.83E+00			1E-05		3E-05		5E-05		5E-03		1E-03		4E-03
12-A	SVOC	Diethylphthalate	84-66-2	6.85E-02	6.85E-02	2E-09		3E-09		7E-09		5E-09		5E-07		1E-07		5E-08
12-A	SVOC	2,4-Dinitrotoluene	121-14-2	7.47E-02	7.47E-02						4E-10	2E-06	1E-07	2E-04	2E-08	4E-05	2E-09	1E-04
12-A	SVOC	Fluoranthene	206-44-0	8.19E+00	8.19E+00			7E-07		2E-06		1E-05		1E-03		3E-04		8E-05
12-A	SVOC	Fluorene	86-73-7	1.90E+00	1.90E+00			5E-06		1E-05		3E-06		3E-04		1E-04		4E-05
12-A	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	9.91E-01	9.91E-01		1E-12		3E-12		6E-09		2E-06		3E-07		3E-08	
12-A	SVOC	2-Methylnaphthalene	91-57-6	5.84E+00	5.84E+00			1E-02		3E-02		6E-04		4E-02		3E-02		2E-01
12-A	SVOC	Naphthalene	91-20-3	2.88E+00	2.88E+00	2E-06		2E-02		4E-02		5E-04		3E-02		2E-02		2E-01
12-A	SVOC	Phenanthrene	85-01-8	1.23E+01	1.23E+01			9E-06		2E-05		3E-05		2E-03		7E-04		2E-04

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
12-A	SVOC	Pyrene	129-00-0	7.24E+00	7.24E+00			6E-07		1E-06		1E-05		1E-03		3E-04		9E-05
12-A	PCB	PCBs (total)	1336-36-3	2.23E-01	2.23E-01	4E-08	3E-09		9E-09		4E-09	6E-04	1E-06	6E-02	3E-07	2E-02	3E-08	1E-02
12-A	INORG	Antimony	7440-36-0	1.90E+02	1.90E+02							2E-02		2E+00		2E-01		9E-01
12-A	INORG	Arsenic	7440-38-2	2.20E+01	1.39E+01						1E-07	2E-03	4E-05	2E-01	5E-06	3E-02	7E-07	6E-03
12-A	INORG	Barium	7440-39-3	1.00E+03	9.04E+02													
12-A	INORG	Beryllium	7440-41-7	6.90E+00	6.31E+00						4E-09	8E-04	5E-09	1E-02	3E-09	2E-03	7E-09	2E-02
12-A	INORG	Cadmium	7440-43-9	7.50E+00	6.91E+00						4E-09	4E-04	4E-09	3E-02	2E-09	5E-03	6E-09	2E-02
12-A	INORG	Chromium (total)	7440-47-3	3.60E+02	3.28E+02						1E-06	1E-02	1E-06	4E-01	7E-07	6E-02	2E-06	1E-01
12-A	INORG	Cobalt	7440-48-4	1.70E+01	9.95E+00						8E-09	1E-03	9E-09	2E-03	5E-09	5E-04	1E-08	2E-02
12-A	INORG	Copper	7440-50-8	7.20E+02	6.92E+02							7E-04		6E-02		8E-03		3E-02
12-A	INORG	Cyanide (total)	57-12-5	2.00E+00	2.00E+00							4E-06		4E-04		5E-05		2E-04
12-A	INORG	Lead	7439-92-1	1.10E+04	1.10E+04													
12-A	INORG	Manganese	7439-96-5	2.20E+03	1.72E+03							7E-02		7E-02		2E-02		1E+00
12-A	INORG	Mercury	7439-97-6	7.84E+00	7.79E+00	3E-04		3E-02		7E-02		4E-03		2E-01		1E-01		1E+00
12-A	INORG	Nickel	7440-02-0	8.80E+01	6.80E+01						5E-09		5E-09		3E-09		8E-09	
12-A	INORG	Selenium	7782-49-2	6.40E-01	1.21E-01							1E-06		9E-05		1E-05		5E-05
12-A	INORG	Silver	7440-22-4	9.10E-01	7.22E-01							2E-04		6E-04		1E-04		3E-03
12-A	INORG	Thallium	7440-28-0	3.10E-01	1.13E-01							6E-05		6E-03		8E-04		3E-03
12-A	INORG	Vanadium	7440-62-2	1.00E+02	7.51E+01							4E-04		4E-02		5E-03		2E-02
12-A	INORG	Zinc	7440-66-6	3.20E+02	2.10E+02							3E-05		3E-03		3E-04		1E-03
12-B	VOC	Acetone	67-64-1	8.60E-02	8.60E-02	5E-09		2E-06		5E-06		6E-08		3E-06		2E-06		2E-05
12-B	VOC	Methyl Acetate	79-20-9	1.20E-02	1.20E-02	5E-09		5E-07		1E-06		1E-08		5E-07		4E-07		4E-07
12-B	VOC	Methylcyclohexane	108-87-2	1.50E-01	1.50E-01	6E-07		3E-04		3E-04		1E-06		6E-05		5E-05		5E-04
12-B	VOC	Methylene Chloride	75-09-2	1.50E-01	1.50E-01	7E-06	7E-08	1E-04	2E-07	3E-04	1E-10	6E-07	2E-08	4E-05	1E-08	2E-05	4E-09	2E-04
12-B	VOC	Toluene	108-88-3	3.90E-02	3.90E-02	3E-07		2E-05		4E-05		8E-08		5E-06		3E-06		2E-05
12-B	VOC	Xylenes (total)	1330-20-7	1.12E-01	1.12E-01	5E-07		1E-03		3E-03		6E-06		3E-04		2E-04		2E-03
12-B	SVOC	Acenaphthene	83-32-9	6.69E-02	6.69E-02			5E-07		1E-06		1E-07		8E-06		3E-06		2E-06
12-B	SVOC	Anthracene	120-12-7	2.95E-01	2.95E-01							5E-08		5E-06		1E-06		3E-07
12-B	SVOC	Benzo(a)anthracene	56-55-3	1.18E-01	1.18E-01		2E-12		7E-12		7E-10		2E-07		4E-08		4E-09	
12-B	SVOC	Benzo(a)pyrene	50-32-8	1.31E-01	1.31E-01		4E-12		1E-11		8E-09		2E-06		5E-07		4E-08	
12-B	SVOC	Benzo(b)fluoranthene	205-99-2	2.16E-01	2.16E-01		5E-11		1E-10		1E-09		4E-07		8E-08		7E-09	
12-B	SVOC	Benzo(g,h,i)perylene	191-24-2	6.87E-02	6.87E-02			6E-13		1E-12		1E-07		1E-05		3E-06		6E-07
12-B	SVOC	Benzo(k)fluoranthene	207-08-9	1.25E-01	1.25E-01		2E-14		6E-14		7E-11		2E-08		4E-09		4E-10	
12-B	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	8.49E-02	8.49E-02	1E-14	6E-17	6E-13	2E-16	2E-12	9E-12	2E-07	2E-09	2E-05	5E-10	5E-06	4E-11	1E-05
12-B	SVOC	Chrysene	218-01-9	1.73E-01	1.73E-01		1E-12		3E-12		1E-11		3E-09		6E-10		6E-11	
12-B	SVOC	Dibenzofuran	132-64-9	1.17E-01	1.17E-01			8E-07		2E-06		3E-06		3E-04		8E-05		3E-04
12-B	SVOC	Diethylphthalate	84-66-2	3.14E-02	3.14E-02	1E-09		1E-09		3E-09		2E-09		2E-07		6E-08		2E-08
12-B	SVOC	Fluoranthene	206-44-0	5.83E-01	5.83E-01			5E-08		1E-07		9E-07		8E-05		2E-05		6E-06
12-B	SVOC	Fluorene	86-73-7	8.12E-01	8.12E-01			2E-06		5E-06		1E-06		1E-04		4E-05		2E-05
12-B	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	8.25E-02	8.25E-02		9E-14		3E-13		5E-10		1E-07		3E-08		2E-09	
12-B	SVOC	2-Methylnaphthalene	91-57-6	3.52E+00	3.52E+00			8E-03		2E-02		4E-04		2E-02		2E-02		1E-01
12-B	SVOC	Naphthalene	91-20-3	4.41E-01	4.41E-01	2E-07		3E-03		7E-03		8E-05		4E-03		3E-03		3E-02
12-B	SVOC	Phenanthrene	85-01-8	1.97E+00	1.97E+00			1E-06		4E-06		4E-06		4E-04		1E-04		4E-05
12-B	SVOC	Pyrene	129-00-0	5.93E-01	5.93E-01			5E-08		1E-07		1E-06		1E-04		3E-05		7E-06
12-B	INORG	Antimony	7440-36-0	3.70E-01	2.84E-01							3E-05		3E-03		3E-04		1E-03
12-B	INORG	Arsenic	7440-38-2	9.90E+00	1.78E+00						2E-08	3E-04	5E-06	2E-02	7E-07	4E-03	9E-08	8E-04
12-B	INORG	Barium	7440-39-3	1.00E+02	4.31E+00													
12-B	INORG	Beryllium	7440-41-7	6.20E-01	3.00E-02						2E-11	4E-06	2E-11	6E-05	1E-11	8E-06	4E-11	8E-05
12-B	INORG	Cadmium	7440-43-9	1.60E+00	1.01E+00						5E-10	6E-05	6E-10	4E-03	3E-10	8E-04	9E-10	2E-03
12-B	INORG	Chromium (total)	7440-47-3	9.10E+01	5.90E+01						2E-07	2E-03	2E-07	7E-02	1E-07	1E-02	3E-07	3E-02
12-B	INORG	Cobalt	7440-48-4	1.00E+01	2.95E+00						2E-09	3E-04	3E-09	6E-04	2E-09	1E-04	4E-09	5E-03
12-B	INORG	Copper	7440-50-8	4.20E+02	3.92E+02							4E-04		4E-02		5E-03		2E-02
12-B	INORG	Cyanide (total)	57-12-5	3.90E-02	3.90E-02							8E-08		7E-06		1E-06		4E-06

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
12-B	INORG	Lead	7439-92-1	6.20E+02	6.20E+02													
12-B	INORG	Manganese	7439-96-5	1.90E+03	1.42E+03							6E-02		6E-02		2E-02		1E+00
12-B	INORG	Mercury	7439-97-6	6.90E-02	1.66E-02	5E-07		6E-05		2E-04		8E-06		5E-04		2E-04		2E-03
12-B	INORG	Nickel	7440-02-0	9.20E+01	7.20E+01						5E-09		5E-09		3E-09		8E-09	
12-B	INORG	Selenium	7782-49-2	9.30E-01	4.11E-01							3E-06		3E-04		4E-05		2E-04
12-B	INORG	Silver	7440-22-4	1.40E-01														
12-B	INORG	Thallium	7440-28-0	3.60E-01	1.63E-01							9E-05		9E-03		1E-03		5E-03
12-B	INORG	Vanadium	7440-62-2	4.60E+01	2.11E+01							1E-04		1E-02		1E-03		6E-03
12-B	INORG	Zinc	7440-66-6	3.20E+02	2.10E+02							3E-05		3E-03		3E-04		1E-03
12-C	VOC	Acetone	67-64-1	9.60E-02	9.60E-02	5E-09		2E-06		5E-06		7E-08		4E-06		3E-06		2E-05
12-C	VOC	1,2-Dichloroethane	107-06-2	1.60E-02	1.60E-02	7E-06	2E-07	4E-03	6E-07	1E-02	4E-10	2E-05	7E-08	1E-03	4E-08	9E-04	2E-08	9E-03
12-C	VOC	Methyl Acetate	79-20-9	2.50E-02	2.50E-02	9E-09		1E-06		3E-06		2E-08		1E-06		8E-07		7E-07
12-C	INORG	Arsenic	7440-38-2	5.10E+00														
12-C	INORG	Barium	7440-39-3	5.80E+01														
12-C	INORG	Beryllium	7440-41-7	4.70E-01														
12-C	INORG	Cadmium	7440-43-9	1.80E-01														
12-C	INORG	Chromium (total)	7440-47-3	1.20E+01														
12-C	INORG	Cobalt	7440-48-4	4.30E+00														
12-C	INORG	Copper	7440-50-8	1.10E+01														
12-C	INORG	Cyanide (total)	57-12-5	2.30E-02	2.30E-02							5E-08		4E-06		6E-07		2E-06
12-C	INORG	Lead	7439-92-1	6.20E+00	6.20E+00													
12-C	INORG	Manganese	7439-96-5	2.10E+02														
12-C	INORG	Mercury	7439-97-6	6.76E-02	1.52E-02	5E-07		6E-05		1E-04		7E-06		4E-04		2E-04		2E-03
12-C	INORG	Nickel	7440-02-0	1.40E+01														
12-C	INORG	Selenium	7782-49-2	7.20E-01	2.01E-01							2E-06		1E-04		2E-05		8E-05
12-C	INORG	Silver	7440-22-4	5.80E-02														
12-C	INORG	Thallium	7440-28-0	1.60E-01														
12-C	INORG	Vanadium	7440-62-2	1.70E+01														
12-C	INORG	Zinc	7440-66-6	2.40E+01														
12-D	VOC	Methylcyclohexane	108-87-2	1.80E-02	1.80E-02	7E-08		3E-05		4E-05		1E-07		8E-06		6E-06		6E-05
12-D	VOC	Tetrachloroethene	127-18-4	9.00E-02	9.00E-02	4E-06	5E-07	1E-03	7E-07	1E-03	5E-10	3E-06	8E-08	2E-04	5E-08	1E-04	2E-08	1E-03
12-D	VOC	Xylenes (total)	1330-20-7	5.45E-02	5.45E-02	2E-07		7E-04		2E-03		3E-06		1E-04		1E-04		1E-03
12-D	SVOC	Anthracene	120-12-7	5.45E-02	5.45E-02							1E-08		9E-07		2E-07		5E-08
12-D	SVOC	Benzo(a)anthracene	56-55-3	2.23E-01	2.23E-01		5E-12		1E-11		1E-09		4E-07		8E-08		7E-09	
12-D	SVOC	Benzo(a)pyrene	50-32-8	2.62E-01	2.62E-01		7E-12		2E-11		2E-08		4E-06		9E-07		8E-08	
12-D	SVOC	Benzo(b)fluoranthene	205-99-2	3.61E-01	3.61E-01		8E-11		2E-10		2E-09		6E-07		1E-07		1E-08	
12-D	SVOC	Benzo(g,h,i)perylene	191-24-2	2.17E-01	2.17E-01			2E-12		5E-12		4E-07		4E-05		1E-05		2E-06
12-D	SVOC	Benzo(k)fluoranthene	207-08-9	2.97E-01	2.97E-01		5E-14		1E-13		2E-10		5E-08		1E-08		9E-10	
12-D	SVOC	Chrysene	218-01-9	2.49E-01	2.49E-01		1E-12		4E-12		1E-11		4E-09		9E-10		9E-11	
12-D	SVOC	Fluoranthene	206-44-0	2.56E-01	2.56E-01			2E-08		5E-08		4E-07		3E-05		9E-06		2E-06
12-D	SVOC	Phenanthrene	85-01-8	1.75E-01	1.75E-01			1E-07		3E-07		4E-07		3E-05		1E-05		3E-06
12-D	SVOC	Pyrene	129-00-0	9.63E-01	9.63E-01			7E-08		2E-07		2E-06		2E-04		5E-05		1E-05
12-D	INORG	Arsenic	7440-38-2	8.90E+00	7.77E-01						8E-09	1E-04	2E-06	1E-02	3E-07	2E-03	4E-08	3E-04
12-D	INORG	Barium	7440-39-3	8.80E+01														
12-D	INORG	Beryllium	7440-41-7	6.70E-01	8.00E-02						6E-11	1E-05	6E-11	1E-04	4E-11	2E-05	9E-11	2E-04
12-D	INORG	Cadmium	7440-43-9	2.50E-01														
12-D	INORG	Chromium (total)	7440-47-3	2.00E+01														
12-D	INORG	Cobalt	7440-48-4	9.70E+00	2.65E+00						2E-09	3E-04	2E-09	6E-04	1E-09	1E-04	4E-09	5E-03
12-D	INORG	Copper	7440-50-8	1.70E+01														
12-D	INORG	Lead	7439-92-1	2.00E+01	2.00E+01													
12-D	INORG	Manganese	7439-96-5	7.40E+02	2.63E+02							1E-02		1E-02		4E-03		2E-01
12-D	INORG	Mercury	7439-97-6	2.08E-02														
12-D	INORG	Nickel	7440-02-0	2.60E+01	6.04E+00						4E-10		5E-10		3E-10		7E-10	

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
12-D	INORG	Silver	7440-22-4	9.60E-02														
12-D	INORG	Thallium	7440-28-0	2.30E-01	3.35E-02							2E-05		2E-03		2E-04		9E-04
12-D	INORG	Vanadium	7440-62-2	3.10E+01	6.13E+00							3E-05		3E-03		4E-04		2E-03
12-D	INORG	Zinc	7440-66-6	5.40E+01														
16-A	VOC	1,2-Dichloroethane	107-06-2	1.20E-02	1.20E-02	5E-06	1E-07	3E-03	4E-07	8E-03	3E-10	2E-05	5E-08	9E-04	3E-08	7E-04	1E-08	7E-03
16-A	VOC	Methyl Acetate	79-20-9	7.10E-02	7.10E-02	3E-08		3E-06		8E-06		6E-08		3E-06		2E-06		2E-06
16-A	VOC	Methylene Chloride	75-09-2	1.70E-02	1.70E-02	8E-07	8E-09	2E-05	2E-08	3E-05	1E-11	7E-08	2E-09	4E-06	1E-09	3E-06	5E-10	2E-05
16-A	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	4.17E-01	4.17E-01	6E-14	3E-16	3E-12	1E-15	8E-12	4E-11	1E-06	1E-08	1E-04	2E-09	2E-05	2E-10	5E-05
16-A	INORG	Arsenic	7440-38-2	1.70E+01	8.88E+00						9E-08	1E-03	2E-05	1E-01	3E-06	2E-02	4E-07	4E-03
16-A	INORG	Barium	7440-39-3	9.20E+01														
16-A	INORG	Beryllium	7440-41-7	6.00E-01	1.00E-02						7E-12	1E-06	7E-12	2E-05	4E-12	3E-06	1E-11	3E-05
16-A	INORG	Cadmium	7440-43-9	5.70E-01														
16-A	INORG	Chromium (total)	7440-47-3	1.40E+01														
16-A	INORG	Cobalt	7440-48-4	1.30E+01	5.95E+00						5E-09	6E-04	5E-09	1E-03	3E-09	3E-04	8E-09	1E-02
16-A	INORG	Copper	7440-50-8	1.60E+01														
16-A	INORG	Cyanide (total)	57-12-5	1.00E-01	1.00E-01							2E-07		2E-05		2E-06		1E-05
16-A	INORG	Lead	7439-92-1	1.10E+01	1.10E+01													
16-A	INORG	Manganese	7439-96-5	5.40E+02	6.25E+01							3E-03		3E-03		9E-04		4E-02
16-A	INORG	Mercury	7439-97-6	3.30E-02														
16-A	INORG	Nickel	7440-02-0	2.20E+01	2.04E+00						1E-10		2E-10		9E-11		2E-10	
16-A	INORG	Selenium	7782-49-2	5.00E-01														
16-A	INORG	Silver	7440-22-4	7.20E-01	5.32E-01							1E-04		4E-04		8E-05		2E-03
16-A	INORG	Thallium	7440-28-0	1.80E-01														
16-A	INORG	Vanadium	7440-62-2	2.20E+01														
16-A	INORG	Zinc	7440-66-6	4.20E+01														
16-B	VOC	Ethyl Benzene	100-41-4	1.20E-02	1.20E-02	6E-08		2E-05		4E-05		7E-08		4E-06		3E-06		3E-05
16-B	VOC	Methylcyclohexane	108-87-2	8.80E-02	8.80E-02	3E-07		1E-04		2E-04		7E-07		4E-05		3E-05		3E-04
16-B	VOC	Methylene Chloride	75-09-2	9.70E-02	9.70E-02	5E-06	5E-08	1E-04	1E-07	2E-04	7E-11	4E-07	1E-08	2E-05	7E-09	2E-05	3E-09	1E-04
16-B	VOC	Tetrachloroethene	127-18-4	4.10E-02	4.10E-02	2E-06	2E-07	5E-04	3E-07	6E-04	2E-10	1E-06	4E-08	8E-05	2E-08	5E-05	8E-09	5E-04
16-B	VOC	Toluene	108-88-3	2.30E-02	2.30E-02	2E-07		1E-05		3E-05		5E-08		3E-06		2E-06		1E-05
16-B	VOC	Xylenes (total)	1330-20-7	1.03E-01	1.03E-01	4E-07		1E-03		3E-03		5E-06		3E-04		2E-04		2E-03
16-B	SVOC	Fluoranthene	206-44-0	4.02E-02	4.02E-02			3E-09		8E-09		6E-08		5E-06		1E-06		4E-07
16-B	SVOC	Phenanthrene	85-01-8	3.95E-02	3.95E-02			3E-08		7E-08		8E-08		7E-06		2E-06		8E-07
16-B	INORG	Antimony	7440-36-0	1.80E-01	9.36E-02							9E-06		9E-04		1E-04		5E-04
16-B	INORG	Arsenic	7440-38-2	6.60E+00														
16-B	INORG	Barium	7440-39-3	1.20E+02	2.43E+01													
16-B	INORG	Beryllium	7440-41-7	1.10E+00	5.10E-01						4E-10	6E-05	4E-10	1E-03	2E-10	1E-04	6E-10	1E-03
16-B	INORG	Cadmium	7440-43-9	1.80E-01														
16-B	INORG	Chromium (total)	7440-47-3	3.10E+01														
16-B	INORG	Cobalt	7440-48-4	1.10E+01	3.95E+00						3E-09	4E-04	3E-09	9E-04	2E-09	2E-04	5E-09	7E-03
16-B	INORG	Copper	7440-50-8	1.80E+01														
16-B	INORG	Cyanide (total)	57-12-5	1.30E-02	1.30E-02							3E-08		2E-06		3E-07		1E-06
16-B	INORG	Lead	7439-92-1	1.30E+01	1.30E+01													
16-B	INORG	Manganese	7439-96-5	2.90E+02														
16-B	INORG	Mercury	7439-97-6	2.91E-02														
16-B	INORG	Nickel	7440-02-0	3.50E+01	1.50E+01						1E-09		1E-09		7E-10		2E-09	
16-B	INORG	Silver	7440-22-4	1.40E-01														
16-B	INORG	Thallium	7440-28-0	5.10E-01	3.13E-01							2E-04		2E-02		2E-03		9E-03
16-B	INORG	Vanadium	7440-62-2	4.50E+01	2.01E+01							1E-04		1E-02		1E-03		6E-03
16-B	INORG	Zinc	7440-66-6	6.50E+01														
16-C	VOC	Acetone	67-64-1	5.50E-02	5.50E-02	3E-09		1E-06		3E-06		4E-08		2E-06		2E-06		1E-05
16-C	VOC	Benzene	71-43-2	8.60E-01	8.60E-01	2E-03	9E-06	1E-01	2E-05	2E-01	1E-08	3E-04	2E-06	2E-02	1E-06	1E-02	4E-07	6E-02
16-C	VOC	2-Butanone	78-93-3	4.50E-02	4.50E-02	1E-08		9E-07		2E-06		2E-08		1E-06		8E-07		7E-06

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
16-C	VOC	Cumene	98-82-8	4.90E-02	4.90E-02	4E-07		2E-04		4E-04		6E-07		3E-05		2E-05		2E-04
16-C	VOC	Cyclohexane	110-82-7	5.30E-02	5.30E-02	4E-07		4E-05		5E-05		2E-07		9E-06		7E-06		6E-05
16-C	VOC	1,1-Dichloroethane	75-34-3	1.60E-02	1.60E-02	3E-07		2E-04		2E-04		4E-07		2E-05		2E-05		1E-05
16-C	VOC	cis-1,2-Dichloroethene	156-59-2	1.40E+00	1.40E+00	1E-05		2E-01		2E-01		4E-04		2E-02		2E-02		2E-02
16-C	VOC	Ethyl Benzene	100-41-4	7.00E-01	7.00E-01	3E-06		1E-03		3E-03		4E-06		2E-04		2E-04		2E-03
16-C	VOC	Methyl Acetate	79-20-9	3.90E-01	3.90E-01	1E-07		2E-05		5E-05		3E-07		2E-05		1E-05		1E-05
16-C	VOC	Methylcyclohexane	108-87-2	2.20E-01	2.20E-01	8E-07		4E-04		4E-04		2E-06		9E-05		7E-05		7E-04
16-C	VOC	Methylene Chloride	75-09-2	1.70E-01	1.70E-01	8E-06	8E-08	2E-04	2E-07	3E-04	1E-10	7E-07	2E-08	4E-05	1E-08	3E-05	5E-09	2E-04
16-C	VOC	Tetrachloroethene	127-18-4	2.10E-02	2.10E-02	9E-07	1E-07	3E-04	2E-07	3E-04	1E-10	7E-07	2E-08	4E-05	1E-08	3E-05	4E-09	2E-04
16-C	VOC	Toluene	108-88-3	1.20E+00	1.20E+00	1E-05		5E-04		1E-03		2E-06		2E-04		8E-05		7E-04
16-C	VOC	Trichloroethene	79-01-6	1.70E-01	1.70E-01	3E-06	4E-07		7E-07		4E-10		6E-08		4E-08		1E-08	
16-C	VOC	1,2,4-Trimethylbenzene	95-63-6	6.50E-01	6.50E-01	4E-06		5E-02		1E-01		3E-04		2E-02		1E-02		1E-02
16-C	VOC	1,3,5-Trimethylbenzene	108-67-8	4.70E-01	4.70E-01	1E-06		2E-02		5E-02		2E-04		9E-03		7E-03		6E-03
16-C	VOC	Vinyl Chloride	75-01-4	1.60E-01	1.60E-01	5E-04	3E-06	8E-03	4E-06	9E-03	6E-09	4E-05	1E-06	2E-03	6E-07	2E-03	2E-07	2E-02
16-C	VOC	Xylenes (total)	1330-20-7	3.06E+00	3.06E+00	1E-05		4E-02		9E-02		2E-04		8E-03		7E-03		6E-02
16-C	SVOC	Acenaphthene	83-32-9	9.99E-01	9.99E-01			8E-06		2E-05		2E-06		1E-04		5E-05		3E-05
16-C	SVOC	Acetophenone	98-86-2	2.62E-01	2.62E-01	8E-08		8E-06		2E-05		5E-07		3E-05		2E-05		2E-05
16-C	SVOC	Anthracene	120-12-7	3.48E+00	3.48E+00							6E-07		6E-05		2E-05		3E-06
16-C	SVOC	Benzo(a)anthracene	56-55-3	5.92E+00	5.92E+00		1E-10		4E-10		3E-08		1E-05		2E-06		2E-07	
16-C	SVOC	Benzo(a)pyrene	50-32-8	5.18E+00	5.18E+00		1E-10		4E-10		3E-07		8E-05		2E-05		2E-06	
16-C	SVOC	Benzo(b)fluoranthene	205-99-2	5.53E+00	5.53E+00		1E-09		4E-09		3E-08		9E-06		2E-06		2E-07	
16-C	SVOC	Benzo(g,h,i)perylene	191-24-2	2.08E+00	2.08E+00			2E-11		4E-11		4E-06		4E-04		9E-05		2E-05
16-C	SVOC	Benzo(k)fluoranthene	207-08-9	5.29E+00	5.29E+00		9E-13		3E-12		3E-09		9E-07		2E-07		2E-08	
16-C	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	6.14E-01	6.14E-01	1E-13	5E-16	5E-12	1E-15	1E-11	6E-11	2E-06	2E-08	1E-04	3E-09	3E-05	3E-10	8E-05
16-C	SVOC	Butylbenzylphthalate	85-68-7	1.64E-01	1.64E-01		5E-14	4E-10	2E-13	1E-09	2E-12	4E-08	6E-10	4E-06	1E-10	1E-06	1E-11	2E-07
16-C	SVOC	Carbazole	86-74-8	1.68E+00	1.68E+00		2E-12		6E-12		3E-10		7E-08		1E-08		2E-09	
16-C	SVOC	Chrysene	218-01-9	6.40E+00	6.40E+00		4E-11		1E-10		4E-10		1E-07		2E-08		2E-09	
16-C	SVOC	Dibenz(a,h)anthracene	53-70-3	8.05E-01	8.05E-01		1E-13		3E-13		5E-08		1E-05		3E-06		2E-07	
16-C	SVOC	Dibenzofuran	132-64-9	6.78E-01	6.78E-01			5E-06		1E-05		2E-05		2E-03		5E-04		2E-03
16-C	SVOC	Diethylphthalate	84-66-2	1.65E-01	1.65E-01	5E-09		6E-09		2E-08		1E-08		1E-06		3E-07		1E-07
16-C	SVOC	Fluoranthene	206-44-0	1.52E+01	1.52E+01			1E-06		3E-06		2E-05		2E-03		5E-04		1E-04
16-C	SVOC	Fluorene	86-73-7	1.17E+00	1.17E+00			3E-06		8E-06		2E-06		2E-04		6E-05		3E-05
16-C	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	2.24E+00	2.24E+00		3E-12		8E-12		1E-08		4E-06		8E-07		7E-08	
16-C	SVOC	2-Methylnaphthalene	91-57-6	1.23E+00	1.23E+00			3E-03		7E-03		1E-04		8E-03		5E-03		5E-02
16-C	SVOC	Naphthalene	91-20-3	3.70E-01	3.70E-01	2E-07		2E-03		6E-03		7E-05		4E-03		3E-03		3E-02
16-C	SVOC	Nitrobenzene	98-95-3	2.16E-02	2.16E-02	1E-07		2E-04		5E-04		9E-06		6E-04		3E-04		3E-04
16-C	SVOC	Phenanthrene	85-01-8	1.09E+01	1.09E+01			8E-06		2E-05		2E-05		2E-03		6E-04		2E-04
16-C	SVOC	Pyrene	129-00-0	1.32E+01	1.32E+01			1E-06		3E-06		3E-05		2E-03		6E-04		2E-04
16-C	PCB	PCBs (total)	1336-36-3	1.17E+00	1.17E+00	2E-07	1E-08		5E-08		2E-08	3E-03	6E-06	3E-01	1E-06	8E-02	2E-07	7E-02
16-C	INORG	Antimony	7440-36-0	1.60E-01	7.36E-02							7E-06		7E-04		9E-05		4E-04
16-C	INORG	Arsenic	7440-38-2	1.40E+01	5.88E+00						6E-08	8E-04	2E-05	8E-02	2E-06	1E-02	3E-07	3E-03
16-C	INORG	Barium	7440-39-3	1.20E+02	2.43E+01													
16-C	INORG	Beryllium	7440-41-7	3.20E+00	2.61E+00						2E-09	3E-04	2E-09	5E-03	1E-09	7E-04	3E-09	7E-03
16-C	INORG	Cadmium	7440-43-9	1.30E+00	7.12E-01						4E-10	4E-05	4E-10	3E-03	2E-10	5E-04	6E-10	2E-03
16-C	INORG	Chromium (total)	7440-47-3	7.10E+01	3.90E+01						1E-07	1E-03	1E-07	5E-02	9E-08	7E-03	2E-07	2E-02
16-C	INORG	Cobalt	7440-48-4	1.30E+01	5.95E+00						5E-09	6E-04	5E-09	1E-03	3E-09	3E-04	8E-09	1E-02
16-C	INORG	Copper	7440-50-8	1.10E+02	8.15E+01							8E-05		7E-03		1E-03		4E-03
16-C	INORG	Cyanide (total)	57-12-5	5.50E-01	5.50E-01							1E-06		1E-04		1E-05		5E-05
16-C	INORG	Lead	7439-92-1	2.50E+02	2.50E+02													
16-C	INORG	Manganese	7439-96-5	1.30E+03	8.23E+02							3E-02		3E-02		1E-02		6E-01
16-C	INORG	Mercury	7439-97-6	2.61E-01	2.09E-01	7E-06		8E-04		2E-03		9E-05		6E-03		3E-03		3E-02
16-C	INORG	Nickel	7440-02-0	7.90E+01	5.90E+01						4E-09		4E-09		3E-09		7E-09	
16-C	INORG	Selenium	7782-49-2	8.60E-01	3.41E-01							3E-06		2E-04		3E-05		1E-04

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
16-C	INORG	Silver	7440-22-4	2.30E+00	2.11E+00							5E-04		2E-03		3E-04		8E-03
16-C	INORG	Thallium	7440-28-0	3.60E-01	1.63E-01							9E-05		9E-03		1E-03		5E-03
16-C	INORG	Vanadium	7440-62-2	3.00E+01	5.13E+00							3E-05		3E-03		4E-04		1E-03
16-C	INORG	Zinc	7440-66-6	1.50E+02	3.95E+01							5E-06		5E-04		6E-05		3E-04
16-D	VOC	1,2-Dichloroethane	107-06-2	9.40E-03	9.40E-03	4E-06	1E-07	2E-03	3E-07	6E-03	2E-10	1E-05	4E-08	7E-04	3E-08	6E-04	1E-08	5E-03
16-D	VOC	Methyl Acetate	79-20-9	7.00E-02	7.00E-02	3E-08		3E-06		8E-06		6E-08		3E-06		2E-06		2E-06
16-D	VOC	Methylene Chloride	75-09-2	1.70E-02	1.70E-02	8E-07	8E-09	2E-05	2E-08	3E-05	1E-11	7E-08	2E-09	4E-06	1E-09	3E-06	5E-10	2E-05
16-D	VOC	Xylenes (total)	1330-20-7	6.55E-02	6.55E-02	3E-07		8E-04		2E-03		3E-06		2E-04		1E-04		1E-03
16-D	SVOC	Butylbenzylphthalate	85-68-7	1.28E-01	1.28E-01		4E-14	3E-10	1E-13	8E-10	2E-12	3E-08	5E-10	3E-06	1E-10	7E-07	1E-11	2E-07
16-D	SVOC	Fluoranthene	206-44-0	5.27E-02	5.27E-02			4E-09		1E-08		8E-08		7E-06		2E-06		5E-07
16-D	SVOC	Phenanthrene	85-01-8	3.58E-02	3.58E-02			3E-08		6E-08		8E-08		7E-06		2E-06		7E-07
16-D	SVOC	Pyrene	129-00-0	4.60E-02	4.60E-02			4E-09		9E-09		9E-08		8E-06		2E-06		6E-07
16-D	INORG	Arsenic	7440-38-2	6.60E+00														
16-D	INORG	Barium	7440-39-3	5.90E+01														
16-D	INORG	Beryllium	7440-41-7	4.90E-01														
16-D	INORG	Cadmium	7440-43-9	1.60E-01														
16-D	INORG	Chromium (total)	7440-47-3	2.30E+01														
16-D	INORG	Cobalt	7440-48-4	8.90E+00	1.85E+00						2E-09	2E-04	2E-09	4E-04	1E-09	9E-05	3E-09	3E-03
16-D	INORG	Copper	7440-50-8	1.50E+01														
16-D	INORG	Cyanide (total)	57-12-5	2.80E-02	2.80E-02							6E-08		5E-06		7E-07		3E-06
16-D	INORG	Lead	7439-92-1	9.40E+00	9.40E+00													
16-D	INORG	Manganese	7439-96-5	5.90E+02	1.13E+02							5E-03		5E-03		2E-03		8E-02
16-D	INORG	Mercury	7439-97-6	3.22E-02														
16-D	INORG	Nickel	7440-02-0	2.20E+01	2.04E+00						1E-10		2E-10		9E-11		2E-10	
16-D	INORG	Silver	7440-22-4	5.70E-02														
16-D	INORG	Thallium	7440-28-0	7.00E-01	5.03E-01							3E-04		3E-02		4E-03		1E-02
16-D	INORG	Vanadium	7440-62-2	2.40E+01														
16-D	INORG	Zinc	7440-66-6	3.80E+01														
17-A	VOC	Acetone	67-64-1	2.80E-01	2.80E-01	2E-08		6E-06		2E-05		2E-07		1E-05		8E-06		6E-05
17-A	VOC	Benzene	71-43-2	8.20E-02	8.20E-02	1E-04	9E-07	1E-02	2E-06	2E-02	1E-09	3E-05	2E-07	2E-03	1E-07	1E-03	4E-08	6E-03
17-A	VOC	Bromodichloromethane	75-27-4	1.20E-02	1.20E-02		9E-08	2E-04	3E-07	5E-04	1E-10	6E-07	2E-08	3E-05	1E-08	3E-05	4E-09	2E-04
17-A	VOC	2-Butanone	78-93-3	1.70E-01	1.70E-01	4E-08		3E-06		8E-06		8E-08		5E-06		3E-06		3E-05
17-A	VOC	Chloromethane	74-87-3	5.00E-02	5.00E-02	4E-06		3E-03		3E-03		9E-06		5E-04		4E-04		4E-03
17-A	VOC	Cumene	98-82-8	2.50E-01	2.50E-01	2E-06		8E-04		2E-03		3E-06		2E-04		1E-04		1E-03
17-A	VOC	Cyclohexane	110-82-7	9.20E-01	9.20E-01	6E-06		8E-04		9E-04		3E-06		1E-04		1E-04		1E-03
17-A	VOC	1,2-Dichloroethane	107-06-2	1.10E-02	1.10E-02	5E-06	1E-07	3E-03	4E-07	7E-03	3E-10	2E-05	5E-08	8E-04	3E-08	6E-04	1E-08	6E-03
17-A	VOC	Ethyl Benzene	100-41-4	4.00E-01	4.00E-01	2E-06		6E-04		1E-03		2E-06		1E-04		9E-05		9E-04
17-A	VOC	2-Hexanone	591-78-6	1.90E-02	1.90E-02	7E-06		2E-02		2E-02		3E-08		2E-06		2E-07		1E-06
17-A	VOC	Methyl Acetate	79-20-9	4.30E-01	4.30E-01	2E-07		2E-05		5E-05		3E-07		2E-05		1E-05		1E-05
17-A	VOC	4-Methyl-2-pentanone	108-10-1	6.40E-02	6.40E-02	5E-08		4E-06		1E-05		5E-08		3E-06		2E-06		2E-05
17-A	VOC	Methylcyclohexane	108-87-2	3.30E+00	3.30E+00	1E-05		6E-03		6E-03		3E-05		1E-03		1E-03		1E-02
17-A	VOC	Methylene Chloride	75-09-2	1.50E-01	1.50E-01	7E-06	7E-08	1E-04	2E-07	3E-04	1E-10	6E-07	2E-08	4E-05	1E-08	2E-05	4E-09	2E-04
17-A	VOC	Styrene	100-42-5	1.80E-02	1.80E-02	3E-08		5E-06		1E-05		4E-08		2E-06		2E-06		5E-06
17-A	VOC	Tetrachloroethene	127-18-4	1.00E-02	1.00E-02	4E-07	6E-08	1E-04	8E-08	1E-04	5E-11	3E-07	9E-09	2E-05	5E-09	1E-05	2E-09	1E-04
17-A	VOC	Toluene	108-88-3	2.90E+00	2.90E+00	3E-05		1E-03		3E-03		6E-06		4E-04		2E-04		2E-03
17-A	VOC	Trichlorofluoromethane	75-69-4	4.70E-02	4.70E-02	6E-08		3E-04		4E-04		2E-06		8E-05		6E-05		6E-05
17-A	VOC	Xylenes (total)	1330-20-7	3.60E+00	3.60E+00	1E-05		4E-02		1E-01		2E-04		1E-02		8E-03		7E-02
17-A	SVOC	Acenaphthylene	208-96-8	6.50E-02	6.50E-02			7E-07		2E-06		2E-07		2E-05		6E-06		3E-06
17-A	SVOC	Acetophenone	98-86-2	5.08E-02	5.08E-02	2E-08		2E-06		4E-06		1E-07		7E-06		4E-06		3E-06
17-A	SVOC	Anthracene	120-12-7	6.13E-02	6.13E-02							1E-08		1E-06		3E-07		6E-08
17-A	SVOC	Benzo(a)anthracene	56-55-3	1.95E-01	1.95E-01		4E-12		1E-11		1E-09		3E-07		7E-08		6E-09	
17-A	SVOC	Benzo(a)pyrene	50-32-8	2.93E-01	2.93E-01		8E-12		2E-11		2E-08		5E-06		1E-06		9E-08	
17-A	SVOC	Benzo(b)fluoranthene	205-99-2	5.26E-01	5.26E-01		1E-10		3E-10		3E-09		9E-07		2E-07		2E-08	

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
17-A	SVOC	Benzo(g,h,i)perylene	191-24-2	1.79E-01	1.79E-01			1E-12		4E-12		3E-07		3E-05		8E-06		2E-06
17-A	SVOC	Benzo(k)fluoranthene	207-08-9	3.20E-01	3.20E-01		5E-14		2E-13		2E-10		5E-08		1E-08		9E-10	
17-A	SVOC	Butylbenzylphthalate	85-68-7	2.40E-01	2.40E-01		8E-14	6E-10	2E-13	1E-09	3E-12	6E-08	9E-10	6E-06	2E-10	1E-06	2E-11	4E-07
17-A	SVOC	Carbazole	86-74-8	4.07E-02	4.07E-02		4E-14		1E-13		6E-12		2E-09		3E-10		4E-11	
17-A	SVOC	Chrysene	218-01-9	2.56E-01	2.56E-01		1E-12		4E-12		2E-11		4E-09		9E-10		9E-11	
17-A	SVOC	Dibenzofuran	132-64-9	2.80E-01	2.80E-01			2E-06		5E-06		8E-06		7E-04		2E-04		6E-04
17-A	SVOC	Di-n-butylphthalate	84-74-2	5.05E-02	5.05E-02	6E-13						3E-08		2E-06		6E-07		1E-07
17-A	SVOC	Fluoranthene	206-44-0	3.25E-01	3.25E-01			3E-08		7E-08		5E-07		4E-05		1E-05		3E-06
17-A	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	1.90E-01	1.90E-01		2E-13		7E-13		1E-09		3E-07		7E-08		6E-09	
17-A	SVOC	2-Methylnaphthalene	91-57-6	8.45E-01	8.45E-01			2E-03		5E-03		9E-05		5E-03		4E-03		3E-02
17-A	SVOC	Naphthalene	91-20-3	5.82E-01	5.82E-01	3E-07		4E-03		9E-03		1E-04		6E-03		4E-03		4E-02
17-A	SVOC	Phenanthrene	85-01-8	5.43E-01	5.43E-01			4E-07		1E-06		1E-06		1E-04		3E-05		1E-05
17-A	SVOC	Pyrene	129-00-0	5.67E-01	5.67E-01			4E-08		1E-07		1E-06		1E-04		3E-05		7E-06
17-A	PCB	PCBs (total)	1336-36-3	2.82E-01	2.82E-01	5E-08	4E-09		1E-08		5E-09	8E-04	1E-06	7E-02	3E-07	2E-02	4E-08	2E-02
17-A	INORG	Antimony	7440-36-0	4.00E-01	3.14E-01							3E-05		3E-03		4E-04		2E-03
17-A	INORG	Arsenic	7440-38-2	1.40E+01	5.88E+00						6E-08	8E-04	2E-05	8E-02	2E-06	1E-02	3E-07	3E-03
17-A	INORG	Barium	7440-39-3	1.60E+02	6.43E+01													
17-A	INORG	Beryllium	7440-41-7	2.10E+00	1.51E+00						1E-09	2E-04	1E-09	3E-03	7E-10	4E-04	2E-09	4E-03
17-A	INORG	Cadmium	7440-43-9	3.10E-01														
17-A	INORG	Chromium (total)	7440-47-3	3.10E+01														
17-A	INORG	Cobalt	7440-48-4	8.30E+00	1.25E+00						1E-09	1E-04	1E-09	3E-04	6E-10	6E-05	2E-09	2E-03
17-A	INORG	Copper	7440-50-8	1.30E+02	1.02E+02							1E-04		9E-03		1E-03		5E-03
17-A	INORG	Cyanide (total)	57-12-5	2.80E-01	2.80E-01							6E-07		5E-05		7E-06		3E-05
17-A	INORG	Lead	7439-92-1	2.70E+02	2.70E+02													
17-A	INORG	Manganese	7439-96-5	4.90E+02	1.25E+01							5E-04		5E-04		2E-04		9E-03
17-A	INORG	Mercury	7439-97-6	1.63E-01	1.11E-01	4E-06		4E-04		1E-03		5E-05		3E-03		2E-03		1E-02
17-A	INORG	Nickel	7440-02-0	3.40E+01	1.40E+01						1E-09		1E-09		6E-10		2E-09	
17-A	INORG	Selenium	7782-49-2	1.10E+00	5.81E-01							5E-06		4E-04		6E-05		2E-04
17-A	INORG	Silver	7440-22-4	1.50E-01														
17-A	INORG	Thallium	7440-28-0	3.10E-01	1.13E-01							6E-05		6E-03		8E-04		3E-03
17-A	INORG	Vanadium	7440-62-2	3.10E+01	6.13E+00							3E-05		3E-03		4E-04		2E-03
17-A	INORG	Zinc	7440-66-6	9.30E+01														
21-1	VOC	2-Butanone	78-93-3	7.80E-02	7.80E-02	2E-08		2E-06		4E-06		3E-08		2E-06		1E-06		1E-05
21-1	VOC	Cumene	98-82-8	4.10E-02	4.10E-02	3E-07		1E-04		3E-04		5E-07		3E-05		2E-05		2E-04
21-1	VOC	Cyclohexane	110-82-7	2.80E-01	2.80E-01	2E-06		2E-04		3E-04		8E-07		5E-05		4E-05		3E-04
21-1	VOC	Ethyl Benzene	100-41-4	5.30E-02	5.30E-02	3E-07		8E-05		2E-04		3E-07		2E-05		1E-05		1E-04
21-1	VOC	2-Hexanone	591-78-6	2.90E-02	2.90E-02	1E-05		3E-02		3E-02		4E-08		3E-06		4E-07		2E-06
21-1	VOC	Methyl Acetate	79-20-9	8.00E-01	8.00E-01	3E-07		4E-05		9E-05		6E-07		4E-05		3E-05		2E-05
21-1	VOC	Methylcyclohexane	108-87-2	8.00E-01	8.00E-01	3E-06		1E-03		2E-03		6E-06		3E-04		3E-04		2E-03
21-1	VOC	Methylene Chloride	75-09-2	3.40E-02	3.40E-02	2E-06	2E-08	3E-05	4E-08	7E-05	3E-11	1E-07	4E-09	9E-06	3E-09	5E-06	1E-09	5E-05
21-1	VOC	Tetrachloroethene	127-18-4	3.50E-02	3.50E-02	2E-06	2E-07	4E-04	3E-07	5E-04	2E-10	1E-06	3E-08	7E-05	2E-08	4E-05	7E-09	4E-04
21-1	VOC	Toluene	108-88-3	1.20E-01	1.20E-01	1E-06		5E-05		1E-04		2E-07		2E-05		8E-06		7E-05
21-1	VOC	Trichloroethene	79-01-6	4.00E-02	4.00E-02	8E-07	9E-08		2E-07		9E-11		1E-08		9E-09		3E-09	
21-1	VOC	Xylenes (total)	1330-20-7	5.50E-01	5.50E-01	2E-06		7E-03		2E-02		3E-05		2E-03		1E-03		1E-02
21-1	SVOC	Acenaphthene	83-32-9	7.40E-02	7.40E-02			6E-07		2E-06		1E-07		9E-06		4E-06		2E-06
21-1	SVOC	Anthracene	120-12-7	2.67E-01	2.67E-01							5E-08		5E-06		1E-06		2E-07
21-1	SVOC	Benzo(a)anthracene	56-55-3	4.94E-01	4.94E-01		1E-11		3E-11		3E-09		8E-07		2E-07		2E-08	
21-1	SVOC	Benzo(a)pyrene	50-32-8	5.24E-01	5.24E-01		1E-11		4E-11		3E-08		8E-06		2E-06		2E-07	
21-1	SVOC	Benzo(b)fluoranthene	205-99-2	5.24E-01	5.24E-01		1E-10		3E-10		3E-09		9E-07		2E-07		2E-08	
21-1	SVOC	Benzo(g,h,i)perylene	191-24-2	2.30E-01	2.30E-01			2E-12		5E-12		4E-07		4E-05		1E-05		2E-06
21-1	SVOC	Benzo(k)fluoranthene	207-08-9	4.97E-01	4.97E-01		8E-14		3E-13		3E-10		8E-08		2E-08		1E-09	
21-1	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	6.41E-02	6.41E-02	1E-14	5E-17	5E-13	1E-16	1E-12	7E-12	2E-07	2E-09	2E-05	4E-10	4E-06	3E-11	8E-06
21-1	SVOC	Carbazole	86-74-8	8.46E-02	8.46E-02		9E-14		3E-13		1E-11		4E-09		7E-10		8E-11	

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
21-1	SVOC	Chrysene	218-01-9	5.36E-01	5.36E-01		3E-12		9E-12		3E-11		9E-09		2E-09		2E-10	
21-1	SVOC	Dibenzofuran	132-64-9	5.83E-02	5.83E-02			4E-07		1E-06		2E-06		1E-04		4E-05		1E-04
21-1	SVOC	Fluoranthene	206-44-0	8.43E-01	8.43E-01			7E-08		2E-07		1E-06		1E-04		3E-05		8E-06
21-1	SVOC	Fluorene	86-73-7	1.16E-01	1.16E-01			3E-07		8E-07		2E-07		2E-05		6E-06		3E-06
21-1	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	2.17E-01	2.17E-01		2E-13		8E-13		1E-09		3E-07		8E-08		6E-09	
21-1	SVOC	2-Methylnaphthalene	91-57-6	2.09E-01	2.09E-01			4E-04		1E-03		2E-05		1E-03		9E-04		8E-03
21-1	SVOC	Naphthalene	91-20-3	1.04E-01	1.04E-01	6E-08		6E-04		2E-03		2E-05		1E-03		8E-04		7E-03
21-1	SVOC	Phenanthrene	85-01-8	1.02E+00	1.02E+00			7E-07		2E-06		2E-06		2E-04		6E-05		2E-05
21-1	SVOC	Pyrene	129-00-0	1.51E+00	1.51E+00			1E-07		3E-07		3E-06		3E-04		7E-05		2E-05
21-1	PCB	PCBs (total)	1336-36-3	9.10E-02	9.10E-02	2E-08	1E-09		4E-09		2E-09	3E-04	4E-07	2E-02	1E-07	6E-03	1E-08	5E-03
21-1	INORG	Antimony	7440-36-0	5.20E-01	4.34E-01							4E-05		4E-03		5E-04		2E-03
21-1	INORG	Arsenic	7440-38-2	2.10E+01	1.29E+01						1E-07	2E-03	3E-05	2E-01	5E-06	3E-02	6E-07	6E-03
21-1	INORG	Barium	7440-39-3	8.20E+01														
21-1	INORG	Beryllium	7440-41-7	1.20E+00	6.10E-01						4E-10	7E-05	5E-10	1E-03	3E-10	2E-04	7E-10	2E-03
21-1	INORG	Cadmium	7440-43-9	2.30E+00	1.71E+00						9E-10	9E-05	1E-09	7E-03	6E-10	1E-03	2E-09	4E-03
21-1	INORG	Chromium (total)	7440-47-3	4.20E+01	1.00E+01						4E-08	3E-04	4E-08	1E-02	2E-08	2E-03	6E-08	4E-03
21-1	INORG	Cobalt	7440-48-4	9.50E+00	2.45E+00						2E-09	3E-04	2E-09	5E-04	1E-09	1E-04	3E-09	4E-03
21-1	INORG	Copper	7440-50-8	5.50E+01	2.65E+01							3E-05		2E-03		3E-04		1E-03
21-1	INORG	Cyanide (total)	57-12-5	3.80E-01	3.80E-01							8E-07		7E-05		9E-06		4E-05
21-1	INORG	Lead	7439-92-1	1.40E+02	1.40E+02													
21-1	INORG	Manganese	7439-96-5	1.40E+03	9.23E+02							4E-02		4E-02		1E-02		6E-01
21-1	INORG	Mercury	7439-97-6	2.10E-01	1.58E-01	5E-06		6E-04		1E-03		7E-05		5E-03		2E-03		2E-02
21-1	INORG	Nickel	7440-02-0	3.90E+01	1.90E+01						1E-09		1E-09		8E-10		2E-09	
21-1	INORG	Selenium	7782-49-2	7.40E-01	2.21E-01							2E-06		2E-04		2E-05		9E-05
21-1	INORG	Silver	7440-22-4	1.50E-01														
21-1	INORG	Thallium	7440-28-0	3.50E-01	1.53E-01							9E-05		8E-03		1E-03		4E-03
21-1	INORG	Vanadium	7440-62-2	3.90E+01	1.41E+01							8E-05		7E-03		1E-03		4E-03
21-1	INORG	Zinc	7440-66-6	5.90E+01														
23-A	VOC	Benzene	71-43-2	8.60E-03	8.60E-03	2E-05	9E-08	1E-03	2E-07	2E-03	1E-10	3E-06	2E-08	2E-04	1E-08	1E-04	4E-09	6E-04
23-A	VOC	Cyclohexane	110-82-7	3.40E-02	3.40E-02	2E-07		3E-05		3E-05		1E-07		5E-06		4E-06		4E-05
23-A	VOC	Ethyl Benzene	100-41-4	1.50E-02	1.50E-02	7E-08		2E-05		6E-05		9E-08		5E-06		4E-06		3E-05
23-A	VOC	Methyl Acetate	79-20-9	5.60E-01	5.60E-01	2E-07		3E-05		6E-05		4E-07		2E-05		2E-05		2E-05
23-A	VOC	Methylcyclohexane	108-87-2	1.20E-01	1.20E-01	4E-07		2E-04		2E-04		1E-06		5E-05		4E-05		4E-04
23-A	VOC	Methylene Chloride	75-09-2	1.30E-02	1.30E-02	6E-07	6E-09	1E-05	2E-08	3E-05	1E-11	6E-08	2E-09	3E-06	1E-09	2E-06	4E-10	2E-05
23-A	VOC	Tetrachloroethene	127-18-4	1.10E-02	1.10E-02	5E-07	6E-08	1E-04	9E-08	2E-04	6E-11	4E-07	1E-08	2E-05	6E-09	1E-05	2E-09	1E-04
23-A	VOC	Trichloroethene	79-01-6	8.00E-02	8.00E-02	2E-06	2E-07		3E-07		2E-10		3E-08		2E-08		7E-09	
23-A	VOC	Trichlorofluoromethane	75-69-4	1.00E-02	1.00E-02	1E-08		7E-05		8E-05		3E-07		2E-05		1E-05		1E-05
23-A	VOC	Xylenes (total)	1330-20-7	1.06E-01	1.06E-01	4E-07		1E-03		3E-03		5E-06		3E-04		2E-04		2E-03
23-A	SVOC	Anthracene	120-12-7	7.81E-02	7.81E-02							1E-08		1E-06		3E-07		7E-08
23-A	SVOC	Benzo(a)anthracene	56-55-3	3.59E-01	3.59E-01		7E-12		2E-11		2E-09		6E-07		1E-07		1E-08	
23-A	SVOC	Benzo(a)pyrene	50-32-8	3.68E-01	3.68E-01		1E-11		3E-11		2E-08		6E-06		1E-06		1E-07	
23-A	SVOC	Benzo(b)fluoranthene	205-99-2	3.34E-01	3.34E-01		7E-11		2E-10		2E-09		5E-07		1E-07		1E-08	
23-A	SVOC	Benzo(g,h,i)perylene	191-24-2	2.79E-01	2.79E-01			2E-12		6E-12		5E-07		5E-05		1E-05		3E-06
23-A	SVOC	Benzo(k)fluoranthene	207-08-9	3.03E-01	3.03E-01		5E-14		2E-13		2E-10		5E-08		1E-08		9E-10	
23-A	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	1.99E+00	1.99E+00	3E-13	2E-15	2E-11	5E-15	4E-11	2E-10	5E-06	6E-08	5E-04	1E-08	1E-04	1E-09	3E-04
23-A	SVOC	Carbazole	86-74-8	4.27E-02	4.27E-02		5E-14		1E-13		7E-12		2E-09		4E-10		4E-11	
23-A	SVOC	Chrysene	218-01-9	3.84E-01	3.84E-01		2E-12		7E-12		2E-11		6E-09		1E-09		1E-10	
23-A	SVOC	Dibenz(a,h)anthracene	53-70-3	9.52E-02	9.52E-02		1E-14		4E-14		6E-09		2E-06		3E-07		3E-08	
23-A	SVOC	Diethylphthalate	84-66-2	7.92E-02	7.92E-02	2E-09		3E-09		8E-09		6E-09		5E-07		1E-07		6E-08
23-A	SVOC	Di-n-butylphthalate	84-74-2	1.40E-01	1.40E-01	2E-12						7E-08		7E-06		2E-06		4E-07
23-A	SVOC	Fluoranthene	206-44-0	6.76E-01	6.76E-01			6E-08		1E-07		1E-06		9E-05		2E-05		7E-06
23-A	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	2.28E-01	2.28E-01		3E-13		8E-13		1E-09		4E-07		8E-08		7E-09	
23-A	SVOC	Naphthalene	91-20-3	5.31E-02	5.31E-02	3E-08		3E-04		8E-04		1E-05		5E-04		4E-04		4E-03

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
23-A	SVOC	Phenanthrene	85-01-8	4.43E-01	4.43E-01			3E-07		8E-07		9E-07		8E-05		2E-05		9E-06
23-A	SVOC	Pyrene	129-00-0	9.74E-01	9.74E-01			8E-08		2E-07		2E-06		2E-04		5E-05		1E-05
23-A	INORG	Antimony	7440-36-0	2.10E-01	1.24E-01							1E-05		1E-03		2E-04		6E-04
23-A	INORG	Arsenic	7440-38-2	4.90E+00														
23-A	INORG	Barium	7440-39-3	1.10E+02	1.43E+01													
23-A	INORG	Beryllium	7440-41-7	7.50E-01	1.60E-01						1E-10	2E-05	1E-10	3E-04	7E-11	4E-05	2E-10	4E-04
23-A	INORG	Cadmium	7440-43-9	3.20E-01														
23-A	INORG	Chromium (total)	7440-47-3	1.40E+01														
23-A	INORG	Cobalt	7440-48-4	5.10E+00														
23-A	INORG	Copper	7440-50-8	9.00E+01	6.15E+01							6E-05		6E-03		8E-04		3E-03
23-A	INORG	Cyanide (total)	57-12-5	6.30E-02	6.30E-02							1E-07		1E-05		2E-06		6E-06
23-A	INORG	Lead	7439-92-1	7.70E+01	7.70E+01													
23-A	INORG	Manganese	7439-96-5	4.90E+02	1.25E+01							5E-04		5E-04		2E-04		9E-03
23-A	INORG	Mercury	7439-97-6	1.48E-01	9.56E-02	3E-06		4E-04		9E-04		4E-05		3E-03		1E-03		1E-02
23-A	INORG	Nickel	7440-02-0	1.80E+01														
23-A	INORG	Silver	7440-22-4	1.40E-01														
23-A	INORG	Thallium	7440-28-0	1.20E-01														
23-A	INORG	Vanadium	7440-62-2	1.80E+01														
23-A	INORG	Zinc	7440-66-6	9.50E+01														
29-A	VOC	Methyl Acetate	79-20-9	1.00E-01	1.00E-01	4E-08		5E-06		1E-05		8E-08		4E-06		3E-06		3E-06
29-A	VOC	Methylcyclohexane	108-87-2	4.50E-02	4.50E-02	2E-07		8E-05		9E-05		4E-07		2E-05		2E-05		1E-04
29-A	VOC	Xylenes (total)	1330-20-7	5.55E-02	5.55E-02	2E-07		7E-04		2E-03		3E-06		2E-04		1E-04		1E-03
29-A	SVOC	Anthracene	120-12-7	6.07E-02	6.07E-02							1E-08		1E-06		3E-07		6E-08
29-A	SVOC	Benzo(a)anthracene	56-55-3	2.64E-01	2.64E-01		5E-12		2E-11		2E-09		4E-07		9E-08		8E-09	
29-A	SVOC	Benzo(a)pyrene	50-32-8	2.34E-01	2.34E-01		6E-12		2E-11		1E-08		4E-06		8E-07		7E-08	
29-A	SVOC	Benzo(b)fluoranthene	205-99-2	2.87E-01	2.87E-01		6E-11		2E-10		2E-09		5E-07		1E-07		9E-09	
29-A	SVOC	Benzo(g,h,i)perylene	191-24-2	1.75E-01	1.75E-01			1E-12		4E-12		3E-07		3E-05		8E-06		2E-06
29-A	SVOC	Benzo(k)fluoranthene	207-08-9	2.45E-01	2.45E-01		4E-14		1E-13		1E-10		4E-08		9E-09		7E-10	
29-A	SVOC	Chrysene	218-01-9	2.88E-01	2.88E-01		2E-12		5E-12		2E-11		5E-09		1E-09		1E-10	
29-A	SVOC	Fluoranthene	206-44-0	4.51E-01	4.51E-01			4E-08		9E-08		7E-07		6E-05		2E-05		4E-06
29-A	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	1.59E-01	1.59E-01		2E-13		6E-13		9E-10		3E-07		6E-08		5E-09	
29-A	SVOC	Phenanthrene	85-01-8	2.98E-01	2.98E-01			2E-07		5E-07		6E-07		6E-05		2E-05		6E-06
29-A	SVOC	Pyrene	129-00-0	5.55E-01	5.55E-01			4E-08		1E-07		1E-06		1E-04		3E-05		7E-06
29-A	INORG	Arsenic	7440-38-2	8.10E+00														
29-A	INORG	Barium	7440-39-3	4.00E+02	3.04E+02													
29-A	INORG	Beryllium	7440-41-7	1.50E+00	9.10E-01						6E-10	1E-04	7E-10	2E-03	4E-10	2E-04	1E-09	2E-03
29-A	INORG	Cadmium	7440-43-9	1.20E+00	6.12E-01						3E-10	3E-05	3E-10	3E-03	2E-10	5E-04	5E-10	1E-03
29-A	INORG	Chromium (total)	7440-47-3	2.10E+02	1.78E+02						6E-07	6E-03	7E-07	2E-01	4E-07	3E-02	1E-06	8E-02
29-A	INORG	Cobalt	7440-48-4	3.90E+01	3.19E+01						3E-08	3E-03	3E-08	7E-03	2E-08	2E-03	4E-08	6E-02
29-A	INORG	Copper	7440-50-8	6.00E+02	5.72E+02							6E-04		5E-02		7E-03		3E-02
29-A	INORG	Lead	7439-92-1	1.50E+03	1.50E+03													
29-A	INORG	Manganese	7439-96-5	4.40E+02														
29-A	INORG	Mercury	7439-97-6	2.20E-01	1.68E-01	5E-06		6E-04		2E-03		8E-05		5E-03		2E-03		2E-02
29-A	INORG	Nickel	7440-02-0	5.00E+01	3.00E+01						2E-09		2E-09		1E-09		4E-09	
29-A	INORG	Selenium	7782-49-2	7.10E-01	1.91E-01							2E-06		1E-04		2E-05		7E-05
29-A	INORG	Silver	7440-22-4	2.30E-01	4.23E-02							9E-06		3E-05		6E-06		2E-04
29-A	INORG	Vanadium	7440-62-2	6.60E+01	4.11E+01							2E-04		2E-02		3E-03		1E-02
29-A	INORG	Zinc	7440-66-6	7.40E+02	6.30E+02							8E-05		8E-03		1E-03		4E-03
36-1	VOC	Acetone	67-64-1	3.10E-01	3.10E-01	2E-08		7E-06		2E-05		2E-07		1E-05		9E-06		7E-05
36-1	VOC	Benzene	71-43-2	2.40E+02	2.40E+02	4E-01	3E-03	3E+01	5E-03	5E+01	3E-06	9E-02	5E-04	5E+00	3E-04	4E+00	1E-04	2E+01
36-1	VOC	2-Butanone	78-93-3	6.20E-02	6.20E-02	1E-08		1E-06		3E-06		3E-08		2E-06		1E-06		9E-06
36-1	VOC	Chlorobenzene	108-90-7	2.00E+00	2.00E+00	9E-06		4E-02		9E-02		2E-04		9E-03		7E-03		6E-02
36-1	VOC	Chloromethane	74-87-3	5.60E-02	5.60E-02	4E-06		3E-03		4E-03		1E-05		6E-04		4E-04		4E-03

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
36-1	VOC	Cumene	98-82-8	1.40E+00	1.40E+00	1E-05		5E-03		1E-02		2E-05		1E-03		7E-04		7E-03
36-1	VOC	Cyclohexane	110-82-7	1.00E-01	1.00E-01	7E-07		8E-05		1E-04		3E-07		2E-05		1E-05		1E-04
36-1	VOC	1,4-Dichlorobenzene	106-46-7	4.00E-02	4.00E-02	4E-08	3E-08	1E-05	8E-08	4E-05	9E-11	2E-07	1E-08	1E-05	9E-09	6E-06	3E-09	2E-05
36-1	VOC	1,1-Dichloroethane	75-34-3	1.60E+00	1.60E+00	3E-05		2E-02		2E-02		4E-05		2E-03		2E-03		1E-03
36-1	VOC	1,1-Dichloroethene	75-35-4	1.40E-01	1.40E-01	5E-05		4E-03		4E-03		1E-05		7E-04		6E-04		5E-03
36-1	VOC	cis-1,2-Dichloroethene	156-59-2	3.10E+00	3.10E+00	2E-05		3E-01		5E-01		9E-04		5E-02		4E-02		3E-02
36-1	VOC	trans-1,2-Dichloroethene	156-60-5	1.10E-01	1.10E-01	1E-06		9E-03		1E-02		2E-05		1E-03		9E-04		9E-03
36-1	VOC	Ethyl Benzene	100-41-4	6.80E+02	6.80E+02	3E-03		1E+00		3E+00		4E-03		2E-01		2E-01		1E+00
36-1	VOC	Methyl Acetate	79-20-9	3.40E-01	3.40E-01	1E-07		2E-05		4E-05		3E-07		2E-05		1E-05		1E-05
36-1	VOC	4-Methyl-2-pentanone	108-10-1	8.50E-01	8.50E-01	6E-07		6E-05		1E-04		7E-07		4E-05		3E-05		3E-04
36-1	VOC	Methylcyclohexane	108-87-2	1.00E+00	1.00E+00	4E-06		2E-03		2E-03		8E-06		4E-04		3E-04		3E-03
36-1	VOC	Methylene Chloride	75-09-2	1.50E-01	1.50E-01	7E-06	7E-08	1E-04	2E-07	3E-04	1E-10	6E-07	2E-08	4E-05	1E-08	2E-05	4E-09	2E-04
36-1	VOC	Tetrachloroethene	127-18-4	1.54E+00	1.54E+00	7E-05	9E-06	2E-02	1E-05	2E-02	8E-09	5E-05	1E-06	3E-03	8E-07	2E-03	3E-07	2E-02
36-1	VOC	Toluene	108-88-3	4.10E+03	4.10E+03	4E-02		2E+00		5E+00		8E-03		5E-01		3E-01		2E+00
36-1	VOC	1,1,1-Trichloroethane	71-55-6	1.50E-01	1.50E-01	6E-07		3E-04		4E-04		9E-07		5E-05		4E-05		4E-05
36-1	VOC	Trichloroethene	79-01-6	1.50E+00	1.50E+00	3E-05	3E-06		6E-06		3E-09		5E-07		3E-07		1E-07	
36-1	VOC	Vinyl Chloride	75-01-4	3.60E-02	3.60E-02	1E-04	6E-07	2E-03	8E-07	2E-03	1E-09	9E-06	3E-07	5E-04	1E-07	4E-04	5E-08	4E-03
36-1	VOC	Xylenes (total)	1330-20-7	2.48E+03	2.48E+03	1E-02		3E+01		8E+01		1E-01		7E+00		5E+00		5E+01
36-1	SVOC	Acenaphthene	83-32-9	4.60E+00	4.60E+00			4E-05		9E-05		7E-06		6E-04		2E-04		1E-04
36-1	SVOC	Acenaphthylene	208-96-8	7.00E-01	7.00E-01			8E-06		2E-05		2E-06		2E-04		6E-05		4E-05
36-1	SVOC	Anthracene	120-12-7	1.30E+00	1.30E+00							2E-07		2E-05		6E-06		1E-06
36-1	SVOC	Benzaldehyde	100-52-7	2.17E-01	2.17E-01			2E-05		4E-05		6E-07		4E-05		2E-05		2E-04
36-1	SVOC	Benzo(a)anthracene	56-55-3	6.98E+00	6.98E+00		1E-10		4E-10		4E-08		1E-05		2E-06		2E-07	
36-1	SVOC	Benzo(a)pyrene	50-32-8	6.16E+00	6.16E+00		2E-10		5E-10		4E-07		1E-04		2E-05		2E-06	
36-1	SVOC	Benzo(b)fluoranthene	205-99-2	6.21E+00	6.21E+00		1E-09		4E-09		4E-08		1E-05		2E-06		2E-07	
36-1	SVOC	Benzo(g,h,i)perylene	191-24-2	6.88E+00	6.88E+00			6E-11		1E-10		1E-05		1E-03		3E-04		6E-05
36-1	SVOC	Benzo(k)fluoranthene	207-08-9	4.00E+00	4.00E+00		7E-13		2E-12		2E-09		6E-07		1E-07		1E-08	
36-1	SVOC	Biphenyl	92-52-4	3.50E+00	3.50E+00	1E-05		4E-05		1E-04		7E-06		5E-04		2E-04		1E-03
36-1	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	2.30E+00	2.30E+00	4E-13	2E-15	2E-11	5E-15	4E-11	2E-10	6E-06	7E-08	6E-04	1E-08	1E-04	1E-09	3E-04
36-1	SVOC	Butylbenzylphthalate	85-68-7	1.97E+02	1.97E+02		7E-11	5E-07	2E-10	1E-06	3E-09	5E-05	8E-07	5E-03	2E-07	1E-03	2E-08	3E-04
36-1	SVOC	Carbazole	86-74-8	2.49E+00	2.49E+00		3E-12		8E-12		4E-10		1E-07		2E-08		2E-09	
36-1	SVOC	Chrysene	218-01-9	6.95E+00	6.95E+00		4E-11		1E-10		4E-10		1E-07		3E-08		2E-09	
36-1	SVOC	Dibenz(a,h)anthracene	53-70-3	1.10E+00	1.10E+00		1E-13		4E-13		6E-08		2E-05		4E-06		3E-07	
36-1	SVOC	Dibenzofuran	132-64-9	1.50E+00	1.50E+00			1E-05		3E-05		4E-05		4E-03		1E-03		3E-03
36-1	SVOC	Diethylphthalate	84-66-2	8.79E-02	8.79E-02	3E-09		3E-09		9E-09		7E-09		6E-07		2E-07		7E-08
36-1	SVOC	Dimethylphthalate	131-11-3	3.00E-01	3.00E-01	6E-09												8E-08
36-1	SVOC	Di-n-butylphthalate	84-74-2	6.18E-01	6.18E-01	7E-12						3E-07		3E-05		7E-06		2E-06
36-1	SVOC	Di-n-octylphthalate	117-84-0	2.47E-01	2.47E-01							3E-07		3E-05		7E-06		2E-06
36-1	SVOC	Fluoranthene	206-44-0	1.25E+01	1.25E+01			1E-06		3E-06		2E-05		2E-03		5E-04		1E-04
36-1	SVOC	Fluorene	86-73-7	6.70E+00	6.70E+00			2E-05		4E-05		1E-05		1E-03		3E-04		2E-04
36-1	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	6.80E+00	6.80E+00		8E-12		2E-11		4E-08		1E-05		2E-06		2E-07	
36-1	SVOC	2-Methylnaphthalene	91-57-6	9.60E+01	9.60E+01			2E-01		5E-01		1E-02		6E-01		4E-01		4E+00
36-1	SVOC	Methylphenol (total)	1319-77-3	1.13E+00	1.13E+00	4E-08						1E-06		1E-04		3E-05		6E-06
36-1	SVOC	Naphthalene	91-20-3	4.38E+01	4.38E+01	2E-05		3E-01		7E-01		8E-03		4E-01		3E-01		3E+00
36-1	SVOC	N-Nitroso-di-n-propylamine	621-64-7	4.49E-01	4.49E-01		8E-07		3E-06		5E-08		1E-05		4E-06		1E-06	
36-1	SVOC	Pentachlorophenol	87-86-5	7.21E+00	7.21E+00	7E-08	3E-10	2E-07	1E-09	6E-07	9E-09	2E-05	2E-06	2E-03	7E-07	5E-04	6E-08	1E-03
36-1	SVOC	Phenanthrene	85-01-8	1.81E+01	1.81E+01			1E-05		3E-05		4E-05		3E-03		1E-03		4E-04
36-1	SVOC	Pyrene	129-00-0	1.75E+01	1.75E+01			1E-06		3E-06		3E-05		3E-03		8E-04		2E-04
36-1	SVOC	2,4,5-Trichlorophenol	95-95-4	1.14E+00	1.14E+00							6E-07		5E-05		1E-05		3E-06
36-1	SVOC	2,4,6-Trichlorophenol	88-06-2	2.43E-01	2.43E-01		4E-10		1E-09		3E-11	1E-04	7E-09	1E-02	2E-09	3E-03	6E-10	6E-03
36-1	PCB	PCBs (total)	1336-36-3	8.76E+00	8.76E+00	2E-06	1E-07		3E-07		2E-07	3E-02	4E-05	2E+00	1E-05	6E-01	1E-06	5E-01
36-1	INORG	Antimony	7440-36-0	1.07E+00	9.84E-01							1E-04		9E-03		1E-03		5E-03
36-1	INORG	Arsenic	7440-38-2	3.90E+01	3.09E+01						3E-07	4E-03	8E-05	4E-01	1E-05	7E-02	1E-06	1E-02

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
36-1	INORG	Barium	7440-39-3	4.76E+02	3.80E+02													
36-1	INORG	Beryllium	7440-41-7	8.60E-01	2.70E-01						2E-10	3E-05	2E-10	5E-04	1E-10	7E-05	3E-10	7E-04
36-1	INORG	Cadmium	7440-43-9	2.08E+00	1.49E+00						8E-10	8E-05	8E-10	6E-03	5E-10	1E-03	1E-09	3E-03
36-1	INORG	Chromium (total)	7440-47-3	4.10E+02	3.78E+02						1E-06	1E-02	1E-06	5E-01	8E-07	6E-02	2E-06	2E-01
36-1	INORG	Cobalt	7440-48-4	8.50E+01	7.79E+01						6E-08	8E-03	7E-08	2E-02	4E-08	4E-03	1E-07	1E-01
36-1	INORG	Copper	7440-50-8	3.47E+02	3.19E+02							3E-04		3E-02		4E-03		2E-02
36-1	INORG	Cyanide (total)	57-12-5	1.00E-01	1.00E-01							2E-07		2E-05		2E-06		1E-05
36-1	INORG	Lead	7439-92-1	5.45E+02	5.45E+02													
36-1	INORG	Manganese	7439-96-5	6.73E+03	6.25E+03							3E-01		3E-01		9E-02		4E+00
36-1	INORG	Mercury	7439-97-6	1.19E+00	1.14E+00	4E-05		4E-03		1E-02		5E-04		3E-02		2E-02		1E-01
36-1	INORG	Nickel	7440-02-0	1.30E+02	1.10E+02						8E-09		8E-09		5E-09		1E-08	
36-1	INORG	Selenium	7782-49-2	7.10E-01	1.91E-01							2E-06		1E-04		2E-05		7E-05
36-1	INORG	Silver	7440-22-4	3.00E+00	2.81E+00							6E-04		2E-03		4E-04		1E-02
36-1	INORG	Thallium	7440-28-0	5.40E-01	3.43E-01							2E-04		2E-02		2E-03		1E-02
36-1	INORG	Vanadium	7440-62-2	3.40E+01	9.13E+00							5E-05		5E-03		6E-04		3E-03
36-1	INORG	Zinc	7440-66-6	3.65E+02	2.55E+02							3E-05		3E-03		4E-04		2E-03
36-2	VOC	Acetone	67-64-1	2.00E-01	2.00E-01	1E-08		4E-06		1E-05		1E-07		8E-06		6E-06		5E-05
36-2	VOC	2-Butanone	78-93-3	2.80E-02	2.80E-02	7E-09		5E-07		1E-06		1E-08		7E-07		5E-07		4E-06
36-2	VOC	Carbon Disulfide	75-15-0	2.70E-02	2.70E-02	2E-05		2E-04		2E-04		9E-07		5E-05		4E-05		3E-04
36-2	VOC	Methyl Acetate	79-20-9	1.10E-01	1.10E-01	4E-08		5E-06		1E-05		9E-08		5E-06		4E-06		3E-06
36-2	VOC	Methylcyclohexane	108-87-2	8.00E-02	8.00E-02	3E-07		1E-04		2E-04		6E-07		3E-05		3E-05		2E-04
36-2	VOC	Methylene Chloride	75-09-2	8.10E-02	8.10E-02	4E-06	4E-08	8E-05	1E-07	2E-04	6E-11	3E-07	1E-08	2E-05	6E-09	1E-05	2E-09	1E-04
36-2	VOC	Xylenes (total)	1330-20-7	6.40E-02	6.40E-02	3E-07		8E-04		2E-03		3E-06		2E-04		1E-04		1E-03
36-2	SVOC	Benzo(a)anthracene	56-55-3	9.32E-02	9.32E-02		2E-12		6E-12		5E-10		2E-07		3E-08		3E-09	
36-2	SVOC	Benzo(a)pyrene	50-32-8	9.04E-02	9.04E-02		2E-12		8E-12		5E-09		1E-06		3E-07		3E-08	
36-2	SVOC	Benzo(b)fluoranthene	205-99-2	9.32E-02	9.32E-02		2E-11		6E-11		6E-10		2E-07		3E-08		3E-09	
36-2	SVOC	Benzo(g,h,i)perylene	191-24-2	5.48E-02	5.48E-02			4E-13		1E-12		1E-07		9E-06		2E-06		5E-07
36-2	SVOC	Benzo(k)fluoranthene	207-08-9	8.79E-02	8.79E-02		1E-14		4E-14		5E-11		1E-08		3E-09		3E-10	
36-2	SVOC	Chrysene	218-01-9	1.05E+00	1.05E+00		6E-12		2E-11		6E-11		2E-08		4E-09		4E-10	
36-2	SVOC	Fluoranthene	206-44-0	1.38E-01	1.38E-01			1E-08		3E-08		2E-07		2E-05		5E-06		1E-06
36-2	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	5.12E-02	5.12E-02		6E-14		2E-13		3E-10		8E-08		2E-08		2E-09	
36-2	SVOC	Phenanthrene	85-01-8	5.80E-02	5.80E-02			4E-08		1E-07		1E-07		1E-05		3E-06		1E-06
36-2	SVOC	Pyrene	129-00-0	1.21E+00	1.21E+00			9E-08		2E-07		2E-06		2E-04		6E-05		1E-05
36-2	INORG	Antimony	7440-36-0	3.80E-02														
36-2	INORG	Arsenic	7440-38-2	5.80E+00														
36-2	INORG	Barium	7440-39-3	3.20E+01														
36-2	INORG	Beryllium	7440-41-7	2.80E-01														
36-2	INORG	Cadmium	7440-43-9	1.70E-01														
36-2	INORG	Chromium (total)	7440-47-3	4.50E+02	4.18E+02						1E-06	1E-02	2E-06	5E-01	9E-07	7E-02	2E-06	2E-01
36-2	INORG	Chromium III	16065-83-1	2.20E+02	2.20E+02							6E-06		5E-04		7E-05		3E-04
36-2	INORG	Chromium VI	18540-29-9	3.40E-01	3.40E-01						1E-09	1E-05	1E-09	4E-04	8E-10	6E-05	2E-09	1E-04
36-2	INORG	Cobalt	7440-48-4	9.60E+00	2.55E+00						2E-09	3E-04	2E-09	6E-04	1E-09	1E-04	3E-09	5E-03
36-2	INORG	Copper	7440-50-8	9.30E+01	6.45E+01							6E-05		6E-03		8E-04		3E-03
36-2	INORG	Cyanide (total)	57-12-5	8.20E-02	8.20E-02							2E-07		1E-05		2E-06		8E-06
36-2	INORG	Lead	7439-92-1	4.00E+01	4.00E+01													
36-2	INORG	Manganese	7439-96-5	1.10E+03	6.23E+02							3E-02		3E-02		9E-03		4E-01
36-2	INORG	Mercury	7439-97-6	3.25E-02														
36-2	INORG	Nickel	7440-02-0	4.70E+01	2.70E+01						2E-09		2E-09		1E-09		3E-09	
36-2	INORG	Selenium	7782-49-2	1.90E-01														
36-2	INORG	Silver	7440-22-4	1.50E-01														
36-2	INORG	Thallium	7440-28-0	1.60E-01														
36-2	INORG	Vanadium	7440-62-2	1.20E+02	9.51E+01							5E-04		5E-02		7E-03		3E-02
36-2	INORG	Zinc	7440-66-6	5.50E+01														

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
36-3	VOC	Benzene	71-43-2	1.90E+00	1.90E+00	3E-03	2E-05	3E-01	4E-05	4E-01	2E-08	7E-04	4E-06	4E-02	2E-06	3E-02	9E-07	1E-01
36-3	VOC	2-Butanone	78-93-3	3.30E-02	3.30E-02	8E-09		6E-07		2E-06		1E-08		9E-07		6E-07		5E-06
36-3	VOC	Cumene	98-82-8	3.00E+00	3.00E+00	2E-05		1E-02		3E-02		4E-05		2E-03		2E-03		1E-02
36-3	VOC	Cyclohexane	110-82-7	4.10E-02	4.10E-02	3E-07		3E-05		4E-05		1E-07		7E-06		5E-06		5E-05
36-3	VOC	Ethyl Benzene	100-41-4	2.50E+01	2.50E+01	1E-04		4E-02		9E-02		1E-04		8E-03		6E-03		5E-02
36-3	VOC	Methyl Acetate	79-20-9	2.10E-01	2.10E-01	8E-08		1E-05		2E-05		2E-07		9E-06		7E-06		6E-06
36-3	VOC	Methylcyclohexane	108-87-2	1.50E+01	1.50E+01	6E-05		3E-02		3E-02		1E-04		6E-03		5E-03		5E-02
36-3	VOC	Methylene Chloride	75-09-2	6.40E-02	6.40E-02	3E-06	3E-08	6E-05	8E-08	1E-04	5E-11	3E-07	8E-09	2E-05	5E-09	1E-05	2E-09	9E-05
36-3	VOC	Toluene	108-88-3	2.90E+01	2.90E+01	3E-04		1E-02		3E-02		6E-05		4E-03		2E-03		2E-02
36-3	VOC	Xylenes (total)	1330-20-7	8.70E+01	8.70E+01	4E-04		1E+00		3E+00		4E-03		2E-01		2E-01		2E+00
36-3	SVOC	Anthracene	120-12-7	4.08E-02	4.08E-02							8E-09		7E-07		2E-07		4E-08
36-3	SVOC	Benzaldehyde	100-52-7	1.17E-01	1.17E-01			9E-06		2E-05		3E-07		2E-05		1E-05		1E-04
36-3	SVOC	Benzo(a)anthracene	56-55-3	7.38E-02	7.38E-02		2E-12		5E-12		4E-10		1E-07		3E-08		2E-09	
36-3	SVOC	Benzo(a)pyrene	50-32-8	1.04E-01	1.04E-01		3E-12		9E-12		6E-09		2E-06		4E-07		3E-08	
36-3	SVOC	Benzo(b)fluoranthene	205-99-2	1.21E-01	1.21E-01		3E-11		8E-11		7E-10		2E-07		4E-08		4E-09	
36-3	SVOC	Benzo(g,h,i)perylene	191-24-2	9.50E-02	9.50E-02			8E-13		2E-12		2E-07		2E-05		4E-06		9E-07
36-3	SVOC	Benzo(k)fluoranthene	207-08-9	1.03E-01	1.03E-01		2E-14		5E-14		6E-11		2E-08		4E-09		3E-10	
36-3	SVOC	Biphenyl	92-52-4	8.85E-02	8.85E-02	3E-07		1E-06		3E-06		2E-07		1E-05		5E-06		4E-05
36-3	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	2.07E-01	2.07E-01	3E-14	2E-16	2E-12	5E-16	4E-12	2E-11	5E-07	6E-09	5E-05	1E-09	1E-05	1E-10	3E-05
36-3	SVOC	Butylbenzylphthalate	85-68-7	1.55E-01	1.55E-01		5E-14	4E-10	2E-13	1E-09	2E-12	4E-08	6E-10	4E-06	1E-10	9E-07	1E-11	2E-07
36-3	SVOC	Chrysene	218-01-9	9.61E-02	9.61E-02		6E-13		2E-12		6E-12		2E-09		3E-10		3E-11	
36-3	SVOC	Diethylphthalate	84-66-2	1.37E-01	1.37E-01	4E-09		5E-09		1E-08		1E-08		9E-07		3E-07		1E-07
36-3	SVOC	Fluoranthene	206-44-0	1.29E-01	1.29E-01			1E-08		3E-08		2E-07		2E-05		5E-06		1E-06
36-3	SVOC	Fluorene	86-73-7	1.05E-01	1.05E-01			3E-07		7E-07		2E-07		2E-05		5E-06		2E-06
36-3	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	7.13E-02	7.13E-02		8E-14		2E-13		4E-10		1E-07		2E-08		2E-09	
36-3	SVOC	2-Methylnaphthalene	91-57-6	3.37E+00	3.37E+00			7E-03		2E-02		4E-04		2E-02		1E-02		1E-01
36-3	SVOC	Naphthalene	91-20-3	3.77E+00	3.77E+00	2E-06		2E-02		6E-02		7E-04		4E-02		3E-02		3E-01
36-3	SVOC	Phenanthrene	85-01-8	1.56E-01	1.56E-01			1E-07		3E-07		3E-07		3E-05		9E-06		3E-06
36-3	SVOC	Pyrene	129-00-0	2.63E-01	2.63E-01			2E-08		5E-08		5E-07		5E-05		1E-05		3E-06
36-3	INORG	Antimony	7440-36-0	4.40E-01	3.54E-01							4E-05		3E-03		4E-04		2E-03
36-3	INORG	Arsenic	7440-38-2	5.70E+00														
36-3	INORG	Barium	7440-39-3	5.20E+01														
36-3	INORG	Beryllium	7440-41-7	2.60E-01														
36-3	INORG	Cadmium	7440-43-9	7.50E-01	1.62E-01						9E-11	9E-06	9E-11	7E-04	5E-11	1E-04	1E-10	4E-04
36-3	INORG	Chromium (total)	7440-47-3	1.90E+01														
36-3	INORG	Cobalt	7440-48-4	4.30E+00														
36-3	INORG	Copper	7440-50-8	3.90E+02	3.62E+02							4E-04		3E-02		4E-03		2E-02
36-3	INORG	Cyanide (total)	57-12-5	4.20E-01	4.20E-01							8E-07		8E-05		1E-05		4E-05
36-3	INORG	Lead	7439-92-1	4.70E+01	4.70E+01													
36-3	INORG	Manganese	7439-96-5	4.30E+02														
36-3	INORG	Mercury	7439-97-6	4.78E-02														
36-3	INORG	Nickel	7440-02-0	1.60E+01														
36-3	INORG	Selenium	7782-49-2	4.20E-01														
36-3	INORG	Silver	7440-22-4	3.10E-01	1.22E-01							3E-05		1E-04		2E-05		5E-04
36-3	INORG	Thallium	7440-28-0	9.00E-02														
36-3	INORG	Vanadium	7440-62-2	1.60E+01														
36-3	INORG	Zinc	7440-66-6	1.40E+02	2.95E+01							4E-06		4E-04		5E-05		2E-04
36-4	VOC	1,1-Dichloroethane	75-34-3	1.40E+00	1.40E+00	3E-05		1E-02		2E-02		3E-05		2E-03		1E-03		1E-03
36-4	VOC	1,1,1-Trichloroethane	71-55-6	3.50E-01	3.50E-01	1E-06		8E-04		9E-04		2E-06		1E-04		9E-05		8E-05
36-4	SVOC	Di-n-octylphthalate	117-84-0	1.89E-01	1.89E-01							2E-07		2E-05		5E-06		1E-06
36-4	INORG	Arsenic	7440-38-2	7.70E+00														
36-4	INORG	Barium	7440-39-3	3.80E+01														
36-4	INORG	Cadmium	7440-43-9	2.30E-01														

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
36-4	INORG	Chromium (total)	7440-47-3	6.70E+01	3.50E+01						1E-07	1E-03	1E-07	4E-02	8E-08	6E-03	2E-07	2E-02
36-4	INORG	Lead	7439-92-1	2.90E+01	2.90E+01													
36-4	INORG	Selenium	7782-49-2	3.30E-01														
36-4	INORG	Silver	7440-22-4	6.60E-01	4.72E-01							1E-04		4E-04		7E-05		2E-03
36-5	VOC	Methyl Acetate	79-20-9	8.00E-02	8.00E-02	3E-08		4E-06		9E-06		6E-08		4E-06		3E-06		2E-06
36-5	VOC	Methylcyclohexane	108-87-2	1.30E-01	1.30E-01	5E-07		2E-04		3E-04		1E-06		6E-05		4E-05		4E-04
36-5	VOC	Toluene	108-88-3	3.30E-02	3.30E-02	3E-07		1E-05		4E-05		7E-08		4E-06		2E-06		2E-05
36-5	VOC	Trichloroethene	79-01-6	3.00E-02	3.00E-02	6E-07	6E-08		1E-07		7E-11		1E-08		7E-09		3E-09	
36-5	VOC	Xylenes (total)	1330-20-7	8.20E-02	8.20E-02	3E-07		1E-03		3E-03		4E-06		2E-04		2E-04		2E-03
36-5	SVOC	Acenaphthene	83-32-9	1.60E-01	1.60E-01			1E-06		3E-06		3E-07		2E-05		8E-06		5E-06
36-5	SVOC	Acenaphthylene	208-96-8	2.85E-01	2.85E-01			3E-06		8E-06		9E-07		7E-05		3E-05		2E-05
36-5	SVOC	Anthracene	120-12-7	7.06E-01	7.06E-01							1E-07		1E-05		3E-06		7E-07
36-5	SVOC	Benzo(a)anthracene	56-55-3	2.58E+00	2.58E+00		5E-11		2E-10		2E-08		4E-06		9E-07		8E-08	
36-5	SVOC	Benzo(a)pyrene	50-32-8	2.81E+00	2.81E+00		8E-11		2E-10		2E-07		5E-05		1E-05		8E-07	
36-5	SVOC	Benzo(b)fluoranthene	205-99-2	3.29E+00	3.29E+00		7E-10		2E-09		2E-08		5E-06		1E-06		1E-07	
36-5	SVOC	Benzo(g,h,i)perylene	191-24-2	1.42E+00	1.42E+00			1E-11		3E-11		3E-06		2E-04		6E-05		1E-05
36-5	SVOC	Benzo(k)fluoranthene	207-08-9	2.53E+00	2.53E+00		4E-13		1E-12		1E-09		4E-07		9E-08		7E-09	
36-5	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	8.75E+00	8.75E+00	1E-12	7E-15	7E-11	2E-14	2E-10	9E-10	2E-05	3E-07	2E-03	5E-08	5E-04	5E-09	1E-03
36-5	SVOC	Butylbenzylphthalate	85-68-7	5.94E+00	5.94E+00		2E-12	1E-08	6E-12	4E-08	9E-11	2E-06	2E-08	1E-04	5E-09	3E-05	5E-10	9E-06
36-5	SVOC	Carbazole	86-74-8	1.33E-01	1.33E-01		1E-13		4E-13		2E-11		6E-09		1E-09		1E-10	
36-5	SVOC	Chrysene	218-01-9	2.66E+00	2.66E+00		2E-11		5E-11		2E-10		4E-08		1E-08		9E-10	
36-5	SVOC	Diethylphthalate	84-66-2	1.48E-01	1.48E-01	5E-09		6E-09		1E-08		1E-08		1E-06		3E-07		1E-07
36-5	SVOC	Di-n-butylphthalate	84-74-2	1.58E-01	1.58E-01	2E-12						8E-08		8E-06		2E-06		4E-07
36-5	SVOC	Fluoranthene	206-44-0	3.77E+00	3.77E+00			3E-07		8E-07		6E-06		5E-04		1E-04		4E-05
36-5	SVOC	Fluorene	86-73-7	4.16E-01	4.16E-01			1E-06		3E-06		8E-07		6E-05		2E-05		1E-05
36-5	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	1.30E+00	1.30E+00		1E-12		5E-12		8E-09		2E-06		5E-07		4E-08	
36-5	SVOC	2-Methylnaphthalene	91-57-6	2.09E-01	2.09E-01			4E-04		1E-03		2E-05		1E-03		9E-04		8E-03
36-5	SVOC	Naphthalene	91-20-3	1.14E-01	1.14E-01	6E-08		7E-04		2E-03		2E-05		1E-03		9E-04		8E-03
36-5	SVOC	Phenanthrene	85-01-8	2.71E+00	2.71E+00			2E-06		5E-06		6E-06		5E-04		1E-04		5E-05
36-5	SVOC	Pyrene	129-00-0	3.93E+00	3.93E+00			3E-07		8E-07		8E-06		7E-04		2E-04		5E-05
36-5	PCB	PCBs (total)	1336-36-3	8.80E-02	8.80E-02	2E-08	1E-09		3E-09		2E-09	3E-04	4E-07	2E-02	1E-07	6E-03	1E-08	5E-03
36-5	INORG	Antimony	7440-36-0	1.60E-01	7.36E-02							7E-06		7E-04		9E-05		4E-04
36-5	INORG	Arsenic	7440-38-2	5.80E+00														
36-5	INORG	Barium	7440-39-3	1.10E+02	1.43E+01													
36-5	INORG	Beryllium	7440-41-7	3.80E-01														
36-5	INORG	Cadmium	7440-43-9	1.40E+00	8.12E-01						4E-10	4E-05	5E-10	3E-03	3E-10	6E-04	7E-10	2E-03
36-5	INORG	Chromium (total)	7440-47-3	8.10E+01	4.90E+01						2E-07	2E-03	2E-07	6E-02	1E-07	8E-03	3E-07	2E-02
36-5	INORG	Cobalt	7440-48-4	4.20E+00														
36-5	INORG	Copper	7440-50-8	1.00E+02	7.15E+01							7E-05		7E-03		9E-04		4E-03
36-5	INORG	Cyanide (total)	57-12-5	5.00E-01	5.00E-01							1E-06		9E-05		1E-05		5E-05
36-5	INORG	Lead	7439-92-1	1.20E+02	1.20E+02													
36-5	INORG	Manganese	7439-96-5	7.50E+02	2.73E+02							1E-02		1E-02		4E-03		2E-01
36-5	INORG	Mercury	7439-97-6	1.06E-01	5.36E-02	2E-06		2E-04		5E-04		2E-05		2E-03		8E-04		7E-03
36-5	INORG	Nickel	7440-02-0	3.10E+01	1.10E+01						8E-10		8E-10		5E-10		1E-09	
36-5	INORG	Selenium	7782-49-2	8.80E-01	3.61E-01							3E-06		3E-04		4E-05		1E-04
36-5	INORG	Silver	7440-22-4	3.10E-01	1.22E-01							3E-05		1E-04		2E-05		5E-04
36-5	INORG	Thallium	7440-28-0	2.00E-01	3.46E-03							2E-06		2E-04		2E-05		1E-04
36-5	INORG	Vanadium	7440-62-2	2.00E+01														
36-5	INORG	Zinc	7440-66-6	1.80E+02	6.95E+01							9E-06		8E-04		1E-04		5E-04
38-1	VOC	2-Butanone	78-93-3	3.10E-02	3.10E-02	7E-09		6E-07		2E-06		1E-08		8E-07		5E-07		5E-06
38-1	VOC	Chloromethane	74-87-3	3.10E-02	3.10E-02	2E-06		2E-03		2E-03		6E-06		3E-04		2E-04		2E-03
38-1	VOC	Cumene	98-82-8	3.50E-02	3.50E-02	3E-07		1E-04		3E-04		4E-07		2E-05		2E-05		2E-04
38-1	VOC	Ethyl Benzene	100-41-4	1.80E-01	1.80E-01	9E-07		3E-04		7E-04		1E-06		6E-05		4E-05		4E-04

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
38-1	VOC	Methyl Acetate	79-20-9	6.90E-02	6.90E-02	3E-08		3E-06		8E-06		6E-08		3E-06		2E-06		2E-06
38-1	VOC	Methylcyclohexane	108-87-2	2.90E-02	2.90E-02	1E-07		5E-05		6E-05		2E-07		1E-05		1E-05		9E-05
38-1	VOC	Methylene Chloride	75-09-2	9.40E-02	9.40E-02	5E-06	5E-08	9E-05	1E-07	2E-04	7E-11	4E-07	1E-08	2E-05	7E-09	1E-05	3E-09	1E-04
38-1	VOC	Toluene	108-88-3	3.10E-02	3.10E-02	3E-07		1E-05		4E-05		6E-08		4E-06		2E-06		2E-05
38-1	VOC	1,2,4-Trichlorobenzene	120-82-1	3.10E-02	3.10E-02			9E-06		2E-05		2E-07		2E-05		6E-06		1E-05
38-1	VOC	Trichloroethene	79-01-6	7.10E-02	7.10E-02	1E-06	2E-07		3E-07		2E-10		3E-08		2E-08		6E-09	
38-1	VOC	Xylenes (total)	1330-20-7	1.39E-01	1.39E-01	6E-07		2E-03		4E-03		7E-06		4E-04		3E-04		3E-03
38-1	SVOC	Acenaphthene	83-32-9	1.55E-01	1.55E-01			1E-06		3E-06		2E-07		2E-05		8E-06		5E-06
38-1	SVOC	Anthracene	120-12-7	2.18E-01	2.18E-01							4E-08		4E-06		1E-06		2E-07
38-1	SVOC	Benzo(a)anthracene	56-55-3	7.37E-01	7.37E-01		2E-11		5E-11		4E-09		1E-06		3E-07		2E-08	
38-1	SVOC	Benzo(a)pyrene	50-32-8	7.45E-01	7.45E-01		2E-11		6E-11		4E-08		1E-05		3E-06		2E-07	
38-1	SVOC	Benzo(b)fluoranthene	205-99-2	8.69E-01	8.69E-01		2E-10		6E-10		5E-09		1E-06		3E-07		3E-08	
38-1	SVOC	Benzo(g,h,i)perylene	191-24-2	5.13E-01	5.13E-01			4E-12		1E-11		1E-06		9E-05		2E-05		5E-06
38-1	SVOC	Benzo(k)fluoranthene	207-08-9	8.43E-01	8.43E-01		1E-13		4E-13		5E-10		1E-07		3E-08		2E-09	
38-1	SVOC	Biphenyl	92-52-4	4.69E-02	4.69E-02	2E-07		6E-07		2E-06		9E-08		7E-06		3E-06		2E-05
38-1	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	3.26E-01	3.26E-01	5E-14	2E-16	2E-12	8E-16	6E-12	3E-11	9E-07	9E-09	8E-05	2E-09	2E-05	2E-10	4E-05
38-1	SVOC	Butylbenzylphthalate	85-68-7	1.19E-01	1.19E-01		4E-14	3E-10	1E-13	7E-10	2E-12	3E-08	5E-10	3E-06	9E-11	7E-07	9E-12	2E-07
38-1	SVOC	Carbazole	86-74-8	1.07E-01	1.07E-01		1E-13		4E-13		2E-11		4E-09		9E-10		1E-10	
38-1	SVOC	Chrysene	218-01-9	8.38E-01	8.38E-01		5E-12		1E-11		5E-11		1E-08		3E-09		3E-10	
38-1	SVOC	Dibenzofuran	132-64-9	1.75E-01	1.75E-01			1E-06		3E-06		5E-06		4E-04		1E-04		4E-04
38-1	SVOC	Diethylphthalate	84-66-2	1.50E-01	1.50E-01	5E-09		6E-09		1E-08		1E-08		1E-06		3E-07		1E-07
38-1	SVOC	Di-n-butylphthalate	84-74-2	3.29E-01	3.29E-01	4E-12						2E-07		2E-05		4E-06		9E-07
38-1	SVOC	Fluoranthene	206-44-0	1.33E+00	1.33E+00			1E-07		3E-07		2E-06		2E-04		5E-05		1E-05
38-1	SVOC	Fluorene	86-73-7	9.20E-02	9.20E-02			2E-07		6E-07		2E-07		1E-05		5E-06		2E-06
38-1	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	4.89E-01	4.89E-01		6E-13		2E-12		3E-09		8E-07		2E-07		1E-08	
38-1	SVOC	2-Methylnaphthalene	91-57-6	2.51E-01	2.51E-01			5E-04		1E-03		3E-05		2E-03		1E-03		1E-02
38-1	SVOC	Naphthalene	91-20-3	2.01E-01	2.01E-01	1E-07		1E-03		3E-03		4E-05		2E-03		2E-03		1E-02
38-1	SVOC	Phenanthrene	85-01-8	1.13E+00	1.13E+00			8E-07		2E-06		2E-06		2E-04		6E-05		2E-05
38-1	SVOC	Pyrene	129-00-0	1.91E+00	1.91E+00			1E-07		4E-07		4E-06		3E-04		9E-05		2E-05
38-1	PCB	PCBs (total)	1336-36-3	7.75E-02	7.75E-02	1E-08	1E-09		3E-09		1E-09	2E-04	4E-07	2E-02	9E-08	5E-03	1E-08	4E-03
38-1	INORG	Antimony	7440-36-0	3.70E-01	2.84E-01							3E-05		3E-03		3E-04		1E-03
38-1	INORG	Arsenic	7440-38-2	6.40E+00														
38-1	INORG	Barium	7440-39-3	6.20E+01														
38-1	INORG	Beryllium	7440-41-7	6.60E-01	7.00E-02						5E-11	9E-06	5E-11	1E-04	3E-11	2E-05	8E-11	2E-04
38-1	INORG	Cadmium	7440-43-9	7.60E-01	1.72E-01						9E-11	9E-06	1E-10	7E-04	6E-11	1E-04	2E-10	4E-04
38-1	INORG	Chromium (total)	7440-47-3	2.80E+01														
38-1	INORG	Cobalt	7440-48-4	6.00E+00														
38-1	INORG	Copper	7440-50-8	2.40E+01														
38-1	INORG	Cyanide (total)	57-12-5	1.20E-01	1.20E-01							2E-07		2E-05		3E-06		1E-05
38-1	INORG	Lead	7439-92-1	2.40E+01	2.40E+01													
38-1	INORG	Manganese	7439-96-5	6.20E+02	1.43E+02							6E-03		6E-03		2E-03		1E-01
38-1	INORG	Mercury	7439-97-6	5.43E-02	1.93E-03	6E-08		7E-06		2E-05		9E-07		6E-05		3E-05		3E-04
38-1	INORG	Nickel	7440-02-0	1.80E+01														
38-1	INORG	Selenium	7782-49-2	4.20E-01														
38-1	INORG	Silver	7440-22-4	3.40E-01	1.52E-01							3E-05		1E-04		2E-05		6E-04
38-1	INORG	Thallium	7440-28-0	2.10E-01	1.35E-02							8E-06		7E-04		9E-05		4E-04
38-1	INORG	Vanadium	7440-62-2	2.50E+01	1.29E-01							7E-07		7E-05		9E-06		4E-05
38-1	INORG	Zinc	7440-66-6	6.30E+01														
40-A	VOC	Acetone	67-64-1	3.50E-01	3.50E-01	2E-08		8E-06		2E-05		2E-07		1E-05		1E-05		8E-05
40-A	VOC	Benzene	71-43-2	9.10E-01	9.10E-01	2E-03	1E-05	1E-01	2E-05	2E-01	1E-08	3E-04	2E-06	2E-02	1E-06	1E-02	4E-07	6E-02
40-A	VOC	2-Butanone	78-93-3	1.10E-01	1.10E-01	3E-08		2E-06		5E-06		5E-08		3E-06		2E-06		2E-05
40-A	VOC	Chloromethane	74-87-3	4.40E-02	4.40E-02	3E-06		2E-03		3E-03		8E-06		4E-04		3E-04		3E-03
40-A	VOC	Cumene	98-82-8	6.90E-01	6.90E-01	5E-06		2E-03		6E-03		9E-06		5E-04		4E-04		3E-03

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
40-A	VOC	Cyclohexane	110-82-7	2.00E+00	2.00E+00	1E-05		2E-03		2E-03		6E-06		3E-04		3E-04		2E-03
40-A	VOC	1,2-Dichloroethane	107-06-2	1.40E-02	1.40E-02	6E-06	2E-07	3E-03	5E-07	9E-03	4E-10	2E-05	6E-08	1E-03	4E-08	8E-04	1E-08	8E-03
40-A	VOC	cis-1,2-Dichloroethene	156-59-2	9.00E-02	9.00E-02	6E-07		1E-02		2E-02		3E-05		1E-03		1E-03		1E-03
40-A	VOC	Ethyl Benzene	100-41-4	3.90E+00	3.90E+00	2E-05		6E-03		1E-02		2E-05		1E-03		9E-04		8E-03
40-A	VOC	Methyl Acetate	79-20-9	1.00E+00	1.00E+00	4E-07		5E-05		1E-04		8E-07		4E-05		3E-05		3E-05
40-A	VOC	Methylcyclohexane	108-87-2	1.00E+01	1.00E+01	4E-05		2E-02		2E-02		8E-05		4E-03		3E-03		3E-02
40-A	VOC	Methylene Chloride	75-09-2	1.70E-01	1.70E-01	8E-06	8E-08	2E-04	2E-07	3E-04	1E-10	7E-07	2E-08	4E-05	1E-08	3E-05	5E-09	2E-04
40-A	VOC	Styrene	100-42-5	3.60E-02	3.60E-02	6E-08		9E-06		2E-05		9E-08		5E-06		3E-06		1E-05
40-A	VOC	Toluene	108-88-3	4.00E-01	4.00E-01	3E-06		2E-04		5E-04		8E-07		5E-05		3E-05		2E-04
40-A	VOC	1,1,1-Trichloroethane	71-55-6	1.50E-01	1.50E-01	6E-07		3E-04		4E-04		9E-07		5E-05		4E-05		4E-05
40-A	VOC	Trichloroethene	79-01-6	3.20E-01	3.20E-01	6E-06	7E-07		1E-06		7E-10		1E-07		7E-08		3E-08	
40-A	VOC	Trichlorofluoromethane	75-69-4	9.00E-02	9.00E-02	1E-07		7E-04		8E-04		3E-06		2E-04		1E-04		1E-04
40-A	VOC	Xylenes (total)	1330-20-7	1.33E+01	1.33E+01	5E-05		2E-01		4E-01		7E-04		4E-02		3E-02		3E-01
40-A	SVOC	Acenaphthene	83-32-9	7.69E+00	7.69E+00			6E-05		2E-04		1E-05		9E-04		4E-04		2E-04
40-A	SVOC	Acenaphthylene	208-96-8	5.15E-01	5.15E-01			6E-06		1E-05		2E-06		1E-04		5E-05		3E-05
40-A	SVOC	Anthracene	120-12-7	1.59E+01	1.59E+01							3E-06		3E-04		7E-05		1E-05
40-A	SVOC	Benzo(a)anthracene	56-55-3	3.71E+01	3.71E+01		8E-10		2E-09		2E-07		6E-05		1E-05		1E-06	
40-A	SVOC	Benzo(a)pyrene	50-32-8	3.58E+01	3.58E+01		1E-09		3E-09		2E-06		6E-04		1E-04		1E-05	
40-A	SVOC	Benzo(b)fluoranthene	205-99-2	3.61E+01	3.61E+01		8E-09		2E-08		2E-07		6E-05		1E-05		1E-06	
40-A	SVOC	Benzo(g,h,i)perylene	191-24-2	2.30E+01	2.30E+01			2E-10		5E-10		4E-05		4E-03		1E-03		2E-04
40-A	SVOC	Benzo(k)fluoranthene	207-08-9	3.72E+01	3.72E+01		6E-12		2E-11		2E-08		6E-06		1E-06		1E-07	
40-A	SVOC	Biphenyl	92-52-4	5.43E-02	5.43E-02	2E-07		7E-07		2E-06		1E-07		8E-06		3E-06		2E-05
40-A	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	2.20E+00	2.20E+00	3E-13	2E-15	2E-11	5E-15	4E-11	2E-10	6E-06	6E-08	5E-04	1E-08	1E-04	1E-09	3E-04
40-A	SVOC	Butylbenzylphthalate	85-68-7	4.17E+00	4.17E+00		1E-12	1E-08	4E-12	3E-08	6E-11	1E-06	2E-08	1E-04	3E-09	2E-05	3E-10	6E-06
40-A	SVOC	Carbazole	86-74-8	1.07E+01	1.07E+01		1E-11		4E-11		2E-09		4E-07		9E-08		1E-08	
40-A	SVOC	Chrysene	218-01-9	3.79E+01	3.79E+01		2E-10		7E-10		2E-09		6E-07		1E-07		1E-08	
40-A	SVOC	Dibenzofuran	132-64-9	4.93E+00	4.93E+00			3E-05		8E-05		1E-04		1E-02		3E-03		1E-02
40-A	SVOC	Diethylphthalate	84-66-2	1.98E-01	1.98E-01	6E-09		8E-09		2E-08		2E-08		1E-06		4E-07		1E-07
40-A	SVOC	Di-n-butylphthalate	84-74-2	6.06E-02	6.06E-02	7E-13						3E-08		3E-06		7E-07		2E-07
40-A	SVOC	Fluoranthene	206-44-0	1.05E+02	1.05E+02			9E-06		2E-05		2E-04		1E-02		4E-03		1E-03
40-A	SVOC	Fluorene	86-73-7	7.10E+00	7.10E+00			2E-05		5E-05		1E-05		1E-03		4E-04		2E-04
40-A	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	2.08E+01	2.08E+01		2E-11		7E-11		1E-07		3E-05		7E-06		6E-07	
40-A	SVOC	2-Methylnaphthalene	91-57-6	1.94E+00	1.94E+00			4E-03		1E-02		2E-04		1E-02		8E-03		7E-02
40-A	SVOC	Naphthalene	91-20-3	3.54E+00	3.54E+00	2E-06		2E-02		6E-02		6E-04		4E-02		3E-02		2E-01
40-A	SVOC	N-Nitrosodiphenylamine	86-30-6	9.61E-02	9.61E-02						4E-12	3E-07	1E-09	2E-05	2E-10	5E-06	2E-11	1E-05
40-A	SVOC	Phenanthrene	85-01-8	7.71E+01	7.71E+01			5E-05		1E-04		2E-04		1E-02		4E-03		2E-03
40-A	SVOC	Pyrene	129-00-0	8.88E+01	8.88E+01			7E-06		2E-05		2E-04		2E-02		4E-03		1E-03
40-A	PCB	PCBs (total)	1336-36-3	1.16E+00	1.16E+00	2E-07	1E-08		5E-08		2E-08	3E-03	6E-06	3E-01	1E-06	8E-02	2E-07	7E-02
40-A	INORG	Antimony	7440-36-0	3.80E-01	2.94E-01							3E-05		3E-03		4E-04		1E-03
40-A	INORG	Arsenic	7440-38-2	1.30E+01	4.88E+00						5E-08	7E-04	1E-05	7E-02	2E-06	1E-02	2E-07	2E-03
40-A	INORG	Barium	7440-39-3	2.90E+02	1.94E+02													
40-A	INORG	Beryllium	7440-41-7	5.70E+00	5.11E+00						4E-09	6E-04	4E-09	1E-02	2E-09	1E-03	6E-09	1E-02
40-A	INORG	Cadmium	7440-43-9	2.00E+00	1.41E+00						7E-10	8E-05	8E-10	6E-03	5E-10	1E-03	1E-09	3E-03
40-A	INORG	Chromium (total)	7440-47-3	7.90E+01	4.70E+01						2E-07	2E-03	2E-07	6E-02	1E-07	8E-03	3E-07	2E-02
40-A	INORG	Cobalt	7440-48-4	1.10E+01	3.95E+00						3E-09	4E-04	3E-09	9E-04	2E-09	2E-04	5E-09	7E-03
40-A	INORG	Copper	7440-50-8	8.10E+01	5.25E+01							5E-05		5E-03		6E-04		3E-03
40-A	INORG	Cyanide (total)	57-12-5	2.60E+00	2.60E+00							5E-06		5E-04		6E-05		3E-04
40-A	INORG	Lead	7439-92-1	4.90E+02	4.90E+02													
40-A	INORG	Manganese	7439-96-5	7.60E+02	2.83E+02							1E-02		1E-02		4E-03		2E-01
40-A	INORG	Mercury	7439-97-6	3.65E-01	3.13E-01	1E-05		1E-03		3E-03		1E-04		9E-03		5E-03		4E-02
40-A	INORG	Nickel	7440-02-0	3.00E+01	1.00E+01						7E-10		8E-10		4E-10		1E-09	
40-A	INORG	Selenium	7782-49-2	7.80E-01	2.61E-01							2E-06		2E-04		3E-05		1E-04
40-A	INORG	Silver	7440-22-4	4.70E-01	2.82E-01							6E-05		2E-04		4E-05		1E-03

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
40-A	INORG	Thallium	7440-28-0	5.30E-01	3.33E-01							2E-04		2E-02		2E-03		9E-03
40-A	INORG	Vanadium	7440-62-2	1.50E+02	1.25E+02							7E-04		7E-02		9E-03		4E-02
40-A	INORG	Zinc	7440-66-6	7.60E+02	6.50E+02							9E-05		8E-03		1E-03		4E-03
40-B	VOC	Chloromethane	74-87-3	3.40E-02	3.40E-02	2E-06		2E-03		2E-03		6E-06		3E-04		3E-04		2E-03
40-B	VOC	Methyl Acetate	79-20-9	1.90E-01	1.90E-01	7E-08		9E-06		2E-05		2E-07		8E-06		6E-06		6E-06
40-B	VOC	Methylcyclohexane	108-87-2	4.80E-02	4.80E-02	2E-07		8E-05		9E-05		4E-07		2E-05		2E-05		1E-04
40-B	VOC	Methylene Chloride	75-09-2	3.10E-02	3.10E-02	2E-06	2E-08	3E-05	4E-08	6E-05	2E-11	1E-07	4E-09	8E-06	2E-09	5E-06	9E-10	4E-05
40-B	VOC	Tetrachloroethene	127-18-4	6.10E-02	6.10E-02	3E-06	3E-07	8E-04	5E-07	9E-04	3E-10	2E-06	5E-08	1E-04	3E-08	8E-05	1E-08	7E-04
40-B	VOC	Trichloroethene	79-01-6	1.50E-01	1.50E-01	3E-06	3E-07		6E-07		3E-10		5E-08		3E-08		1E-08	
40-B	SVOC	Acenaphthene	83-32-9	4.33E-02	4.33E-02			3E-07		9E-07		7E-08		5E-06		2E-06		1E-06
40-B	SVOC	Anthracene	120-12-7	1.71E-01	1.71E-01							3E-08		3E-06		8E-07		2E-07
40-B	SVOC	Benzo(a)anthracene	56-55-3	6.15E-01	6.15E-01		1E-11		4E-11		4E-09		1E-06		2E-07		2E-08	
40-B	SVOC	Benzo(a)pyrene	50-32-8	6.17E-01	6.17E-01		2E-11		5E-11		4E-08		1E-05		2E-06		2E-07	
40-B	SVOC	Benzo(b)fluoranthene	205-99-2	9.09E-01	9.09E-01		2E-10		6E-10		5E-09		1E-06		3E-07		3E-08	
40-B	SVOC	Benzo(g,h,i)perylene	191-24-2	1.39E+00	1.39E+00			1E-11		3E-11		3E-06		2E-04		6E-05		1E-05
40-B	SVOC	Benzo(k)fluoranthene	207-08-9	6.86E-01	6.86E-01		1E-13		3E-13		4E-10		1E-07		2E-08		2E-09	
40-B	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	1.68E-01	1.68E-01	3E-14	1E-16	1E-12	4E-16	3E-12	2E-11	4E-07	5E-09	4E-05	1E-09	1E-05	9E-11	2E-05
40-B	SVOC	Carbazole	86-74-8	6.46E-02	6.46E-02		7E-14		2E-13		1E-11		3E-09		5E-10		6E-11	
40-B	SVOC	Chrysene	218-01-9	7.14E-01	7.14E-01		4E-12		1E-11		4E-11		1E-08		3E-09		2E-10	
40-B	SVOC	Dibenz(a,h)anthracene	53-70-3	9.62E-02	9.62E-02		1E-14		4E-14		6E-09		2E-06		3E-07		3E-08	
40-B	SVOC	Dibenzofuran	132-64-9	4.22E-02	4.22E-02			3E-07		7E-07		1E-06		1E-04		3E-05		1E-04
40-B	SVOC	Fluoranthene	206-44-0	1.06E+00	1.06E+00			9E-08		2E-07		2E-06		1E-04		4E-05		1E-05
40-B	SVOC	Fluorene	86-73-7	2.84E-01	2.84E-01			7E-07		2E-06		5E-07		4E-05		1E-05		7E-06
40-B	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	1.09E+00	1.09E+00		1E-12		4E-12		6E-09		2E-06		4E-07		3E-08	
40-B	SVOC	Naphthalene	91-20-3	4.22E-02	4.22E-02	2E-08		3E-04		7E-04		8E-06		4E-04		3E-04		3E-03
40-B	SVOC	Phenanthrene	85-01-8	1.67E+00	1.67E+00			1E-06		3E-06		4E-06		3E-04		9E-05		3E-05
40-B	SVOC	Pyrene	129-00-0	1.04E+00	1.04E+00			8E-08		2E-07		2E-06		2E-04		5E-05		1E-05
40-B	PCB	PCBs (total)	1336-36-3	9.55E-02	9.55E-02	2E-08	1E-09		4E-09		2E-09	3E-04	5E-07	3E-02	1E-07	7E-03	1E-08	5E-03
40-B	INORG	Antimony	7440-36-0	1.50E-01	6.36E-02							6E-06		6E-04		8E-05		3E-04
40-B	INORG	Arsenic	7440-38-2	9.10E+00	9.77E-01						1E-08	1E-04	3E-06	1E-02	4E-07	2E-03	5E-08	4E-04
40-B	INORG	Barium	7440-39-3	6.10E+01														
40-B	INORG	Beryllium	7440-41-7	3.30E+00	2.71E+00						2E-09	3E-04	2E-09	5E-03	1E-09	7E-04	3E-09	7E-03
40-B	INORG	Cadmium	7440-43-9	2.80E-01														
40-B	INORG	Chromium (total)	7440-47-3	1.70E+01														
40-B	INORG	Cobalt	7440-48-4	5.80E+00														
40-B	INORG	Copper	7440-50-8	1.50E+01														
40-B	INORG	Cyanide (total)	57-12-5	1.40E-01	1.40E-01							3E-07		3E-05		3E-06		1E-05
40-B	INORG	Lead	7439-92-1	1.20E+01	1.20E+01													
40-B	INORG	Manganese	7439-96-5	4.40E+02														
40-B	INORG	Nickel	7440-02-0	1.60E+01														
40-B	INORG	Selenium	7782-49-2	2.30E-01														
40-B	INORG	Silver	7440-22-4	1.90E-01	2.28E-03							5E-07		2E-06		3E-07		9E-06
40-B	INORG	Thallium	7440-28-0	2.30E-01	3.35E-02							2E-05		2E-03		2E-04		9E-04
40-B	INORG	Vanadium	7440-62-2	2.60E+01	1.13E+00							6E-06		6E-04		8E-05		3E-04
40-B	INORG	Zinc	7440-66-6	3.50E+01														
40-C	VOC	Benzene	71-43-2	1.30E-01	1.30E-01	2E-04	1E-06	2E-02	3E-06	3E-02	2E-09	5E-05	3E-07	3E-03	2E-07	2E-03	6E-08	9E-03
40-C	VOC	2-Butanone	78-93-3	5.00E-02	5.00E-02	1E-08		1E-06		2E-06		2E-08		1E-06		8E-07		8E-06
40-C	VOC	Cumene	98-82-8	6.20E-02	6.20E-02	5E-07		2E-04		5E-04		8E-07		4E-05		3E-05		3E-04
40-C	VOC	Cyclohexane	110-82-7	2.60E-01	2.60E-01	2E-06		2E-04		3E-04		8E-07		4E-05		3E-05		3E-04
40-C	VOC	Ethyl Benzene	100-41-4	1.20E-01	1.20E-01	6E-07		2E-04		4E-04		7E-07		4E-05		3E-05		3E-04
40-C	VOC	Methylcyclohexane	108-87-2	7.70E-01	7.70E-01	3E-06		1E-03		2E-03		6E-06		3E-04		3E-04		2E-03
40-C	VOC	Methylene Chloride	75-09-2	4.50E-02	4.50E-02	2E-06	2E-08	4E-05	5E-08	9E-05	3E-11	2E-07	6E-09	1E-05	3E-09	7E-06	1E-09	6E-05
40-C	VOC	Toluene	108-88-3	5.80E-01	5.80E-01	5E-06		3E-04		7E-04		1E-06		7E-05		4E-05		3E-04

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
40-C	VOC	Trichloroethene	79-01-6	3.20E-01	3.20E-01	6E-06	7E-07		1E-06		7E-10		1E-07		7E-08		3E-08	
40-C	VOC	Xylenes (total)	1330-20-7	8.00E-01	8.00E-01	3E-06		1E-02		2E-02		4E-05		2E-03		2E-03		2E-02
40-C	SVOC	Anthracene	120-12-7	7.34E-02	7.34E-02							1E-08		1E-06		3E-07		7E-08
40-C	SVOC	Benzo(a)anthracene	56-55-3	1.38E-01	1.38E-01		3E-12		9E-12		8E-10		2E-07		5E-08		4E-09	
40-C	SVOC	Benzo(a)pyrene	50-32-8	1.29E-01	1.29E-01		4E-12		1E-11		8E-09		2E-06		4E-07		4E-08	
40-C	SVOC	Benzo(b)fluoranthene	205-99-2	1.23E-01	1.23E-01		3E-11		8E-11		7E-10		2E-07		4E-08		4E-09	
40-C	SVOC	Benzo(g,h,i)perylene	191-24-2	6.88E-02	6.88E-02			6E-13		1E-12		1E-07		1E-05		3E-06		6E-07
40-C	SVOC	Benzo(k)fluoranthene	207-08-9	9.72E-02	9.72E-02		2E-14		5E-14		6E-11		2E-08		3E-09		3E-10	
40-C	SVOC	Chrysene	218-01-9	1.46E-01	1.46E-01		8E-13		3E-12		9E-12		2E-09		5E-10		5E-11	
40-C	SVOC	Fluoranthene	206-44-0	3.87E-01	3.87E-01			3E-08		8E-08		6E-07		5E-05		1E-05		4E-06
40-C	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	6.35E-02	6.35E-02		7E-14		2E-13		4E-10		1E-07		2E-08		2E-09	
40-C	SVOC	Phenanthrene	85-01-8	3.96E-01	3.96E-01			3E-07		7E-07		8E-07		7E-05		2E-05		8E-06
40-C	SVOC	Pyrene	129-00-0	3.60E-01	3.60E-01			3E-08		7E-08		7E-07		6E-05		2E-05		4E-06
40-C	INORG	Antimony	7440-36-0	8.20E-02														
40-C	INORG	Arsenic	7440-38-2	9.50E+00	1.38E+00						1E-08	2E-04	4E-06	2E-02	5E-07	3E-03	7E-08	6E-04
40-C	INORG	Barium	7440-39-3	1.70E+02	7.43E+01													
40-C	INORG	Beryllium	7440-41-7	2.30E+00	1.71E+00						1E-09	2E-04	1E-09	3E-03	8E-10	5E-04	2E-09	5E-03
40-C	INORG	Cadmium	7440-43-9	4.50E-01														
40-C	INORG	Chromium (total)	7440-47-3	1.50E+01														
40-C	INORG	Cobalt	7440-48-4	6.70E+00														
40-C	INORG	Copper	7440-50-8	9.90E+00														
40-C	INORG	Lead	7439-92-1	1.30E+01	1.30E+01													
40-C	INORG	Manganese	7439-96-5	1.20E+03	7.23E+02							3E-02		3E-02		1E-02		5E-01
40-C	INORG	Mercury	7439-97-6	7.92E-02	2.68E-02	9E-07		1E-04		2E-04		1E-05		8E-04		4E-04		3E-03
40-C	INORG	Nickel	7440-02-0	1.50E+01														
40-C	INORG	Selenium	7782-49-2	3.00E-01														
40-C	INORG	Silver	7440-22-4	1.30E-01														
40-C	INORG	Thallium	7440-28-0	1.90E-01														
40-C	INORG	Vanadium	7440-62-2	2.70E+01	2.13E+00							1E-05		1E-03		1E-04		6E-04
40-C	INORG	Zinc	7440-66-6	4.70E+01														
40-D	VOC	Acetone	67-64-1	2.50E-01	2.50E-01	1E-08		6E-06		1E-05		2E-07		1E-05		7E-06		6E-05
40-D	VOC	2-Butanone	78-93-3	5.40E-02	5.40E-02	1E-08		1E-06		3E-06		2E-08		1E-06		9E-07		8E-06
40-D	VOC	Cyclohexane	110-82-7	6.50E-02	6.50E-02	5E-07		5E-05		6E-05		2E-07		1E-05		8E-06		8E-05
40-D	VOC	cis-1,2-Dichloroethene	156-59-2	7.10E-02	7.10E-02	5E-07		8E-03		1E-02		2E-05		1E-03		8E-04		8E-04
40-D	VOC	Ethyl Benzene	100-41-4	2.80E-02	2.80E-02	1E-07		4E-05		1E-04		2E-07		9E-06		7E-06		6E-05
40-D	VOC	Methyl Acetate	79-20-9	2.80E-01	2.80E-01	1E-07		1E-05		3E-05		2E-07		1E-05		9E-06		8E-06
40-D	VOC	Methylcyclohexane	108-87-2	1.90E-01	1.90E-01	7E-07		3E-04		4E-04		2E-06		8E-05		6E-05		6E-04
40-D	VOC	Toluene	108-88-3	1.20E-01	1.20E-01	1E-06		5E-05		1E-04		2E-07		2E-05		8E-06		7E-05
40-D	VOC	Trichloroethene	79-01-6	1.30E+00	1.30E+00	2E-05	3E-06		6E-06		3E-09		5E-07		3E-07		1E-07	
40-D	VOC	Xylenes (total)	1330-20-7	1.93E-01	1.93E-01	8E-07		2E-03		6E-03		1E-05		5E-04		4E-04		4E-03
40-D	SVOC	Acenaphthylene	208-96-8	4.08E-02	4.08E-02			5E-07		1E-06		1E-07		9E-06		4E-06		2E-06
40-D	SVOC	Anthracene	120-12-7	3.52E-02	3.52E-02							7E-09		6E-07		2E-07		3E-08
40-D	SVOC	Benzo(a)anthracene	56-55-3	1.54E-01	1.54E-01		3E-12		1E-11		9E-10		2E-07		5E-08		5E-09	
40-D	SVOC	Benzo(a)pyrene	50-32-8	2.23E-01	2.23E-01		6E-12		2E-11		1E-08		4E-06		8E-07		7E-08	
40-D	SVOC	Benzo(b)fluoranthene	205-99-2	2.60E-01	2.60E-01		6E-11		2E-10		2E-09		4E-07		9E-08		8E-09	
40-D	SVOC	Benzo(g,h,i)perylene	191-24-2	1.22E-01	1.22E-01			1E-12		3E-12		2E-07		2E-05		5E-06		1E-06
40-D	SVOC	Benzo(k)fluoranthene	207-08-9	2.32E-01	2.32E-01		4E-14		1E-13		1E-10		4E-08		8E-09		7E-10	
40-D	SVOC	Butylbenzylphthalate	85-68-7	1.13E-01	1.13E-01		4E-14	3E-10	1E-13	7E-10	2E-12	3E-08	4E-10	3E-06	9E-11	7E-07	9E-12	2E-07
40-D	SVOC	Chrysene	218-01-9	1.79E-01	1.79E-01		1E-12		3E-12		1E-11		3E-09		6E-10		6E-11	
40-D	SVOC	Diethylphthalate	84-66-2	5.39E-02	5.39E-02	2E-09		2E-09		5E-09		4E-09		4E-07		1E-07		4E-08
40-D	SVOC	Di-n-butylphthalate	84-74-2	5.65E-02	5.65E-02	6E-13						3E-08		3E-06		6E-07		1E-07
40-D	SVOC	Fluoranthene	206-44-0	2.62E-01	2.62E-01			2E-08		5E-08		4E-07		3E-05		9E-06		3E-06
40-D	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	1.31E-01	1.31E-01		1E-13		5E-13		8E-10		2E-07		5E-08		4E-09	

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
40-D	SVOC	Phenanthrene	85-01-8	1.70E-01	1.70E-01			1E-07		3E-07		4E-07		3E-05		9E-06		3E-06
40-D	SVOC	Pyrene	129-00-0	2.65E-01	2.65E-01			2E-08		5E-08		5E-07		5E-05		1E-05		3E-06
40-D	PCB	PCBs (total)	1336-36-3	1.39E-01	1.39E-01	3E-08	2E-09		5E-09		3E-09	4E-04	7E-07	4E-02	2E-07	1E-02	2E-08	8E-03
40-D	INORG	Arsenic	7440-38-2	9.30E+00	1.18E+00						1E-08	2E-04	3E-06	2E-02	4E-07	3E-03	6E-08	5E-04
40-D	INORG	Barium	7440-39-3	7.00E+01														
40-D	INORG	Beryllium	7440-41-7	8.60E-01	2.70E-01						2E-10	3E-05	2E-10	5E-04	1E-10	7E-05	3E-10	7E-04
40-D	INORG	Cadmium	7440-43-9	4.50E-01														
40-D	INORG	Chromium (total)	7440-47-3	1.60E+01														
40-D	INORG	Cobalt	7440-48-4	5.90E+00														
40-D	INORG	Copper	7440-50-8	6.30E+01	3.45E+01							3E-05		3E-03		4E-04		2E-03
40-D	INORG	Cyanide (total)	57-12-5	1.80E+00	1.80E+00							4E-06		3E-04		4E-05		2E-04
40-D	INORG	Lead	7439-92-1	2.90E+01	2.90E+01													
40-D	INORG	Manganese	7439-96-5	4.80E+02	2.50E+00							1E-04		1E-04		3E-05		2E-03
40-D	INORG	Mercury	7439-97-6	4.20E-02														
40-D	INORG	Nickel	7440-02-0	1.60E+01														
40-D	INORG	Selenium	7782-49-2	1.90E+00	1.38E+00							1E-05		1E-03		1E-04		5E-04
40-D	INORG	Silver	7440-22-4	2.60E-01	7.23E-02							2E-05		6E-05		1E-05		3E-04
40-D	INORG	Thallium	7440-28-0	9.10E-01	7.13E-01							4E-04		4E-02		5E-03		2E-02
40-D	INORG	Vanadium	7440-62-2	2.30E+01														
40-D	INORG	Zinc	7440-66-6	8.50E+01														
44-A	VOC	Acetone	67-64-1	1.50E-01	1.50E-01	9E-09		3E-06		8E-06		1E-07		6E-06		4E-06		3E-05
44-A	VOC	2-Butanone	78-93-3	4.80E-02	4.80E-02	1E-08		9E-07		2E-06		2E-08		1E-06		8E-07		7E-06
44-A	VOC	Chloromethane	74-87-3	3.60E-02	3.60E-02	3E-06		2E-03		2E-03		7E-06		4E-04		3E-04		3E-03
44-A	VOC	Cyclohexane	110-82-7	8.30E-03	8.30E-03	6E-08		7E-06		8E-06		2E-08		1E-06		1E-06		1E-05
44-A	VOC	1,2-Dichloroethane	107-06-2	9.00E-03	9.00E-03	4E-06	1E-07	2E-03	3E-07	6E-03	2E-10	1E-05	4E-08	7E-04	2E-08	5E-04	9E-09	5E-03
44-A	VOC	cis-1,2-Dichloroethene	156-59-2	2.60E-02	2.60E-02	2E-07		3E-03		4E-03		7E-06		4E-04		3E-04		3E-04
44-A	VOC	Ethyl Benzene	100-41-4	1.00E-02	1.00E-02	5E-08		1E-05		4E-05		6E-08		3E-06		2E-06		2E-05
44-A	VOC	Methyl Acetate	79-20-9	1.20E+01	1.20E+01	5E-06		5E-04		1E-03		1E-05		5E-04		4E-04		4E-04
44-A	VOC	4-Methyl-2-pentanone	108-10-1	4.70E-02	4.70E-02	3E-08		3E-06		8E-06		4E-08		2E-06		2E-06		2E-05
44-A	VOC	Methylcyclohexane	108-87-2	3.10E-02	3.10E-02	1E-07		5E-05		6E-05		2E-07		1E-05		1E-05		1E-04
44-A	VOC	Trichloroethene	79-01-6	7.50E-02	7.50E-02	1E-06	2E-07		3E-07		2E-10		3E-08		2E-08		6E-09	
44-A	VOC	Trichlorofluoromethane	75-69-4	3.60E-02	3.60E-02	5E-08		3E-04		3E-04		1E-06		6E-05		5E-05		5E-05
44-A	VOC	Xylenes (total)	1330-20-7	6.00E-02	6.00E-02	2E-07		7E-04		2E-03		3E-06		2E-04		1E-04		1E-03
44-A	SVOC	Anthracene	120-12-7	3.71E-01	3.71E-01							7E-08		6E-06		2E-06		3E-07
44-A	SVOC	Benzo(a)anthracene	56-55-3	1.18E+00	1.18E+00		2E-11		7E-11		7E-09		2E-06		4E-07		4E-08	
44-A	SVOC	Benzo(a)pyrene	50-32-8	1.23E+00	1.23E+00		3E-11		1E-10		7E-08		2E-05		4E-06		4E-07	
44-A	SVOC	Benzo(b)fluoranthene	205-99-2	1.31E+00	1.31E+00		3E-10		9E-10		8E-09		2E-06		5E-07		4E-08	
44-A	SVOC	Benzo(g,h,i)perylene	191-24-2	3.74E-01	3.74E-01			3E-12		8E-12		7E-07		6E-05		2E-05		4E-06
44-A	SVOC	Benzo(k)fluoranthene	207-08-9	1.26E+00	1.26E+00		2E-13		6E-13		7E-10		2E-07		4E-08		4E-09	
44-A	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	4.05E-01	4.05E-01	6E-14	3E-16	3E-12	9E-16	8E-12	4E-11	1E-06	1E-08	1E-04	2E-09	2E-05	2E-10	5E-05
44-A	SVOC	Butylbenzylphthalate	85-68-7	4.44E+00	4.44E+00		1E-12	1E-08	5E-12	3E-08	6E-11	1E-06	2E-08	1E-04	4E-09	3E-05	4E-10	7E-06
44-A	SVOC	Chrysene	218-01-9	1.24E+00	1.24E+00		7E-12		2E-11		7E-11		2E-08		4E-09		4E-10	
44-A	SVOC	Dibenz(a,h)anthracene	53-70-3	5.60E-02	5.60E-02		7E-15		2E-14		3E-09		9E-07		2E-07		2E-08	
44-A	SVOC	Di-n-octylphthalate	117-84-0	1.28E-01	1.28E-01							2E-07		2E-05		4E-06		8E-07
44-A	SVOC	Fluoranthene	206-44-0	2.73E+00	2.73E+00			2E-07		6E-07		4E-06		4E-04		1E-04		3E-05
44-A	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	4.56E-01	4.56E-01		5E-13		2E-12		3E-09		7E-07		2E-07		1E-08	
44-A	SVOC	Phenanthrene	85-01-8	1.63E+00	1.63E+00			1E-06		3E-06		3E-06		3E-04		9E-05		3E-05
44-A	SVOC	Pyrene	129-00-0	2.70E+00	2.70E+00			2E-07		5E-07		5E-06		5E-04		1E-04		3E-05
44-A	PCB	PCBs (total)	1336-36-3	5.90E-01	5.90E-01	1E-07	8E-09		2E-08		1E-08	2E-03	3E-06	2E-01	7E-07	4E-02	8E-08	3E-02
44-A	INORG	Antimony	7440-36-0	3.40E-01	2.54E-01							3E-05		2E-03		3E-04		1E-03
44-A	INORG	Arsenic	7440-38-2	9.90E+00	1.78E+00						2E-08	3E-04	5E-06	2E-02	7E-07	4E-03	9E-08	8E-04
44-A	INORG	Barium	7440-39-3	1.60E+02	6.43E+01													
44-A	INORG	Beryllium	7440-41-7	1.80E+00	1.21E+00						9E-10	1E-04	9E-10	2E-03	5E-10	3E-04	1E-09	3E-03

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
44-A	INORG	Cadmium	7440-43-9	6.80E-01	9.23E-02						5E-11	5E-06	5E-11	4E-04	3E-11	7E-05	8E-11	2E-04
44-A	INORG	Chromium (total)	7440-47-3	2.10E+02	1.78E+02						6E-07	6E-03	7E-07	2E-01	4E-07	3E-02	1E-06	8E-02
44-A	INORG	Cobalt	7440-48-4	7.10E+00	4.62E-02						4E-11	5E-06	4E-11	1E-05	2E-11	2E-06	6E-11	8E-05
44-A	INORG	Copper	7440-50-8	7.80E+01	4.95E+01							5E-05		5E-03		6E-04		2E-03
44-A	INORG	Cyanide (total)	57-12-5	2.90E+01	2.90E+01							6E-05		5E-03		7E-04		3E-03
44-A	INORG	Lead	7439-92-1	6.80E+01	6.80E+01													
44-A	INORG	Manganese	7439-96-5	5.00E+03	4.52E+03							2E-01		2E-01		6E-02		3E+00
44-A	INORG	Mercury	7439-97-6	1.03E-01	5.06E-02	2E-06		2E-04		5E-04		2E-05		1E-03		8E-04		7E-03
44-A	INORG	Nickel	7440-02-0	4.40E+01	2.40E+01						2E-09		2E-09		1E-09		3E-09	
44-A	INORG	Selenium	7782-49-2	7.30E-01	2.11E-01							2E-06		2E-04		2E-05		8E-05
44-A	INORG	Silver	7440-22-4	6.40E-01	4.52E-01							1E-04		4E-04		7E-05		2E-03
44-A	INORG	Thallium	7440-28-0	1.90E-01														
44-A	INORG	Vanadium	7440-62-2	2.70E+01	2.13E+00							1E-05		1E-03		1E-04		6E-04
44-A	INORG	Zinc	7440-66-6	1.50E+03	1.39E+03							2E-04		2E-02		2E-03		9E-03
55-1	VOC	Acetone	67-64-1	5.10E-01	5.10E-01	3E-08		1E-05		3E-05		4E-07		2E-05		1E-05		1E-04
55-1	VOC	Cyclohexane	110-82-7	3.80E-02	3.80E-02	3E-07		3E-05		4E-05		1E-07		6E-06		5E-06		4E-05
55-1	VOC	1,1-Dichloroethane	75-34-3	9.40E-02	9.40E-02	2E-06		1E-03		1E-03		2E-06		1E-04		9E-05		8E-05
55-1	VOC	cis-1,2-Dichloroethene	156-59-2	2.50E-01	2.50E-01	2E-06		3E-02		4E-02		7E-05		4E-03		3E-03		3E-03
55-1	VOC	Ethyl Benzene	100-41-4	8.30E-02	8.30E-02	4E-07		1E-04		3E-04		5E-07		3E-05		2E-05		2E-04
55-1	VOC	Methyl Acetate	79-20-9	1.10E-01	1.10E-01	4E-08		5E-06		1E-05		9E-08		5E-06		4E-06		3E-06
55-1	VOC	4-Methyl-2-pentanone	108-10-1	4.90E-02	4.90E-02	4E-08		3E-06		8E-06		4E-08		2E-06		2E-06		2E-05
55-1	VOC	Methylcyclohexane	108-87-2	1.20E-01	1.20E-01	4E-07		2E-04		2E-04		1E-06		5E-05		4E-05		4E-04
55-1	VOC	Methylene Chloride	75-09-2	2.40E-01	2.40E-01	1E-05	1E-07	2E-04	3E-07	5E-04	2E-10	1E-06	3E-08	6E-05	2E-08	4E-05	7E-09	3E-04
55-1	VOC	Toluene	108-88-3	8.50E-02	8.50E-02	7E-07		4E-05		1E-04		2E-07		1E-05		6E-06		5E-05
55-1	VOC	1,1,1-Trichloroethane	71-55-6	6.60E-02	6.60E-02	3E-07		2E-04		2E-04		4E-07		2E-05		2E-05		2E-05
55-1	VOC	Trichloroethene	79-01-6	3.60E-01	3.60E-01	7E-06	8E-07		2E-06		8E-10		1E-07		8E-08		3E-08	
55-1	VOC	Xylenes (total)	1330-20-7	6.10E-01	6.10E-01	2E-06		7E-03		2E-02		3E-05		2E-03		1E-03		1E-02
55-1	SVOC	Acenaphthene	83-32-9	1.70E-01	1.70E-01			1E-06		3E-06		3E-07		2E-05		8E-06		5E-06
55-1	SVOC	Acenaphthylene	208-96-8	1.94E-01	1.94E-01			2E-06		5E-06		6E-07		5E-05		2E-05		1E-05
55-1	SVOC	Acetophenone	98-86-2	4.15E-02	4.15E-02	1E-08		1E-06		3E-06		9E-08		5E-06		3E-06		3E-06
55-1	SVOC	Anthracene	120-12-7	3.37E-01	3.37E-01							6E-08		6E-06		1E-06		3E-07
55-1	SVOC	Atrazine	1912-24-9	8.20E-02	8.20E-02	8E-11	6E-12	2E-09	2E-11	5E-09	1E-10	1E-07	4E-08	1E-05	8E-09	3E-06	1E-09	9E-06
55-1	SVOC	Benzaldehyde	100-52-7	7.15E-02	7.15E-02			5E-06		1E-05		2E-07		1E-05		8E-06		7E-05
55-1	SVOC	Benzo(a)anthracene	56-55-3	1.38E+00	1.38E+00		3E-11		9E-11		8E-09		2E-06		5E-07		4E-08	
55-1	SVOC	Benzo(a)pyrene	50-32-8	1.43E+00	1.43E+00		4E-11		1E-10		8E-08		2E-05		5E-06		4E-07	
55-1	SVOC	Benzo(b)fluoranthene	205-99-2	1.57E+00	1.57E+00		3E-10		1E-09		9E-09		3E-06		6E-07		5E-08	
55-1	SVOC	Benzo(g,h,i)perylene	191-24-2	7.53E-01	7.53E-01			6E-12		2E-11		1E-06		1E-04		3E-05		7E-06
55-1	SVOC	Benzo(k)fluoranthene	207-08-9	1.35E+00	1.35E+00		2E-13		7E-13		8E-10		2E-07		5E-08		4E-09	
55-1	SVOC	Biphenyl	92-52-4	3.10E-01	3.10E-01	1E-06		4E-06		1E-05		6E-07		4E-05		2E-05		1E-04
55-1	SVOC	bis(2-Chloroethoxy)methane	111-91-1	2.19E-02	2.19E-02													
55-1	SVOC	bis(2-Chloroethyl) ether	111-44-4	2.52E-02	2.52E-02	3E-08	7E-08		2E-07		1E-09		2E-07		1E-07		4E-08	
55-1	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	9.92E-01	9.92E-01	2E-13	8E-16	8E-12	2E-15	2E-11	1E-10	3E-06	3E-08	2E-04	6E-09	6E-05	5E-10	1E-04
55-1	SVOC	Butylbenzylphthalate	85-68-7	7.25E-01	7.25E-01		2E-13	2E-09	7E-13	5E-09	1E-11	2E-07	3E-09	2E-05	6E-10	4E-06	6E-11	1E-06
55-1	SVOC	Carbazole	86-74-8	2.83E-01	2.83E-01		3E-13		9E-13		4E-11		1E-08		2E-09		3E-10	
55-1	SVOC	2-Chloronaphthalene	91-58-7	2.16E-02	2.16E-02			2E-07		4E-07		3E-08		2E-06		9E-07		6E-06
55-1	SVOC	Chrysene	218-01-9	1.58E+00	1.58E+00		9E-12		3E-11		9E-11		3E-08		6E-09		5E-10	
55-1	SVOC	Dibenz(a,h)anthracene	53-70-3	3.47E-01	3.47E-01		4E-14		1E-13		2E-08		6E-06		1E-06		1E-07	
55-1	SVOC	Dibenzofuran	132-64-9	1.55E-01	1.55E-01			1E-06		3E-06		4E-06		4E-04		1E-04		4E-04
55-1	SVOC	2,4-Dichlorophenol	120-83-2	4.39E-02	4.39E-02			5E-06		1E-05		1E-06		1E-04		4E-05		2E-04
55-1	SVOC	2,4-Dimethylphenol	105-67-9	3.91E-02	3.91E-02			3E-07		9E-07		2E-07		1E-05		5E-06		3E-06
55-1	SVOC	Dimethylphthalate	131-11-3	5.93E-02	5.93E-02	1E-09												2E-08
55-1	SVOC	Di-n-butylphthalate	84-74-2	3.59E-02	3.59E-02	4E-13						2E-08		2E-06		4E-07		9E-08
55-1	SVOC	Fluoranthene	206-44-0	2.07E+00	2.07E+00			2E-07		4E-07		3E-06		3E-04		7E-05		2E-05

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
55-1	SVOC	Fluorene	86-73-7	1.84E-01	1.84E-01			5E-07		1E-06		3E-07		3E-05		9E-06		4E-06
55-1	SVOC	Hexachlorobutadiene	87-68-3	2.61E-02	2.61E-02	2E-05	2E-09		7E-09		5E-11	7E-06	1E-08	6E-04	4E-09	1E-04	1E-09	1E-04
55-1	SVOC	Hexachloroethane	67-72-1	2.09E-02	2.09E-02	5E-07	4E-09		1E-08		6E-12	1E-06	1E-09	1E-04	5E-10	2E-05	2E-10	5E-06
55-1	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	7.15E-01	7.15E-01		8E-13		2E-12		4E-09		1E-06		2E-07		2E-08	
55-1	SVOC	Isophorone	78-59-1	2.16E-02	2.16E-02	8E-09					2E-13	6E-09	4E-11	5E-07	8E-12	1E-07	8E-13	3E-08
55-1	SVOC	2-Methylnaphthalene	91-57-6	1.50E-01	1.50E-01			3E-04		8E-04		2E-05		1E-03		6E-04		6E-03
55-1	SVOC	Methylphenol (total)	1319-77-3	1.32E-01	1.32E-01	5E-09						1E-07		1E-05		3E-06		7E-07
55-1	SVOC	Naphthalene	91-20-3	1.15E-01	1.15E-01	6E-08		7E-04		2E-03		2E-05		1E-03		9E-04		8E-03
55-1	SVOC	Nitrobenzene	98-95-3	3.24E-02	3.24E-02	2E-07		3E-04		7E-04		1E-05		9E-04		5E-04		4E-04
55-1	SVOC	2-Nitrophenol	88-75-5	4.78E-02	4.78E-02													
55-1	SVOC	Phenanthrene	85-01-8	2.25E+00	2.25E+00			2E-06		4E-06		5E-06		4E-04		1E-04		4E-05
55-1	SVOC	Phenol	108-95-2	1.00E+00	1.00E+00	3E-08						2E-07		2E-05		4E-06		9E-06
55-1	SVOC	Pyrene	129-00-0	7.06E+00	7.06E+00			5E-07		1E-06		1E-05		1E-03		3E-04		9E-05
55-1	SVOC	2,4,5-Trichlorophenol	95-95-4	2.16E-02	2.16E-02							1E-08		1E-06		2E-07		6E-08
55-1	SVOC	2,4,6-Trichlorophenol	88-06-2	2.58E-02	2.58E-02		4E-11		1E-10		3E-12	1E-05	8E-10	1E-03	3E-10	3E-04	6E-11	7E-04
55-1	PCB	PCBs (total)	1336-36-3	1.43E+00	1.43E+00	3E-07	2E-08		6E-08		3E-08	4E-03	7E-06	4E-01	2E-06	1E-01	2E-07	8E-02
55-1	INORG	Antimony	7440-36-0	1.10E+00	1.01E+00							1E-04		9E-03		1E-03		5E-03
55-1	INORG	Arsenic	7440-38-2	8.30E+00	1.77E-01						2E-09	3E-05	5E-07	2E-03	6E-08	4E-04	9E-09	8E-05
55-1	INORG	Barium	7440-39-3	9.20E+01														
55-1	INORG	Beryllium	7440-41-7	3.20E+01	3.14E+01						2E-08	4E-03	2E-08	6E-02	1E-08	8E-03	4E-08	8E-02
55-1	INORG	Cadmium	7440-43-9	8.30E-01	2.42E-01						1E-10	1E-05	1E-10	1E-03	8E-11	2E-04	2E-10	5E-04
55-1	INORG	Chromium (total)	7440-47-3	6.60E+01	3.40E+01						1E-07	1E-03	1E-07	4E-02	8E-08	6E-03	2E-07	1E-02
55-1	INORG	Cobalt	7440-48-4	7.50E+00	4.46E-01						4E-10	5E-05	4E-10	1E-04	2E-10	2E-05	6E-10	8E-04
55-1	INORG	Copper	7440-50-8	8.10E+01	5.25E+01							5E-05		5E-03		6E-04		3E-03
55-1	INORG	Cyanide (total)	57-12-5	6.30E+00	6.30E+00							1E-05		1E-03		2E-04		6E-04
55-1	INORG	Lead	7439-92-1	1.80E+02	1.80E+02													
55-1	INORG	Manganese	7439-96-5	1.50E+03	1.02E+03							4E-02		4E-02		1E-02		7E-01
55-1	INORG	Mercury	7439-97-6	1.11E-01	5.86E-02	2E-06		2E-04		5E-04		3E-05		2E-03		9E-04		8E-03
55-1	INORG	Nickel	7440-02-0	3.30E+01	1.30E+01						9E-10		1E-09		6E-10		2E-09	
55-1	INORG	Selenium	7782-49-2	1.60E+00	1.08E+00							9E-06		8E-04		1E-04		4E-04
55-1	INORG	Silver	7440-22-4	2.80E-01	9.23E-02							2E-05		7E-05		1E-05		4E-04
55-1	INORG	Thallium	7440-28-0	4.20E-01	2.23E-01							1E-04		1E-02		2E-03		6E-03
55-1	INORG	Vanadium	7440-62-2	2.70E+01	2.13E+00							1E-05		1E-03		1E-04		6E-04
55-1	INORG	Zinc	7440-66-6	1.50E+02	3.95E+01							5E-06		5E-04		6E-05		3E-04
65-1	VOC	Methyl Acetate	79-20-9	4.00E-01	4.00E-01	2E-07		2E-05		5E-05		3E-07		2E-05		1E-05		1E-05
65-1	VOC	Methylcyclohexane	108-87-2	7.80E-02	7.80E-02	3E-07		1E-04		2E-04		6E-07		3E-05		3E-05		2E-04
65-1	VOC	Trichloroethene	79-01-6	4.40E-02	4.40E-02	8E-07	9E-08		2E-07		1E-10		2E-08		1E-08		4E-09	
65-1	SVOC	Benzo(a)anthracene	56-55-3	4.01E-02	4.01E-02		8E-13		3E-12		2E-10		6E-08		1E-08		1E-09	
65-1	SVOC	Benzo(a)pyrene	50-32-8	5.53E-02	5.53E-02		2E-12		5E-12		3E-09		9E-07		2E-07		2E-08	
65-1	SVOC	Benzo(b)fluoranthene	205-99-2	6.69E-02	6.69E-02		1E-11		4E-11		4E-10		1E-07		2E-08		2E-09	
65-1	SVOC	Benzo(k)fluoranthene	207-08-9	7.63E-02	7.63E-02		1E-14		4E-14		4E-11		1E-08		3E-09		2E-10	
65-1	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	5.87E-02	5.87E-02	9E-15	4E-17	4E-13	1E-16	1E-12	6E-12	2E-07	2E-09	1E-05	3E-10	3E-06	3E-11	8E-06
65-1	SVOC	Chrysene	218-01-9	5.46E-02	5.46E-02		3E-13		1E-12		3E-12		9E-10		2E-10		2E-11	
65-1	SVOC	Diethylphthalate	84-66-2	6.04E-02	6.04E-02	2E-09		2E-09		6E-09		5E-09		4E-07		1E-07		5E-08
65-1	SVOC	Fluoranthene	206-44-0	6.22E-02	6.22E-02			5E-09		1E-08		9E-08		8E-06		2E-06		6E-07
65-1	SVOC	Pyrene	129-00-0	7.09E-02	7.09E-02			5E-09		1E-08		1E-07		1E-05		3E-06		9E-07
65-1	INORG	Antimony	7440-36-0	7.00E-02														
65-1	INORG	Arsenic	7440-38-2	3.70E+00														
65-1	INORG	Barium	7440-39-3	3.20E+01														
65-1	INORG	Beryllium	7440-41-7	2.00E-01														
65-1	INORG	Cadmium	7440-43-9	1.20E-01														
65-1	INORG	Chromium (total)	7440-47-3	1.00E+01														
65-1	INORG	Cobalt	7440-48-4	3.80E+00														

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
65-1	INORG	Copper	7440-50-8	9.00E+00														
65-1	INORG	Lead	7439-92-1	1.20E+01	1.20E+01													
65-1	INORG	Manganese	7439-96-5	2.30E+02														
65-1	INORG	Mercury	7439-97-6	3.26E-02														
65-1	INORG	Nickel	7440-02-0	8.10E+00														
65-1	INORG	Selenium	7782-49-2	1.90E-01														
65-1	INORG	Silver	7440-22-4	2.00E-02														
65-1	INORG	Thallium	7440-28-0	1.00E-01														
65-1	INORG	Vanadium	7440-62-2	1.40E+01														
65-1	INORG	Zinc	7440-66-6	3.20E+01														
81-1	VOC	Benzene	71-43-2	1.30E-01	1.30E-01	2E-04	1E-06	2E-02	3E-06	3E-02	2E-09	5E-05	3E-07	3E-03	2E-07	2E-03	6E-08	9E-03
81-1	VOC	2-Butanone	78-93-3	4.50E-02	4.50E-02	1E-08		9E-07		2E-06		2E-08		1E-06		8E-07		7E-06
81-1	VOC	Cumene	98-82-8	4.50E-02	4.50E-02	4E-07		1E-04		4E-04		6E-07		3E-05		2E-05		2E-04
81-1	VOC	Cyclohexane	110-82-7	8.90E-02	8.90E-02	6E-07		8E-05		9E-05		3E-07		1E-05		1E-05		1E-04
81-1	VOC	cis-1,2-Dichloroethene	156-59-2	9.90E-01	9.90E-01	7E-06		1E-01		2E-01		3E-04		1E-02		1E-02		1E-02
81-1	VOC	Ethyl Benzene	100-41-4	6.60E-02	6.60E-02	3E-07		1E-04		2E-04		4E-07		2E-05		2E-05		1E-04
81-1	VOC	Methyl Acetate	79-20-9	3.70E-01	3.70E-01	1E-07		2E-05		4E-05		3E-07		2E-05		1E-05		1E-05
81-1	VOC	Methylcyclohexane	108-87-2	2.50E-01	2.50E-01	9E-07		4E-04		5E-04		2E-06		1E-04		8E-05		8E-04
81-1	VOC	Tetrachloroethene	127-18-4	4.10E-02	4.10E-02	2E-06	2E-07	5E-04	3E-07	6E-04	2E-10	1E-06	4E-08	8E-05	2E-08	5E-05	8E-09	5E-04
81-1	VOC	Toluene	108-88-3	1.00E-01	1.00E-01	9E-07		4E-05		1E-04		2E-07		1E-05		7E-06		6E-05
81-1	VOC	Vinyl Chloride	75-01-4	2.90E-02	2.90E-02	9E-05	5E-07	1E-03	6E-07	2E-03	1E-09	8E-06	2E-07	4E-04	1E-07	3E-04	4E-08	3E-03
81-1	VOC	Xylenes (total)	1330-20-7	1.30E-01	1.30E-01	5E-07		2E-03		4E-03		7E-06		4E-04		3E-04		3E-03
81-1	SVOC	Acenaphthene	83-32-9	8.60E-02	8.60E-02			7E-07		2E-06		1E-07		1E-05		4E-06		3E-06
81-1	SVOC	Anthracene	120-12-7	3.66E-01	3.66E-01							7E-08		6E-06		2E-06		3E-07
81-1	SVOC	Benzo(a)anthracene	56-55-3	3.62E+00	3.62E+00		7E-11		2E-10		2E-08		6E-06		1E-06		1E-07	
81-1	SVOC	Benzo(a)pyrene	50-32-8	3.89E+00	3.89E+00		1E-10		3E-10		2E-07		6E-05		1E-05		1E-06	
81-1	SVOC	Benzo(b)fluoranthene	205-99-2	2.70E+00	2.70E+00		6E-10		2E-09		2E-08		4E-06		1E-06		9E-08	
81-1	SVOC	Benzo(g,h,i)perylene	191-24-2	4.06E+00	4.06E+00			3E-11		9E-11		8E-06		7E-04		2E-04		4E-05
81-1	SVOC	Benzo(k)fluoranthene	207-08-9	2.67E+00	2.67E+00		4E-13		1E-12		2E-09		4E-07		9E-08		8E-09	
81-1	SVOC	Biphenyl	92-52-4	1.28E-01	1.28E-01	4E-07		2E-06		4E-06		2E-07		2E-05		8E-06		5E-05
81-1	SVOC	Carbazole	86-74-8	9.52E-02	9.52E-02		1E-13		3E-13		1E-11		4E-09		8E-10		9E-11	
81-1	SVOC	Chrysene	218-01-9	4.11E+00	4.11E+00		2E-11		7E-11		2E-10		7E-08		1E-08		1E-09	
81-1	SVOC	Dibenzofuran	132-64-9	1.70E-01	1.70E-01			1E-06		3E-06		5E-06		4E-04		1E-04		4E-04
81-1	SVOC	Fluoranthene	206-44-0	2.36E+00	2.36E+00			2E-07		5E-07		3E-06		3E-04		9E-05		2E-05
81-1	SVOC	Fluorene	86-73-7	9.04E-02	9.04E-02			2E-07		6E-07		2E-07		1E-05		5E-06		2E-06
81-1	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	3.02E+00	3.02E+00		3E-12		1E-11		2E-08		5E-06		1E-06		9E-08	
81-1	SVOC	2-Methylnaphthalene	91-57-6	9.34E-01	9.34E-01			2E-03		5E-03		1E-04		6E-03		4E-03		4E-02
81-1	SVOC	Naphthalene	91-20-3	5.85E-01	5.85E-01	3E-07		4E-03		9E-03		1E-04		6E-03		4E-03		4E-02
81-1	SVOC	Phenanthrene	85-01-8	1.42E+00	1.42E+00			1E-06		3E-06		3E-06		3E-04		8E-05		3E-05
81-1	SVOC	Pyrene	129-00-0	9.99E+00	9.99E+00			8E-07		2E-06		2E-05		2E-03		5E-04		1E-04
81-1	INORG	Antimony	7440-36-0	2.70E-01	1.84E-01							2E-05		2E-03		2E-04		9E-04
81-1	INORG	Arsenic	7440-38-2	1.90E+01	1.09E+01						1E-07	2E-03	3E-05	1E-01	4E-06	2E-02	5E-07	5E-03
81-1	INORG	Barium	7440-39-3	2.00E+03	1.90E+03													
81-1	INORG	Beryllium	7440-41-7	6.30E+00	5.71E+00						4E-09	7E-04	4E-09	1E-02	3E-09	2E-03	7E-09	2E-02
81-1	INORG	Cadmium	7440-43-9	1.90E+01	1.84E+01						1E-08	1E-03	1E-08	8E-02	6E-09	1E-02	2E-08	4E-02
81-1	INORG	Chromium (total)	7440-47-3	2.30E+02	1.98E+02						7E-07	7E-03	7E-07	2E-01	4E-07	3E-02	1E-06	9E-02
81-1	INORG	Cobalt	7440-48-4	4.40E+01	3.69E+01						3E-08	4E-03	3E-08	8E-03	2E-08	2E-03	5E-08	7E-02
81-1	INORG	Copper	7440-50-8	8.30E+03	8.27E+03							8E-03		8E-01		1E-01		4E-01
81-1	INORG	Cyanide (total)	57-12-5	6.90E-01	6.90E-01							1E-06		1E-04		2E-05		7E-05
81-1	INORG	Lead	7439-92-1	6.90E+04	6.90E+04													
81-1	INORG	Manganese	7439-96-5	1.30E+03	8.23E+02							3E-02		3E-02		1E-02		6E-01
81-1	INORG	Mercury	7439-97-6	9.14E-01	8.62E-01	3E-05		3E-03		8E-03		4E-04		3E-02		1E-02		1E-01
81-1	INORG	Nickel	7440-02-0	1.70E+02	1.50E+02						1E-08		1E-08		7E-09		2E-08	

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
81-1	INORG	Selenium	7782-49-2	2.70E+00	2.18E+00							2E-05		2E-03		2E-04		9E-04
81-1	INORG	Silver	7440-22-4	3.90E+00	3.71E+00							8E-04		3E-03		6E-04		1E-02
81-1	INORG	Thallium	7440-28-0	2.70E-01	7.35E-02							4E-05		4E-03		5E-04		2E-03
81-1	INORG	Vanadium	7440-62-2	3.80E+01	1.31E+01							7E-05		7E-03		9E-04		4E-03
81-1	INORG	Zinc	7440-66-6	5.80E+03	5.69E+03							8E-04		7E-02		9E-03		4E-02
81-2	VOC	Acetone	67-64-1	1.70E+00	1.70E+00	1E-07		4E-05		1E-04		1E-06		7E-05		5E-05		4E-04
81-2	VOC	Benzene	71-43-2	5.60E-01	5.60E-01	1E-03	6E-06	7E-02	1E-05	1E-01	7E-09	2E-04	1E-06	1E-02	7E-07	8E-03	3E-07	4E-02
81-2	VOC	2-Butanone	78-93-3	1.10E+00	1.10E+00	3E-07		2E-05		5E-05		5E-07		3E-05		2E-05		2E-04
81-2	VOC	Carbon Disulfide	75-15-0	3.90E-02	3.90E-02	2E-05		3E-04		3E-04		1E-06		7E-05		5E-05		5E-04
81-2	VOC	Chlorobenzene	108-90-7	5.40E-02	5.40E-02	2E-07		1E-03		2E-03		4E-06		2E-04		2E-04		2E-03
81-2	VOC	Chloroform	67-66-3	7.30E-02	7.30E-02	4E-05	2E-06	5E-03	4E-06	9E-03	3E-09	2E-05	4E-07	9E-04	3E-07	7E-04	1E-07	6E-03
81-2	VOC	Chloromethane	74-87-3	2.20E-01	2.20E-01	2E-05		1E-02		1E-02		4E-05		2E-03		2E-03		2E-02
81-2	VOC	Cumene	98-82-8	6.60E+00	6.60E+00	5E-05		2E-02		6E-02		8E-05		4E-03		3E-03		3E-02
81-2	VOC	Cyclohexane	110-82-7	3.80E+00	3.80E+00	3E-05		3E-03		4E-03		1E-05		6E-04		5E-04		4E-03
81-2	VOC	Dichlorodifluoromethane	75-71-8	4.40E-01	4.40E-01	7E-07		1E-02		1E-02		6E-05		3E-03		3E-03		2E-03
81-2	VOC	1,1-Dichloroethane	75-34-3	7.00E+03	7.00E+03	1E-01		7E+01		8E+01		2E-01		9E+00		7E+00		6E+00
81-2	VOC	1,1-Dichloroethene	75-35-4	1.00E+01	1.00E+01	4E-03		3E-01		3E-01		1E-03		5E-02		4E-02		4E-01
81-2	VOC	cis-1,2-Dichloroethene	156-59-2	1.20E-01	1.20E-01	8E-07		1E-02		2E-02		3E-05		2E-03		1E-03		1E-03
81-2	VOC	trans-1,2-Dichloroethene	156-60-5	9.30E-02	9.30E-02	9E-07		8E-03		9E-03		2E-05		1E-03		8E-04		7E-03
81-2	VOC	Ethyl Benzene	100-41-4	1.30E+00	1.30E+00	6E-06		2E-03		5E-03		8E-06		4E-04		3E-04		3E-03
81-2	VOC	2-Hexanone	591-78-6	7.00E-02	7.00E-02	3E-05		7E-02		8E-02		1E-07		6E-06		9E-07		4E-06
81-2	VOC	Methyl Acetate	79-20-9	3.30E-01	3.30E-01	1E-07		1E-05		4E-05		3E-07		1E-05		1E-05		1E-05
81-2	VOC	Methylcyclohexane	108-87-2	1.10E+01	1.10E+01	4E-05		2E-02		2E-02		9E-05		5E-03		4E-03		3E-02
81-2	VOC	Methylene Chloride	75-09-2	1.20E+00	1.20E+00	6E-05	6E-07	1E-03	1E-06	2E-03	9E-10	5E-06	2E-07	3E-04	9E-08	2E-04	3E-08	2E-03
81-2	VOC	Tetrachloroethene	127-18-4	1.00E-01	1.00E-01	4E-06	6E-07	1E-03	8E-07	1E-03	5E-10	3E-06	9E-08	2E-04	5E-08	1E-04	2E-08	1E-03
81-2	VOC	Toluene	108-88-3	4.40E+00	4.40E+00	4E-05		2E-03		5E-03		9E-06		6E-04		3E-04		3E-03
81-2	VOC	1,2,4-Trichlorobenzene	120-82-1	2.80E-02	2.80E-02			8E-06		2E-05		2E-07		2E-05		5E-06		9E-06
81-2	VOC	1,1,1-Trichloroethane	71-55-6	4.70E+04	4.70E+04	2E-01		1E+02		1E+02		3E-01		2E+01		1E+01		1E+01
81-2	VOC	1,1,2-Trichloroethane	79-00-5	1.30E-01	1.30E-01	3E-06	6E-07		2E-06		1E-09		2E-07		1E-07		5E-08	
81-2	VOC	Trichloroethene	79-01-6	4.00E+00	4.00E+00	8E-05	9E-06		2E-05		9E-09		1E-06		9E-07		3E-07	
81-2	VOC	Trichlorofluoromethane	75-69-4	3.00E-01	3.00E-01	4E-07		2E-03		3E-03		1E-05		5E-04		4E-04		4E-04
81-2	VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	6.40E+04	6.40E+04	6E-02		1E+01		1E+01		5E-02		3E+00		2E+00		2E+01
81-2	VOC	Vinyl Chloride	75-01-4	5.00E-01	5.00E-01	1E-03	8E-06	3E-02	1E-05	3E-02	2E-08	1E-04	4E-06	7E-03	2E-06	5E-03	6E-07	5E-02
81-2	VOC	Xylenes (total)	1330-20-7	9.10E+00	9.10E+00	4E-05		1E-01		3E-01		5E-04		2E-02		2E-02		2E-01
81-2	SVOC	Acenaphthene	83-32-9	9.50E-01	9.50E-01			8E-06		2E-05		2E-06		1E-04		5E-05		3E-05
81-2	SVOC	Acenaphthylene	208-96-8	4.25E-02	4.25E-02			5E-07		1E-06		1E-07		1E-05		4E-06		2E-06
81-2	SVOC	Anthracene	120-12-7	1.57E+00	1.57E+00							3E-07		3E-05		7E-06		1E-06
81-2	SVOC	Benzaldehyde	100-52-7	1.41E-01	1.41E-01			1E-05		3E-05		4E-07		2E-05		2E-05		1E-04
81-2	SVOC	Benzo(a)anthracene	56-55-3	3.27E+00	3.27E+00		7E-11		2E-10		2E-08		5E-06		1E-06		1E-07	
81-2	SVOC	Benzo(a)pyrene	50-32-8	3.36E+00	3.36E+00		9E-11		3E-10		2E-07		5E-05		1E-05		1E-06	
81-2	SVOC	Benzo(b)fluoranthene	205-99-2	3.15E+00	3.15E+00		7E-10		2E-09		2E-08		5E-06		1E-06		1E-07	
81-2	SVOC	Benzo(g,h,i)perylene	191-24-2	1.96E+00	1.96E+00			2E-11		4E-11		4E-06		3E-04		9E-05		2E-05
81-2	SVOC	Benzo(k)fluoranthene	207-08-9	3.27E+00	3.27E+00		5E-13		2E-12		2E-09		5E-07		1E-07		1E-08	
81-2	SVOC	Biphenyl	92-52-4	1.83E-01	1.83E-01	6E-07		2E-06		6E-06		4E-07		3E-05		1E-05		7E-05
81-2	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	5.34E-01	5.34E-01	8E-14	4E-16	4E-12	1E-15	1E-11	6E-11	1E-06	2E-08	1E-04	3E-09	3E-05	3E-10	7E-05
81-2	SVOC	Butylbenzylphthalate	85-68-7	1.14E-01	1.14E-01		4E-14	3E-10	1E-13	7E-10	2E-12	3E-08	5E-10	3E-06	9E-11	7E-07	9E-12	2E-07
81-2	SVOC	Caprolactam	105-60-2	1.56E-01	1.56E-01	2E-09		3E-09		9E-09		2E-08		2E-06		6E-07		3E-06
81-2	SVOC	Carbazole	86-74-8	9.41E-01	9.41E-01		1E-12		3E-12		1E-10		4E-08		8E-09		8E-10	
81-2	SVOC	Chrysene	218-01-9	3.33E+00	3.33E+00		2E-11		6E-11		2E-10		5E-08		1E-08		1E-09	
81-2	SVOC	Dibenz(a,h)anthracene	53-70-3	7.65E-01	7.65E-01		1E-13		3E-13		4E-08		1E-05		3E-06		2E-07	
81-2	SVOC	Dibenzofuran	132-64-9	5.95E-01	5.95E-01			4E-06		1E-05		2E-05		2E-03		4E-04		1E-03
81-2	SVOC	2,4-Dimethylphenol	105-67-9	1.51E-01	1.51E-01			1E-06		3E-06		6E-07		5E-05		2E-05		1E-05

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
81-2	SVOC	Di-n-butylphthalate	84-74-2	6.11E-01	6.11E-01	7E-12						3E-07		3E-05		7E-06		2E-06
81-2	SVOC	4,6-Dinitro-2-methylphenol	534-52-1	4.30E-01	4.30E-01	6E-07		2E-04		6E-04		3E-04		2E-02		7E-03		3E-02
81-2	SVOC	Fluoranthene	206-44-0	4.25E+00	4.25E+00			4E-07		9E-07		6E-06		6E-04		2E-04		4E-05
81-2	SVOC	Fluorene	86-73-7	5.97E-01	5.97E-01			2E-06		4E-06		1E-06		9E-05		3E-05		1E-05
81-2	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	1.62E+00	1.62E+00		2E-12		6E-12		1E-08		3E-06		6E-07		5E-08	
81-2	SVOC	2-Methylnaphthalene	91-57-6	1.17E+01	1.17E+01			3E-02		6E-02		1E-03		7E-02		5E-02		4E-01
81-2	SVOC	Naphthalene	91-20-3	7.77E+00	7.77E+00	4E-06		5E-02		1E-01		1E-03		8E-02		6E-02		5E-01
81-2	SVOC	Phenanthrene	85-01-8	3.75E+00	3.75E+00			3E-06		7E-06		8E-06		7E-04		2E-04		7E-05
81-2	SVOC	Pyrene	129-00-0	7.14E+00	7.14E+00			6E-07		1E-06		1E-05		1E-03		3E-04		9E-05
81-2	PCB	PCBs (total)	1336-36-3	5.37E+00	5.37E+00	1E-06	7E-08		2E-07		1E-07	2E-02	3E-05	1E+00	6E-06	4E-01	8E-07	3E-01
81-2	INORG	Antimony	7440-36-0	2.00E-01	1.14E-01							1E-05		1E-03		1E-04		6E-04
81-2	INORG	Arsenic	7440-38-2	5.60E+01	4.79E+01						5E-07	7E-03	1E-04	6E-01	2E-05	1E-01	2E-06	2E-02
81-2	INORG	Barium	7440-39-3	5.60E+02	4.64E+02													
81-2	INORG	Beryllium	7440-41-7	1.10E+01	1.04E+01						7E-09	1E-03	8E-09	2E-02	5E-09	3E-03	1E-08	3E-02
81-2	INORG	Cadmium	7440-43-9	2.10E+00	1.51E+00						8E-10	8E-05	8E-10	6E-03	5E-10	1E-03	1E-09	3E-03
81-2	INORG	Chromium (total)	7440-47-3	2.70E+02	2.38E+02						8E-07	8E-03	9E-07	3E-01	5E-07	4E-02	1E-06	1E-01
81-2	INORG	Chromium III	16065-83-1	1.60E+01	1.60E+01							4E-07		4E-05		5E-06		2E-05
81-2	INORG	Cobalt	7440-48-4	4.30E+01	3.59E+01						3E-08	4E-03	3E-08	8E-03	2E-08	2E-03	5E-08	7E-02
81-2	INORG	Copper	7440-50-8	9.90E+02	9.62E+02							1E-03		9E-02		1E-02		5E-02
81-2	INORG	Cyanide (total)	57-12-5	7.00E-01	7.00E-01							1E-06		1E-04		2E-05		7E-05
81-2	INORG	Lead	7439-92-1	3.10E+03	3.10E+03													
81-2	INORG	Manganese	7439-96-5	1.80E+03	1.32E+03							5E-02		5E-02		2E-02		9E-01
81-2	INORG	Mercury	7439-97-6	3.72E-01	3.20E-01	1E-05		1E-03		3E-03		1E-04		9E-03		5E-03		4E-02
81-2	INORG	Nickel	7440-02-0	1.10E+02	9.00E+01						6E-09		7E-09		4E-09		1E-08	
81-2	INORG	Selenium	7782-49-2	5.40E+00	4.88E+00							4E-05		4E-03		5E-04		2E-03
81-2	INORG	Silver	7440-22-4	6.70E-01	4.82E-01							1E-04		4E-04		7E-05		2E-03
81-2	INORG	Thallium	7440-28-0	1.10E+00	9.03E-01							5E-04		5E-02		6E-03		3E-02
81-2	INORG	Vanadium	7440-62-2	4.30E+01	1.81E+01							1E-04		9E-03		1E-03		5E-03
81-2	INORG	Zinc	7440-66-6	1.50E+03	1.39E+03							2E-04		2E-02		2E-03		9E-03
81-3	VOC	Acetone	67-64-1	7.30E-01	7.30E-01	4E-08		2E-05		4E-05		5E-07		3E-05		2E-05		2E-04
81-3	VOC	Benzene	71-43-2	1.90E-01	1.90E-01	3E-04	2E-06	3E-02	4E-06	4E-02	2E-09	7E-05	4E-07	4E-03	2E-07	3E-03	9E-08	1E-02
81-3	VOC	2-Butanone	78-93-3	2.40E-01	2.40E-01	6E-08		5E-06		1E-05		1E-07		6E-06		4E-06		4E-05
81-3	VOC	Cumene	98-82-8	1.50E-01	1.50E-01	1E-06		5E-04		1E-03		2E-06		1E-04		8E-05		7E-04
81-3	VOC	Cyclohexane	110-82-7	1.00E+00	1.00E+00	7E-06		8E-04		1E-03		3E-06		2E-04		1E-04		1E-03
81-3	VOC	cis-1,2-Dichloroethene	156-59-2	3.80E-01	3.80E-01	3E-06		4E-02		6E-02		1E-04		6E-03		4E-03		4E-03
81-3	VOC	trans-1,2-Dichloroethene	156-60-5	3.00E-02	3.00E-02	3E-07		3E-03		3E-03		6E-06		3E-04		3E-04		2E-03
81-3	VOC	Ethyl Benzene	100-41-4	4.10E-01	4.10E-01	2E-06		6E-04		2E-03		2E-06		1E-04		1E-04		9E-04
81-3	VOC	Methyl Acetate	79-20-9	1.00E+00	1.00E+00	4E-07		5E-05		1E-04		8E-07		4E-05		3E-05		3E-05
81-3	VOC	Methylcyclohexane	108-87-2	4.30E+00	4.30E+00	2E-05		7E-03		8E-03		3E-05		2E-03		1E-03		1E-02
81-3	VOC	Methylene Chloride	75-09-2	1.60E-01	1.60E-01	8E-06	8E-08	2E-04	2E-07	3E-04	1E-10	7E-07	2E-08	4E-05	1E-08	3E-05	5E-09	2E-04
81-3	VOC	Tetrachloroethene	127-18-4	2.48E+00	2.48E+00	1E-04	1E-05	3E-02	2E-05	4E-02	1E-08	8E-05	2E-06	5E-03	1E-06	3E-03	5E-07	3E-02
81-3	VOC	Toluene	108-88-3	1.20E+00	1.20E+00	1E-05		5E-04		1E-03		2E-06		2E-04		8E-05		7E-04
81-3	VOC	1,1,1-Trichloroethane	71-55-6	7.10E-01	7.10E-01	3E-06		2E-03		2E-03		4E-06		2E-04		2E-04		2E-04
81-3	VOC	Trichloroethene	79-01-6	7.35E+00	7.35E+00	1E-04	2E-05		3E-05		2E-08		3E-06		2E-06		6E-07	
81-3	VOC	Vinyl Chloride	75-01-4	2.90E-02	2.90E-02	9E-05	5E-07	1E-03	6E-07	2E-03	1E-09	8E-06	2E-07	4E-04	1E-07	3E-04	4E-08	3E-03
81-3	VOC	Xylenes (total)	1330-20-7	3.10E+00	3.10E+00	1E-05		4E-02		9E-02		2E-04		8E-03		7E-03		6E-02
81-3	SVOC	Acenaphthene	83-32-9	6.07E+00	6.07E+00			5E-05		1E-04		1E-05		7E-04		3E-04		2E-04
81-3	SVOC	Acenaphthylene	208-96-8	2.12E+00	2.12E+00			2E-05		6E-05		6E-06		5E-04		2E-04		1E-04
81-3	SVOC	Acetophenone	98-86-2	3.66E-01	3.66E-01	1E-07		1E-05		3E-05		8E-07		5E-05		3E-05		2E-05
81-3	SVOC	Anthracene	120-12-7	1.26E+01	1.26E+01							2E-06		2E-04		6E-05		1E-05
81-3	SVOC	Benzo(a)anthracene	56-55-3	5.32E+00	5.32E+00		1E-10		3E-10		3E-08		9E-06		2E-06		2E-07	
81-3	SVOC	Benzo(a)pyrene	50-32-8	4.57E+00	4.57E+00		1E-10		4E-10		3E-07		7E-05		2E-05		1E-06	
81-3	SVOC	Benzo(b)fluoranthene	205-99-2	6.14E+00	6.14E+00		1E-09		4E-09		4E-08		1E-05		2E-06		2E-07	

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
81-3	SVOC	Benzo(g,h,i)perylene	191-24-2	2.63E+00	2.63E+00			2E-11		6E-11		5E-06		5E-04		1E-04		2E-05
81-3	SVOC	Benzo(k)fluoranthene	207-08-9	3.40E+00	3.40E+00		6E-13		2E-12		2E-09		5E-07		1E-07		1E-08	
81-3	SVOC	Biphenyl	92-52-4	1.84E+00	1.84E+00	6E-06		2E-05		6E-05		4E-06		3E-04		1E-04		7E-04
81-3	SVOC	bis(2-Chloroethyl) ether	111-44-4	2.40E-02	2.40E-02	3E-08	7E-08		2E-07		1E-09		2E-07		1E-07		4E-08	
81-3	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	1.06E-01	1.06E-01	2E-14	8E-17	8E-13	2E-16	2E-12	1E-11	3E-07	3E-09	3E-05	6E-10	6E-06	6E-11	1E-05
81-3	SVOC	Butylbenzylphthalate	85-68-7	7.27E-01	7.27E-01		2E-13	2E-09	7E-13	5E-09	1E-11	2E-07	3E-09	2E-05	6E-10	4E-06	6E-11	1E-06
81-3	SVOC	Carbazole	86-74-8	8.57E+00	8.57E+00		9E-12		3E-11		1E-09		4E-07		7E-08		8E-09	
81-3	SVOC	Chrysene	218-01-9	5.36E+00	5.36E+00		3E-11		9E-11		3E-10		9E-08		2E-08		2E-09	
81-3	SVOC	Dibenz(a,h)anthracene	53-70-3	9.26E-01	9.26E-01		1E-13		4E-13		5E-08		1E-05		3E-06		3E-07	
81-3	SVOC	Dibenzofuran	132-64-9	5.66E+00	5.66E+00			4E-05		1E-04		2E-04		1E-02		4E-03		1E-02
81-3	SVOC	Diethylphthalate	84-66-2	5.53E-02	5.53E-02	2E-09		2E-09		5E-09		4E-09		4E-07		1E-07		4E-08
81-3	SVOC	Di-n-butylphthalate	84-74-2	6.00E-02	6.00E-02	7E-13						3E-08		3E-06		7E-07		2E-07
81-3	SVOC	Fluoranthene	206-44-0	2.11E+01	2.11E+01			2E-06		4E-06		3E-05		3E-03		8E-04		2E-04
81-3	SVOC	Fluorene	86-73-7	9.87E+00	9.87E+00			3E-05		6E-05		2E-05		1E-03		5E-04		2E-04
81-3	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	2.51E+00	2.51E+00		3E-12		9E-12		1E-08		4E-06		9E-07		7E-08	
81-3	SVOC	2-Methylnaphthalene	91-57-6	3.81E+00	3.81E+00			8E-03		2E-02		4E-04		2E-02		2E-02		1E-01
81-3	SVOC	Naphthalene	91-20-3	1.54E+00	1.54E+00	8E-07		9E-03		2E-02		3E-04		2E-02		1E-02		1E-01
81-3	SVOC	Phenanthrene	85-01-8	4.21E+01	4.21E+01			3E-05		8E-05		9E-05		8E-03		2E-03		8E-04
81-3	SVOC	Pyrene	129-00-0	1.78E+01	1.78E+01			1E-06		3E-06		3E-05		3E-03		8E-04		2E-04
81-3	PCB	PCBs (total)	1336-36-3	7.28E-01	7.28E-01	1E-07	9E-09		3E-08		1E-08	2E-03	3E-06	2E-01	8E-07	5E-02	1E-07	4E-02
81-3	INORG	Antimony	7440-36-0	1.20E+00	1.11E+00							1E-04		1E-02		1E-03		5E-03
81-3	INORG	Arsenic	7440-38-2	1.00E+01	1.88E+00						2E-08	3E-04	5E-06	3E-02	7E-07	4E-03	9E-08	8E-04
81-3	INORG	Barium	7440-39-3	1.10E+02	1.43E+01													
81-3	INORG	Beryllium	7440-41-7	1.40E+00	8.10E-01						6E-10	1E-04	6E-10	2E-03	4E-10	2E-04	1E-09	2E-03
81-3	INORG	Cadmium	7440-43-9	1.10E+00	5.12E-01						3E-10	3E-05	3E-10	2E-03	2E-10	4E-04	5E-10	1E-03
81-3	INORG	Chromium (total)	7440-47-3	4.20E+01	1.00E+01						4E-08	3E-04	4E-08	1E-02	2E-08	2E-03	6E-08	4E-03
81-3	INORG	Chromium III	16065-83-1	7.19E+00	7.19E+00							2E-07		2E-05		2E-06		9E-06
81-3	INORG	Cobalt	7440-48-4	1.10E+01	3.95E+00						3E-09	4E-04	3E-09	9E-04	2E-09	2E-04	5E-09	7E-03
81-3	INORG	Copper	7440-50-8	8.10E+01	5.25E+01							5E-05		5E-03		6E-04		3E-03
81-3	INORG	Cyanide (total)	57-12-5	1.40E-01	1.40E-01							3E-07		3E-05		3E-06		1E-05
81-3	INORG	Lead	7439-92-1	2.00E+02	2.00E+02													
81-3	INORG	Manganese	7439-96-5	1.00E+03	5.23E+02							2E-02		2E-02		7E-03		4E-01
81-3	INORG	Mercury	7439-97-6	4.12E-01	3.60E-01	1E-05		1E-03		3E-03		2E-04		1E-02		5E-03		5E-02
81-3	INORG	Nickel	7440-02-0	2.80E+01	8.04E+00						6E-10		6E-10		4E-10		9E-10	
81-3	INORG	Selenium	7782-49-2	2.20E+00	1.68E+00							1E-05		1E-03		2E-04		7E-04
81-3	INORG	Silver	7440-22-4	7.80E-01	5.92E-01							1E-04		5E-04		9E-05		2E-03
81-3	INORG	Thallium	7440-28-0	1.70E-01														
81-3	INORG	Vanadium	7440-62-2	2.90E+01	4.13E+00							2E-05		2E-03		3E-04		1E-03
81-3	INORG	Zinc	7440-66-6	2.82E+02	1.72E+02							2E-05		2E-03		3E-04		1E-03
81-4	VOC	Methyl Acetate	79-20-9	2.40E-01	2.40E-01	9E-08		1E-05		3E-05		2E-07		1E-05		8E-06		7E-06
81-4	VOC	Methylcyclohexane	108-87-2	6.10E-02	6.10E-02	2E-07		1E-04		1E-04		5E-07		3E-05		2E-05		2E-04
81-4	VOC	Tetrachloroethene	127-18-4	4.90E-02	4.90E-02	2E-06	3E-07	6E-04	4E-07	7E-04	3E-10	2E-06	4E-08	9E-05	3E-08	6E-05	9E-09	5E-04
81-4	SVOC	Anthracene	120-12-7	2.62E-01	2.62E-01							5E-08		4E-06		1E-06		2E-07
81-4	SVOC	Benzo(a)anthracene	56-55-3	1.83E+00	1.83E+00		4E-11		1E-10		1E-08		3E-06		6E-07		6E-08	
81-4	SVOC	Benzo(a)pyrene	50-32-8	1.24E+00	1.24E+00		3E-11		1E-10		7E-08		2E-05		4E-06		4E-07	
81-4	SVOC	Benzo(b)fluoranthene	205-99-2	1.32E+00	1.32E+00		3E-10		9E-10		8E-09		2E-06		5E-07		4E-08	
81-4	SVOC	Benzo(g,h,i)perylene	191-24-2	4.73E-01	4.73E-01			4E-12		1E-11		9E-07		8E-05		2E-05		4E-06
81-4	SVOC	Benzo(k)fluoranthene	207-08-9	1.50E+00	1.50E+00		2E-13		8E-13		9E-10		2E-07		5E-08		4E-09	
81-4	SVOC	Carbazole	86-74-8	7.53E-02	7.53E-02		8E-14		3E-13		1E-11		3E-09		6E-10		7E-11	
81-4	SVOC	Chrysene	218-01-9	1.77E+00	1.77E+00		1E-11		3E-11		1E-10		3E-08		6E-09		6E-10	
81-4	SVOC	Dibenz(a,h)anthracene	53-70-3	2.62E-01	2.62E-01		3E-14		1E-13		2E-08		4E-06		9E-07		8E-08	
81-4	SVOC	Diethylphthalate	84-66-2	6.97E-02	6.97E-02	2E-09		3E-09		7E-09		5E-09		5E-07		1E-07		5E-08
81-4	SVOC	Fluoranthene	206-44-0	3.05E+00	3.05E+00			3E-07		6E-07		5E-06		4E-04		1E-04		3E-05

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
81-4	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	4.28E-01	4.28E-01		5E-13		1E-12		3E-09		7E-07		1E-07		1E-08	
81-4	SVOC	Phenanthrene	85-01-8	7.02E-01	7.02E-01			5E-07		1E-06		2E-06		1E-04		4E-05		1E-05
81-4	SVOC	Pyrene	129-00-0	4.92E+00	4.92E+00			4E-07		1E-06		1E-05		9E-04		2E-04		6E-05
81-4	INORG	Arsenic	7440-38-2	4.40E+00														
81-4	INORG	Barium	7440-39-3	5.20E+01														
81-4	INORG	Beryllium	7440-41-7	3.00E-01														
81-4	INORG	Cadmium	7440-43-9	3.60E-01														
81-4	INORG	Chromium (total)	7440-47-3	1.60E+01														
81-4	INORG	Cobalt	7440-48-4	3.30E+00														
81-4	INORG	Copper	7440-50-8	1.00E+01														
81-4	INORG	Cyanide (total)	57-12-5	3.40E-01	3.40E-01							7E-07		6E-05		8E-06		3E-05
81-4	INORG	Lead	7439-92-1	1.30E+01	1.30E+01													
81-4	INORG	Manganese	7439-96-5	3.50E+02														
81-4	INORG	Mercury	7439-97-6	7.24E-02	2.00E-02	6E-07		7E-05		2E-04		9E-06		6E-04		3E-04		3E-03
81-4	INORG	Nickel	7440-02-0	8.90E+00														
81-4	INORG	Selenium	7782-49-2	3.80E-01														
81-4	INORG	Thallium	7440-28-0	8.20E-02														
81-4	INORG	Vanadium	7440-62-2	1.50E+01														
81-4	INORG	Zinc	7440-66-6	5.00E+01														
81-5	VOC	2-Butanone	78-93-3	2.90E-02	2.90E-02	7E-09		6E-07		1E-06		1E-08		8E-07		5E-07		4E-06
81-5	VOC	Cyclohexane	110-82-7	6.70E-02	6.70E-02	5E-07		6E-05		7E-05		2E-07		1E-05		8E-06		8E-05
81-5	VOC	Methyl Acetate	79-20-9	1.40E-01	1.40E-01	5E-08		6E-06		2E-05		1E-07		6E-06		5E-06		4E-06
81-5	VOC	Methylcyclohexane	108-87-2	1.30E-01	1.30E-01	5E-07		2E-04		3E-04		1E-06		6E-05		4E-05		4E-04
81-5	VOC	Methylene Chloride	75-09-2	1.40E-01	1.40E-01	7E-06	7E-08	1E-04	2E-07	3E-04	1E-10	6E-07	2E-08	4E-05	1E-08	2E-05	4E-09	2E-04
81-5	VOC	Tetrachloroethene	127-18-4	1.30E-01	1.30E-01	6E-06	7E-07	2E-03	1E-06	2E-03	7E-10	4E-06	1E-07	2E-04	7E-08	2E-04	3E-08	1E-03
81-5	VOC	Toluene	108-88-3	6.40E-02	6.40E-02	6E-07		3E-05		7E-05		1E-07		8E-06		4E-06		4E-05
81-5	VOC	1,1,1-Trichloroethane	71-55-6	2.90E-02	2.90E-02	1E-07		7E-05		8E-05		2E-07		9E-06		7E-06		7E-06
81-5	VOC	Trichloroethene	79-01-6	5.60E-02	5.60E-02	1E-06	1E-07		2E-07		1E-10		2E-08		1E-08		5E-09	
81-5	VOC	Trichlorofluoromethane	75-69-4	3.20E-02	3.20E-02	4E-08		2E-04		3E-04		1E-06		6E-05		4E-05		4E-05
81-5	VOC	Xylenes (total)	1330-20-7	1.31E-01	1.31E-01	5E-07		2E-03		4E-03		7E-06		4E-04		3E-04		3E-03
81-5	SVOC	Acenaphthene	83-32-9	5.70E-02	5.70E-02			5E-07		1E-06		9E-08		7E-06		3E-06		2E-06
81-5	SVOC	Anthracene	120-12-7	1.58E-01	1.58E-01							3E-08		3E-06		7E-07		1E-07
81-5	SVOC	Benzo(a)anthracene	56-55-3	5.30E-01	5.30E-01		1E-11		3E-11		3E-09		9E-07		2E-07		2E-08	
81-5	SVOC	Benzo(a)pyrene	50-32-8	6.21E-01	6.21E-01		2E-11		5E-11		4E-08		1E-05		2E-06		2E-07	
81-5	SVOC	Benzo(b)fluoranthene	205-99-2	5.70E-01	5.70E-01		1E-10		4E-10		3E-09		9E-07		2E-07		2E-08	
81-5	SVOC	Benzo(g,h,i)perylene	191-24-2	3.35E-01	3.35E-01			3E-12		7E-12		6E-07		6E-05		1E-05		3E-06
81-5	SVOC	Benzo(k)fluoranthene	207-08-9	5.98E-01	5.98E-01		1E-13		3E-13		4E-10		1E-07		2E-08		2E-09	
81-5	SVOC	Carbazole	86-74-8	6.09E-02	6.09E-02		7E-14		2E-13		9E-12		3E-09		5E-10		5E-11	
81-5	SVOC	Chrysene	218-01-9	5.63E-01	5.63E-01		3E-12		1E-11		3E-11		9E-09		2E-09		2E-10	
81-5	SVOC	Fluoranthene	206-44-0	9.83E-01	9.83E-01			8E-08		2E-07		1E-06		1E-04		4E-05		1E-05
81-5	SVOC	Fluorene	86-73-7	5.03E-02	5.03E-02			1E-07		3E-07		9E-08		8E-06		3E-06		1E-06
81-5	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	2.93E-01	2.93E-01		3E-13		1E-12		2E-09		5E-07		1E-07		9E-09	
81-5	SVOC	Phenanthrene	85-01-8	5.68E-01	5.68E-01			4E-07		1E-06		1E-06		1E-04		3E-05		1E-05
81-5	SVOC	Pyrene	129-00-0	1.40E+00	1.40E+00			1E-07		3E-07		3E-06		2E-04		7E-05		2E-05
81-5	PCB	PCBs (total)	1336-36-3	8.40E-02	8.40E-02	2E-08	1E-09		3E-09		2E-09	2E-04	4E-07	2E-02	1E-07	6E-03	1E-08	5E-03
81-5	INORG	Antimony	7440-36-0	1.50E-01	6.36E-02							6E-06		6E-04		8E-05		3E-04
81-5	INORG	Arsenic	7440-38-2	4.70E+00														
81-5	INORG	Barium	7440-39-3	5.10E+01														
81-5	INORG	Beryllium	7440-41-7	4.10E-01														
81-5	INORG	Cadmium	7440-43-9	7.20E-01	1.32E-01						7E-11	7E-06	7E-11	5E-04	4E-11	1E-04	1E-10	3E-04
81-5	INORG	Chromium (total)	7440-47-3	2.50E+01														
81-5	INORG	Cobalt	7440-48-4	3.20E+00														
81-5	INORG	Copper	7440-50-8	4.30E+02	4.02E+02							4E-04		4E-02		5E-03		2E-02

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
81-5	INORG	Cyanide (total)	57-12-5	7.40E-02	7.40E-02							1E-07		1E-05		2E-06		7E-06
81-5	INORG	Lead	7439-92-1	3.60E+02	3.60E+02													
81-5	INORG	Manganese	7439-96-5	9.40E+02	4.63E+02							2E-02		2E-02		6E-03		3E-01
81-5	INORG	Mercury	7439-97-6	6.79E-01	6.27E-01	2E-05		2E-03		6E-03		3E-04		2E-02		9E-03		8E-02
81-5	INORG	Nickel	7440-02-0	1.40E+01														
81-5	INORG	Selenium	7782-49-2	3.90E-01														
81-5	INORG	Silver	7440-22-4	1.80E-01														
81-5	INORG	Thallium	7440-28-0	7.70E-02														
81-5	INORG	Vanadium	7440-62-2	1.40E+01														
81-5	INORG	Zinc	7440-66-6	1.20E+02	9.51E+00							1E-06		1E-04		2E-05		6E-05
83/84-1	VOC	Benzene	71-43-2	1.10E+00	1.10E+00	2E-03	1E-05	1E-01	2E-05	2E-01	1E-08	4E-04	2E-06	2E-02	1E-06	2E-02	5E-07	8E-02
83/84-1	VOC	1,1-Dichloroethane	75-34-3	5.00E-02	5.00E-02	9E-07		5E-04		6E-04		1E-06		6E-05		5E-05		4E-05
83/84-1	VOC	Ethyl Benzene	100-41-4	4.30E-01	4.30E-01	2E-06		6E-04		2E-03		3E-06		1E-04		1E-04		9E-04
83/84-1	VOC	Methylcyclohexane	108-87-2	3.10E-02	3.10E-02	1E-07		5E-05		6E-05		2E-07		1E-05		1E-05		1E-04
83/84-1	VOC	Toluene	108-88-3	6.80E-01	6.80E-01	6E-06		3E-04		8E-04		1E-06		9E-05		5E-05		4E-04
83/84-1	VOC	Trichloroethene	79-01-6	8.30E-02	8.30E-02	2E-06	2E-07		4E-07		2E-10		3E-08		2E-08		7E-09	
83/84-1	VOC	Xylenes (total)	1330-20-7	1.06E+00	1.06E+00	4E-06		1E-02		3E-02		5E-05		3E-03		2E-03		2E-02
83/84-1	SVOC	Acetophenone	98-86-2	6.88E-02	6.88E-02	2E-08		2E-06		5E-06		1E-07		9E-06		5E-06		4E-06
83/84-1	SVOC	Benzo(a)anthracene	56-55-3	3.88E-02	3.88E-02		8E-13		2E-12		2E-10		6E-08		1E-08		1E-09	
83/84-1	SVOC	Benzo(a)pyrene	50-32-8	4.08E-02	4.08E-02		1E-12		3E-12		2E-09		7E-07		1E-07		1E-08	
83/84-1	SVOC	Chrysene	218-01-9	5.04E-02	5.04E-02		3E-13		9E-13		3E-12		8E-10		2E-10		2E-11	
83/84-1	SVOC	2,4-Dimethylphenol	105-67-9	1.53E-01	1.53E-01			1E-06		3E-06		6E-07		5E-05		2E-05		1E-05
83/84-1	SVOC	Fluoranthene	206-44-0	6.46E-02	6.46E-02			5E-09		1E-08		1E-07		9E-06		2E-06		6E-07
83/84-1	SVOC	Isophorone	78-59-1	8.82E-01	8.82E-01	3E-07					6E-12	2E-07	2E-09	2E-05	3E-10	5E-06	3E-11	1E-06
83/84-1	SVOC	Phenanthrene	85-01-8	6.58E-02	6.58E-02			5E-08		1E-07		1E-07		1E-05		4E-06		1E-06
83/84-1	SVOC	Pyrene	129-00-0	5.92E-02	5.92E-02			5E-09		1E-08		1E-07		1E-05		3E-06		7E-07
83/84-1	INORG	Arsenic	7440-38-2	7.40E+00														
83/84-1	INORG	Barium	7440-39-3	6.10E+01														
83/84-1	INORG	Beryllium	7440-41-7	1.10E+00	5.10E-01						4E-10	6E-05	4E-10	1E-03	2E-10	1E-04	6E-10	1E-03
83/84-1	INORG	Cadmium	7440-43-9	1.60E-01														
83/84-1	INORG	Chromium (total)	7440-47-3	1.70E+01														
83/84-1	INORG	Cobalt	7440-48-4	8.00E+00	9.46E-01						8E-10	1E-04	8E-10	2E-04	5E-10	5E-05	1E-09	2E-03
83/84-1	INORG	Copper	7440-50-8	3.20E+01	3.54E+00							4E-06		3E-04		4E-05		2E-04
83/84-1	INORG	Cyanide (total)	57-12-5	1.60E-01	1.60E-01							3E-07		3E-05		4E-06		2E-05
83/84-1	INORG	Lead	7439-92-1	5.00E+01	5.00E+01													
83/84-1	INORG	Manganese	7439-96-5	4.60E+02														
83/84-1	INORG	Mercury	7439-97-6	4.04E-02														
83/84-1	INORG	Nickel	7440-02-0	2.20E+01	2.04E+00						1E-10		2E-10		9E-11		2E-10	
83/84-1	INORG	Selenium	7782-49-2	2.80E-01														
83/84-1	INORG	Silver	7440-22-4	1.64E+00	1.45E+00							3E-04		1E-03		2E-04		6E-03
83/84-1	INORG	Thallium	7440-28-0	2.10E-01	1.35E-02							8E-06		7E-04		9E-05		4E-04
83/84-1	INORG	Vanadium	7440-62-2	2.50E+01	1.29E-01							7E-07		7E-05		9E-06		4E-05
83/84-1	INORG	Zinc	7440-66-6	4.00E+01														
83/84-2	VOC	Acetone	67-64-1	4.60E-01	4.60E-01	3E-08		1E-05		3E-05		3E-07		2E-05		1E-05		1E-04
83/84-2	VOC	Benzene	71-43-2	1.40E+00	1.40E+00	3E-03	2E-05	2E-01	3E-05	3E-01	2E-08	5E-04	3E-06	3E-02	2E-06	2E-02	6E-07	1E-01
83/84-2	VOC	2-Butanone	78-93-3	2.70E-01	2.70E-01	6E-08		5E-06		1E-05		1E-07		7E-06		5E-06		4E-05
83/84-2	VOC	Cumene	98-82-8	6.30E-01	6.30E-01	5E-06		2E-03		5E-03		8E-06		4E-04		3E-04		3E-03
83/84-2	VOC	Cyclohexane	110-82-7	4.50E-01	4.50E-01	3E-06		4E-04		4E-04		1E-06		7E-05		6E-05		5E-04
83/84-2	VOC	1,1-Dichloroethane	75-34-3	1.40E-01	1.40E-01	3E-06		1E-03		2E-03		3E-06		2E-04		1E-04		1E-04
83/84-2	VOC	cis-1,2-Dichloroethene	156-59-2	8.30E-02	8.30E-02	6E-07		9E-03		1E-02		2E-05		1E-03		1E-03		9E-04
83/84-2	VOC	Ethyl Benzene	100-41-4	6.10E-01	6.10E-01	3E-06		9E-04		2E-03		4E-06		2E-04		1E-04		1E-03
83/84-2	VOC	Methyl Acetate	79-20-9	7.20E-01	7.20E-01	3E-07		3E-05		8E-05		6E-07		3E-05		2E-05		2E-05
83/84-2	VOC	Methylcyclohexane	108-87-2	2.00E+00	2.00E+00	7E-06		3E-03		4E-03		2E-05		9E-04		7E-04		6E-03

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
83/84-2	VOC	Methylene Chloride	75-09-2	3.40E-02	3.40E-02	2E-06	2E-08	3E-05	4E-08	7E-05	3E-11	1E-07	4E-09	9E-06	3E-09	5E-06	1E-09	5E-05
83/84-2	VOC	Toluene	108-88-3	4.50E-01	4.50E-01	4E-06		2E-04		5E-04		9E-07		6E-05		3E-05		3E-04
83/84-2	VOC	Trichloroethene	79-01-6	8.20E-02	8.20E-02	2E-06	2E-07		4E-07		2E-10		3E-08		2E-08		7E-09	
83/84-2	VOC	Xylenes (total)	1330-20-7	4.80E+00	4.80E+00	2E-05		6E-02		1E-01		2E-04		1E-02		1E-02		1E-01
83/84-2	SVOC	Acenaphthene	83-32-9	2.39E+01	2.39E+01			2E-04		5E-04		4E-05		3E-03		1E-03		7E-04
83/84-2	SVOC	Acenaphthylene	208-96-8	1.95E-01	1.95E-01			2E-06		6E-06		6E-07		5E-05		2E-05		1E-05
83/84-2	SVOC	Anthracene	120-12-7	6.12E+01	6.12E+01							1E-05		1E-03		3E-04		6E-05
83/84-2	SVOC	Benzo(a)anthracene	56-55-3	8.12E+01	8.12E+01		2E-09		5E-09		5E-07		1E-04		3E-05		2E-06	
83/84-2	SVOC	Benzo(a)pyrene	50-32-8	6.61E+01	6.61E+01		2E-09		6E-09		4E-06		1E-03		2E-04		2E-05	
83/84-2	SVOC	Benzo(b)fluoranthene	205-99-2	6.29E+01	6.29E+01		1E-08		4E-08		4E-07		1E-04		2E-05		2E-06	
83/84-2	SVOC	Benzo(g,h,i)perylene	191-24-2	2.78E+01	2.78E+01			2E-10		6E-10		5E-05		5E-03		1E-03		3E-04
83/84-2	SVOC	Benzo(k)fluoranthene	207-08-9	5.86E+01	5.86E+01		1E-11		3E-11		3E-08		9E-06		2E-06		2E-07	
83/84-2	SVOC	Biphenyl	92-52-4	7.13E-01	7.13E-01	2E-06		9E-06		2E-05		1E-06		1E-04		4E-05		3E-04
83/84-2	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	1.74E+00	1.74E+00	3E-13	1E-15	1E-11	4E-15	3E-11	2E-10	5E-06	5E-08	4E-04	1E-08	1E-04	9E-10	2E-04
83/84-2	SVOC	Butylbenzylphthalate	85-68-7	4.72E+00	4.72E+00		2E-12	1E-08	5E-12	3E-08	7E-11	1E-06	2E-08	1E-04	4E-09	3E-05	4E-10	7E-06
83/84-2	SVOC	Caprolactam	105-60-2	1.71E-01	1.71E-01	2E-09		4E-09		9E-09		2E-08		2E-06		6E-07		3E-06
83/84-2	SVOC	Carbazole	86-74-8	3.99E+01	3.99E+01		4E-11		1E-10		6E-09		2E-06		3E-07		4E-08	
83/84-2	SVOC	Chrysene	218-01-9	8.48E+01	8.48E+01		5E-10		1E-09		5E-09		1E-06		3E-07		3E-08	
83/84-2	SVOC	Dibenz(a,h)anthracene	53-70-3	1.69E+01	1.69E+01		2E-12		7E-12		1E-06		3E-04		6E-05		5E-06	
83/84-2	SVOC	Dibenzofuran	132-64-9	1.67E+01	1.67E+01			1E-04		3E-04		5E-04		4E-02		1E-02		4E-02
83/84-2	SVOC	Diethylphthalate	84-66-2	5.97E-02	5.97E-02	2E-09		2E-09		6E-09		5E-09		4E-07		1E-07		5E-08
83/84-2	SVOC	Di-n-butylphthalate	84-74-2	3.43E+00	3.43E+00	4E-11						2E-06		2E-04		4E-05		9E-06
83/84-2	SVOC	Fluoranthene	206-44-0	1.78E+02	1.78E+02			1E-05		4E-05		3E-04		2E-02		6E-03		2E-03
83/84-2	SVOC	Fluorene	86-73-7	3.45E+01	3.45E+01			9E-05		2E-04		6E-05		5E-03		2E-03		8E-04
83/84-2	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	2.91E+01	2.91E+01		3E-11		1E-10		2E-07		5E-05		1E-05		9E-07	
83/84-2	SVOC	2-Methylnaphthalene	91-57-6	4.14E+00	4.14E+00			9E-03		2E-02		5E-04		3E-02		2E-02		2E-01
83/84-2	SVOC	Naphthalene	91-20-3	4.79E+00	4.79E+00	3E-06		3E-02		7E-02		9E-04		5E-02		4E-02		3E-01
83/84-2	SVOC	Phenanthrene	85-01-8	1.92E+02	1.92E+02			1E-04		3E-04		4E-04		4E-02		1E-02		4E-03
83/84-2	SVOC	Pyrene	129-00-0	1.62E+02	1.62E+02			1E-05		3E-05		3E-04		3E-02		8E-03		2E-03
83/84-2	PCB	PCBs (total)	1336-36-3	3.79E-01	3.79E-01	7E-08	5E-09		1E-08		7E-09	1E-03	2E-06	1E-01	4E-07	3E-02	5E-08	2E-02
83/84-2	INORG	Antimony	7440-36-0	2.20E+01	2.19E+01							2E-03		2E-01		3E-02		1E-01
83/84-2	INORG	Arsenic	7440-38-2	4.70E+01	3.89E+01						4E-07	6E-03	1E-04	5E-01	1E-05	9E-02	2E-06	2E-02
83/84-2	INORG	Barium	7440-39-3	3.40E+03	3.30E+03													
83/84-2	INORG	Beryllium	7440-41-7	1.10E+01	1.04E+01						7E-09	1E-03	8E-09	2E-02	5E-09	3E-03	1E-08	3E-02
83/84-2	INORG	Cadmium	7440-43-9	2.40E+01	2.34E+01						1E-08	1E-03	1E-08	1E-01	8E-09	2E-02	2E-08	5E-02
83/84-2	INORG	Chromium (total)	7440-47-3	2.40E+03	2.37E+03						8E-06	8E-02	9E-06	3E+00	5E-06	4E-01	1E-05	1E+00
83/84-2	INORG	Cobalt	7440-48-4	2.10E+02	2.03E+02						2E-07	2E-02	2E-07	4E-02	1E-07	1E-02	3E-07	4E-01
83/84-2	INORG	Copper	7440-50-8	1.30E+04	1.30E+04							1E-02		1E+00		2E-01		6E-01
83/84-2	INORG	Cyanide (total)	57-12-5	3.20E+00	3.20E+00							6E-06		6E-04		8E-05		3E-04
83/84-2	INORG	Lead	7439-92-1	6.50E+03	6.50E+03													
83/84-2	INORG	Manganese	7439-96-5	3.50E+03	3.02E+03							1E-01		1E-01		4E-02		2E+00
83/84-2	INORG	Mercury	7439-97-6	1.13E+00	1.08E+00	3E-05		4E-03		1E-02		5E-04		3E-02		2E-02		1E-01
83/84-2	INORG	Nickel	7440-02-0	1.20E+02	1.00E+02						7E-09		7E-09		4E-09		1E-08	
83/84-2	INORG	Selenium	7782-49-2	3.60E+00	3.08E+00							2E-05		2E-03		3E-04		1E-03
83/84-2	INORG	Silver	7440-22-4	7.70E+00	7.51E+00							2E-03		6E-03		1E-03		3E-02
83/84-2	INORG	Thallium	7440-28-0	2.90E-01	9.35E-02							5E-05		5E-03		7E-04		3E-03
83/84-2	INORG	Vanadium	7440-62-2	3.90E+02	3.65E+02							2E-03		2E-01		3E-02		1E-01
83/84-2	INORG	Zinc	7440-66-6	2.90E+03	2.79E+03							4E-04		3E-02		5E-03		2E-02
83/84-3	VOC	Methyl Acetate	79-20-9	9.50E-02	9.50E-02	4E-08		4E-06		1E-05		8E-08		4E-06		3E-06		3E-06
83/84-3	VOC	4-Methyl-2-pentanone	108-10-1	3.40E+00	3.40E+00	2E-06		2E-04		6E-04		3E-06		2E-04		1E-04		1E-03
83/84-3	VOC	Methylcyclohexane	108-87-2	9.70E-02	9.70E-02	4E-07		2E-04		2E-04		8E-07		4E-05		3E-05		3E-04
83/84-3	VOC	Toluene	108-88-3	4.80E+00	4.80E+00	4E-05		2E-03		5E-03		9E-06		6E-04		3E-04		3E-03
83/84-3	VOC	Xylenes (total)	1330-20-7	1.32E-01	1.32E-01	5E-07		2E-03		4E-03		7E-06		4E-04		3E-04		3E-03

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
83/84-3	SVOC	Acenaphthene	83-32-9	1.68E-01	1.68E-01			1E-06		3E-06		3E-07		2E-05		8E-06		5E-06
83/84-3	SVOC	Anthracene	120-12-7	1.06E+00	1.06E+00							2E-07		2E-05		5E-06		1E-06
83/84-3	SVOC	Benzaldehyde	100-52-7	8.70E-02	8.70E-02			6E-06		2E-05		3E-07		2E-05		1E-05		8E-05
83/84-3	SVOC	Benzo(a)anthracene	56-55-3	4.44E+00	4.44E+00		9E-11		3E-10		3E-08		7E-06		2E-06		1E-07	
83/84-3	SVOC	Benzo(a)pyrene	50-32-8	4.03E+00	4.03E+00		1E-10		3E-10		2E-07		7E-05		1E-05		1E-06	
83/84-3	SVOC	Benzo(b)fluoranthene	205-99-2	4.10E+00	4.10E+00		9E-10		3E-09		2E-08		7E-06		1E-06		1E-07	
83/84-3	SVOC	Benzo(g,h,i)perylene	191-24-2	1.55E+00	1.55E+00			1E-11		3E-11		3E-06		3E-04		7E-05		1E-05
83/84-3	SVOC	Benzo(k)fluoranthene	207-08-9	4.31E+00	4.31E+00		7E-13		2E-12		3E-09		7E-07		1E-07		1E-08	
83/84-3	SVOC	Carbazole	86-74-8	8.11E-01	8.11E-01		9E-13		3E-12		1E-10		3E-08		7E-09		7E-10	
83/84-3	SVOC	Chrysene	218-01-9	5.19E+00	5.19E+00		3E-11		9E-11		3E-10		8E-08		2E-08		2E-09	
83/84-3	SVOC	Dibenzofuran	132-64-9	1.56E-01	1.56E-01			1E-06		3E-06		4E-06		4E-04		1E-04		4E-04
83/84-3	SVOC	Diethylphthalate	84-66-2	5.59E-02	5.59E-02	2E-09		2E-09		5E-09		4E-09		4E-07		1E-07		4E-08
83/84-3	SVOC	Fluoranthene	206-44-0	6.20E+00	6.20E+00			5E-07		1E-06		9E-06		8E-04		2E-04		6E-05
83/84-3	SVOC	Fluorene	86-73-7	2.75E-01	2.75E-01			7E-07		2E-06		5E-07		4E-05		1E-05		6E-06
83/84-3	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	1.65E+00	1.65E+00		2E-12		6E-12		1E-08		3E-06		6E-07		5E-08	
83/84-3	SVOC	Naphthalene	91-20-3	5.16E-02	5.16E-02	3E-08		3E-04		8E-04		9E-06		5E-04		4E-04		4E-03
83/84-3	SVOC	Phenanthrene	85-01-8	4.40E+00	4.40E+00			3E-06		8E-06		9E-06		8E-04		2E-04		9E-05
83/84-3	SVOC	Pyrene	129-00-0	1.22E+01	1.22E+01			9E-07		2E-06		2E-05		2E-03		6E-04		1E-04
83/84-3	INORG	Arsenic	7440-38-2	5.70E+00														
83/84-3	INORG	Barium	7440-39-3	2.10E+02	1.14E+02													
83/84-3	INORG	Beryllium	7440-41-7	9.10E-01	3.20E-01						2E-10	4E-05	2E-10	6E-04	1E-10	9E-05	4E-10	9E-04
83/84-3	INORG	Cadmium	7440-43-9	9.20E-01	3.32E-01						2E-10	2E-05	2E-10	1E-03	1E-10	2E-04	3E-10	7E-04
83/84-3	INORG	Chromium (total)	7440-47-3	1.70E+01														
83/84-3	INORG	Cobalt	7440-48-4	4.50E+00														
83/84-3	INORG	Copper	7440-50-8	1.60E+02	1.32E+02							1E-04		1E-02		2E-03		6E-03
83/84-3	INORG	Cyanide (total)	57-12-5	3.20E-01	3.20E-01							6E-07		6E-05		8E-06		3E-05
83/84-3	INORG	Lead	7439-92-1	4.20E+04	4.20E+04													
83/84-3	INORG	Manganese	7439-96-5	2.00E+02														
83/84-3	INORG	Mercury	7439-97-6	5.12E+00	5.07E+00	2E-04		2E-02		5E-02		2E-03		1E-01		8E-02		7E-01
83/84-3	INORG	Nickel	7440-02-0	2.10E+01	1.04E+00						7E-11		8E-11		5E-11		1E-10	
83/84-3	INORG	Silver	7440-22-4	3.00E-01	1.12E-01							2E-05		9E-05		2E-05		4E-04
83/84-3	INORG	Thallium	7440-28-0	3.40E-01	1.43E-01							8E-05		7E-03		1E-03		4E-03
83/84-3	INORG	Vanadium	7440-62-2	1.40E+01														
83/84-3	INORG	Zinc	7440-66-6	1.90E+02	7.95E+01							1E-05		1E-03		1E-04		5E-04
83/84-4	VOC	Acetone	67-64-1	2.30E-01	2.30E-01	1E-08		5E-06		1E-05		2E-07		9E-06		6E-06		5E-05
83/84-4	VOC	Benzene	71-43-2	4.30E-02	4.30E-02	8E-05	5E-07	6E-03	8E-07	8E-03	5E-10	2E-05	8E-08	8E-04	5E-08	6E-04	2E-08	3E-03
83/84-4	VOC	2-Butanone	78-93-3	8.00E-02	8.00E-02	2E-08		2E-06		4E-06		4E-08		2E-06		1E-06		1E-05
83/84-4	VOC	Cumene	98-82-8	2.50E-01	2.50E-01	2E-06		8E-04		2E-03		3E-06		2E-04		1E-04		1E-03
83/84-4	VOC	Cyclohexane	110-82-7	1.30E-01	1.30E-01	9E-07		1E-04		1E-04		4E-07		2E-05		2E-05		2E-04
83/84-4	VOC	1,2-Dichlorobenzene	95-50-1	7.40E-02	7.40E-02	2E-07		8E-05		2E-04		8E-07		4E-05		3E-05		3E-05
83/84-4	VOC	cis-1,2-Dichloroethene	156-59-2	5.00E+00	5.00E+00	3E-05		5E-01		8E-01		1E-03		8E-02		6E-02		5E-02
83/84-4	VOC	trans-1,2-Dichloroethene	156-60-5	5.70E-01	5.70E-01	5E-06		5E-02		6E-02		1E-04		6E-03		5E-03		5E-02
83/84-4	VOC	Ethyl Benzene	100-41-4	1.90E-01	1.90E-01	9E-07		3E-04		7E-04		1E-06		6E-05		4E-05		4E-04
83/84-4	VOC	Methyl Acetate	79-20-9	6.30E-01	6.30E-01	2E-07		3E-05		7E-05		5E-07		3E-05		2E-05		2E-05
83/84-4	VOC	Methylcyclohexane	108-87-2	9.30E-01	9.30E-01	3E-06		2E-03		2E-03		7E-06		4E-04		3E-04		3E-03
83/84-4	VOC	Methylene Chloride	75-09-2	5.20E-02	5.20E-02	3E-06	3E-08	5E-05	6E-08	1E-04	4E-11	2E-07	7E-09	1E-05	4E-09	8E-06	1E-09	7E-05
83/84-4	VOC	Toluene	108-88-3	1.40E-01	1.40E-01	1E-06		6E-05		2E-04		3E-07		2E-05		1E-05		8E-05
83/84-4	VOC	Trichloroethene	79-01-6	8.30E-01	8.30E-01	2E-05	2E-06		4E-06		2E-09		3E-07		2E-07		7E-08	
83/84-4	VOC	Vinyl Chloride	75-01-4	2.30E-01	2.30E-01	7E-04	4E-06	1E-02	5E-06	1E-02	9E-09	6E-05	2E-06	3E-03	8E-07	2E-03	3E-07	2E-02
83/84-4	VOC	Xylenes (total)	1330-20-7	8.60E-01	8.60E-01	3E-06		1E-02		3E-02		4E-05		2E-03		2E-03		2E-02
83/84-4	SVOC	Acenaphthene	83-32-9	1.46E+00	1.46E+00			1E-05		3E-05		2E-06		2E-04		7E-05		4E-05
83/84-4	SVOC	Acetophenone	98-86-2	1.16E+00	1.16E+00	4E-07		4E-05		9E-05		2E-06		2E-04		9E-05		7E-05
83/84-4	SVOC	Anthracene	120-12-7	2.79E+00	2.79E+00							5E-07		5E-05		1E-05		3E-06

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
83/84-4	SVOC	Benzo(a)anthracene	56-55-3	7.69E+00	7.69E+00		2E-10		5E-10		5E-08		1E-05		3E-06		2E-07	
83/84-4	SVOC	Benzo(a)pyrene	50-32-8	6.43E+00	6.43E+00		2E-10		5E-10		4E-07		1E-04		2E-05		2E-06	
83/84-4	SVOC	Benzo(b)fluoranthene	205-99-2	7.31E+00	7.31E+00		2E-09		5E-09		4E-08		1E-05		3E-06		2E-07	
83/84-4	SVOC	Benzo(g,h,i)perylene	191-24-2	2.20E+00	2.20E+00			2E-11		5E-11		4E-06		4E-04		1E-04		2E-05
83/84-4	SVOC	Benzo(k)fluoranthene	207-08-9	5.84E+00	5.84E+00		1E-12		3E-12		3E-09		9E-07		2E-07		2E-08	
83/84-4	SVOC	Biphenyl	92-52-4	1.36E-01	1.36E-01	4E-07		2E-06		4E-06		3E-07		2E-05		8E-06		5E-05
83/84-4	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	5.28E-01	5.28E-01	8E-14	4E-16	4E-12	1E-15	1E-11	6E-11	1E-06	2E-08	1E-04	3E-09	3E-05	3E-10	7E-05
83/84-4	SVOC	Butylbenzylphthalate	85-68-7	5.09E-01	5.09E-01		2E-13	1E-09	5E-13	3E-09	7E-12	1E-07	2E-09	1E-05	4E-10	3E-06	4E-11	7E-07
83/84-4	SVOC	Carbazole	86-74-8	2.97E+00	2.97E+00		3E-12		1E-11		5E-10		1E-07		3E-08		3E-09	
83/84-4	SVOC	Chrysene	218-01-9	7.23E+00	7.23E+00		4E-11		1E-10		4E-10		1E-07		3E-08		3E-09	
83/84-4	SVOC	Dibenz(a,h)anthracene	53-70-3	1.22E+00	1.22E+00		2E-13		5E-13		7E-08		2E-05		4E-06		4E-07	
83/84-4	SVOC	Dibenzofuran	132-64-9	9.59E-01	9.59E-01			6E-06		2E-05		3E-05		2E-03		6E-04		2E-03
83/84-4	SVOC	Di-n-butylphthalate	84-74-2	9.53E-02	9.53E-02	1E-12						5E-08		5E-06		1E-06		2E-07
83/84-4	SVOC	Fluoranthene	206-44-0	1.46E+01	1.46E+01			1E-06		3E-06		2E-05		2E-03		5E-04		1E-04
83/84-4	SVOC	Fluorene	86-73-7	1.75E+00	1.75E+00			4E-06		1E-05		3E-06		3E-04		9E-05		4E-05
83/84-4	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	2.06E+00	2.06E+00		2E-12		7E-12		1E-08		3E-06		7E-07		6E-08	
83/84-4	SVOC	2-Methylnaphthalene	91-57-6	5.05E+00	5.05E+00			1E-02		3E-02		6E-04		3E-02		2E-02		2E-01
83/84-4	SVOC	Naphthalene	91-20-3	1.83E+00	1.83E+00	1E-06		1E-02		3E-02		3E-04		2E-02		1E-02		1E-01
83/84-4	SVOC	Phenanthrene	85-01-8	1.19E+01	1.19E+01			8E-06		2E-05		3E-05		2E-03		7E-04		2E-04
83/84-4	SVOC	Pyrene	129-00-0	1.14E+01	1.14E+01			9E-07		2E-06		2E-05		2E-03		5E-04		1E-04
83/84-4	PCB	PCBs (total)	1336-36-3	8.50E-01	8.50E-01	2E-07	1E-08		3E-08		2E-08	2E-03	4E-06	2E-01	1E-06	6E-02	1E-07	5E-02
83/84-4	INORG	Antimony	7440-36-0	3.70E+00	3.61E+00							4E-04		3E-02		4E-03		2E-02
83/84-4	INORG	Arsenic	7440-38-2	1.60E+01	7.88E+00						8E-08	1E-03	2E-05	1E-01	3E-06	2E-02	4E-07	3E-03
83/84-4	INORG	Barium	7440-39-3	3.30E+02	2.34E+02													
83/84-4	INORG	Beryllium	7440-41-7	8.00E-01	2.10E-01						1E-10	3E-05	2E-10	4E-04	9E-11	6E-05	2E-10	6E-04
83/84-4	INORG	Cadmium	7440-43-9	6.30E+00	5.71E+00						3E-09	3E-04	3E-09	2E-02	2E-09	4E-03	5E-09	1E-02
83/84-4	INORG	Chromium (total)	7440-47-3	1.20E+02	8.80E+01						3E-07	3E-03	3E-07	1E-01	2E-07	1E-02	5E-07	4E-02
83/84-4	INORG	Cobalt	7440-48-4	1.10E+01	3.95E+00						3E-09	4E-04	3E-09	9E-04	2E-09	2E-04	5E-09	7E-03
83/84-4	INORG	Copper	7440-50-8	2.20E+03	2.17E+03							2E-03		2E-01		3E-02		1E-01
83/84-4	INORG	Cyanide (total)	57-12-5	2.10E+01	2.10E+01							4E-05		4E-03		5E-04		2E-03
83/84-4	INORG	Lead	7439-92-1	8.40E+02	8.40E+02													
83/84-4	INORG	Manganese	7439-96-5	1.10E+03	6.23E+02							3E-02		3E-02		9E-03		4E-01
83/84-4	INORG	Mercury	7439-97-6	1.35E-01	8.26E-02	3E-06		3E-04		8E-04		4E-05		2E-03		1E-03		1E-02
83/84-4	INORG	Nickel	7440-02-0	6.90E+01	4.90E+01						3E-09		4E-09		2E-09		6E-09	
83/84-4	INORG	Selenium	7782-49-2	9.00E-01	3.81E-01							3E-06		3E-04		4E-05		1E-04
83/84-4	INORG	Silver	7440-22-4	7.30E+00	7.11E+00							2E-03		6E-03		1E-03		3E-02
83/84-4	INORG	Thallium	7440-28-0	2.70E-01	7.35E-02							4E-05		4E-03		5E-04		2E-03
83/84-4	INORG	Vanadium	7440-62-2	3.70E+01	1.21E+01							7E-05		6E-03		8E-04		3E-03
83/84-4	INORG	Zinc	7440-66-6	2.50E+02	1.40E+02							2E-05		2E-03		2E-04		9E-04
83/84-5	VOC	Xylenes (total)	1330-20-7	6.80E-02	6.80E-02	3E-07		8E-04		2E-03		3E-06		2E-04		1E-04		1E-03
83/84-5	SVOC	Acenaphthene	83-32-9	5.02E-01	5.02E-01			4E-06		1E-05		8E-07		6E-05		2E-05		2E-05
83/84-5	SVOC	Anthracene	120-12-7	6.75E-01	6.75E-01							1E-07		1E-05		3E-06		6E-07
83/84-5	SVOC	Benzo(a)anthracene	56-55-3	9.17E-01	9.17E-01		2E-11		6E-11		5E-09		1E-06		3E-07		3E-08	
83/84-5	SVOC	Benzo(a)pyrene	50-32-8	7.10E-01	7.10E-01		2E-11		6E-11		4E-08		1E-05		2E-06		2E-07	
83/84-5	SVOC	Benzo(b)fluoranthene	205-99-2	7.84E-01	7.84E-01		2E-10		5E-10		5E-09		1E-06		3E-07		3E-08	
83/84-5	SVOC	Benzo(g,h,i)perylene	191-24-2	5.59E-01	5.59E-01			5E-12		1E-11		1E-06		1E-04		2E-05		5E-06
83/84-5	SVOC	Benzo(k)fluoranthene	207-08-9	8.55E-01	8.55E-01		1E-13		4E-13		5E-10		1E-07		3E-08		3E-09	
83/84-5	SVOC	Chrysene	218-01-9	1.05E+00	1.05E+00		6E-12		2E-11		6E-11		2E-08		4E-09		4E-10	
83/84-5	SVOC	Dibenzofuran	132-64-9	4.20E-01	4.20E-01			3E-06		7E-06		1E-05		1E-03		3E-04		1E-03
83/84-5	SVOC	Fluoranthene	206-44-0	2.20E+00	2.20E+00			2E-07		5E-07		3E-06		3E-04		8E-05		2E-05
83/84-5	SVOC	Fluorene	86-73-7	8.15E-01	8.15E-01			2E-06		5E-06		1E-06		1E-04		4E-05		2E-05
83/84-5	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	5.37E-01	5.37E-01		6E-13		2E-12		3E-09		9E-07		2E-07		2E-08	
83/84-5	SVOC	Phenanthrene	85-01-8	3.07E+00	3.07E+00			2E-06		6E-06		7E-06		6E-04		2E-04		6E-05

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
83/84-5	SVOC	Pyrene	129-00-0	3.36E+00	3.36E+00			3E-07		7E-07		7E-06		6E-04		2E-04		4E-05
83/84-5	INORG	Arsenic	7440-38-2	3.20E+00														
83/84-5	INORG	Barium	7440-39-3	4.20E+01														
83/84-5	INORG	Beryllium	7440-41-7	5.40E-01														
83/84-5	INORG	Cadmium	7440-43-9	1.50E-01														
83/84-5	INORG	Chromium (total)	7440-47-3	1.50E+01														
83/84-5	INORG	Cobalt	7440-48-4	7.10E+00	4.62E-02						4E-11	5E-06	4E-11	1E-05	2E-11	2E-06	6E-11	8E-05
83/84-5	INORG	Copper	7440-50-8	1.30E+01														
83/84-5	INORG	Lead	7439-92-1	1.30E+01	1.30E+01													
83/84-5	INORG	Manganese	7439-96-5	2.50E+02														
83/84-5	INORG	Mercury	7439-97-6	1.83E-02														
83/84-5	INORG	Nickel	7440-02-0	1.90E+01														
83/84-5	INORG	Selenium	7782-49-2	6.60E-01	1.41E-01							1E-06		1E-04		1E-05		6E-05
83/84-5	INORG	Silver	7440-22-4	8.10E-02														
83/84-5	INORG	Thallium	7440-28-0	2.10E-01	1.35E-02							8E-06		7E-04		9E-05		4E-04
83/84-5	INORG	Vanadium	7440-62-2	2.20E+01														
83/84-5	INORG	Zinc	7440-66-6	4.10E+01														
83/84-6	VOC	Trichloroethene	79-01-6	5.10E-02	5.10E-02	1E-06	1E-07		2E-07		1E-10		2E-08		1E-08		4E-09	
83/84-6	SVOC	Acenaphthene	83-32-9	2.20E+00	2.20E+00			2E-05		4E-05		4E-06		3E-04		1E-04		7E-05
83/84-6	SVOC	Anthracene	120-12-7	3.80E+00	3.80E+00							7E-07		7E-05		2E-05		4E-06
83/84-6	SVOC	Benzo(a)anthracene	56-55-3	7.90E+00	7.90E+00		2E-10		5E-10		5E-08		1E-05		3E-06		2E-07	
83/84-6	SVOC	Benzo(a)pyrene	50-32-8	8.30E+00	8.30E+00		2E-10		7E-10		5E-07		1E-04		3E-05		2E-06	
83/84-6	SVOC	Benzo(b)fluoranthene	205-99-2	7.80E+00	7.80E+00		2E-09		5E-09		5E-08		1E-05		3E-06		3E-07	
83/84-6	SVOC	Benzo(g,h,i)perylene	191-24-2	5.80E+00	5.80E+00			5E-11		1E-10		1E-05		1E-03		3E-04		5E-05
83/84-6	SVOC	Benzo(k)fluoranthene	207-08-9	7.30E+00	7.30E+00		1E-12		4E-12		4E-09		1E-06		3E-07		2E-08	
83/84-6	SVOC	Carbazole	86-74-8	2.00E+00	2.00E+00		2E-12		7E-12		3E-10		8E-08		2E-08		2E-09	
83/84-6	SVOC	Chrysene	218-01-9	8.70E+00	8.70E+00		5E-11		2E-10		5E-10		1E-07		3E-08		3E-09	
83/84-6	SVOC	Dibenz(a,h)anthracene	53-70-3	9.50E-01	9.50E-01		1E-13		4E-13		6E-08		2E-05		3E-06		3E-07	
83/84-6	SVOC	Fluoranthene	206-44-0	1.30E+01	1.30E+01			1E-06		3E-06		2E-05		2E-03		5E-04		1E-04
83/84-6	SVOC	Fluorene	86-73-7	1.60E+00	1.60E+00			4E-06		1E-05		3E-06		2E-04		8E-05		4E-05
83/84-6	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	5.40E+00	5.40E+00		6E-12		2E-11		3E-08		9E-06		2E-06		2E-07	
83/84-6	SVOC	Phenanthrene	85-01-8	1.10E+01	1.10E+01			8E-06		2E-05		2E-05		2E-03		6E-04		2E-04
83/84-6	SVOC	Pyrene	129-00-0	1.70E+01	1.70E+01			1E-06		3E-06		3E-05		3E-03		8E-04		2E-04
83/84-6	INORG	Arsenic	7440-38-2	5.72E+00														
83/84-6	INORG	Barium	7440-39-3	2.12E+02	1.16E+02													
83/84-6	INORG	Cadmium	7440-43-9	8.99E-02														
83/84-6	INORG	Chromium (total)	7440-47-3	1.49E+01														
83/84-6	INORG	Lead	7439-92-1	8.57E+02	8.57E+02													
83/84-6	INORG	Mercury	7439-97-6	9.58E-02	4.34E-02	1E-06		2E-04		4E-04		2E-05		1E-03		6E-04		6E-03
83/84-6	INORG	Selenium	7782-49-2	2.10E-01														
83/84-6	INORG	Silver	7440-22-4	4.78E+00	4.59E+00							1E-03		4E-03		7E-04		2E-02
83/84-7	VOC	Methyl Acetate	79-20-9	2.70E-01	2.70E-01	1E-07		1E-05		3E-05		2E-07		1E-05		9E-06		8E-06
83/84-7	VOC	Methylcyclohexane	108-87-2	3.00E-02	3.00E-02	1E-07		5E-05		6E-05		2E-07		1E-05		1E-05		9E-05
83/84-7	SVOC	Benzo(a)anthracene	56-55-3	8.34E-02	8.34E-02		2E-12		5E-12		5E-10		1E-07		3E-08		3E-09	
83/84-7	SVOC	Benzo(a)pyrene	50-32-8	8.09E-02	8.09E-02		2E-12		7E-12		5E-09		1E-06		3E-07		2E-08	
83/84-7	SVOC	Benzo(b)fluoranthene	205-99-2	1.19E-01	1.19E-01		3E-11		8E-11		7E-10		2E-07		4E-08		4E-09	
83/84-7	SVOC	Benzo(k)fluoranthene	207-08-9	9.48E-02	9.48E-02		2E-14		5E-14		6E-11		2E-08		3E-09		3E-10	
83/84-7	SVOC	Butylbenzylphthalate	85-68-7	1.21E+00	1.21E+00		4E-13	3E-09	1E-12	8E-09	2E-11	3E-07	5E-09	3E-05	1E-09	7E-06	1E-10	2E-06
83/84-7	SVOC	Chrysene	218-01-9	1.07E-01	1.07E-01		6E-13		2E-12		6E-12		2E-09		4E-10		4E-11	
83/84-7	SVOC	Diethylphthalate	84-66-2	8.49E-02	8.49E-02	3E-09		3E-09		8E-09		7E-09		6E-07		2E-07		6E-08
83/84-7	SVOC	Fluoranthene	206-44-0	1.50E-01	1.50E-01			1E-08		3E-08		2E-07		2E-05		5E-06		1E-06
83/84-7	SVOC	Phenanthrene	85-01-8	7.17E-02	7.17E-02			5E-08		1E-07		2E-07		1E-05		4E-06		1E-06
83/84-7	SVOC	Pyrene	129-00-0	2.37E-01	2.37E-01			2E-08		5E-08		5E-07		4E-05		1E-05		3E-06

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
83/84-7	PCB	PCBs (total)	1336-36-3	8.90E-02	8.90E-02	2E-08	1E-09		3E-09		2E-09	3E-04	4E-07	2E-02	1E-07	6E-03	1E-08	5E-03
83/84-7	INORG	Antimony	7440-36-0	4.60E-02														
83/84-7	INORG	Arsenic	7440-38-2	3.60E+00														
83/84-7	INORG	Barium	7440-39-3	3.20E+01														
83/84-7	INORG	Beryllium	7440-41-7	2.00E-01														
83/84-7	INORG	Cadmium	7440-43-9	2.60E-01														
83/84-7	INORG	Chromium (total)	7440-47-3	1.40E+01														
83/84-7	INORG	Cobalt	7440-48-4	2.40E+00														
83/84-7	INORG	Copper	7440-50-8	3.30E+01	4.54E+00							5E-06		4E-04		6E-05		2E-04
83/84-7	INORG	Cyanide (total)	57-12-5	3.30E-01	3.30E-01							7E-07		6E-05		8E-06		3E-05
83/84-7	INORG	Lead	7439-92-1	3.30E+01	3.30E+01													
83/84-7	INORG	Manganese	7439-96-5	1.90E+02														
83/84-7	INORG	Mercury	7439-97-6	2.58E-02														
83/84-7	INORG	Nickel	7440-02-0	1.80E+01														
83/84-7	INORG	Selenium	7782-49-2	2.90E-01														
83/84-7	INORG	Silver	7440-22-4	8.20E-02														
83/84-7	INORG	Thallium	7440-28-0	4.70E-02														
83/84-7	INORG	Vanadium	7440-62-2	1.10E+01														
83/84-7	INORG	Zinc	7440-66-6	4.30E+01														
84-A	VOC	Benzene	71-43-2	1.10E-02	1.10E-02	2E-05	1E-07	1E-03	2E-07	2E-03	1E-10	4E-06	2E-08	2E-04	1E-08	2E-04	5E-09	8E-04
84-A	VOC	Cumene	98-82-8	1.40E-02	1.40E-02	1E-07		5E-05		1E-04		2E-07		1E-05		7E-06		7E-05
84-A	VOC	Cyclohexane	110-82-7	3.40E-02	3.40E-02	2E-07		3E-05		3E-05		1E-07		5E-06		4E-06		4E-05
84-A	VOC	cis-1,2-Dichloroethene	156-59-2	4.70E-01	4.70E-01	3E-06		5E-02		8E-02		1E-04		7E-03		5E-03		5E-03
84-A	VOC	trans-1,2-Dichloroethene	156-60-5	2.00E-02	2.00E-02	2E-07		2E-03		2E-03		4E-06		2E-04		2E-04		2E-03
84-A	VOC	Ethyl Benzene	100-41-4	2.00E-02	2.00E-02	1E-07		3E-05		7E-05		1E-07		7E-06		5E-06		4E-05
84-A	VOC	Methyl Acetate	79-20-9	5.20E-01	5.20E-01	2E-07		2E-05		6E-05		4E-07		2E-05		2E-05		2E-05
84-A	VOC	Methylcyclohexane	108-87-2	1.60E-01	1.60E-01	6E-07		3E-04		3E-04		1E-06		7E-05		5E-05		5E-04
84-A	VOC	Methylene Chloride	75-09-2	1.30E-02	1.30E-02	6E-07	6E-09	1E-05	2E-08	3E-05	1E-11	6E-08	2E-09	3E-06	1E-09	2E-06	4E-10	2E-05
84-A	VOC	Toluene	108-88-3	4.80E-02	4.80E-02	4E-07		2E-05		5E-05		9E-08		6E-06		3E-06		3E-05
84-A	VOC	1,1,1-Trichloroethane	71-55-6	5.70E-02	5.70E-02	2E-07		1E-04		2E-04		3E-07		2E-05		1E-05		1E-05
84-A	VOC	Trichloroethene	79-01-6	1.00E+00	1.00E+00	2E-05	2E-06		4E-06		2E-09		4E-07		2E-07		8E-08	
84-A	VOC	Trichlorofluoromethane	75-69-4	1.10E-02	1.10E-02	1E-08		8E-05		9E-05		4E-07		2E-05		2E-05		1E-05
84-A	VOC	Xylenes (total)	1330-20-7	1.08E-01	1.08E-01	4E-07		1E-03		3E-03		6E-06		3E-04		2E-04		2E-03
84-A	SVOC	Acenaphthene	83-32-9	1.47E-01	1.47E-01			1E-06		3E-06		2E-07		2E-05		7E-06		4E-06
84-A	SVOC	Acenaphthylene	208-96-8	2.00E-02	2.00E-02			2E-07		6E-07		6E-08		5E-06		2E-06		1E-06
84-A	SVOC	Anthracene	120-12-7	4.95E-01	4.95E-01							9E-08		9E-06		2E-06		5E-07
84-A	SVOC	Benzo(a)anthracene	56-55-3	1.24E+00	1.24E+00		3E-11		8E-11		7E-09		2E-06		4E-07		4E-08	
84-A	SVOC	Benzo(a)pyrene	50-32-8	1.08E+00	1.08E+00		3E-11		9E-11		6E-08		2E-05		4E-06		3E-07	
84-A	SVOC	Benzo(b)fluoranthene	205-99-2	1.31E+00	1.31E+00		3E-10		9E-10		8E-09		2E-06		5E-07		4E-08	
84-A	SVOC	Benzo(g,h,i)perylene	191-24-2	4.76E-01	4.76E-01			4E-12		1E-11		9E-07		8E-05		2E-05		4E-06
84-A	SVOC	Benzo(k)fluoranthene	207-08-9	1.15E+00	1.15E+00		2E-13		6E-13		7E-10		2E-07		4E-08		3E-09	
84-A	SVOC	Biphenyl	92-52-4	3.00E-02	3.00E-02	1E-07		4E-07		1E-06		6E-08		4E-06		2E-06		1E-05
84-A	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	8.00E-02	8.00E-02	1E-14	6E-17	6E-13	2E-16	2E-12	8E-12	2E-07	2E-09	2E-05	5E-10	5E-06	4E-11	1E-05
84-A	SVOC	Butylbenzylphthalate	85-68-7	2.00E-02	2.00E-02		7E-15	5E-11	2E-14	1E-10	3E-13	5E-09	8E-11	5E-07	2E-11	1E-07	2E-12	3E-08
84-A	SVOC	Carbazole	86-74-8	2.58E-01	2.58E-01		3E-13		9E-13		4E-11		1E-08		2E-09		2E-10	
84-A	SVOC	Chrysene	218-01-9	1.33E+00	1.33E+00		8E-12		2E-11		8E-11		2E-08		5E-09		5E-10	
84-A	SVOC	Dibenzofuran	132-64-9	1.45E-01	1.45E-01			1E-06		2E-06		4E-06		4E-04		1E-04		3E-04
84-A	SVOC	Di-n-butylphthalate	84-74-2	8.89E-02	8.89E-02	1E-12						5E-08		4E-06		1E-06		2E-07
84-A	SVOC	Fluoranthene	206-44-0	2.95E+00	2.95E+00			2E-07		6E-07		4E-06		4E-04		1E-04		3E-05
84-A	SVOC	Fluorene	86-73-7	1.59E-01	1.59E-01			4E-07		1E-06		3E-07		2E-05		8E-06		4E-06
84-A	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	4.93E-01	4.93E-01		6E-13		2E-12		3E-09		8E-07		2E-07		1E-08	
84-A	SVOC	2-Methylnaphthalene	91-57-6	2.00E-02	2.00E-02			4E-05		1E-04		2E-06		1E-04		9E-05		8E-04
84-A	SVOC	Naphthalene	91-20-3	5.65E-02	5.65E-02	3E-08		3E-04		9E-04		1E-05		6E-04		4E-04		4E-03

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
84-A	SVOC	Phenanthrene	85-01-8	2.39E+00	2.39E+00			2E-06		4E-06		5E-06		4E-04		1E-04		5E-05
84-A	SVOC	Pyrene	129-00-0	3.08E+00	3.08E+00			2E-07		6E-07		6E-06		5E-04		1E-04		4E-05
84-A	INORG	Antimony	7440-36-0	1.70E+00	1.61E+00							2E-04		1E-02		2E-03		8E-03
84-A	INORG	Arsenic	7440-38-2	1.20E+01	3.88E+00						4E-08	6E-04	1E-05	5E-02	1E-06	9E-03	2E-07	2E-03
84-A	INORG	Barium	7440-39-3	1.10E+02	1.43E+01													
84-A	INORG	Beryllium	7440-41-7	3.70E+00	3.11E+00						2E-09	4E-04	2E-09	6E-03	1E-09	8E-04	4E-09	8E-03
84-A	INORG	Cadmium	7440-43-9	1.40E+01	1.34E+01						7E-09	7E-04	8E-09	6E-02	4E-09	1E-02	1E-08	3E-02
84-A	INORG	Chromium (total)	7440-47-3	3.93E+01	7.34E+00						3E-08	2E-04	3E-08	9E-03	2E-08	1E-03	4E-08	3E-03
84-A	INORG	Cobalt	7440-48-4	9.00E+00	1.95E+00						2E-09	2E-04	2E-09	4E-04	1E-09	1E-04	3E-09	4E-03
84-A	INORG	Copper	7440-50-8	2.80E+02	2.52E+02							2E-04		2E-02		3E-03		1E-02
84-A	INORG	Cyanide (total)	57-12-5	6.50E-01	6.50E-01							1E-06		1E-04		2E-05		6E-05
84-A	INORG	Lead	7439-92-1	6.00E+02	6.00E+02													
84-A	INORG	Manganese	7439-96-5	4.20E+02														
84-A	INORG	Mercury	7439-97-6	5.48E-01	4.96E-01	2E-05		2E-03		5E-03		2E-04		1E-02		7E-03		6E-02
84-A	INORG	Nickel	7440-02-0	4.80E+01	2.80E+01						2E-09		2E-09		1E-09		3E-09	
84-A	INORG	Selenium	7782-49-2	1.20E+00	6.81E-01							5E-06		5E-04		7E-05		3E-04
84-A	INORG	Silver	7440-22-4	3.10E-01	1.22E-01							3E-05		1E-04		2E-05		5E-04
84-A	INORG	Thallium	7440-28-0	3.60E-01	1.63E-01							9E-05		9E-03		1E-03		5E-03
84-A	INORG	Vanadium	7440-62-2	2.30E+01														
84-A	INORG	Zinc	7440-66-6	1.00E+03	8.90E+02							1E-04		1E-02		1E-03		6E-03
84-B	SVOC	Benzo(a)anthracene	56-55-3	8.88E-02	8.88E-02		2E-12		6E-12		5E-10		1E-07		3E-08		3E-09	
84-B	SVOC	Benzo(a)pyrene	50-32-8	8.38E-02	8.38E-02		2E-12		7E-12		5E-09		1E-06		3E-07		2E-08	
84-B	SVOC	Benzo(b)fluoranthene	205-99-2	1.02E-01	1.02E-01		2E-11		7E-11		6E-10		2E-07		4E-08		3E-09	
84-B	SVOC	Benzo(k)fluoranthene	207-08-9	8.70E-02	8.70E-02		1E-14		4E-14		5E-11		1E-08		3E-09		3E-10	
84-B	SVOC	Chrysene	218-01-9	1.12E-01	1.12E-01		6E-13		2E-12		7E-12		2E-09		4E-10		4E-11	
84-B	SVOC	Diethylphthalate	84-66-2	9.27E-02	9.27E-02	3E-09		4E-09		9E-09		7E-09		6E-07		2E-07		7E-08
84-B	SVOC	Di-n-butylphthalate	84-74-2	8.02E-02	8.02E-02	9E-13						4E-08		4E-06		9E-07		2E-07
84-B	SVOC	Fluoranthene	206-44-0	1.78E-01	1.78E-01			1E-08		4E-08		3E-07		2E-05		6E-06		2E-06
84-B	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	4.35E-02	4.35E-02		5E-14		2E-13		3E-10		7E-08		2E-08		1E-09	
84-B	SVOC	Naphthalene	91-20-3	4.21E-02	4.21E-02	2E-08		3E-04		7E-04		8E-06		4E-04		3E-04		3E-03
84-B	SVOC	Phenanthrene	85-01-8	1.61E-01	1.61E-01			1E-07		3E-07		3E-07		3E-05		9E-06		3E-06
84-B	SVOC	Pyrene	129-00-0	2.04E-01	2.04E-01			2E-08		4E-08		4E-07		4E-05		1E-05		2E-06
84-B	INORG	Arsenic	7440-38-2	1.10E+01	2.88E+00						3E-08	4E-04	7E-06	4E-02	1E-06	7E-03	1E-07	1E-03
84-B	INORG	Barium	7440-39-3	7.50E+01														
84-B	INORG	Beryllium	7440-41-7	5.60E-01														
84-B	INORG	Cadmium	7440-43-9	1.90E-01														
84-B	INORG	Chromium (total)	7440-47-3	1.90E+01														
84-B	INORG	Cobalt	7440-48-4	9.30E+00	2.25E+00						2E-09	2E-04	2E-09	5E-04	1E-09	1E-04	3E-09	4E-03
84-B	INORG	Copper	7440-50-8	1.60E+01														
84-B	INORG	Cyanide (total)	57-12-5	5.30E-02	5.30E-02							1E-07		1E-05		1E-06		5E-06
84-B	INORG	Lead	7439-92-1	1.60E+01	1.60E+01													
84-B	INORG	Manganese	7439-96-5	4.20E+02														
84-B	INORG	Mercury	7439-97-6	3.56E-02														
84-B	INORG	Nickel	7440-02-0	2.40E+01	4.04E+00						3E-10		3E-10		2E-10		5E-10	
84-B	INORG	Silver	7440-22-4	9.90E-02														
84-B	INORG	Thallium	7440-28-0	2.00E-01	3.46E-03							2E-06		2E-04		2E-05		1E-04
84-B	INORG	Vanadium	7440-62-2	2.70E+01	2.13E+00							1E-05		1E-03		1E-04		6E-04
84-B	INORG	Zinc	7440-66-6	5.20E+01														
84-C	VOC	Methylcyclohexane	108-87-2	4.00E-02	4.00E-02	1E-07		7E-05		8E-05		3E-07		2E-05		1E-05		1E-04
84-C	SVOC	Benzo(a)anthracene	56-55-3	1.13E-01	1.13E-01		2E-12		7E-12		7E-10		2E-07		4E-08		3E-09	
84-C	SVOC	Benzo(a)pyrene	50-32-8	1.24E-01	1.24E-01		3E-12		1E-11		7E-09		2E-06		4E-07		4E-08	
84-C	SVOC	Benzo(b)fluoranthene	205-99-2	1.08E-01	1.08E-01		2E-11		7E-11		6E-10		2E-07		4E-08		3E-09	
84-C	SVOC	Benzo(g,h,i)perylene	191-24-2	9.24E-02	9.24E-02			8E-13		2E-12		2E-07		2E-05		4E-06		9E-07

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
84-C	SVOC	Benzo(k)fluoranthene	207-08-9	1.23E-01	1.23E-01		2E-14		6E-14		7E-11		2E-08		4E-09		4E-10	
84-C	SVOC	Chrysene	218-01-9	1.32E-01	1.32E-01		8E-13		2E-12		8E-12		2E-09		5E-10		5E-11	
84-C	SVOC	Diethylphthalate	84-66-2	5.97E-02	5.97E-02	2E-09		2E-09		6E-09		5E-09		4E-07		1E-07		5E-08
84-C	SVOC	Di-n-butylphthalate	84-74-2	7.20E-02	7.20E-02	8E-13						4E-08		3E-06		8E-07		2E-07
84-C	SVOC	Fluoranthene	206-44-0	2.21E-01	2.21E-01			2E-08		5E-08		3E-07		3E-05		8E-06		2E-06
84-C	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	8.29E-02	8.29E-02		9E-14		3E-13		5E-10		1E-07		3E-08		2E-09	
84-C	SVOC	Phenanthrene	85-01-8	1.43E-01	1.43E-01			1E-07		3E-07		3E-07		3E-05		8E-06		3E-06
84-C	SVOC	Pyrene	129-00-0	2.10E-01	2.10E-01			2E-08		4E-08		4E-07		4E-05		1E-05		3E-06
84-C	INORG	Antimony	7440-36-0	6.20E-01	5.34E-01							5E-05		5E-03		7E-04		3E-03
84-C	INORG	Arsenic	7440-38-2	1.90E+01	1.09E+01						1E-07	2E-03	3E-05	1E-01	4E-06	2E-02	5E-07	5E-03
84-C	INORG	Barium	7440-39-3	8.30E+01														
84-C	INORG	Beryllium	7440-41-7	8.80E-01	2.90E-01						2E-10	4E-05	2E-10	5E-04	1E-10	8E-05	3E-10	8E-04
84-C	INORG	Cadmium	7440-43-9	6.30E-01	4.23E-02						2E-11	2E-06	2E-11	2E-04	1E-11	3E-05	4E-11	1E-04
84-C	INORG	Chromium (total)	7440-47-3	1.90E+01														
84-C	INORG	Cobalt	7440-48-4	8.90E+00	1.85E+00						2E-09	2E-04	2E-09	4E-04	1E-09	9E-05	3E-09	3E-03
84-C	INORG	Copper	7440-50-8	2.60E+01														
84-C	INORG	Cyanide (total)	57-12-5	7.10E-02	7.10E-02							1E-07		1E-05		2E-06		7E-06
84-C	INORG	Lead	7439-92-1	1.40E+02	1.40E+02													
84-C	INORG	Manganese	7439-96-5	3.30E+02														
84-C	INORG	Mercury	7439-97-6	6.61E-02	1.37E-02	4E-07		5E-05		1E-04		6E-06		4E-04		2E-04		2E-03
84-C	INORG	Nickel	7440-02-0	2.00E+01	4.06E-02						3E-12		3E-12		2E-12		5E-12	
84-C	INORG	Selenium	7782-49-2	1.00E+00	4.81E-01							4E-06		4E-04		5E-05		2E-04
84-C	INORG	Silver	7440-22-4	1.80E-01														
84-C	INORG	Thallium	7440-28-0	1.20E+00	1.00E+00							6E-04		5E-02		7E-03		3E-02
84-C	INORG	Vanadium	7440-62-2	2.80E+01	3.13E+00							2E-05		2E-03		2E-04		9E-04
84-C	INORG	Zinc	7440-66-6	8.40E+01														
84-D	VOC	Acetone	67-64-1	5.70E-02	5.70E-02	3E-09		1E-06		3E-06		4E-08		2E-06		2E-06		1E-05
84-D	VOC	Benzene	71-43-2	3.00E-02	3.00E-02	5E-05	3E-07	4E-03	6E-07	6E-03	4E-10	1E-05	6E-08	6E-04	4E-08	4E-04	1E-08	2E-03
84-D	VOC	Chloromethane	74-87-3	2.40E-02	2.40E-02	2E-06		1E-03		2E-03		5E-06		2E-04		2E-04		2E-03
84-D	VOC	Cumene	98-82-8	2.00E-02	2.00E-02	2E-07		7E-05		2E-04		2E-07		1E-05		1E-05		9E-05
84-D	VOC	Cyclohexane	110-82-7	7.00E-02	7.00E-02	5E-07		6E-05		7E-05		2E-07		1E-05		9E-06		8E-05
84-D	VOC	1,1-Dichloroethane	75-34-3	6.80E-03	6.80E-03	1E-07		7E-05		8E-05		2E-07		9E-06		7E-06		6E-06
84-D	VOC	cis-1,2-Dichloroethene	156-59-2	2.60E-01	2.60E-01	2E-06		3E-02		4E-02		7E-05		4E-03		3E-03		3E-03
84-D	VOC	trans-1,2-Dichloroethene	156-60-5	4.00E-02	4.00E-02	4E-07		3E-03		4E-03		8E-06		4E-04		3E-04		3E-03
84-D	VOC	Ethyl Benzene	100-41-4	3.00E-02	3.00E-02	1E-07		4E-05		1E-04		2E-07		1E-05		7E-06		6E-05
84-D	VOC	Methylcyclohexane	108-87-2	1.90E-01	1.90E-01	7E-07		3E-04		4E-04		2E-06		8E-05		6E-05		6E-04
84-D	VOC	Styrene	100-42-5	2.00E-02	2.00E-02	4E-08		5E-06		1E-05		5E-08		3E-06		2E-06		6E-06
84-D	VOC	Tetrachloroethene	127-18-4	3.00E-02	3.00E-02	1E-06	2E-07	4E-04	2E-07	4E-04	2E-10	1E-06	3E-08	6E-05	2E-08	4E-05	6E-09	3E-04
84-D	VOC	Toluene	108-88-3	1.20E-01	1.20E-01	1E-06		5E-05		1E-04		2E-07		2E-05		8E-06		7E-05
84-D	VOC	Trichloroethene	79-01-6	4.10E+00	4.10E+00	8E-05	9E-06		2E-05		9E-09		2E-06		9E-07		3E-07	
84-D	VOC	Xylenes (total)	1330-20-7	2.10E-01	2.10E-01	8E-07		3E-03		6E-03		1E-05		6E-04		4E-04		4E-03
84-D	SVOC	Acenaphthene	83-32-9	5.00E-02	5.00E-02			4E-07		1E-06		8E-08		6E-06		2E-06		2E-06
84-D	SVOC	Anthracene	120-12-7	1.00E-01	1.00E-01							2E-08		2E-06		4E-07		9E-08
84-D	SVOC	Benzo(a)anthracene	56-55-3	2.00E-01	2.00E-01		4E-12		1E-11		1E-09		3E-07		7E-08		6E-09	
84-D	SVOC	Benzo(a)pyrene	50-32-8	1.00E-01	1.00E-01		3E-12		8E-12		6E-09		2E-06		3E-07		3E-08	
84-D	SVOC	Benzo(b)fluoranthene	205-99-2	1.00E-01	1.00E-01		2E-11		7E-11		6E-10		2E-07		4E-08		3E-09	
84-D	SVOC	Benzo(g,h,i)perylene	191-24-2	3.00E-01	3.00E-01			2E-12		6E-12		6E-07		5E-05		1E-05		3E-06
84-D	SVOC	Benzo(k)fluoranthene	207-08-9	2.00E-01	2.00E-01		3E-14		1E-13		1E-10		3E-08		7E-09		6E-10	
84-D	SVOC	Carbazole	86-74-8	7.00E-02	7.00E-02		8E-14		2E-13		1E-11		3E-09		6E-10		6E-11	
84-D	SVOC	Chrysene	218-01-9	2.00E-01	2.00E-01		1E-12		4E-12		1E-11		3E-09		7E-10		7E-11	
84-D	SVOC	Dibenz(a,h)anthracene	53-70-3	2.00E-01	2.00E-01		3E-14		8E-14		1E-08		3E-06		7E-07		6E-08	
84-D	SVOC	Dibenzofuran	132-64-9	6.00E-02	6.00E-02			4E-07		1E-06		2E-06		2E-04		4E-05		1E-04
84-D	SVOC	Diethylphthalate	84-66-2	2.00E-02	2.00E-02	6E-10		8E-10		2E-09		2E-09		1E-07		4E-08		2E-08

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
84-D	SVOC	Di-n-butylphthalate	84-74-2	3.00E-02	3.00E-02	3E-13						2E-08		1E-06		3E-07		8E-08
84-D	SVOC	Fluoranthene	206-44-0	4.60E-01	4.60E-01			4E-08		1E-07		7E-07		6E-05		2E-05		4E-06
84-D	SVOC	Fluorene	86-73-7	7.00E-02	7.00E-02			2E-07		5E-07		1E-07		1E-05		4E-06		2E-06
84-D	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	3.00E-01	3.00E-01		3E-13		1E-12		2E-09		5E-07		1E-07		9E-09	
84-D	SVOC	2-Methylnaphthalene	91-57-6	4.00E-02	4.00E-02			9E-05		2E-04		4E-06		3E-04		2E-04		2E-03
84-D	SVOC	Naphthalene	91-20-3	5.00E-02	5.00E-02	3E-08		3E-04		8E-04		9E-06		5E-04		4E-04		4E-03
84-D	SVOC	Phenanthrene	85-01-8	5.40E-01	5.40E-01			4E-07		1E-06		1E-06		1E-04		3E-05		1E-05
84-D	SVOC	Pyrene	129-00-0	3.60E-01	3.60E-01			3E-08		7E-08		7E-07		6E-05		2E-05		4E-06
84-D	INORG	Antimony	7440-36-0	4.70E-01	3.84E-01							4E-05		4E-03		5E-04		2E-03
84-D	INORG	Arsenic	7440-38-2	1.10E+01	2.88E+00						3E-08	4E-04	7E-06	4E-02	1E-06	7E-03	1E-07	1E-03
84-D	INORG	Barium	7440-39-3	9.80E+01	2.31E+00													
84-D	INORG	Beryllium	7440-41-7	7.80E-01	1.90E-01						1E-10	2E-05	1E-10	4E-04	8E-11	5E-05	2E-10	5E-04
84-D	INORG	Cadmium	7440-43-9	5.40E-01														
84-D	INORG	Chromium (total)	7440-47-3	5.00E+01	1.80E+01						6E-08	6E-04	7E-08	2E-02	4E-08	3E-03	1E-07	8E-03
84-D	INORG	Cobalt	7440-48-4	1.10E+01	3.95E+00						3E-09	4E-04	3E-09	9E-04	2E-09	2E-04	5E-09	7E-03
84-D	INORG	Copper	7440-50-8	7.70E+01	4.85E+01							5E-05		4E-03		6E-04		2E-03
84-D	INORG	Cyanide (total)	57-12-5	5.60E-02	5.60E-02							1E-07		1E-05		1E-06		6E-06
84-D	INORG	Lead	7439-92-1	1.70E+02	1.70E+02													
84-D	INORG	Manganese	7439-96-5	7.80E+02	3.03E+02							1E-02		1E-02		4E-03		2E-01
84-D	INORG	Mercury	7439-97-6	1.34E-01	8.16E-02	3E-06		3E-04		8E-04		4E-05		2E-03		1E-03		1E-02
84-D	INORG	Nickel	7440-02-0	3.70E+01	1.70E+01						1E-09		1E-09		8E-10		2E-09	
84-D	INORG	Selenium	7782-49-2	9.20E-01	4.01E-01							3E-06		3E-04		4E-05		2E-04
84-D	INORG	Silver	7440-22-4	2.20E-01	3.23E-02							7E-06		3E-05		5E-06		1E-04
84-D	INORG	Thallium	7440-28-0	2.50E-01	5.35E-02							3E-05		3E-03		4E-04		2E-03
84-D	INORG	Vanadium	7440-62-2	3.80E+01	1.31E+01							7E-05		7E-03		9E-04		4E-03
84-D	INORG	Zinc	7440-66-6	9.60E+01														
85-1	VOC	Benzene	71-43-2	4.20E-02	4.20E-02	8E-05	5E-07	6E-03	8E-07	8E-03	5E-10	2E-05	8E-08	8E-04	5E-08	6E-04	2E-08	3E-03
85-1	VOC	2-Butanone	78-93-3	4.50E-02	4.50E-02	1E-08		9E-07		2E-06		2E-08		1E-06		8E-07		7E-06
85-1	VOC	Cumene	98-82-8	6.40E-01	6.40E-01	5E-06		2E-03		5E-03		8E-06		4E-04		3E-04		3E-03
85-1	VOC	Cyclohexane	110-82-7	9.90E+00	9.90E+00	7E-05		8E-03		1E-02		3E-05		2E-03		1E-03		1E-02
85-1	VOC	Ethyl Benzene	100-41-4	5.50E+00	5.50E+00	3E-05		8E-03		2E-02		3E-05		2E-03		1E-03		1E-02
85-1	VOC	Methyl Acetate	79-20-9	8.80E-02	8.80E-02	3E-08		4E-06		1E-05		7E-08		4E-06		3E-06		3E-06
85-1	VOC	Methylcyclohexane	108-87-2	7.00E+00	7.00E+00	3E-05		1E-02		1E-02		6E-05		3E-03		2E-03		2E-02
85-1	VOC	Methylene Chloride	75-09-2	9.00E-02	9.00E-02	4E-06	4E-08	9E-05	1E-07	2E-04	7E-11	4E-07	1E-08	2E-05	7E-09	1E-05	3E-09	1E-04
85-1	VOC	Tetrachloroethene	127-18-4	2.20E+00	2.20E+00	1E-04	1E-05	3E-02	2E-05	3E-02	1E-08	7E-05	2E-06	4E-03	1E-06	3E-03	4E-07	2E-02
85-1	VOC	1,1,1-Trichloroethane	71-55-6	2.90E-01	2.90E-01	1E-06		7E-04		8E-04		2E-06		9E-05		7E-05		7E-05
85-1	VOC	Trichloroethene	79-01-6	2.80E+00	2.80E+00	5E-05	6E-06		1E-05		6E-09		1E-06		6E-07		2E-07	
85-1	VOC	Xylenes (total)	1330-20-7	1.30E+01	1.30E+01	5E-05		2E-01		4E-01		7E-04		4E-02		3E-02		3E-01
85-1	SVOC	Anthracene	120-12-7	4.13E-02	4.13E-02							8E-09		7E-07		2E-07		4E-08
85-1	SVOC	Benzo(a)anthracene	56-55-3	1.49E-01	1.49E-01		3E-12		9E-12		9E-10		2E-07		5E-08		5E-09	
85-1	SVOC	Benzo(a)pyrene	50-32-8	1.50E-01	1.50E-01		4E-12		1E-11		9E-09		2E-06		5E-07		4E-08	
85-1	SVOC	Benzo(b)fluoranthene	205-99-2	2.85E-01	2.85E-01		6E-11		2E-10		2E-09		5E-07		1E-07		9E-09	
85-1	SVOC	Benzo(g,h,i)perylene	191-24-2	5.94E-02	5.94E-02			5E-13		1E-12		1E-07		1E-05		3E-06		6E-07
85-1	SVOC	Benzo(k)fluoranthene	207-08-9	1.63E-01	1.63E-01		3E-14		8E-14		1E-10		3E-08		6E-09		5E-10	
85-1	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	1.82E-01	1.82E-01	3E-14	1E-16	1E-12	4E-16	4E-12	2E-11	5E-07	5E-09	4E-05	1E-09	1E-05	1E-10	2E-05
85-1	SVOC	Butylbenzylphthalate	85-68-7	5.62E-02	5.62E-02		2E-14	1E-10	6E-14	3E-10	8E-13	2E-08	2E-10	1E-06	4E-11	3E-07	4E-12	8E-08
85-1	SVOC	Caprolactam	105-60-2	6.82E-02	6.82E-02	8E-10		1E-09		4E-09		1E-08		8E-07		3E-07		1E-06
85-1	SVOC	Chrysene	218-01-9	1.70E-01	1.70E-01		1E-12		3E-12		1E-11		3E-09		6E-10		6E-11	
85-1	SVOC	Dibenzofuran	132-64-9	4.92E-02	4.92E-02			3E-07		8E-07		1E-06		1E-04		3E-05		1E-04
85-1	SVOC	Diethylphthalate	84-66-2	1.68E-01	1.68E-01	5E-09		6E-09		2E-08		1E-08		1E-06		3E-07		1E-07
85-1	SVOC	Di-n-butylphthalate	84-74-2	1.03E-01	1.03E-01	1E-12						5E-08		5E-06		1E-06		3E-07
85-1	SVOC	Fluoranthene	206-44-0	1.96E-01	1.96E-01			2E-08		4E-08		3E-07		3E-05		7E-06		2E-06
85-1	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	4.63E-02	4.63E-02		5E-14		2E-13		3E-10		7E-08		2E-08		1E-09	

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
85-1	SVOC	2-Methylnaphthalene	91-57-6	8.23E-01	8.23E-01			2E-03		4E-03		9E-05		5E-03		4E-03		3E-02
85-1	SVOC	Naphthalene	91-20-3	5.74E-01	5.74E-01	3E-07		4E-03		9E-03		1E-04		6E-03		4E-03		4E-02
85-1	SVOC	Phenanthrene	85-01-8	2.86E-01	2.86E-01			2E-07		5E-07		6E-07		5E-05		2E-05		6E-06
85-1	SVOC	Pyrene	129-00-0	4.24E-01	4.24E-01			3E-08		8E-08		8E-07		7E-05		2E-05		5E-06
85-1	PCB	PCBs (total)	1336-36-3	8.55E-02	8.55E-02	2E-08	1E-09		3E-09		2E-09	2E-04	4E-07	2E-02	1E-07	6E-03	1E-08	5E-03
85-1	INORG	Antimony	7440-36-0	1.40E-01	5.36E-02							5E-06		5E-04		7E-05		3E-04
85-1	INORG	Arsenic	7440-38-2	8.70E+00	5.77E-01						6E-09	8E-05	1E-06	8E-03	2E-07	1E-03	3E-08	2E-04
85-1	INORG	Barium	7440-39-3	8.00E+01														
85-1	INORG	Beryllium	7440-41-7	1.00E+00	4.10E-01						3E-10	5E-05	3E-10	8E-04	2E-10	1E-04	5E-10	1E-03
85-1	INORG	Cadmium	7440-43-9	2.50E-01														
85-1	INORG	Chromium (total)	7440-47-3	2.00E+01														
85-1	INORG	Cobalt	7440-48-4	1.00E+01	2.95E+00						2E-09	3E-04	3E-09	6E-04	2E-09	1E-04	4E-09	5E-03
85-1	INORG	Copper	7440-50-8	4.50E+01	1.65E+01							2E-05		2E-03		2E-04		8E-04
85-1	INORG	Cyanide (total)	57-12-5	1.60E-01	1.60E-01							3E-07		3E-05		4E-06		2E-05
85-1	INORG	Lead	7439-92-1	8.50E+01	8.50E+01													
85-1	INORG	Manganese	7439-96-5	4.90E+02	1.25E+01							5E-04		5E-04		2E-04		9E-03
85-1	INORG	Mercury	7439-97-6	2.45E-01	1.93E-01	6E-06		7E-04		2E-03		9E-05		6E-03		3E-03		3E-02
85-1	INORG	Nickel	7440-02-0	2.60E+01	6.04E+00						4E-10		5E-10		3E-10		7E-10	
85-1	INORG	Selenium	7782-49-2	2.90E-01														
85-1	INORG	Silver	7440-22-4	1.90E-01	2.28E-03							5E-07		2E-06		3E-07		9E-06
85-1	INORG	Thallium	7440-28-0	3.60E-01	1.63E-01							9E-05		9E-03		1E-03		5E-03
85-1	INORG	Vanadium	7440-62-2	3.10E+01	6.13E+00							3E-05		3E-03		4E-04		2E-03
85-1	INORG	Zinc	7440-66-6	5.60E+01														
86-1	VOC	Benzene	71-43-2	1.00E-01	1.00E-01	2E-04	1E-06	1E-02	2E-06	2E-02	1E-09	4E-05	2E-07	2E-03	1E-07	1E-03	5E-08	7E-03
86-1	VOC	Chloroethane	75-00-3	1.80E-01	1.80E-01	5E-07		9E-05		1E-04		5E-07		3E-05		2E-05		2E-04
86-1	VOC	Chloromethane	74-87-3	9.90E-02	9.90E-02	7E-06		6E-03		6E-03		2E-05		1E-03		8E-04		7E-03
86-1	VOC	Cumene	98-82-8	1.40E-01	1.40E-01	1E-06		5E-04		1E-03		2E-06		1E-04		7E-05		7E-04
86-1	VOC	Cyclohexane	110-82-7	4.80E-02	4.80E-02	3E-07		4E-05		5E-05		1E-07		8E-06		6E-06		6E-05
86-1	VOC	1,1-Dichloroethane	75-34-3	9.80E-02	9.80E-02	2E-06		1E-03		1E-03		2E-06		1E-04		9E-05		9E-05
86-1	VOC	cis-1,2-Dichloroethene	156-59-2	9.70E-02	9.70E-02	7E-07		1E-02		2E-02		3E-05		1E-03		1E-03		1E-03
86-1	VOC	Ethyl Benzene	100-41-4	1.80E-01	1.80E-01	9E-07		3E-04		7E-04		1E-06		6E-05		4E-05		4E-04
86-1	VOC	Methyl Acetate	79-20-9	6.30E-01	6.30E-01	2E-07		3E-05		7E-05		5E-07		3E-05		2E-05		2E-05
86-1	VOC	4-Methyl-2-pentanone	108-10-1	2.40E-01	2.40E-01	2E-07		2E-05		4E-05		2E-07		1E-05		8E-06		8E-05
86-1	VOC	Methylcyclohexane	108-87-2	1.50E+00	1.50E+00	6E-06		3E-03		3E-03		1E-05		6E-04		5E-04		5E-03
86-1	VOC	Methylene Chloride	75-09-2	1.10E+00	1.10E+00	5E-05	5E-07	1E-03	1E-06	2E-03	8E-10	5E-06	1E-07	3E-04	8E-08	2E-04	3E-08	2E-03
86-1	VOC	Tetrachloroethene	127-18-4	1.80E-01	1.80E-01	8E-06	1E-06	2E-03	1E-06	3E-03	9E-10	6E-06	2E-07	3E-04	9E-08	2E-04	3E-08	2E-03
86-1	VOC	Toluene	108-88-3	6.70E-01	6.70E-01	6E-06		3E-04		8E-04		1E-06		8E-05		5E-05		4E-04
86-1	VOC	1,1,1-Trichloroethane	71-55-6	1.50E+00	1.50E+00	6E-06		3E-03		4E-03		9E-06		5E-04		4E-04		4E-04
86-1	VOC	Trichloroethene	79-01-6	5.50E+00	5.50E+00	1E-04	1E-05		2E-05		1E-08		2E-06		1E-06		5E-07	
86-1	VOC	Trichlorofluoromethane	75-69-4	1.10E-02	1.10E-02	1E-08		8E-05		9E-05		4E-07		2E-05		2E-05		1E-05
86-1	VOC	Xylenes (total)	1330-20-7	1.48E+00	1.48E+00	6E-06		2E-02		5E-02		8E-05		4E-03		3E-03		3E-02
86-1	SVOC	Acenaphthene	83-32-9	3.96E-02	3.96E-02			3E-07		8E-07		6E-08		5E-06		2E-06		1E-06
86-1	SVOC	Acenaphthylene	208-96-8	6.14E-01	6.14E-01			7E-06		2E-05		2E-06		1E-04		6E-05		3E-05
86-1	SVOC	Anthracene	120-12-7	2.89E-01	2.89E-01							5E-08		5E-06		1E-06		3E-07
86-1	SVOC	Benzo(a)anthracene	56-55-3	2.45E+00	2.45E+00		5E-11		2E-10		1E-08		4E-06		9E-07		8E-08	
86-1	SVOC	Benzo(a)pyrene	50-32-8	3.85E+00	3.85E+00		1E-10		3E-10		2E-07		6E-05		1E-05		1E-06	
86-1	SVOC	Benzo(b)fluoranthene	205-99-2	4.34E+00	4.34E+00		9E-10		3E-09		3E-08		7E-06		2E-06		1E-07	
86-1	SVOC	Benzo(g,h,i)perylene	191-24-2	4.51E+00	4.51E+00			4E-11		9E-11		9E-06		8E-04		2E-04		4E-05
86-1	SVOC	Benzo(k)fluoranthene	207-08-9	3.50E+00	3.50E+00		6E-13		2E-12		2E-09		6E-07		1E-07		1E-08	
86-1	SVOC	Biphenyl	92-52-4	1.90E-01	1.90E-01	6E-07		2E-06		6E-06		4E-07		3E-05		1E-05		8E-05
86-1	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	4.74E-01	4.74E-01	7E-14	4E-16	4E-12	1E-15	9E-12	5E-11	1E-06	1E-08	1E-04	3E-09	3E-05	2E-10	6E-05
86-1	SVOC	Butylbenzylphthalate	85-68-7	3.78E-01	3.78E-01		1E-13	9E-10	4E-13	2E-09	5E-12	1E-07	1E-09	9E-06	3E-10	2E-06	3E-11	6E-07
86-1	SVOC	Carbazole	86-74-8	1.38E-01	1.38E-01		2E-13		5E-13		2E-11		6E-09		1E-09		1E-10	

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
86-1	SVOC	Chrysene	218-01-9	2.95E+00	2.95E+00		2E-11		5E-11		2E-10		5E-08		1E-08		1E-09	
86-1	SVOC	Dibenz(a,h)anthracene	53-70-3	1.33E+00	1.33E+00		2E-13		5E-13		8E-08		2E-05		5E-06		4E-07	
86-1	SVOC	Dibenzofuran	132-64-9	2.31E-01	2.31E-01			2E-06		4E-06		7E-06		6E-04		2E-04		5E-04
86-1	SVOC	Diethylphthalate	84-66-2	1.77E-01	1.77E-01	6E-09		7E-09		2E-08		1E-08		1E-06		3E-07		1E-07
86-1	SVOC	Fluoranthene	206-44-0	2.21E+00	2.21E+00			2E-07		5E-07		3E-06		3E-04		8E-05		2E-05
86-1	SVOC	Fluorene	86-73-7	5.68E-02	5.68E-02			1E-07		4E-07		1E-07		9E-06		3E-06		1E-06
86-1	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	4.02E+00	4.02E+00		5E-12		1E-11		2E-08		6E-06		1E-06		1E-07	
86-1	SVOC	2-Methylnaphthalene	91-57-6	7.35E+00	7.35E+00			2E-02		4E-02		8E-04		5E-02		3E-02		3E-01
86-1	SVOC	Naphthalene	91-20-3	1.85E+00	1.85E+00	1E-06		1E-02		3E-02		3E-04		2E-02		1E-02		1E-01
86-1	SVOC	Phenanthrene	85-01-8	1.03E+00	1.03E+00			7E-07		2E-06		2E-06		2E-04		6E-05		2E-05
86-1	SVOC	Pyrene	129-00-0	5.00E+00	5.00E+00			4E-07		1E-06		1E-05		9E-04		2E-04		6E-05
86-1	PCB	PCBs (total)	1336-36-3	3.79E+00	3.79E+00	7E-07	5E-08		1E-07		7E-08	1E-02	2E-05	1E+00	4E-06	3E-01	5E-07	2E-01
86-1	INORG	Antimony	7440-36-0	1.10E+00	1.01E+00							1E-04		9E-03		1E-03		5E-03
86-1	INORG	Arsenic	7440-38-2	1.90E+02	1.82E+02						2E-06	3E-02	5E-04	2E+00	7E-05	4E-01	9E-06	8E-02
86-1	INORG	Barium	7440-39-3	2.00E+02	1.04E+02													
86-1	INORG	Beryllium	7440-41-7	1.60E+00	1.01E+00						7E-10	1E-04	8E-10	2E-03	4E-10	3E-04	1E-09	3E-03
86-1	INORG	Cadmium	7440-43-9	4.40E+00	3.81E+00						2E-09	2E-04	2E-09	2E-02	1E-09	3E-03	3E-09	9E-03
86-1	INORG	Chromium (total)	7440-47-3	3.80E+01	6.04E+00						2E-08	2E-04	2E-08	7E-03	1E-08	1E-03	4E-08	3E-03
86-1	INORG	Cobalt	7440-48-4	7.40E+01	6.69E+01						6E-08	7E-03	6E-08	1E-02	3E-08	3E-03	9E-08	1E-01
86-1	INORG	Copper	7440-50-8	4.60E+02	4.32E+02							4E-04		4E-02		5E-03		2E-02
86-1	INORG	Cyanide (total)	57-12-5	3.60E-01	3.60E-01							7E-07		7E-05		9E-06		4E-05
86-1	INORG	Lead	7439-92-1	6.30E+02	6.30E+02													
86-1	INORG	Manganese	7439-96-5	3.20E+03	2.72E+03							1E-01		1E-01		4E-02		2E+00
86-1	INORG	Mercury	7439-97-6	3.83E-01	3.31E-01	1E-05		1E-03		3E-03		2E-04		1E-02		5E-03		4E-02
86-1	INORG	Nickel	7440-02-0	1.50E+02	1.30E+02						9E-09		1E-08		6E-09		2E-08	
86-1	INORG	Selenium	7782-49-2	4.80E+00	4.28E+00							3E-05		3E-03		4E-04		2E-03
86-1	INORG	Silver	7440-22-4	6.20E-01	4.32E-01							9E-05		3E-04		6E-05		2E-03
86-1	INORG	Thallium	7440-28-0	5.70E-01	3.73E-01							2E-04		2E-02		3E-03		1E-02
86-1	INORG	Vanadium	7440-62-2	4.80E+01	2.31E+01							1E-04		1E-02		2E-03		6E-03
86-1	INORG	Zinc	7440-66-6	5.40E+02	4.30E+02							6E-05		5E-03		7E-04		3E-03
94-A	VOC	Methyl Acetate	79-20-9	4.50E-02	4.50E-02	2E-08		2E-06		5E-06		4E-08		2E-06		1E-06		1E-06
94-A	VOC	Methylcyclohexane	108-87-2	3.30E-02	3.30E-02	1E-07		6E-05		6E-05		3E-07		1E-05		1E-05		1E-04
94-A	VOC	Xylenes (total)	1330-20-7	1.04E-01	1.04E-01	4E-07		1E-03		3E-03		5E-06		3E-04		2E-04		2E-03
94-A	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	1.02E-01	1.02E-01	2E-14	8E-17	8E-13	2E-16	2E-12	1E-11	3E-07	3E-09	2E-05	6E-10	6E-06	5E-11	1E-05
94-A	INORG	Antimony	7440-36-0	5.20E-02														
94-A	INORG	Arsenic	7440-38-2	1.60E+01	7.88E+00						8E-08	1E-03	2E-05	1E-01	3E-06	2E-02	4E-07	3E-03
94-A	INORG	Barium	7440-39-3	6.90E+01														
94-A	INORG	Beryllium	7440-41-7	6.00E-01	1.00E-02						7E-12	1E-06	7E-12	2E-05	4E-12	3E-06	1E-11	3E-05
94-A	INORG	Cadmium	7440-43-9	6.50E-01	6.23E-02						3E-11	3E-06	3E-11	3E-04	2E-11	5E-05	5E-11	1E-04
94-A	INORG	Chromium (total)	7440-47-3	2.00E+01														
94-A	INORG	Cobalt	7440-48-4	7.90E+00	8.46E-01						7E-10	9E-05	7E-10	2E-04	4E-10	4E-05	1E-09	2E-03
94-A	INORG	Copper	7440-50-8	2.60E+01														
94-A	INORG	Lead	7439-92-1	1.60E+01	1.60E+01													
94-A	INORG	Manganese	7439-96-5	1.30E+03	8.23E+02							3E-02		3E-02		1E-02		6E-01
94-A	INORG	Mercury	7439-97-6	3.26E-02														
94-A	INORG	Nickel	7440-02-0	2.20E+01	2.04E+00						1E-10		2E-10		9E-11		2E-10	
94-A	INORG	Selenium	7782-49-2	1.10E+00	5.81E-01							5E-06		4E-04		6E-05		2E-04
94-A	INORG	Silver	7440-22-4	1.70E-01														
94-A	INORG	Thallium	7440-28-0	1.80E-01														
94-A	INORG	Vanadium	7440-62-2	5.20E+01	2.71E+01							2E-04		1E-02		2E-03		8E-03
94-A	INORG	Zinc	7440-66-6	7.50E+01														
94-B	VOC	Methylcyclohexane	108-87-2	9.00E-03	9.00E-03	3E-08		2E-05		2E-05		7E-08		4E-06		3E-06		3E-05
94-B	VOC	Toluene	108-88-3	9.80E-02	9.80E-02	8E-07		4E-05		1E-04		2E-07		1E-05		7E-06		6E-05

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
94-B	SVOC	Anthracene	120-12-7	5.26E-02	5.26E-02							1E-08		9E-07		2E-07		5E-08
94-B	SVOC	Benzo(a)anthracene	56-55-3	2.09E-01	2.09E-01		4E-12		1E-11		1E-09		3E-07		7E-08		6E-09	
94-B	SVOC	Benzo(a)pyrene	50-32-8	2.27E-01	2.27E-01		6E-12		2E-11		1E-08		4E-06		8E-07		7E-08	
94-B	SVOC	Benzo(b)fluoranthene	205-99-2	2.31E-01	2.31E-01		5E-11		2E-10		1E-09		4E-07		8E-08		7E-09	
94-B	SVOC	Benzo(g,h,i)perylene	191-24-2	1.07E-01	1.07E-01			9E-13		2E-12		2E-07		2E-05		5E-06		1E-06
94-B	SVOC	Benzo(k)fluoranthene	207-08-9	2.53E-01	2.53E-01		4E-14		1E-13		1E-10		4E-08		9E-09		7E-10	
94-B	SVOC	Butylbenzylphthalate	85-68-7	5.41E-02	5.41E-02		2E-14	1E-10	5E-14	3E-10	8E-13	1E-08	2E-10	1E-06	4E-11	3E-07	4E-12	8E-08
94-B	SVOC	Chrysene	218-01-9	2.36E-01	2.36E-01		1E-12		4E-12		1E-11		4E-09		9E-10		8E-11	
94-B	SVOC	Diethylphthalate	84-66-2	6.02E-02	6.02E-02	2E-09		2E-09		6E-09		5E-09		4E-07		1E-07		5E-08
94-B	SVOC	Fluoranthene	206-44-0	4.71E-01	4.71E-01			4E-08		1E-07		7E-07		6E-05		2E-05		5E-06
94-B	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	1.12E-01	1.12E-01		1E-13		4E-13		7E-10		2E-07		4E-08		3E-09	
94-B	SVOC	2-Methylnaphthalene	91-57-6	1.00E-02	1.00E-02			2E-05		5E-05		1E-06		6E-05		4E-05		4E-04
94-B	SVOC	Phenanthrene	85-01-8	2.64E-01	2.64E-01			2E-07		5E-07		6E-07		5E-05		1E-05		5E-06
94-B	SVOC	Pyrene	129-00-0	4.89E-01	4.89E-01			4E-08		1E-07		1E-06		9E-05		2E-05		6E-06
94-B	INORG	Antimony	7440-36-0	1.40E-01	5.36E-02							5E-06		5E-04		7E-05		3E-04
94-B	INORG	Arsenic	7440-38-2	8.20E+00	7.69E-02						8E-10	1E-05	2E-07	1E-03	3E-08	2E-04	4E-09	3E-05
94-B	INORG	Barium	7440-39-3	1.10E+02	1.43E+01													
94-B	INORG	Beryllium	7440-41-7	5.40E-01														
94-B	INORG	Cadmium	7440-43-9	7.00E-01	1.12E-01						6E-11	6E-06	6E-11	5E-04	4E-11	8E-05	1E-10	3E-04
94-B	INORG	Chromium (total)	7440-47-3	2.00E+01														
94-B	INORG	Cobalt	7440-48-4	8.00E+00	9.46E-01						8E-10	1E-04	8E-10	2E-04	5E-10	5E-05	1E-09	2E-03
94-B	INORG	Copper	7440-50-8	2.90E+01	5.38E-01							5E-07		5E-05		7E-06		3E-05
94-B	INORG	Cyanide (total)	57-12-5	9.90E-02	9.90E-02							2E-07		2E-05		2E-06		1E-05
94-B	INORG	Lead	7439-92-1	1.10E+02	1.10E+02													
94-B	INORG	Manganese	7439-96-5	4.60E+02														
94-B	INORG	Mercury	7439-97-6	1.12E-01	5.96E-02	2E-06		2E-04		6E-04		3E-05		2E-03		9E-04		8E-03
94-B	INORG	Nickel	7440-02-0	2.30E+01	3.04E+00						2E-10		2E-10		1E-10		4E-10	
94-B	INORG	Selenium	7782-49-2	6.20E-01	1.01E-01							8E-07		7E-05		1E-05		4E-05
94-B	INORG	Silver	7440-22-4	2.00E-01	1.23E-02							3E-06		1E-05		2E-06		5E-05
94-B	INORG	Thallium	7440-28-0	1.60E-01														
94-B	INORG	Vanadium	7440-62-2	2.60E+01	1.13E+00							6E-06		6E-04		8E-05		3E-04
94-B	INORG	Zinc	7440-66-6	1.60E+02	4.95E+01							7E-06		6E-04		8E-05		3E-04
94-C	VOC	Cyclohexane	110-82-7	2.10E-02	2.10E-02	1E-07		2E-05		2E-05		6E-08		3E-06		3E-06		2E-05
94-C	VOC	Ethyl Benzene	100-41-4	2.10E-02	2.10E-02	1E-07		3E-05		8E-05		1E-07		7E-06		5E-06		5E-05
94-C	VOC	Methylcyclohexane	108-87-2	7.80E-02	7.80E-02	3E-07		1E-04		2E-04		6E-07		3E-05		3E-05		2E-04
94-C	VOC	Methylene Chloride	75-09-2	5.20E-02	5.20E-02	3E-06	3E-08	5E-05	6E-08	1E-04	4E-11	2E-07	7E-09	1E-05	4E-09	8E-06	1E-09	7E-05
94-C	VOC	Xylenes (total)	1330-20-7	1.05E-01	1.05E-01	4E-07		1E-03		3E-03		5E-06		3E-04		2E-04		2E-03
94-C	SVOC	Acenaphthene	83-32-9	2.42E-02	2.42E-02			2E-07		5E-07		4E-08		3E-06		1E-06		7E-07
94-C	SVOC	Anthracene	120-12-7	7.51E-02	7.51E-02							1E-08		1E-06		3E-07		7E-08
94-C	SVOC	Benzaldehyde	100-52-7	9.68E-02	9.68E-02			7E-06		2E-05		3E-07		2E-05		1E-05		9E-05
94-C	SVOC	Benzo(a)anthracene	56-55-3	2.52E-01	2.52E-01		5E-12		2E-11		1E-09		4E-07		9E-08		8E-09	
94-C	SVOC	Benzo(a)pyrene	50-32-8	1.83E-01	1.83E-01		5E-12		2E-11		1E-08		3E-06		6E-07		5E-08	
94-C	SVOC	Benzo(b)fluoranthene	205-99-2	2.61E-01	2.61E-01		6E-11		2E-10		2E-09		4E-07		9E-08		8E-09	
94-C	SVOC	Benzo(g,h,i)perylene	191-24-2	5.25E-02	5.25E-02			4E-13		1E-12		1E-07		9E-06		2E-06		5E-07
94-C	SVOC	Benzo(k)fluoranthene	207-08-9	1.90E-01	1.90E-01		3E-14		1E-13		1E-10		3E-08		7E-09		6E-10	
94-C	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	8.61E-02	8.61E-02	1E-14	7E-17	7E-13	2E-16	2E-12	9E-12	2E-07	2E-09	2E-05	5E-10	5E-06	5E-11	1E-05
94-C	SVOC	Chrysene	218-01-9	2.68E-01	2.68E-01		2E-12		5E-12		2E-11		4E-09		1E-09		9E-11	
94-C	SVOC	Dibenzofuran	132-64-9	1.20E-01	1.20E-01			8E-07		2E-06		3E-06		3E-04		8E-05		3E-04
94-C	SVOC	Di-n-butylphthalate	84-74-2	1.52E-01	1.52E-01	2E-12						8E-08		7E-06		2E-06		4E-07
94-C	SVOC	Fluoranthene	206-44-0	4.23E-01	4.23E-01			4E-08		9E-08		6E-07		6E-05		2E-05		4E-06
94-C	SVOC	Fluorene	86-73-7	6.48E-02	6.48E-02			2E-07		4E-07		1E-07		1E-05		3E-06		2E-06
94-C	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	3.48E-02	3.48E-02		4E-14		1E-13		2E-10		6E-08		1E-08		1E-09	
94-C	SVOC	2-Methylnaphthalene	91-57-6	3.82E-01	3.82E-01			8E-04		2E-03		4E-05		2E-03		2E-03		1E-02

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
94-C	SVOC	Naphthalene	91-20-3	1.90E-01	1.90E-01	1E-07		1E-03		3E-03		3E-05		2E-03		1E-03		1E-02
94-C	SVOC	Phenanthrene	85-01-8	4.57E-01	4.57E-01			3E-07		8E-07		1E-06		8E-05		3E-05		9E-06
94-C	SVOC	Pyrene	129-00-0	5.70E-01	5.70E-01			4E-08		1E-07		1E-06		1E-04		3E-05		7E-06
94-C	INORG	Antimony	7440-36-0	1.60E-01	7.36E-02							7E-06		7E-04		9E-05		4E-04
94-C	INORG	Arsenic	7440-38-2	8.20E+00	7.69E-02						8E-10	1E-05	2E-07	1E-03	3E-08	2E-04	4E-09	3E-05
94-C	INORG	Barium	7440-39-3	7.10E+01														
94-C	INORG	Beryllium	7440-41-7	9.10E-01	3.20E-01						2E-10	4E-05	2E-10	6E-04	1E-10	9E-05	4E-10	9E-04
94-C	INORG	Cadmium	7440-43-9	9.60E-01	3.72E-01						2E-10	2E-05	2E-10	2E-03	1E-10	3E-04	3E-10	8E-04
94-C	INORG	Chromium (total)	7440-47-3	4.40E+01	1.20E+01						4E-08	4E-04	5E-08	1E-02	3E-08	2E-03	7E-08	5E-03
94-C	INORG	Cobalt	7440-48-4	7.60E+00	5.46E-01						4E-10	6E-05	5E-10	1E-04	3E-10	3E-05	7E-10	1E-03
94-C	INORG	Copper	7440-50-8	9.20E+01	6.35E+01							6E-05		6E-03		8E-04		3E-03
94-C	INORG	Cyanide (total)	57-12-5	4.00E-02	4.00E-02							8E-08		7E-06		1E-06		4E-06
94-C	INORG	Lead	7439-92-1	1.50E+02	1.50E+02													
94-C	INORG	Manganese	7439-96-5	7.20E+02	2.43E+02							1E-02		1E-02		3E-03		2E-01
94-C	INORG	Mercury	7439-97-6	1.03E-01	5.06E-02	2E-06		2E-04		5E-04		2E-05		1E-03		8E-04		7E-03
94-C	INORG	Nickel	7440-02-0	3.80E+01	1.80E+01						1E-09		1E-09		8E-10		2E-09	
94-C	INORG	Selenium	7782-49-2	8.60E-01	3.41E-01							3E-06		2E-04		3E-05		1E-04
94-C	INORG	Silver	7440-22-4	1.80E-01														
94-C	INORG	Thallium	7440-28-0	7.30E-01	5.33E-01							3E-04		3E-02		4E-03		1E-02
94-C	INORG	Vanadium	7440-62-2	2.20E+01														
94-C	INORG	Zinc	7440-66-6	9.40E+01														
94-D	VOC	Trichloroethene	79-01-6	1.30E-01	1.30E-01	2E-06	3E-07		6E-07		3E-10		5E-08		3E-08		1E-08	
94-D	SVOC	Anthracene	120-12-7	5.10E-02	5.10E-02							1E-08		9E-07		2E-07		5E-08
94-D	SVOC	Benzo(a)anthracene	56-55-3	1.20E-01	1.20E-01		2E-12		8E-12		7E-10		2E-07		4E-08		4E-09	
94-D	SVOC	Benzo(a)pyrene	50-32-8	8.87E-02	8.87E-02		2E-12		7E-12		5E-09		1E-06		3E-07		3E-08	
94-D	SVOC	Benzo(b)fluoranthene	205-99-2	1.12E-01	1.12E-01		2E-11		7E-11		7E-10		2E-07		4E-08		4E-09	
94-D	SVOC	Benzo(k)fluoranthene	207-08-9	9.70E-02	9.70E-02		2E-14		5E-14		6E-11		2E-08		3E-09		3E-10	
94-D	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	1.28E-01	1.28E-01	2E-14	1E-16	1E-12	3E-16	2E-12	1E-11	3E-07	4E-09	3E-05	7E-10	7E-06	7E-11	2E-05
94-D	SVOC	Chrysene	218-01-9	1.43E-01	1.43E-01		8E-13		3E-12		9E-12		2E-09		5E-10		5E-11	
94-D	SVOC	Fluoranthene	206-44-0	2.67E-01	2.67E-01			2E-08		6E-08		4E-07		4E-05		1E-05		3E-06
94-D	SVOC	Phenanthrene	85-01-8	2.25E-01	2.25E-01			2E-07		4E-07		5E-07		4E-05		1E-05		4E-06
94-D	SVOC	Pyrene	129-00-0	2.53E-01	2.53E-01			2E-08		5E-08		5E-07		4E-05		1E-05		3E-06
94-D	INORG	Antimony	7440-36-0	2.40E-01	1.54E-01							2E-05		1E-03		2E-04		8E-04
94-D	INORG	Arsenic	7440-38-2	8.10E+00														
94-D	INORG	Barium	7440-39-3	9.90E+01	3.31E+00													
94-D	INORG	Beryllium	7440-41-7	5.30E-01														
94-D	INORG	Cadmium	7440-43-9	3.40E-01														
94-D	INORG	Chromium (total)	7440-47-3	2.80E+01														
94-D	INORG	Cobalt	7440-48-4	9.00E+00	1.95E+00						2E-09	2E-04	2E-09	4E-04	1E-09	1E-04	3E-09	4E-03
94-D	INORG	Copper	7440-50-8	2.70E+01														
94-D	INORG	Cyanide (total)	57-12-5	3.40E-02	3.40E-02							7E-08		6E-06		8E-07		3E-06
94-D	INORG	Lead	7439-92-1	1.60E+02	1.60E+02													
94-D	INORG	Manganese	7439-96-5	4.10E+02														
94-D	INORG	Mercury	7439-97-6	5.08E-02														
94-D	INORG	Nickel	7440-02-0	2.20E+01	2.04E+00						1E-10		2E-10		9E-11		2E-10	
94-D	INORG	Silver	7440-22-4	3.30E-01	1.42E-01							3E-05		1E-04		2E-05		5E-04
94-D	INORG	Thallium	7440-28-0	2.20E-01	2.35E-02							1E-05		1E-03		2E-04		7E-04
94-D	INORG	Vanadium	7440-62-2	3.40E+01	9.13E+00							5E-05		5E-03		6E-04		3E-03
94-D	INORG	Zinc	7440-66-6	1.10E+02														
94-E	VOC	Cyclohexane	110-82-7	4.60E-02	4.60E-02	3E-07		4E-05		5E-05		1E-07		7E-06		6E-06		5E-05
94-E	VOC	Methylcyclohexane	108-87-2	1.20E-01	1.20E-01	4E-07		2E-04		2E-04		1E-06		5E-05		4E-05		4E-04
94-E	VOC	Toluene	108-88-3	1.20E-01	1.20E-01	1E-06		5E-05		1E-04		2E-07		2E-05		8E-06		7E-05
94-E	VOC	Xylenes (total)	1330-20-7	2.05E-01	2.05E-01	8E-07		2E-03		6E-03		1E-05		6E-04		4E-04		4E-03

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
94-E	SVOC	Benzo(a)anthracene	56-55-3	8.99E-02	8.99E-02		2E-12		6E-12		5E-10		1E-07		3E-08		3E-09	
94-E	SVOC	Benzo(a)pyrene	50-32-8	8.39E-02	8.39E-02		2E-12		7E-12		5E-09		1E-06		3E-07		2E-08	
94-E	SVOC	Benzo(b)fluoranthene	205-99-2	1.20E-01	1.20E-01		3E-11		8E-11		7E-10		2E-07		4E-08		4E-09	
94-E	SVOC	Benzo(g,h,i)perylene	191-24-2	4.29E-02	4.29E-02			4E-13		9E-13		8E-08		7E-06		2E-06		4E-07
94-E	SVOC	Benzo(k)fluoranthene	207-08-9	6.53E-02	6.53E-02		1E-14		3E-14		4E-11		1E-08		2E-09		2E-10	
94-E	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	5.82E-02	5.82E-02	9E-15	4E-17	4E-13	1E-16	1E-12	6E-12	2E-07	2E-09	1E-05	3E-10	3E-06	3E-11	8E-06
94-E	SVOC	Chrysene	218-01-9	1.05E-01	1.05E-01		6E-13		2E-12		6E-12		2E-09		4E-10		4E-11	
94-E	SVOC	Diethylphthalate	84-66-2	5.46E-01	5.46E-01	2E-08		2E-08		5E-08		4E-08		4E-06		1E-06		4E-07
94-E	SVOC	Di-n-butylphthalate	84-74-2	6.90E-02	6.90E-02	8E-13						4E-08		3E-06		8E-07		2E-07
94-E	SVOC	Di-n-octylphthalate	117-84-0	5.34E-02	5.34E-02							7E-08		6E-06		2E-06		3E-07
94-E	SVOC	Fluoranthene	206-44-0	1.59E-01	1.59E-01			1E-08		3E-08		2E-07		2E-05		6E-06		2E-06
94-E	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	5.11E-02	5.11E-02		6E-14		2E-13		3E-10		8E-08		2E-08		2E-09	
94-E	SVOC	Pentachlorophenol	87-86-5	6.53E-02	6.53E-02	7E-10	3E-12	2E-09	9E-12	6E-09	8E-11	2E-07	2E-08	1E-05	6E-09	5E-06	5E-10	1E-05
94-E	SVOC	Phenanthrene	85-01-8	8.65E-02	8.65E-02			6E-08		2E-07		2E-07		2E-05		5E-06		2E-06
94-E	SVOC	Pyrene	129-00-0	1.78E-01	1.78E-01			1E-08		3E-08		3E-07		3E-05		8E-06		2E-06
94-E	INORG	Antimony	7440-36-0	1.80E-01	9.36E-02							9E-06		9E-04		1E-04		5E-04
94-E	INORG	Arsenic	7440-38-2	1.20E+01	3.88E+00						4E-08	6E-04	1E-05	5E-02	1E-06	9E-03	2E-07	2E-03
94-E	INORG	Barium	7440-39-3	7.00E+01														
94-E	INORG	Beryllium	7440-41-7	4.10E-01														
94-E	INORG	Cadmium	7440-43-9	4.00E-01														
94-E	INORG	Chromium (total)	7440-47-3	1.50E+01														
94-E	INORG	Cobalt	7440-48-4	6.00E+00														
94-E	INORG	Copper	7440-50-8	3.40E+01	5.54E+00							6E-06		5E-04		7E-05		3E-04
94-E	INORG	Cyanide (total)	57-12-5	4.20E-02	4.20E-02							8E-08		8E-06		1E-06		4E-06
94-E	INORG	Lead	7439-92-1	7.50E+01	7.50E+01													
94-E	INORG	Manganese	7439-96-5	3.80E+02														
94-E	INORG	Mercury	7439-97-6	1.06E-01	5.36E-02	2E-06		2E-04		5E-04		2E-05		2E-03		8E-04		7E-03
94-E	INORG	Nickel	7440-02-0	1.60E+01														
94-E	INORG	Selenium	7782-49-2	6.80E-01	1.61E-01							1E-06		1E-04		2E-05		6E-05
94-E	INORG	Silver	7440-22-4	1.50E-01														
94-E	INORG	Thallium	7440-28-0	2.30E-01	3.35E-02							2E-05		2E-03		2E-04		9E-04
94-E	INORG	Vanadium	7440-62-2	2.20E+01														
94-E	INORG	Zinc	7440-66-6	1.00E+02														
Aeration Lagoon	VOC	Acetone	67-64-1	4.80E-01	4.80E-01	3E-08		1E-05		3E-05		3E-07		2E-05		1E-05		1E-04
Aeration Lagoon	VOC	Methyl Acetate	79-20-9	2.60E-01	2.60E-01	1E-07		1E-05		3E-05		2E-07		1E-05		8E-06		8E-06
Aeration Lagoon	VOC	Methylcyclohexane	108-87-2	4.30E-02	4.30E-02	2E-07		7E-05		8E-05		3E-07		2E-05		1E-05		1E-04
Aeration Lagoon	VOC	Methylene Chloride	75-09-2	5.60E-02	5.60E-02	3E-06	3E-08	6E-05	7E-08	1E-04	4E-11	2E-07	7E-09	1E-05	4E-09	9E-06	2E-09	8E-05
Aeration Lagoon	VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	8.60E-02	8.60E-02	8E-08		1E-05		2E-05		7E-08		4E-06		3E-06		3E-05
Aeration Lagoon	SVOC	Benzo(a)anthracene	56-55-3	8.16E-02	8.16E-02		2E-12		5E-12		5E-10		1E-07		3E-08		3E-09	
Aeration Lagoon	SVOC	Benzo(a)pyrene	50-32-8	8.14E-02	8.14E-02		2E-12		7E-12		5E-09		1E-06		3E-07		2E-08	
Aeration Lagoon	SVOC	Benzo(b)fluoranthene	205-99-2	1.15E-01	1.15E-01		3E-11		8E-11		7E-10		2E-07		4E-08		4E-09	
Aeration Lagoon	SVOC	Benzo(k)fluoranthene	207-08-9	1.22E-01	1.22E-01		2E-14		6E-14		7E-11		2E-08		4E-09		4E-10	
Aeration Lagoon	SVOC	Butylbenzylphthalate	85-68-7	8.63E-02	8.63E-02		3E-14	2E-10	9E-14	5E-10	1E-12	2E-08	3E-10	2E-06	7E-11	5E-07	7E-12	1E-07
Aeration Lagoon	SVOC	Chrysene	218-01-9	9.06E-02	9.06E-02		5E-13		2E-12		5E-12		1E-09		3E-10		3E-11	
Aeration Lagoon	SVOC	Fluoranthene	206-44-0	1.68E-01	1.68E-01			1E-08		4E-08		2E-07		2E-05		6E-06		2E-06
Aeration Lagoon	SVOC	Phenanthrene	85-01-8	8.33E-02	8.33E-02			6E-08		2E-07		2E-07		2E-05		5E-06		2E-06
Aeration Lagoon	SVOC	Pyrene	129-00-0	2.12E-01	2.12E-01			2E-08		4E-08		4E-07		4E-05		1E-05		3E-06
Aeration Lagoon	PCB	PCBs (total)	1336-36-3	8.88E-01	8.88E-01	2E-07	1E-08		3E-08		2E-08	3E-03	4E-06	2E-01	1E-06	6E-02	1E-07	5E-02
Aeration Lagoon	INORG	Antimony	7440-36-0	8.90E-02	2.64E-03							3E-07		2E-05		3E-06		1E-05
Aeration Lagoon	INORG	Arsenic	7440-38-2	2.10E+01	1.29E+01						1E-07	2E-03	3E-05	2E-01	5E-06	3E-02	6E-07	6E-03
Aeration Lagoon	INORG	Barium	7440-39-3	1.60E+02	6.43E+01													
Aeration Lagoon	INORG	Beryllium	7440-41-7	6.40E-01	5.00E-02						4E-11	6E-06	4E-11	9E-05	2E-11	1E-05	6E-11	1E-04

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
Aeration Lagoon	INORG	Cadmium	7440-43-9	7.30E-01	1.42E-01						8E-11	8E-06	8E-11	6E-04	5E-11	1E-04	1E-10	3E-04
Aeration Lagoon	INORG	Chromium (total)	7440-47-3	4.60E+01	1.40E+01						5E-08	5E-04	5E-08	2E-02	3E-08	2E-03	8E-08	6E-03
Aeration Lagoon	INORG	Cobalt	7440-48-4	7.60E+00	5.46E-01						4E-10	6E-05	5E-10	1E-04	3E-10	3E-05	7E-10	1E-03
Aeration Lagoon	INORG	Copper	7440-50-8	8.70E+01	5.85E+01							6E-05		5E-03		7E-04		3E-03
Aeration Lagoon	INORG	Cyanide (total)	57-12-5	8.90E-01	8.90E-01							2E-06		2E-04		2E-05		9E-05
Aeration Lagoon	INORG	Lead	7439-92-1	1.20E+02	1.20E+02													
Aeration Lagoon	INORG	Manganese	7439-96-5	1.30E+03	8.23E+02							3E-02		3E-02		1E-02		6E-01
Aeration Lagoon	INORG	Mercury	7439-97-6	9.06E-02	3.82E-02	1E-06		1E-04		4E-04		2E-05		1E-03		6E-04		5E-03
Aeration Lagoon	INORG	Nickel	7440-02-0	2.00E+01	4.06E-02						3E-12		3E-12		2E-12		5E-12	
Aeration Lagoon	INORG	Selenium	7782-49-2	1.10E+00	5.81E-01							5E-06		4E-04		6E-05		2E-04
Aeration Lagoon	INORG	Silver	7440-22-4	3.30E-01	1.42E-01							3E-05		1E-04		2E-05		5E-04
Aeration Lagoon	INORG	Thallium	7440-28-0	1.80E-01														
Aeration Lagoon	INORG	Vanadium	7440-62-2	3.60E+01	1.11E+01							6E-05		6E-03		8E-04		3E-03
Aeration Lagoon	INORG	Zinc	7440-66-6	1.70E+02	5.95E+01							8E-06		7E-04		1E-04		4E-04
BD01	VOC	Methyl Acetate	79-20-9	1.20E-01	1.20E-01	5E-08		5E-06		1E-05		1E-07		5E-06		4E-06		4E-06
BD01	VOC	Methylcyclohexane	108-87-2	6.40E-02	6.40E-02	2E-07		1E-04		1E-04		5E-07		3E-05		2E-05		2E-04
BD01	VOC	Methylene Chloride	75-09-2	1.30E-01	1.30E-01	6E-06	6E-08	1E-04	2E-07	3E-04	1E-10	6E-07	2E-08	3E-05	1E-08	2E-05	4E-09	2E-04
BD01	SVOC	Acenaphthene	83-32-9	4.94E-02	4.94E-02			4E-07		1E-06		8E-08		6E-06		2E-06		1E-06
BD01	SVOC	Anthracene	120-12-7	1.50E-01	1.50E-01							3E-08		3E-06		7E-07		1E-07
BD01	SVOC	Benzo(a)anthracene	56-55-3	3.93E-01	3.93E-01		8E-12		2E-11		2E-09		6E-07		1E-07		1E-08	
BD01	SVOC	Benzo(a)pyrene	50-32-8	4.16E-01	4.16E-01		1E-11		4E-11		2E-08		7E-06		1E-06		1E-07	
BD01	SVOC	Benzo(b)fluoranthene	205-99-2	4.50E-01	4.50E-01		1E-10		3E-10		3E-09		7E-07		2E-07		1E-08	
BD01	SVOC	Benzo(g,h,i)perylene	191-24-2	2.16E-01	2.16E-01			2E-12		5E-12		4E-07		4E-05		1E-05		2E-06
BD01	SVOC	Benzo(k)fluoranthene	207-08-9	4.29E-01	4.29E-01		7E-14		2E-13		3E-10		7E-08		1E-08		1E-09	
BD01	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	3.88E-01	3.88E-01	6E-14	3E-16	3E-12	9E-16	8E-12	4E-11	1E-06	1E-08	9E-05	2E-09	2E-05	2E-10	5E-05
BD01	SVOC	Butylbenzylphthalate	85-68-7	1.98E-01	1.98E-01		7E-14	5E-10	2E-13	1E-09	3E-12	5E-08	8E-10	5E-06	2E-10	1E-06	2E-11	3E-07
BD01	SVOC	Carbazole	86-74-8	6.40E-02	6.40E-02		7E-14		2E-13		1E-11		3E-09		5E-10		6E-11	
BD01	SVOC	Chrysene	218-01-9	4.46E-01	4.46E-01		3E-12		8E-12		3E-11		7E-09		2E-09		2E-10	
BD01	SVOC	Dibenz(a,h)anthracene	53-70-3	1.54E-01	1.54E-01		2E-14		6E-14		9E-09		2E-06		5E-07		5E-08	
BD01	SVOC	Dibenzofuran	132-64-9	4.66E-02	4.66E-02			3E-07		8E-07		1E-06		1E-04		3E-05		1E-04
BD01	SVOC	Fluoranthene	206-44-0	9.27E-01	9.27E-01			8E-08		2E-07		1E-06		1E-04		3E-05		9E-06
BD01	SVOC	Fluorene	86-73-7	6.40E-02	6.40E-02			2E-07		4E-07		1E-07		1E-05		3E-06		2E-06
BD01	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	2.02E-01	2.02E-01		2E-13		7E-13		1E-09		3E-07		7E-08		6E-09	
BD01	SVOC	Phenanthrene	85-01-8	7.42E-01	7.42E-01			5E-07		1E-06		2E-06		1E-04		4E-05		1E-05
BD01	SVOC	Pyrene	129-00-0	9.26E-01	9.26E-01			7E-08		2E-07		2E-06		2E-04		4E-05		1E-05
BD01	PCB	PCBs (total)	1336-36-3	7.90E-02	7.90E-02	1E-08	1E-09		3E-09		1E-09	2E-04	4E-07	2E-02	9E-08	6E-03	1E-08	5E-03
BD01	INORG	Antimony	7440-36-0	4.30E-02														
BD01	INORG	Arsenic	7440-38-2	7.20E+00														
BD01	INORG	Barium	7440-39-3	1.20E+02	2.43E+01													
BD01	INORG	Beryllium	7440-41-7	8.70E-01	2.80E-01						2E-10	3E-05	2E-10	5E-04	1E-10	8E-05	3E-10	8E-04
BD01	INORG	Cadmium	7440-43-9	4.40E-01														
BD01	INORG	Chromium (total)	7440-47-3	2.70E+01														
BD01	INORG	Cobalt	7440-48-4	1.90E+01	1.19E+01						1E-08	1E-03	1E-08	3E-03	6E-09	6E-04	2E-08	2E-02
BD01	INORG	Copper	7440-50-8	6.30E+02	6.02E+02							6E-04		5E-02		7E-03		3E-02
BD01	INORG	Cyanide (total)	57-12-5	1.10E-01	1.10E-01							2E-07		2E-05		3E-06		1E-05
BD01	INORG	Lead	7439-92-1	9.10E+01	9.10E+01													
BD01	INORG	Manganese	7439-96-5	5.60E+02	8.25E+01							3E-03		3E-03		1E-03		6E-02
BD01	INORG	Mercury	7439-97-6	7.22E-02	1.98E-02	6E-07		7E-05		2E-04		9E-06		6E-04		3E-04		3E-03
BD01	INORG	Nickel	7440-02-0	3.50E+01	1.50E+01						1E-09		1E-09		7E-10		2E-09	
BD01	INORG	Selenium	7782-49-2	5.00E-01														
BD01	INORG	Silver	7440-22-4	1.30E-01														
BD01	INORG	Thallium	7440-28-0	3.80E-01	1.83E-01							1E-04		1E-02		1E-03		5E-03
BD01	INORG	Vanadium	7440-62-2	3.60E+01	1.11E+01							6E-05		6E-03		8E-04		3E-03

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
BD01	INORG	Zinc	7440-66-6	6.80E+01														
BG	INORG	Antimony	7440-36-0	1.10E-01	2.36E-02							2E-06		2E-04		3E-05		1E-04
BG	INORG	Arsenic	7440-38-2	1.00E+01	1.88E+00						2E-08	3E-04	5E-06	3E-02	7E-07	4E-03	9E-08	8E-04
BG	INORG	Barium	7440-39-3	1.50E+02	5.43E+01													
BG	INORG	Beryllium	7440-41-7	8.90E-01	3.00E-01						2E-10	4E-05	2E-10	6E-04	1E-10	8E-05	4E-10	8E-04
BG	INORG	Cadmium	7440-43-9	1.10E+00	5.12E-01						3E-10	3E-05	3E-10	2E-03	2E-10	4E-04	5E-10	1E-03
BG	INORG	Chromium (total)	7440-47-3	4.70E+01	1.50E+01						5E-08	5E-04	6E-08	2E-02	3E-08	3E-03	9E-08	7E-03
BG	INORG	Cobalt	7440-48-4	1.00E+01	2.95E+00						2E-09	3E-04	3E-09	6E-04	2E-09	1E-04	4E-09	5E-03
BG	INORG	Copper	7440-50-8	4.70E+01	1.85E+01							2E-05		2E-03		2E-04		9E-04
BG	INORG	Lead	7439-92-1	1.90E+02	1.90E+02													
BG	INORG	Manganese	7439-96-5	2.10E+03	1.62E+03							7E-02		7E-02		2E-02		1E+00
BG	INORG	Mercury	7439-97-6	9.40E-02	4.16E-02	1E-06		2E-04		4E-04		2E-05		1E-03		6E-04		5E-03
BG	INORG	Nickel	7440-02-0	2.20E+01	2.04E+00						1E-10		2E-10		9E-11		2E-10	
BG	INORG	Selenium	7782-49-2	4.20E-01														
BG	INORG	Silver	7440-22-4	2.60E-01	7.23E-02							2E-05		6E-05		1E-05		3E-04
BG	INORG	Thallium	7440-28-0	2.80E-01	8.35E-02							5E-05		4E-03		6E-04		2E-03
BG	INORG	Vanadium	7440-62-2	3.60E+01	1.11E+01							6E-05		6E-03		8E-04		3E-03
BG	INORG	Zinc	7440-66-6	7.20E+02	6.10E+02							8E-05		7E-03		1E-03		4E-03
Build 94 Parking Lot	VOC	Methyl Acetate	79-20-9	3.80E-02	3.80E-02	1E-08		2E-06		4E-06		3E-08		2E-06		1E-06		1E-06
Build 94 Parking Lot	VOC	Methylene Chloride	75-09-2	4.80E-02	4.80E-02	2E-06	2E-08	5E-05	6E-08	9E-05	4E-11	2E-07	6E-09	1E-05	4E-09	8E-06	1E-09	7E-05
Build 94 Parking Lot	SVOC	Benzo(g,h,i)perylene	191-24-2	6.23E-02	6.23E-02			5E-13		1E-12		1E-07		1E-05		3E-06		6E-07
Build 94 Parking Lot	SVOC	Diethylphthalate	84-66-2	9.36E-02	9.36E-02	3E-09		4E-09		9E-09		7E-09		6E-07		2E-07		7E-08
Build 94 Parking Lot	SVOC	Fluoranthene	206-44-0	5.59E-02	5.59E-02			5E-09		1E-08		8E-08		7E-06		2E-06		5E-07
Build 94 Parking Lot	SVOC	Formaldehyde	50-00-0	5.08E+00	5.08E+00						2E-11		2E-11		1E-11		3E-11	
Build 94 Parking Lot	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	1.37E-01	1.37E-01		2E-13		5E-13		8E-10		2E-07		5E-08		4E-09	
Build 94 Parking Lot	SVOC	Phenanthrene	85-01-8	4.49E-02	4.49E-02			3E-08		8E-08		1E-07		8E-06		2E-06		9E-07
Build 94 Parking Lot	SVOC	Pyrene	129-00-0	2.29E-01	2.29E-01			2E-08		4E-08		4E-07		4E-05		1E-05		3E-06
Build 94 Parking Lot	PCB	PCBs (total)	1336-36-3	7.20E+00	7.20E+00	1E-06	9E-08		3E-07		1E-07	2E-02	3E-05	2E+00	8E-06	5E-01	1E-06	4E-01
Build 94 Parking Lot	INORG	Antimony	7440-36-0	9.00E-01	8.14E-01							8E-05		7E-03		1E-03		4E-03
Build 94 Parking Lot	INORG	Arsenic	7440-38-2	1.00E+01	1.88E+00						2E-08	3E-04	5E-06	3E-02	7E-07	4E-03	9E-08	8E-04
Build 94 Parking Lot	INORG	Barium	7440-39-3	1.10E+02	1.43E+01													
Build 94 Parking Lot	INORG	Beryllium	7440-41-7	8.10E-01	2.20E-01						2E-10	3E-05	2E-10	4E-04	1E-10	6E-05	3E-10	6E-04
Build 94 Parking Lot	INORG	Cadmium	7440-43-9	7.00E-01	1.12E-01						6E-11	6E-06	6E-11	5E-04	4E-11	8E-05	1E-10	3E-04
Build 94 Parking Lot	INORG	Chromium (total)	7440-47-3	2.80E+01														
Build 94 Parking Lot	INORG	Cobalt	7440-48-4	1.40E+01	6.95E+00						6E-09	7E-04	6E-09	2E-03	4E-09	4E-04	1E-08	1E-02
Build 94 Parking Lot	INORG	Copper	7440-50-8	1.90E+01														
Build 94 Parking Lot	INORG	Cyanide (total)	57-12-5	1.40E-01	1.40E-01							3E-07		3E-05		3E-06		1E-05
Build 94 Parking Lot	INORG	Lead	7439-92-1	1.30E+02	1.30E+02													
Build 94 Parking Lot	INORG	Manganese	7439-96-5	4.10E+02														
Build 94 Parking Lot	INORG	Mercury	7439-97-6	9.12E-02	3.88E-02	1E-06		1E-04		4E-04		2E-05		1E-03		6E-04		5E-03
Build 94 Parking Lot	INORG	Nickel	7440-02-0	3.50E+01	1.50E+01						1E-09		1E-09		7E-10		2E-09	
Build 94 Parking Lot	INORG	Silver	7440-22-4	3.20E-01	1.32E-01							3E-05		1E-04		2E-05		5E-04
Build 94 Parking Lot	INORG	Thallium	7440-28-0	3.00E-01	1.03E-01							6E-05		5E-03		7E-04		3E-03
Build 94 Parking Lot	INORG	Vanadium	7440-62-2	4.50E+01	2.01E+01							1E-04		1E-02		1E-03		6E-03
Build 94 Parking Lot	INORG	Zinc	7440-66-6	1.90E+02	7.95E+01							1E-05		1E-03		1E-04		5E-04
Harriet Street	VOC	Acetone	67-64-1	2.30E+00	2.30E+00	1E-07		5E-05		1E-04		2E-06		9E-05		6E-05		5E-04
Harriet Street	VOC	Benzene	71-43-2	1.20E-01	1.20E-01	2E-04	1E-06	2E-02	2E-06	2E-02	1E-09	4E-05	2E-07	2E-03	1E-07	2E-03	5E-08	8E-03
Harriet Street	VOC	Cumene	98-82-8	6.30E-02	6.30E-02	5E-07		2E-04		5E-04		8E-07		4E-05		3E-05		3E-04
Harriet Street	VOC	Cyclohexane	110-82-7	2.30E-01	2.30E-01	2E-06		2E-04		2E-04		7E-07		4E-05		3E-05		3E-04
Harriet Street	VOC	Ethyl Benzene	100-41-4	4.80E+00	4.80E+00	2E-05		7E-03		2E-02		3E-05		2E-03		1E-03		1E-02
Harriet Street	VOC	Methyl Acetate	79-20-9	4.10E-02	4.10E-02	2E-08		2E-06		5E-06		3E-08		2E-06		1E-06		1E-06
Harriet Street	VOC	Methylcyclohexane	108-87-2	5.90E+01	5.90E+01	2E-04		1E-01		1E-01		5E-04		3E-02		2E-02		2E-01
Harriet Street	VOC	Methylene Chloride	75-09-2	2.00E+00	2.00E+00	1E-04	1E-06	2E-03	2E-06	4E-03	2E-09	8E-06	3E-07	5E-04	2E-07	3E-04	6E-08	3E-03

Attachment G12: Soil Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Exposure Conc (mg/kg)	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ	Maintenance Worker Soil Contact Risk	Maintenance Worker Soil Contact HQ	Resident Soil Contact Risk	Resident Soil Contact HQ	Routine Worker Soil Contact Risk	Routine Worker Soil Contact HQ	Redevelop-ment Construction Worker Soil Contact Risk	Redevelop-ment Construction Worker Soil Contact HQ
Harriet Street	VOC	Toluene	108-88-3	8.70E-02	8.70E-02	8E-07		4E-05		1E-04		2E-07		1E-05		6E-06		5E-05
Harriet Street	VOC	Trichloroethene	79-01-6	2.00E-01	2.00E-01	4E-06	4E-07		9E-07		4E-10		7E-08		5E-08		2E-08	
Harriet Street	VOC	Xylenes (total)	1330-20-7	1.90E+01	1.90E+01	8E-05		2E-01		6E-01		1E-03		5E-02		4E-02		4E-01
Harriet Street	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	3.46E-01	3.46E-01	5E-14	3E-16	3E-12	8E-16	7E-12	4E-11	9E-07	1E-08	8E-05	2E-09	2E-05	2E-10	5E-05
Harriet Street	SVOC	Diethylphthalate	84-66-2	6.09E-02	6.09E-02	2E-09		2E-09		6E-09		5E-09		4E-07		1E-07		5E-08
Harriet Street	SVOC	Di-n-butylphthalate	84-74-2	6.40E-02	6.40E-02	7E-13						3E-08		3E-06		7E-07		2E-07
Harriet Street	SVOC	2-Methylnaphthalene	91-57-6	5.65E+00	5.65E+00			1E-02		3E-02		6E-04		4E-02		2E-02		2E-01
Harriet Street	SVOC	Naphthalene	91-20-3	2.58E+00	2.58E+00	1E-06		2E-02		4E-02		5E-04		3E-02		2E-02		2E-01
Harriet Street	SVOC	Phenanthrene	85-01-8	3.50E-02	3.50E-02			2E-08		6E-08		8E-08		6E-06		2E-06		7E-07
Harriet Street	PCB	PCBs (total)	1336-36-3	5.00E+00	5.00E+00	9E-07	6E-08		2E-07		9E-08	1E-02	2E-05	1E+00	6E-06	3E-01	7E-07	3E-01
Harriet Street	INORG	Arsenic	7440-38-2	9.50E+00	1.38E+00						1E-08	2E-04	4E-06	2E-02	5E-07	3E-03	7E-08	6E-04
Harriet Street	INORG	Barium	7440-39-3	6.10E+01														
Harriet Street	INORG	Cadmium	7440-43-9	2.40E-01														
Harriet Street	INORG	Chromium (total)	7440-47-3	1.30E+01														
Harriet Street	INORG	Copper	7440-50-8	1.40E+01														
Harriet Street	INORG	Lead	7439-92-1	3.60E+01	3.60E+01													
Harriet Street	INORG	Mercury	7439-97-6	1.20E-01	6.76E-02	2E-06		2E-04		6E-04		3E-05		2E-03		1E-03		9E-03
Harriet Street	INORG	Selenium	7782-49-2	6.40E-01	1.21E-01							1E-06		9E-05		1E-05		5E-05
Harriet Street	INORG	Silver	7440-22-4	2.70E+00	2.51E+00							5E-04		2E-03		4E-04		1E-02
Harriet Street	INORG	Zinc	7440-66-6	9.80E+01														
FEP	VOC	Acetone	67-64-1	8.00E-01	8.00E-01	5E-08		2E-05		5E-05		6E-07		3E-05		2E-05		2E-04
FEP	VOC	Cumene	98-82-8	7.00E-02	7.00E-02	6E-07		2E-04		6E-04		9E-07		5E-05		4E-05		3E-04
FEP	VOC	cis-1,2-Dichloroethene	156-59-2	4.00E-02	4.00E-02	3E-07		4E-03		7E-03		1E-05		6E-04		5E-04		4E-04
FEP	VOC	Ethyl Benzene	100-41-4	4.00E-02	4.00E-02	2E-07		6E-05		1E-04		2E-07		1E-05		9E-06		9E-05
FEP	VOC	Methylcyclohexane	108-87-2	4.30E-01	4.30E-01	2E-06		7E-04		8E-04		3E-06		2E-04		1E-04		1E-03
FEP	VOC	Toluene	108-88-3	4.00E-02	4.00E-02	3E-07		2E-05		5E-05		8E-08		5E-06		3E-06		2E-05
FEP	VOC	Trichloroethene	79-01-6	1.00E-01	1.00E-01	2E-06	2E-07		4E-07		2E-10		4E-08		2E-08		8E-09	
FEP	VOC	Xylenes (total)	1330-20-7	1.40E-01	1.40E-01	6E-07		2E-03		4E-03		7E-06		4E-04		3E-04		3E-03
FEP	SVOC	Acenaphthene	83-32-9	3.00E+00	3.00E+00			2E-05		6E-05		5E-06		4E-04		1E-04		9E-05
FEP	SVOC	Anthracene	120-12-7	3.00E+00	3.00E+00							6E-07		5E-05		1E-05		3E-06
FEP	SVOC	Benzo(a)anthracene	56-55-3	5.00E+00	5.00E+00		1E-10		3E-10		3E-08		8E-06		2E-06		2E-07	
FEP	SVOC	Benzo(a)pyrene	50-32-8	4.00E+00	4.00E+00		1E-10		3E-10		2E-07		6E-05		1E-05		1E-06	
FEP	SVOC	Benzo(b)fluoranthene	205-99-2	5.00E+00	5.00E+00		1E-09		3E-09		3E-08		8E-06		2E-06		2E-07	
FEP	SVOC	Benzo(g,h,i)perylene	191-24-2	2.00E+00	2.00E+00			2E-11		4E-11		4E-06		3E-04		9E-05		2E-05
FEP	SVOC	Benzo(k)fluoranthene	207-08-9	3.00E+00	3.00E+00		5E-13		2E-12		2E-09		5E-07		1E-07		9E-09	
FEP	SVOC	Chrysene	218-01-9	6.00E+00	6.00E+00		3E-11		1E-10		4E-10		1E-07		2E-08		2E-09	
FEP	SVOC	Fluoranthene	206-44-0	1.20E+01	1.20E+01			1E-06		3E-06		2E-05		2E-03		4E-04		1E-04
FEP	SVOC	Fluorene	86-73-7	3.00E+00	3.00E+00			8E-06		2E-05		6E-06		5E-04		2E-04		7E-05
FEP	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	2.00E+00	2.00E+00		2E-12		7E-12		1E-08		3E-06		7E-07		6E-08	
FEP	SVOC	2-Methylnaphthalene	91-57-6	2.00E+00	2.00E+00			4E-03		1E-02		2E-04		1E-02		9E-03		8E-02
FEP	SVOC	Phenanthrene	85-01-8	1.10E+01	1.10E+01			8E-06		2E-05		2E-05		2E-03		6E-04		2E-04
FEP	SVOC	Pyrene	129-00-0	1.30E+01	1.30E+01			1E-06		3E-06		3E-05		2E-03		6E-04		2E-04

Notes:

Only detected chemicals in each area are shown.

Site-specific background concentrations of inorganics are subtracted to obtain the site-related exposure concentration.

Attachment G12: Groundwater Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/L)	Maintenance Worker GW Contact Risk	Maintenance Worker GW Contact Risk	Redevelopment Construction Worker GW Contact Risk	Redevelopment Construction Worker GW Contact HQ	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ
02-B	VOC	Acetone	67-64-1	4.70E+01		7E-03		7E-03	2E-07		8E-05		2E-04
02-B	VOC	Benzene	71-43-2	2.00E-04	4E-10	1E-05	4E-11	7E-06	3E-08	2E-10	2E-06	4E-10	4E-06
02-B	VOC	2-Butanone	78-93-3	1.40E-01		2E-05		2E-05	3E-09		2E-07		5E-07
02-B	VOC	1,1-Dichloroethane	75-34-3	1.00E-03		3E-06		3E-07	1E-09		7E-07		1E-06
02-B	VOC	cis-1,2-Dichloroethene	156-59-2	8.00E-04		4E-05		4E-06	4E-10		7E-06		1E-05
02-B	VOC	Methyl Acetate	79-20-9	1.80E-01		4E-05		4E-06	5E-09		7E-07		2E-06
02-B	VOC	Trichloroethene	79-01-6	2.00E-04	8E-11	1E-06	8E-12	1E-06	5E-10	6E-11		1E-10	
02-B	INORG	Barium	7440-39-3	7.30E-02		2E-05		2E-05					
02-B	INORG	Chromium (total)	7440-47-3	7.00E-04		2E-05		4E-06					
02-B	INORG	Cobalt	7440-48-4	3.00E-04		4E-08		4E-08					
02-B	INORG	Copper	7440-50-8	1.90E-03		2E-07		2E-07					
02-B	INORG	Cyanide (total)	57-12-5	4.80E-03		8E-07		8E-07					
02-B	INORG	Manganese	7439-96-5	8.30E-02		1E-05		1E-05					
02-B	INORG	Nickel	7440-02-0	8.40E-03		4E-06		4E-06					
02-B	INORG	Vanadium	7440-62-2	2.70E-04		2E-06		2E-06					
02-B	INORG	Zinc	7440-66-6	6.60E-03		6E-08		6E-08					
02-E	PCB	PCBs (total)	1336-36-3	2.35E-04	2E-07	3E-02	2E-08	1E-02	7E-08	5E-09		1E-08	
02-E	INORG	Arsenic	7440-38-2	1.40E-03	1E-09	2E-05	1E-10	9E-07					
02-E	INORG	Barium	7440-39-3	3.30E-01		1E-04		1E-04					
02-E	INORG	Beryllium	7440-41-7	2.00E-04		2E-05		2E-05					
02-E	INORG	Cadmium	7440-43-9	1.10E-04		6E-06		6E-06					
02-E	INORG	Chromium (total)	7440-47-3	5.00E-03		2E-04		3E-05					
02-E	INORG	Cobalt	7440-48-4	6.40E-04		8E-08		8E-08					
02-E	INORG	Copper	7440-50-8	2.10E-02		2E-06		2E-06					
02-E	INORG	Cyanide (total)	57-12-5	1.70E-03		3E-07		3E-07					
02-E	INORG	Lead	7439-92-1	2.10E-03									
02-E	INORG	Manganese	7439-96-5	2.00E+00		3E-04		3E-04					
02-E	INORG	Nickel	7440-02-0	1.20E-02		5E-06		5E-06					
02-E	INORG	Selenium	7782-49-2	2.20E-03		1E-06		1E-06					
02-E	INORG	Thallium	7440-28-0	1.70E-04		8E-06		8E-06					
02-E	INORG	Vanadium	7440-62-2	2.70E-04		2E-06		2E-06					
02-E	INORG	Zinc	7440-66-6	6.40E-02		6E-07		6E-07					
02-F	PCB	PCBs (total)	1336-36-3	1.54E-04	1E-07	2E-02	1E-08	7E-03	5E-08	3E-09		7E-09	
02-F	INORG	Arsenic	7440-38-2	2.50E-03	2E-09	3E-05	2E-10	2E-06					
02-F	INORG	Barium	7440-39-3	1.80E-01		5E-05		5E-05					
02-F	INORG	Beryllium	7440-41-7	2.50E-03		2E-04		2E-04					
02-F	INORG	Cadmium	7440-43-9	4.40E-04		2E-05		2E-05					
02-F	INORG	Chromium (total)	7440-47-3	3.40E-03		1E-04		2E-05					
02-F	INORG	Cobalt	7440-48-4	4.00E-03		5E-07		5E-07					
02-F	INORG	Copper	7440-50-8	5.50E-03		4E-07		4E-07					
02-F	INORG	Cyanide (total)	57-12-5	1.50E-03		2E-07		2E-07					
02-F	INORG	Lead	7439-92-1	1.10E-03									
02-F	INORG	Manganese	7439-96-5	3.70E+00		6E-04		6E-04					

Attachment G12: Groundwater Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/L)	Maintenance Worker GW Contact Risk	Maintenance Worker GW Contact Risk	Redevelopment Construction Worker GW Contact Risk	Redevelopment Construction Worker GW Contact HQ	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ
02-F	INORG	Mercury	7439-97-6	1.47E-04		6E-04		6E-04	1E-06		1E-04		2E-04
02-F	INORG	Nickel	7440-02-0	2.70E-02		1E-05		1E-05					
02-F	INORG	Selenium	7782-49-2	2.30E-03		1E-06		1E-06					
02-F	INORG	Thallium	7440-28-0	5.20E-04		2E-05		2E-05					
02-F	INORG	Vanadium	7440-62-2	6.20E-04		5E-06		5E-06					
02-F	INORG	Zinc	7440-66-6	1.70E-02		2E-07		2E-07					
03-1	VOC	Acetone	67-64-1	8.00E-03		1E-06		1E-06	4E-11		1E-08		4E-08
03-1	VOC	Benzene	71-43-2	3.00E-03	7E-09	2E-04	7E-10	1E-04	5E-07	3E-09	4E-05	6E-09	6E-05
03-1	VOC	2-Butanone	78-93-3	1.20E-03		1E-07		1E-07	2E-11		2E-09		4E-09
03-1	VOC	Chloroethane	75-00-3	3.30E-03	2E-11	7E-07	2E-12	7E-07	1E-09		2E-07		3E-07
03-1	VOC	1,1-Dichloroethane	75-34-3	1.40E-03		5E-06		5E-07	2E-09		1E-06		2E-06
03-1	VOC	1,1-Dichloroethene	75-35-4	2.40E-03		2E-05		2E-05	1E-07		9E-06		1E-05
03-1	VOC	cis-1,2-Dichloroethene	156-59-2	4.20E-02		2E-03		2E-04	2E-08		4E-04		6E-04
03-1	VOC	trans-1,2-Dichloroethene	156-60-5	2.90E-03		8E-05		8E-05	3E-09		2E-05		4E-05
03-1	VOC	4-Methyl-2-pentanone	108-10-1	1.00E-03		3E-07		3E-07	6E-11		6E-09		1E-08
03-1	VOC	Methylcyclohexane	108-87-2	1.00E-03		5E-07		5E-07	1E-09		5E-07		7E-07
03-1	VOC	1,1,1-Trichloroethane	71-55-6	5.70E-04		4E-07		9E-08	3E-10		2E-07		2E-07
03-1	VOC	Trichloroethene	79-01-6	6.40E-02	3E-08	4E-04	3E-09	4E-04	2E-07	2E-08		4E-08	
03-1	VOC	Vinyl Chloride	75-01-4	9.10E-03	5E-08	2E-04	5E-09	2E-04	5E-06	3E-08	8E-05	5E-08	1E-04
03-1	SVOC	Acenaphthene	83-32-9	6.10E-04		4E-06		4E-07			6E-08		1E-07
03-1	SVOC	Acetophenone	98-86-2	7.90E-04		4E-07		4E-08	4E-11		4E-09		9E-09
03-1	SVOC	Benzaldehyde	100-52-7	1.26E-03		1E-06		1E-06			1E-08		3E-08
03-1	SVOC	Biphenyl	92-52-4	7.60E-04		8E-06		8E-06	4E-08		1E-07		3E-07
03-1	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	3.94E-03	2E-08	5E-04	2E-09	5E-04	2E-11	9E-14	9E-10	3E-13	2E-09
03-1	SVOC	Diethylphthalate	84-66-2	1.23E-03		3E-08		3E-09	3E-11		3E-11		8E-11
03-1	SVOC	Fluoranthene	206-44-0	1.26E-03		3E-05		3E-06			2E-08		5E-08
03-1	SVOC	Fluorene	86-73-7	6.20E-04		6E-06		6E-07			4E-08		8E-08
03-1	SVOC	2-Methylnaphthalene	91-57-6	8.42E-04		4E-04		4E-04			2E-05		3E-05
03-1	SVOC	Naphthalene	91-20-3	7.50E-04		3E-04		3E-04	1E-09		1E-05		3E-05
03-1	SVOC	Nitrobenzene	98-95-3	6.30E-04		1E-04		1E-05	6E-10		1E-06		3E-06
03-1	SVOC	Phenanthrene	85-01-8	8.42E-04		1E-05		1E-06			3E-08		6E-08
03-1	SVOC	Pyrene	129-00-0	8.44E-04		2E-05		2E-06			1E-08		3E-08
03-1	INORG	Antimony	7440-36-0	3.20E-03		8E-05		8E-05					
03-1	INORG	Arsenic	7440-38-2	9.00E-02	6E-08	1E-03	6E-09	6E-05					
03-1	INORG	Barium	7440-39-3	6.30E-01		2E-04		2E-04					
03-1	INORG	Beryllium	7440-41-7	4.30E-02		4E-03		4E-03					
03-1	INORG	Cadmium	7440-43-9	3.70E-03		2E-04		2E-04					
03-1	INORG	Chromium (total)	7440-47-3	7.00E-03		2E-04		4E-05					
03-1	INORG	Cobalt	7440-48-4	3.00E-03		4E-07		4E-07					
03-1	INORG	Copper	7440-50-8	2.20E-02		2E-06		2E-06					
03-1	INORG	Cyanide (total)	57-12-5	1.00E-01		2E-05		2E-05					
03-1	INORG	Lead	7439-92-1	1.30E-03									
03-1	INORG	Manganese	7439-96-5	1.50E+00		3E-04		3E-04					

Attachment G12: Groundwater Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/L)	Maintenance Worker GW Contact Risk	Maintenance Worker GW Contact Risk	Redevelopment Construction Worker GW Contact Risk	Redevelopment Construction Worker GW Contact HQ	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ
03-1	INORG	Nickel	7440-02-0	1.60E-02		7E-06		7E-06					
03-1	INORG	Selenium	7782-49-2	1.90E-01		1E-04		1E-04					
03-1	INORG	Silver	7440-22-4	2.10E-03		9E-06		9E-06					
03-1	INORG	Thallium	7440-28-0	1.90E-03		9E-05		9E-05					
03-1	INORG	Vanadium	7440-62-2	6.50E-03		5E-05		5E-05					
03-1	INORG	Zinc	7440-66-6	1.80E-01		2E-06		2E-06					
04-D	VOC	Benzene	71-43-2	2.80E-03	6E-09	2E-04	6E-10	1E-04	5E-07	3E-09	3E-05	6E-09	6E-05
04-D	VOC	2-Butanone	78-93-3	1.20E-03		1E-07		1E-07	2E-11		2E-09		4E-09
04-D	VOC	Dichlorodifluoromethane	75-71-8	3.20E-02		2E-04		2E-05	1E-08		2E-04		3E-04
04-D	VOC	Ethyl Benzene	100-41-4	2.40E-02		6E-05		6E-05	3E-08		9E-06		1E-05
04-D	VOC	4-Methyl-2-pentanone	108-10-1	4.40E-03		1E-06		1E-06	3E-10		3E-08		6E-08
04-D	VOC	Methylcyclohexane	108-87-2	5.10E-04		3E-07		3E-07	5E-10		2E-07		4E-07
04-D	VOC	Xylenes (total)	1330-20-7	3.32E-02		5E-04		5E-04	4E-08		1E-04		2E-04
04-D	PCB	PCBs (total)	1336-36-3	2.10E-04	1E-07	2E-02	1E-08	9E-03	7E-08	5E-09		9E-09	
04-D	INORG	Arsenic	7440-38-2	6.50E-03	5E-09	7E-05	5E-10	4E-06					
04-D	INORG	Barium	7440-39-3	7.20E-02		2E-05		2E-05					
04-D	INORG	Chromium (total)	7440-47-3	6.30E-04		2E-05		3E-06					
04-D	INORG	Cobalt	7440-48-4	5.00E-04		6E-08		6E-08					
04-D	INORG	Copper	7440-50-8	2.50E-02		2E-06		2E-06					
04-D	INORG	Cyanide (total)	57-12-5	3.80E-03		6E-07		6E-07					
04-D	INORG	Lead	7439-92-1	7.00E-04									
04-D	INORG	Manganese	7439-96-5	1.00E-01		2E-05		2E-05					
04-D	INORG	Nickel	7440-02-0	7.50E-03		3E-06		3E-06					
04-D	INORG	Selenium	7782-49-2	1.30E-02		8E-06		8E-06					
04-D	INORG	Vanadium	7440-62-2	4.40E-03		3E-05		3E-05					
04-D	INORG	Zinc	7440-66-6	2.60E-01		2E-06		2E-06					
05-1	VOC	Acetone	67-64-1	3.90E-03		6E-07		6E-07	2E-11		7E-09		2E-08
05-1	VOC	1,1-Dichloroethane	75-34-3	7.60E-04		3E-06		3E-07	1E-09		5E-07		9E-07
05-1	VOC	cis-1,2-Dichloroethene	156-59-2	1.20E-03		6E-05		6E-06	7E-10		1E-05		2E-05
05-1	VOC	Vinyl Chloride	75-01-4	1.10E-03	6E-09	3E-05	6E-10	3E-05	6E-07	3E-09	1E-05	6E-09	2E-05
05-1	SVOC	Diethylphthalate	84-66-2	1.23E-03		3E-08		3E-09	3E-11		3E-11		8E-11
05-1	INORG	Arsenic	7440-38-2	4.60E-02	3E-08	5E-04	3E-09	3E-05					
05-1	INORG	Barium	7440-39-3	9.30E-01		3E-04		3E-04					
05-1	INORG	Beryllium	7440-41-7	2.40E-04		2E-05		2E-05					
05-1	INORG	Cadmium	7440-43-9	1.40E-04		8E-06		8E-06					
05-1	INORG	Chromium (total)	7440-47-3	1.30E-03		5E-05		7E-06					
05-1	INORG	Cobalt	7440-48-4	6.10E-03		8E-07		8E-07					
05-1	INORG	Copper	7440-50-8	6.60E-03		5E-07		5E-07					
05-1	INORG	Cyanide (total)	57-12-5	2.00E-03		3E-07		3E-07					
05-1	INORG	Lead	7439-92-1	7.40E-04									
05-1	INORG	Manganese	7439-96-5	1.80E+00		3E-04		3E-04					
05-1	INORG	Mercury	7439-97-6	2.91E-04		1E-03		1E-03	2E-06		3E-04		4E-04
05-1	INORG	Nickel	7440-02-0	2.80E-02		1E-05		1E-05					

Attachment G12: Groundwater Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/L)	Maintenance Worker GW Contact Risk	Maintenance Worker GW Contact Risk	Redevelopment Construction Worker GW Contact Risk	Redevelopment Construction Worker GW Contact HQ	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ
05-1	INORG	Selenium	7782-49-2	2.40E-03		2E-06		2E-06					
05-1	INORG	Thallium	7440-28-0	1.70E-04		8E-06		8E-06					
05-1	INORG	Zinc	7440-66-6	2.60E-02		2E-07		2E-07					
05-2	VOC	2-Butanone	78-93-3	5.90E-04		7E-08		7E-08	1E-11		9E-10		2E-09
05-2	VOC	Cumene	98-82-8	9.70E-04		5E-06		4E-06	3E-09		1E-06		2E-06
05-2	VOC	1,1-Dichloroethane	75-34-3	3.50E-03		1E-05		1E-06	5E-09		3E-06		4E-06
05-2	VOC	cis-1,2-Dichloroethene	156-59-2	1.40E-02		7E-04		7E-05	8E-09		1E-04		2E-04
05-2	VOC	trans-1,2-Dichloroethene	156-60-5	7.30E-04		2E-05		2E-05	7E-10		6E-06		1E-05
05-2	VOC	Ethyl Benzene	100-41-4	8.60E-04		2E-06		2E-06	1E-09		3E-07		5E-07
05-2	VOC	Methylene Chloride	75-09-2	6.00E-04	7E-11	4E-07	7E-12	4E-07	2E-09	2E-11	4E-08	5E-11	8E-08
05-2	VOC	Trichloroethene	79-01-6	9.50E-02	4E-08	6E-04	4E-09	6E-04	2E-07	3E-08		5E-08	
05-2	VOC	Vinyl Chloride	75-01-4	1.90E-02	1E-07	5E-04	1E-08	5E-04	1E-05	5E-08	2E-04	1E-07	3E-04
05-2	VOC	Xylenes (total)	1330-20-7	1.07E-03		2E-05		2E-05	1E-09		4E-06		7E-06
05-2	SVOC	Acenaphthene	83-32-9	1.21E-02		8E-05		8E-06			1E-06		2E-06
05-2	SVOC	Dibenzofuran	132-64-9	2.68E-03		5E-04		5E-04			7E-07		2E-06
05-2	SVOC	Naphthalene	91-20-3	1.41E-03		5E-04		5E-04	2E-09		2E-05		5E-05
05-2	INORG	Arsenic	7440-38-2	1.80E-02	1E-08	2E-04	1E-09	1E-05					
05-2	INORG	Barium	7440-39-3	2.60E-01		8E-05		8E-05					
05-2	INORG	Beryllium	7440-41-7	5.60E-03		5E-04		5E-04					
05-2	INORG	Cadmium	7440-43-9	3.40E-03		2E-04		2E-04					
05-2	INORG	Chromium (total)	7440-47-3	1.90E-02		7E-04		1E-04					
05-2	INORG	Cobalt	7440-48-4	9.60E-02		1E-05		1E-05					
05-2	INORG	Copper	7440-50-8	1.20E-02		1E-06		1E-06					
05-2	INORG	Cyanide (total)	57-12-5	2.60E-03		4E-07		4E-07					
05-2	INORG	Lead	7439-92-1	2.20E-03									
05-2	INORG	Manganese	7439-96-5	2.20E+00		4E-04		4E-04					
05-2	INORG	Nickel	7440-02-0	2.10E-01		9E-05		9E-05					
05-2	INORG	Selenium	7782-49-2	2.30E-03		1E-06		1E-06					
05-2	INORG	Silver	7440-22-4	4.20E-04		2E-06		2E-06					
05-2	INORG	Thallium	7440-28-0	8.70E-04		4E-05		4E-05					
05-2	INORG	Vanadium	7440-62-2	3.80E-03		3E-05		3E-05					
05-2	INORG	Zinc	7440-66-6	3.50E-02		3E-07		3E-07					
05-3	VOC	Carbon Disulfide	75-15-0	9.90E-04		3E-06		3E-06	1E-07		1E-06		2E-06
05-3	VOC	1,1-Dichloroethane	75-34-3	2.90E-03		1E-05		1E-06	4E-09		2E-06		4E-06
05-3	VOC	cis-1,2-Dichloroethene	156-59-2	9.00E-03		4E-04		4E-05	5E-09		8E-05		1E-04
05-3	VOC	trans-1,2-Dichloroethene	156-60-5	1.00E-03		3E-05		3E-05	9E-10		8E-06		1E-05
05-3	VOC	Toluene	108-88-3	5.30E-04		5E-07		2E-07	8E-10		4E-08		7E-08
05-3	VOC	1,1,1-Trichloroethane	71-55-6	1.10E-02		8E-06		2E-06	5E-09		3E-06		5E-06
05-3	VOC	Trichloroethene	79-01-6	2.90E-02	1E-08	2E-04	1E-09	2E-04	7E-08	8E-09		2E-08	
05-3	INORG	Antimony	7440-36-0	2.20E-03		6E-05		6E-05					
05-3	INORG	Arsenic	7440-38-2	8.40E-02	6E-08	9E-04	6E-09	5E-05					
05-3	INORG	Barium	7440-39-3	4.60E-01		1E-04		1E-04					
05-3	INORG	Cadmium	7440-43-9	3.10E-04		2E-05		2E-05					

Attachment G12: Groundwater Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/L)	Maintenance Worker GW Contact Risk	Maintenance Worker GW Contact Risk	Redevelopment Construction Worker GW Contact Risk	Redevelopment Construction Worker GW Contact HQ	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ
05-3	INORG	Chromium (total)	7440-47-3	1.60E-03		6E-05		8E-06					
05-3	INORG	Cobalt	7440-48-4	4.40E-03		5E-07		5E-07					
05-3	INORG	Copper	7440-50-8	6.80E-03		6E-07		6E-07					
05-3	INORG	Cyanide (total)	57-12-5	7.90E-03		1E-06		1E-06					
05-3	INORG	Lead	7439-92-1	2.50E-03									
05-3	INORG	Manganese	7439-96-5	7.60E-01		1E-04		1E-04					
05-3	INORG	Nickel	7440-02-0	1.50E-02		6E-06		6E-06					
05-3	INORG	Selenium	7782-49-2	6.70E-03		4E-06		4E-06					
05-3	INORG	Thallium	7440-28-0	4.70E-04		2E-05		2E-05					
05-3	INORG	Zinc	7440-66-6	3.50E-02		3E-07		3E-07					
05-4	VOC	Acetone	67-64-1	6.90E-04		1E-07		1E-07	3E-12		1E-09		3E-09
05-4	INORG	Arsenic	7440-38-2	1.10E-03	8E-10	1E-05	8E-11	7E-07					
05-4	INORG	Barium	7440-39-3	2.00E-01		6E-05		6E-05					
05-4	INORG	Cobalt	7440-48-4	1.20E-03		1E-07		1E-07					
05-4	INORG	Copper	7440-50-8	5.60E-03		5E-07		5E-07					
05-4	INORG	Cyanide (total)	57-12-5	7.40E-03		1E-06		1E-06					
05-4	INORG	Manganese	7439-96-5	3.50E-01		6E-05		6E-05					
05-4	INORG	Nickel	7440-02-0	7.20E-03		3E-06		3E-06					
05-4	INORG	Selenium	7782-49-2	1.80E-03		1E-06		1E-06					
05-4	INORG	Zinc	7440-66-6	1.10E-02		1E-07		1E-07					
05-5	VOC	Acetone	67-64-1	1.90E-01		3E-05		3E-05	9E-10		3E-07		8E-07
05-5	VOC	1,1-Dichloroethane	75-34-3	1.40E-03		5E-06		5E-07	2E-09		1E-06		2E-06
05-5	VOC	cis-1,2-Dichloroethene	156-59-2	3.90E-03		2E-04		2E-05	2E-09		3E-05		6E-05
05-5	VOC	Methyl Acetate	79-20-9	8.00E-02		2E-05		2E-06	2E-09		3E-07		7E-07
05-5	VOC	Methylene Chloride	75-09-2	4.00E-04	5E-11	3E-07	5E-12	3E-07	1E-09	1E-11	3E-08	3E-11	5E-08
05-5	VOC	Toluene	108-88-3	2.00E-04		2E-07		8E-08	3E-10		1E-08		2E-08
05-5	VOC	Trichloroethene	79-01-6	8.00E-04	3E-10	5E-06	3E-11	5E-06	2E-09	2E-10		4E-10	
05-5	INORG	Arsenic	7440-38-2	7.00E-02	5E-08	8E-04	5E-09	5E-05					
05-5	INORG	Barium	7440-39-3	2.70E-01		8E-05		8E-05					
05-5	INORG	Cadmium	7440-43-9	3.10E-03		2E-04		2E-04					
05-5	INORG	Chromium (total)	7440-47-3	1.50E-03		5E-05		8E-06					
05-5	INORG	Cobalt	7440-48-4	9.90E-02		1E-05		1E-05					
05-5	INORG	Copper	7440-50-8	1.30E-02		1E-06		1E-06					
05-5	INORG	Cyanide (total)	57-12-5	2.40E-03		4E-07		4E-07					
05-5	INORG	Lead	7439-92-1	1.70E-03									
05-5	INORG	Manganese	7439-96-5	1.90E+00		3E-04		3E-04					
05-5	INORG	Mercury	7439-97-6	1.33E-04		5E-04		5E-04	1E-06		1E-04		2E-04
05-5	INORG	Nickel	7440-02-0	2.20E-01		9E-05		9E-05					
05-5	INORG	Selenium	7782-49-2	4.10E-03		3E-06		3E-06					
05-5	INORG	Silver	7440-22-4	2.80E-03		1E-05		1E-05					
05-5	INORG	Thallium	7440-28-0	6.30E-04		3E-05		3E-05					
05-5	INORG	Vanadium	7440-62-2	4.40E-04		3E-06		3E-06					
05-5	INORG	Zinc	7440-66-6	3.40E-02		3E-07		3E-07					

Attachment G12: Groundwater Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/L)	Maintenance Worker GW Contact Risk	Maintenance Worker GW Contact Risk	Redevelopment Construction Worker GW Contact Risk	Redevelopment Construction Worker GW Contact HQ	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ
05-6	VOC	Benzene	71-43-2	2.00E-04	4E-10	1E-05	4E-11	7E-06	3E-08	2E-10	2E-06	4E-10	4E-06
05-6	VOC	Carbon Disulfide	75-15-0	5.50E-04		2E-06		2E-06	6E-08		7E-07		1E-06
05-6	VOC	1,2-Dichloroethane	107-06-2	1.20E-03	7E-09	3E-04	7E-10	3E-04	5E-08	1E-09	3E-05	3E-09	5E-05
05-6	VOC	cis-1,2-Dichloroethene	156-59-2	8.10E-02		4E-03		4E-04	4E-08		7E-04		1E-03
05-6	VOC	trans-1,2-Dichloroethene	156-60-5	1.30E-03		4E-05		4E-05	1E-09		1E-05		2E-05
05-6	VOC	Ethyl Benzene	100-41-4	6.50E-04		2E-06		2E-06	8E-10		2E-07		4E-07
05-6	VOC	Methylene Chloride	75-09-2	4.00E-04	5E-11	3E-07	5E-12	3E-07	1E-09	1E-11	3E-08	3E-11	5E-08
05-6	VOC	Tetrachloroethene	127-18-4	6.40E-04	5E-10	4E-06	5E-11	2E-06	3E-09	4E-10	9E-07	7E-10	1E-06
05-6	VOC	Trichloroethene	79-01-6	2.50E-01	1E-07	2E-03	1E-08	2E-03	6E-07	7E-08		1E-07	
05-6	VOC	Vinyl Chloride	75-01-4	1.90E-02	1E-07	5E-04	1E-08	5E-04	1E-05	5E-08	2E-04	1E-07	3E-04
05-6	VOC	Xylenes (total)	1330-20-7	4.20E-03		7E-05		7E-05	5E-09		2E-05		3E-05
05-6	SVOC	Diethylphthalate	84-66-2	2.77E-03		6E-08		6E-09	6E-11		7E-11		2E-10
05-6	INORG	Antimony	7440-36-0	5.80E-04		2E-05		2E-05					
05-6	INORG	Arsenic	7440-38-2	1.70E-02	1E-08	2E-04	1E-09	1E-05					
05-6	INORG	Barium	7440-39-3	4.90E-01		1E-04		1E-04					
05-6	INORG	Beryllium	7440-41-7	1.20E-03		1E-04		1E-04					
05-6	INORG	Cadmium	7440-43-9	7.80E-04		4E-05		4E-05					
05-6	INORG	Chromium (total)	7440-47-3	1.90E-03		7E-05		1E-05					
05-6	INORG	Cobalt	7440-48-4	1.10E-02		1E-06		1E-06					
05-6	INORG	Copper	7440-50-8	1.10E-02		9E-07		9E-07					
05-6	INORG	Cyanide (total)	57-12-5	2.50E-02		4E-06		4E-06					
05-6	INORG	Lead	7439-92-1	2.30E-04									
05-6	INORG	Manganese	7439-96-5	3.10E+00		5E-04		5E-04					
05-6	INORG	Nickel	7440-02-0	3.40E-02		1E-05		1E-05					
05-6	INORG	Selenium	7782-49-2	4.00E-03		3E-06		3E-06					
05-6	INORG	Silver	7440-22-4	5.90E-04		3E-06		3E-06					
05-6	INORG	Thallium	7440-28-0	1.20E-03		6E-05		6E-05					
05-6	INORG	Zinc	7440-66-6	2.80E-02		3E-07		3E-07					
07-1	VOC	Acetone	67-64-1	8.10E-04		1E-07		1E-07	4E-12		1E-09		4E-09
07-1	VOC	cis-1,2-Dichloroethene	156-59-2	1.70E-02		8E-04		8E-05	9E-09		1E-04		3E-04
07-1	VOC	trans-1,2-Dichloroethene	156-60-5	1.20E-03		3E-05		3E-05	1E-09		1E-05		2E-05
07-1	VOC	Vinyl Chloride	75-01-4	3.30E-03	2E-08	8E-05	2E-09	8E-05	2E-06	9E-09	3E-05	2E-08	5E-05
07-1	INORG	Antimony	7440-36-0	2.80E-03		7E-05		7E-05					
07-1	INORG	Arsenic	7440-38-2	1.10E-03	8E-10	1E-05	8E-11	7E-07					
07-1	INORG	Barium	7440-39-3	7.30E-02		2E-05		2E-05					
07-1	INORG	Cadmium	7440-43-9	3.00E-04		2E-05		2E-05					
07-1	INORG	Chromium (total)	7440-47-3	6.60E-04		2E-05		3E-06					
07-1	INORG	Cobalt	7440-48-4	1.00E-03		1E-07		1E-07					
07-1	INORG	Copper	7440-50-8	1.10E-02		9E-07		9E-07					
07-1	INORG	Cyanide (total)	57-12-5	1.10E-03		2E-07		2E-07					
07-1	INORG	Lead	7439-92-1	6.20E-04									
07-1	INORG	Manganese	7439-96-5	3.70E-01		6E-05		6E-05					
07-1	INORG	Nickel	7440-02-0	2.00E-02		8E-06		8E-06					

Attachment G12: Groundwater Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/L)	Maintenance Worker GW Contact Risk	Maintenance Worker GW Contact Risk	Redevelopment Construction Worker GW Contact Risk	Redevelopment Construction Worker GW Contact HQ	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ
07-1	INORG	Selenium	7782-49-2	1.10E-02		7E-06		7E-06					
07-1	INORG	Zinc	7440-66-6	1.30E-01		1E-06		1E-06					
07-3	VOC	Acetone	67-64-1	5.90E-04		9E-08		8E-08	3E-12		1E-09		3E-09
07-3	VOC	1,1-Dichloroethane	75-34-3	3.90E-03		1E-05		1E-06	5E-09		3E-06		5E-06
07-3	VOC	Tetrachloroethene	127-18-4	5.00E-04	4E-10	3E-06	4E-11	2E-06	2E-09	3E-10	7E-07	6E-10	1E-06
07-3	VOC	1,1,1-Trichloroethane	71-55-6	1.00E-03		7E-07		2E-07	4E-10		3E-07		4E-07
07-3	VOC	Xylenes (total)	1330-20-7	1.14E-03		2E-05		2E-05	1E-09		4E-06		7E-06
07-3	SVOC	Diethylphthalate	84-66-2	2.46E-03		5E-08		5E-09	5E-11		6E-11		2E-10
07-3	INORG	Arsenic	7440-38-2	2.80E-03	2E-09	3E-05	2E-10	2E-06					
07-3	INORG	Barium	7440-39-3	1.50E-01		4E-05		4E-05					
07-3	INORG	Beryllium	7440-41-7	1.30E-03		1E-04		1E-04					
07-3	INORG	Cadmium	7440-43-9	1.20E-04		6E-06		6E-06					
07-3	INORG	Chromium (total)	7440-47-3	2.00E-03		7E-05		1E-05					
07-3	INORG	Cobalt	7440-48-4	1.60E-03		2E-07		2E-07					
07-3	INORG	Copper	7440-50-8	5.80E-03		5E-07		5E-07					
07-3	INORG	Cyanide (total)	57-12-5	2.10E-03		3E-07		3E-07					
07-3	INORG	Lead	7439-92-1	3.20E-04									
07-3	INORG	Manganese	7439-96-5	5.30E-01		9E-05		9E-05					
07-3	INORG	Nickel	7440-02-0	1.50E-02		6E-06		6E-06					
07-3	INORG	Selenium	7782-49-2	1.60E-02		1E-05		1E-05					
07-3	INORG	Silver	7440-22-4	4.10E-04		2E-06		2E-06					
07-3	INORG	Thallium	7440-28-0	2.30E-04		1E-05		1E-05					
07-3	INORG	Zinc	7440-66-6	1.00E-01		9E-07		9E-07					
09-A	VOC	Acetone	67-64-1	6.90E-02		1E-05		1E-05	3E-10		1E-07		3E-07
09-A	VOC	Benzene	71-43-2	1.00E-03	2E-09	7E-05	2E-10	4E-05	2E-07	1E-09	1E-05	2E-09	2E-05
09-A	VOC	2-Butanone	78-93-3	1.10E-03		1E-07		1E-07	2E-11		2E-09		4E-09
09-A	VOC	Carbon Tetrachloride	56-23-5	3.00E-04	1E-09	1E-05	1E-10	1E-06	3E-08	1E-09		2E-09	
09-A	VOC	Chloroethane	75-00-3	2.10E-03	1E-11	5E-07	1E-12	5E-07	7E-10		1E-07		2E-07
09-A	VOC	Chloroform	67-66-3	3.00E-03	1E-08	9E-05	1E-09	9E-05	1E-07	7E-09	2E-05	2E-08	3E-05
09-A	VOC	Chloromethane	74-87-3	2.60E-03		6E-05		6E-05	1E-08		1E-05		2E-05
09-A	VOC	Cumene	98-82-8	3.60E-03		2E-05		1E-05	9E-09		4E-06		6E-06
09-A	VOC	Cyclohexane	110-82-7	3.40E-02		1E-05		1E-05	6E-08		7E-06		1E-05
09-A	VOC	1,1-Dichloroethane	75-34-3	3.50E-02		1E-04		1E-05	5E-08		3E-05		4E-05
09-A	VOC	1,1-Dichloroethene	75-35-4	4.00E-03		3E-05		3E-05	2E-07		2E-05		2E-05
09-A	VOC	cis-1,2-Dichloroethene	156-59-2	1.20E-02		6E-04		6E-05	7E-09		1E-04		2E-04
09-A	VOC	trans-1,2-Dichloroethene	156-60-5	5.00E-04		1E-05		1E-05	5E-10		4E-06		7E-06
09-A	VOC	Ethyl Benzene	100-41-4	5.70E-04		1E-06		1E-06	7E-10		2E-07		3E-07
09-A	VOC	Methyl Acetate	79-20-9	6.00E-03		1E-06		1E-07	2E-10		2E-08		5E-08
09-A	VOC	Methylcyclohexane	108-87-2	1.20E-01		7E-05		7E-05	1E-07		6E-05		8E-05
09-A	VOC	Toluene	108-88-3	2.00E-03		2E-06		8E-07	3E-09		1E-07		2E-07
09-A	VOC	1,1,1-Trichloroethane	71-55-6	2.58E-01		2E-04		4E-05	1E-07		7E-05		1E-04
09-A	VOC	Trichloroethene	79-01-6	1.84E-01	7E-08	1E-03	7E-09	1E-03	5E-07	5E-08		1E-07	
09-A	VOC	Trichlorofluoromethane	75-69-4	1.40E-02		3E-05		3E-06	4E-09		2E-05		3E-05

Attachment G12: Groundwater Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/L)	Maintenance Worker GW Contact Risk	Maintenance Worker GW Contact Risk	Redevelopment Construction Worker GW Contact Risk	Redevelopment Construction Worker GW Contact HQ	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ
09-A	VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	5.00E-04		2E-08		2E-08	1E-10		2E-08		3E-08
09-A	VOC	Vinyl Chloride	75-01-4	3.80E-03	2E-08	9E-05	2E-09	9E-05	2E-06	1E-08	3E-05	2E-08	5E-05
09-A	VOC	Xylenes (total)	1330-20-7	1.40E-03		2E-05		2E-05	2E-09		5E-06		9E-06
09-A	PCB	PCBs (total)	1336-36-3	1.45E-04	1E-07	2E-02	1E-08	6E-03	5E-08	3E-09		6E-09	
09-A	INORG	Antimony	7440-36-0	1.60E-02		4E-04		4E-04					
09-A	INORG	Arsenic	7440-38-2	9.80E-03	7E-09	1E-04	7E-10	6E-06					
09-A	INORG	Barium	7440-39-3	1.40E-01		4E-05		4E-05					
09-A	INORG	Cadmium	7440-43-9	2.80E-04		2E-05		2E-05					
09-A	INORG	Chromium (total)	7440-47-3	1.70E-02		6E-04		9E-05					
09-A	INORG	Cobalt	7440-48-4	1.20E-03		1E-07		1E-07					
09-A	INORG	Copper	7440-50-8	1.20E-03		1E-07		1E-07					
09-A	INORG	Cyanide (total)	57-12-5	4.40E-03		7E-07		7E-07					
09-A	INORG	Lead	7439-92-1	4.00E-03									
09-A	INORG	Manganese	7439-96-5	1.40E-01		2E-05		2E-05					
09-A	INORG	Nickel	7440-02-0	7.70E-03		3E-06		3E-06					
09-A	INORG	Selenium	7782-49-2	1.10E-02		7E-06		7E-06					
09-A	INORG	Vanadium	7440-62-2	4.20E-03		3E-05		3E-05					
09-A	INORG	Zinc	7440-66-6	8.00E-03		7E-08		7E-08					
09-B	VOC	Acetone	67-64-1	4.60E-01		7E-05		7E-05	2E-09		8E-07		2E-06
09-B	VOC	Benzene	71-43-2	1.21E+00	3E-06	8E-02	3E-07	4E-02	2E-04	1E-06	1E-02	2E-06	2E-02
09-B	VOC	2-Butanone	78-93-3	1.90E-01		2E-05		2E-05	4E-09		3E-07		7E-07
09-B	VOC	Carbon Disulfide	75-15-0	5.70E-04		2E-06		2E-06	6E-08		7E-07		1E-06
09-B	VOC	Chloroethane	75-00-3	6.10E-03	3E-11	1E-06	3E-12	1E-06	2E-09		4E-07		6E-07
09-B	VOC	Cumene	98-82-8	6.60E-02		3E-04		3E-04	2E-07		7E-05		1E-04
09-B	VOC	Cyclohexane	110-82-7	5.60E-01		2E-04		2E-04	1E-06		1E-04		2E-04
09-B	VOC	1,3-Dichlorobenzene	541-73-1	3.00E-04		3E-06		3E-06			5E-07		8E-07
09-B	VOC	Dichlorodifluoromethane	75-71-8	5.60E-03		4E-05		4E-06	2E-09		4E-05		5E-05
09-B	VOC	1,2-Dichloroethane	107-06-2	3.00E-03	2E-08	9E-04	2E-09	9E-04	1E-07	3E-09	6E-05	7E-09	1E-04
09-B	VOC	cis-1,2-Dichloroethene	156-59-2	6.90E-04		3E-05		3E-06	4E-10		6E-06		1E-05
09-B	VOC	Ethyl Benzene	100-41-4	1.00E+00		2E-03		2E-03	1E-06		4E-04		6E-04
09-B	VOC	2-Hexanone	591-78-6	2.40E-02		7E-03		7E-03					
09-B	VOC	Methyl tert-butyl ether	1634-04-4	7.10E-04		3E-07		3E-07	4E-10		2E-08		3E-08
09-B	VOC	4-Methyl-2-pentanone	108-10-1	6.60E-03		2E-06		2E-06	4E-10		4E-08		9E-08
09-B	VOC	Methylcyclohexane	108-87-2	4.00E-01		2E-04		2E-04	4E-07		2E-04		3E-04
09-B	VOC	Methylene Chloride	75-09-2	7.40E-03	9E-10	5E-06	9E-11	5E-06	3E-08	3E-10	5E-07	6E-10	1E-06
09-B	VOC	Toluene	108-88-3	5.40E-01		5E-04		2E-04	8E-07		4E-05		7E-05
09-B	VOC	Xylenes (total)	1330-20-7	1.69E+00		3E-02		3E-02	2E-06		6E-03		1E-02
09-B	SVOC	2,4-Dimethylphenol	105-67-9	2.94E-02		5E-05		5E-06			1E-07		3E-07
09-B	SVOC	2-Methylnaphthalene	91-57-6	1.05E-02		4E-03		4E-03			2E-04		4E-04
09-B	SVOC	Methylphenol (total)	1319-77-3	1.10E-02		4E-06		4E-07	1E-10				
09-B	SVOC	Naphthalene	91-20-3	6.36E-02		2E-02		2E-02	1E-07		1E-03		2E-03
09-B	SVOC	4-Nitrophenol	100-02-7	2.15E-03									

Attachment G12: Groundwater Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/L)	Maintenance Worker GW Contact Risk	Maintenance Worker GW Contact Risk	Redevelopment Construction Worker GW Contact Risk	Redevelopment Construction Worker GW Contact HQ	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ
09-B	SVOC	Phenol	108-95-2	4.94E-03		2E-07		2E-07	2E-11				
09-B	PCB	PCBs (total)	1336-36-3	1.69E-03	1E-06	2E-01	1E-07	7E-02	5E-07	4E-08		7E-08	
09-B	INORG	Antimony	7440-36-0	6.80E-03		2E-04		2E-04					
09-B	INORG	Arsenic	7440-38-2	6.10E-02	4E-08	7E-04	4E-09	4E-05					
09-B	INORG	Barium	7440-39-3	1.40E+00		4E-04		4E-04					
09-B	INORG	Beryllium	7440-41-7	2.70E-03		3E-04		3E-04					
09-B	INORG	Cadmium	7440-43-9	1.00E-03		5E-05		5E-05					
09-B	INORG	Chromium (total)	7440-47-3	1.30E-02		5E-04		7E-05					
09-B	INORG	Cobalt	7440-48-4	2.20E-03		3E-07		3E-07					
09-B	INORG	Copper	7440-50-8	2.10E-02		2E-06		2E-06					
09-B	INORG	Cyanide (total)	57-12-5	7.90E-02		1E-05		1E-05					
09-B	INORG	Lead	7439-92-1	5.80E-03									
09-B	INORG	Manganese	7439-96-5	8.90E-01		1E-04		1E-04					
09-B	INORG	Mercury	7439-97-6	2.70E-04		1E-03		1E-03	2E-06		2E-04		4E-04
09-B	INORG	Nickel	7440-02-0	1.30E-02		5E-06		5E-06					
09-B	INORG	Selenium	7782-49-2	5.20E-02		3E-05		3E-05					
09-B	INORG	Silver	7440-22-4	6.80E-04		3E-06		3E-06					
09-B	INORG	Thallium	7440-28-0	1.60E-03		7E-05		7E-05					
09-B	INORG	Vanadium	7440-62-2	4.40E-03		3E-05		3E-05					
09-B	INORG	Zinc	7440-66-6	1.10E-01		1E-06		1E-06					
10-1	VOC	Acetone	67-64-1	8.10E-03		1E-06		1E-06	4E-11		1E-08		4E-08
10-1	VOC	Benzene	71-43-2	1.60E-03	4E-09	1E-04	4E-10	6E-05	3E-07	2E-09	2E-05	3E-09	3E-05
10-1	VOC	Chloroethane	75-00-3	1.70E-01	8E-10	4E-05	8E-11	4E-05	6E-08		1E-05		2E-05
10-1	VOC	1,1-Dichloroethane	75-34-3	6.90E-01		2E-03		2E-04	9E-07		5E-04		8E-04
10-1	VOC	1,2-Dichloroethane	107-06-2	3.20E-03	2E-08	9E-04	2E-09	9E-04	1E-07	3E-09	7E-05	8E-09	1E-04
10-1	VOC	1,1-Dichloroethene	75-35-4	1.30E-02		1E-04		1E-04	8E-07		5E-05		8E-05
10-1	VOC	cis-1,2-Dichloroethene	156-59-2	2.50E-01		1E-02		1E-03	1E-07		2E-03		4E-03
10-1	VOC	trans-1,2-Dichloroethene	156-60-5	5.20E-03		1E-04		1E-04	5E-09		4E-05		7E-05
10-1	VOC	Methylene Chloride	75-09-2	5.00E-04	6E-11	3E-07	6E-12	3E-07	2E-09	2E-11	3E-08	4E-11	7E-08
10-1	VOC	Toluene	108-88-3	9.20E-03		9E-06		4E-06	1E-08		7E-07		1E-06
10-1	VOC	1,1,1-Trichloroethane	71-55-6	2.10E-01		2E-04		3E-05	9E-08		6E-05		9E-05
10-1	VOC	1,1,2-Trichloroethane	79-00-5	3.30E-03	1E-08	1E-05	1E-09	1E-06	1E-08	2E-09		4E-09	
10-1	VOC	Trichloroethene	79-01-6	1.20E-03	5E-10	8E-06	5E-11	8E-06	3E-09	3E-10		7E-10	
10-1	VOC	Vinyl Chloride	75-01-4	3.20E-03	2E-08	8E-05	2E-09	8E-05	2E-06	9E-09	3E-05	2E-08	5E-05
10-1	VOC	Xylenes (total)	1330-20-7	1.30E-03		2E-05		2E-05	2E-09		5E-06		8E-06
10-1	SVOC	Diethylphthalate	84-66-2	1.64E-03		4E-08		4E-09	3E-11		4E-11		1E-10
10-1	INORG	Antimony	7440-36-0	3.50E-04		9E-06		9E-06					
10-1	INORG	Arsenic	7440-38-2	6.30E-03	4E-09	7E-05	4E-10	4E-06					
10-1	INORG	Barium	7440-39-3	3.30E+01		1E-02		1E-02					
10-1	INORG	Beryllium	7440-41-7	1.30E-04		1E-05		1E-05					
10-1	INORG	Cadmium	7440-43-9	5.40E-04		3E-05		3E-05					
10-1	INORG	Chromium (total)	7440-47-3	4.10E-03		1E-04		2E-05					
10-1	INORG	Cobalt	7440-48-4	5.10E-03		6E-07		6E-07					

Attachment G12: Groundwater Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/L)	Maintenance Worker GW Contact Risk	Maintenance Worker GW Contact Risk	Redevelopment Construction Worker GW Contact Risk	Redevelopment Construction Worker GW Contact HQ	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ
10-1	INORG	Copper	7440-50-8	3.10E-01		3E-05		3E-05					
10-1	INORG	Cyanide (total)	57-12-5	1.20E-02		2E-06		2E-06					
10-1	INORG	Lead	7439-92-1	8.80E-03									
10-1	INORG	Manganese	7439-96-5	2.00E+00		3E-04		3E-04					
10-1	INORG	Nickel	7440-02-0	3.00E-02		1E-05		1E-05					
10-1	INORG	Selenium	7782-49-2	4.10E-04		3E-07		3E-07					
10-1	INORG	Silver	7440-22-4	1.20E-04		5E-07		5E-07					
10-1	INORG	Zinc	7440-66-6	6.60E-01		6E-06		6E-06					
10-2	VOC	Acetone	67-64-1	4.10E-02		7E-06		6E-06	2E-10		7E-08		2E-07
10-2	VOC	Benzene	71-43-2	1.70E-02	4E-08	1E-03	4E-09	6E-04	3E-06	2E-08	2E-04	3E-08	3E-04
10-2	VOC	2-Butanone	78-93-3	6.80E-03		8E-07		8E-07	1E-10		1E-08		3E-08
10-2	VOC	Chloroethane	75-00-3	3.30E+00	2E-08	7E-04	2E-09	7E-04	1E-06		2E-04		3E-04
10-2	VOC	Chloroform	67-66-3	4.20E-03	2E-08	1E-04	2E-09	1E-04	2E-07	1E-08	2E-05	2E-08	4E-05
10-2	VOC	Cumene	98-82-8	3.40E-03		2E-05		1E-05	9E-09		4E-06		6E-06
10-2	VOC	1,1-Dichloroethane	75-34-3	1.10E+00		4E-03		4E-04	1E-06		8E-04		1E-03
10-2	VOC	1,2-Dichloroethane	107-06-2	1.50E-03	8E-09	4E-04	8E-10	4E-04	6E-08	1E-09	3E-05	4E-09	7E-05
10-2	VOC	1,1-Dichloroethene	75-35-4	1.10E-01		9E-04		9E-04	6E-06		4E-04		7E-04
10-2	VOC	cis-1,2-Dichloroethene	156-59-2	1.50E-01		7E-03		7E-04	8E-08		1E-03		2E-03
10-2	VOC	trans-1,2-Dichloroethene	156-60-5	1.00E-02		3E-04		3E-04	9E-09		8E-05		1E-04
10-2	VOC	Ethyl Benzene	100-41-4	6.20E-02		1E-04		1E-04	8E-08		2E-05		4E-05
10-2	VOC	2-Hexanone	591-78-6	6.70E-03		2E-03		2E-03					
10-2	VOC	Methyl tert-butyl ether	1634-04-4	1.20E-03		6E-07		6E-07	7E-10		3E-08		6E-08
10-2	VOC	4-Methyl-2-pentanone	108-10-1	9.80E-03		3E-06		3E-06	6E-10		6E-08		1E-07
10-2	VOC	Methylcyclohexane	108-87-2	7.20E-04		4E-07		4E-07	8E-10		4E-07		5E-07
10-2	VOC	Methylene Chloride	75-09-2	2.90E-02	3E-09	2E-05	3E-10	2E-05	1E-07	1E-09	2E-06	2E-09	4E-06
10-2	VOC	Toluene	108-88-3	9.60E-03		1E-05		4E-06	1E-08		7E-07		1E-06
10-2	VOC	1,1,1-Trichloroethane	71-55-6	5.80E-01		4E-04		9E-05	3E-07		2E-04		2E-04
10-2	VOC	1,1,2-Trichloroethane	79-00-5	5.50E-04	2E-09	2E-06	2E-10	2E-07	2E-09	3E-10		7E-10	
10-2	VOC	Trichloroethene	79-01-6	1.60E-01	6E-08	1E-03	6E-09	1E-03	4E-07	5E-08		9E-08	
10-2	VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	5.20E-04		2E-08		2E-08	1E-10		3E-08		4E-08
10-2	VOC	Vinyl Chloride	75-01-4	6.00E-02	3E-07	1E-03	3E-08	1E-03	3E-05	2E-07	5E-04	3E-07	8E-04
10-2	VOC	Xylenes (total)	1330-20-7	2.34E-01		4E-03		4E-03	3E-07		9E-04		1E-03
10-2	SVOC	2,4-Dimethylphenol	105-67-9	2.46E-02		4E-05		4E-06			1E-07		3E-07
10-2	SVOC	Fluorene	86-73-7	1.18E-03		1E-05		1E-06			7E-08		2E-07
10-2	SVOC	Methylphenol (total)	1319-77-3	1.07E-02		3E-06		3E-07	9E-11				
10-2	INORG	Antimony	7440-36-0	2.60E-03		7E-05		7E-05					
10-2	INORG	Arsenic	7440-38-2	6.80E-02	5E-08	7E-04	5E-09	4E-05					
10-2	INORG	Barium	7440-39-3	1.10E+00		3E-04		3E-04					
10-2	INORG	Beryllium	7440-41-7	1.70E-03		2E-04		2E-04					
10-2	INORG	Cadmium	7440-43-9	4.40E-03		2E-04		2E-04					
10-2	INORG	Chromium (total)	7440-47-3	9.90E-03		3E-04		5E-05					
10-2	INORG	Cobalt	7440-48-4	1.10E-02		1E-06		1E-06					

Attachment G12: Groundwater Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/L)	Maintenance Worker GW Contact Risk	Maintenance Worker GW Contact Risk	Redevelopment Construction Worker GW Contact Risk	Redevelopment Construction Worker GW Contact HQ	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ
10-2	INORG	Copper	7440-50-8	1.30E-02		1E-06		1E-06					
10-2	INORG	Cyanide (total)	57-12-5	2.80E-02		5E-06		5E-06					
10-2	INORG	Lead	7439-92-1	6.80E-03									
10-2	INORG	Manganese	7439-96-5	7.60E+00		1E-03		1E-03					
10-2	INORG	Mercury	7439-97-6	2.55E-04		1E-03		1E-03	2E-06		2E-04		4E-04
10-2	INORG	Nickel	7440-02-0	5.70E-02		2E-05		2E-05					
10-2	INORG	Selenium	7782-49-2	8.50E-03		6E-06		6E-06					
10-2	INORG	Silver	7440-22-4	3.00E-03		1E-05		1E-05					
10-2	INORG	Thallium	7440-28-0	4.20E-04		2E-05		2E-05					
10-2	INORG	Vanadium	7440-62-2	1.10E-02		8E-05		8E-05					
10-2	INORG	Zinc	7440-66-6	4.60E-02		4E-07		4E-07					
10-3	VOC	Acetone	67-64-1	2.10E-01		3E-05		3E-05	1E-09		4E-07		9E-07
10-3	VOC	Benzene	71-43-2	2.00E-03	4E-09	1E-04	4E-10	7E-05	3E-07	2E-09	2E-05	4E-09	4E-05
10-3	VOC	2-Butanone	78-93-3	3.20E-02		4E-06		4E-06	6E-10		5E-08		1E-07
10-3	VOC	Chloroethane	75-00-3	7.40E+00	4E-08	2E-03	4E-09	2E-03	2E-06		4E-04		8E-04
10-3	VOC	Chloroform	67-66-3	3.90E-03	2E-08	1E-04	2E-09	1E-04	2E-07	9E-09	2E-05	2E-08	4E-05
10-3	VOC	1,1-Dichloroethane	75-34-3	1.20E+01		4E-02		4E-03	2E-05		9E-03		1E-02
10-3	VOC	1,2-Dichloroethane	107-06-2	1.70E-02	9E-08	5E-03	9E-09	5E-03	7E-07	2E-08	4E-04	4E-08	7E-04
10-3	VOC	1,1-Dichloroethene	75-35-4	1.30E-01		1E-03		1E-03	8E-06		5E-04		8E-04
10-3	VOC	cis-1,2-Dichloroethene	156-59-2	3.00E-03		1E-04		1E-05	2E-09		3E-05		5E-05
10-3	VOC	trans-1,2-Dichloroethene	156-60-5	5.10E-03		1E-04		1E-04	5E-09		4E-05		7E-05
10-3	VOC	Methyl tert-butyl ether	1634-04-4	3.40E-03		2E-06		2E-06	2E-09		8E-08		2E-07
10-3	VOC	Methylene Chloride	75-09-2	5.00E-03	6E-10	3E-06	6E-11	3E-06	2E-08	2E-10	3E-07	4E-10	7E-07
10-3	VOC	1,1,1-Trichloroethane	71-55-6	2.40E+00		2E-03		4E-04	1E-06		6E-04		1E-03
10-3	VOC	1,1,2-Trichloroethane	79-00-5	4.40E-03	1E-08	2E-05	1E-09	2E-06	1E-08	2E-09		6E-09	
10-3	VOC	Vinyl Chloride	75-01-4	5.20E-01	3E-06	1E-02	3E-07	1E-02	3E-04	1E-06	5E-03	3E-06	7E-03
10-3	SVOC	Acenaphthene	83-32-9	6.63E-04		5E-06		5E-07			6E-08		1E-07
10-3	INORG	Antimony	7440-36-0	1.20E-03		3E-05		3E-05					
10-3	INORG	Arsenic	7440-38-2	2.80E-02	2E-08	3E-04	2E-09	2E-05					
10-3	INORG	Barium	7440-39-3	4.30E-01		1E-04		1E-04					
10-3	INORG	Beryllium	7440-41-7	4.20E-03		4E-04		4E-04					
10-3	INORG	Cadmium	7440-43-9	6.50E-04		3E-05		3E-05					
10-3	INORG	Chromium (total)	7440-47-3	4.00E-03		1E-04		2E-05					
10-3	INORG	Cobalt	7440-48-4	5.70E-03		7E-07		7E-07					
10-3	INORG	Copper	7440-50-8	1.50E-02		1E-06		1E-06					
10-3	INORG	Cyanide (total)	57-12-5	1.80E-02		3E-06		3E-06					
10-3	INORG	Lead	7439-92-1	4.90E-03									
10-3	INORG	Manganese	7439-96-5	1.90E+00		3E-04		3E-04					
10-3	INORG	Mercury	7439-97-6	1.23E-04		5E-04		5E-04	9E-07		1E-04		2E-04
10-3	INORG	Nickel	7440-02-0	2.00E-02		8E-06		8E-06					
10-3	INORG	Selenium	7782-49-2	8.80E-03		6E-06		6E-06					
10-3	INORG	Silver	7440-22-4	1.50E-03		6E-06		6E-06					
10-3	INORG	Thallium	7440-28-0	1.30E-04		6E-06		6E-06					

Attachment G12: Groundwater Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/L)	Maintenance Worker GW Contact Risk	Maintenance Worker GW Contact Risk	Redevelopment Construction Worker GW Contact Risk	Redevelopment Construction Worker GW Contact HQ	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ
10-3	INORG	Vanadium	7440-62-2	7.50E-03		6E-05		6E-05					
10-3	INORG	Zinc	7440-66-6	3.90E-02		4E-07		4E-07					
10-4	VOC	Acetone	67-64-1	3.10E-03		5E-07		4E-07	1E-11		6E-09		1E-08
10-4	VOC	Benzene	71-43-2	6.10E-03	1E-08	4E-04	1E-09	2E-04	1E-06	6E-09	7E-05	1E-08	1E-04
10-4	VOC	2-Butanone	78-93-3	2.40E-03		3E-07		3E-07	5E-11		4E-09		9E-09
10-4	VOC	Chloroethane	75-00-3	3.90E-02	2E-10	9E-06	2E-11	9E-06	1E-08		2E-06		4E-06
10-4	VOC	Cyclohexane	110-82-7	1.30E-03		4E-07		4E-07	2E-09		3E-07		4E-07
10-4	VOC	1,1-Dichloroethane	75-34-3	2.30E-02		8E-05		8E-06	3E-08		2E-05		3E-05
10-4	VOC	1,1-Dichloroethene	75-35-4	5.70E-04		5E-06		5E-06	3E-08		2E-06		3E-06
10-4	VOC	cis-1,2-Dichloroethene	156-59-2	6.20E-04		3E-05		3E-06	3E-10		5E-06		9E-06
10-4	VOC	1,2,4-Trichlorobenzene	120-82-1	6.30E-04		1E-05		1E-05			4E-07		6E-07
10-4	VOC	1,1,1-Trichloroethane	71-55-6	2.00E-03		1E-06		3E-07	9E-10		5E-07		8E-07
10-4	VOC	Vinyl Chloride	75-01-4	2.30E-03	1E-08	6E-05	1E-09	6E-05	1E-06	7E-09	2E-05	1E-08	3E-05
10-4	SVOC	2-Methylnaphthalene	91-57-6	1.04E-03		4E-04		4E-04			2E-05		4E-05
10-4	INORG	Arsenic	7440-38-2	3.80E-02	3E-08	4E-04	3E-09	2E-05					
10-4	INORG	Barium	7440-39-3	1.80E+00		5E-04		5E-04					
10-4	INORG	Cadmium	7440-43-9	8.50E-04		5E-05		5E-05					
10-4	INORG	Chromium (total)	7440-47-3	6.50E-03		2E-04		3E-05					
10-4	INORG	Cobalt	7440-48-4	2.60E-03		3E-07		3E-07					
10-4	INORG	Copper	7440-50-8	1.40E-02		1E-06		1E-06					
10-4	INORG	Cyanide (total)	57-12-5	4.80E-02		8E-06		8E-06					
10-4	INORG	Lead	7439-92-1	1.10E-03									
10-4	INORG	Manganese	7439-96-5	7.30E-01		1E-04		1E-04					
10-4	INORG	Nickel	7440-02-0	2.00E-02		8E-06		8E-06					
10-4	INORG	Selenium	7782-49-2	2.10E-02		1E-05		1E-05					
10-4	INORG	Silver	7440-22-4	1.90E-03		8E-06		8E-06					
10-4	INORG	Thallium	7440-28-0	4.60E-05		2E-06		2E-06					
10-4	INORG	Vanadium	7440-62-2	2.70E-04		2E-06		2E-06					
10-4	INORG	Zinc	7440-66-6	5.30E-02		5E-07		5E-07					
12-A	VOC	Acetone	67-64-1	2.20E-01		3E-05		3E-05	1E-09		4E-07		1E-06
12-A	VOC	Benzene	71-43-2	2.70E-03	6E-09	2E-04	6E-10	1E-04	4E-07	3E-09	3E-05	6E-09	6E-05
12-A	VOC	2-Butanone	78-93-3	3.50E-02		4E-06		4E-06	7E-10		6E-08		1E-07
12-A	VOC	Cumene	98-82-8	3.80E-03		2E-05		2E-05	1E-08		4E-06		6E-06
12-A	VOC	Cyclohexane	110-82-7	1.50E-02		4E-06		4E-06	3E-08		3E-06		5E-06
12-A	VOC	Dichlorodifluoromethane	75-71-8	3.30E-02		2E-04		2E-05	1E-08		2E-04		3E-04
12-A	VOC	Ethyl Benzene	100-41-4	1.50E-03		4E-06		4E-06	2E-09		6E-07		9E-07
12-A	VOC	2-Hexanone	591-78-6	1.20E-03		4E-04		4E-04					
12-A	VOC	Methyl Acetate	79-20-9	2.30E-02		5E-06		5E-07	7E-10		8E-08		2E-07
12-A	VOC	4-Methyl-2-pentanone	108-10-1	8.90E-04		3E-07		3E-07	6E-11		5E-09		1E-08
12-A	VOC	Methylcyclohexane	108-87-2	1.10E-02		6E-06		6E-06	1E-08		5E-06		8E-06
12-A	VOC	Toluene	108-88-3	5.70E-03		6E-06		2E-06	8E-09		4E-07		7E-07
12-A	VOC	Trichlorofluoromethane	75-69-4	2.00E-03		4E-06		5E-07	6E-10		3E-06		5E-06
12-A	VOC	Xylenes (total)	1330-20-7	3.70E-03		6E-05		6E-05	5E-09		1E-05		2E-05

Attachment G12: Groundwater Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/L)	Maintenance Worker GW Contact Risk	Maintenance Worker GW Contact Risk	Redevelopment Construction Worker GW Contact Risk	Redevelopment Construction Worker GW Contact HQ	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ
12-A	SVOC	Acenaphthene	83-32-9	3.00E-04		2E-06		2E-07			3E-08		6E-08
12-A	SVOC	Anthracene	120-12-7	2.00E-04		3E-07		3E-08					
12-A	SVOC	Biphenyl	92-52-4	1.00E-04		1E-06		1E-06	5E-09		2E-08		4E-08
12-A	SVOC	Carbazole	86-74-8	1.23E-03	4E-10		4E-11			9E-15		3E-14	
12-A	SVOC	Dibenzofuran	132-64-9	3.00E-04		6E-05		6E-05			7E-08		2E-07
12-A	SVOC	Fluorene	86-73-7	5.00E-04		5E-06		5E-07			3E-08		7E-08
12-A	SVOC	2-Methylnaphthalene	91-57-6	3.11E-03		1E-03		1E-03			6E-05		1E-04
12-A	SVOC	Methylphenol (total)	1319-77-3	6.64E-03		2E-06		2E-07	6E-11				
12-A	SVOC	Naphthalene	91-20-3	4.05E-02		2E-02		2E-02	6E-08		7E-04		1E-03
12-A	SVOC	Phenanthrene	85-01-8	8.53E-04		1E-05		1E-06			3E-08		6E-08
12-A	SVOC	Phenol	108-95-2	9.82E-03		3E-07		3E-07	5E-11				
12-A	INORG	Antimony	7440-36-0	4.30E-03		1E-04		1E-04					
12-A	INORG	Arsenic	7440-38-2	6.00E-02	4E-08	6E-04	4E-09	4E-05					
12-A	INORG	Barium	7440-39-3	6.10E-01		2E-04		2E-04					
12-A	INORG	Beryllium	7440-41-7	2.70E-01		3E-02		3E-02					
12-A	INORG	Cadmium	7440-43-9	6.70E-03		4E-04		4E-04					
12-A	INORG	Chromium (total)	7440-47-3	1.20E-01		4E-03		6E-04					
12-A	INORG	Cobalt	7440-48-4	4.60E-02		6E-06		6E-06					
12-A	INORG	Copper	7440-50-8	8.90E-02		7E-06		7E-06					
12-A	INORG	Cyanide (total)	57-12-5	2.40E-02		4E-06		4E-06					
12-A	INORG	Lead	7439-92-1	5.90E-02									
12-A	INORG	Manganese	7439-96-5	2.10E+00		4E-04		4E-04					
12-A	INORG	Mercury	7439-97-6	4.37E-05		2E-04		2E-04	3E-07		4E-05		6E-05
12-A	INORG	Nickel	7440-02-0	1.20E-01		5E-05		5E-05					
12-A	INORG	Selenium	7782-49-2	4.50E-03		3E-06		3E-06					
12-A	INORG	Silver	7440-22-4	4.40E-03		2E-05		2E-05					
12-A	INORG	Thallium	7440-28-0	3.60E-03		2E-04		2E-04					
12-A	INORG	Vanadium	7440-62-2	1.40E-01		1E-03		1E-03					
12-A	INORG	Zinc	7440-66-6	2.60E-01		2E-06		2E-06					
12-B	VOC	Acetone	67-64-1	7.80E-03		1E-06		1E-06	4E-11		1E-08		3E-08
12-B	VOC	2-Butanone	78-93-3	1.70E-03		2E-07		2E-07	3E-11		3E-09		6E-09
12-B	PCB	PCBs (total)	1336-36-3	1.01E-04	7E-08	1E-02	7E-09	4E-03	3E-08	2E-09		4E-09	
12-B	INORG	Antimony	7440-36-0	1.30E-03		3E-05		3E-05					
12-B	INORG	Arsenic	7440-38-2	1.00E-03	7E-10	1E-05	7E-11	6E-07					
12-B	INORG	Barium	7440-39-3	1.80E-01		5E-05		5E-05					
12-B	INORG	Cadmium	7440-43-9	2.00E-04		1E-05		1E-05					
12-B	INORG	Chromium (total)	7440-47-3	6.80E-04		2E-05		4E-06					
12-B	INORG	Cobalt	7440-48-4	1.10E-03		1E-07		1E-07					
12-B	INORG	Copper	7440-50-8	2.70E-02		2E-06		2E-06					
12-B	INORG	Lead	7439-92-1	6.00E-04									
12-B	INORG	Manganese	7439-96-5	7.40E-01		1E-04		1E-04					
12-B	INORG	Nickel	7440-02-0	1.70E-02		7E-06		7E-06					
12-B	INORG	Selenium	7782-49-2	2.00E-03		1E-06		1E-06					

Attachment G12: Groundwater Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/L)	Maintenance Worker GW Contact Risk	Maintenance Worker GW Contact Risk	Redevelopment Construction Worker GW Contact Risk	Redevelopment Construction Worker GW Contact HQ	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ
12-B	INORG	Vanadium	7440-62-2	3.30E-04		2E-06		2E-06					
12-B	INORG	Zinc	7440-66-6	2.80E-02		3E-07		3E-07					
16-A	VOC	Acetone	67-64-1	6.30E-03		1E-06		9E-07	3E-11		1E-08		3E-08
16-A	VOC	1,1-Dichloroethane	75-34-3	1.80E-03		6E-06		6E-07	2E-09		1E-06		2E-06
16-A	SVOC	Benzaldehyde	100-52-7	1.11E-03		9E-07		9E-07			1E-08		3E-08
16-A	INORG	Arsenic	7440-38-2	7.30E-03	5E-09	8E-05	5E-10	5E-06					
16-A	INORG	Barium	7440-39-3	2.80E-01		8E-05		8E-05					
16-A	INORG	Chromium (total)	7440-47-3	7.10E-03		2E-04		4E-05					
16-A	INORG	Cobalt	7440-48-4	2.10E-03		3E-07		3E-07					
16-A	INORG	Copper	7440-50-8	5.50E-03		4E-07		4E-07					
16-A	INORG	Cyanide (total)	57-12-5	3.60E-03		6E-07		6E-07					
16-A	INORG	Manganese	7439-96-5	8.80E-01		1E-04		1E-04					
16-A	INORG	Nickel	7440-02-0	4.80E-02		2E-05		2E-05					
16-A	INORG	Selenium	7782-49-2	1.00E-02		6E-06		6E-06					
16-A	INORG	Silver	7440-22-4	2.90E-03		1E-05		1E-05					
16-A	INORG	Vanadium	7440-62-2	3.70E-03		3E-05		3E-05					
16-A	INORG	Zinc	7440-66-6	1.40E-02		1E-07		1E-07					
16-C	VOC	Acetone	67-64-1	1.60E-02		3E-06		2E-06	7E-11		3E-08		7E-08
16-C	VOC	Benzene	71-43-2	2.10E-01	5E-07	1E-02	5E-08	8E-03	3E-05	2E-07	2E-03	4E-07	4E-03
16-C	VOC	2-Butanone	78-93-3	4.10E-03		5E-07		5E-07	8E-11		6E-09		2E-08
16-C	VOC	Chlorobenzene	108-90-7	2.10E-02		6E-04		6E-04	2E-08		9E-05		2E-04
16-C	VOC	Chloromethane	74-87-3	5.30E-04		1E-05		1E-05	3E-09		2E-06		4E-06
16-C	VOC	Cumene	98-82-8	3.20E-03		2E-05		1E-05	8E-09		4E-06		5E-06
16-C	VOC	Cyclohexane	110-82-7	1.60E-02		5E-06		5E-06	3E-08		4E-06		5E-06
16-C	VOC	1,2-Dichlorobenzene	95-50-1	3.70E-03		3E-05		6E-06	6E-09		3E-06		5E-06
16-C	VOC	cis-1,2-Dichloroethene	156-59-2	9.00E-04		4E-05		4E-06	5E-10		8E-06		1E-05
16-C	VOC	Methylcyclohexane	108-87-2	9.50E-04		5E-07		5E-07	1E-09		5E-07		7E-07
16-C	VOC	Toluene	108-88-3	1.20E-03		1E-06		5E-07	2E-09		9E-08		1E-07
16-C	VOC	Trichloroethene	79-01-6	5.20E-04	2E-10	3E-06	2E-11	3E-06	1E-09	1E-10		3E-10	
16-C	VOC	Xylenes (total)	1330-20-7	1.03E-03		2E-05		2E-05	1E-09		4E-06		6E-06
16-C	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	4.46E-03	2E-08	6E-04	2E-09	6E-04	2E-11	1E-13	1E-09	3E-13	3E-09
16-C	SVOC	Diethylphthalate	84-66-2	3.91E-03		8E-08		8E-09	8E-11		1E-10		2E-10
16-C	INORG	Antimony	7440-36-0	3.20E-03		8E-05		8E-05					
16-C	INORG	Arsenic	7440-38-2	1.90E-02	1E-08	2E-04	1E-09	1E-05					
16-C	INORG	Barium	7440-39-3	4.00E-01		1E-04		1E-04					
16-C	INORG	Beryllium	7440-41-7	4.40E-02		4E-03		4E-03					
16-C	INORG	Cadmium	7440-43-9	3.20E-03		2E-04		2E-04					
16-C	INORG	Chromium (total)	7440-47-3	2.10E-02		7E-04		1E-04					
16-C	INORG	Cobalt	7440-48-4	3.70E-03		5E-07		5E-07					
16-C	INORG	Copper	7440-50-8	1.00E-01		8E-06		8E-06					
16-C	INORG	Cyanide (total)	57-12-5	6.20E-02		1E-05		1E-05					
16-C	INORG	Lead	7439-92-1	1.00E-03									
16-C	INORG	Manganese	7439-96-5	1.20E+00		2E-04		2E-04					

Attachment G12: Groundwater Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/L)	Maintenance Worker GW Contact Risk	Maintenance Worker GW Contact Risk	Redevelopment Construction Worker GW Contact Risk	Redevelopment Construction Worker GW Contact HQ	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ
16-C	INORG	Nickel	7440-02-0	2.80E-02		1E-05		1E-05					
16-C	INORG	Selenium	7782-49-2	1.80E-01		1E-04		1E-04					
16-C	INORG	Silver	7440-22-4	2.00E-03		9E-06		9E-06					
16-C	INORG	Thallium	7440-28-0	1.50E-03		7E-05		7E-05					
16-C	INORG	Vanadium	7440-62-2	6.60E-03		5E-05		5E-05					
16-C	INORG	Zinc	7440-66-6	4.90E-02		4E-07		4E-07					
17-A	VOC	1,1-Dichloroethane	75-34-3	2.00E-03		7E-06		7E-07	3E-09		1E-06		2E-06
17-A	VOC	Methyl tert-butyl ether	1634-04-4	3.00E-03		1E-06		1E-06	2E-09		7E-08		1E-07
17-A	INORG	Antimony	7440-36-0	4.30E-03		1E-04		1E-04					
17-A	INORG	Arsenic	7440-38-2	2.70E-02	2E-08	3E-04	2E-09	2E-05					
17-A	INORG	Barium	7440-39-3	1.40E-01		4E-05		4E-05					
17-A	INORG	Cadmium	7440-43-9	9.30E-05		5E-06		5E-06					
17-A	INORG	Chromium (total)	7440-47-3	2.60E-03		9E-05		1E-05					
17-A	INORG	Cobalt	7440-48-4	1.20E-03		1E-07		1E-07					
17-A	INORG	Copper	7440-50-8	6.30E-03		5E-07		5E-07					
17-A	INORG	Cyanide (total)	57-12-5	1.60E-03		3E-07		3E-07					
17-A	INORG	Lead	7439-92-1	2.00E-03									
17-A	INORG	Manganese	7439-96-5	8.50E-02		1E-05		1E-05					
17-A	INORG	Nickel	7440-02-0	7.90E-03		3E-06		3E-06					
17-A	INORG	Selenium	7782-49-2	7.30E-03		5E-06		5E-06					
17-A	INORG	Silver	7440-22-4	4.50E-04		2E-06		2E-06					
17-A	INORG	Thallium	7440-28-0	5.50E-05		3E-06		3E-06					
17-A	INORG	Vanadium	7440-62-2	3.80E-03		3E-05		3E-05					
17-A	INORG	Zinc	7440-66-6	2.90E-02		3E-07		3E-07					
21-1	VOC	Methylene Chloride	75-09-2	6.00E-04	7E-11	4E-07	7E-12	4E-07	2E-09	2E-11	4E-08	5E-11	8E-08
21-1	SVOC	Dibenz(a,h)anthracene	53-70-3	5.00E-04	2E-06		2E-07			5E-13		1E-12	
21-1	SVOC	Dibenzofuran	132-64-9	1.00E-04		2E-05		2E-05			2E-08		6E-08
21-1	SVOC	Fluorene	86-73-7	1.00E-04		1E-06		1E-07			6E-09		1E-08
21-1	SVOC	Phenanthrene	85-01-8	4.00E-04		6E-06		6E-07			1E-08		3E-08
21-1	INORG	Arsenic	7440-38-2	4.30E-03	3E-09	5E-05	3E-10	3E-06					
21-1	INORG	Barium	7440-39-3	7.10E-01		2E-04		2E-04					
21-1	INORG	Cadmium	7440-43-9	2.80E-03		2E-04		2E-04					
21-1	INORG	Chromium (total)	7440-47-3	3.70E-03		1E-04		2E-05					
21-1	INORG	Cobalt	7440-48-4	5.00E-03		6E-07		6E-07					
21-1	INORG	Copper	7440-50-8	5.10E-03		4E-07		4E-07					
21-1	INORG	Cyanide (total)	57-12-5	7.50E-03		1E-06		1E-06					
21-1	INORG	Lead	7439-92-1	3.50E-04									
21-1	INORG	Manganese	7439-96-5	1.64E+01		3E-03		3E-03					
21-1	INORG	Nickel	7440-02-0	2.10E-02		9E-06		9E-06					
21-1	INORG	Silver	7440-22-4	9.00E-05		4E-07		4E-07					
21-1	INORG	Thallium	7440-28-0	1.30E-04		6E-06		6E-06					
21-1	INORG	Zinc	7440-66-6	1.90E-02		2E-07		2E-07					
23-A	VOC	1,1,1-Trichloroethane	71-55-6	7.00E-04		5E-07		1E-07	3E-10		2E-07		3E-07

Attachment G12: Groundwater Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/L)	Maintenance Worker GW Contact Risk	Maintenance Worker GW Contact Risk	Redevelopment Construction Worker GW Contact Risk	Redevelopment Construction Worker GW Contact HQ	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ
23-A	SVOC	Biphenyl	92-52-4	1.00E-04		1E-06		1E-06	5E-09		2E-08		4E-08
23-A	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	7.00E-04	4E-09	1E-04	4E-10	1E-04	3E-12	2E-14	2E-10	5E-14	4E-10
23-A	SVOC	2,4-Dichlorophenol	120-83-2	6.00E-04		1E-05		1E-05			3E-08		7E-08
23-A	SVOC	2,4-Dimethylphenol	105-67-9	1.00E-03		2E-06		2E-07			4E-09		1E-08
23-A	SVOC	Methylphenol (total)	1319-77-3	3.20E-03		1E-06		1E-07	3E-11				
23-A	SVOC	Naphthalene	91-20-3	1.00E-04		4E-05		4E-05	2E-10		2E-06		4E-06
23-A	SVOC	4-Nitrophenol	100-02-7	8.00E-03									
23-A	SVOC	Pentachlorophenol	87-86-5	3.00E-03	2E-08	5E-05	2E-09	5E-05	4E-11	2E-13	1E-10	5E-13	3E-10
23-A	SVOC	Phenanthrene	85-01-8	2.00E-04		3E-06		3E-07			6E-09		1E-08
23-A	SVOC	Phenol	108-95-2	1.00E-03		3E-08		3E-08	5E-12				
23-A	INORG	Arsenic	7440-38-2	2.30E-03	2E-09	2E-05	2E-10	1E-06					
23-A	INORG	Barium	7440-39-3	1.30E-01		4E-05		4E-05					
23-A	INORG	Chromium (total)	7440-47-3	1.30E-03		5E-05		7E-06					
23-A	INORG	Cobalt	7440-48-4	1.10E-03		1E-07		1E-07					
23-A	INORG	Copper	7440-50-8	1.60E-02		1E-06		1E-06					
23-A	INORG	Cyanide (total)	57-12-5	1.10E-02		2E-06		2E-06					
23-A	INORG	Manganese	7439-96-5	3.01E-01		5E-05		5E-05					
23-A	INORG	Nickel	7440-02-0	5.20E-03		2E-06		2E-06					
23-A	INORG	Selenium	7782-49-2	4.70E-03		3E-06		3E-06					
23-A	INORG	Vanadium	7440-62-2	9.00E-03		7E-05		7E-05					
23-A	INORG	Zinc	7440-66-6	1.20E-02		1E-07		1E-07					
36-1	VOC	Acetone	67-64-1	1.30E-02		2E-06		2E-06	6E-11		2E-08		6E-08
36-1	VOC	Benzene	71-43-2	3.60E-01	8E-07	2E-02	8E-08	1E-02	6E-05	4E-07	4E-03	7E-07	7E-03
36-1	VOC	2-Butanone	78-93-3	3.90E-03		5E-07		5E-07	8E-11		6E-09		1E-08
36-1	VOC	Carbon Disulfide	75-15-0	9.70E-04		3E-06		3E-06	1E-07		1E-06		2E-06
36-1	VOC	Chloroethane	75-00-3	1.10E+00	5E-09	2E-04	5E-10	2E-04	4E-07		7E-05		1E-04
36-1	VOC	Chloroform	67-66-3	1.20E-02	6E-08	4E-04	6E-09	4E-04	5E-07	3E-08	7E-05	6E-08	1E-04
36-1	VOC	Cumene	98-82-8	3.00E-03		1E-05		1E-05	8E-09		3E-06		5E-06
36-1	VOC	Cyclohexane	110-82-7	7.90E-04		2E-07		2E-07	1E-09		2E-07		2E-07
36-1	VOC	1,3-Dichlorobenzene	541-73-1	7.70E-04		8E-06		8E-06			1E-06		2E-06
36-1	VOC	1,1-Dichloroethane	75-34-3	1.30E+00		4E-03		4E-04	2E-06		9E-04		2E-03
36-1	VOC	1,2-Dichloroethane	107-06-2	9.30E-03	5E-08	3E-03	5E-09	3E-03	4E-07	9E-09	2E-04	2E-08	4E-04
36-1	VOC	1,1-Dichloroethene	75-35-4	1.20E-01		1E-03		1E-03	7E-06		5E-04		7E-04
36-1	VOC	cis-1,2-Dichloroethene	156-59-2	1.50E-01		7E-03		7E-04	8E-08		1E-03		2E-03
36-1	VOC	trans-1,2-Dichloroethene	156-60-5	6.40E-03		2E-04		2E-04	6E-09		5E-05		9E-05
36-1	VOC	Ethyl Benzene	100-41-4	4.00E-03		1E-05		1E-05	5E-09		2E-06		2E-06
36-1	VOC	2-Hexanone	591-78-6	1.60E-02		5E-03		5E-03					
36-1	VOC	Methyl tert-butyl ether	1634-04-4	1.50E-02		7E-06		7E-06	8E-09		3E-07		7E-07
36-1	VOC	Methylcyclohexane	108-87-2	1.00E-03		5E-07		5E-07	1E-09		5E-07		7E-07
36-1	VOC	Methylene Chloride	75-09-2	2.10E-03	3E-10	1E-06	3E-11	1E-06	7E-09	7E-11	1E-07	2E-10	3E-07
36-1	VOC	Tetrachloroethene	127-18-4	1.00E-03	8E-10	6E-06	8E-11	3E-06	5E-09	6E-10	1E-06	1E-09	2E-06
36-1	VOC	Toluene	108-88-3	2.60E-03		3E-06		1E-06	4E-09		2E-07		3E-07
36-1	VOC	1,1,1-Trichloroethane	71-55-6	9.50E-01		7E-04		2E-04	4E-07		3E-04		4E-04

Attachment G12: Groundwater Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/L)	Maintenance Worker GW Contact Risk	Maintenance Worker GW Contact Risk	Redevelopment Construction Worker GW Contact Risk	Redevelopment Construction Worker GW Contact HQ	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ
36-1	VOC	1,1,2-Trichloroethane	79-00-5	5.00E-03	1E-08	2E-05	1E-09	2E-06	2E-08	3E-09		7E-09	
36-1	VOC	Trichloroethene	79-01-6	9.90E-02	4E-08	6E-04	4E-09	6E-04	3E-07	3E-08		5E-08	
36-1	VOC	Vinyl Chloride	75-01-4	1.98E-01	1E-06	5E-03	1E-07	5E-03	1E-04	6E-07	2E-03	1E-06	3E-03
36-1	VOC	Xylenes (total)	1330-20-7	1.10E-02		2E-04		2E-04	1E-08		4E-05		7E-05
36-1	SVOC	Benzo(a)pyrene	50-32-8	5.50E-04	1E-06		1E-07			3E-11		9E-11	
36-1	SVOC	Benzo(k)fluoranthene	207-08-9	7.20E-04	2E-08		2E-09			3E-13		9E-13	
36-1	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	9.80E-04	5E-09	1E-04	5E-10	1E-04	5E-12	2E-14	2E-10	7E-14	6E-10
36-1	SVOC	Diethylphthalate	84-66-2	1.19E-03		3E-08		3E-09	2E-11		3E-11		8E-11
36-1	INORG	Antimony	7440-36-0	1.40E-03		4E-05		4E-05					
36-1	INORG	Arsenic	7440-38-2	1.40E-01	1E-07	2E-03	1E-08	9E-05					
36-1	INORG	Barium	7440-39-3	8.40E-01		2E-04		2E-04					
36-1	INORG	Beryllium	7440-41-7	3.00E-02		3E-03		3E-03					
36-1	INORG	Cadmium	7440-43-9	2.10E-02		1E-03		1E-03					
36-1	INORG	Chromium (total)	7440-47-3	2.20E-01		8E-03		1E-03					
36-1	INORG	Cobalt	7440-48-4	1.40E-02		2E-06		2E-06					
36-1	INORG	Copper	7440-50-8	7.00E-02		6E-06		6E-06					
36-1	INORG	Cyanide (total)	57-12-5	1.10E-02		2E-06		2E-06					
36-1	INORG	Lead	7439-92-1	2.20E-02									
36-1	INORG	Manganese	7439-96-5	2.20E+00		4E-04		4E-04					
36-1	INORG	Mercury	7439-97-6	3.90E-04		1E-03		1E-03	3E-06		3E-04		5E-04
36-1	INORG	Nickel	7440-02-0	1.30E-01		5E-05		5E-05					
36-1	INORG	Selenium	7782-49-2	4.20E-03		3E-06		3E-06					
36-1	INORG	Silver	7440-22-4	1.70E-03		7E-06		7E-06					
36-1	INORG	Thallium	7440-28-0	1.30E-03		6E-05		6E-05					
36-1	INORG	Vanadium	7440-62-2	2.10E-01		2E-03		2E-03					
36-1	INORG	Zinc	7440-66-6	1.30E-01		1E-06		1E-06					
36-2	VOC	Acetone	67-64-1	4.80E-03		8E-07		7E-07	2E-11		9E-09		2E-08
36-2	VOC	Benzene	71-43-2	4.50E+00	1E-05	3E-01	1E-06	2E-01	7E-04	4E-06	5E-02	9E-06	9E-02
36-2	VOC	2-Butanone	78-93-3	2.60E-03		3E-07		3E-07	5E-11		4E-09		1E-08
36-2	VOC	Chloroethane	75-00-3	1.80E-01	9E-10	4E-05	9E-11	4E-05	6E-08		1E-05		2E-05
36-2	VOC	1,1-Dichloroethane	75-34-3	5.00E-01		2E-03		2E-04	7E-07		4E-04		6E-04
36-2	VOC	1,2-Dichloroethane	107-06-2	1.30E-02	7E-08	4E-03	7E-09	4E-03	5E-07	1E-08	3E-04	3E-08	6E-04
36-2	VOC	1,1-Dichloroethene	75-35-4	5.70E-03		5E-05		5E-05	3E-07		2E-05		3E-05
36-2	VOC	cis-1,2-Dichloroethene	156-59-2	2.80E-03		1E-04		1E-05	2E-09		2E-05		4E-05
36-2	VOC	trans-1,2-Dichloroethene	156-60-5	7.20E-04		2E-05		2E-05	7E-10		6E-06		1E-05
36-2	VOC	Methyl tert-butyl ether	1634-04-4	6.10E-03		3E-06		3E-06	3E-09		1E-07		3E-07
36-2	VOC	1,1,1-Trichloroethane	71-55-6	2.40E-01		2E-04		4E-05	1E-07		6E-05		1E-04
36-2	VOC	Trichloroethene	79-01-6	3.50E-02	1E-08	2E-04	1E-09	2E-04	9E-08	1E-08		2E-08	
36-2	VOC	Trichlorofluoromethane	75-69-4	3.20E-03		7E-06		8E-07	1E-09		5E-06		8E-06
36-2	VOC	Vinyl Chloride	75-01-4	8.10E-03	4E-08	2E-04	4E-09	2E-04	4E-06	2E-08	7E-05	4E-08	1E-04
36-2	INORG	Arsenic	7440-38-2	1.70E-01	1E-07	2E-03	1E-08	1E-04					
36-2	INORG	Barium	7440-39-3	8.30E-01		2E-04		2E-04					
36-2	INORG	Beryllium	7440-41-7	1.00E-03		9E-05		9E-05					

Attachment G12: Groundwater Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/L)	Maintenance Worker GW Contact Risk	Maintenance Worker GW Contact Risk	Redevelopment Construction Worker GW Contact Risk	Redevelopment Construction Worker GW Contact HQ	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ
36-2	INORG	Cadmium	7440-43-9	1.70E-04		9E-06		9E-06					
36-2	INORG	Chromium (total)	7440-47-3	1.40E-03		5E-05		7E-06					
36-2	INORG	Cobalt	7440-48-4	6.10E-03		8E-07		8E-07					
36-2	INORG	Copper	7440-50-8	9.60E-03		8E-07		8E-07					
36-2	INORG	Cyanide (total)	57-12-5	1.60E-03		3E-07		3E-07					
36-2	INORG	Lead	7439-92-1	5.70E-04									
36-2	INORG	Manganese	7439-96-5	1.70E+00		3E-04		3E-04					
36-2	INORG	Nickel	7440-02-0	2.70E-02		1E-05		1E-05					
36-2	INORG	Selenium	7782-49-2	7.10E-03		5E-06		5E-06					
36-2	INORG	Thallium	7440-28-0	8.90E-05		4E-06		4E-06					
36-2	INORG	Zinc	7440-66-6	4.20E-02		4E-07		4E-07					
36-3	VOC	Acetone	67-64-1	8.50E-03		1E-06		1E-06	4E-11		2E-08		4E-08
36-3	VOC	Benzene	71-43-2	6.00E+00	1E-05	4E-01	1E-06	2E-01	1E-03	6E-06	7E-02	1E-05	1E-01
36-3	VOC	2-Butanone	78-93-3	3.80E-03		5E-07		5E-07	7E-11		6E-09		1E-08
36-3	VOC	Chloroethane	75-00-3	7.60E-04	4E-12	2E-07	4E-13	2E-07	3E-10		5E-08		8E-08
36-3	VOC	Cumene	98-82-8	3.70E-02		2E-04		1E-04	1E-07		4E-05		6E-05
36-3	VOC	Cyclohexane	110-82-7	4.40E-02		1E-05		1E-05	8E-08		1E-05		1E-05
36-3	VOC	1,1-Dichloroethane	75-34-3	2.10E-03		7E-06		7E-07	3E-09		2E-06		3E-06
36-3	VOC	1,2-Dichloroethane	107-06-2	1.10E-03	6E-09	3E-04	6E-10	3E-04	4E-08	1E-09	2E-05	3E-09	5E-05
36-3	VOC	Ethyl Benzene	100-41-4	1.30E+00		3E-03		3E-03	2E-06		5E-04		8E-04
36-3	VOC	Methylcyclohexane	108-87-2	1.50E-01		8E-05		8E-05	2E-07		7E-05		1E-04
36-3	VOC	Methylene Chloride	75-09-2	1.00E-02	1E-09	7E-06	1E-10	7E-06	3E-08	3E-10	7E-07	8E-10	1E-06
36-3	VOC	Toluene	108-88-3	2.00E+01		2E-02		8E-03	3E-05		1E-03		2E-03
36-3	VOC	1,1,1-Trichloroethane	71-55-6	2.10E-02		2E-05		3E-06	9E-09		6E-06		9E-06
36-3	VOC	Trichlorofluoromethane	75-69-4	2.60E-03		5E-06		6E-07	8E-10		4E-06		6E-06
36-3	VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	2.10E-03		9E-08		9E-08	6E-10		1E-07		1E-07
36-3	VOC	Xylenes (total)	1330-20-7	5.00E+00		8E-02		8E-02	6E-06		2E-02		3E-02
36-3	SVOC	2,4-Dimethylphenol	105-67-9	9.67E-02		2E-04		2E-05			4E-07		1E-06
36-3	SVOC	Di-n-butylphthalate	84-74-2	1.95E-03		4E-06		4E-07	1E-12				
36-3	SVOC	Methylphenol (total)	1319-77-3	6.20E-02		2E-05		2E-06	5E-10				
36-3	SVOC	Naphthalene	91-20-3	1.08E-02		4E-03		4E-03	2E-08		2E-04		4E-04
36-3	INORG	Antimony	7440-36-0	2.20E-03		6E-05		6E-05					
36-3	INORG	Arsenic	7440-38-2	3.90E-02	3E-08	4E-04	3E-09	3E-05					
36-3	INORG	Barium	7440-39-3	8.10E-01		2E-04		2E-04					
36-3	INORG	Beryllium	7440-41-7	8.10E-03		8E-04		8E-04					
36-3	INORG	Cadmium	7440-43-9	3.10E-03		2E-04		2E-04					
36-3	INORG	Chromium (total)	7440-47-3	1.90E-01		7E-03		1E-03					
36-3	INORG	Cobalt	7440-48-4	4.20E-03		5E-07		5E-07					
36-3	INORG	Copper	7440-50-8	1.40E-02		1E-06		1E-06					
36-3	INORG	Cyanide (total)	57-12-5	1.60E-01		3E-05		3E-05					
36-3	INORG	Lead	7439-92-1	7.70E-04									
36-3	INORG	Manganese	7439-96-5	1.30E+00		2E-04		2E-04					

Attachment G12: Groundwater Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/L)	Maintenance Worker GW Contact Risk	Maintenance Worker GW Contact Risk	Redevelopment Construction Worker GW Contact Risk	Redevelopment Construction Worker GW Contact HQ	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ
36-3	INORG	Nickel	7440-02-0	2.70E-02		1E-05		1E-05					
36-3	INORG	Selenium	7782-49-2	1.90E-02		1E-05		1E-05					
36-3	INORG	Silver	7440-22-4	1.50E-03		6E-06		6E-06					
36-3	INORG	Thallium	7440-28-0	1.30E-04		6E-06		6E-06					
36-3	INORG	Vanadium	7440-62-2	3.80E-01		3E-03		3E-03					
36-3	INORG	Zinc	7440-66-6	9.10E-02		8E-07		8E-07					
36-4	VOC	1,1-Dichloroethane	75-34-3	2.40E-02		8E-05		8E-06	3E-08		2E-05		3E-05
36-4	VOC	cis-1,2-Dichloroethene	156-59-2	1.20E-02		6E-04		6E-05	7E-09		1E-04		2E-04
36-4	VOC	Tetrachloroethene	127-18-4	1.70E-03	1E-09	1E-05	1E-10	6E-06	8E-09	1E-09	2E-06	2E-09	4E-06
36-4	VOC	1,1,1-Trichloroethane	71-55-6	1.10E-02		8E-06		2E-06	5E-09		3E-06		5E-06
36-4	VOC	Trichloroethene	79-01-6	1.20E-03	5E-10	8E-06	5E-11	8E-06	3E-09	3E-10		7E-10	
36-4	INORG	Arsenic	7440-38-2	4.70E-03	3E-09	5E-05	3E-10	3E-06					
36-4	INORG	Barium	7440-39-3	6.10E-02		2E-05		2E-05					
36-4	INORG	Cobalt	7440-48-4	6.30E-04		8E-08		8E-08					
36-4	INORG	Copper	7440-50-8	4.00E-03		3E-07		3E-07					
36-4	INORG	Cyanide (total)	57-12-5	1.00E-03		2E-07		2E-07					
36-4	INORG	Manganese	7439-96-5	3.30E-01		6E-05		6E-05					
36-4	INORG	Nickel	7440-02-0	4.10E-03		2E-06		2E-06					
36-4	INORG	Selenium	7782-49-2	2.20E-03		1E-06		1E-06					
36-4	INORG	Zinc	7440-66-6	1.10E-02		1E-07		1E-07					
36-5	VOC	Acetone	67-64-1	7.80E-04		1E-07		1E-07	4E-12		1E-09		3E-09
36-5	VOC	Benzene	71-43-2	4.70E-03	1E-08	3E-04	1E-09	2E-04	8E-07	5E-09	6E-05	1E-08	1E-04
36-5	VOC	1,1-Dichloroethane	75-34-3	7.50E-03		2E-05		2E-06	1E-08		5E-06		9E-06
36-5	VOC	1,1-Dichloroethene	75-35-4	1.50E-03		1E-05		1E-05	9E-08		6E-06		9E-06
36-5	VOC	cis-1,2-Dichloroethene	156-59-2	6.10E-02		3E-03		3E-04	3E-08		5E-04		9E-04
36-5	VOC	trans-1,2-Dichloroethene	156-60-5	1.30E-02		4E-04		4E-04	1E-08		1E-04		2E-04
36-5	VOC	Methyl tert-butyl ether	1634-04-4	6.80E-04		3E-07		3E-07	4E-10		2E-08		3E-08
36-5	VOC	Tetrachloroethene	127-18-4	1.80E-03	1E-09	1E-05	1E-10	6E-06	9E-09	1E-09	3E-06	2E-09	4E-06
36-5	VOC	1,1,1-Trichloroethane	71-55-6	1.20E-02		9E-06		2E-06	5E-09		3E-06		5E-06
36-5	VOC	Trichloroethene	79-01-6	4.40E-02	2E-08	3E-04	2E-09	3E-04	1E-07	1E-08		2E-08	
36-5	VOC	Vinyl Chloride	75-01-4	1.40E-02	7E-08	3E-04	7E-09	3E-04	7E-06	4E-08	1E-04	7E-08	2E-04
36-5	SVOC	Diethylphthalate	84-66-2	1.68E-03		4E-08		4E-09	3E-11		4E-11		1E-10
36-5	SVOC	Di-n-butylphthalate	84-74-2	2.59E-03		6E-06		6E-07	2E-12				
36-5	INORG	Antimony	7440-36-0	7.00E-04		2E-05		2E-05					
36-5	INORG	Arsenic	7440-38-2	5.00E-02	3E-08	5E-04	3E-09	3E-05					
36-5	INORG	Barium	7440-39-3	6.60E-01		2E-04		2E-04					
36-5	INORG	Beryllium	7440-41-7	3.40E-04		3E-05		3E-05					
36-5	INORG	Cadmium	7440-43-9	7.20E-04		4E-05		4E-05					
36-5	INORG	Chromium (total)	7440-47-3	1.30E-02		5E-04		7E-05					
36-5	INORG	Cobalt	7440-48-4	7.30E-03		9E-07		9E-07					
36-5	INORG	Copper	7440-50-8	2.70E-02		2E-06		2E-06					
36-5	INORG	Cyanide (total)	57-12-5	2.90E-02		5E-06		5E-06					
36-5	INORG	Lead	7439-92-1	1.30E-03									

Attachment G12: Groundwater Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/L)	Maintenance Worker GW Contact Risk	Maintenance Worker GW Contact Risk	Redevelopment Construction Worker GW Contact Risk	Redevelopment Construction Worker GW Contact HQ	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ
36-5	INORG	Manganese	7439-96-5	3.70E+00		6E-04		6E-04					
36-5	INORG	Nickel	7440-02-0	2.30E-02		1E-05		1E-05					
36-5	INORG	Selenium	7782-49-2	3.50E-02		2E-05		2E-05					
36-5	INORG	Silver	7440-22-4	1.50E-03		6E-06		6E-06					
36-5	INORG	Thallium	7440-28-0	2.40E-04		1E-05		1E-05					
36-5	INORG	Vanadium	7440-62-2	2.90E-03		2E-05		2E-05					
36-5	INORG	Zinc	7440-66-6	4.60E-02		4E-07		4E-07					
38-1	VOC	Acetone	67-64-1	9.00E-04		1E-07		1E-07	4E-12		2E-09		4E-09
38-1	VOC	1,1-Dichloroethane	75-34-3	5.90E-03		2E-05		2E-06	8E-09		4E-06		7E-06
38-1	VOC	Trichloroethene	79-01-6	2.70E-03	1E-09	2E-05	1E-10	2E-05	7E-09	8E-10		1E-09	
38-1	SVOC	Diethylphthalate	84-66-2	1.60E-03		3E-08		3E-09	3E-11		4E-11		1E-10
38-1	INORG	Antimony	7440-36-0	1.40E-03		4E-05		4E-05					
38-1	INORG	Arsenic	7440-38-2	7.20E-03	5E-09	8E-05	5E-10	5E-06					
38-1	INORG	Barium	7440-39-3	2.00E-01		6E-05		6E-05					
38-1	INORG	Beryllium	7440-41-7	3.20E-03		3E-04		3E-04					
38-1	INORG	Cadmium	7440-43-9	6.00E-04		3E-05		3E-05					
38-1	INORG	Chromium (total)	7440-47-3	4.90E-03		2E-04		3E-05					
38-1	INORG	Cobalt	7440-48-4	7.50E-03		9E-07		9E-07					
38-1	INORG	Copper	7440-50-8	7.50E-03		6E-07		6E-07					
38-1	INORG	Cyanide (total)	57-12-5	2.90E-03		5E-07		5E-07					
38-1	INORG	Lead	7439-92-1	6.50E-03									
38-1	INORG	Manganese	7439-96-5	1.70E+00		3E-04		3E-04					
38-1	INORG	Mercury	7439-97-6	1.26E-04		5E-04		5E-04	1E-06		1E-04		2E-04
38-1	INORG	Nickel	7440-02-0	3.50E-02		1E-05		1E-05					
38-1	INORG	Selenium	7782-49-2	2.50E-03		2E-06		2E-06					
38-1	INORG	Silver	7440-22-4	5.00E-04		2E-06		2E-06					
38-1	INORG	Thallium	7440-28-0	3.80E-03		2E-04		2E-04					
38-1	INORG	Vanadium	7440-62-2	4.50E-03		3E-05		3E-05					
38-1	INORG	Zinc	7440-66-6	1.10E-01		1E-06		1E-06					
40-A	VOC	Acetone	67-64-1	2.70E-02		4E-06		4E-06	1E-10		5E-08		1E-07
40-A	VOC	Benzene	71-43-2	5.50E+00	1E-05	4E-01	1E-06	2E-01	9E-04	5E-06	7E-02	1E-05	1E-01
40-A	VOC	2-Butanone	78-93-3	1.00E-02		1E-06		1E-06	2E-10		2E-08		4E-08
40-A	VOC	Chloroethane	75-00-3	1.40E-03	7E-12	3E-07	7E-13	3E-07	5E-10		8E-08		1E-07
40-A	VOC	Cumene	98-82-8	7.40E-02		4E-04		3E-04	2E-07		8E-05		1E-04
40-A	VOC	Cyclohexane	110-82-7	2.50E-01		7E-05		7E-05	5E-07		5E-05		8E-05
40-A	VOC	1,1-Dichloroethane	75-34-3	1.40E-03		5E-06		5E-07	2E-09		1E-06		2E-06
40-A	VOC	cis-1,2-Dichloroethene	156-59-2	2.50E-03		1E-04		1E-05	1E-09		2E-05		4E-05
40-A	VOC	Ethyl Benzene	100-41-4	8.00E-01		2E-03		2E-03	1E-06		3E-04		5E-04
40-A	VOC	2-Hexanone	591-78-6	7.90E-04		2E-04		2E-04					
40-A	VOC	Methyl tert-butyl ether	1634-04-4	1.40E-03		7E-07		7E-07	8E-10		3E-08		7E-08
40-A	VOC	4-Methyl-2-pentanone	108-10-1	6.30E-04		2E-07		2E-07	4E-11		4E-09		9E-09
40-A	VOC	Methylcyclohexane	108-87-2	1.80E-01		1E-04		1E-04	2E-07		9E-05		1E-04
40-A	VOC	Toluene	108-88-3	6.80E-02		7E-05		3E-05	1E-07		5E-06		8E-06

Attachment G12: Groundwater Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/L)	Maintenance Worker GW Contact Risk	Maintenance Worker GW Contact Risk	Redevelopment Construction Worker GW Contact Risk	Redevelopment Construction Worker GW Contact HQ	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ
40-A	VOC	Trichloroethene	79-01-6	2.10E-03	8E-10	1E-05	8E-11	1E-05	5E-09	6E-10		1E-09	
40-A	VOC	Xylenes (total)	1330-20-7	2.43E+00		4E-02		4E-02	3E-06		9E-03		1E-02
40-A	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	1.32E-03	7E-09	2E-04	7E-10	2E-04	6E-12	3E-14	3E-10	9E-14	8E-10
40-A	SVOC	Diethylphthalate	84-66-2	1.51E-03		3E-08		3E-09	3E-11		4E-11		1E-10
40-A	SVOC	2,4-Dimethylphenol	105-67-9	2.34E-02		4E-05		4E-06			1E-07		3E-07
40-A	SVOC	2-Methylnaphthalene	91-57-6	5.32E-02		2E-02		2E-02			1E-03		2E-03
40-A	SVOC	Naphthalene	91-20-3	8.94E-02		3E-02		3E-02	1E-07		2E-03		3E-03
40-A	SVOC	Phenol	108-95-2	2.46E-02		8E-07		8E-07	1E-10				
40-A	PCB	PCBs (total)	1336-36-3	2.35E-04	2E-07	3E-02	2E-08	1E-02	7E-08	5E-09		1E-08	
40-A	INORG	Antimony	7440-36-0	3.30E-03		9E-05		9E-05					
40-A	INORG	Arsenic	7440-38-2	4.40E-01	3E-07	5E-03	3E-08	3E-04					
40-A	INORG	Barium	7440-39-3	6.70E-01		2E-04		2E-04					
40-A	INORG	Beryllium	7440-41-7	1.70E-01		2E-02		2E-02					
40-A	INORG	Cadmium	7440-43-9	2.00E-03		1E-04		1E-04					
40-A	INORG	Chromium (total)	7440-47-3	9.70E-03		3E-04		5E-05					
40-A	INORG	Cobalt	7440-48-4	4.00E-03		5E-07		5E-07					
40-A	INORG	Copper	7440-50-8	1.60E-02		1E-06		1E-06					
40-A	INORG	Cyanide (total)	57-12-5	4.40E-01		7E-05		7E-05					
40-A	INORG	Lead	7439-92-1	6.40E-03									
40-A	INORG	Manganese	7439-96-5	1.00E+00		2E-04		2E-04					
40-A	INORG	Mercury	7439-97-6	1.21E-04		5E-04		5E-04	9E-07		1E-04		2E-04
40-A	INORG	Nickel	7440-02-0	3.70E-02		2E-05		2E-05					
40-A	INORG	Selenium	7782-49-2	5.40E-03		4E-06		4E-06					
40-A	INORG	Silver	7440-22-4	1.60E-03		7E-06		7E-06					
40-A	INORG	Thallium	7440-28-0	9.90E-04		5E-05		5E-05					
40-A	INORG	Vanadium	7440-62-2	4.00E-03		3E-05		3E-05					
40-A	INORG	Zinc	7440-66-6	2.40E-02		2E-07		2E-07					
40-B	VOC	Acetone	67-64-1	1.40E-03		2E-07		2E-07	6E-12		3E-09		6E-09
40-B	VOC	1,1-Dichloroethane	75-34-3	6.70E-04		2E-06		2E-07	9E-10		5E-07		8E-07
40-B	VOC	cis-1,2-Dichloroethene	156-59-2	9.30E-02		4E-03		4E-04	5E-08		8E-04		1E-03
40-B	VOC	trans-1,2-Dichloroethene	156-60-5	3.30E-03		9E-05		9E-05	3E-09		3E-05		5E-05
40-B	VOC	Tetrachloroethene	127-18-4	6.90E-04	5E-10	4E-06	5E-11	2E-06	3E-09	4E-10	1E-06	8E-10	1E-06
40-B	VOC	Trichloroethene	79-01-6	1.00E-01	4E-08	6E-04	4E-09	6E-04	3E-07	3E-08		6E-08	
40-B	VOC	Vinyl Chloride	75-01-4	7.80E-03	4E-08	2E-04	4E-09	2E-04	4E-06	2E-08	7E-05	4E-08	1E-04
40-B	INORG	Barium	7440-39-3	3.50E-02		1E-05		1E-05					
40-B	INORG	Beryllium	7440-41-7	2.00E-03		2E-04		2E-04					
40-B	INORG	Chromium (total)	7440-47-3	5.10E-03		2E-04		3E-05					
40-B	INORG	Cobalt	7440-48-4	3.00E-04		4E-08		4E-08					
40-B	INORG	Copper	7440-50-8	1.50E-03		1E-07		1E-07					
40-B	INORG	Cyanide (total)	57-12-5	2.10E-03		3E-07		3E-07					
40-B	INORG	Manganese	7439-96-5	1.20E-02		2E-06		2E-06					
40-B	INORG	Nickel	7440-02-0	2.90E-03		1E-06		1E-06					
40-B	INORG	Vanadium	7440-62-2	1.70E-03		1E-05		1E-05					

Attachment G12: Groundwater Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/L)	Maintenance Worker GW Contact Risk	Maintenance Worker GW Contact Risk	Redevelopment Construction Worker GW Contact Risk	Redevelopment Construction Worker GW Contact HQ	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ
40-C	VOC	Acetone	67-64-1	2.50E-03		4E-07		4E-07	1E-11		5E-09		1E-08
40-C	VOC	1,1-Dichloroethene	75-35-4	1.30E-03		1E-05		1E-05	8E-08		5E-06		8E-06
40-C	VOC	cis-1,2-Dichloroethene	156-59-2	1.00E-02		5E-04		5E-05	6E-09		9E-05		2E-04
40-C	VOC	trans-1,2-Dichloroethene	156-60-5	1.00E-03		3E-05		3E-05	9E-10		8E-06		1E-05
40-C	VOC	Trichloroethene	79-01-6	1.20E-01	5E-08	8E-04	5E-09	8E-04	3E-07	3E-08		7E-08	
40-C	VOC	Vinyl Chloride	75-01-4	3.00E-03	2E-08	7E-05	2E-09	7E-05	2E-06	9E-09	3E-05	2E-08	4E-05
40-C	SVOC	2,6-Dinitrotoluene	606-20-2	1.39E-03	2E-09	2E-05	2E-10	2E-06		1E-11	5E-08	3E-11	1E-07
40-C	INORG	Antimony	7440-36-0	1.10E-03		3E-05		3E-05					
40-C	INORG	Arsenic	7440-38-2	2.20E-03	2E-09	2E-05	2E-10	1E-06					
40-C	INORG	Barium	7440-39-3	9.60E-02		3E-05		3E-05					
40-C	INORG	Beryllium	7440-41-7	5.20E-03		5E-04		5E-04					
40-C	INORG	Cadmium	7440-43-9	2.90E-03		2E-04		2E-04					
40-C	INORG	Chromium (total)	7440-47-3	7.30E-03		3E-04		4E-05					
40-C	INORG	Cobalt	7440-48-4	2.20E-03		3E-07		3E-07					
40-C	INORG	Copper	7440-50-8	1.20E-02		1E-06		1E-06					
40-C	INORG	Lead	7439-92-1	6.50E-04									
40-C	INORG	Manganese	7439-96-5	1.00E+00		2E-04		2E-04					
40-C	INORG	Nickel	7440-02-0	1.30E-02		5E-06		5E-06					
40-C	INORG	Thallium	7440-28-0	5.00E-04		2E-05		2E-05					
40-C	INORG	Vanadium	7440-62-2	1.60E-03		1E-05		1E-05					
40-C	INORG	Zinc	7440-66-6	4.60E-02		4E-07		4E-07					
40-D	VOC	Acetone	67-64-1	7.60E-03		1E-06		1E-06	4E-11		1E-08		3E-08
40-D	VOC	Benzene	71-43-2	5.60E-04	1E-09	4E-05	1E-10	2E-05	9E-08	6E-10	7E-06	1E-09	1E-05
40-D	VOC	2-Butanone	78-93-3	4.60E-03		6E-07		5E-07	9E-11		7E-09		2E-08
40-D	VOC	1,1-Dichloroethane	75-34-3	1.40E-03		5E-06		5E-07	2E-09		1E-06		2E-06
40-D	VOC	cis-1,2-Dichloroethene	156-59-2	3.60E-02		2E-03		2E-04	2E-08		3E-04		6E-04
40-D	VOC	trans-1,2-Dichloroethene	156-60-5	2.10E-03		6E-05		6E-05	2E-09		2E-05		3E-05
40-D	VOC	Toluene	108-88-3	1.30E-03		1E-06		5E-07	2E-09		1E-07		2E-07
40-D	VOC	Trichloroethene	79-01-6	4.10E-03	2E-09	3E-05	2E-10	3E-05	1E-08	1E-09		2E-09	
40-D	VOC	Vinyl Chloride	75-01-4	5.80E-03	3E-08	1E-04	3E-09	1E-04	3E-06	2E-08	5E-05	3E-08	8E-05
40-D	VOC	Xylenes (total)	1330-20-7	1.45E-03		2E-05		2E-05	2E-09		5E-06		9E-06
40-D	PCB	PCBs (total)	1336-36-3	2.25E-04	2E-07	2E-02	2E-08	1E-02	7E-08	5E-09		1E-08	
40-D	INORG	Antimony	7440-36-0	2.00E-03		5E-05		5E-05					
40-D	INORG	Arsenic	7440-38-2	4.10E-02	3E-08	4E-04	3E-09	3E-05					
40-D	INORG	Barium	7440-39-3	4.70E-01		1E-04		1E-04					
40-D	INORG	Beryllium	7440-41-7	3.00E-03		3E-04		3E-04					
40-D	INORG	Cadmium	7440-43-9	7.10E-04		4E-05		4E-05					
40-D	INORG	Chromium (total)	7440-47-3	9.30E-03		3E-04		5E-05					
40-D	INORG	Cobalt	7440-48-4	3.00E-03		4E-07		4E-07					
40-D	INORG	Copper	7440-50-8	2.70E-02		2E-06		2E-06					
40-D	INORG	Cyanide (total)	57-12-5	2.40E-02		4E-06		4E-06					
40-D	INORG	Lead	7439-92-1	9.20E-03									
40-D	INORG	Manganese	7439-96-5	4.40E-01		7E-05		7E-05					

Attachment G12: Groundwater Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/L)	Maintenance Worker GW Contact Risk	Maintenance Worker GW Contact Risk	Redevelopment Construction Worker GW Contact Risk	Redevelopment Construction Worker GW Contact HQ	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ
40-D	INORG	Mercury	7439-97-6	1.45E-04		5E-04		5E-04	1E-06		1E-04		2E-04
40-D	INORG	Nickel	7440-02-0	1.80E-02		8E-06		8E-06					
40-D	INORG	Selenium	7782-49-2	2.20E-03		1E-06		1E-06					
40-D	INORG	Silver	7440-22-4	6.80E-04		3E-06		3E-06					
40-D	INORG	Thallium	7440-28-0	8.10E-04		4E-05		4E-05					
40-D	INORG	Vanadium	7440-62-2	7.10E-03		5E-05		5E-05					
40-D	INORG	Zinc	7440-66-6	4.30E-02		4E-07		4E-07					
44-A	VOC	Acetone	67-64-1	6.00E-03		1E-06		9E-07	3E-11		1E-08		3E-08
44-A	VOC	4-Methyl-2-pentanone	108-10-1	5.50E-04		2E-07		2E-07	4E-11		3E-09		7E-09
44-A	SVOC	Diethylphthalate	84-66-2	1.49E-03		3E-08		3E-09	3E-11		4E-11		9E-11
44-A	PCB	PCBs (total)	1336-36-3	1.09E-03	7E-07	1E-01	7E-08	5E-02	3E-07	2E-08		5E-08	
44-A	INORG	Antimony	7440-36-0	4.20E-02		1E-03		1E-03					
44-A	INORG	Arsenic	7440-38-2	3.60E-02	3E-08	4E-04	3E-09	2E-05					
44-A	INORG	Barium	7440-39-3	2.90E-01		8E-05		8E-05					
44-A	INORG	Cadmium	7440-43-9	4.30E-03		2E-04		2E-04					
44-A	INORG	Chromium (total)	7440-47-3	3.80E-01		1E-02		2E-03					
44-A	INORG	Cobalt	7440-48-4	2.50E-02		3E-06		3E-06					
44-A	INORG	Copper	7440-50-8	2.20E-01		2E-05		2E-05					
44-A	INORG	Cyanide (total)	57-12-5	1.90E-02		3E-06		3E-06					
44-A	INORG	Lead	7439-92-1	7.50E-02									
44-A	INORG	Manganese	7439-96-5	4.30E-01		7E-05		7E-05					
44-A	INORG	Nickel	7440-02-0	5.10E-01		2E-04		2E-04					
44-A	INORG	Selenium	7782-49-2	5.20E-02		3E-05		3E-05					
44-A	INORG	Silver	7440-22-4	8.50E-05		4E-07		4E-07					
44-A	INORG	Thallium	7440-28-0	5.50E-05		3E-06		3E-06					
44-A	INORG	Vanadium	7440-62-2	7.40E-03		5E-05		5E-05					
44-A	INORG	Zinc	7440-66-6	6.20E-01		6E-06		6E-06					
55-1	VOC	Acetone	67-64-1	9.20E-03		1E-06		1E-06	4E-11		2E-08		4E-08
55-1	VOC	Benzene	71-43-2	1.80E-02	4E-08	1E-03	4E-09	7E-04	3E-06	2E-08	2E-04	4E-08	4E-04
55-1	VOC	Chloroethane	75-00-3	7.90E-02	4E-10	2E-05	4E-11	2E-05	3E-08		5E-06		8E-06
55-1	VOC	Chloroform	67-66-3	4.60E-03	2E-08	1E-04	2E-09	1E-04	2E-07	1E-08	3E-05	2E-08	5E-05
55-1	VOC	1,1-Dichloroethane	75-34-3	3.20E-02		1E-04		1E-05	4E-08		2E-05		4E-05
55-1	VOC	1,2-Dichloroethane	107-06-2	4.00E-04	2E-09	1E-04	2E-10	1E-04	2E-08	4E-10	9E-06	1E-09	2E-05
55-1	VOC	1,1-Dichloroethene	75-35-4	4.80E-04		4E-06		4E-06	3E-08		2E-06		3E-06
55-1	VOC	cis-1,2-Dichloroethene	156-59-2	8.20E-03		4E-04		4E-05	5E-09		7E-05		1E-04
55-1	VOC	trans-1,2-Dichloroethene	156-60-5	9.00E-03		3E-04		2E-04	8E-09		8E-05		1E-04
55-1	VOC	1,2-Dichloropropane	78-87-5	1.40E-01	2E-08	5E-02	2E-09	2E-02	1E-07		8E-03		1E-02
55-1	VOC	Methyl tert-butyl ether	1634-04-4	7.90E-04		4E-07		4E-07	4E-10		2E-08		4E-08
55-1	VOC	Methylene Chloride	75-09-2	5.30E-04	6E-11	4E-07	6E-12	4E-07	2E-09	2E-11	4E-08	4E-11	7E-08
55-1	VOC	Tetrachloroethene	127-18-4	5.90E-04	4E-10	3E-06	4E-11	2E-06	3E-09	4E-10	8E-07	7E-10	1E-06
55-1	VOC	1,1,1-Trichloroethane	71-55-6	3.50E-02		3E-05		6E-06	2E-08		9E-06		1E-05
55-1	VOC	Trichloroethene	79-01-6	1.07E-01	4E-08	7E-04	4E-09	7E-04	3E-07	3E-08		6E-08	
55-1	VOC	Vinyl Chloride	75-01-4	2.80E-02	1E-07	7E-04	1E-08	7E-04	1E-05	8E-08	3E-04	1E-07	4E-04

Attachment G12: Groundwater Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/L)	Maintenance Worker GW Contact Risk	Maintenance Worker GW Contact Risk	Redevelopment Construction Worker GW Contact Risk	Redevelopment Construction Worker GW Contact HQ	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ
55-1	SVOC	bis(2-Chloroethyl) ether	111-44-4	2.60E-02	3E-07		3E-08		3E-09	8E-09		2E-08	
55-1	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	1.56E-03	9E-09	2E-04	9E-10	2E-04	7E-12	4E-14	4E-10	1E-13	9E-10
55-1	SVOC	Caprolactam	105-60-2	1.83E-03		9E-09		9E-09	2E-12		3E-12		9E-12
55-1	SVOC	Diethylphthalate	84-66-2	1.44E-03		3E-08		3E-09	3E-11		4E-11		9E-11
55-1	SVOC	4-Nitrophenol	100-02-7	1.22E-03									
55-1	INORG	Antimony	7440-36-0	1.30E-02		3E-04		3E-04					
55-1	INORG	Arsenic	7440-38-2	8.60E-02	6E-08	9E-04	6E-09	6E-05					
55-1	INORG	Barium	7440-39-3	5.10E-01		1E-04		1E-04					
55-1	INORG	Beryllium	7440-41-7	6.10E-01		6E-02		6E-02					
55-1	INORG	Cadmium	7440-43-9	1.60E-02		9E-04		9E-04					
55-1	INORG	Chromium (total)	7440-47-3	2.55E+01		9E-01		1E-01					
55-1	INORG	Cobalt	7440-48-4	5.80E-02		7E-06		7E-06					
55-1	INORG	Copper	7440-50-8	1.10E-01		9E-06		9E-06					
55-1	INORG	Cyanide (total)	57-12-5	1.10E+00		2E-04		2E-04					
55-1	INORG	Lead	7439-92-1	2.50E-02									
55-1	INORG	Manganese	7439-96-5	2.90E+00		5E-04		5E-04					
55-1	INORG	Mercury	7439-97-6	2.35E-04		9E-04		9E-04	2E-06		2E-04		3E-04
55-1	INORG	Nickel	7440-02-0	1.30E-01		5E-05		5E-05					
55-1	INORG	Selenium	7782-49-2	6.60E-03		4E-06		4E-06					
55-1	INORG	Silver	7440-22-4	9.60E-03		4E-05		4E-05					
55-1	INORG	Thallium	7440-28-0	4.10E-03		2E-04		2E-04					
55-1	INORG	Vanadium	7440-62-2	1.20E-02		9E-05		9E-05					
55-1	INORG	Zinc	7440-66-6	1.70E-01		2E-06		2E-06					
65-1	VOC	cis-1,2-Dichloroethene	156-59-2	4.90E-02		2E-03		2E-04	3E-08		4E-04		8E-04
65-1	VOC	trans-1,2-Dichloroethene	156-60-5	7.10E-04		2E-05		2E-05	7E-10		6E-06		1E-05
65-1	VOC	Tetrachloroethene	127-18-4	8.20E-04	6E-10	5E-06	6E-11	3E-06	4E-09	5E-10	1E-06	9E-10	2E-06
65-1	VOC	1,1,1-Trichloroethane	71-55-6	2.10E-03		2E-06		3E-07	9E-10		6E-07		9E-07
65-1	VOC	Trichloroethene	79-01-6	4.60E-02	2E-08	3E-04	2E-09	3E-04	1E-07	1E-08		3E-08	
65-1	INORG	Barium	7440-39-3	2.50E-01		7E-05		7E-05					
65-1	INORG	Cadmium	7440-43-9	8.30E-04		4E-05		4E-05					
65-1	INORG	Chromium (total)	7440-47-3	2.10E-03		7E-05		1E-05					
65-1	INORG	Cobalt	7440-48-4	4.60E-03		6E-07		6E-07					
65-1	INORG	Copper	7440-50-8	1.30E-02		1E-06		1E-06					
65-1	INORG	Cyanide (total)	57-12-5	4.00E-03		6E-07		6E-07					
65-1	INORG	Lead	7439-92-1	2.80E-04									
65-1	INORG	Manganese	7439-96-5	1.90E+00		3E-04		3E-04					
65-1	INORG	Nickel	7440-02-0	2.30E-02		1E-05		1E-05					
65-1	INORG	Selenium	7782-49-2	1.20E-03		8E-07		8E-07					
65-1	INORG	Thallium	7440-28-0	1.70E-04		8E-06		8E-06					
65-1	INORG	Vanadium	7440-62-2	5.60E-04		4E-06		4E-06					
65-1	INORG	Zinc	7440-66-6	1.40E-02		1E-07		1E-07					
81-1	VOC	Acetone	67-64-1	1.90E-03		3E-07		3E-07	9E-12		3E-09		8E-09
81-1	VOC	Cyclohexane	110-82-7	2.00E-03		6E-07		6E-07	4E-09		4E-07		6E-07

Attachment G12: Groundwater Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/L)	Maintenance Worker GW Contact Risk	Maintenance Worker GW Contact Risk	Redevelopment Construction Worker GW Contact Risk	Redevelopment Construction Worker GW Contact HQ	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ
81-1	VOC	1,1-Dichloroethane	75-34-3	5.40E-04		2E-06		2E-07	7E-10		4E-07		7E-07
81-1	VOC	cis-1,2-Dichloroethene	156-59-2	2.90E-03		1E-04		1E-05	2E-09		2E-05		4E-05
81-1	VOC	4-Methyl-2-pentanone	108-10-1	1.60E-03		5E-07		5E-07	1E-10		1E-08		2E-08
81-1	VOC	Trichloroethene	79-01-6	1.90E-03	8E-10	1E-05	8E-11	1E-05	5E-09	5E-10		1E-09	
81-1	VOC	Vinyl Chloride	75-01-4	1.20E-02	6E-08	3E-04	6E-09	3E-04	6E-06	3E-08	1E-04	6E-08	2E-04
81-1	INORG	Antimony	7440-36-0	1.70E-03		4E-05		4E-05					
81-1	INORG	Arsenic	7440-38-2	9.10E-02	6E-08	1E-03	6E-09	6E-05					
81-1	INORG	Barium	7440-39-3	1.00E+00		3E-04		3E-04					
81-1	INORG	Cadmium	7440-43-9	1.30E-04		7E-06		7E-06					
81-1	INORG	Chromium (total)	7440-47-3	5.50E-03		2E-04		3E-05					
81-1	INORG	Cobalt	7440-48-4	3.80E-03		5E-07		5E-07					
81-1	INORG	Copper	7440-50-8	2.80E-02		2E-06		2E-06					
81-1	INORG	Cyanide (total)	57-12-5	4.50E-03		7E-07		7E-07					
81-1	INORG	Lead	7439-92-1	1.00E-02									
81-1	INORG	Manganese	7439-96-5	2.40E-01		4E-05		4E-05					
81-1	INORG	Mercury	7439-97-6	1.29E-04		5E-04		5E-04	1E-06		1E-04		2E-04
81-1	INORG	Nickel	7440-02-0	2.40E-02		1E-05		1E-05					
81-1	INORG	Selenium	7782-49-2	3.50E-03		2E-06		2E-06					
81-1	INORG	Silver	7440-22-4	1.30E-04		6E-07		6E-07					
81-1	INORG	Thallium	7440-28-0	1.30E-04		6E-06		6E-06					
81-1	INORG	Vanadium	7440-62-2	1.20E-02		9E-05		9E-05					
81-1	INORG	Zinc	7440-66-6	2.60E-02		2E-07		2E-07					
81-2	VOC	Acetone	67-64-1	6.10E-03		1E-06		9E-07	3E-11		1E-08		3E-08
81-2	VOC	Benzene	71-43-2	5.00E-04	1E-09	3E-05	1E-10	2E-05	8E-08	5E-10	6E-06	1E-09	1E-05
81-2	VOC	2-Butanone	78-93-3	1.20E-03		1E-07		1E-07	2E-11		2E-09		4E-09
81-2	VOC	Chloroethane	75-00-3	3.50E-03	2E-11	8E-07	2E-12	8E-07	1E-09		2E-07		4E-07
81-2	VOC	Cumene	98-82-8	2.30E-02		1E-04		9E-05	6E-08		3E-05		4E-05
81-2	VOC	1,1-Dichloroethane	75-34-3	1.60E-03		5E-06		5E-07	2E-09		1E-06		2E-06
81-2	VOC	cis-1,2-Dichloroethene	156-59-2	3.20E-03		2E-04		2E-05	2E-09		3E-05		5E-05
81-2	VOC	Ethyl Benzene	100-41-4	1.20E-03		3E-06		3E-06	2E-09		5E-07		7E-07
81-2	VOC	Methylcyclohexane	108-87-2	1.00E-03		5E-07		5E-07	1E-09		5E-07		7E-07
81-2	VOC	Toluene	108-88-3	2.00E-04		2E-07		8E-08	3E-10		1E-08		2E-08
81-2	VOC	1,1,1-Trichloroethane	71-55-6	6.30E-04		5E-07		1E-07	3E-10		2E-07		3E-07
81-2	VOC	Trichloroethene	79-01-6	2.90E-03	1E-09	2E-05	1E-10	2E-05	7E-09	8E-10		2E-09	
81-2	VOC	Vinyl Chloride	75-01-4	6.30E-04	3E-09	2E-05	3E-10	2E-05	3E-07	2E-09	6E-06	3E-09	9E-06
81-2	VOC	Xylenes (total)	1330-20-7	2.20E-03		3E-05		3E-05	3E-09		8E-06		1E-05
81-2	SVOC	Benzo(a)anthracene	56-55-3	8.89E-04	1E-07		1E-08			1E-11		4E-11	
81-2	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	1.11E-03	6E-09	2E-04	6E-10	2E-04	5E-12	3E-14	3E-10	8E-14	6E-10
81-2	SVOC	Di-n-butylphthalate	84-74-2	1.76E-03		4E-06		4E-07	1E-12				
81-2	SVOC	Fluoranthene	206-44-0	1.18E-03		3E-05		3E-06			2E-08		4E-08
81-2	SVOC	Pyrene	129-00-0	1.07E-03		3E-05		3E-06			2E-08		4E-08
81-2	INORG	Antimony	7440-36-0	1.70E-03		4E-05		4E-05					
81-2	INORG	Arsenic	7440-38-2	3.50E-02	2E-08	4E-04	2E-09	2E-05					

Attachment G12: Groundwater Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/L)	Maintenance Worker GW Contact Risk	Maintenance Worker GW Contact Risk	Redevelopment Construction Worker GW Contact Risk	Redevelopment Construction Worker GW Contact HQ	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ
81-2	INORG	Barium	7440-39-3	5.00E-01		1E-04		1E-04					
81-2	INORG	Beryllium	7440-41-7	2.30E-03		2E-04		2E-04					
81-2	INORG	Cadmium	7440-43-9	4.40E-04		2E-05		2E-05					
81-2	INORG	Chromium (total)	7440-47-3	1.90E-03		7E-05		1E-05					
81-2	INORG	Cobalt	7440-48-4	1.60E-02		2E-06		2E-06					
81-2	INORG	Copper	7440-50-8	1.50E-02		1E-06		1E-06					
81-2	INORG	Cyanide (total)	57-12-5	1.60E-03		3E-07		3E-07					
81-2	INORG	Lead	7439-92-1	5.50E-02									
81-2	INORG	Manganese	7439-96-5	3.20E+00		5E-04		5E-04					
81-2	INORG	Mercury	7439-97-6	1.78E-04		7E-04		7E-04	1E-06		2E-04		2E-04
81-2	INORG	Nickel	7440-02-0	3.90E-02		2E-05		2E-05					
81-2	INORG	Selenium	7782-49-2	1.70E-02		1E-05		1E-05					
81-2	INORG	Thallium	7440-28-0	4.80E-04		2E-05		2E-05					
81-2	INORG	Vanadium	7440-62-2	1.20E-03		9E-06		9E-06					
81-2	INORG	Zinc	7440-66-6	7.30E-02		7E-07		7E-07					
81-3	VOC	Acetone	67-64-1	8.00E-03		1E-06		1E-06	4E-11		1E-08		4E-08
81-3	VOC	Benzene	71-43-2	3.00E-04	7E-10	2E-05	7E-11	1E-05	5E-08	3E-10	4E-06	6E-10	6E-06
81-3	VOC	2-Butanone	78-93-3	2.50E-03		3E-07		3E-07	5E-11		4E-09		9E-09
81-3	VOC	1,1-Dichloroethane	75-34-3	4.70E-03		2E-05		2E-06	6E-09		3E-06		6E-06
81-3	VOC	1,1-Dichloroethene	75-35-4	6.00E-04		5E-06		5E-06	3E-08		2E-06		4E-06
81-3	VOC	cis-1,2-Dichloroethene	156-59-2	1.62E-01		8E-03		8E-04	9E-08		1E-03		2E-03
81-3	VOC	trans-1,2-Dichloroethene	156-60-5	8.20E-03		2E-04		2E-04	8E-09		7E-05		1E-04
81-3	VOC	1,1,1-Trichloroethane	71-55-6	1.20E-03		9E-07		2E-07	5E-10		3E-07		5E-07
81-3	VOC	Trichloroethene	79-01-6	3.20E-02	1E-08	2E-04	1E-09	2E-04	8E-08	9E-09		2E-08	
81-3	VOC	Vinyl Chloride	75-01-4	6.40E-02	3E-07	2E-03	3E-08	2E-03	3E-05	2E-07	6E-04	3E-07	9E-04
81-3	SVOC	Acenaphthene	83-32-9	5.93E-04		4E-06		4E-07			5E-08		1E-07
81-3	INORG	Antimony	7440-36-0	5.70E-03		2E-04		2E-04					
81-3	INORG	Arsenic	7440-38-2	1.30E-02	9E-09	1E-04	9E-10	8E-06					
81-3	INORG	Barium	7440-39-3	2.50E+00		7E-04		7E-04					
81-3	INORG	Beryllium	7440-41-7	7.00E-04		7E-05		7E-05					
81-3	INORG	Cadmium	7440-43-9	9.80E-03		5E-04		5E-04					
81-3	INORG	Chromium (total)	7440-47-3	5.60E-03		2E-04		3E-05					
81-3	INORG	Cobalt	7440-48-4	7.20E-02		9E-06		9E-06					
81-3	INORG	Copper	7440-50-8	5.10E-02		4E-06		4E-06					
81-3	INORG	Cyanide (total)	57-12-5	1.10E-02		2E-06		2E-06					
81-3	INORG	Lead	7439-92-1	4.70E-02									
81-3	INORG	Manganese	7439-96-5	3.30E+00		6E-04		6E-04					
81-3	INORG	Mercury	7439-97-6	1.94E-04		7E-04		7E-04	1E-06		2E-04		3E-04
81-3	INORG	Nickel	7440-02-0	2.40E-01		1E-04		1E-04					
81-3	INORG	Selenium	7782-49-2	5.90E-03		4E-06		4E-06					
81-3	INORG	Silver	7440-22-4	1.40E-03		6E-06		6E-06					
81-3	INORG	Thallium	7440-28-0	4.50E-04		2E-05		2E-05					
81-3	INORG	Vanadium	7440-62-2	8.60E-03		6E-05		6E-05					

Attachment G12: Groundwater Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/L)	Maintenance Worker GW Contact Risk	Maintenance Worker GW Contact Risk	Redevelopment Construction Worker GW Contact Risk	Redevelopment Construction Worker GW Contact HQ	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ
81-3	INORG	Zinc	7440-66-6	6.00E+00		5E-05		5E-05					
81-4	VOC	Tetrachloroethene	127-18-4	1.10E-02	8E-09	6E-05	8E-10	4E-05	5E-08	7E-09	2E-05	1E-08	2E-05
81-4	INORG	Arsenic	7440-38-2	2.60E-03	2E-09	3E-05	2E-10	2E-06					
81-4	INORG	Barium	7440-39-3	2.40E-01		7E-05		7E-05					
81-4	INORG	Cadmium	7440-43-9	2.10E-04		1E-05		1E-05					
81-4	INORG	Cobalt	7440-48-4	2.00E-03		2E-07		2E-07					
81-4	INORG	Copper	7440-50-8	1.70E-03		1E-07		1E-07					
81-4	INORG	Cyanide (total)	57-12-5	3.80E-03		6E-07		6E-07					
81-4	INORG	Manganese	7439-96-5	7.00E-01		1E-04		1E-04					
81-4	INORG	Nickel	7440-02-0	6.00E-03		3E-06		3E-06					
81-4	INORG	Selenium	7782-49-2	3.50E-03		2E-06		2E-06					
81-4	INORG	Zinc	7440-66-6	8.10E-03		7E-08		7E-08					
83/84-1	VOC	Benzene	71-43-2	1.10E-03	2E-09	7E-05	2E-10	4E-05	2E-07	1E-09	1E-05	2E-09	2E-05
83/84-1	VOC	2-Butanone	78-93-3	5.30E-04		7E-08		6E-08	1E-11		8E-10		2E-09
83/84-1	VOC	cis-1,2-Dichloroethene	156-59-2	5.90E-04		3E-05		3E-06	3E-10		5E-06		9E-06
83/84-1	VOC	Trichloroethene	79-01-6	1.60E-03	6E-10	1E-05	6E-11	1E-05	4E-09	5E-10		9E-10	
83/84-1	INORG	Arsenic	7440-38-2	8.10E-03	6E-09	9E-05	6E-10	5E-06					
83/84-1	INORG	Barium	7440-39-3	1.70E-01		5E-05		5E-05					
83/84-1	INORG	Chromium (total)	7440-47-3	1.80E-03		6E-05		9E-06					
83/84-1	INORG	Cobalt	7440-48-4	6.70E-04		8E-08		8E-08					
83/84-1	INORG	Copper	7440-50-8	9.60E-03		8E-07		8E-07					
83/84-1	INORG	Cyanide (total)	57-12-5	5.10E-02		8E-06		8E-06					
83/84-1	INORG	Lead	7439-92-1	6.50E-04									
83/84-1	INORG	Manganese	7439-96-5	1.10E+00		2E-04		2E-04					
83/84-1	INORG	Nickel	7440-02-0	5.10E-03		2E-06		2E-06					
83/84-1	INORG	Selenium	7782-49-2	1.90E-02		1E-05		1E-05					
83/84-1	INORG	Silver	7440-22-4	1.40E-03		6E-06		6E-06					
83/84-1	INORG	Thallium	7440-28-0	1.20E-04		6E-06		6E-06					
83/84-1	INORG	Vanadium	7440-62-2	2.40E-04		2E-06		2E-06					
83/84-1	INORG	Zinc	7440-66-6	1.90E-02		2E-07		2E-07					
83/84-2	VOC	Acetone	67-64-1	9.00E-03		1E-06		1E-06	4E-11		2E-08		4E-08
83/84-2	VOC	Benzene	71-43-2	4.00E-04	9E-10	3E-05	9E-11	1E-05	7E-08	4E-10	5E-06	8E-10	8E-06
83/84-2	VOC	Cumene	98-82-8	2.00E-04		1E-06		8E-07	5E-10		2E-07		3E-07
83/84-2	VOC	Methylcyclohexane	108-87-2	3.00E-04		2E-07		2E-07	3E-10		1E-07		2E-07
83/84-2	VOC	Toluene	108-88-3	4.00E-04		4E-07		2E-07	6E-10		3E-08		5E-08
83/84-2	VOC	Xylenes (total)	1330-20-7	2.70E-03		4E-05		4E-05	3E-09		1E-05		2E-05
83/84-2	SVOC	Di-n-butylphthalate	84-74-2	1.56E-03		3E-06		3E-07	1E-12				
83/84-2	SVOC	2-Methylnaphthalene	91-57-6	9.50E-04		4E-04		4E-04			2E-05		4E-05
83/84-2	SVOC	Naphthalene	91-20-3	2.97E-03		1E-03		1E-03	5E-09		5E-05		1E-04
83/84-2	SVOC	Phenol	108-95-2	1.34E-03		4E-08		4E-08	6E-12				
83/84-2	INORG	Arsenic	7440-38-2	7.90E-03	5E-09	9E-05	5E-10	5E-06					
83/84-2	INORG	Barium	7440-39-3	3.30E-01		1E-04		1E-04					
83/84-2	INORG	Beryllium	7440-41-7	2.30E-02		2E-03		2E-03					

Attachment G12: Groundwater Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/L)	Maintenance Worker GW Contact Risk	Maintenance Worker GW Contact Risk	Redevelopment Construction Worker GW Contact Risk	Redevelopment Construction Worker GW Contact HQ	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ
83/84-2	INORG	Cadmium	7440-43-9	1.40E-03		8E-05		8E-05					
83/84-2	INORG	Chromium (total)	7440-47-3	1.40E-02		5E-04		7E-05					
83/84-2	INORG	Cobalt	7440-48-4	3.70E-03		5E-07		5E-07					
83/84-2	INORG	Copper	7440-50-8	7.30E-03		6E-07		6E-07					
83/84-2	INORG	Cyanide (total)	57-12-5	7.40E-03		1E-06		1E-06					
83/84-2	INORG	Lead	7439-92-1	9.20E-04									
83/84-2	INORG	Manganese	7439-96-5	1.20E+00		2E-04		2E-04					
83/84-2	INORG	Mercury	7439-97-6	2.08E-04		8E-04		8E-04	2E-06		2E-04		3E-04
83/84-2	INORG	Nickel	7440-02-0	1.20E-02		5E-06		5E-06					
83/84-2	INORG	Silver	7440-22-4	1.10E-03		5E-06		5E-06					
83/84-2	INORG	Vanadium	7440-62-2	9.90E-04		7E-06		7E-06					
83/84-2	INORG	Zinc	7440-66-6	2.40E-02		2E-07		2E-07					
83/84-3	VOC	Acetone	67-64-1	7.60E-04		1E-07		1E-07	4E-12		1E-09		3E-09
83/84-3	VOC	cis-1,2-Dichloroethene	156-59-2	8.30E-04		4E-05		4E-06	5E-10		7E-06		1E-05
83/84-3	VOC	Toluene	108-88-3	7.80E-04		8E-07		3E-07	1E-09		6E-08		1E-07
83/84-3	VOC	Trichloroethene	79-01-6	1.50E-03	6E-10	9E-06	6E-11	9E-06	4E-09	4E-10		8E-10	
83/84-3	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	3.33E-03	2E-08	5E-04	2E-09	5E-04	2E-11	8E-14	8E-10	2E-13	2E-09
83/84-3	INORG	Arsenic	7440-38-2	2.30E-02	2E-08	2E-04	2E-09	1E-05					
83/84-3	INORG	Barium	7440-39-3	1.30E-01		4E-05		4E-05					
83/84-3	INORG	Beryllium	7440-41-7	1.10E-02		1E-03		1E-03					
83/84-3	INORG	Cadmium	7440-43-9	1.10E-03		6E-05		6E-05					
83/84-3	INORG	Chromium (total)	7440-47-3	1.40E-02		5E-04		7E-05					
83/84-3	INORG	Cobalt	7440-48-4	6.00E-03		7E-07		7E-07					
83/84-3	INORG	Copper	7440-50-8	6.80E-03		6E-07		6E-07					
83/84-3	INORG	Cyanide (total)	57-12-5	2.80E-03		5E-07		5E-07					
83/84-3	INORG	Lead	7439-92-1	1.70E-02									
83/84-3	INORG	Manganese	7439-96-5	9.20E-01		2E-04		2E-04					
83/84-3	INORG	Nickel	7440-02-0	2.40E-02		1E-05		1E-05					
83/84-3	INORG	Selenium	7782-49-2	2.60E-03		2E-06		2E-06					
83/84-3	INORG	Silver	7440-22-4	4.70E-04		2E-06		2E-06					
83/84-3	INORG	Thallium	7440-28-0	7.10E-04		3E-05		3E-05					
83/84-3	INORG	Vanadium	7440-62-2	2.30E-03		2E-05		2E-05					
83/84-3	INORG	Zinc	7440-66-6	8.10E-02		7E-07		7E-07					
83/84-4	VOC	1,1-Dichloroethane	75-34-3	5.20E-04		2E-06		2E-07	7E-10		4E-07		6E-07
83/84-4	SVOC	Naphthalene	91-20-3	1.34E-03		5E-04		5E-04	2E-09		2E-05		5E-05
83/84-4	INORG	Antimony	7440-36-0	2.20E-03		6E-05		6E-05					
83/84-4	INORG	Arsenic	7440-38-2	1.10E-01	8E-08	1E-03	8E-09	7E-05					
83/84-4	INORG	Barium	7440-39-3	4.00E-01		1E-04		1E-04					
83/84-4	INORG	Beryllium	7440-41-7	1.40E-01		1E-02		1E-02					
83/84-4	INORG	Cadmium	7440-43-9	2.70E-03		1E-04		1E-04					
83/84-4	INORG	Chromium (total)	7440-47-3	1.60E-02		6E-04		8E-05					
83/84-4	INORG	Cobalt	7440-48-4	1.10E-02		1E-06		1E-06					
83/84-4	INORG	Copper	7440-50-8	3.10E-02		3E-06		3E-06					

Attachment G12: Groundwater Incremental Risks
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83/84-4	INORG	Lead	7439-92-1	8.10E-03									
83/84-4	INORG	Manganese	7439-96-5	3.60E-01		6E-05		6E-05					
83/84-4	INORG	Nickel	7440-02-0	4.20E-02		2E-05		2E-05					
83/84-4	INORG	Selenium	7782-49-2	3.00E-03		2E-06		2E-06					
83/84-4	INORG	Silver	7440-22-4	1.90E-03		8E-06		8E-06					
83/84-4	INORG	Thallium	7440-28-0	1.00E-03		5E-05		5E-05					
83/84-4	INORG	Vanadium	7440-62-2	1.00E-02		7E-05		7E-05					
83/84-4	INORG	Zinc	7440-66-6	7.10E-02		6E-07		6E-07					
83/84-5	INORG	Arsenic	7440-38-2	3.10E-03	2E-09	3E-05	2E-10	2E-06					
83/84-5	INORG	Barium	7440-39-3	3.40E-01		1E-04		1E-04					
83/84-5	INORG	Chromium (total)	7440-47-3	6.00E-04		2E-05		3E-06					
83/84-5	INORG	Cobalt	7440-48-4	6.20E-04		8E-08		8E-08					
83/84-5	INORG	Copper	7440-50-8	2.60E-03		2E-07		2E-07					
83/84-5	INORG	Cyanide (total)	57-12-5	3.50E-03		6E-07		6E-07					
83/84-5	INORG	Manganese	7439-96-5	1.30E-01		2E-05		2E-05					
83/84-5	INORG	Nickel	7440-02-0	1.50E-02		6E-06		6E-06					
83/84-5	INORG	Selenium	7782-49-2	4.50E-03		3E-06		3E-06					
83/84-5	INORG	Zinc	7440-66-6	9.20E-03		8E-08		8E-08					
83/84-7	VOC	Acetone	67-64-1	3.00E-02		5E-06		4E-06	1E-10		5E-08		1E-07
83/84-7	VOC	Benzene	71-43-2	1.60E-01	4E-07	1E-02	4E-08	6E-03	3E-05	2E-07	2E-03	3E-07	3E-03
83/84-7	VOC	Chloromethane	74-87-3	1.60E-02		4E-04		4E-04	9E-08		7E-05		1E-04
83/84-7	VOC	Cumene	98-82-8	2.30E-02		1E-04		9E-05	6E-08		3E-05		4E-05
83/84-7	VOC	Cyclohexane	110-82-7	6.90E-02		2E-05		2E-05	1E-07		2E-05		2E-05
83/84-7	VOC	1,1-Dichloroethane	75-34-3	2.20E-03		7E-06		7E-07	3E-09		2E-06		3E-06
83/84-7	VOC	1,2-Dichloroethane	107-06-2	8.50E-04	5E-09	2E-04	5E-10	2E-04	3E-08	8E-10	2E-05	2E-09	4E-05
83/84-7	VOC	cis-1,2-Dichloroethene	156-59-2	8.80E-02		4E-03		4E-04	5E-08		8E-04		1E-03
83/84-7	VOC	trans-1,2-Dichloroethene	156-60-5	1.60E-03		5E-05		4E-05	1E-09		1E-05		2E-05
83/84-7	VOC	Ethyl Benzene	100-41-4	5.65E-01		1E-03		1E-03	7E-07		2E-04		3E-04
83/84-7	VOC	Methylcyclohexane	108-87-2	2.20E-02		1E-05		1E-05	2E-08		1E-05		2E-05
83/84-7	VOC	Methylene Chloride	75-09-2	1.00E-02	1E-09	7E-06	1E-10	7E-06	3E-08	3E-10	7E-07	8E-10	1E-06
83/84-7	VOC	Toluene	108-88-3	2.30E+00		2E-03		9E-04	3E-06		2E-04		3E-04
83/84-7	VOC	1,2,4-Trichlorobenzene	120-82-1	7.50E-04		2E-05		1E-05			4E-07		8E-07
83/84-7	VOC	Trichloroethene	79-01-6	3.50E-02	1E-08	2E-04	1E-09	2E-04	9E-08	1E-08		2E-08	
83/84-7	VOC	Vinyl Chloride	75-01-4	1.50E-01	8E-07	4E-03	8E-08	4E-03	8E-05	4E-07	1E-03	8E-07	2E-03
83/84-7	VOC	Xylenes (total)	1330-20-7	1.92E+00		3E-02		3E-02	2E-06		7E-03		1E-02
83/84-7	SVOC	Diethylphthalate	84-66-2	1.39E-03		3E-08		3E-09	3E-11		3E-11		9E-11
83/84-7	SVOC	2-Methylnaphthalene	91-57-6	1.49E-03		6E-04		6E-04			3E-05		6E-05
83/84-7	SVOC	Naphthalene	91-20-3	3.47E-02		1E-02		1E-02	5E-08		6E-04		1E-03
83/84-7	INORG	Arsenic	7440-38-2	3.90E-02	3E-08	4E-04	3E-09	3E-05					
83/84-7	INORG	Barium	7440-39-3	8.90E-01		3E-04		3E-04					
83/84-7	INORG	Cadmium	7440-43-9	4.00E-04		2E-05		2E-05					
83/84-7	INORG	Chromium (total)	7440-47-3	3.10E-03		1E-04		2E-05					
83/84-7	INORG	Cobalt	7440-48-4	8.70E-03		1E-06		1E-06					

Attachment G12: Groundwater Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/L)	Maintenance Worker GW Contact Risk	Maintenance Worker GW Contact Risk	Redevelopment Construction Worker GW Contact Risk	Redevelopment Construction Worker GW Contact HQ	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ
83/84-7	INORG	Copper	7440-50-8	4.30E-02		3E-06		3E-06					
83/84-7	INORG	Cyanide (total)	57-12-5	9.90E-03		2E-06		2E-06					
83/84-7	INORG	Lead	7439-92-1	1.60E-03									
83/84-7	INORG	Manganese	7439-96-5	1.10E+00		2E-04		2E-04					
83/84-7	INORG	Mercury	7439-97-6	2.64E-04		1E-03		1E-03	2E-06		2E-04		4E-04
83/84-7	INORG	Nickel	7440-02-0	1.60E-02		7E-06		7E-06					
83/84-7	INORG	Selenium	7782-49-2	6.00E-03		4E-06		4E-06					
83/84-7	INORG	Silver	7440-22-4	7.70E-03		3E-05		3E-05					
83/84-7	INORG	Thallium	7440-28-0	1.00E-04		5E-06		5E-06					
83/84-7	INORG	Vanadium	7440-62-2	6.40E-03		5E-05		5E-05					
83/84-7	INORG	Zinc	7440-66-6	2.80E-02		3E-07		3E-07					
84-A	VOC	Acetone	67-64-1	8.00E-03		1E-06		1E-06	4E-11		1E-08		4E-08
84-A	VOC	Benzene	71-43-2	6.00E-03	1E-08	4E-04	1E-09	2E-04	1E-06	6E-09	7E-05	1E-08	1E-04
84-A	VOC	1,1-Dichloroethene	75-35-4	8.00E-03		7E-05		7E-05	5E-07		3E-05		5E-05
84-A	VOC	cis-1,2-Dichloroethene	156-59-2	3.22E-01		2E-02		2E-03	2E-07		3E-03		5E-03
84-A	VOC	trans-1,2-Dichloroethene	156-60-5	2.70E-02		8E-04		7E-04	2E-08		2E-04		4E-04
84-A	VOC	Methyl tert-butyl ether	1634-04-4	3.00E-04		1E-07		1E-07	2E-10		7E-09		1E-08
84-A	VOC	Trichloroethene	79-01-6	2.58E-01	1E-07	2E-03	1E-08	2E-03	7E-07	7E-08		1E-07	
84-A	VOC	Vinyl Chloride	75-01-4	1.05E-01	5E-07	3E-03	5E-08	3E-03	6E-05	3E-07	1E-03	6E-07	1E-03
84-A	INORG	Antimony	7440-36-0	9.40E-04		2E-05		2E-05					
84-A	INORG	Arsenic	7440-38-2	3.50E-03	2E-09	4E-05	2E-10	2E-06					
84-A	INORG	Barium	7440-39-3	7.00E-02		2E-05		2E-05					
84-A	INORG	Cadmium	7440-43-9	9.00E-05		5E-06		5E-06					
84-A	INORG	Chromium (total)	7440-47-3	6.60E-03		2E-04		3E-05					
84-A	INORG	Cobalt	7440-48-4	1.80E-03		2E-07		2E-07					
84-A	INORG	Copper	7440-50-8	1.30E-02		1E-06		1E-06					
84-A	INORG	Cyanide (total)	57-12-5	7.10E-02		1E-05		1E-05					
84-A	INORG	Lead	7439-92-1	9.40E-04									
84-A	INORG	Manganese	7439-96-5	5.10E-02		9E-06		9E-06					
84-A	INORG	Nickel	7440-02-0	9.20E-03		4E-06		4E-06					
84-A	INORG	Selenium	7782-49-2	4.00E-03		3E-06		3E-06					
84-A	INORG	Silver	7440-22-4	2.40E-04		1E-06		1E-06					
84-A	INORG	Thallium	7440-28-0	1.70E-04		8E-06		8E-06					
84-A	INORG	Vanadium	7440-62-2	4.00E-03		3E-05		3E-05					
84-A	INORG	Zinc	7440-66-6	2.00E-02		2E-07		2E-07					
84-D	VOC	Acetone	67-64-1	2.00E-01		3E-05		3E-05	9E-10		4E-07		9E-07
84-D	VOC	Benzene	71-43-2	1.44E+00	3E-06	1E-01	3E-07	5E-02	2E-04	1E-06	2E-02	3E-06	3E-02
84-D	VOC	Chloroform	67-66-3	2.00E-03	9E-09	6E-05	9E-10	6E-05	9E-08	5E-09	1E-05	1E-08	2E-05
84-D	VOC	Cyclohexane	110-82-7	7.00E-02		2E-05		2E-05	1E-07		2E-05		2E-05
84-D	VOC	1,1-Dichloroethane	75-34-3	1.80E-02		6E-05		6E-06	2E-08		1E-05		2E-05
84-D	VOC	1,1-Dichloroethene	75-35-4	8.00E-04		7E-06		7E-06	5E-08		3E-06		5E-06
84-D	VOC	cis-1,2-Dichloroethene	156-59-2	7.80E-02		4E-03		4E-04	4E-08		7E-04		1E-03
84-D	VOC	trans-1,2-Dichloroethene	156-60-5	6.00E-03		2E-04		2E-04	6E-09		5E-05		8E-05

Attachment G12: Groundwater Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/L)	Maintenance Worker GW Contact Risk	Maintenance Worker GW Contact Risk	Redevelopment Construction Worker GW Contact Risk	Redevelopment Construction Worker GW Contact HQ	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ
84-D	VOC	Methyl tert-butyl ether	1634-04-4	3.00E-03		1E-06		1E-06	2E-09		7E-08		1E-07
84-D	VOC	Methylcyclohexane	108-87-2	6.00E-03		3E-06		3E-06	6E-09		3E-06		4E-06
84-D	VOC	Tetrachloroethene	127-18-4	5.00E-04	4E-10	3E-06	4E-11	2E-06	2E-09	3E-10	7E-07	6E-10	1E-06
84-D	VOC	Toluene	108-88-3	1.00E-02		1E-05		4E-06	1E-08		7E-07		1E-06
84-D	VOC	1,1,1-Trichloroethane	71-55-6	1.10E-02		8E-06		2E-06	5E-09		3E-06		5E-06
84-D	VOC	Trichloroethene	79-01-6	1.30E-02	5E-09	8E-05	5E-10	8E-05	3E-08	4E-09		7E-09	
84-D	VOC	Vinyl Chloride	75-01-4	1.14E-01	6E-07	3E-03	6E-08	3E-03	6E-05	3E-07	1E-03	6E-07	2E-03
84-D	INORG	Antimony	7440-36-0	3.20E-03		8E-05		8E-05					
84-D	INORG	Arsenic	7440-38-2	1.30E-02	9E-09	1E-04	9E-10	8E-06					
84-D	INORG	Barium	7440-39-3	1.70E-01		5E-05		5E-05					
84-D	INORG	Beryllium	7440-41-7	2.60E-01		2E-02		2E-02					
84-D	INORG	Cadmium	7440-43-9	2.90E-03		2E-04		2E-04					
84-D	INORG	Chromium (total)	7440-47-3	4.50E-01		2E-02		2E-03					
84-D	INORG	Cobalt	7440-48-4	2.00E-02		2E-06		2E-06					
84-D	INORG	Copper	7440-50-8	6.40E-02		5E-06		5E-06					
84-D	INORG	Cyanide (total)	57-12-5	9.10E-03		1E-06		1E-06					
84-D	INORG	Lead	7439-92-1	2.60E-03									
84-D	INORG	Manganese	7439-96-5	4.30E-01		7E-05		7E-05					
84-D	INORG	Mercury	7439-97-6	8.21E-05		3E-04		3E-04	6E-07		7E-05		1E-04
84-D	INORG	Nickel	7440-02-0	9.10E-01		4E-04		4E-04					
84-D	INORG	Selenium	7782-49-2	4.20E-02		3E-05		3E-05					
84-D	INORG	Silver	7440-22-4	1.90E-03		8E-06		8E-06					
84-D	INORG	Thallium	7440-28-0	1.40E-03		6E-05		6E-05					
84-D	INORG	Vanadium	7440-62-2	2.00E-03		1E-05		1E-05					
84-D	INORG	Zinc	7440-66-6	5.30E-02		5E-07		5E-07					
85-1	VOC	Acetone	67-64-1	4.60E-03		7E-07		7E-07	2E-11		8E-09		2E-08
85-1	VOC	Benzene	71-43-2	1.20E-03	3E-09	8E-05	3E-10	4E-05	2E-07	1E-09	1E-05	2E-09	2E-05
85-1	VOC	Bromodichloromethane	75-27-4	9.50E-04	3E-09	2E-05	3E-10	2E-05		8E-10	2E-06	2E-09	3E-06
85-1	VOC	2-Butanone	78-93-3	3.00E-03		4E-07		4E-07	6E-11		5E-09		1E-08
85-1	VOC	Chloroform	67-66-3	3.50E-03	2E-08	1E-04	2E-09	1E-04	1E-07	8E-09	2E-05	2E-08	4E-05
85-1	VOC	Cyclohexane	110-82-7	1.40E-02		4E-06		4E-06	3E-08		3E-06		4E-06
85-1	VOC	1,1-Dichloroethane	75-34-3	6.20E-04		2E-06		2E-07	8E-10		4E-07		8E-07
85-1	VOC	cis-1,2-Dichloroethene	156-59-2	5.30E-03		2E-04		2E-05	3E-09		5E-05		8E-05
85-1	VOC	trans-1,2-Dichloroethene	156-60-5	2.70E-03		8E-05		7E-05	2E-09		2E-05		4E-05
85-1	VOC	Ethyl Benzene	100-41-4	2.50E-02		6E-05		6E-05	3E-08		9E-06		2E-05
85-1	VOC	Methylcyclohexane	108-87-2	6.50E-03		4E-06		4E-06	7E-09		3E-06		4E-06
85-1	VOC	Tetrachloroethene	127-18-4	2.20E-02	2E-08	1E-04	2E-09	7E-05	1E-07	1E-08	3E-05	3E-08	5E-05
85-1	VOC	1,1,1-Trichloroethane	71-55-6	2.70E-03		2E-06		4E-07	1E-09		7E-07		1E-06
85-1	VOC	Trichloroethene	79-01-6	9.30E-02	4E-08	6E-04	4E-09	6E-04	2E-07	3E-08		5E-08	
85-1	VOC	Vinyl Chloride	75-01-4	6.70E-04	3E-09	2E-05	3E-10	2E-05	4E-07	2E-09	6E-06	4E-09	9E-06
85-1	VOC	Xylenes (total)	1330-20-7	7.79E-02		1E-03		1E-03	1E-07		3E-04		5E-04
85-1	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	1.04E-03	6E-09	1E-04	6E-10	1E-04	5E-12	2E-14	2E-10	7E-14	6E-10
85-1	SVOC	Diethylphthalate	84-66-2	2.02E-03		4E-08		4E-09	4E-11		5E-11		1E-10

Attachment G12: Groundwater Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/L)	Maintenance Worker GW Contact Risk	Maintenance Worker GW Contact Risk	Redevelopment Construction Worker GW Contact Risk	Redevelopment Construction Worker GW Contact HQ	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ
85-1	INORG	Arsenic	7440-38-2	1.00E-02	7E-09	1E-04	7E-10	6E-06					
85-1	INORG	Barium	7440-39-3	7.20E-01		2E-04		2E-04					
85-1	INORG	Beryllium	7440-41-7	7.00E-03		7E-04		7E-04					
85-1	INORG	Cadmium	7440-43-9	3.40E-03		2E-04		2E-04					
85-1	INORG	Chromium (total)	7440-47-3	8.10E-03		3E-04		4E-05					
85-1	INORG	Cobalt	7440-48-4	2.70E-03		3E-07		3E-07					
85-1	INORG	Copper	7440-50-8	9.80E-03		8E-07		8E-07					
85-1	INORG	Cyanide (total)	57-12-5	1.60E-02		3E-06		3E-06					
85-1	INORG	Lead	7439-92-1	3.30E-04									
85-1	INORG	Manganese	7439-96-5	9.40E-01		2E-04		2E-04					
85-1	INORG	Nickel	7440-02-0	1.30E-02		5E-06		5E-06					
85-1	INORG	Selenium	7782-49-2	8.00E-02		5E-05		5E-05					
85-1	INORG	Silver	7440-22-4	3.10E-03		1E-05		1E-05					
85-1	INORG	Thallium	7440-28-0	4.30E-04		2E-05		2E-05					
85-1	INORG	Vanadium	7440-62-2	1.30E-01		1E-03		1E-03					
85-1	INORG	Zinc	7440-66-6	2.50E-02		2E-07		2E-07					
86-1	VOC	Acetone	67-64-1	2.90E-03		5E-07		4E-07	1E-11		5E-09		1E-08
86-1	VOC	Benzene	71-43-2	7.90E-03	2E-08	5E-04	2E-09	3E-04	1E-06	8E-09	9E-05	2E-08	2E-04
86-1	VOC	2-Butanone	78-93-3	3.90E-03		5E-07		5E-07	8E-11		6E-09		1E-08
86-1	VOC	Carbon Disulfide	75-15-0	6.00E-03		2E-05		2E-05	6E-07		7E-06		1E-05
86-1	VOC	Chloroethane	75-00-3	1.40E+01	7E-08	3E-03	7E-09	3E-03	5E-06		8E-04		1E-03
86-1	VOC	Chloroform	67-66-3	4.00E-04	2E-09	1E-05	2E-10	1E-05	2E-08	9E-10	2E-06	2E-09	4E-06
86-1	VOC	Chloromethane	74-87-3	5.80E-04		1E-05		1E-05	3E-09		3E-06		4E-06
86-1	VOC	Cumene	98-82-8	7.70E-04		4E-06		3E-06	2E-09		8E-07		1E-06
86-1	VOC	1,2-Dichlorobenzene	95-50-1	9.60E-04		7E-06		2E-06	1E-09		8E-07		1E-06
86-1	VOC	1,1-Dichloroethane	75-34-3	1.30E-01		4E-04		4E-05	2E-07		9E-05		2E-04
86-1	VOC	1,2-Dichloroethane	107-06-2	2.20E-03	1E-08	6E-04	1E-09	6E-04	9E-08	2E-09	5E-05	5E-09	1E-04
86-1	VOC	1,1-Dichloroethene	75-35-4	2.70E-02		2E-04		2E-04	2E-06		1E-04		2E-04
86-1	VOC	cis-1,2-Dichloroethene	156-59-2	4.50E-01		2E-02		2E-03	2E-07		4E-03		7E-03
86-1	VOC	trans-1,2-Dichloroethene	156-60-5	2.00E-02		6E-04		5E-04	2E-08		2E-04		3E-04
86-1	VOC	Ethyl Benzene	100-41-4	3.50E-03		8E-06		8E-06	4E-09		1E-06		2E-06
86-1	VOC	Methylene Chloride	75-09-2	3.10E-03	4E-10	2E-06	4E-11	2E-06	1E-08	1E-10	2E-07	3E-10	4E-07
86-1	VOC	Tetrachloroethene	127-18-4	4.10E-02	3E-08	2E-04	3E-09	1E-04	2E-07	3E-08	6E-05	5E-08	9E-05
86-1	VOC	Toluene	108-88-3	2.00E-02		2E-05		8E-06	3E-08		1E-06		2E-06
86-1	VOC	1,1,1-Trichloroethane	71-55-6	8.40E-03		6E-06		1E-06	4E-09		2E-06		3E-06
86-1	VOC	1,1,2-Trichloroethane	79-00-5	3.90E-03	1E-08	1E-05	1E-09	1E-06	1E-08	2E-09		5E-09	
86-1	VOC	Trichloroethene	79-01-6	2.00E+00	8E-07	1E-02	8E-08	1E-02	5E-06	6E-07		1E-06	
86-1	VOC	Trichlorofluoromethane	75-69-4	1.20E-03		2E-06		3E-07	4E-10		2E-06		3E-06
86-1	VOC	Vinyl Chloride	75-01-4	4.30E-01	2E-06	1E-02	2E-07	1E-02	2E-04	1E-06	4E-03	2E-06	6E-03
86-1	VOC	Xylenes (total)	1330-20-7	1.31E-02		2E-04		2E-04	2E-08		5E-05		8E-05
86-1	SVOC	Acenaphthene	83-32-9	5.60E-04		4E-06		4E-07			5E-08		1E-07
86-1	SVOC	Biphenyl	92-52-4	1.05E-02		1E-04		1E-04	5E-07		2E-06		4E-06
86-1	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	3.19E-03	2E-08	4E-04	2E-09	4E-04	1E-11	7E-14	7E-10	2E-13	2E-09

Attachment G12: Groundwater Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/L)	Maintenance Worker GW Contact Risk	Maintenance Worker GW Contact Risk	Redevelopment Construction Worker GW Contact Risk	Redevelopment Construction Worker GW Contact HQ	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ
86-1	SVOC	Dibenzofuran	132-64-9	2.19E-03		4E-04		4E-04			5E-07		1E-06
86-1	SVOC	2,4-Dimethylphenol	105-67-9	2.87E-03		5E-06		5E-07			1E-08		3E-08
86-1	SVOC	Fluorene	86-73-7	1.97E-03		2E-05		2E-06			1E-07		3E-07
86-1	SVOC	2-Methylnaphthalene	91-57-6	5.45E-02		2E-02		2E-02			1E-03		2E-03
86-1	SVOC	Naphthalene	91-20-3	3.73E-02		1E-02		1E-02	6E-08		7E-04		1E-03
86-1	PCB	PCBs (total)	1336-36-3	3.30E-04	2E-07	4E-02	2E-08	1E-02	1E-07	7E-09		1E-08	
86-1	INORG	Antimony	7440-36-0	1.30E-03		3E-05		3E-05					
86-1	INORG	Arsenic	7440-38-2	4.70E-02	3E-08	5E-04	3E-09	3E-05					
86-1	INORG	Barium	7440-39-3	6.20E-01		2E-04		2E-04					
86-1	INORG	Beryllium	7440-41-7	9.80E-03		9E-04		9E-04					
86-1	INORG	Cadmium	7440-43-9	2.00E-03		1E-04		1E-04					
86-1	INORG	Chromium (total)	7440-47-3	1.60E-02		6E-04		8E-05					
86-1	INORG	Cobalt	7440-48-4	1.70E-02		2E-06		2E-06					
86-1	INORG	Copper	7440-50-8	1.40E-02		1E-06		1E-06					
86-1	INORG	Cyanide (total)	57-12-5	3.20E-03		5E-07		5E-07					
86-1	INORG	Lead	7439-92-1	1.00E-02									
86-1	INORG	Manganese	7439-96-5	1.30E+00		2E-04		2E-04					
86-1	INORG	Nickel	7440-02-0	3.00E-02		1E-05		1E-05					
86-1	INORG	Selenium	7782-49-2	1.50E-02		1E-05		1E-05					
86-1	INORG	Silver	7440-22-4	7.40E-04		3E-06		3E-06					
86-1	INORG	Thallium	7440-28-0	1.40E-04		6E-06		6E-06					
86-1	INORG	Vanadium	7440-62-2	1.40E-02		1E-04		1E-04					
86-1	INORG	Zinc	7440-66-6	2.20E-01		2E-06		2E-06					
94-B	VOC	Benzene	71-43-2	5.00E-04	1E-09	3E-05	1E-10	2E-05	8E-08	5E-10	6E-06	1E-09	1E-05
94-B	VOC	Chloroform	67-66-3	3.00E-03	1E-08	9E-05	1E-09	9E-05	1E-07	7E-09	2E-05	2E-08	3E-05
94-B	VOC	1,1-Dichloroethane	75-34-3	1.00E-03		3E-06		3E-07	1E-09		7E-07		1E-06
94-B	VOC	1,1-Dichloroethene	75-35-4	7.50E-03		6E-05		6E-05	4E-07		3E-05		5E-05
94-B	VOC	cis-1,2-Dichloroethene	156-59-2	2.30E-02		1E-03		1E-04	1E-08		2E-04		4E-04
94-B	VOC	trans-1,2-Dichloroethene	156-60-5	3.00E-04		8E-06		8E-06	3E-10		3E-06		4E-06
94-B	VOC	1,1,1-Trichloroethane	71-55-6	3.90E-02		3E-05		6E-06	2E-08		1E-05		2E-05
94-B	VOC	1,1,2-Trichloroethane	79-00-5	8.10E-04	2E-09	3E-06	2E-10	3E-07	3E-09	4E-10		1E-09	
94-B	VOC	Trichloroethene	79-01-6	9.50E-01	4E-07	6E-03	4E-08	6E-03	2E-06	3E-07		5E-07	
94-B	VOC	Trichlorofluoromethane	75-69-4	1.10E-03		2E-06		3E-07	3E-10		2E-06		3E-06
94-B	SVOC	Phenol	108-95-2	1.85E-02		6E-07		6E-07	9E-11				
94-B	INORG	Barium	7440-39-3	4.70E-02		1E-05		1E-05					
94-B	INORG	Cadmium	7440-43-9	7.50E-05		4E-06		4E-06					
94-B	INORG	Chromium (total)	7440-47-3	3.40E-04		1E-05		2E-06					
94-B	INORG	Cobalt	7440-48-4	1.60E-03		2E-07		2E-07					
94-B	INORG	Copper	7440-50-8	5.20E-03		4E-07		4E-07					
94-B	INORG	Cyanide (total)	57-12-5	3.20E-03		5E-07		5E-07					
94-B	INORG	Lead	7439-92-1	2.80E-04									
94-B	INORG	Manganese	7439-96-5	2.90E-01		5E-05		5E-05					
94-B	INORG	Nickel	7440-02-0	1.60E-02		7E-06		7E-06					

Attachment G12: Groundwater Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/L)	Maintenance Worker GW Contact Risk	Maintenance Worker GW Contact Risk	Redevelopment Construction Worker GW Contact Risk	Redevelopment Construction Worker GW Contact HQ	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ
94-B	INORG	Vanadium	7440-62-2	3.50E-04		3E-06		3E-06					
94-B	INORG	Zinc	7440-66-6	8.90E-03		8E-08		8E-08					
94-D	VOC	Trichloroethene	79-01-6	7.40E-04	3E-10	5E-06	3E-11	5E-06	2E-09	2E-10		4E-10	
94-D	INORG	Arsenic	7440-38-2	1.20E-03	8E-10	1E-05	8E-11	8E-07					
94-D	INORG	Barium	7440-39-3	4.50E-02		1E-05		1E-05					
94-D	INORG	Chromium (total)	7440-47-3	1.30E-03		5E-05		7E-06					
94-D	INORG	Cobalt	7440-48-4	9.10E-04		1E-07		1E-07					
94-D	INORG	Copper	7440-50-8	2.90E-03		2E-07		2E-07					
94-D	INORG	Lead	7439-92-1	8.60E-04									
94-D	INORG	Manganese	7439-96-5	1.20E-01		2E-05		2E-05					
94-D	INORG	Nickel	7440-02-0	5.60E-03		2E-06		2E-06					
94-D	INORG	Thallium	7440-28-0	1.50E-04		7E-06		7E-06					
94-D	INORG	Vanadium	7440-62-2	1.10E-03		8E-06		8E-06					
94-D	INORG	Zinc	7440-66-6	5.10E-03		5E-08		5E-08					
Aeration Lagoon	SVOC	Acetophenone	98-86-2	5.00E-04		2E-07		2E-08	2E-11		2E-09		6E-09
Aeration Lagoon	INORG	Arsenic	7440-38-2	3.20E-02	2E-08	3E-04	2E-09	2E-05					
Aeration Lagoon	INORG	Barium	7440-39-3	1.19E-01		3E-05		3E-05					
Aeration Lagoon	INORG	Cadmium	7440-43-9	1.00E-04		5E-06		5E-06					
Aeration Lagoon	INORG	Copper	7440-50-8	1.50E-03		1E-07		1E-07					
Aeration Lagoon	INORG	Manganese	7439-96-5	2.49E-01		4E-05		4E-05					
Aeration Lagoon	INORG	Selenium	7782-49-2	1.00E-02		6E-06		6E-06					
Aeration Lagoon	INORG	Zinc	7440-66-6	1.10E-02		1E-07		1E-07					
BD01	VOC	Acetone	67-64-1	1.90E-03		3E-07		3E-07	9E-12		3E-09		8E-09
BD01	VOC	Benzene	71-43-2	8.70E-02	2E-07	6E-03	2E-08	3E-03	1E-05	9E-08	1E-03	2E-07	2E-03
BD01	VOC	2-Butanone	78-93-3	1.30E-03		2E-07		2E-07	3E-11		2E-09		5E-09
BD01	VOC	1,3-Dichlorobenzene	541-73-1	1.10E-03		1E-05		1E-05			2E-06		3E-06
BD01	VOC	1,2-Dichloroethane	107-06-2	3.80E-03	2E-08	1E-03	2E-09	1E-03	1E-07	4E-09	8E-05	9E-09	2E-04
BD01	VOC	Methyl tert-butyl ether	1634-04-4	7.50E-03		4E-06		4E-06	4E-09		2E-07		4E-07
BD01	VOC	4-Methyl-2-pentanone	108-10-1	3.80E-03		1E-06		1E-06	2E-10		2E-08		5E-08
BD01	VOC	Toluene	108-88-3	1.20E-03		1E-06		5E-07	2E-09		9E-08		1E-07
BD01	VOC	Trichlorofluoromethane	75-69-4	1.00E-03		2E-06		2E-07	3E-10		2E-06		2E-06
BD01	INORG	Arsenic	7440-38-2	2.80E-03	2E-09	3E-05	2E-10	2E-06					
BD01	INORG	Barium	7440-39-3	2.00E-01		6E-05		6E-05					
BD01	INORG	Beryllium	7440-41-7	7.90E-04		7E-05		7E-05					
BD01	INORG	Cadmium	7440-43-9	7.10E-05		4E-06		4E-06					
BD01	INORG	Chromium (total)	7440-47-3	6.20E-03		2E-04		3E-05					
BD01	INORG	Cobalt	7440-48-4	8.00E-04		1E-07		1E-07					
BD01	INORG	Copper	7440-50-8	3.10E-03		3E-07		3E-07					
BD01	INORG	Cyanide (total)	57-12-5	3.20E-03		5E-07		5E-07					
BD01	INORG	Lead	7439-92-1	1.00E-04									
BD01	INORG	Manganese	7439-96-5	1.40E-01		2E-05		2E-05					
BD01	INORG	Nickel	7440-02-0	5.10E-03		2E-06		2E-06					
BD01	INORG	Selenium	7782-49-2	3.00E-03		2E-06		2E-06					

Attachment G12: Groundwater Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Max Detected (mg/L)	Maintenance Worker GW Contact Risk	Maintenance Worker GW Contact Risk	Redevelopment Construction Worker GW Contact Risk	Redevelopment Construction Worker GW Contact HQ	Occupational Vapor Intrusion Ratio	Industrial Vapor Intrusion Risk	Industrial Vapor Intrusion HQ	Residential Vapor Intrusion Risk	Residential Vapor Intrusion HQ
BD01	INORG	Silver	7440-22-4	6.40E-04		3E-06		3E-06					
BD01	INORG	Thallium	7440-28-0	5.50E-05		3E-06		3E-06					
BD01	INORG	Vanadium	7440-62-2	1.20E-03		9E-06		9E-06					
BD01	INORG	Zinc	7440-66-6	1.40E-02		1E-07		1E-07					
Build 94 Parking Lot	SVOC	Formaldehyde	50-00-0	4.90E-02	6E-10	1E-06	6E-11	1E-06	4E-09	1E-11		4E-11	
Harriet Street	VOC	Acetone	67-64-1	5.10E-03		8E-07		7E-07	2E-11		9E-09		2E-08
Harriet Street	VOC	Benzene	71-43-2	4.40E-02	1E-07	3E-03	1E-08	2E-03	7E-06	4E-08	5E-04	9E-08	9E-04
Harriet Street	VOC	Cyclohexane	110-82-7	4.00E-02		1E-05		1E-05	7E-08		9E-06		1E-05
Harriet Street	VOC	Ethyl Benzene	100-41-4	5.00E-04		1E-06		1E-06	6E-10		2E-07		3E-07
Harriet Street	VOC	4-Methyl-2-pentanone	108-10-1	1.70E-03		5E-07		5E-07	1E-10		1E-08		2E-08
Harriet Street	VOC	Methylcyclohexane	108-87-2	1.10E-02		6E-06		6E-06	1E-08		5E-06		8E-06
Harriet Street	VOC	Toluene	108-88-3	3.90E-03		4E-06		2E-06	6E-09		3E-07		5E-07
Harriet Street	VOC	Trichlorofluoromethane	75-69-4	1.00E-03		2E-06		2E-07	3E-10		2E-06		2E-06
Harriet Street	VOC	Xylenes (total)	1330-20-7	1.22E-03		2E-05		2E-05	2E-09		5E-06		8E-06
Harriet Street	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	1.93E-03	1E-08	3E-04	1E-09	3E-04	9E-12	4E-14	4E-10	1E-13	1E-09
Harriet Street	SVOC	Diethylphthalate	84-66-2	1.64E-03		4E-08		4E-09	3E-11		4E-11		1E-10
Note:													
Only detected chemicals in each area are shown.													

Attachment G12: Basement, Tunnel, and Sewer Water Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Matrix	Max Detected (mg/L)	Maintenance Worker GW Contact Risk	Maintenance Worker GW Contact Risk
12-A	PCB	PCBs (total)	1336-36-3	Basement Water	8.90E-05	6E-08	1E-02
12-A	INORG	Antimony	7440-36-0	Basement Water	5.40E-03		1E-04
12-A	INORG	Arsenic	7440-38-2	Basement Water	3.60E-03	3E-09	4E-05
12-A	INORG	Barium	7440-39-3	Basement Water	3.20E-03		9E-07
12-A	INORG	Cadmium	7440-43-9	Basement Water	1.30E-03		7E-05
12-A	INORG	Chromium (total)	7440-47-3	Basement Water	4.30E-03		2E-04
12-A	INORG	Cobalt	7440-48-4	Basement Water	4.50E-03		6E-07
12-A	INORG	Copper	7440-50-8	Basement Water	6.10E-02		5E-06
12-A	INORG	Cyanide (total)	57-12-5	Basement Water	1.80E-03		3E-07
12-A	INORG	Lead	7439-92-1	Basement Water	7.90E-03		
12-A	INORG	Manganese	7439-96-5	Basement Water	5.50E-02		9E-06
12-A	INORG	Nickel	7440-02-0	Basement Water	3.40E-02		1E-05
12-A	INORG	Vanadium	7440-62-2	Basement Water	2.50E-03		2E-05
12-A	INORG	Zinc	7440-66-6	Basement Water	1.60E-01		1E-06
23-A	VOC	Acetone	67-64-1	Basement Water	5.00E-03		8E-07
23-A	VOC	2-Butanone	78-93-3	Basement Water	2.50E-03		3E-07
23-A	VOC	1,1-Dichloroethane	75-34-3	Basement Water	6.40E-04		2E-06
23-A	VOC	cis-1,2-Dichloroethene	156-59-2	Basement Water	1.30E-03		6E-05
23-A	VOC	4-Methyl-2-pentanone	108-10-1	Basement Water	6.70E-04		2E-07
23-A	SVOC	Benzo(a)anthracene	56-55-3	Basement Water	1.13E-02	2E-06	
23-A	SVOC	Benzo(a)pyrene	50-32-8	Basement Water	1.13E-02	3E-05	
23-A	SVOC	Benzo(b)fluoranthene	205-99-2	Basement Water	6.59E-02	2E-05	
23-A	SVOC	Benzo(k)fluoranthene	207-08-9	Basement Water	8.80E-03	2E-07	
23-A	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	Basement Water	1.97E-01	1E-06	3E-02
23-A	SVOC	Chrysene	218-01-9	Basement Water	1.02E-02	2E-08	
23-A	SVOC	Di-n-octylphthalate	117-84-0	Basement Water	2.34E-01		2E-02
23-A	SVOC	Fluoranthene	206-44-0	Basement Water	2.22E-02		5E-04
23-A	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	Basement Water	1.66E-02	6E-06	
12-A	VOC	Acetone	67-64-1	Basement Water	4.10E-03		7E-07
12-A	VOC	2-Butanone	78-93-3	Basement Water	7.70E-04		1E-07

Attachment G12: Basement, Tunnel, and Sewer Water Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Matrix	Max Detected (mg/L)	Maintenance Worker GW Contact Risk	Maintenance Worker GW Contact Risk
12-A	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	Basement Water	1.40E-03	8E-09	2E-04
23-A	SVOC	Phenanthrene	85-01-8	Basement Water	1.62E-02		2E-04
23-A	SVOC	Pyrene	129-00-0	Basement Water	1.95E-02		6E-04
23-A	INORG	Antimony	7440-36-0	Basement Water	3.10E-03		8E-05
23-A	INORG	Barium	7440-39-3	Basement Water	4.00E-02		1E-05
23-A	INORG	Cadmium	7440-43-9	Basement Water	3.10E-04		2E-05
23-A	INORG	Chromium (total)	7440-47-3	Basement Water	6.70E-03		2E-04
23-A	INORG	Cobalt	7440-48-4	Basement Water	7.50E-04		9E-08
23-A	INORG	Copper	7440-50-8	Basement Water	6.90E-03		6E-07
23-A	INORG	Lead	7439-92-1	Basement Water	7.70E-03		
23-A	INORG	Manganese	7439-96-5	Basement Water	1.70E-01		3E-05
23-A	INORG	Nickel	7440-02-0	Basement Water	6.80E-03		3E-06
23-A	INORG	Selenium	7782-49-2	Basement Water	2.40E-03		2E-06
23-A	INORG	Silver	7440-22-4	Basement Water	5.20E-04		2E-06
23-A	INORG	Vanadium	7440-62-2	Basement Water	6.90E-04		5E-06
23-A	INORG	Zinc	7440-66-6	Basement Water	9.40E-02		9E-07
36-3	VOC	Acetone	67-64-1	Basement Water	4.70E-03		7E-07
36-3	VOC	Benzene	71-43-2	Basement Water	1.40E-02	3E-08	9E-04
36-3	VOC	Chloroethane	75-00-3	Basement Water	8.20E-04	4E-12	2E-07
36-3	VOC	1,1-Dichloroethane	75-34-3	Basement Water	1.50E-02		5E-05
36-3	VOC	1,1-Dichloroethene	75-35-4	Basement Water	1.00E-02		9E-05
36-3	VOC	cis-1,2-Dichloroethene	156-59-2	Basement Water	1.00E+00		5E-02
36-3	VOC	trans-1,2-Dichloroethene	156-60-5	Basement Water	2.10E-02		6E-04
36-3	VOC	Ethyl Benzene	100-41-4	Basement Water	5.70E-04		1E-06
36-3	VOC	Tetrachloroethene	127-18-4	Basement Water	1.50E-01	1E-07	9E-04
36-3	VOC	Toluene	108-88-3	Basement Water	5.30E-04		5E-07
36-3	VOC	1,1,2-Trichloroethane	79-00-5	Basement Water	8.40E-04	2E-09	3E-06
36-3	VOC	Trichloroethene	79-01-6	Basement Water	3.60E-01	1E-07	2E-03
36-3	VOC	Vinyl Chloride	75-01-4	Basement Water	1.40E-01	7E-07	3E-03
36-3	INORG	Arsenic	7440-38-2	Basement Water	3.30E-02	2E-08	4E-04

Attachment G12: Basement, Tunnel, and Sewer Water Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Matrix	Max Detected (mg/L)	Maintenance Worker GW Contact Risk	Maintenance Worker GW Contact Risk
36-3	INORG	Barium	7440-39-3	Basement Water	2.60E-01		8E-05
36-3	INORG	Cadmium	7440-43-9	Basement Water	4.20E-05		2E-06
36-3	INORG	Chromium (total)	7440-47-3	Basement Water	1.30E-03		5E-05
36-3	INORG	Cobalt	7440-48-4	Basement Water	3.90E-04		5E-08
36-3	INORG	Copper	7440-50-8	Basement Water	6.50E-02		5E-06
36-3	INORG	Fluoride	16984-48-8	Basement Water	4.30E-01		
36-3	INORG	Lead	7439-92-1	Basement Water	2.20E-04		
36-3	INORG	Manganese	7439-96-5	Basement Water	3.00E-01		5E-05
36-3	INORG	Nickel	7440-02-0	Basement Water	1.00E-02		4E-06
36-3	INORG	Selenium	7782-49-2	Basement Water	1.00E-02		6E-06
36-3	INORG	Thallium	7440-28-0	Basement Water	2.60E-04		1E-05
36-3	INORG	Vanadium	7440-62-2	Basement Water	2.30E-03		2E-05
36-3	INORG	Zinc	7440-66-6	Basement Water	2.50E-02		2E-07
40-D	VOC	Benzene	71-43-2	Tunnel Water	8.10E-04	2E-09	5E-05
40-D	VOC	Xylenes (total)	1330-20-7	Tunnel Water	8.80E-04		1E-05
40-D	SVOC	Benzo(b)fluoranthene	205-99-2	Tunnel Water	6.90E-04	2E-07	
40-D	SVOC	Benzo(k)fluoranthene	207-08-9	Tunnel Water	7.20E-04	2E-08	
40-D	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	Tunnel Water	9.60E-04	5E-09	1E-04
40-D	SVOC	Chrysene	218-01-9	Tunnel Water	1.14E-03	2E-09	
40-D	SVOC	Fluoranthene	206-44-0	Tunnel Water	1.35E-03		3E-05
40-D	SVOC	Phenanthrene	85-01-8	Tunnel Water	8.80E-04		1E-05
40-D	SVOC	Pyrene	129-00-0	Tunnel Water	2.97E-03		9E-05
40-D	PCB	PCBs (total)	1336-36-3	Tunnel Water	3.65E-04	2E-07	4E-02
40-D	INORG	Arsenic	7440-38-2	Tunnel Water	3.50E-03	2E-09	4E-05
40-D	INORG	Barium	7440-39-3	Tunnel Water	4.20E-02		1E-05
40-D	INORG	Chromium (total)	7440-47-3	Tunnel Water	2.70E-03		9E-05
40-D	INORG	Copper	7440-50-8	Tunnel Water	2.30E-03		2E-07
40-D	INORG	Cyanide (total)	57-12-5	Tunnel Water	6.10E-03		1E-06
40-D	INORG	Lead	7439-92-1	Tunnel Water	4.90E-04		
40-D	INORG	Manganese	7439-96-5	Tunnel Water	5.00E-02		8E-06

Attachment G12: Basement, Tunnel, and Sewer Water Incremental Risks
GMC: NAO Flint Operations Site, Flint, Michigan

Area	Chem Group	Chemical	CASRN	Matrix	Max Detected (mg/L)	Maintenance Worker GW Contact Risk	Maintenance Worker GW Contact Risk
40-D	INORG	Nickel	7440-02-0	Tunnel Water	7.70E-04		3E-07
40-D	INORG	Vanadium	7440-62-2	Tunnel Water	5.50E-03		4E-05
40-D	INORG	Zinc	7440-66-6	Tunnel Water	1.20E-02		1E-07
SS	VOC	Acetone	67-64-1	Storm Sewer Water	1.50E-02		2E-06
SS	VOC	Bromodichloromethane	75-27-4	Storm Sewer Water	4.00E-03	1E-08	7E-05
SS	VOC	2-Butanone	78-93-3	Storm Sewer Water	4.90E-03		6E-07
SS	VOC	Chloroethane	75-00-3	Storm Sewer Water	2.70E-02	1E-10	6E-06
SS	VOC	Chloroform	67-66-3	Storm Sewer Water	8.90E-03	4E-08	3E-04
SS	VOC	Dibromochloromethane	124-48-1	Storm Sewer Water	1.70E-03	6E-09	2E-05
SS	VOC	Dichlorodifluoromethane	75-71-8	Storm Sewer Water	1.40E-03		1E-05
SS	VOC	1,1-Dichloroethane	75-34-3	Storm Sewer Water	3.70E-02		1E-04
SS	VOC	cis-1,2-Dichloroethene	156-59-2	Storm Sewer Water	5.90E-02		3E-03
SS	VOC	trans-1,2-Dichloroethene	156-60-5	Storm Sewer Water	2.50E-03		7E-05
SS	VOC	4-Methyl-2-pentanone	108-10-1	Storm Sewer Water	1.20E-03		3E-07
SS	VOC	Methylene Chloride	75-09-2	Storm Sewer Water	9.00E-04	1E-10	6E-07
SS	VOC	Tetrachloroethene	127-18-4	Storm Sewer Water	6.30E-04	5E-10	4E-06
SS	VOC	1,1,1-Trichloroethane	71-55-6	Storm Sewer Water	4.10E-03		3E-06
SS	VOC	Trichloroethene	79-01-6	Storm Sewer Water	8.00E-03	3E-09	5E-05
SS	VOC	Vinyl Chloride	75-01-4	Storm Sewer Water	7.30E-03	4E-08	2E-04
SS	PCB	PCBs (total)	1336-36-3	Storm Sewer Water	3.10E-03	2E-06	3E-01
Note:							
Only detected chemicals in each area are shown.							

Attachment G13
Point-by-Point Risk Estimates at the Southend

Attachment G13
Point-by-Point Risk Estimates at the Southend

The methodology for calculating the location-by-location upper-bound cumulative cancer and noncancer risk estimates for exposure to soil in Parcels 1, 2, and 3 at the Southend of the Site is discussed below:

The highest concentration of each chemical detected in soil that could be encountered by a receptor population at each location was used as exposure concentrations to calculate upper-bound cumulative cancer and noncancer risk estimates. For routine worker and resident exposure to surface soil, the highest concentration of each chemical detected in the surface soil sample (samples collected to characterize the first 2 ft bgs) at each location was used in the calculations. For the redevelopment worker exposure scenario, the highest concentration of each chemical detected among all the samples (surface and subsurface) at each location was conservatively used in the calculations.

If a chemical was analyzed and not detected in a particular soil sample but was detected in at least another soil sample from the Southend of the Site, one-half the sample quantitation limit (SQL) for that sample was assigned as the concentration for the chemical (consistent with USEPA risk assessment guidance). If the SQL was unusually high and gave significant risk estimates, one-half the lowest SQL among the samples at that boring location was assigned as the concentration. Chemicals that were not detected in any soil sample at the Southend of the Site were not included in the risk calculations.

If a chemical was not analyzed in a soil sample at a particular location but was detected in at least one soil sample from the Southend of the Site, a surrogate concentration was assigned to the location if the chemical was identified as a key chemical that could contribute significantly to the cumulative cancer and/or noncancer risk estimates for any of the four exposure scenarios evaluated. The assignment of surrogate concentrations was performed only for the key chemicals because the procedure for assigning surrogates (described below) is time-consuming and would not have enhanced the reliability of the risk assessment results for the other chemicals.

The identification of key chemicals was based on an initial set of risk calculations for each exposure scenario that used the highest concentrations for all chemicals among all samples from the Site. From the calculations for a particular scenario, the estimates of cancer risk were ranked from low to high and the lowest estimates were summed until they reached approximately 10^{-5}. Similarly, the lowest HQs were summed until they reach approximately 0.1. The chemicals associated with the estimates that were included in both sums are those for which their highest concentrations across the entire Site, taken in combination, contribute to only a small fraction of the acceptable cumulative cancer risk limit of 10^{-4} and HI limit of 1, and therefore are not considered key chemicals for the given exposure scenario. The remaining chemicals were identified as the key chemicals that warrant assignment of surrogate concentrations.

Assignment of surrogate concentrations for key chemicals was performed using measured concentrations from the nearest location or depth (i.e., nearest neighbor method). For a chemical that was not analyzed in a surface sample, a surrogate concentration was assigned from the nearest location where the chemical was analyzed in a surface sample. For a chemical that was not analyzed in a subsurface sample (deeper than 2 ft bgs), the highest measured concentration of the chemical among the other samples at that location was assigned as the surrogate. If the chemical was not analyzed in another sample at the location, then the highest concentration among samples at the nearest boring location was used as the surrogate. The results of this surrogating can be represented as Thiessen polygon tessellations across the entire Parcel.

Site-related cumulative cancer risk and HI were calculated for each location. The exposure factors, toxicity values, and physical/chemical property data used in these calculations are the same as those used in the calculations based on the maximum concentrations by AOI. The details of the risk calculations for boring locations RFI-84-12 and RFI-09-48 are shown as an example of the risk calculations that were performed for each of the 184 soil boring locations.

Attachment G13: Incremental Risk Calculations at RFI-84-10
GMC: NAO Flint Operations Site, Flint, Michigan

Location	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Limit (mg/kg)	Max Exposure Conc (mg/kg)	Concentration Basis	Surrogate Sample Name	RW SCC-C (mg/kg)	RW SCC-NC (mg/kg)	RW SC Risk	RW SC HQ	Redev Worker SCC-C (mg/kg)	Redev Worker SCC-NC (mg/kg)	Redev Worker SC Risk	Redev Worker SC HQ	Res SCC-C (mg/kg)	Res SCC-NC (mg/kg)	Res SC Risk	Res SC HQ
RFI-84-10	VOC	Acetone	67-64-1		9.00E-01	4.50E-01	Half-Limit	NA		3.6E+04		1E-05		4.4E+03		1E-04		2.6E+04		2E-05
RFI-84-10	VOC	Benzene	71-43-2		6.00E-02	3.00E-02	Half-Limit	NA	8.1E+00	6.8E+01	4E-08	4E-04	2.2E+01	1.5E+01	1E-08	2E-03	5.1E+00	5.1E+01	6E-08	6E-04
RFI-84-10	VOC	Bromodichloromethane	75-27-4		6.00E-02	3.00E-02	Half-Limit	NA	1.1E+01	4.7E+02	3E-08	6E-05	2.9E+01	5.1E+01	1E-08	6E-04	6.6E+00	3.5E+02	5E-08	9E-05
RFI-84-10	VOC	Bromoform	75-25-2		6.00E-02		No Value	NA	4.7E+02				1.3E+03				2.3E+02			
RFI-84-10	VOC	Bromomethane	74-83-9		3.00E-01		No Value	NA		8.3E+00				3.5E+01				6.4E+00		
RFI-84-10	VOC	2-Butanone	78-93-3		9.00E-01	4.50E-01	Half-Limit	NA		5.9E+04		8E-06		6.7E+03		7E-05		3.8E+04		1E-05
RFI-84-10	VOC	Carbon Disulfide	75-15-0		3.00E-01	1.50E-01	Half-Limit	NA		7.4E+02		2E-04		8.0E+01		2E-03		5.7E+02		3E-04
RFI-84-10	VOC	Carbon Tetrachloride	56-23-5		6.00E-02	3.00E-02	Half-Limit	NA	3.2E+00		9E-08		8.6E+00		3E-08		2.0E+00		1E-07	
RFI-84-10	VOC	Chlorobenzene	108-90-7		6.00E-02	3.00E-02	Half-Limit	NA		3.0E+02		1E-04		3.2E+01		9E-04		2.3E+02		1E-04
RFI-84-10	VOC	Chloroethane	75-00-3		3.00E-01	1.50E-01	Half-Limit	NA		8.0E+03		2E-05		8.7E+02		2E-04		6.0E+03		3E-05
RFI-84-10	VOC	Chloroform	67-66-3		6.00E-02	3.00E-02	Half-Limit	NA	2.7E+00	1.1E+02	1E-07	3E-04	7.4E+00	1.2E+01	4E-08	2E-03	1.8E+00	8.5E+01	2E-07	4E-04
RFI-84-10	VOC	Chloromethane	74-87-3		3.00E-01	1.50E-01	Half-Limit	NA		1.3E+02		1E-03		1.4E+01		1E-02		9.9E+01		2E-03
RFI-84-10	VOC	Cumene	98-82-8		6.00E-02	3.00E-02	Half-Limit	NA		2.0E+03		2E-05		2.1E+02		1E-04		1.5E+03		2E-05
RFI-84-10	VOC	Cyclohexane	110-82-7		6.00E-02	3.00E-02	Half-Limit	NA		7.9E+03		4E-06		8.5E+02		4E-05		6.2E+03		5E-06
RFI-84-10	VOC	1,2-Dibromo-3-chloropropane	96-12-8		6.00E-02		No Value	NA	3.9E+01	4.0E+00			2.3E+02	4.3E-01			4.5E+00	3.1E+00		
RFI-84-10	VOC	Dibromochloromethane	124-48-1		6.00E-02		No Value	NA	1.4E+01	8.6E+02			3.9E+01	9.3E+02			8.5E+00	6.1E+02		
RFI-84-10	VOC	1,2-Dibromoethane	106-93-4		2.00E-02		No Value	NA	2.2E-01	4.2E+01			5.8E-01	4.5E+00			1.4E-01	3.2E+01		
RFI-84-10	VOC	1,2-Dichlorobenzene	95-50-1		6.00E-02	3.00E-02	Half-Limit	NA		2.3E+03		1E-05		2.4E+03		1E-05		1.7E+03		2E-05
RFI-84-10	VOC	1,3-Dichlorobenzene	541-73-1		6.00E-02	3.00E-02	Half-Limit	NA		1.2E+03		2E-05		1.3E+02		2E-04		9.2E+02		3E-05
RFI-84-10	VOC	1,4-Dichlorobenzene	106-46-7		6.00E-02	3.00E-02	Half-Limit	NA	4.5E+01	7.2E+03	7E-09	4E-06	1.2E+02	2.3E+03	2E-09	1E-05	2.7E+01	3.6E+03	1E-08	8E-06
RFI-84-10	VOC	Dichlorodifluoromethane	75-71-8		6.00E-02	3.00E-02	Half-Limit	NA		1.7E+02		2E-04		1.9E+02		2E-04		1.4E+02		2E-04
RFI-84-10	VOC	1,1-Dichloroethane	75-34-3		6.00E-02	3.00E-02	Half-Limit	NA		1.0E+03		3E-05		1.1E+03		3E-05		7.9E+02		4E-05
RFI-84-10	VOC	1,2-Dichloroethane	107-06-2		6.00E-02	3.00E-02	Half-Limit	NA	3.6E+00	1.7E+01	8E-08	2E-03	9.8E+00	1.8E+00	3E-08	2E-02	2.3E+00	1.3E+01	1E-07	2E-03
RFI-84-10	VOC	1,1-Dichloroethene	75-35-4		6.00E-02	3.00E-02	Half-Limit	NA		2.5E+02		1E-04		2.7E+01		1E-03		1.9E+02		2E-04
RFI-84-10	VOC	cis-1,2-Dichloroethene	156-59-2		6.00E-02	3.00E-02	Half-Limit	NA		8.6E+01		3E-04		9.3E+01		3E-04		6.6E+01		5E-04
RFI-84-10	VOC	trans-1,2-Dichloroethene	156-60-5		6.00E-02	3.00E-02	Half-Limit	NA		1.2E+02		3E-04		1.3E+01		2E-03		9.0E+01		3E-04
RFI-84-10	VOC	1,2-Dichloropropane	78-87-5		6.00E-02		No Value	NA		1.2E+01				4.2E+00				9.4E+00		
RFI-84-10	VOC	1,3-Dichloropropene (total)	542-75-6		6.00E-02		No Value	NA	1.1E+01	3.2E+01			3.0E+01	3.5E+00			6.6E+00	2.5E+01		
RFI-84-10	VOC	Ethyl Benzene	100-41-4	8.00E-03	6.00E-02	8.00E-03	Max Detect	NA		4.3E+03		2E-06		4.6E+02		2E-05		3.0E+03		3E-06
RFI-84-10	VOC	2-Hexanone	591-78-6		3.00E+00		Removed Limit	NA		8.1E+04				1.8E+04				1.1E+04		
RFI-84-10	VOC	Methyl Acetate	79-20-9		3.00E+00	1.50E+00	Half-Limit	NA		3.1E+04		5E-05		3.3E+04		4E-05		2.2E+04		7E-05
RFI-84-10	VOC	Methyl tert-butyl ether	1634-04-4		3.00E-01		No Value	NA		1.3E+04				1.4E+03				1.0E+04		
RFI-84-10	VOC	4-Methyl-2-pentanone	108-10-1		3.00E+00	1.50E+00	Half-Limit	NA		2.9E+04		5E-05		3.1E+03		5E-04		2.2E+04		7E-05
RFI-84-10	VOC	Methylcyclohexane	108-87-2	4.00E-02	6.00E-02	4.00E-02	Max Detect	NA		3.0E+03		1E-05		3.2E+02		1E-04		2.3E+03		2E-05
RFI-84-10	VOC	Methylene Chloride	75-09-2		3.00E-01	1.50E-01	Half-Limit	NA	1.3E+02	6.3E+03	1E-08	2E-05	3.5E+02	7.0E+02	4E-09	2E-04	7.8E+01	3.9E+03	2E-08	4E-05
RFI-84-10	VOC	Styrene	100-42-5		6.00E-02	3.00E-02	Half-Limit	NA		1.0E+04		3E-06		3.3E+03		9E-06		7.2E+03		4E-06
RFI-84-10	VOC	1,1,2,2-Tetrachloroethane	79-34-5		6.00E-02		No Value	NA	5.4E+00				1.5E+01				3.2E+00			
RFI-84-10	VOC	Tetrachloroethene	127-18-4		6.00E-02	3.00E-02	Half-Limit	NA	1.9E+01	8.1E+02	2E-08	4E-05	5.2E+01	9.1E+01	6E-09	3E-04	1.1E+01	5.3E+02	3E-08	6E-05
RFI-84-10	VOC	Toluene	108-88-3	2.00E-02	6.00E-02	2.00E-02	Max Detect	NA		1.5E+04		1E-06		1.7E+03		1E-05		8.0E+03		3E-06
RFI-84-10	VOC	1,2,4-Trichlorobenzene	120-82-1		1.00E-01	5.00E-02	Half-Limit	NA		5.1E+03		1E-05		3.0E+03		2E-05		1.8E+03		3E-05
RFI-84-10	VOC	1,1,1-Trichloroethane	71-55-6		6.00E-02	3.00E-02	Half-Limit	NA		4.0E+03		7E-06		4.3E+03		7E-06		3.1E+03		1E-05
RFI-84-10	VOC	1,1,2-Trichloroethane	79-00-5		6.00E-02	3.00E-02	Half-Limit	NA	9.4E+00		3E-08		2.5E+01		1E-08		5.8E+00		5E-08	
RFI-84-10	VOC	Trichloroethene	79-01-6		6.00E-02	3.00E-02	Half-Limit	NA	4.4E+01		7E-09		1.2E+02		3E-09		2.7E+01		1E-08	
RFI-84-10	VOC	Trichlorofluoromethane	75-69-4		1.00E-01	5.00E-02	Half-Limit	NA		7.3E+02		7E-05		7.9E+02		6E-05		5.7E+02		9E-05
RFI-84-10	VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		1.00E-01	5.00E-02	Half-Limit	NA		3.0E+04		2E-06		3.2E+03		2E-05		2.3E+04		2E-06
RFI-84-10	VOC	Vinyl Chloride	75-01-4		1.00E-01	5.00E-02	Half-Limit	NA	2.8E+00	9.4E+01	2E-07	5E-04	7.9E+00	1.0E+01	6E-08	5E-03	1.4E+00	6.8E+01	4E-07	7E-04
RFI-84-10	VOC	Xylenes (total)	1330-20-7	4.50E-02	6.00E-02	4.50E-02	Max Detect	NA		4.7E+02		1E-04		5.1E+01		9E-04		3.6E+02		1E-04
RFI-84-10	SVOC	Benzo(a)anthracene	56-55-3	1.95E-01		1.95E-01	Interpolated Max	RFI-17-01(0.7-02)	2.9E+01		7E-08		3.3E+02		6E-09		6.2E+00		3E-07	
RFI-84-10	SVOC	Benzo(a)pyrene	50-32-8	2.93E-01		2.93E-01	Interpolated Max	RFI-17-01(0.7-02)	2.9E+00		1E-06		3.4E+01		9E-08		6.2E-01		5E-06	
RFI-84-10	SVOC	Benzo(b)fluoranthene	205-99-2	5.26E-01		5.26E-01	Interpolated Max	RFI-17-01(0.7-02)	2.8E+01		2E-07		3.1E+02		2E-08		6.2E+00		9E-07	
RFI-84-10	SVOC	Benzo(k)fluoranthene	207-08-9	3.20E-01		3.20E-01	Interpolated Max	RFI-17-01(0.7-02)	2.9E+02		1E-08		3.4E+03		9E-10		6.2E+01		5E-08	
RFI-84-10	SVOC	Dibenz(a,h)anthracene	53-70-3		2.00E-01	1.00E-01	Interpolated QL/2	RFI-17-01(02-04)	2.9E+00		3E-07		3.4E+01		3E-08		6.2E-01		2E-06	

Attachment G13: Incremental Risk Calculations at RFI-84-10
GMC: NAO Flint Operations Site, Flint, Michigan

Location	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Limit (mg/kg)	Max Exposure Conc (mg/kg)	Concentration Basis	Surrogate Sample Name	RW SCC-C (mg/kg)	RW SCC-NC (mg/kg)	RW SC Risk	RW SC HQ	Redev Worker SCC-C (mg/kg)	Redev Worker SCC-NC (mg/kg)	Redev Worker SC Risk	Redev Worker SC HQ	Res SCC-C (mg/kg)	Res SCC-NC (mg/kg)	Res SC Risk	Res SC HQ
RFI-84-10	VOC	Acetone	67-64-1		9.00E-01	4.50E-01	Half-Limit	NA		3.6E+04		1E-05		4.4E+03		1E-04		2.6E+04		2E-05
RFI-84-10	VOC	Benzene	71-43-2		6.00E-02	3.00E-02	Half-Limit	NA	8.1E+00	6.8E+01	4E-08	4E-04	2.2E+01	1.5E+01	1E-08	2E-03	5.1E+00	5.1E+01	6E-08	6E-04
RFI-84-10	VOC	Bromodichloromethane	75-27-4		6.00E-02	3.00E-02	Half-Limit	NA	1.1E+01	4.7E+02	3E-08	6E-05	2.9E+01	5.1E+01	1E-08	6E-04	6.6E+00	3.5E+02	5E-08	9E-05
RFI-84-10	VOC	Bromoform	75-25-2		6.00E-02		No Value	NA	4.7E+02				1.3E+03				2.3E+02			
RFI-84-10	VOC	Bromomethane	74-83-9		3.00E-01		No Value	NA		8.3E+00				3.5E+01				6.4E+00		
RFI-84-10	VOC	2-Butanone	78-93-3		9.00E-01	4.50E-01	Half-Limit	NA		5.9E+04		8E-06		6.7E+03		7E-05		3.8E+04		1E-05
RFI-84-10	VOC	Carbon Disulfide	75-15-0		3.00E-01	1.50E-01	Half-Limit	NA		7.4E+02		2E-04		8.0E+01		2E-03		5.7E+02		3E-04
RFI-84-10	VOC	Carbon Tetrachloride	56-23-5		6.00E-02	3.00E-02	Half-Limit	NA	3.2E+00		9E-08		8.6E+00		3E-08		2.0E+00		1E-07	
RFI-84-10	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	1.90E-01		1.90E-01	Interpolated Max	RFI-17-01(0.7-02)	2.9E+01		7E-08		3.4E+02		6E-09		6.2E+00		3E-07	
RFI-84-10	SVOC	2-Methylnaphthalene	91-57-6	8.45E-01		8.45E-01	Interpolated Max	RFI-17-01(0.7-02)		2.3E+02		4E-03		2.6E+01		3E-02		1.6E+02		5E-03
RFI-84-10	SVOC	Naphthalene	91-20-3	5.82E-01		5.82E-01	Interpolated Max	RFI-17-01(0.7-02)		1.3E+02		4E-03		1.4E+01		4E-02		1.0E+02		6E-03
RFI-84-10	SVOC	N-Nitroso-di-n-propylamine	621-64-7		2.00E-01	1.00E-01	Interpolated QL/2	RFI-17-01(02-04)	1.0E+00		1E-06		3.5E+00		3E-07		4.0E-01		3E-06	
RFI-84-10	PCB	PCBs (total)	1336-36-3	2.82E-01		2.82E-01	Interpolated Max	RFI-17-01(02-04)	8.7E+00	1.4E+01	3E-07	2E-02	7.1E+01	1.7E+01	4E-08	2E-02	2.1E+00	3.8E+00	1E-06	7E-02
RFI-84-10	INORG	Antimony	7440-36-0	4.00E-01		3.14E-01	Interpolated Max	RFI-17-01(0.7-02)		8.2E+02		4E-04		2.0E+02		2E-03		1.1E+02		3E-03
RFI-84-10	INORG	Arsenic	7440-38-2	1.30E+01		4.88E+00	Interpolated Max	RFI-17-01(0.7-02)	2.7E+01	4.4E+02	2E-06	1E-02	2.1E+02	2.3E+03	2E-07	2E-03	3.9E+00	7.5E+01	1E-05	7E-02
RFI-84-10	INORG	Beryllium	7440-41-7	4.50E-01			Interpolated Max	RFI-17-01(0.7-02)	2.2E+04	3.7E+03			8.5E+03	3.7E+02			1.3E+04	5.4E+02		
RFI-84-10	INORG	Cadmium	7440-43-9	2.50E-01			Interpolated Max	RFI-17-01(0.7-02)	3.0E+04	1.3E+03			1.1E+04	4.4E+02			1.8E+04	2.4E+02		
RFI-84-10	INORG	Chromium (total)	7440-47-3	3.10E+01			Interpolated Max	RFI-17-01(0.7-02)	4.5E+03	5.9E+03			1.7E+03	2.3E+03			2.7E+03	8.2E+02		
RFI-84-10	INORG	Cobalt	7440-48-4	3.70E+00			Interpolated Max	RFI-17-01(02-04)	1.9E+04	2.0E+04			7.3E+03	5.5E+02			1.1E+04	4.6E+03		
RFI-84-10	INORG	Copper	7440-50-8	2.90E+01		5.38E-01	Interpolated Max	RFI-17-01(0.7-02)		8.2E+04		7E-06		2.0E+04		3E-05		1.1E+04		5E-05
RFI-84-10	INORG	Lead	7439-92-1	6.50E+01			Interpolated Max	RFI-17-01(0.7-02)												
RFI-84-10	INORG	Manganese	7439-96-5	4.90E+02		1.25E+01	Interpolated Max	RFI-17-01(0.7-02)		7.2E+04		2E-04		1.4E+03		9E-03		2.5E+04		5E-04
RFI-84-10	INORG	Mercury	7439-97-6	4.42E-02			Interpolated Max	RFI-17-01(02-04)		6.7E+01				7.7E+00				3.4E+01		
RFI-84-10	INORG	Thallium	7440-28-0	1.60E-01			Interpolated Max	RFI-17-01(0.7-02)		1.4E+02				3.6E+01				1.9E+01		
RFI-84-10	INORG	Vanadium	7440-62-2	1.20E+01			Interpolated Max	RFI-17-01(02-04)		1.4E+04				3.6E+03				1.9E+03		
RFI-84-10	INORG	Zinc	7440-66-6	5.00E+01			Interpolated Max	RFI-17-01(02-04)		6.1E+05				1.5E+05				8.2E+04		

Notes:

The pathways shown are those for which at least one location at the Southend had unacceptable bounding risk estimates.

Site-specific background concentrations of inorganics are subtracted to obtain the site-related exposure concentration.

Occ - Occupational

VI - Vapor Intrusion

RW - Routine Worker; Redev Worker - Redevelopment Construction Worker; Res - Resident

SCC - Soil Contact Criteria; SC - Soil Contact

C - Carcinogenic; NC - Noncarcinogenic

HQ - Hazard Quotient

Attachment G13: Incremental Risk Calculations at RFI-09-48
GMC: NAO Flint Operations Site, Flint, Michigan

Location	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Limit (mg/kg)	Max Exposure Conc (mg/kg)	Concentration Basis	Surrogate Sample Name	RW SCC-C (mg/kg)	RW SCC-NC (mg/kg)	RW SC Risk	RW SC HQ	Redev Worker SCC-C (mg/kg)	Redev Worker SCC-NC (mg/kg)	Redev Worker SC Risk	Redev Worker SC HQ	Res SCC-C (mg/kg)	Res SCC-NC (mg/kg)	Res SC Risk	Res SC HQ
RFI-09-48	VOC	Acetone	67-64-1		4.00E-01	2.00E-01	Half-Limit	NA		3.6E+04		6E-06		4.4E+03		5E-05		2.6E+04		8E-06
RFI-09-48	VOC	Benzene	71-43-2		4.60E-02	2.30E-02	Half-Limit	NA	8.1E+00	6.8E+01	3E-08	3E-04	2.2E+01	1.5E+01	1E-08	2E-03	5.1E+00	5.1E+01	5E-08	5E-04
RFI-09-48	VOC	Bromodichloromethane	75-27-4		9.30E-02	4.65E-02	Half-Limit	NA	1.1E+01	4.7E+02	4E-08	1E-04	2.9E+01	5.1E+01	2E-08	9E-04	6.6E+00	3.5E+02	7E-08	1E-04
RFI-09-48	VOC	Bromoform	75-25-2		9.30E-02		No Value	NA	4.7E+02				1.3E+03				2.3E+02			
RFI-09-48	VOC	Bromomethane	74-83-9		2.00E-01		No Value	NA		8.3E+00				3.5E+01				6.4E+00		
RFI-09-48	VOC	2-Butanone	78-93-3		4.00E-01	2.00E-01	Half-Limit	NA		5.9E+04		3E-06		6.7E+03		3E-05		3.8E+04		5E-06
RFI-09-48	VOC	Carbon Disulfide	75-15-0		2.00E-01	1.00E-01	Half-Limit	NA		7.4E+02		1E-04		8.0E+01		1E-03		5.7E+02		2E-04
RFI-09-48	VOC	Carbon Tetrachloride	56-23-5		4.60E-02	2.30E-02	Half-Limit	NA	3.2E+00		7E-08		8.6E+00		3E-08		2.0E+00		1E-07	
RFI-09-48	VOC	Chlorobenzene	108-90-7		4.60E-02	2.30E-02	Half-Limit	NA		3.0E+02		8E-05		3.2E+01		7E-04		2.3E+02		1E-04
RFI-09-48	VOC	Chloroethane	75-00-3		2.00E-01	1.00E-01	Half-Limit	NA		8.0E+03		1E-05		8.7E+02		1E-04		6.0E+03		2E-05
RFI-09-48	VOC	Chloroform	67-66-3		4.60E-02	2.30E-02	Half-Limit	NA	2.7E+00	1.1E+02	8E-08	2E-04	7.4E+00	1.2E+01	3E-08	2E-03	1.8E+00	8.5E+01	1E-07	3E-04
RFI-09-48	VOC	Chloromethane	74-87-3		2.00E-01	1.00E-01	Half-Limit	NA		1.3E+02		8E-04		1.4E+01		7E-03		9.9E+01		1E-03
RFI-09-48	VOC	Cumene	98-82-8		2.00E-01	1.00E-01	Half-Limit	NA		2.0E+03		5E-05		2.1E+02		5E-04		1.5E+03		7E-05
RFI-09-48	VOC	Cyclohexane	110-82-7		2.00E-01	1.00E-01	Half-Limit	NA		7.9E+03		1E-05		8.5E+02		1E-04		6.2E+03		2E-05
RFI-09-48	VOC	1,2-Dibromo-3-chloropropane	96-12-8		2.00E-01		No Value	NA	3.9E+01	4.0E+00			2.3E+02	4.3E-01			4.5E+00	3.1E+00		
RFI-09-48	VOC	Dibromochloromethane	124-48-1		9.30E-02		No Value	NA	1.4E+01	8.6E+02			3.9E+01	9.3E+02			8.5E+00	6.1E+02		
RFI-09-48	VOC	1,2-Dibromoethane	106-93-4		2.00E-01		No Value	NA	2.2E-01	4.2E+01			5.8E-01	4.5E+00			1.4E-01	3.2E+01		
RFI-09-48	VOC	1,2-Dichlorobenzene	95-50-1		9.30E-02	4.65E-02	Half-Limit	NA		2.3E+03		2E-05		2.4E+03		2E-05		1.7E+03		3E-05
RFI-09-48	VOC	1,3-Dichlorobenzene	541-73-1		9.30E-02	4.65E-02	Half-Limit	NA		1.2E+03		4E-05		1.3E+02		4E-04		9.2E+02		5E-05
RFI-09-48	VOC	1,4-Dichlorobenzene	106-46-7		9.30E-02	4.65E-02	Half-Limit	NA	4.5E+01	7.2E+03	1E-08	6E-06	1.2E+02	2.3E+03	4E-09	2E-05	2.7E+01	3.6E+03	2E-08	1E-05
RFI-09-48	VOC	Dichlorodifluoromethane	75-71-8		9.30E-02	4.65E-02	Half-Limit	NA		1.7E+02		3E-04		1.9E+02		2E-04		1.4E+02		3E-04
RFI-09-48	VOC	1,1-Dichloroethane	75-34-3		4.60E-02	2.30E-02	Half-Limit	NA		1.0E+03		2E-05		1.1E+03		2E-05		7.9E+02		3E-05
RFI-09-48	VOC	1,2-Dichloroethane	107-06-2		4.60E-02	2.30E-02	Half-Limit	NA	3.6E+00	1.7E+01	6E-08	1E-03	9.8E+00	1.8E+00	2E-08	1E-02	2.3E+00	1.3E+01	1E-07	2E-03
RFI-09-48	VOC	1,1-Dichloroethene	75-35-4		4.60E-02	2.30E-02	Half-Limit	NA		2.5E+02		9E-05		2.7E+01		9E-04		1.9E+02		1E-04
RFI-09-48	VOC	cis-1,2-Dichloroethene	156-59-2		4.60E-02	2.30E-02	Half-Limit	NA		8.6E+01		3E-04		9.3E+01		2E-04		6.6E+01		3E-04
RFI-09-48	VOC	trans-1,2-Dichloroethene	156-60-5		4.60E-02	2.30E-02	Half-Limit	NA		1.2E+02		2E-04		1.3E+01		2E-03		9.0E+01		3E-04
RFI-09-48	VOC	1,2-Dichloropropane	78-87-5		4.60E-02		No Value	NA		1.2E+01				4.2E+00				9.4E+00		
RFI-09-48	VOC	1,3-Dichloropropene (total)	542-75-6		4.60E-02		No Value	NA	1.1E+01	3.2E+01			3.0E+01	3.5E+00			6.6E+00	2.5E+01		
RFI-09-48	VOC	Ethyl Benzene	100-41-4	3.40E-02	4.60E-02	3.40E-02	Max Detect	NA		4.3E+03		8E-06		4.6E+02		7E-05		3.0E+03		1E-05
RFI-09-48	VOC	2-Hexanone	591-78-6		9.30E-02	4.65E-02	Half-Limit	NA		8.1E+04		6E-07		1.8E+04		3E-06		1.1E+04		4E-06
RFI-09-48	VOC	Methyl Acetate	79-20-9	9.00E-02	1.70E-01	9.00E-02	Max Detect	NA		3.1E+04		3E-06		3.3E+04		3E-06		2.2E+04		4E-06
RFI-09-48	VOC	Methyl tert-butyl ether	1634-04-4		2.00E-01		No Value	NA		1.3E+04				1.4E+03				1.0E+04		
RFI-09-48	VOC	4-Methyl-2-pentanone	108-10-1		2.00E+00	1.00E+00	Half-Limit	NA		2.9E+04		3E-05		3.1E+03		3E-04		2.2E+04		4E-05
RFI-09-48	VOC	Methylcyclohexane	108-87-2	6.80E-02		6.80E-02	Max Detect	NA		3.0E+03		2E-05		3.2E+02		2E-04		2.3E+03		3E-05
RFI-09-48	VOC	Methylene Chloride	75-09-2	1.30E-01		1.30E-01	Max Detect	NA	1.3E+02	6.3E+03	1E-08	2E-05	3.5E+02	7.0E+02	4E-09	2E-04	7.8E+01	3.9E+03	2E-08	3E-05
RFI-09-48	VOC	Styrene	100-42-5		4.60E-02	2.30E-02	Half-Limit	NA		1.0E+04		2E-06		3.3E+03		7E-06		7.2E+03		3E-06
RFI-09-48	VOC	1,1,2,2-Tetrachloroethane	79-34-5		9.30E-02		No Value	NA	5.4E+00				1.5E+01				3.2E+00			
RFI-09-48	VOC	Tetrachloroethene	127-18-4		4.60E-02	2.30E-02	Half-Limit	NA	1.9E+01	8.1E+02	1E-08	3E-05	5.2E+01	9.1E+01	4E-09	3E-04	1.1E+01	5.3E+02	2E-08	4E-05
RFI-09-48	VOC	Toluene	108-88-3	3.90E-02	9.30E-02	3.90E-02	Max Detect	NA		1.5E+04		3E-06		1.7E+03		2E-05		8.0E+03		5E-06
RFI-09-48	VOC	1,2,4-Trichlorobenzene	120-82-1		2.00E-01	1.00E-01	Half-Limit	NA		5.1E+03		2E-05		3.0E+03		3E-05		1.8E+03		6E-05
RFI-09-48	VOC	1,1,1-Trichloroethane	71-55-6		4.60E-02	2.30E-02	Half-Limit	NA		4.0E+03		6E-06		4.3E+03		5E-06		3.1E+03		8E-06
RFI-09-48	VOC	1,1,2-Trichloroethane	79-00-5		4.60E-02	2.30E-02	Half-Limit	NA	9.4E+00		2E-08		2.5E+01		9E-09		5.8E+00		4E-08	
RFI-09-48	VOC	Trichloroethene	79-01-6		4.60E-02	2.30E-02	Half-Limit	NA	4.4E+01		5E-09		1.2E+02		2E-09		2.7E+01		8E-09	
RFI-09-48	VOC	Trichlorofluoromethane	75-69-4		9.30E-02	4.65E-02	Half-Limit	NA		7.3E+02		6E-05		7.9E+02		6E-05		5.7E+02		8E-05
RFI-09-48	VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		2.00E-01	1.00E-01	Half-Limit	NA		3.0E+04		3E-06		3.2E+03		3E-05		2.3E+04		4E-06
RFI-09-48	VOC	Vinyl Chloride	75-01-4		9.30E-02	4.65E-02	Half-Limit	NA	2.8E+00	9.4E+01	2E-07	5E-04	7.9E+00	1.0E+01	6E-08	5E-03	1.4E+00	6.8E+01	3E-07	7E-04
RFI-09-48	VOC	Xylenes (total)	1330-20-7	7.20E-02	9.30E-02	7.20E-02	Max Detect	NA		4.7E+02		2E-04		5.1E+01		1E-03		3.6E+02		2E-04
RFI-09-48	SVOC	Acenaphthene	83-32-9		9.50E-01	4.75E-01	Half-Limit	NA		2.0E+04		2E-05		3.3E+04		1E-05		8.3E+03		6E-05
RFI-09-48	SVOC	Acenaphthylene	208-96-8		9.50E-01	4.75E-01	Half-Limit	NA		1.1E+04		4E-05		1.9E+04		3E-05		4.3E+03		1E-04
RFI-09-48	SVOC	Acetophenone	98-86-2		9.50E-01	4.75E-01	Half-Limit	NA		1.3E+04		4E-05		1.6E+04		3E-05		7.6E+03		6E-05
RFI-09-48	SVOC	Anthracene	120-12-7		9.50E-01	4.75E-01	Half-Limit	NA		2.3E+05		2E-06		1.1E+06		4E-07		5.8E+04		8E-06
RFI-09-48	SVOC	Atrazine	1912-24-9		9.50E-01	4.75E-01	Half-Limit	NA	9.8E+01	2.7E+04	5E-08	2E-05	7.8E+02	8.7E+03	6E-09	5E-05	2.1E+01	7.0E+03	2E-07	7E-05

Attachment G13: Incremental Risk Calculations at RFI-09-48
GMC: NAO Flint Operations Site, Flint, Michigan

Location	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Limit (mg/kg)	Max Exposure Conc (mg/kg)	Concentration Basis	Surrogate Sample Name	RW SCC-C (mg/kg)	RW SCC-NC (mg/kg)	RW SC Risk	RW SC HQ	Redev Worker SCC-C (mg/kg)	Redev Worker SCC-NC (mg/kg)	Redev Worker SC Risk	Redev Worker SC HQ	Res SCC-C (mg/kg)	Res SCC-NC (mg/kg)	Res SC Risk	Res SC HQ
RFI-09-48	SVOC	Benzaldehyde	100-52-7		9.50E-01	4.75E-01	Half-Limit	NA		9.1E+03		5E-05		1.1E+03		4E-04		5.7E+03		8E-05
RFI-09-48	SVOC	Benzo(a)anthracene	56-55-3		9.50E-01	4.75E-01	Half-Limit	NA	2.9E+01		2E-07		3.3E+02		1E-08		6.2E+00		8E-07	
RFI-09-48	SVOC	Benzo(a)pyrene	50-32-8		9.50E-01	4.75E-01	Half-Limit	NA	2.9E+00		2E-06		3.4E+01		1E-07		6.2E-01		8E-06	
RFI-09-48	SVOC	Benzo(b)fluoranthene	205-99-2		9.50E-01	4.75E-01	Half-Limit	NA	2.8E+01		2E-07		3.1E+02		2E-08		6.2E+00		8E-07	
RFI-09-48	SVOC	Benzo(g,h,i)perylene	191-24-2		9.50E-01	4.75E-01	Half-Limit	NA		2.3E+04		2E-05		1.1E+05		4E-06		5.8E+03		8E-05
RFI-09-48	SVOC	Benzo(k)fluoranthene	207-08-9		9.50E-01	4.75E-01	Half-Limit	NA	2.9E+02		2E-08		3.4E+03		1E-09		6.2E+01		8E-08	
RFI-09-48	SVOC	Biphenyl	92-52-4		9.50E-01	4.75E-01	Half-Limit	NA		1.7E+04		3E-05		2.5E+03		2E-04		7.0E+03		7E-05
RFI-09-48	SVOC	bis(2-Chloroethoxy)methane	111-91-1		9.50E-01	4.75E-01	Half-Limit	NA												
RFI-09-48	SVOC	bis(2-Chloroethyl) ether	111-44-4		1.80E-01	9.00E-02	Half-Limit	NA	2.2E+00		4E-07		6.5E+00		1E-07		1.2E+00		8E-07	
RFI-09-48	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7		9.50E-01	4.75E-01	Half-Limit	NA	1.8E+03	1.8E+04	3E-09	3E-05	1.9E+04	7.7E+03	2E-10	6E-05	3.5E+02	4.2E+03	1E-08	1E-04
RFI-09-48	SVOC	4-Bromophenyl-phenyl ether	101-55-3		9.50E-01		No Value	NA												
RFI-09-48	SVOC	Butylbenzylphthalate	85-68-7		9.50E-01	4.75E-01	Half-Limit	NA	1.3E+04	1.7E+05	4E-10	3E-06	1.3E+05	6.8E+05	4E-11	7E-07	2.5E+03	4.1E+04	2E-09	1E-05
RFI-09-48	SVOC	Caprolactam	105-60-2		9.50E-01	4.75E-01	Half-Limit	NA		2.7E+05		2E-06		5.3E+04		9E-06		8.7E+04		5E-06
RFI-09-48	SVOC	Carbazole	86-74-8		9.50E-01	4.75E-01	Half-Limit	NA	1.2E+03		4E-09		1.1E+04		4E-10		2.4E+02		2E-08	
RFI-09-48	SVOC	4-Chloro-3-methylphenol	59-50-7		9.50E-01		No Value	NA						3.9E+05						
RFI-09-48	SVOC	4-Chloroaniline	106-47-8		3.80E+00		No Value	NA	2.6E+02	2.0E+03			1.3E+03	3.9E+02			7.4E+01	6.8E+02		
RFI-09-48	SVOC	2-Chloronaphthalene	91-58-7		9.50E-01	4.75E-01	Half-Limit	NA		2.5E+04		2E-05		3.7E+03		1E-04		1.1E+04		4E-05
RFI-09-48	SVOC	2-Chlorophenol	95-57-8		9.50E-01		No Value	NA		3.8E+02				4.4E+02				2.5E+02		
RFI-09-48	SVOC	4-Chlorophenyl-phenyl ether	7005-72-3		3.80E+00		No Value	NA												
RFI-09-48	SVOC	Chrysene	218-01-9		9.50E-01	4.75E-01	Half-Limit	NA	2.8E+03		2E-09		2.9E+04		2E-10		6.1E+02		8E-09	
RFI-09-48	SVOC	Dibenz(a,h)anthracene	53-70-3		9.50E-01	4.75E-01	Half-Limit	NA	2.9E+00		2E-06		3.4E+01		1E-07		6.2E-01		8E-06	
RFI-09-48	SVOC	Dibenzofuran	132-64-9		9.50E-01	4.75E-01	Half-Limit	NA		1.5E+03		3E-04		4.4E+02		1E-03		3.9E+02		1E-03
RFI-09-48	SVOC	3,3'-Dichlorobenzidine	91-94-1		3.80E+00		No Value	NA	5.0E+01				4.3E+02				1.0E+01			
RFI-09-48	SVOC	2,4-Dichlorophenol	120-83-2		9.50E-01	4.75E-01	Half-Limit	NA		1.2E+03		4E-04		1.9E+02		2E-03		4.5E+02		1E-03
RFI-09-48	SVOC	Diethylphthalate	84-66-2		9.50E-01	4.75E-01	Half-Limit	NA		5.3E+05		9E-07		1.3E+06		4E-07		1.5E+05		3E-06
RFI-09-48	SVOC	2,4-Dimethylphenol	105-67-9		9.50E-01	4.75E-01	Half-Limit	NA		8.4E+03		6E-05		1.4E+04		3E-05		3.1E+03		2E-04
RFI-09-48	SVOC	Dimethylphthalate	131-11-3		9.50E-01	4.75E-01	Half-Limit	NA						3.8E+06		1E-07				
RFI-09-48	SVOC	Di-n-butylphthalate	84-74-2		9.50E-01	4.75E-01	Half-Limit	NA		8.8E+04		5E-06		3.8E+05		1E-06		2.1E+04		2E-05
RFI-09-48	SVOC	4,6-Dinitro-2-methylphenol	534-52-1		3.80E+00	1.90E+00	Half-Limit	NA		5.9E+01		3E-02		1.3E+01		1E-01		1.8E+01		1E-01
RFI-09-48	SVOC	2,4-Dinitrophenol	51-28-5		3.80E+00		No Value	NA		1.8E+03				7.7E+02				4.2E+02		
RFI-09-48	SVOC	2,4-Dinitrotoluene	121-14-2		3.80E+00	1.90E+00	Half-Limit	NA	3.6E+01	1.8E+03	5E-07	1E-03	4.0E+02	7.7E+02	5E-08	2E-03	7.1E+00	4.2E+02	3E-06	5E-03
RFI-09-48	SVOC	2,6-Dinitrotoluene	606-20-2		9.50E-01		No Value	NA	2.0E+01	4.8E+02			9.0E+01	8.8E+02			5.7E+00	1.7E+02		
RFI-09-48	SVOC	Di-n-octylphthalate	117-84-0		9.50E-01	4.75E-01	Half-Limit	NA		3.5E+04		1E-05		1.5E+05		3E-06		8.3E+03		6E-05
RFI-09-48	SVOC	Fluoranthene	206-44-0		9.50E-01	4.75E-01	Half-Limit	NA		2.8E+04		2E-05		1.0E+05		5E-06		7.5E+03		6E-05
RFI-09-48	SVOC	Fluorene	86-73-7		9.50E-01	4.75E-01	Half-Limit	NA		2.0E+04		2E-05		4.3E+04		1E-05		6.6E+03		7E-05
RFI-09-48	SVOC	Hexachlorobenzene	118-74-1		9.50E-01		No Value	NA	5.6E+00	7.0E+02			2.1E+01	3.1E+02			2.0E+00	1.7E+02		
RFI-09-48	SVOC	Hexachlorobutadiene	87-68-3		9.50E-01	4.75E-01	Half-Limit	NA	5.9E+01	1.8E+02	8E-08	3E-03	1.8E+02	2.7E+02	3E-08	2E-03	2.7E+01	4.2E+01	2E-07	1E-02
RFI-09-48	SVOC	Hexachlorocyclopentadiene	77-47-4		9.50E-01	4.75E-01	Half-Limit	NA		2.2E+01		2E-02		8.4E+00		6E-02		1.7E+01		3E-02
RFI-09-48	SVOC	Hexachloroethane	67-72-1		9.50E-01	4.75E-01	Half-Limit	NA	3.9E+02	8.8E+02	1E-08	5E-04	1.3E+03	3.8E+03	4E-09	1E-04	1.7E+02	2.1E+02	3E-08	2E-03
RFI-09-48	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5		9.50E-01	4.75E-01	Half-Limit	NA	2.9E+01		2E-07		3.4E+02		1E-08		6.2E+00		8E-07	
RFI-09-48	SVOC	Isophorone	78-59-1		9.50E-01	4.75E-01	Half-Limit	NA	2.6E+04	1.8E+05	2E-10	3E-06	2.8E+05	7.7E+05	2E-11	6E-07	5.1E+03	4.2E+04	9E-10	1E-05
RFI-09-48	SVOC	2-Methylnaphthalene	91-57-6	7.50E-02	9.50E-01	7.50E-02	Max Detect	NA		2.3E+02		3E-04		2.6E+01		3E-03		1.6E+02		5E-04
RFI-09-48	SVOC	Methylphenol (total)	1319-77-3		1.90E+00	9.50E-01	Half-Limit	NA		4.4E+04		2E-05		1.9E+05		5E-06		1.0E+04		9E-05
RFI-09-48	SVOC	Naphthalene	91-20-3		9.50E-01	4.75E-01	Half-Limit	NA		1.3E+02		4E-03		1.4E+01		3E-02		1.0E+02		5E-03
RFI-09-48	SVOC	2-Nitroaniline	88-74-4		3.80E+00		No Value	NA		7.8E+01				8.0E+01				5.7E+01		
RFI-09-48	SVOC	3-Nitroaniline	99-09-2		3.80E+00		No Value	NA	1.2E+03	2.6E+02			1.3E+04	1.1E+02			2.3E+02	6.2E+01		
RFI-09-48	SVOC	4-Nitroaniline	100-01-6		3.80E+00		No Value	NA	1.2E+03	1.2E+03			1.3E+04	2.0E+02			2.3E+02	4.6E+02		
RFI-09-48	SVOC	Nitrobenzene	98-95-3		3.80E-01	1.90E-01	Half-Limit	NA		6.2E+01		3E-03		7.5E+01		3E-03		3.7E+01		5E-03
RFI-09-48	SVOC	2-Nitrophenol	88-75-5		9.50E-01	4.75E-01	Half-Limit	NA												
RFI-09-48	SVOC	4-Nitrophenol	100-02-7		3.80E+00		No Value	NA												
RFI-09-48	SVOC	N-Nitrosodiphenylamine	86-30-6		9.50E-01	4.75E-01	Half-Limit	NA	5.0E+03	1.8E+04	9E-10	3E-05	5.5E+04	7.7E+03	9E-11	6E-05	9.9E+02	4.2E+03	5E-09	1E-04
RFI-09-48	SVOC	N-Nitroso-di-n-propylamine	621-64-7		9.50E-01	4.75E-01	Half-Limit	NA	1.0E+00		5E-06		3.5E+00		1E-06		4.0E-01		1E-05	
RFI-09-48	SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1		9.50E-01	4.75E-01	Half-Limit	NA	7.3E+01	3.5E+04	6E-08	1E-05	2.3E+02	1.5E+04	2E-08	3E-05	3.2E+01	8.3E+03	1E-07	6E-05

Attachment G13: Incremental Risk Calculations at RFI-09-48
GMC: NAO Flint Operations Site, Flint, Michigan

Location	Chem Group	Chemical	CASRN	Max Detected (mg/kg)	Max Limit (mg/kg)	Max Exposure Conc (mg/kg)	Concentration Basis	Surrogate Sample Name	RW SCC-C (mg/kg)	RW SCC-NC (mg/kg)	RW SC Risk	RW SC HQ	Redev Worker SCC-C (mg/kg)	Redev Worker SCC-NC (mg/kg)	Redev Worker SC Risk	Redev Worker SC HQ	Res SCC-C (mg/kg)	Res SCC-NC (mg/kg)	Res SC Risk	Res SC HQ
RFI-09-48	SVOC	Pentachlorophenol	87-86-5		3.80E+00	1.90E+00	Half-Limit	NA	1.0E+02	1.3E+04	2E-07	1E-04	1.2E+03	6.1E+03	2E-08	3E-04	2.9E+01	4.5E+03	7E-07	4E-04
RFI-09-48	SVOC	Phenanthrene	85-01-8	3.60E-01		3.60E-01	Max Detect	NA		1.8E+04		2E-05		5.1E+04		7E-06		5.4E+03		7E-05
RFI-09-48	SVOC	Phenol	108-95-2		9.50E-01	4.75E-01	Half-Limit	NA		2.6E+05		2E-06		1.2E+05		4E-06		6.2E+04		8E-06
RFI-09-48	SVOC	Pyrene	129-00-0	5.33E-01	2.00E-01	5.33E-01	Max Detect	NA		2.1E+04		3E-05		8.2E+04		7E-06		5.7E+03		9E-05
RFI-09-48	SVOC	2,4,5-Trichlorophenol	95-95-4		9.50E-01	4.75E-01	Half-Limit	NA		8.8E+04		5E-06		3.8E+05		1E-06		2.1E+04		2E-05
RFI-09-48	SVOC	2,4,6-Trichlorophenol	88-06-2		9.50E-01	4.75E-01	Half-Limit	NA	1.0E+03	8.8E+01	5E-09	5E-03	4.2E+03	3.8E+01	1E-09	1E-02	3.3E+02	2.1E+01	1E-08	2E-02
RFI-09-48	PCB	PCBs (total)	1336-36-3		4.20E-02	2.10E-02	Half-Limit	NA	8.7E+00	1.4E+01	2E-08	1E-03	7.1E+01	1.7E+01	3E-09	1E-03	2.1E+00	3.8E+00	1E-07	6E-03
RFI-09-48	INORG	Antimony	7440-36-0	2.10E-01		1.24E-01	Max Detect	NA		8.2E+02		2E-04		2.0E+02		6E-04		1.1E+02		1E-03
RFI-09-48	INORG	Arsenic	7440-38-2	1.00E+01		1.88E+00	Max Detect	NA	2.7E+01	4.4E+02	7E-07	4E-03	2.1E+02	2.3E+03	9E-08	8E-04	3.9E+00	7.5E+01	5E-06	3E-02
RFI-09-48	INORG	Barium	7440-39-3	1.10E+02		1.43E+01	Max Detect	NA												
RFI-09-48	INORG	Beryllium	7440-41-7	2.40E+00		1.81E+00	Max Detect	NA	2.2E+04	3.7E+03	8E-10	5E-04	8.5E+03	3.7E+02	2E-09	5E-03	1.3E+04	5.4E+02	1E-09	3E-03
RFI-09-48	INORG	Cadmium	7440-43-9	4.80E-01	1.50E-01		Max Detect	NA	3.0E+04	1.3E+03			1.1E+04	4.4E+02			1.8E+04	2.4E+02		
RFI-09-48	INORG	Chromium (total)	7440-47-3	1.50E+02		1.18E+02	Max Detect	NA	4.5E+03	5.9E+03	3E-07	2E-02	1.7E+03	2.3E+03	7E-07	5E-02	2.7E+03	8.2E+02	4E-07	1E-01
RFI-09-48	INORG	Cobalt	7440-48-4	8.10E+00		1.05E+00	Max Detect	NA	1.9E+04	2.0E+04	5E-10	5E-05	7.3E+03	5.5E+02	1E-09	2E-03	1.1E+04	4.6E+03	9E-10	2E-04
RFI-09-48	INORG	Copper	7440-50-8	5.70E+01		2.85E+01	Max Detect	NA		8.2E+04		3E-04		2.0E+04		1E-03		1.1E+04		3E-03
RFI-09-48	INORG	Cyanide (total)	57-12-5	2.40E-01	2.00E-01	2.40E-01	Max Detect	NA		4.1E+04		6E-06		1.0E+04		2E-05		5.5E+03		4E-05
RFI-09-48	INORG	Lead	7439-92-1	6.10E+01		6.10E+01	Max Detect	NA												
RFI-09-48	INORG	Manganese	7439-96-5	1.80E+03		1.32E+03	Max Detect	NA		7.2E+04		2E-02		1.4E+03		9E-01		2.5E+04		5E-02
RFI-09-48	INORG	Mercury	7439-97-6	1.00E-01		4.76E-02	Max Detect	NA		6.7E+01		7E-04		7.7E+00		6E-03		3.4E+01		1E-03
RFI-09-48	INORG	Nickel	7440-02-0	8.70E+01		6.70E+01	Max Detect	NA	2.2E+05		3E-09		8.5E+04		8E-09		1.3E+05		5E-09	
RFI-09-48	INORG	Selenium	7782-49-2	8.20E-01		3.01E-01	Max Detect	NA		1.0E+04		3E-05		2.5E+03		1E-04		1.4E+03		2E-04
RFI-09-48	INORG	Silver	7440-22-4	1.50E-01			Max Detect	NA		6.7E+03				2.6E+02				1.2E+03		
RFI-09-48	INORG	Thallium	7440-28-0	7.90E-01		5.93E-01	Max Detect	NA		1.4E+02		4E-03		3.6E+01		2E-02		1.9E+01		3E-02
RFI-09-48	INORG	Vanadium	7440-62-2	2.70E+01		2.13E+00	Max Detect	NA		1.4E+04		1E-04		3.6E+03		6E-04		1.9E+03		1E-03
RFI-09-48	INORG	Zinc	7440-66-6	5.40E+01			Max Detect	NA		6.1E+05				1.5E+05				8.2E+04		

Notes

The only pathways shown are those for which at least one location at the Southend had unacceptable bounding risk estimates.

Site-specific background concentrations of inorganics are subtracted to obtain the site-related exposure concentration.

Occ - Occupational

VI - Vapor Intrusion

RW - Routine Worker; Redev Worker - Redevelopment Construction Worker; Res - Resident

SCC - Soil Contact Criteria; SC - Soil Contact

C - Carcinogenic; NC - Noncarcinogenic

HQ - Hazard Quotient

Attachment G13: Cumulative Cancer Risk and HI at all Southend Locations
GMC: NAO Flint Operations Site, Flint, Michigan

Location	RW SC Risk	RW SC HI	RW VI Risk	RW VI HI	MW SC Risk	MW SC HI	Redev Worker SC Risk	Redev Worker SC HI	Res SC Risk	Res SC HI	Res VI Risk	Res VI HI
40-303R	3E-06	3E-02	5E-06	2E-01	5E-08	1E-03	7E-07	1E-01	1E-05	9E-02	1E-05	2E-01
40-4R	4E-06	7E-02	1E-05	5E-01	4E-08	2E-03	1E-06	5E-01	1E-05	1E-01	2E-05	8E-01
40-7R	6E-06	7E-02	4E-06	3E-01	1E-07	3E-03	1E-06	3E-01	3E-05	2E-01	9E-06	4E-01
84-07	5E-06	5E-02	7E-06	9E-02	9E-08	1E-02	1E-06	3E-01	1E-05	1E-01	1E-05	2E-01
BD 94 EP-01	2E-06	2E-02	3E-06	2E-01	4E-08	1E-03	5E-07	1E-01	8E-06	6E-02	6E-06	2E-01
BD 94 EP-02	2E-05	6E-01	4E-06	2E-01	3E-07	2E-02	3E-06	6E-01	7E-05	2E+00	1E-05	3E-01
BD 94 EP-03	3E-06	3E-02	3E-06	2E-01	6E-08	2E-03	7E-07	1E-01	1E-05	1E-01	6E-06	2E-01
EP 94-02A	2E-05	5E-01	4E-06	2E-01	3E-07	2E-02	3E-06	6E-01	7E-05	2E+00	8E-06	2E-01
EP 94-02B	3E-06	3E-02	3E-06	2E-01	6E-08	2E-03	6E-07	1E-01	1E-05	9E-02	6E-06	2E-01
EP 94-02C	9E-06	2E-02	2E-06	1E-02	1E-07	1E-03	2E-06	8E-02	3E-05	6E-02	4E-06	2E-02
EP 94-02D	9E-06	2E-02	2E-06	1E-02	1E-07	1E-03	2E-06	8E-02	3E-05	6E-02	4E-06	2E-02
RFI-02-01	2E-06	3E-02	3E-06	2E-01	4E-08	2E-03	6E-07	2E-01	8E-06	1E-01	6E-06	2E-01
RFI-02-02	3E-06	4E-02	3E-06	2E-01	6E-08	2E-02	7E-07	4E-01	1E-05	1E-01	6E-06	2E-01
RFI-02-03	3E-06	8E-02	3E-06	2E-01	1E-06	1E-02	3E-06	3E-01	1E-05	5E-01	6E-06	2E-01
RFI-02-04	3E-05	2E-02	3E-06	2E-01	4E-07	9E-04	3E-06	1E-01	1E-04	6E-02	6E-06	2E-01
RFI-02-05	4E-06	3E-02	3E-06	2E-01	7E-08	2E-03	8E-07	2E-01	2E-05	1E-01	7E-06	3E-01
RFI-02-06	1E-05	9E-02	4E-06	2E-01	2E-07	9E-03	2E-06	4E-01	4E-05	2E-01	1E-05	3E-01
RFI-02-07	3E-06	3E-02	3E-06	2E-01	5E-08	1E-02	6E-07	3E-01	8E-06	9E-02	6E-06	2E-01
RFI-02-08	5E-06	4E-02	3E-06	2E-01	1E-07	4E-02	9E-07	7E-01	2E-05	1E-01	6E-06	2E-01
RFI-02-09	3E-06	7E-02	1E-06	8E-03	1E-06	1E-02	3E-06	2E-01	8E-06	5E-01	2E-06	1E-02
RFI-02-10	3E-06	7E-02	1E-06	8E-03	1E-06	1E-02	3E-06	2E-01	8E-06	5E-01	2E-06	1E-02
RFI-02-11	3E-06	7E-02	1E-06	8E-03	1E-06	1E-02	3E-06	2E-01	8E-06	5E-01	2E-06	1E-02
RFI-02-12	3E-06	2E-02	3E-06	8E-02	4E-08	1E-03	6E-07	1E-01	9E-06	6E-02	7E-06	1E-01
RFI-02-13	2E-06	2E-02	3E-06	2E-01	3E-08	7E-04	5E-07	9E-02	8E-06	5E-02	6E-06	2E-01
RFI-02-14	7E-06	4E-02	5E-06	5E-02	1E-07	1E-03	1E-06	1E-01	3E-05	1E-01	1E-05	9E-02
RFI-02-19	8E-06	4E-02	5E-06	5E-02	1E-07	1E-03	1E-06	1E-01	3E-05	1E-01	1E-05	8E-02
RFI-02-20	4E-06	4E-02	5E-06	5E-02	7E-08	6E-03	1E-06	2E-01	1E-05	1E-01	1E-05	8E-02
RFI-02-21	4E-06	4E-02	5E-06	5E-02	6E-08	1E-03	1E-06	1E-01	1E-05	1E-01	1E-05	8E-02
RFI-02-22	4E-06	8E-02	4E-06	5E-02	6E-08	2E-02	1E-06	7E-01	1E-05	3E-01	9E-06	9E-02
RFI-02-23	4E-06	4E-02	5E-06	5E-02	6E-08	1E-03	1E-06	1E-01	1E-05	1E-01	1E-05	9E-02
RFI-04-01	1E-05	7E-02	4E-06	2E-01	2E-07	3E-03	2E-06	3E-01	5E-05	2E-01	9E-06	3E-01
RFI-04-02	5E-06	2E-02	3E-06	2E-01	7E-08	9E-04	7E-07	1E-01	2E-05	7E-02	6E-06	2E-01

Attachment G13: Cumulative Cancer Risk and HI at all Southend Locations
GMC: NAO Flint Operations Site, Flint, Michigan

Location	RW SC Risk	RW SC HI	RW VI Risk	RW VI HI	MW SC Risk	MW SC HI	Redev Worker SC Risk	Redev Worker SC HI	Res SC Risk	Res SC HI	Res VI Risk	Res VI HI
RFI-04-03	2E-06	2E-02	3E-06	2E-01	4E-08	8E-03	6E-07	2E-01	8E-06	6E-02	6E-06	2E-01
RFI-04-04	2E-06	3E-02	3E-06	2E-01	3E-08	1E-03	5E-07	9E-02	7E-06	8E-02	6E-06	2E-01
RFI-09-01	5E-06	1E-01	5E-06	2E-01	2E-07	1E-02	1E-06	7E-01	2E-05	5E-01	9E-06	3E-01
RFI-09-01R	4E-06	9E-02	2E-06	2E-02	2E-07	1E-02	8E-07	6E-01	2E-05	4E-01	3E-06	3E-02
RFI-09-02	4E-05	7E-01	1E-05	2E-01	6E-07	4E-02	8E-06	7E-01	1E-04	2E+00	2E-05	3E-01
RFI-09-03	3E-04	2E-01	7E-06	2E-01	5E-06	2E-02	3E-05	3E-01	1E-03	8E-01	2E-05	3E-01
RFI-09-03R	1E-05	2E-01	1E-06	2E-02	2E-07	7E-03	1E-06	2E-01	5E-05	7E-01	2E-06	4E-02
RFI-09-04	5E-06	2E-01	3E-06	2E-01	2E-07	3E-01	1E-06	6E+00	2E-05	5E-01	7E-06	2E-01
RFI-09-05	3E-05	8E-01	6E-06	2E-01	5E-07	3E-02	5E-06	9E-01	1E-04	3E+00	2E-05	4E-01
RFI-09-06	8E-06	6E-02	4E-06	2E-01	2E-07	4E-02	1E-06	8E-01	3E-05	2E-01	9E-06	3E-01
RFI-09-07	2E-06	3E-02	3E-06	2E-01	3E-08	3E-03	6E-07	2E-01	8E-06	7E-02	7E-06	2E-01
RFI-09-08	3E-06	4E-02	9E-06	3E-01	1E-07	2E-03	9E-07	2E-01	9E-06	1E-01	2E-05	4E-01
RFI-09-09	2E-06	2E-02	3E-06	2E-01	3E-08	7E-04	5E-07	1E-01	7E-06	5E-02	6E-06	2E-01
RFI-09-10	3E-06	3E-02	3E-06	2E-01	6E-08	2E-03	7E-07	1E-01	1E-05	1E-01	6E-06	2E-01
RFI-09-11	2E-06	3E-02	3E-06	2E-01	3E-08	9E-04	5E-07	1E-01	7E-06	7E-02	6E-06	2E-01
RFI-09-12	2E-05	5E-02	3E-06	2E-01	4E-07	4E-02	2E-06	8E-01	1E-04	1E-01	6E-06	2E-01
RFI-09-15	2E-05	3E-01	5E-06	2E-01	4E-07	2E-02	2E-06	8E-01	8E-05	1E+00	1E-05	3E-01
RFI-09-16	1E-05	8E-02	1E-06	2E-02	3E-07	1E-02	2E-06	6E-01	7E-05	4E-01	2E-06	4E-02
RFI-09-18	2E-05	3E-02	4E-06	3E-02	3E-07	9E-04	6E-06	1E-01	8E-05	7E-02	1E-05	5E-02
RFI-09-19	5E-05	2E-01	1E-06	2E-02	8E-07	8E-03	4E-06	2E-01	2E-04	7E-01	2E-06	4E-02
RFI-09-20	8E-06	2E-01	1E-06	2E-02	1E-07	7E-03	1E-06	2E-01	3E-05	7E-01	2E-06	4E-02
RFI-09-21	6E-06	2E-01	1E-06	2E-02	1E-07	7E-03	9E-07	2E-01	2E-05	7E-01	2E-06	4E-02
RFI-09-22	5E-06	3E-02	1E-06	2E-02	2E-07	3E-03	9E-07	8E-02	2E-05	1E-01	3E-06	3E-02
RFI-09-23	6E-06	9E-02	1E-05	2E-01	2E-07	4E-03	1E-06	2E-01	2E-05	3E-01	2E-05	3E-01
RFI-09-24	2E-06	5E-02	9E-07	8E-03	3E-07	1E-01	8E-07	2E+00	6E-06	2E-01	2E-06	2E-02
RFI-09-25	5E-06	7E-02	1E-06	2E-02	2E-07	1E-01	9E-07	2E+00	2E-05	3E-01	3E-06	3E-02
RFI-09-26	2E-05	3E-02	4E-06	3E-02	2E-07	9E-04	3E-06	1E-01	6E-05	7E-02	9E-06	6E-02
RFI-09-27	2E-05	2E-02	4E-06	3E-02	2E-07	7E-04	3E-06	1E-01	6E-05	5E-02	9E-06	6E-02
RFI-09-28	4E-06	3E-02	3E-06	2E-01	6E-08	1E-03	7E-07	1E-01	2E-05	9E-02	6E-06	2E-01
RFI-09-29	2E-05	5E-02	4E-06	3E-02	2E-07	2E-03	3E-06	2E-01	6E-05	2E-01	9E-06	6E-02
RFI-09-33	2E-06	3E-02	9E-07	8E-03	3E-07	4E-02	8E-07	8E-01	6E-06	1E-01	2E-06	2E-02
RFI-09-34	2E-06	3E-02	9E-07	8E-03	3E-07	4E-02	8E-07	7E-01	6E-06	1E-01	2E-06	2E-02

Attachment G13: Cumulative Cancer Risk and HI at all Southend Locations
GMC: NAO Flint Operations Site, Flint, Michigan

Location	RW SC Risk	RW SC HI	RW VI Risk	RW VI HI	MW SC Risk	MW SC HI	Redev Worker SC Risk	Redev Worker SC HI	Res SC Risk	Res SC HI	Res VI Risk	Res VI HI
RFI-09-35	5E-06	8E-02	1E-06	1E-02	2E-07	5E-02	1E-06	9E-01	2E-05	3E-01	3E-06	2E-02
RFI-09-36R	3E-05	3E-01	7E-06	2E-01	6E-06	2E-01	6E-06	9E-01	1E-04	1E+00	2E-05	4E-01
RFI-09-37	2E-05	2E-01	1E-06	1E-02	3E-07	9E-03	2E-06	3E-01	8E-05	8E-01	2E-06	3E-02
RFI-09-38	3E-05	6E-01	4E-06	3E-02	5E-07	2E-02	7E-06	6E-01	1E-04	2E+00	1E-05	5E-02
RFI-09-39	4E-05	3E-02	1E-06	3E-02	7E-07	9E-04	4E-06	1E-01	2E-04	7E-02	2E-06	5E-02
RFI-09-40	2E-06	5E-02	3E-06	2E-01	3E-08	8E-03	5E-07	4E-01	7E-06	1E-01	6E-06	2E-01
RFI-09-41	2E-06	8E-02	3E-06	2E-01	3E-08	3E-03	6E-07	6E-01	7E-06	2E-01	7E-06	3E-01
RFI-09-42	1E-05	4E-02	3E-06	8E-02	2E-07	8E-03	1E-06	3E-01	4E-05	9E-02	7E-06	1E-01
RFI-09-43	3E-06	2E-02	3E-06	8E-02	5E-08	8E-04	6E-07	1E-01	1E-05	6E-02	7E-06	1E-01
RFI-09-44	7E-06	5E-02	3E-06	8E-02	1E-07	2E-02	1E-06	5E-01	3E-05	2E-01	6E-06	1E-01
RFI-09-45	7E-05	2E-01	4E-06	3E-01	2E-06	8E-03	7E-06	9E-01	3E-04	5E-01	9E-06	4E-01
RFI-09-45R	5E-05	3E-02	1E-06	2E-02	9E-07	3E-03	5E-06	2E-01	2E-04	9E-02	2E-06	5E-02
RFI-09-47	2E-05	1E-01	5E-06	3E-01	3E-07	5E-03	4E-06	5E-01	7E-05	4E-01	1E-05	4E-01
RFI-09-49	2E-06	6E-02	3E-06	7E-02	3E-07	9E-02	9E-07	2E+00	8E-06	2E-01	6E-06	1E-01
RFI-09-50	4E-05	4E-02	7E-06	9E-02	6E-07	2E-03	9E-06	3E-01	1E-04	7E-02	2E-05	1E-01
RFI-09-52	4E-06	8E-02	4E-06	8E-02	6E-07	4E-02	2E-06	7E-01	1E-05	4E-01	8E-06	1E-01
RFI-09-53	7E-06	1E-01	9E-06	5E-02	2E-07	5E-02	2E-06	1E+00	2E-05	4E-01	2E-05	9E-02
RFI-09-56	5E-06	1E-01	4E-06	5E-02	6E-08	6E-03	1E-06	4E-01	1E-05	6E-01	8E-06	9E-02
RFI-09-57	4E-06	4E-02	5E-06	5E-02	6E-08	1E-03	1E-06	1E-01	1E-05	1E-01	1E-05	9E-02
RFI-12-01	4E-06	3E-02	2E-06	2E-01	5E-08	1E-03	6E-07	9E-02	1E-05	1E-01	5E-06	2E-01
RFI-12-02	1E-05	1E-01	5E-06	2E-01	7E-07	5E-02	2E-06	1E+00	4E-05	3E-01	1E-05	3E-01
RFI-12-03	7E-06	7E-02	5E-06	2E-01	1E-07	2E-03	1E-06	4E-01	3E-05	2E-01	9E-06	3E-01
RFI-12-04	7E-06	3E-02	3E-06	2E-01	1E-07	1E-02	1E-06	3E-01	3E-05	8E-02	7E-06	2E-01
RFI-12-05	2E-05	1E-01	3E-06	2E-01	3E-07	4E-03	2E-06	1E+00	7E-05	3E-01	6E-06	3E-01
RFI-12-06	2E-06	2E-02	3E-06	2E-01	3E-08	7E-04	6E-07	9E-02	8E-06	5E-02	6E-06	2E-01
RFI-12-07	3E-06	4E-02	3E-06	2E-01	3E-07	5E-03	1E-06	1E-01	1E-05	2E-01	6E-06	2E-01
RFI-12-08	1E-05	1E-01	3E-06	2E-01	3E-07	1E-02	2E-06	5E-01	7E-05	4E-01	6E-06	2E-01
RFI-12-10	2E-05	2E-01	5E-06	3E-01	3E-07	6E-03	4E-06	7E-01	7E-05	4E-01	1E-05	4E-01
RFI-12-11D	3E-06	6E-02	3E-06	2E-01	2E-07	6E-02	9E-07	1E+00	8E-06	2E-01	6E-06	2E-01
RFI-12-14	2E-06	5E-02	3E-06	2E-01	2E-07	6E-02	7E-07	1E+00	7E-06	2E-01	6E-06	2E-01
RFI-12-15	5E-06	3E-02	3E-06	2E-01	8E-08	9E-04	8E-07	1E-01	2E-05	7E-02	6E-06	2E-01
RFI-12-16	8E-06	5E-02	1E-06	3E-02	6E-07	4E-02	9E-07	9E-01	3E-05	1E-01	2E-06	6E-02

Attachment G13: Cumulative Cancer Risk and HI at all Southend Locations
GMC: NAO Flint Operations Site, Flint, Michigan

Location	RW SC Risk	RW SC HI	RW VI Risk	RW VI HI	MW SC Risk	MW SC HI	Redev Worker SC Risk	Redev Worker SC HI	Res SC Risk	Res SC HI	Res VI Risk	Res VI HI
RFI-12-17	4E-05	4E-02	5E-06	2E-02	6E-07	4E-03	7E-06	3E-01	1E-04	1E-01	1E-05	5E-02
RFI-12-18	8E-06	5E-02	1E-06	3E-02	6E-07	4E-02	9E-07	9E-01	3E-05	1E-01	2E-06	6E-02
RFI-12-21	3E-06	3E-02	3E-06	2E-01	4E-08	2E-03	6E-07	1E-01	9E-06	7E-02	7E-06	3E-01
RFI-12-22	2E-06	3E-02	3E-06	2E-01	4E-08	3E-02	6E-07	5E-01	7E-06	1E-01	7E-06	2E-01
RFI-12-23	4E-06	5E-02	3E-06	9E-02	6E-08	2E-03	7E-07	3E-01	1E-05	1E-01	7E-06	1E-01
RFI-12-24	2E-06	2E-02	3E-06	6E-02	3E-08	6E-04	5E-07	8E-02	7E-06	5E-02	6E-06	1E-01
RFI-12-25	1E-05	8E-02	4E-06	1E-01	2E-07	4E-03	2E-06	3E-01	4E-05	2E-01	1E-05	2E-01
RFI-12-26	9E-06	3E-01	5E-06	2E-01	6E-07	1E-02	2E-06	1E+00	3E-05	9E-01	1E-05	4E-01
RFI-12-27	3E-06	3E-02	5E-06	8E-02	4E-08	9E-04	7E-07	1E-01	1E-05	7E-02	9E-06	1E-01
RFI-12-28	2E-05	2E-01	3E-06	1E-01	3E-07	5E-03	2E-06	1E+00	8E-05	3E-01	7E-06	2E-01
RFI-12-29	3E-06	3E-02	3E-06	7E-02	3E-08	1E-03	6E-07	1E-01	8E-06	8E-02	7E-06	1E-01
RFI-12-30	3E-06	9E-02	3E-06	7E-02	1E-06	2E-02	3E-06	4E-01	1E-05	6E-01	7E-06	1E-01
RFI-12-31	5E-06	3E-01	3E-06	7E-02	4E-07	3E-02	1E-06	1E+00	2E-05	2E+00	6E-06	1E-01
RFI-12-32	4E-06	3E-02	3E-06	7E-02	5E-08	9E-04	7E-07	9E-02	1E-05	8E-02	6E-06	1E-01
RFI-12-33	1E-05	1E-01	4E-06	2E-01	8E-07	1E-02	3E-06	5E-01	3E-05	5E-01	1E-05	4E-01
RFI-12-34	3E-06	6E-02	3E-06	7E-02	1E-07	7E-02	8E-07	1E+00	8E-06	2E-01	6E-06	1E-01
RFI-12-35	5E-06	3E-01	3E-06	8E-02	4E-07	3E-02	1E-06	1E+00	2E-05	2E+00	7E-06	1E-01
RFI-16-01	6E-06	4E-02	3E-06	2E-01	1E-07	5E-03	1E-06	1E-01	3E-05	2E-01	6E-06	2E-01
RFI-16-02	3E-06	3E-02	3E-06	2E-01	4E-08	1E-03	6E-07	1E-01	8E-06	8E-02	7E-06	2E-01
RFI-16-03	4E-06	3E-02	4E-06	2E-01	5E-08	1E-02	7E-07	3E-01	1E-05	9E-02	8E-06	3E-01
RFI-16-04	8E-06	1E-01	3E-06	2E-01	1E-07	4E-03	1E-06	2E-01	3E-05	4E-01	6E-06	2E-01
RFI-16-05	2E-06	3E-02	3E-06	2E-01	3E-08	4E-03	6E-07	2E-01	8E-06	7E-02	6E-06	2E-01
RFI-16-06	2E-06	3E-02	3E-06	2E-01	3E-08	6E-03	5E-07	2E-01	8E-06	8E-02	5E-06	2E-01
RFI-16-07	2E-06	2E-02	3E-06	2E-01	7E-08	1E-03	6E-07	9E-02	7E-06	6E-02	6E-06	2E-01
RFI-16-08	4E-06	7E-02	1E-05	4E-01	7E-08	2E-02	1E-06	5E-01	1E-05	1E-01	2E-05	7E-01
RFI-16-09	2E-06	2E-02	3E-06	2E-01	3E-08	9E-04	5E-07	9E-02	7E-06	5E-02	6E-06	2E-01
RFI-16-10	2E-06	2E-02	3E-06	2E-01	3E-08	7E-04	5E-07	8E-02	7E-06	5E-02	6E-06	2E-01
RFI-16-11	3E-05	2E-01	3E-06	2E-01	1E-06	4E-02	3E-06	1E+00	1E-04	5E-01	8E-06	4E-01
RFI-16-12	5E-06	6E-02	5E-06	3E-01	1E-07	3E-03	1E-06	1E-01	2E-05	2E-01	1E-05	5E-01
RFI-16-13	2E-06	3E-02	3E-06	2E-01	3E-08	1E-03	6E-07	2E-01	8E-06	7E-02	6E-06	3E-01
RFI-16-20	3E-06	2E-02	4E-06	2E-01	4E-08	9E-04	6E-07	1E-01	8E-06	6E-02	8E-06	3E-01
RFI-16-24	4E-05	3E-02	4E-06	6E-02	7E-07	4E-02	5E-06	7E-01	1E-04	1E-01	1E-05	9E-02

Attachment G13: Cumulative Cancer Risk and HI at all Southend Locations
GMC: NAO Flint Operations Site, Flint, Michigan

Location	RW SC Risk	RW SC HI	RW VI Risk	RW VI HI	MW SC Risk	MW SC HI	Redev Worker SC Risk	Redev Worker SC HI	Res SC Risk	Res SC HI	Res VI Risk	Res VI HI
RFI-16-25	4E-05	3E-02	4E-06	6E-02	7E-07	4E-02	5E-06	7E-01	1E-04	1E-01	1E-05	1E-01
RFI-17-01	5E-06	7E-02	3E-06	1E-01	1E-07	3E-03	9E-07	3E-01	3E-05	2E-01	6E-06	2E-01
RFI-17-02	5E-06	4E-02	3E-06	2E-01	1E-07	2E-03	9E-07	1E-01	2E-05	2E-01	6E-06	2E-01
RFI-23-01	4E-06	2E-02	3E-06	2E-01	5E-08	1E-03	7E-07	1E-01	1E-05	6E-02	6E-06	2E-01
RFI-23-02	3E-06	2E-02	3E-06	2E-01	4E-08	8E-04	5E-07	1E-01	8E-06	6E-02	6E-06	2E-01
RFI-29-01	4E-06	7E-02	3E-06	2E-01	7E-07	1E-02	2E-06	3E-01	1E-05	4E-01	6E-06	2E-01
RFI-29-02	3E-06	5E-02	1E-06	8E-03	7E-07	1E-02	2E-06	2E-01	1E-05	3E-01	2E-06	1E-02
RFI-29-03	3E-06	5E-02	1E-06	8E-03	7E-07	1E-02	2E-06	2E-01	1E-05	3E-01	2E-06	1E-02
RFI-40-01	3E-06	2E-02	3E-06	2E-01	4E-08	8E-04	6E-07	1E-01	1E-05	6E-02	6E-06	2E-01
RFI-40-02	5E-06	3E-02	3E-06	2E-01	8E-08	1E-03	8E-07	1E-01	2E-05	8E-02	6E-06	2E-01
RFI-40-03	3E-06	3E-02	3E-06	2E-01	5E-08	3E-02	6E-07	6E-01	1E-05	1E-01	7E-06	2E-01
RFI-40-04	3E-06	3E-02	3E-06	2E-01	5E-08	2E-03	6E-07	1E-01	1E-05	1E-01	6E-06	2E-01
RFI-40-05	2E-06	2E-02	3E-06	2E-01	3E-08	9E-04	6E-07	1E-01	8E-06	7E-02	6E-06	2E-01
RFI-40-06	3E-06	2E-02	3E-06	2E-01	4E-08	9E-04	6E-07	1E-01	9E-06	6E-02	6E-06	2E-01
RFI-40-07	2E-06	2E-02	3E-06	2E-01	3E-08	7E-04	5E-07	9E-02	7E-06	5E-02	6E-06	2E-01
RFI-40-08	4E-06	6E-02	3E-06	2E-01	3E-07	2E-02	1E-06	4E-01	2E-05	3E-01	7E-06	2E-01
RFI-40-09	3E-06	3E-02	3E-06	2E-01	5E-08	2E-03	7E-07	2E-01	1E-05	9E-02	6E-06	3E-01
RFI-40-10	4E-06	3E-02	3E-06	2E-01	6E-08	1E-03	7E-07	1E-01	2E-05	8E-02	7E-06	2E-01
RFI-40-12	2E-04	3E-01	4E-06	2E-01	3E-06	1E-02	1E-05	9E-01	8E-04	8E-01	1E-05	3E-01
RFI-40-16	5E-05	1E-01	1E-06	3E-02	8E-07	4E-03	5E-06	4E-01	2E-04	4E-01	2E-06	8E-02
RFI-40-17	4E-05	1E-01	1E-06	3E-02	6E-07	4E-03	4E-06	4E-01	2E-04	4E-01	2E-06	8E-02
RFI-44-01	2E-06	2E-02	2E-06	2E-01	3E-08	6E-04	5E-07	8E-02	8E-06	5E-02	5E-06	2E-01
RFI-44-02	1E-05	1E-01	4E-06	2E-01	2E-07	3E-02	2E-06	7E-01	5E-05	4E-01	9E-06	3E-01
RFI-44-03	1E-05	7E-02	3E-06	2E-01	1E-07	2E-03	2E-06	3E-01	3E-05	2E-01	8E-06	3E-01
RFI-44-04	2E-05	1E-01	5E-06	2E-01	3E-07	5E-03	4E-06	6E-01	7E-05	4E-01	1E-05	3E-01
RFI-44-05	2E-05	2E-01	5E-06	2E-01	9E-07	2E-01	5E-06	3E+00	5E-05	6E-01	1E-05	2E-01
RFI-44-06	3E-06	2E-02	3E-06	2E-01	4E-08	9E-04	6E-07	1E-01	1E-05	7E-02	6E-06	2E-01
RFI-44-07	1E-05	7E-02	2E-06	1E-02	8E-07	5E-02	4E-06	9E-01	4E-05	3E-01	6E-06	3E-02
RFI-44-09	1E-05	6E-02	2E-06	1E-02	8E-07	7E-03	4E-06	2E-01	4E-05	3E-01	6E-06	3E-02
RFI-84-01	8E-06	6E-02	4E-06	2E-01	2E-07	3E-03	1E-06	2E-01	4E-05	2E-01	8E-06	2E-01
RFI-84-02	5E-06	2E-02	3E-06	2E-01	8E-08	8E-04	8E-07	9E-02	2E-05	6E-02	6E-06	2E-01
RFI-84-03	3E-06	3E-02	3E-06	2E-01	6E-08	1E-03	7E-07	1E-01	2E-05	1E-01	6E-06	2E-01

Attachment G13: Cumulative Cancer Risk and HI at all Southend Locations
GMC: NAO Flint Operations Site, Flint, Michigan

Location	RW SC Risk	RW SC HI	RW VI Risk	RW VI HI	MW SC Risk	MW SC HI	Redev Worker SC Risk	Redev Worker SC HI	Res SC Risk	Res SC HI	Res VI Risk	Res VI HI
RFI-84-04	7E-06	5E-02	3E-06	2E-01	2E-07	3E-03	1E-06	1E-01	4E-05	3E-01	6E-06	2E-01
RFI-84-05	5E-06	4E-02	1E-05	2E-01	1E-07	1E-02	1E-06	3E-01	2E-05	1E-01	2E-05	3E-01
RFI-84-06	4E-06	2E-02	3E-06	2E-01	7E-08	1E-03	7E-07	9E-02	2E-05	6E-02	6E-06	2E-01
RFI-84-09	5E-06	3E-02	4E-06	4E-02	1E-07	2E-03	9E-07	1E-01	2E-05	1E-01	9E-06	7E-02
RFI-84-10	5E-06	5E-02	4E-06	4E-02	1E-07	2E-03	9E-07	1E-01	3E-05	2E-01	8E-06	7E-02
RFI-84-11	5E-06	5E-02	4E-06	4E-02	1E-07	2E-03	9E-07	2E-01	3E-05	2E-01	8E-06	8E-02
RFI-84-7	5E-06	5E-02	5E-06	5E-02	9E-08	3E-03	1E-06	2E-01	1E-05	2E-01	1E-05	9E-02
RFI-84-8	5E-06	4E-02	5E-06	5E-02	6E-08	1E-03	1E-06	1E-01	1E-05	1E-01	1E-05	9E-02
RFI-86-01	3E-05	1E-01	4E-06	2E-01	5E-07	1E-01	3E-06	2E+00	1E-04	3E-01	7E-06	3E-01
RFI-86-07	4E-05	5E-01	3E-06	2E-01	1E-06	3E-02	6E-06	5E-01	3E-04	2E+00	7E-06	2E-01
RFI-86-10	2E-05	4E-02	2E-06	4E-02	5E-07	9E-03	3E-06	3E-01	1E-04	2E-01	3E-06	9E-02
RFI-86-11	1E-05	8E-02	9E-07	7E-03	4E-07	4E-02	2E-06	6E-01	9E-05	4E-01	2E-06	1E-02
RFI-86-12	2E-05	4E-01	9E-07	6E-03	6E-07	3E-02	3E-06	4E-01	1E-04	2E+00	2E-06	1E-02
RFI-86-13	5E-06	3E-02	9E-07	7E-03	1E-07	4E-02	8E-07	6E-01	2E-05	1E-01	2E-06	1E-02
RFI-86-17	7E-05	4E-01	9E-07	7E-03	2E-06	6E-02	9E-06	7E-01	5E-04	3E+00	2E-06	1E-02
RFI-86-18	1E-05	3E-01	9E-07	6E-03	2E-07	2E-02	1E-06	4E-01	5E-05	1E+00	2E-06	1E-02
RFI-94-01	2E-06	2E-02	3E-06	2E-01	3E-08	7E-04	5E-07	9E-02	8E-06	5E-02	6E-06	2E-01
RFI-94-02	3E-06	2E-02	3E-06	2E-01	4E-08	8E-04	6E-07	1E-01	1E-05	6E-02	6E-06	2E-01
RFI-94-03	3E-06	3E-02	3E-06	2E-01	8E-08	1E-02	7E-07	3E-01	1E-05	1E-01	6E-06	2E-01
RFI-94-04	3E-06	3E-02	3E-06	2E-01	6E-08	5E-03	6E-07	2E-01	8E-06	8E-02	6E-06	2E-01
RFI-94-05	2E-06	2E-02	3E-06	2E-01	3E-08	1E-03	5E-07	9E-02	8E-06	6E-02	6E-06	2E-01
RFI-94-06	4E-06	3E-02	3E-06	2E-01	7E-08	1E-03	7E-07	1E-01	2E-05	1E-01	6E-06	2E-01
RFI-94-07	1E-05	1E-01	4E-06	2E-01	2E-07	4E-02	3E-06	9E-01	6E-05	4E-01	1E-05	3E-01
RFI-94-08	3E-06	2E-02	3E-06	7E-02	5E-08	8E-04	6E-07	1E-01	1E-05	6E-02	7E-06	1E-01
Notes												
RW - Routine Worker; MW - Maintenance Worker; Redev Worker - Redevelopment Construction Worker; Res - Resident												
SC - Soil Contact; VI - Vapor Intrusion												
HI - Hazard Index												

Attachment G14
Area-Weighted Risk Estimates at the Southend

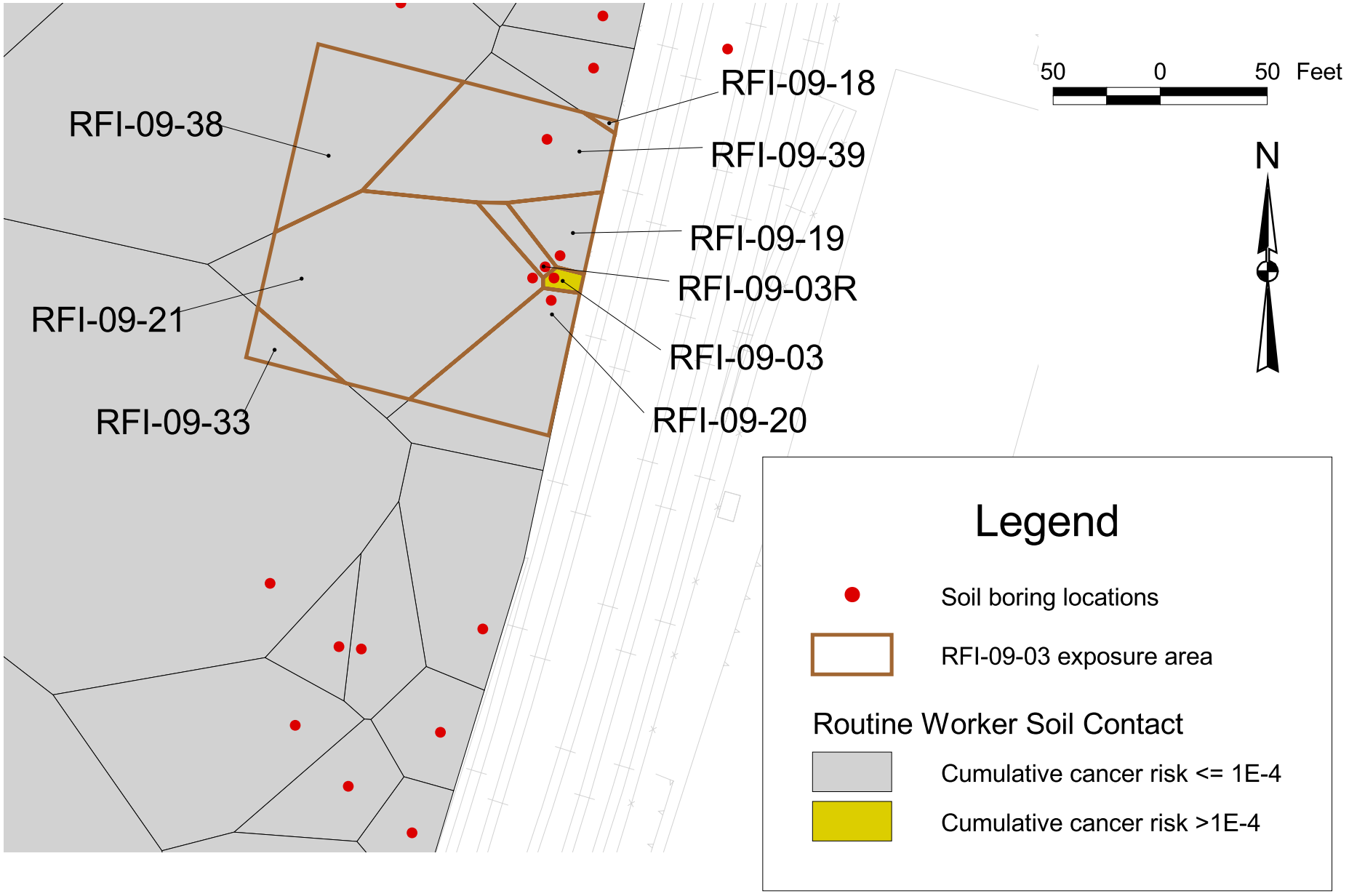
Attachment G14: Area-weighted Cancer Risks GMC: NAO Flint Operations Site, Flint, Michigan							
Location	**Polygon Area (ft^2)**	**Lot Area (ft^2)**	**% Area**	**Receptor**	**Risk**	**Weighted Risk**	**Total**
RFI-09-03	168	21762	0.8%	Routine Worker	3E-04	2E-06	2E-05
RFI-09-03R	395		1.8%		1E-05	2E-07	
RFI-09-18	46		0.2%		2E-05	5E-08	
RFI-09-19	984		4.5%		5E-05	2E-06	
RFI-09-20	2803		12.9%		8E-06	1E-06	
RFI-09-21	8664		39.8%		6E-06	2E-06	
RFI-09-33	571		2.6%		2E-06	5E-08	
RFI-09-38	3734		17.2%		3E-05	6E-06	
RFI-09-39	4396		20.2%		4E-05	9E-06	
40-4R	295	21736	1.4%	Routine Worker	4E-06	5E-08	3E-05
40-7R	6413		29.5%		6E-06	2E-06	
RFI-40-02	3482		16.0%		5E-06	8E-07	
RFI-40-12	263		1.2%		2E-04	2E-06	
RFI-40-16	7145		32.9%		5E-05	2E-05	
RFI-40-17	4138		19.0%		4E-05	7E-06	
40-7R	1514	21784	7.0%	Resident	3E-05	2E-06	1E-04
RFI-40-02	5590		25.7%		2E-05	5E-06	
RFI-40-10	1612		7.4%		2E-05	1E-06	
RFI-40-12	260		1.2%		8E-04	9E-06	
RFI-40-16	7164		32.9%		2E-04	7E-05	
RFI-40-17	5644		25.9%		2E-04	4E-05	
RFI-09-02	334	21715	1.5%	Resident	1E-04	2E-06	1E-04
RFI-09-03	168		0.8%		1E-03	1E-05	
RFI-09-03R	395		1.8%		5E-05	1E-06	
RFI-09-18	1698		7.8%		8E-05	6E-06	
RFI-09-19	976		4.5%		2E-04	1E-05	
RFI-09-20	754		3.5%		3E-05	1E-06	
RFI-09-21	5886		27.1%		2E-05	7E-06	
RFI-09-37	77		0.4%		8E-05	3E-07	
RFI-09-38	6565		30.2%		1E-04	4E-05	
RFI-09-39	4862		22.4%		2E-04	4E-05	

Attachment G14: Residential Area-weighted Noncancer Hazard Index GMC: NAO Flint Operations Site, Flint, Michigan							
Location	**Polygon Area (ft^2)**	**Lot Area (ft^2)**	**% Area**	**Receptor**	**HI**	**Weighted HI**	**Total**
RFI-09-05	645	21791	3.0%	Resident	3E+00	9E-02	2E-01
RFI-09-26	4647		21.3%		7E-02	1E-02	
RFI-09-27	5063		23.2%		5E-02	1E-02	
RFI-09-28	5708		26.2%		9E-02	2E-02	
RFI-09-29	5728		26.3%		2E-01	5E-02	
RFI-12-06	3557	21812	16.3%	Resident	5E-02	9E-03	1E+00
RFI-12-11D	804		3.7%		2E-01	8E-03	
RFI-12-28	173		0.8%		3E-01	3E-03	
RFI-12-30	1619		7.4%		6E-01	4E-02	
RFI-12-31	5923		27.2%		2E+00	6E-01	
RFI-12-35	5121		23.5%		2E+00	5E-01	
RFI-29-01	1873		8.6%		4E-01	3E-02	
RFI-29-03	2743		12.6%		3E-01	4E-02	
RFI-09-02	334	21715	1.5%	Resident	2E+00	4E-02	1E+00
RFI-09-03	168		0.8%		8E-01	6E-03	
RFI-09-03R	395		1.8%		7E-01	1E-02	
RFI-09-18	1698		7.8%		7E-02	5E-03	
RFI-09-19	976		4.5%		7E-01	3E-02	
RFI-09-20	754		3.5%		7E-01	2E-02	
RFI-09-21	5886		27.1%		7E-01	2E-01	
RFI-09-37	77		0.4%		8E-01	3E-03	
RFI-09-38	6565		30.2%		2E+00	7E-01	
RFI-09-39	4862		22.4%		7E-02	2E-02	

Attachment G14: Redevelopment Worker Area-weighted Noncancer Hazard Index
GMC: NAO Flint Operations Site, Flint, Michigan

Location	Polygon Area (ft^2)	Lot Area (ft^2)	% Area	Receptor	HI	Weighted HI	Total
RFI-09-04	1885	83483	2.3%	Redevelopment Construction Worker	6E+00	1E-01	9E-01
RFI-09-22	5213		6.2%		8E-02	5E-03	
RFI-09-23	1423		1.7%		2E-01	4E-03	
RFI-09-24	2381		2.9%		2E+00	5E-02	
RFI-09-25	2262		2.7%		2E+00	7E-02	
RFI-09-33	54937		65.8%		8E-01	5E-01	
RFI-09-34	7507		9.0%		7E-01	6E-02	
RFI-09-35	6533		7.8%		9E-01	7E-02	
RFI-09-49	1342		1.6%		2E+00	2E-02	
RFI-44-04	30937	108950	28.4%	Redevelopment Construction Worker	6E-01	2E-01	6E-01
RFI-44-05	7810		7.2%		3E+00	2E-01	
RFI-44-07	16095		14.8%		9E-01	1E-01	
RFI-44-09	54104		49.7%		2E-01	1E-01	
RFI-86-01	1399	5946	23.5%	Redevelopment Construction Worker	2E+00	5E-01	9E-01
RFI-86-10	1992		33.5%		3E-01	9E-02	
RFI-86-11	2555		43.0%		6E-01	3E-01	

Attachment G14: Area-weighted Lead Concentrations GMC: NAO Flint Operations Site, Flint, Michigan							
Location	**Polygon Area (ft^2)**	**Lot Area (ft^2)**	**% Area**	**Receptor**	**Lead Conc (mg/kg)**	**Weighted Lead Conc (mg/kg)**	**Total**
RFI-40-01	5184	21701	23.9%	Resident	2E+01	5E+00	2E+02
RFI-40-05	2557		11.8%		8E+00	1E+00	
RFI-40-06	5976		27.5%		2E+02	6E+01	
RFI-40-07	19		0.1%		2E+01	2E-02	
RFI-40-08	3126		14.4%		1E+02	1E+01	
RFI-40-09	4838		22.3%		5E+02	1E+02	

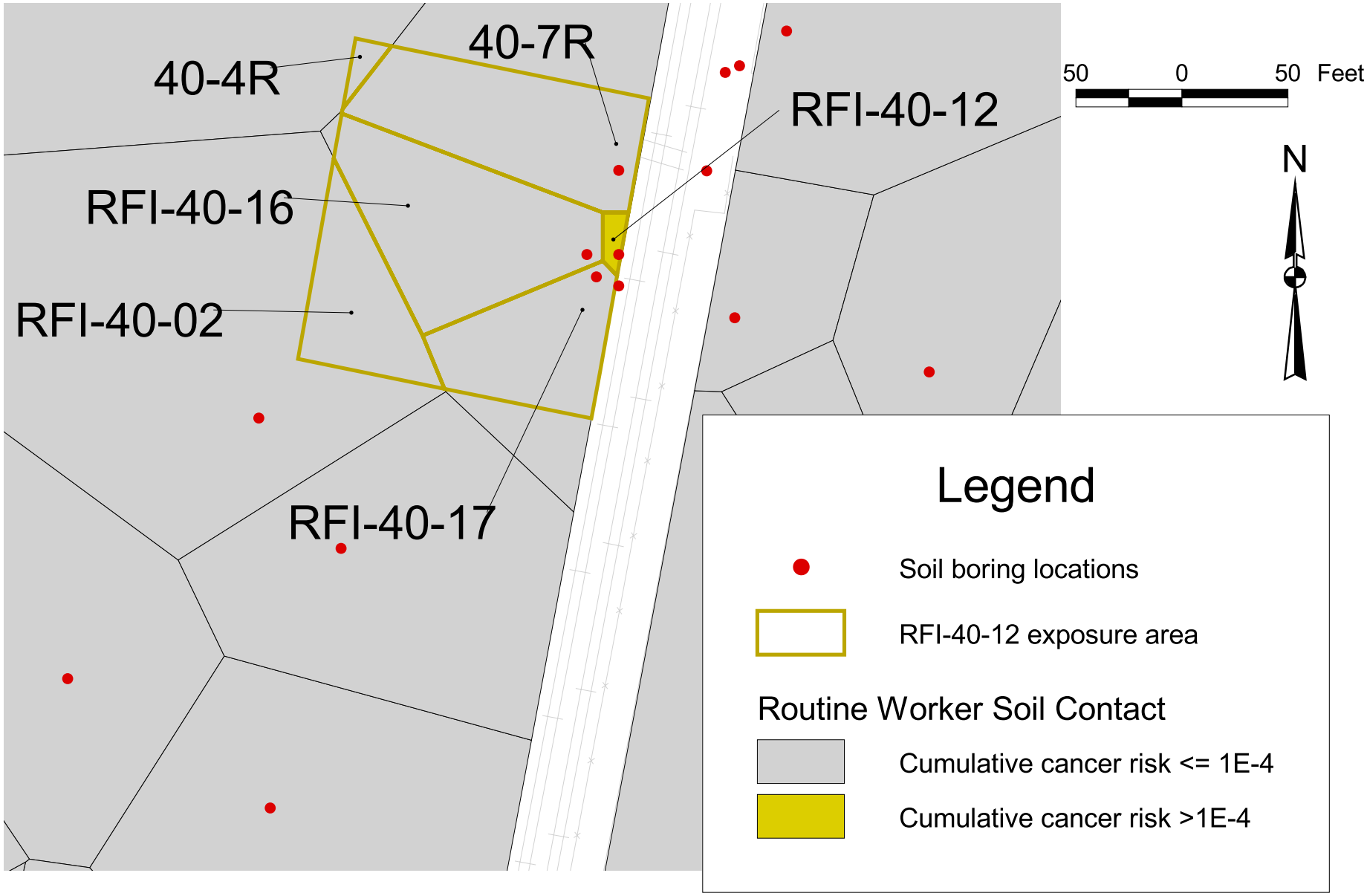


ENVIRON

Date: May 2006

EXPOSURE AREA FOR AREA-WEIGHTED RISKS NEAR RFI-09-03
GMC: NAO FLINT OPERATIONS SITE, FLINT, MICHIGAN

Attachment G-14
Arcview Plot

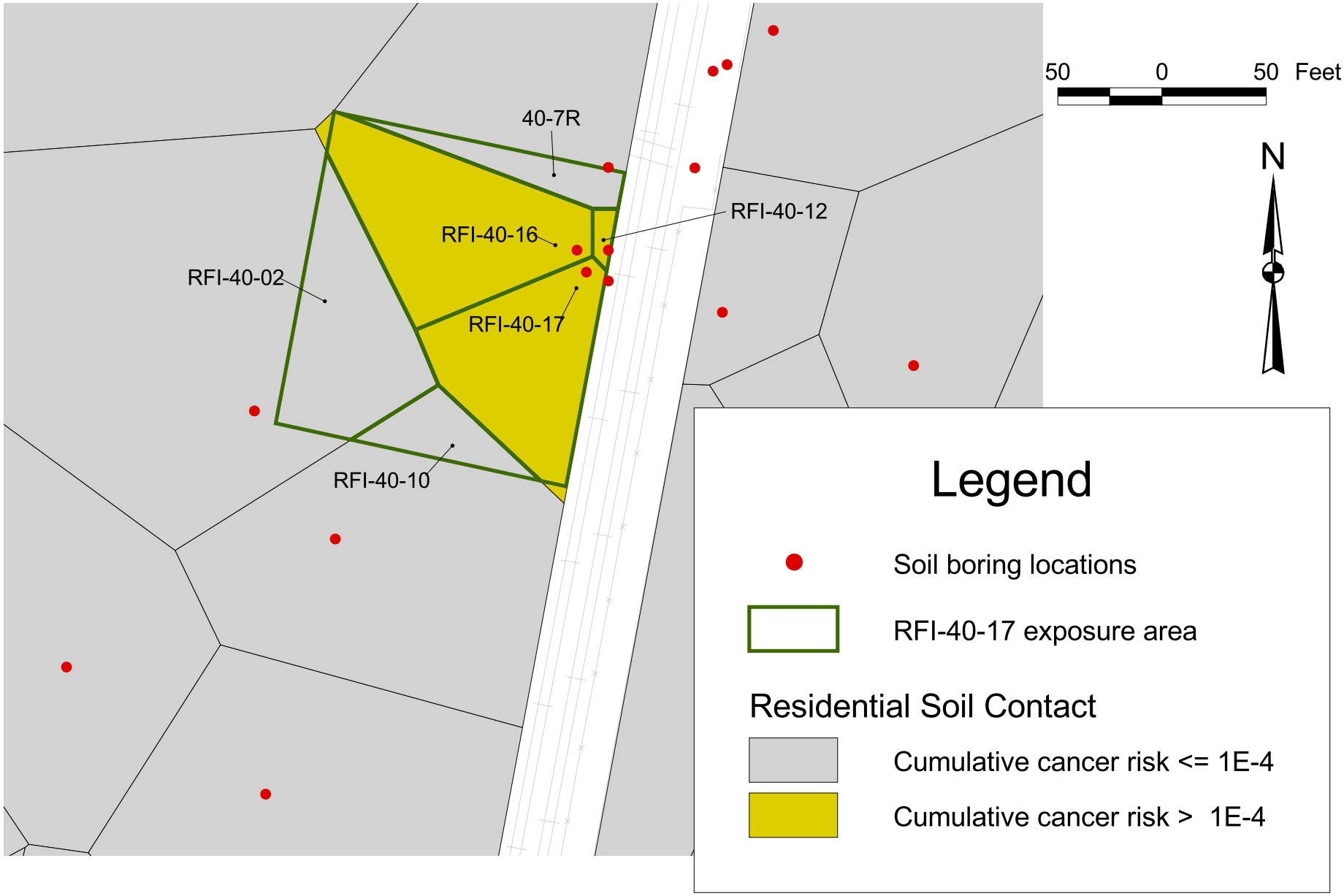


ENVIRON

Date: May 2006

EXPOSURE AREA FOR AREA-WEIGHTED RISKS NEAR RFI-40-12
GMC: NAO FLINT OPERATIONS SITE, FLINT, MICHIGAN

Attachment G-14
Arcview Plot

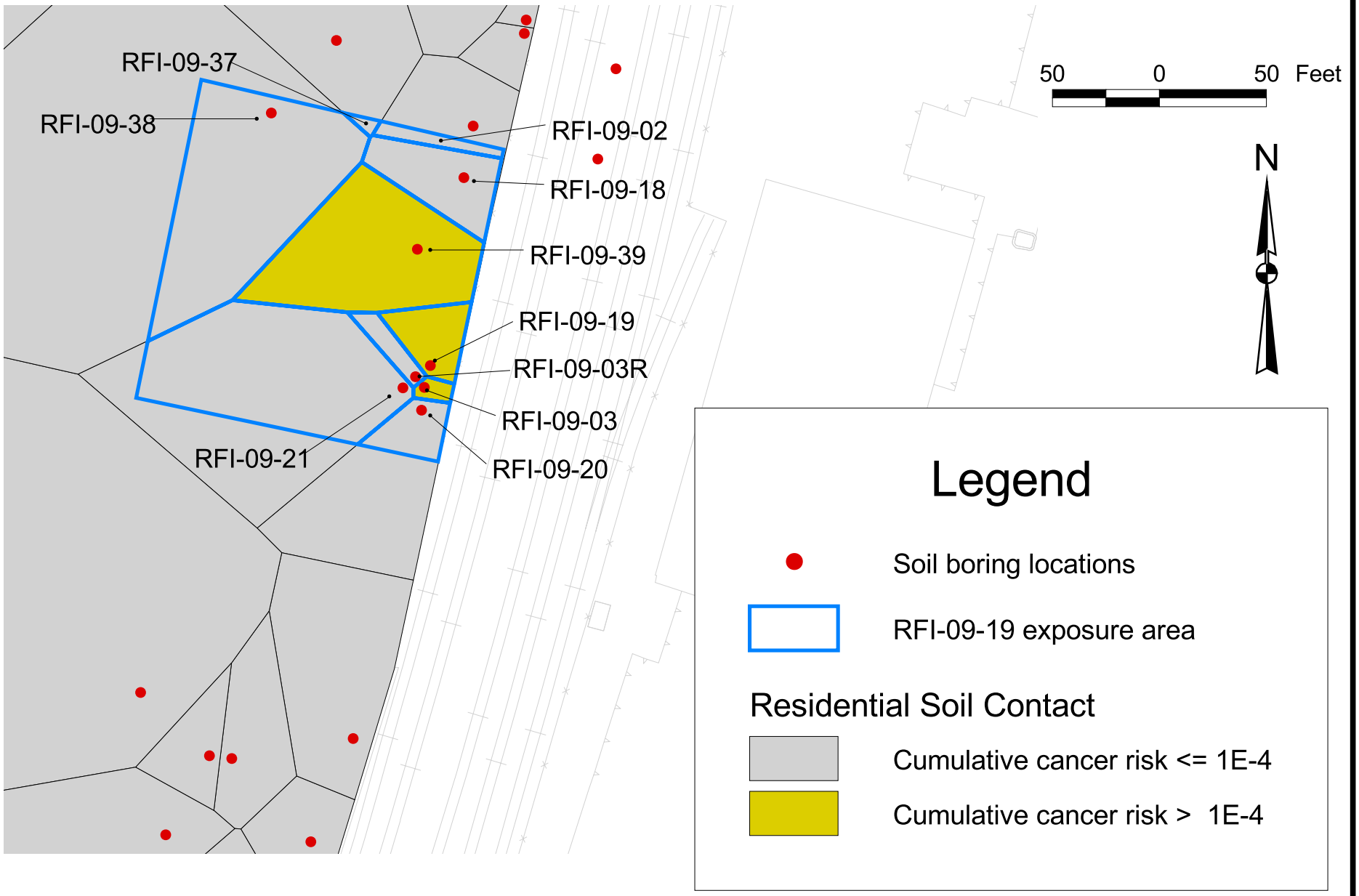


ENVIRON

Date: May 2006

EXPOSURE AREA FOR AREA-WEIGHTED RISKS NEAR RFI-40-17
GMC: NAO FLINT OPERATIONS SITE, FLINT, MICHIGAN

Attachment G-14
Arcview Plot

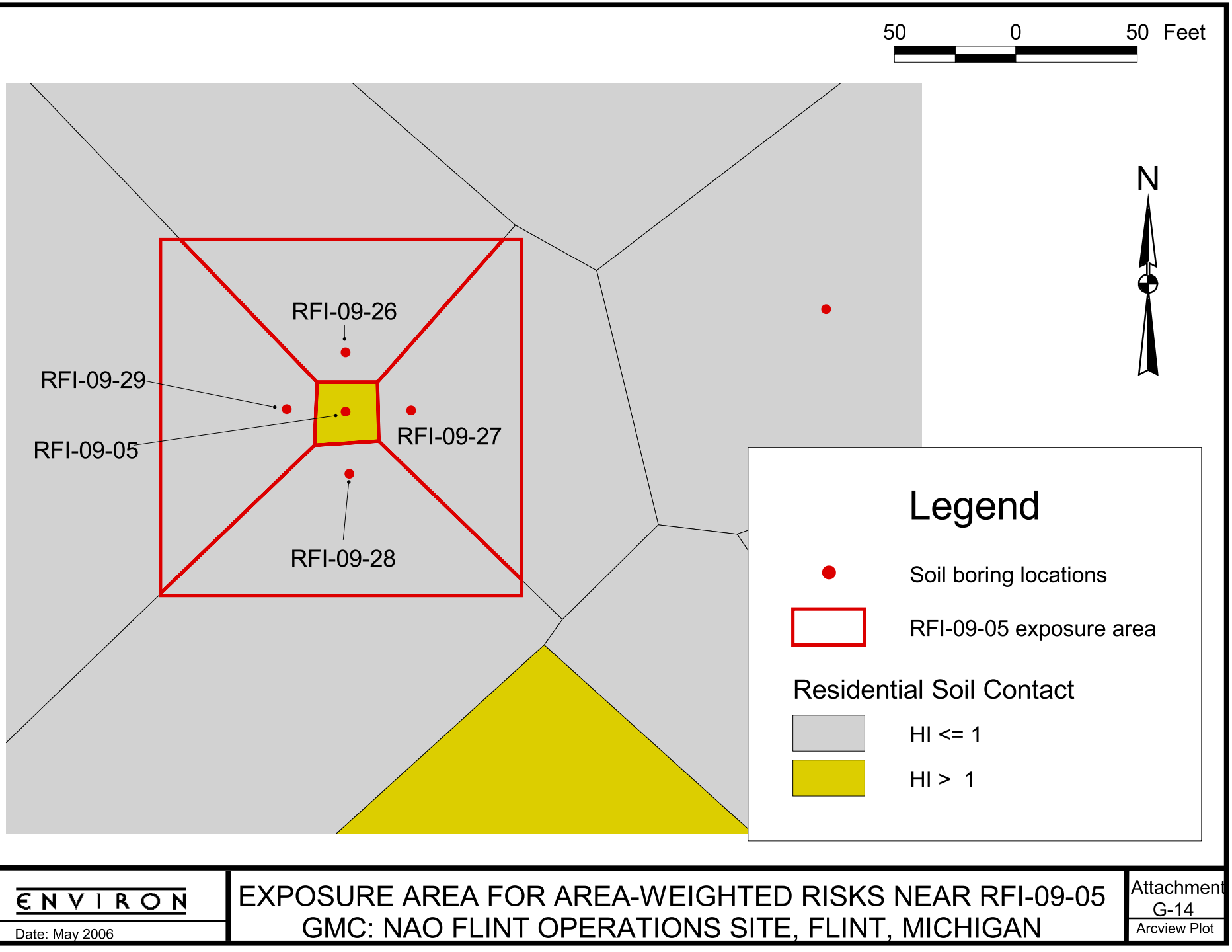


ENVIRON

Date: May 2006

EXPOSURE AREA FOR AREA-WEIGHTED RISKS NEAR RFI-09-19
GMC: NAO FLINT OPERATIONS SITE, FLINT, MICHIGAN

Attachment G-14
Arcview Plot

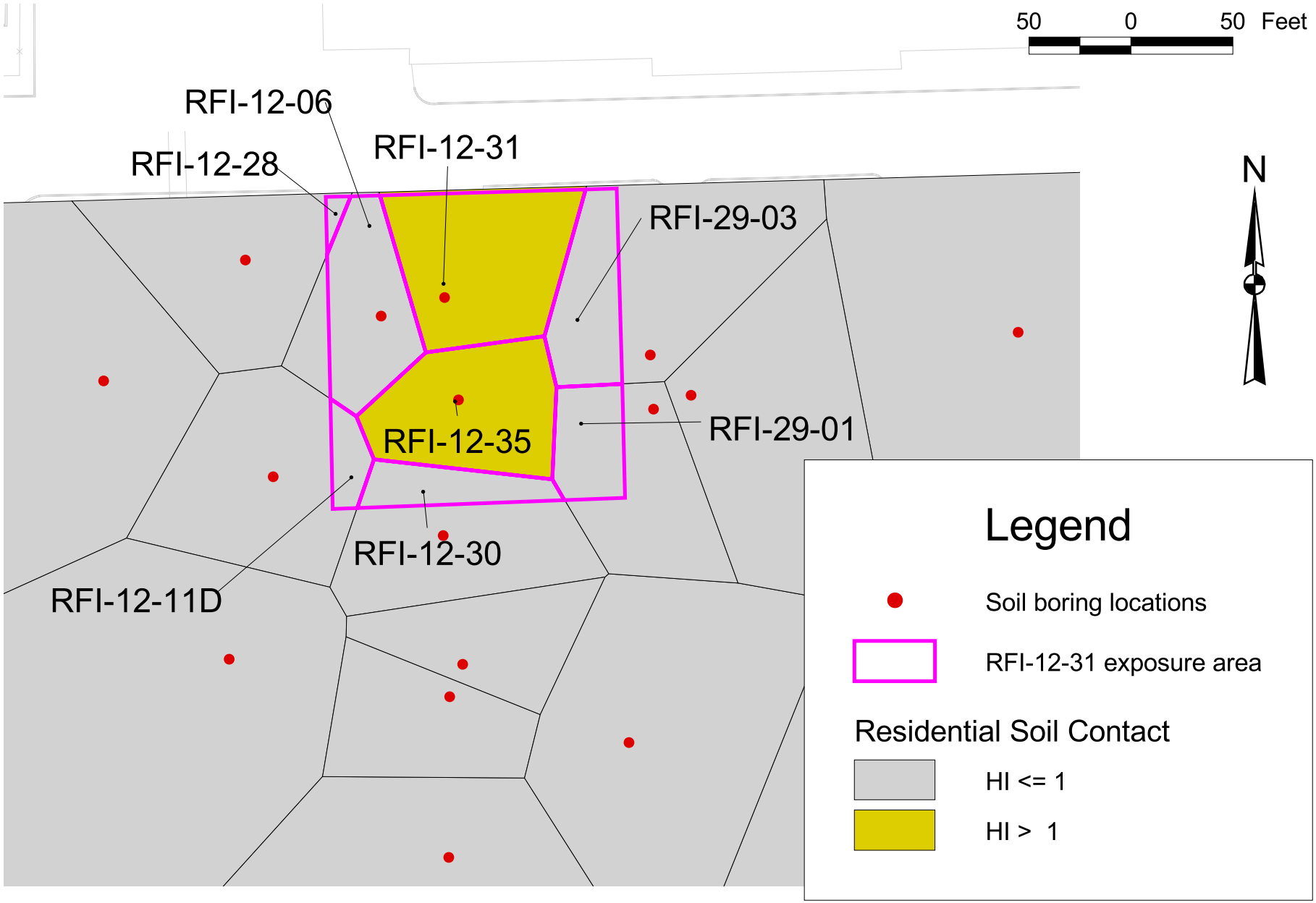


ENVIRON

Date: May 2006

EXPOSURE AREA FOR AREA-WEIGHTED RISKS NEAR RFI-09-05
GMC: NAO FLINT OPERATIONS SITE, FLINT, MICHIGAN

Attachment G-14
Arcview Plot



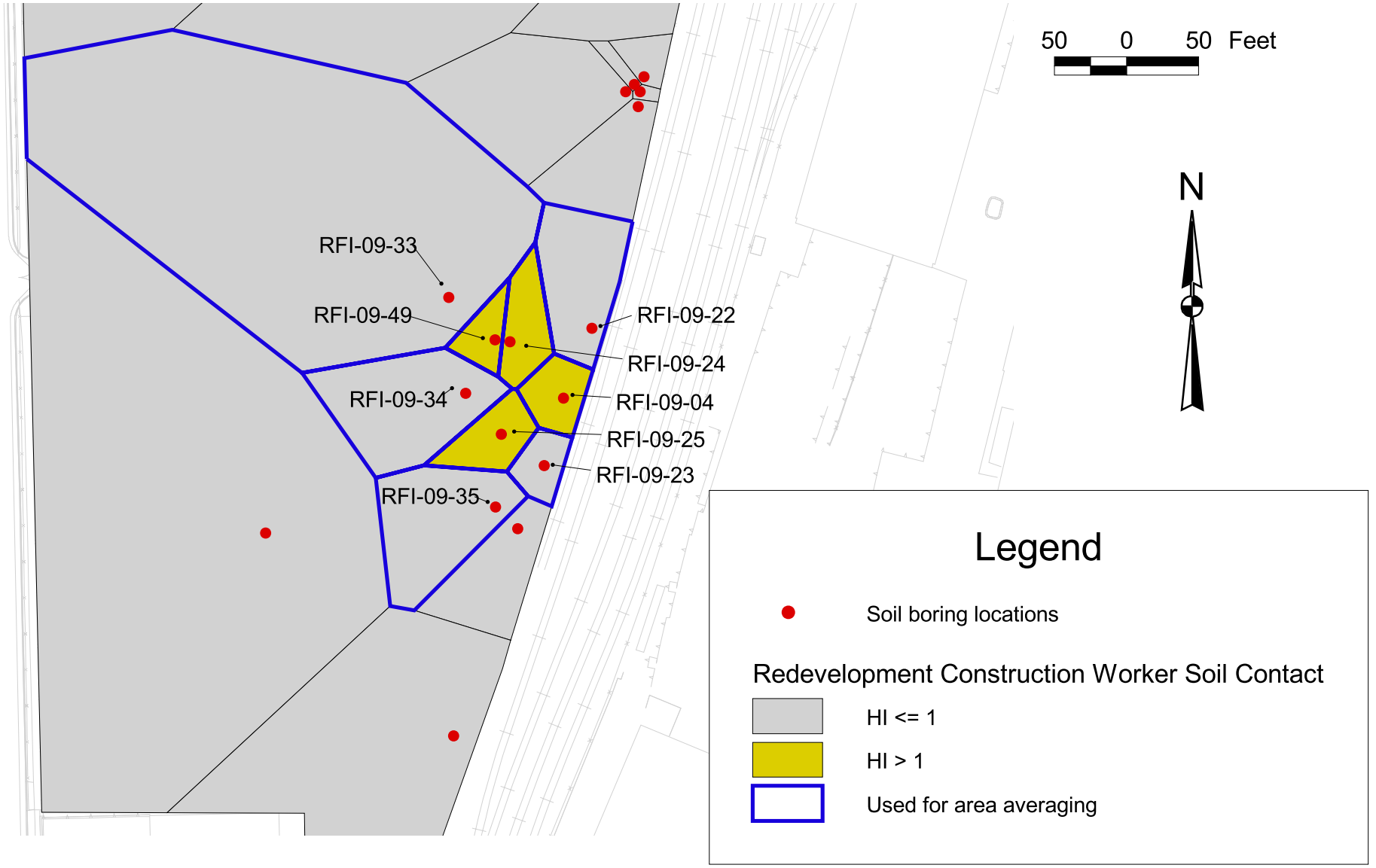
ENVIRON

Date: May 2006

EXPOSURE AREA FOR AREA-WEIGHTED RISKS NEAR RFI-12-31
GMC: NAO FLINT OPERATIONS SITE, FLINT, MICHIGAN

Attachment G-14
Arcview Plot

DRAFT



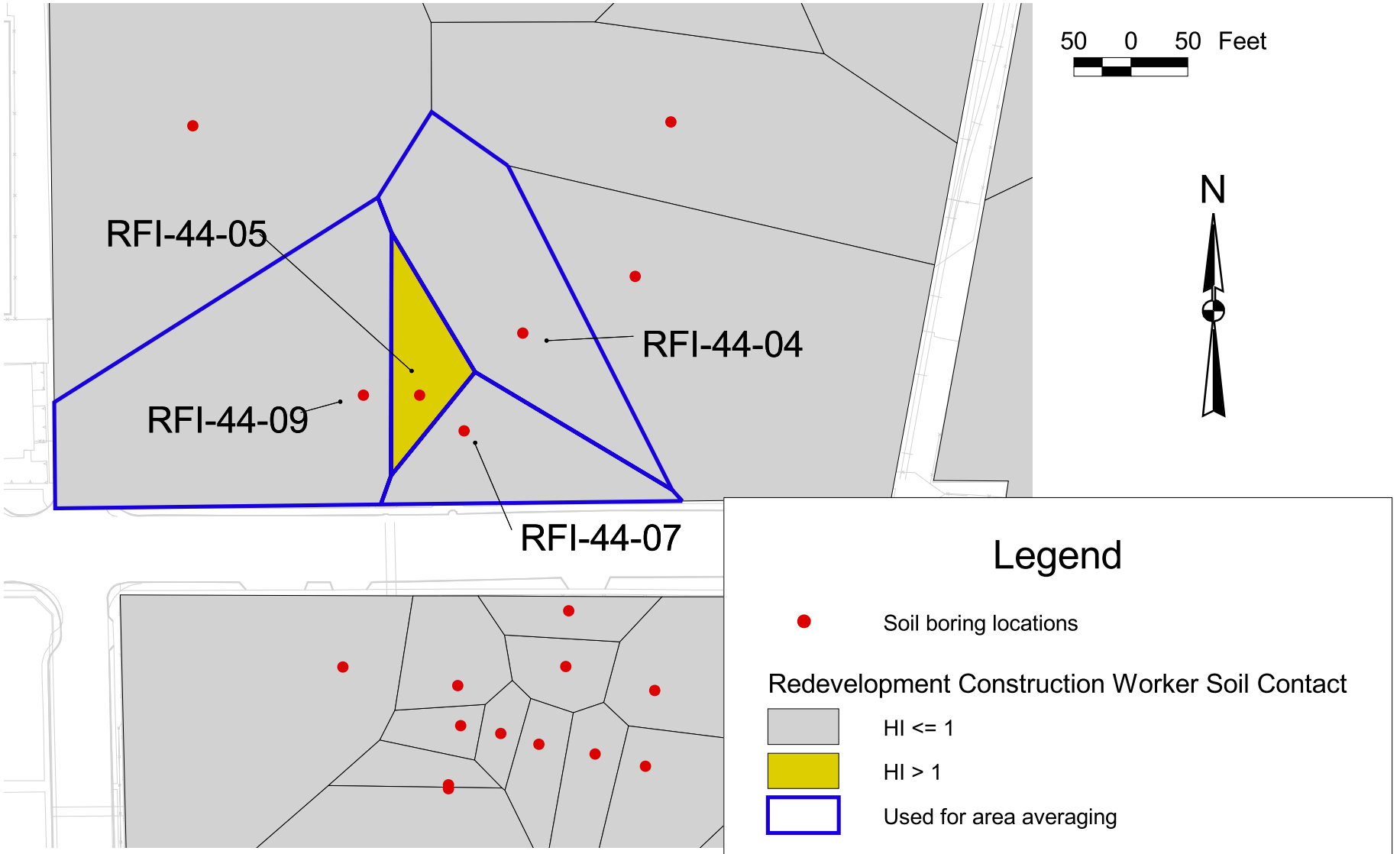
ENVIRON

Date: May 2006

EXPOSURE AREA FOR AREA-WEIGHTED RISKS NEAR RFI-09-24
GMC: NAO FLINT OPERATIONS SITE, FLINT, MICHIGAN

Attachment G-14
Arcview Plot

DRAFT



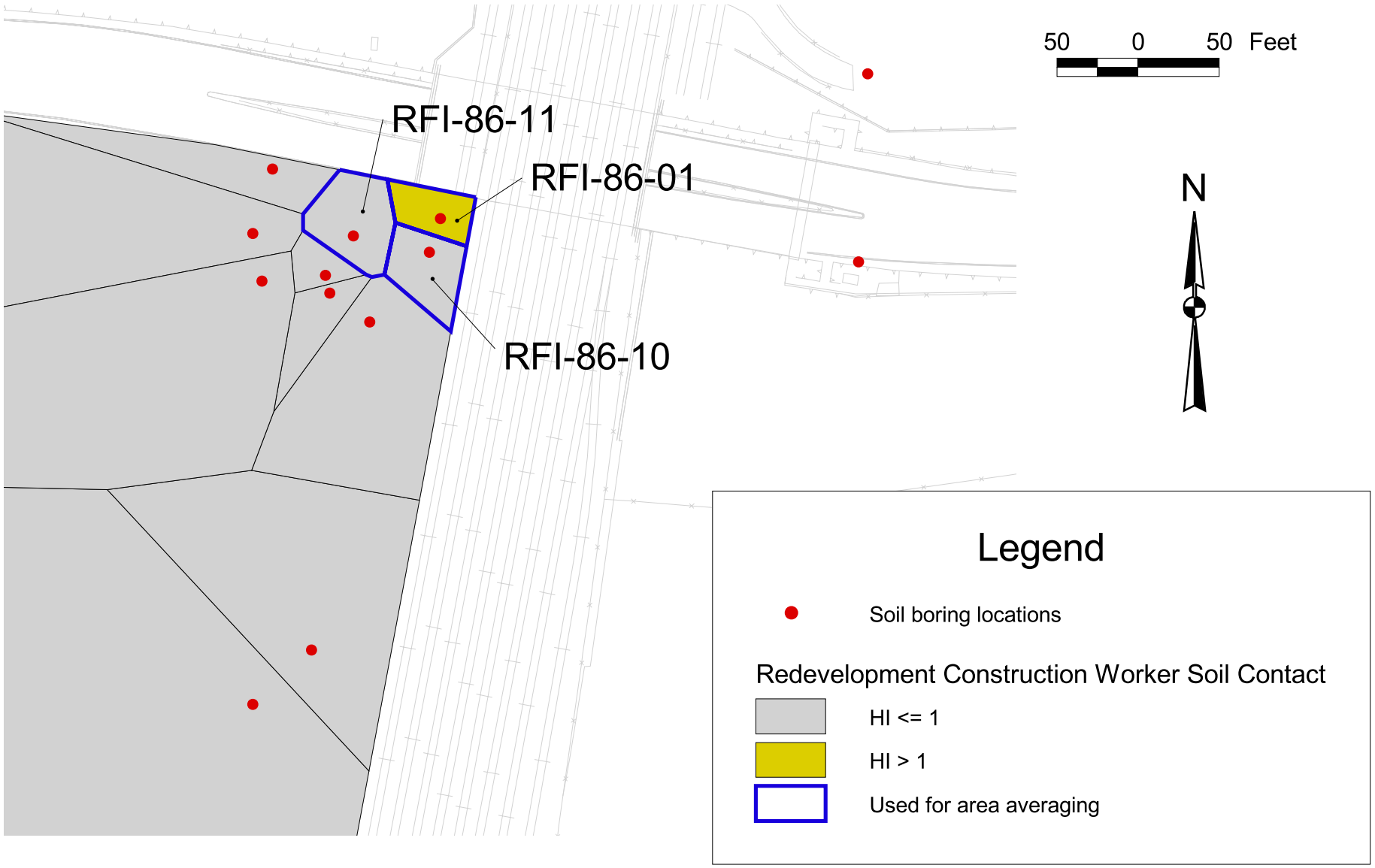
ENVIRON

Date: May 2006

EXPOSURE AREA FOR AREA-WEIGHTED RISKS NEAR RFI-44-05
GMC: NAO FLINT OPERATIONS SITE, FLINT, MICHIGAN

Attachment G-14
Arcview Plot

DRAFT

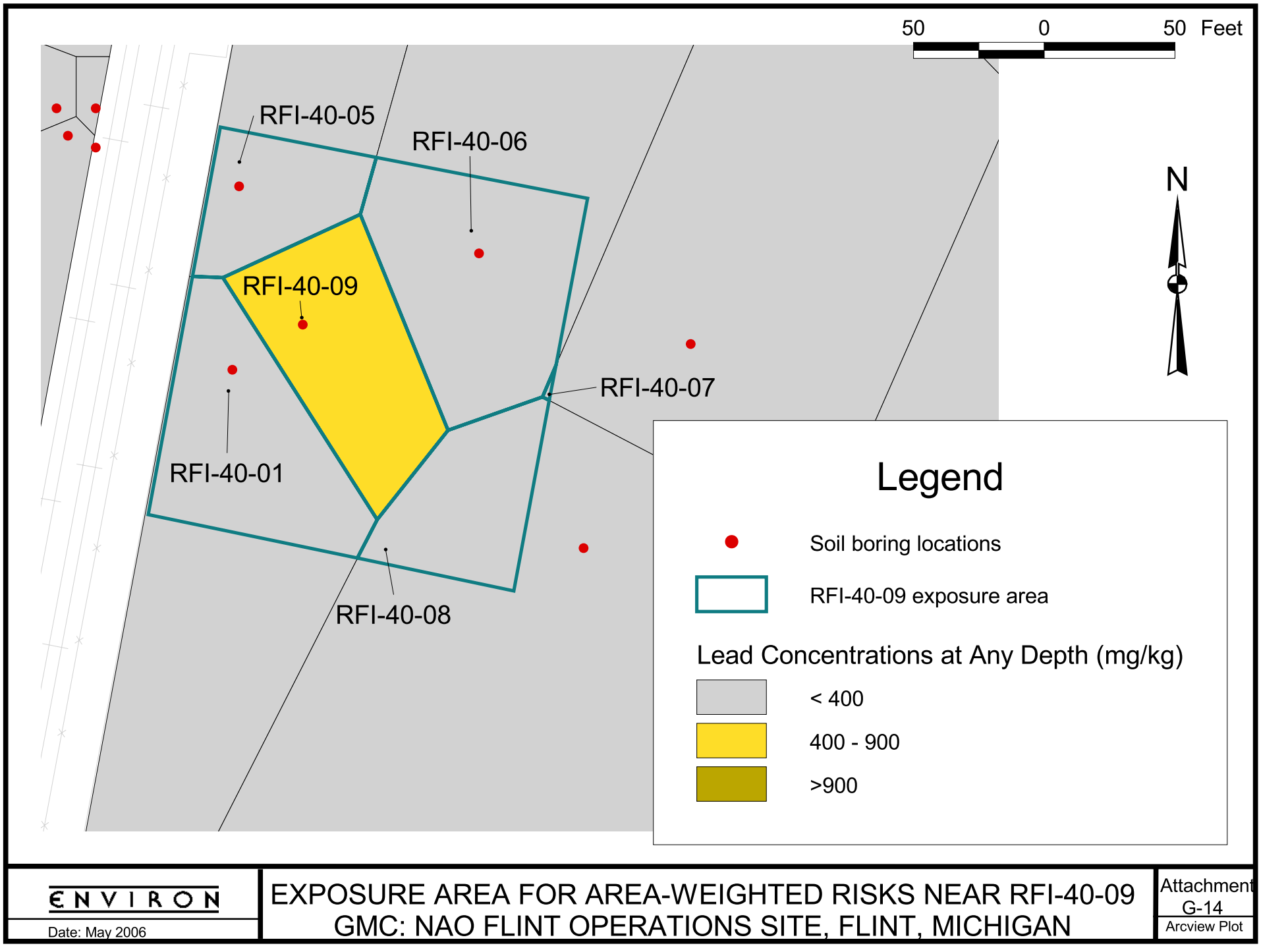


ENVIRON

Date: May 2006

EXPOSURE AREA FOR AREA-WEIGHTED RISKS NEAR RFI-86-01
GMC: NAO FLINT OPERATIONS SITE, FLINT, MICHIGAN

Attachment G-14
Arcview Plot



ENVIRON

Date: May 2006

EXPOSURE AREA FOR AREA-WEIGHTED RISKS NEAR RFI-40-09
GMC: NAO FLINT OPERATIONS SITE, FLINT, MICHIGAN

Attachment G-14
Arcview Plot

Attachment G15
Supplemental Evaluation of Arsenic Groundwater Data

February 13, 2006

To: Kurt Blizzard, General Motors
Derek Kaiding, Blasland Bouck & Lee

From: Francis Ramacciotti
C.Y. Jeng

RE: Supplemental Evaluation of Arsenic Groundwater Data
NAO Flint Operations Site, Flint, Michigan

This memorandum discusses a supplemental evaluation of arsenic groundwater data in support of the RCRA Corrective Action for the General Motors Corporation's (GM's) North American Operations (NAO) Flint Operations Site located at 902 East Leith Street in Flint, Michigan (the Site). This supplemental evaluation compares the arsenic groundwater data for the Site with an update to the generic drinking water criterion for arsenic outlined in Part 201 of the Michigan Natural Resources and Environmental Protection Act, 1994, Public Act 451 (Part 201). This criterion update (the update) was issued by the Michigan Department of Environmental Quality (MDEQ) on October 26, 2005, and became effective on October 31, 2005. As discussed below, the update affects some of the data screening results presented in the RCRA Facility Investigation (RFI) Phase II Report (BBL 2004; revised 2006) and the Migration of Contaminated Groundwater Environmental Indicator (EI) Report (CA750 Report) (ENVIRON 2005), but it does not substantively affect the conclusions of these Reports.

The December 2004 version of the Part 201 generic cleanup criteria (MDEQ 2004) was used for data screening during the preparation of the RFI Phase II Report and the CA750 Report, because it was the version in effect at the time. Subsequently, MDEQ announced revisions to the Part 201 generic cleanup criteria that, among other things, revised from 0.05 mg/L to 0.010 mg/L the generic drinking water criterion for arsenic that was used for data screening (MDEQ 2005). During the RFI 48 groundwater samples from 21 monitoring well locations had arsenic concentrations that exceeded the 2004 Part 201 generic industrial drinking water criterion. As

discussed in the RFI Phase II Report and the CA750 Report, these concentrations were limited to several small areas. Groundwater at the Site is not currently used as a drinking water supply, and the Site has institutional controls to prohibit future use of groundwater as a drinking water supply.

Ninety-eight groundwater samples from 60 monitoring wells have arsenic concentrations that did not exceed the 2004 Part 201 generic drinking water criterion but now exceed the 2005 criterion (see attached Table 1). Figures 4-1 through 4-28 show the locations of these monitoring wells at the Northend and Southend, respectively. As shown on these figures, most of these monitoring wells are interior to the Site and have been sufficiently characterized for arsenic at the downgradient property boundary by other monitoring wells based on site-wide groundwater flow direction from December 2004. There are five areas (two at the Northend and three at the Southend) where arsenic concentrations higher than the 2005 Part 201 generic drinking water criterion lack sufficient downgradient characterization. These five areas are discussed in the following paragraphs.

Northend

The arsenic concentration of 0.013 mg/L at monitoring well RFI-36-02 is slightly higher than the 2005 Part 201 generic drinking water criterion (see Figure 4-4), but it does not exceed the other pertinent Part 201 criteria. As discussed above, no current or future potable or nonpotable uses of groundwater exist at the Site and direct contact is the only potential exposure pathway. Therefore, the fact that this arsenic concentration is now higher than the new the new drinking water criterion does not alter the conclusions in the RFI Report. However, no arsenic groundwater data have been collected downgradient of RFI-36-02. Monitoring well RFI-36-47 is downgradient of RFI 36-02, but it was analyzed for only volatile organic compounds (VOCs) during the RFI. It might be prudent to sample this monitoring well during the next CA750 quarterly sampling event to provide downgradient characterization of arsenic at RFI-36-02.

Five monitoring wells (70-160, GM-1, GM-4, GM-11, and GM-12), located upgradient of or in the Former Aeration Lagoons area (see Figure 4-28), had arsenic concentrations (ranging from 0.012 to 0.032 mg/L) higher than the new drinking water criterion. Groundwater in this area flows west to east toward the Flint River, which is approximately 650 feet downgradient of GM-1 and GM-11. According to USEPA's default dilution factor of 10 for assessing the significance of groundwater discharge to surface water (in Question 5 of the CA750), arsenic concentrations at these locations are not expected to have a significant effect if they discharge to the Flint River since they are less than 10 times the new drinking water criterion. Additionally, arsenic concentrations at these monitoring wells are below the other pertinent Part 201 generic criteria.

Therefore, the conclusions in the RFI Phase II Report and the CA750 Report regarding this area remain unchanged.

Southend

The arsenic concentration of 0.036 mg/L at monitoring well RFI-02-08 from September 2001 exceeded the 2005 Part 201 generic drinking water criterion (see Figure 4-14), but does not exceed the other pertinent Part 201 criteria. Groundwater in this area flows north toward monitoring well RFI-86-01R, where the arsenic concentration in groundwater collected in April 2003 is lower than the 2005 Part 201 generic drinking water criterion. Furthermore, no current or future potable or nonpotable uses of groundwater exist at the Site as discussed above, so the fact that this arsenic concentration now exceeds the new drinking water criterion does not alter the conclusions in the RFI and EI Reports for this area.

The arsenic concentration of 0.037 mg/L at monitoring well 40-303R exceeded the 2005 Part 201 generic drinking water criterion (see Figure 4-22), but does not exceed the other pertinent Part 201 criteria. Groundwater in this area flows southeast toward monitoring well RFI-84-06R (see Figure 4-18), where the arsenic concentration in groundwater collected in April 2003 is lower than the 2005 Part 201 generic drinking water criterion. Furthermore, no current or future potable or nonpotable uses of groundwater exist at the Site as discussed above, so the fact that this arsenic concentration now exceeds the new drinking water criterion does not alter the conclusions in the RFI and EI Reports for this area.

The arsenic concentration of 0.049 mg/L at monitoring well RFI-09-49 exceeded the 2005 Part 201 generic drinking water criterion (see Figure 4-24). Groundwater in this area flows southeast toward the Flint River, about 75 feet downgradient. According to USEPA's default dilution factor of 10 for assessing the significance of groundwater discharge to surface water (in Question 5 of the CA750), arsenic concentrations at this location are not expected to have a significant effect if it discharges to the Flint River since it is less than 10 times the new drinking water criterion. Additionally, arsenic at this monitoring well is below the other pertinent Part 201 generic criteria. Therefore, the conclusions in the RFI Phase II Report and the CA750 Report regarding this area remain unchanged.

References

Blasland, Bouck & Lee, Inc. (BBL). 2004. Phase II RFI Report, NAO Flint Operations Site, Flint, Michigan. March.

ENVIRON International Corporation (ENVIRON). 2005. RCRA Environmental Indicator CA750 Report Determination of Migration of Contaminated Groundwater Under Control, NAO Flint Operations Site, Flint, Michigan. September.

Michigan Department of Environmental Quality (MDEQ). 2004 Update. Administrative Rules for Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as Amended. Generic Cleanup Criteria and Screening Levels. December.

Michigan Department of Environmental Quality (MDEQ). 2005. Administrative Rules for Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as Amended. Generic Cleanup Criteria and Screening Levels. October.

T A B L E

Table 1: Arsenic Concentrations in Groundwater Exceeding 2005 MDEQ Generic Drinking Water Criteria NAO Flint Operations Site, Flint, Michigan

Area	AOI	Well ID	Sample Date	Meas Basis	Conc (mg/L)
GM-North	03-1	03-101	9/27/2001	D	2.90E-02
GM-North	03-1	RFI-03-01	9/19/2001	D	1.10E-02
GM-North	03-1	RFI-03-02	2/26/2002	D	1.10E-02
GM-North	03-1	RFI-03-04	6/13/2002	T	1.20E-02
GM-North	05-1	43-166	9/26/2001	D	2.40E-02
GM-North	05-1	43-166	6/19/2002	T	2.90E-02
GM-North	05-1	43-167	9/26/2001	D	3.70E-02
GM-North	05-1	RFI-05-21	9/25/2001	D	4.60E-02
GM-North	05-1	RFI-05-21	3/27/2003	T	3.50E-02
GM-North	05-2	RFI-05-01	9/25/2001	D	1.80E-02
GM-North	05-3	RFI-05-06	9/25/2001	D	2.40E-02
GM-North	05-5	RFI-05-10	9/19/2001	D	2.30E-02
GM-North	05-5	RFI-05-12	6/14/2002	T	4.60E-02
GM-North	05-6	RFI-05-19DR	12/18/2002	T	1.70E-02
GM-North	10-2	RFI-10-02	9/24/2001	D	3.80E-02
GM-North	10-2	RFI-10-02	6/18/2002	T	4.10E-02
GM-North	10-2	RFI-10-02	3/27/2003	D	3.30E-02
GM-North	10-2	RFI-10-12	12/18/2002	T	4.50E-02
GM-North	10-2	RFI-10-12	12/18/2002	D	4.40E-02
GM-North	10-3	20-101R	11/15/2001	T	2.40E-02
GM-North	10-3	20-101R	11/15/2001	D	2.80E-02
GM-North	10-4	20-FP10	9/25/2001	D	3.80E-02
GM-North	36-1	36-100	9/27/2001	D	1.70E-02
GM-North	36-1	36-100	9/27/2001	T	2.10E-02
GM-North	36-1	36-100	6/13/2002	T	1.20E-02
GM-North	36-1	36-100	3/25/2003	T	1.20E-02
GM-North	36-1	RFI-36-02	3/25/2003	T	1.90E-02
GM-North	36-1	RFI-36-02	10/13/2004	T	1.30E-02
GM-North	36-1	RFI-36-29R	4/3/2003	D	5.00E-02
GM-North	36-1	RFI-36-32	9/28/2001	D	5.00E-02
GM-North	36-1	RFI-36-32	4/2/2003	T	3.70E-02
GM-North	36-1	RFI-36-35	9/27/2001	T	2.00E-02
GM-North	36-1	RFI-36-35	6/18/2002	T	1.50E-02
GM-North	36-1	RFI-36-35	6/18/2002	D	1.20E-02
GM-North	36-2	36-FP1	9/27/2001	D	4.80E-02
GM-North	36-2	36-FP1	6/14/2002	T	3.30E-02
GM-North	36-3	36-FP8	9/27/2001	T	1.40E-02
GM-North	36-3	36-FP8	9/27/2001	D	1.10E-02
GM-North	36-3	RFI-36-08	9/27/2001	D	3.90E-02
GM-North	36-3	RFI-36-08	3/25/2003	T	1.30E-02
GM-North	36-5	20-500	9/21/2001	D	4.10E-02
GM-North	36-5	20-500	3/26/2003	T	5.00E-02
GM-North	36-5	37-01	9/26/2001	D	1.20E-02
GM-North	36-5	37-01	12/18/2002	T	1.40E-02
GM-North	55-1	55-1	9/26/2001	D	2.70E-02
GM-North	55-1	55-2	9/26/2001	D	2.00E-02

Table 1: Arsenic Concentrations in Groundwater Exceeding 2005 MDEQ Generic Drinking Water Criteria NAO Flint Operations Site, Flint, Michigan

Area	AOI	Well ID	Sample Date	Meas Basis	Conc (mg/L)
GM-North	55-1	RFI-55-09	9/27/2001	D	2.70E-02
GM-North	55-1	RFI-55-11	9/26/2003	T	3.10E-02
GM-North	55-1	RFI-55-12	10/8/2004	T	2.10E-02
GM-North	81-2	70-160	9/26/2001	D	3.50E-02
GM-North	81-2	70-160	6/17/2002	T	2.00E-02
GM-North	81-2	70-160	6/17/2002	D	2.20E-02
GM-North	81-2	70-160	3/28/2003	T	2.40E-02
GM-North	81-3	RFI-81-11	9/24/2001	D	1.30E-02
GM-North	81-3	RFI-81-11	6/19/2002	T	1.10E-02
GM-North	83/84-3	RFI-83/84-20	2/22/2002	D	1.70E-02
GM-North	83/84-3	RFI-83/84-20	6/20/2002	T	1.40E-02
GM-North	83/84-3	RFI-83/84-20	4/2/2003	T	2.30E-02
GM-North	83/84-7	88-8	9/20/2001	D	3.90E-02
GM-North	83/84-7	88-9	9/20/2001	D	3.60E-02
GM-North	86-1	87-FP3	9/27/2001	D	2.20E-02
GM-North	86-1	RFI-02-08	9/19/2001	T	3.60E-02
GM-North	86-1	RFI-02-08	9/19/2001	D	2.20E-02
GM-North	86-1	RFI-86-01	9/20/2001	T	1.40E-02
GM-North	86-1	RFI-86-08R	2/21/2002	D	3.60E-02
GM-North	86-1	RFI-86-08R	6/20/2002	T	4.70E-02
GM-North	86-1	RFI-86-08R	12/18/2002	T	4.10E-02
GM-North	Aeration Lagoon	GM-1	10/6/2004	T	3.20E-02
GM-North	Aeration Lagoon	GM-11	10/6/2004	T	1.40E-02
GM-North	Aeration Lagoon	GM-12	11/8/2000	D	1.20E-02
GM-North	Aeration Lagoon	GM-4	11/8/2000	D	2.00E-02
GM-South	09-B	31-8	9/17/2001	D	1.60E-02
GM-South	09-B	31-8	6/24/2002	T	2.20E-02
GM-South	09-B	RFI-09-06	9/13/2001	D	1.70E-02
GM-South	09-B	RFI-09-06	9/13/2001	T	1.60E-02
GM-South	09-B	RFI-09-12	12/13/2001	D	4.30E-02
GM-South	09-B	RFI-09-12	6/21/2002	T	4.90E-02
GM-South	09-B	RFI-09-12	6/21/2002	D	4.00E-02
GM-South	09-B	RFI-09-48	4/24/2003	T	4.90E-02
GM-South	12-A	RFI-12-35	9/17/2003	D	2.00E-02
GM-South	16-C	RFI-16-11	8/13/2001	D	1.90E-02
GM-South	16-C	RFI-16-12	2/28/2002	D	1.90E-02
GM-South	16-C	RFI-16-12	6/24/2002	T	1.20E-02
GM-South	17-A	RFI-17-02	6/25/2002	T	2.70E-02
GM-South	40-A	RFI-40-09	2/26/2002	D	4.90E-02
GM-South	40-A	RFI-40-09	6/24/2002	T	4.30E-02
GM-South	40-A	RFI-40-09	6/24/2002	D	4.10E-02
GM-South	40-A	RFI-40-15	4/22/2003	T	1.10E-02
GM-South	40-D	40-303R	12/7/2001	T	1.80E-02
GM-South	40-D	40-303R	12/7/2001	D	1.40E-02
GM-South	40-D	40-303R	6/24/2002	T	4.10E-02
GM-South	40-D	40-303R	3/27/2003	T	3.70E-02

Table 1: Arsenic Concentrations in Groundwater Exceeding 2005 MDEQ Generic Drinking Water Criteria NAO Flint Operations Site, Flint, Michigan

Area	AOI	Well ID	Sample Date	Meas Basis	Conc (mg/L)
GM-South	40-D	40-305	3/21/2003	D	1.10E-02
GM-South	44-A	04-160	9/21/2001	D	1.10E-02
GM-South	44-A	RFI-44-05	12/20/2002	T	3.30E-02
GM-South	44-A	RFI-44-05	12/20/2002	D	3.60E-02
GM-South	84-D	84-6	10/17/2001	D	1.30E-02
GM-South	84-D	84-6R2	9/15/2003	T	1.30E-02
Notes:					
Meas Basis - Measured Basis; T = Total, D = Dissolved					
2005 MDEQ Part 201 Generic Drinking Water Criterion is 0.010 mg/L.					

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.

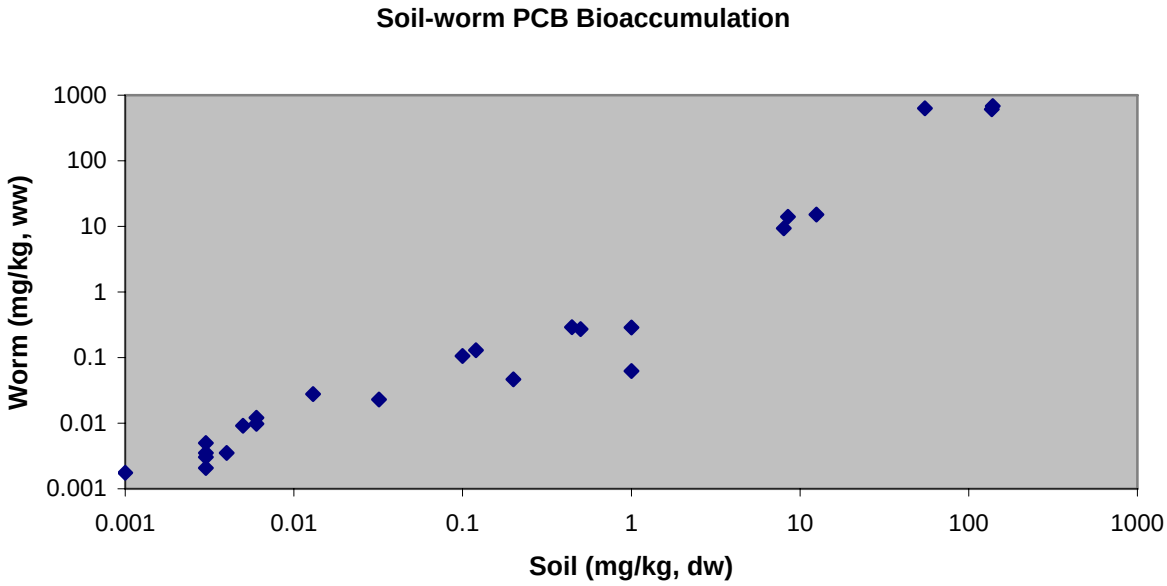


Table 1. Data Used to Develop the Soil-Worm PCB Bioaccumulation Model

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

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MSU is an affirmative-action, equal-opportunity institution.

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

EQP 0100a
(Rev. 1/98)

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

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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

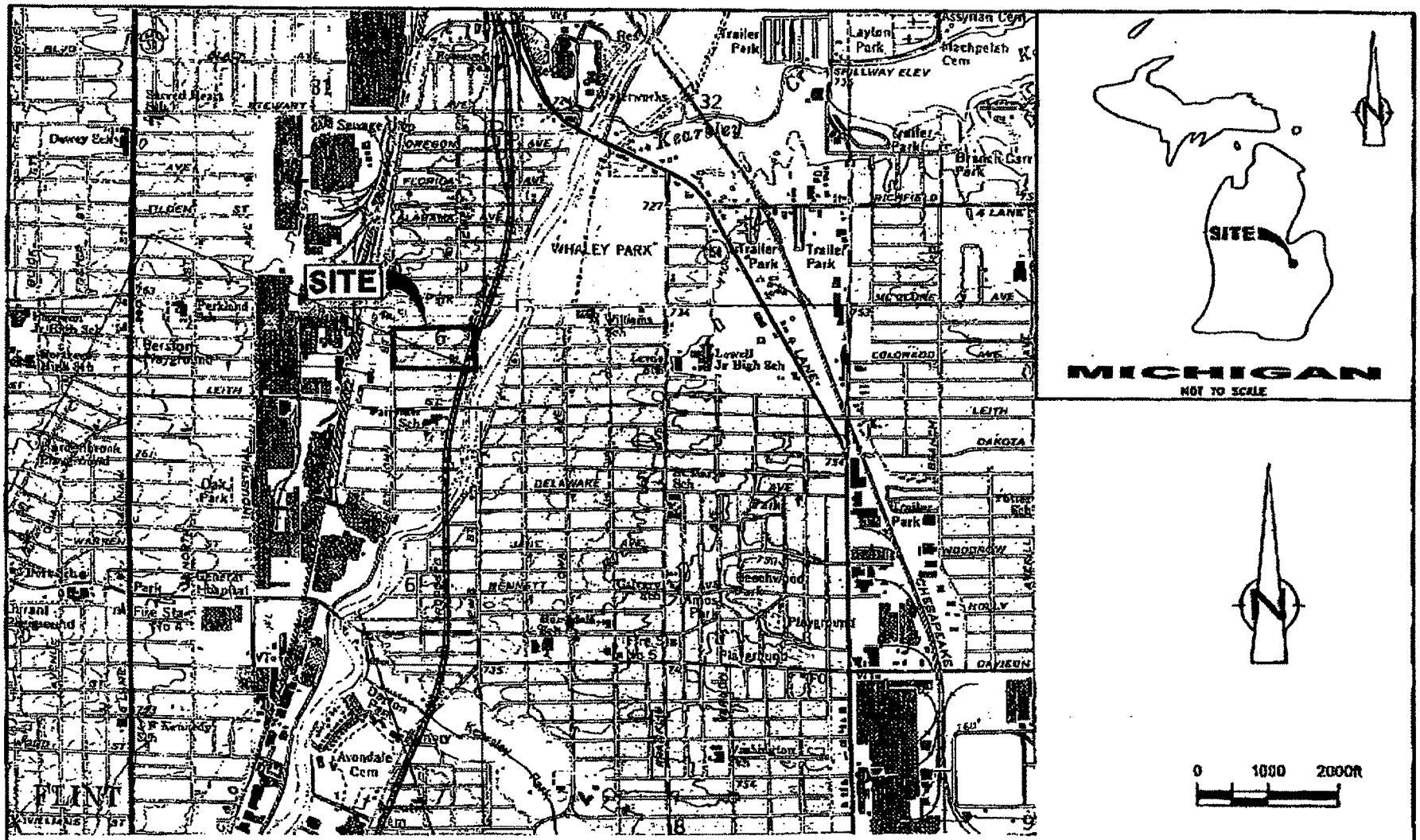
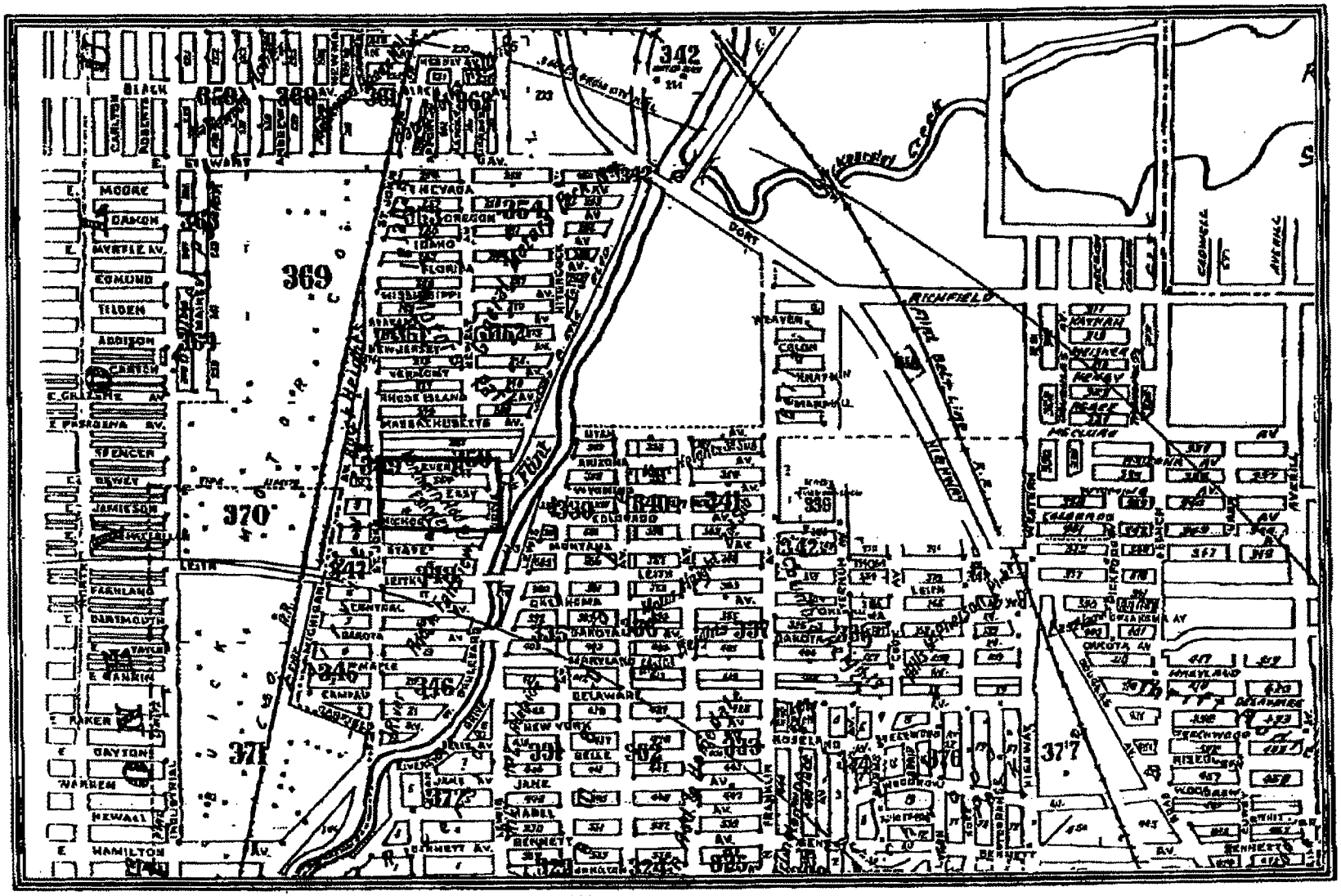


Figure 1

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

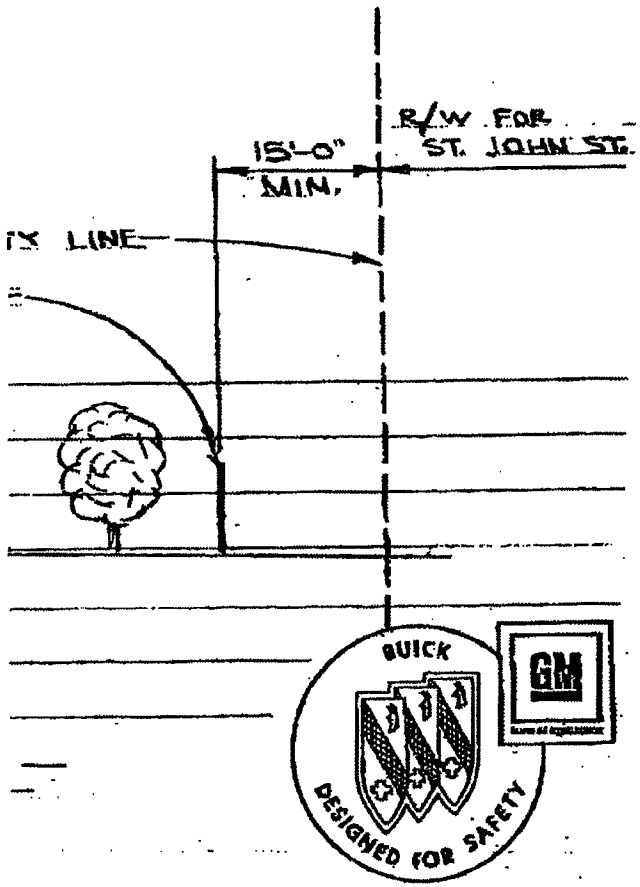


Approximate Scale:
1" = 1,412'

Exhibit 1
Sanborn Fire Insurance Map

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

JUN-18-2002 14:49 BBL AUBURN HILLS 248 377 9413 P.08/13



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	CHECKED	APPROVED
JIM HANZEK		
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

JUN-18-2002 14:50 BBL AUBURN HILLS 248 377 9413 P.09/13

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:

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)

Appendix I

Storm Sewer Investigations

Table of Contents

Section 1. Introduction 1-1

1.1 Purpose and Scope 1-1
1.2 Overview 1-1
1.3 Storm Sewer Mitigation Strategy 1-2
1.4 Organization of Document 1-2

Section 2. Site Conditions 2-1

2.1 Site Description 2-1
2.2 Previous Investigations 2-1
2.3 Storm Sewer and Outfall-Related Issues 2-1

Section 3. June through August 2002 Investigation Activities 3-1

3.1 Investigation Approach 3-1
3.2 Investigative Activities 3-1
3.2.1 Storm Sewer Flow Assessment 3-1
3.2.2 Sampling and Analysis 3-2
3.2.3 Visual Inspection for LNAPL 3-3
3.2.4 Internal Inspection 3-3
3.2.5 Groundwater Elevation Monitoring 3-3
3.3 Investigation Results 3-4
3.3.1 Outfall 002 3-4
3.3.2 Outfall 003 3-6
3.3.3 Outfall 004 3-9
3.3.4 Outfall 005 3-11
3.3.5 Outfall 011 3-13
3.4 Investigation Conclusions 3-13

Section 4. Supplemental Investigation 4-1

4.1 Outfall 002 4-1
4.2 Outfall 004 4-2

Section 5. Outfall 004 & 006 LNAPL Release Summary 5-1

5.1 Summary of Activities – Outfall 006 Release 5-1
5.2 Summary of Activities – Outfall 004 Release 5-1
5.3 Current Conditions 5-1

Section 6. Storm Sewer Interim Measures 6-1

6.1 Outfall 002 Interim Measures 6-1
6.2 Outfall 003 Interim Measures 6-1
6.3 Outfall 004 Interim Measures 6-1
6.4 Outfall 005 Interim Measures 6-1
6.5 Outfall 006 Interim Measures 6-4

Section 7. References 7-1

Tables

Table I-1 Analytical Results for Dry-Weather Event #1 - June 27 and 28, 2002
Table I-2 Analytical Results for Dry-Weather Event #2 - July 9, 2002
Table I-3 Analytical Results for Wet-Weather Event - July 29, 2002
Table I-4 Summary of Absorbent Boom Inspection
Table I-5 Storm Sewer Grab Sample Analytical Data
Table I-6 Storm Sewer Flow Volume Calculations

Figures

Figure I-1 Outfall Drainage Areas
Figure I-2 Outfall 002 Storm Sewer System
Figure I-3 Outfall 003 Storm Sewer System
Figure I-4 Outfall 004 Storm Sewer System
Figure I-5 Outfall 005 Storm Sewer System
Figure I-6 Outfall 011 Storm Sewer System
Figure I-7 Factory 05 Piezometer Locations
Figure I-8 Building 30 Piezometer Locations
Figure I-9 Building 85 Piezometer Locations
Figure I-10 Leigh Street Piezometer Locations
Figure I-11 Outfall 002 Data Box Map
Figure I-12 Outfall 003 Data Box Map
Figure I-13 Outfall 004 Data Box Map
Figure I-14 Outfall 005 Data Box Map
Figure I-15 Outfall 011 Data Box Map
Figure I-16 Outfall 003 Area of Interest
Figure I-17 Outfall 004 Storm Sewer Area of Interest
Figure I-18 Outfall 005 Storm Sewer Area of Interest

Graphs

Graph I-1 Outfall 003 - North Section, Dry Weather Event #1, June 27, 2002
Graph I-2 Outfall 003 - North Section, Dry Weather Event #2, July 9, 2002
Graph I-3 Outfall 003 - North Section, Wet Weather Event, July 29, 2002
Graph I-4 Outfall 003 - South Section, Dry Weather Event #1, June 27, 2002
Graph I-5 Outfall 003 - South Section, Wet Weather Event, July 29, 2002
Graph I-6 Outfall 004 - Dry Weather Event #1, June 27, 2002
Graph I-7 Outfall 004 - Dry Weather Event #2, July 9, 2002
Graph I-8 Outfall 004 - Wet Weather Event, July 29, 2002
Graph I-9 Outfall 005 - Dry Weather Event #1, June 27, 2002
Graph I-10 Outfall 005 - Dry Weather Event #2, July 9, 2002
Graph I-11 Outfall 005 - Wet Weather Event, July 29, 2002
Graph I-12 Outfall 011 - Dry Weather Event #2, July 9, 2002

Attachments

Attachment 1 Summary Tables from Historical Investigation
Attachment 2 Storm Sewer Analytical Data

1. Introduction

1.1 Purpose and Scope

The purpose of this document is to present the results of design-related storm sewer investigation activities recently performed at General Motors (GM) North American Operations (NAO) Flint Operations facility in Flint, Michigan (the Site) to address infiltration of free- and dissolved-phase constituents into the Site's storm sewer systems.

1.2 Overview

The Site operates under the requirements of its National Pollutant Discharge Elimination System (NPDES) permit, which regulates surface water discharges. The Site storm sewer system includes over 20 miles of onsite storm sewers, which provide drainage across Site and discharge into the nearby Flint River through 17 outfalls (outfalls 001 through 013, 004A, 005A, 007A and 100). In addition, these discharges include non-GM drainage flow from other portions of the City of Flint, both upstream and downstream of the Site's storm sewer system. Under its current NPDES permit, GM is permitted to discharge treated wastewater via Outfall 100 to the Flint River.

The storm sewer investigation program was implemented, due to the following observations.

1. Results from the initial round of Site-wide groundwater investigations as part of the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) reveal that there are areas of light non-aqueous phase liquid (LNAPL) and dissolved-phase constituents associated with Site groundwater at various locations across the Site. Some of these areas of impacted groundwater coincide with specific sections of storm sewer pipelines.

2. Groundwater elevation monitoring shows that the storm sewers appear to induce localized drawdown of the water table, indicating a direct hydraulic connection between groundwater and the storm sewers in some areas.

3. Evidence of free- and dissolved-phase constituents has been observed at select outfalls. This evidence includes the presence of visible sheens and detectable concentrations of dissolved-phase constituents based on analytical testing.

These key observations serve as the basis for the need to develop and implement a Site storm sewer mitigation strategy.

The goals of this mitigation strategy have evolved over the course of the project. Originally, the goal was to address both free- and dissolved-phase constituents entering the Site's storm sewer system. However, because of risk assessment conclusions provided in Sections 6 and 7 of the main portion of this RFI Phase II Report, the goal of future storm sewer remedial activities is to deal primarily with LNAPL sheens routinely observed at select outfalls.

1.3 Storm Sewer Mitigation Strategy

In general, the original storm sewer mitigation strategy included the following:

1. Identify suspect areas of the Site storm sewers that may be affecting water quality conditions at the permitted outfalls. This identification is based on:

   - previous storm sewer investigation activities;
   - recent RFI findings; and
   - NPDES monitoring data.

   This element of the mitigation strategy is complete and is described in Section 2 of this appendix.

2. Develop conceptual corrective measures to mitigate potential releases of free- and dissolved-phase constituents into the storm sewer/outfall systems. These controls may include sewer rehabilitation measures to reduce the direct hydraulic connection between areas of impacted groundwater and storm sewers. In combination, these controls may also include supplemental groundwater controls to avoid further migration of dissolved constituents in groundwater.

   This element of the mitigation strategy is ongoing and is discussed in Section 6 of this appendix.

3. Implement a series of focused investigations, to provide design-related information to support the final design of the corrective measures.

   The results of completed investigation activities are presented in Sections 3 and 4 of this appendix.

4. Develop a final design of corrective measures.
   Interim measures are currently being performed to address LNAPL sheens observed at the Flint River outfalls (Outfalls 002 through 006). These interim measures are discussed in Section 6 of this appendix. Final remedial actions for these outfalls will be evaluated in the Corrective Measures Proposal (CMP).

5. Implement the prescribed corrective measures.

   This element of the mitigation strategy will be undertaken following completion of the final design activities evaluated in the CMP

1.4 Organization of Document

The remaining sections of this document are organized as follows:

- **Section 2:** This section provides a description of site conditions, including pre-2002 investigations and identifies storm sewer and outfall-related issues.

- **Section 3:** This section provides a description of the investigation activities performed from June through August 2002 as part of the initial phase of investigation, and summarizes the resulting data.

- **Section 4:** This section provides the results of supplemental investigation activities performed as part of the initial phase of investigation.

- **Section 5:** This section summarizes the releases of LNAPL that occurred at Outfall 006 on October 10, 2002 and Outfall 004 on May 10, 2003.

- **Section 6:** This section provides a summary of the ongoing storm sewer interim measures being performed for Outfalls 002 through 006.

Various tables and figures are referenced throughout these sections for purposes of presenting information that is more detailed.

2. Site Conditions

2.1 Site Description

Sections 2 and 3 of this RFI Phase II Report and the RFI Phase I Report provide a comprehensive description of the physical features of the Site.

As noted above, the Site includes over 20 miles of on-Site storm sewers, which provide drainage across the approximate 452-acre Site with discharge into the nearby Flint River through 17 outfalls. In addition, these discharges include non-GM drainage flow from other portions of the City of Flint. Also, under its current NPDES permit, GM is permitted to discharge treated wastewater via Outfall 100 to the Flint River.

Figure I-1 includes a general layout and orientation of the storm sewers and outfalls.

2.2 Previous Investigations

In 1996 and 1997, GM conducted a series of storm sewer investigation activities that focused on storm sewers tributary to Outfalls 003, 004, and 005. These storm sewers provide drainage for most of the northern portion of the Site (area north of Leith Street). These investigations provided preliminary information regarding potential infiltration of LNAPL and dissolved-phase constituents. Activities performed included:

- Storm sewer site reconnaissance;
- Storm sewer sediment sampling;
- Storm sewer cleaning;
- Storm sewer video inspection;
- Placement of absorbent booms;
- Development of storm water velocity, flow, and physical parameters estimates;
- Collection of storm water samples; and
- Collection of monitoring well elevations.

Data summary tables for these investigations are provided in Attachment 1.

Other information sources include the overall RFI activities as well as ongoing compliance monitoring activities (e.g., NPDES-related) conducted by GM personnel.

2.3 Storm Sewer and Outfall-Related Issues

Based on existing information, the following areas have been identified as having the potential to impact sections of storm sewers:

- South and East Sides of Building 36 – LNAPL and dissolved-phase constituents (various volatile organic compounds [VOCs]) have been detected in this area. Storm sewers exist in this area, which discharge to Outfall 002.

- Building 20 – LNAPL and dissolved-phase constituents (including various VOCs) have been detected near storm sewers in this area, which include the scrapyard area as well as the corridor between Building 20 and Building 43, where an existing product recovery system operates. Storm sewers in these areas discharge to Outfall 003.

- Inside Building 66C and Building 32 – LNAPL has been detected near storm sewers present in this area, which discharge to Outfalls 003 and 005.

- South Side of Building 86/Leith Street Overpass – LNAPL and dissolved-phase constituents (various VOCs) have been detected near storm sewers present in this area, which discharge to both Outfalls 004 and 005.

- Former Buildings 12 and 23 Area – LNAPL plumes have been identified in this area as well as LNAPL observed in an abandoned utility tunnel. Storm sewers in this area discharge to Outfall 006.

- South Side of Hamilton Avenue – Dissolved-phase constituents (various VOCs) have been detected in groundwater in an area near a storm sewer, which eventually discharges into the Flint River through Outfall 011. It has been reported, however, that there has been no evidence of these dissolved-phase VOCs being detected at the outfall as part of the NPDES monitoring activities.

As such, these areas have been the focus of more recent investigations in support of mitigative efforts described in the remaining sections of this document.

3. June through August 2002 Investigation Activities

An initial phase of investigation activities took place from June through August 2002. The goal of these activities was to obtain specific Site information to support the design of engineering controls targeting the issues outlined in Section 2 of this document

3.1 Investigation Approach

The investigations performed during this time period included:

- Storm sewer system flow assessment using in-line flow meters at select manholes to establish baseline hydraulic conditions;
- Sampling and analysis at select manholes to evaluate the concentration and mass loading of dissolved-phase hazardous constituents;
- Visual inspection to evaluate the presence and distribution of free-phase infiltration;
- Internal inspection by videotaping selected stretches of pipe to observe structural conditions; and
- Groundwater elevation monitoring to evaluate localized drawdown in and around impacted sections of storm sewers compared to sewer inverts.

These activities followed procedures provided in the RFI Work Plan for the Site (BBL, 2001), including the Field Sampling Plan (FSP), the Quality Assurance Program Plan (QAPP) and the site-specific Health and Safety Plan (HASP) (Volumes V and VI of the RFI Work Plan [BBL, 2001]). The HASP was revised for the Supplemental Investigation Work Plan to include confined space entry procedures meeting Occupational Safety and Health Administration (OSHA) and GM requirements. These activities are discussed further in the following sections.

3.2 Investigative Activities

This section describes the investigative activities performed.

3.2.1 Storm Sewer Flow Assessment

The storm sewer flow assessment involved calculating flow using three different methods; continuous flow measurement using a data logger, instantaneous flow measurement, and empirically using the rational method. The primary purpose for evaluating flow is to obtain information on the hydraulic characteristics of the sewers, and to determine mass loading of constituents potentially infiltrating the storm sewer system from groundwater contaminant plumes or other sources.

Storm sewer system flows were measured continuously under dry-weather and wet-weather conditions. To determine overall system flows, in-line flow meters with data loggers were deployed at strategic locations, generally in the first manhole upstream of the outfall compliance monitoring points. These locations are shown on Figures I-2 through I-6. The flow meters (American Sigma Model 910) are capable of measuring depth and velocity and calculating flows based on conduit geometry. Measurements were logged at 15-minute intervals for the two-month duration of the study.

In addition to the total system flow, instantaneous flows were measured from selected manholes during the sampling events described below in Section 3.2.2. The instantaneous measurements were taken to assist in understanding the contribution that various storm sewer subsystems have to the total flow, including flows coming onto GM property from off-site, upstream portions of the storm sewer. Instantaneous flow was measured in manholes as shown on Figures I-1 through I-5.

Rainfall data recorded at the Flint Bishop International Airport (located 3 miles southwest of the Site) were obtained for the study period. Measurable rainfall was recorded at the airport on June 11, June 14, June 15, June 17, June 21, July 21, July 22, July 26, July 28, July 29, and August 4, 2002

The rational method was used to estimate a peak runoff rate for some of the outfalls. The rational method uses the following formula to calculate the peak flow rate:

$$\mathbf{Q_p = CiA}$$

Where: Q_p = peak runoff rate (cubic feet per second [cfs])
C = runoff coefficient (dimensionless)
i = rainfall intensity (inches per hour [in/hr])
A = size of the drainage area (acres)

The rainfall amount and intensity data, drainage areas, surface conditions, and flow data were used to develop a site-specific runoff coefficient. Typical values for runoff coefficients used in this calculation in this study were obtained from Design and Construction of Sanitary and Storm Sewers; ASCE M&R No. 37; WPCF MOP9; 1986 (ASCE). The rainfall intensity used in these calculations represented the average rainfall intensity of a specific rain event recorded at the Airport on July 29, 2002 (0.28 in/hr). Approximate drainage areas and sub-areas were determined from existing topographic maps and survey data. The Site is generally flat and covered with buildings or other impervious surfaces. Some of the storm sewer systems service portions of the City of Flint, and this information was also incorporated. Storm sewer diagrams for the off-Site areas were obtained from the City of Flint to determine the contributing area. The contributing areas for each of the outfalls are shown on Figure I-1.

The volume of water conveyed through the storm sewer system under dry-weather conditions (base flow) represents the amount of water that may be entering the storm sewer through infiltration (groundwater) and/or inflow (process water or sanitary sewer cross connections). The flow rate selected as the base flow was that which best represented the most common flow rate during the study period as measured by the flow meters.

A smaller-scale focused investigation was conducted in the system of Outfall 011. Grab samples and instantaneous flow measurements were collected at two locations along this system in the area of potential impact. The overall system flow was not assessed because this portion of the investigation is directly related to ongoing RFI work and no storm sewer mitigation measures are anticipated for this system at this time.

3.2.2 Sampling and Analysis

In addition to measuring flows, sampling for select parameters was performed to provide data for calculating mass loading. Monitoring locations were selected to provide sufficient data to establish the specific pipes that may be receiving LNAPL and/or site-related constituents from groundwater entering the storm sewers. Sampling locations are shown on Figures I-2 through I-6. Grab samples were collected in three separate events,

two during dry weather (June 27 and July 9, 2002) and one during wet weather (July 29, 2002). Water depth and velocity measurements were used to calculate instantaneous flows at each sample location for each sampling event to correlate with the overall flows recorded with the flow data loggers.

Analytical parameters were selected for each outfall based on the results of recent RFI activities and NPDES requirements. Grab samples of water from the sewer system associated with Outfalls 002 and 011 were analyzed for project analyte list (PAL) VOCs (Table 2 of Volume V of the RFI Work Plan [BBL, 2001] presents a listing all PAL constituents grouped by fraction – e.g., VOCs, inorganics, etc.). Grab samples of water from the other systems (Outfalls 003, 004, and 005) were analyzed for PAL VOCs and PCBs.

Sampling consisted of collecting grab samples of flowing water, which were placed in clean containers provided by the analytical laboratory. The samples were placed in coolers with ice and transported to the analytical laboratory under strict chain-of-custody protocol. For additional information, refer to the RFI FSP and QAPP. Data are summarized in Tables I-1 through I-3. A compilation of these data is provided in Attachment 2.

3.2.3 Visual Inspection for LNAPL

Visual inspection for LNAPL was performed to provide an immediate indication of free-phase infiltration between selected locations to help select sewer reaches for video inspection and potential mitigation measures.

Manhole locations were selected based on prior investigations that isolated potential LNAPL infiltration source areas. Field reconnaissance was performed to determine the feasibility of deploying absorbent booms in these manholes. LNAPL inspection included temporary installation of absorbent booms in 12 manholes at the locations shown on Figures I-2 through I-5. The booms were inspected approximately twice per week, observations of accumulated LNAPL were recorded in the field logbook, and the results are summarized in Table I-4.

3.2.4 Internal Inspection

Based on flow data, analytical data, and/or accumulation of LNAPL, selected reaches of the storm sewer system were inspected by physically entering the sewer, under appropriate confined space entry protocol, and/or by remote video camera. Portions of the storm sewer systems were videotaped for each of Outfalls 002, 003, 004, and 005. Figures I-2 through I-5 show the pipes that were videotaped.

The determination of which portions of the storm sewer were to be videotaped was finalized based on flow monitoring, sampling, and LNAPL inspections. Video inspection was preceded by a visual inspection of the manholes along the proposed reaches, followed by an initial videotaping attempt by remote camera or confined space entry. If the initial attempt indicated that there was too much debris in the pipe to allow the camera to progress, videotaping was stopped. The videotapes and log sheets are available upon request from GM.

3.2.5 Groundwater Elevation Monitoring

The relationship between the groundwater elevation and the sewer pipe invert elevations was investigated by installing 12 temporary piezometers immediately adjacent to the storm sewers. The locations of these piezometers are shown on Figures I-7 through I-10. Where possible, water levels in existing groundwater monitoring wells were used to augment the water level measurements of the piezometers. The piezometers were

installed in a line perpendicular to the storm sewer pipe alignment. The piezometers were constructed of two-inch diameter PVC, and were installed using hollow-stem auger drilling method. Locations and top of casing elevations were surveyed to provide accurate groundwater elevation data. In addition, existing invert elevation data were spot checked and confirmed

Groundwater elevation data were used to determine the localized drawdown of the water table caused by groundwater infiltration into the storm sewer. The piezometers provided groundwater elevation data, geologic soil descriptions, and descriptions of the sewer backfill material. Static water levels were obtained from the piezometers and the associated permanent monitoring wells.

3.3 Investigation Results

This section presents the results of the storm server investigation activities described in Section 2.

3.3.1 Outfall 002

General Description

The total drainage area associated with Outfall 002 is approximately 32 acres, and is entirely owned by GM. Twenty-three acres of the drainage area were included in this study. The storm sewer system discharging to Outfall 002 consists of approximately 6,200 linear feet of piping with diameters ranging from 8 to 60 inches. Figure I-2 shows the layout of this storm sewer system and the locations of the investigation activities that were performed.

Storm Sewer Flow

The base flow (dry weather flow) through Outfall 002 was estimated to be approximately 9 gallons per minute (gpm) using data measured by the in-line flow meter that was placed in manhole 2-20. Increases in storm water flow were observed during wet weather events (measurable rainfall) recorded at the Bishop International Airport (airport). In addition, occasional spikes in storm water system flow occurred during dry weather, which seem to indicate non-storm related flow inputs (e.g. compressor blowdown, rinse/wash water). Given the detection of constituents associated with water treatment, such as chloroform, at least some of the base flow is attributable to process water or sanitary sewer cross connections.

Instantaneous flow rates measured at manhole 2-20 are compared to the in-line flow meter measurements in the table below.

Manhole 2-20	Instantaneous Flow Rate			Flow Meter Data Logger		
	Depth (in.)	Velocity (fps)	Flow (gpm)	Depth (in.)	Velocity (fps)	Flow (gpm)
Dry Event #1	0.5	0.2[1]	1.9	3.3	0.05[2]	8.4
Wet Event	3.5	0.15	25.8	6.1	0.05[2]	20.9

Notes:
[1] Estimated value from field observations.
[2] Default minimum velocity.

The differences in calculated flow rates between the two methods are a function of the level of precision of the methods. It is assumed that the actual flow rate is within the range of values presented in the table. Instantaneous flow rates measured at the selected sampling points were used to evaluate the change in mass loadings (see below).

For comparative purposes, the peak flow as determined by the rational method was calculated using a runoff coefficient of 0.8 for onsite drainage based on a drainage area composition of primarily flat, rough concrete. An average rainfall intensity for the July 29, 2002 rainfall event of 0.28 in/hr was used as measured at Flint Bishop International Airport. The peak flow was calculated using the rational method to be 3,200 gpm. The peak flow measured by the in-line flow meter during the same wet event was 2,210 gpm.

Sampling and Analysis

Water samples were collected at only two locations along the system (manholes 2-20 and 2-39) during the first dry weather event because other locations along the system were dry at the time of sampling indicating no groundwater infiltration. No samples were collected during the second dry weather event because all of the manholes were either dry, contained stagnant water (no flow), or exhibited only very limited flow. Water samples were collected at nine locations along the system (manholes 2-41-4, 2-41, 2-39, 2-38, 2-35, 2-33, 2-31, 2-22, and 2-20) during the wet weather event. Collected samples were submitted for laboratory analysis for PAL VOCs. Constituents detected in the samples included methyl ethyl ketone (MEK), acetone, bromodichloromethane, chloroform, dibromochloromethane, 1,1,1-trichloroethane (1,1,1-TCA), 1,1-dichloroethane (1,1-DCA), chloroethane, cis-1,1-dichloroethene (cis-1,2-DCE), trans-1,2-DCE, trichloroethene (TCE) and vinyl chloride. The first five listed constituents may be attributed to laboratory contamination and drinking water treatment processes and are not discussed further. Figure I-11 presents the analytical data, which also are summarized in Tables I-1 through I-3.

In the first dry weather event 1,1,1-TCA, 1,1-DCA, chloroethane, cis-1,2-DCE, trans-1,2-DCE, TCE, and vinyl chloride were detected only in manhole 2-20. No constituents of concern were detected in the samples collected for this outfall during the wet weather sampling event.

Mass Loading

The concentrations measured from the above-mentioned sampling events, along with the instantaneous flow measurements, were used to calculate the mass loading at manhole 2-20. The total mass loading of constituents at manhole 2-20 for the first dry weather event was approximately 1.52 g/day. Figure I-11 presents the mass loading data.

Booms

Table 4 provides the monitoring record for the absorbent booms. Booms were placed in manholes 2-33 and 2-39 on June 10, 2002 and were checked approximately every two weeks. The booms were replaced once during the study period in both manholes 2-33 and 2-39 after becoming saturated with particulate material (e.g., iron deposits). No petroleum product was observed during the study period within the Outfall 002 sewer system.

Videos

The piping run between manholes 2-38 and 2-41 was videotaped. Videotaping was attempted at two additional piping runs, upstream of manhole 2-22 and manhole 2-35; however, obstructions in the pipe prevented

completion. Evidence of minimal groundwater infiltration was observed as both mineral deposits at a few pipe joints and as standing water in isolated low sections in the pipe.

Piezometers

Based on groundwater levels measured in existing site monitoring wells and the invert elevations of the Outfall 002 sewer system in the area of impacted groundwater, the groundwater table in this area is below the storm sewer system. Therefore, piezometers were not installed. However, it was later determined that the portion of the storm sewer system upstream of manhole 2-20 sometimes intersects the water table. Refer to Section 4.1 for a related discussion.

3.3.2 Outfall 003

General Description

The total drainage area associated with Outfall 003 is approximately 480 acres. The offsite drainage area accounts for approximately 345 acres, while the remaining 137 acres are owned by GM. Only 413 acres of drainage area are included in this study because they comprise the contributory area to the flow measured by the two data loggers in the 003 system, as described below. The storm sewer system discharging to Outfall 003 consists of approximately 24,000 linear feet of piping with diameters ranging from 8 to 66 inches. Within the GM portion of the system, this system is divided into three separate piping systems, two of which are included in this study (one, denoted South, that runs predominantly east across the Site [manholes 3-76-11 through 3-65], and another, denoted North, that runs predominantly south across the Site [manholes 3-26, 3-25, and 3-23 through 3-15]). Downstream of manhole 3-15, GM installed a simple underflow/overflow oil interceptor constructed of steel sheet piling. The interceptor also utilizes two belt skimmers to remove accumulated LNAPL.

The two systems merge at manhole 3-10. Downstream of manhole 3-10, GM installed a second underflow/overflow oil interceptor. This unit is constructed of cast-in-place concrete and utilizes a level-controlled sump pump to remove accumulated LNAPL. The water/LNAPL is pumped to a nearby oil/water separator. The pump, rated at 200 gpm at 45 feet of head, is currently set to run once per hour, 24 hours per day. Figure I-3 shows the layout of these storm sewer systems and the locations of the investigation activities that were performed.

More detailed information concerning the two oil interceptors installed along this system is provided in Section 5.7 of the Description of Current Conditions Report for Areas North of Leith Street (NEDOCC).

Storm Sewer Flow

The base flow (dry weather flow) through Outfall 003 (not including flow from the third piping system) was estimated to be approximately 8 gpm using data from the in-line flow meters placed in manholes 3-20 and 3-69 (0 gpm and 8 gpm, respectively). Increases in storm water flow were observed during every wet event (rainfall event) recorded at the airport. In addition, occasional spikes in storm water system flow occurred during dry weather. Given the detection of constituents associated with water treatment, such as chloroform, some of the base flow is attributable to process water or sanitary sewer cross connections.

Instantaneous flow rates measured at manholes 3-20 and 3-69 are compared to the in-line flow meter measurements in the table below:

Manhole 3-20	Instantaneous Flow Rate			Flow Meter Data Logger		
	Depth (in.)	Velocity (fps)	Flow (gpm)	Depth (in.)	Velocity (fps)	Flow (gpm)
Dry Event #1	1.5[1]	0.3	18.5	5.8	0.2[2]	85.3
Dry Event #2	2	0.5	48.3	6.6	0.2[2]	106.6
Wet Event	4.9	4.2	1506.9	7.6	0.33	223.4

Manhole 3-69	Instantaneous Flow Rate			Flow Meter Data Logger		
	Depth (in.)	Velocity (fps)	Flow (gpm)	Depth (in.)	Velocity (fps)	Flow (gpm)
Dry Event #1	-[3]	-	-	1.25	0.2[2]	8.0
Dry Event #2	-	-	-	1.25	0.2[2]	8.0
Wet Event[4]	4.2	0.8	179.8	1.25	0.2[2]	8.0

Notes:
[1] Estimated value from field observations.
[2] Default minimum velocity.
[3] No field data, manholes inaccessible.
[4] Wet weather event sampling took place after the actual main event, so data is more representative of dry weather flow.

The differences in calculated flow rates between the two methods are a function of the level of precision of the methods. It is assumed that the actual flow rate is within the range of values presented in the table. Instantaneous flow rate measured at the selected sampling points was used to evaluate the change in mass loadings (see below).

For comparison purposes, the peak flow as determined by the rational method was calculated using a runoff coefficient of 0.57 for offsite drainage, based on a drainage area composition of 40% roadway, 30% houses and 30% grass, and 0.8 for onsite drainage, based on drainage area composition of primarily flat, rough concrete (ASCE). An average rainfall intensity for the July 29, 2002 rainfall event of 0.28 in/hr was used as measured at Flint Bishop International Airport. The peak flows were calculated using the rational method to be 17,820 gpm and 1,350 gpm for manholes 3-20 and 3-69, respectively. The corresponding peak flows measured by the in-line flow meter during the same wet event were 17,160 gpm and 792 gpm.

Sampling and Analysis

North - Manholes 3-26, 3-25, and 3-23 through 3-15

Water samples were collected at five locations along the system (manholes 3-26, 3-23, 3-22-1, 3-20, and 3-15) during the two dry weather events and the one wet weather event. Collected samples were submitted for laboratory analysis for PAL VOCs and PCBs. Constituents detected in the samples included MEK, acetone, bromodichloromethane, chloroform, dibromochloromethane, methylene chloride, 1,1,1-TCA, 1,1-DCA, chloroethane, cis-1,2-DCE, TCE, vinyl chloride, and Aroclor 1248. The first six listed constituents may be attributed to laboratory contamination and potable water treatment processes and are not discussed further.

In the first dry weather event, most of the constituents were detected in the samples collected from the two most upstream manholes. Manhole 3-26 exhibited detections of 1,1-DCA and cis-1,2-DCE, while manhole 3-22-1 exhibited detections of 1,1,1-TCA, 1,1-DCA, chloroethane, and Aroclor 1248. TCE and vinyl chloride were

first detected further downstream at manholes 3-20 and 3-15 respectively. Similarly, in the second dry weather event, most of the constituents were detected in the samples collected from the two most upstream manholes. Manhole 3-26 exhibited detections of 1,1,1-TCA, 1,1-DCA, cis-1,2-DCE, and TCE, while manhole 3-22-1 exhibited detections of 1,1,1-TCA, 1,1-DCA, chloroethane, and Aroclor 1248. Vinyl chloride was first detected further downstream at manhole 3-20. In the wet weather event, 1,1-DCA, chloroethane and Aroclor 1242 were detected in manhole 3-22-1; however, constituents of concern were not detected at other locations along the system. The potential source of constituents in 3-26 is likely from offsite, while the potential source for constituents in 3-22 is likely onsite, given its proximity to reported LNAPL and VOC plumes. Figure I-12 presents the analytical data, which also are summarized in Tables I-1 through I-3.

South - Manholes 3-76-8 through 3-65

Water samples were collected at two locations along the system (manholes 3-76-8 and 3-65) during the first dry weather event, one location (manhole 3-65) during the second dry weather event and three locations (manholes 3-76-8, 3-69, and 3-65) during the one wet weather event. Manhole 3-69 was inaccessible during the first dry weather event, and manholes 3-69 and 3-76-8 were inaccessible during the second dry weather event. Collected samples were submitted for laboratory analysis for VOCs. Constituents detected in the samples included MEK, acetone, bromodichloromethane, chloroform, cis-1,2-DCE, trans-1,2-DCE, TCE, vinyl chloride, and Aroclor 1260. The first four listed constituents may be attributed to laboratory contamination and drinking water treatment processes and are not discussed further.

In the first dry weather event, the most upstream detections of cis-1,2-DCE, trans-1,2-DCE, TCE, and vinyl chloride were in manhole 3-65. Manhole 3-65 was the only location sampled during the second dry weather event. The constituents detected in manhole 3-65 were cis-1,2-DCE, trans-1,2-DCE, TCE, vinyl chloride, and Aroclor 1260. In the wet weather event, the most upstream detections of cis-1,2-DCE, trans-1,2-DCE, and vinyl chloride were in manhole 3-69. Figure I-12 presents the analytical data, which also are summarized in Tables 1 through 3.

Mass Loading

The concentrations measured from the above-mentioned sampling events, along with the instantaneous flow measurements, were used to calculate the mass loading across the system. The highest total mass loadings of constituents at the most down gradient sampling locations were 3.3 g/day and 2.8 g/day for manholes 3-15 and 3-65 respectively. The mass loading increase between manholes 3-23 and 3-20 is likely due to storm water coming from the area of manhole 3-22-1 converging with the main north piping run between the two referenced manholes. The data show that the mass loading of constituents increased downstream from manhole 3-23. However, the next downstream sample was collected from manhole 3-20 resulting in a relatively long stretch of pipe in which the impact could occur. The highest mass loading values were observed at manhole 3-69 (7.95 g/day), and manhole 3-22-1 (4.81 g/day). Figure I-12 presents the mass loading data. Changes in mass loading are illustrated in Graphs I-1 through I-5.

Booms

Table 4 provides the monitoring record for the absorbent booms. Booms were placed in manholes 3-10, 3-23, and 3-72 on June 10, 2002 and were checked approximately every two weeks. The booms were replaced once during the study period in manholes 3-10 and 3-72 on July 29, 2002 and twice in manhole 3-23 on June 21 and July 29, 2002 after becoming saturated with product.

Videos

The piping runs between manholes 3-20 and 3-26 and manholes 3-22 and 3-22-1 were videotaped. Videotaping was attempted at one additional piping run, downstream of manhole 3-22-1; however, obstructions in the pipe prevented completion. Evidence of groundwater infiltration was observed along the entire length of the inspected sections as mineral deposits at numerous pipe joints.

Piezometers

Temporary piezometers were installed across the north piping run between manholes 3-23 and 3-25 (see Figure I-7) and across the north piping run between manholes 3-20 and 3-21 (see Figure I-8). The results of the piezometer study indicate the water table is influenced by infiltration into the storm sewer.

3.3.3 Outfall 004

General Description

The total drainage area associated with Outfall 004 is approximately 150 acres. The offsite drainage area accounts for approximately 110 acres, while the remaining 40 acres of drainage area are owned by GM. Only 140 acres of drainage area are included in this study. The storm sewer system discharging to Outfall 004 consists of approximately 6,620 linear feet of piping with diameters ranging from 8 to 54 inches. Figure I-4 shows the layout of this storm sewer system and the locations of the investigation activities that were performed.

Storm Sewer Flow

The base flow (non-wet event flow) through Outfall 004 was estimated to be approximately 24 gpm using data from the in-line flow meter that was placed in manhole 4-8. Occasional spikes in storm water system flow occurred during dry weather; a maximum flow rate of 800 gpm was measured on June 20, 2002 and a maximum flow rate of 1,400 gpm was measured on July 10, 2002. Also, increases in storm water flow were observed during every wet event (rainfall event) recorded at the Airport. Given the detection of constituents associated with water treatment, such as chloroform, some of the base flow is attributable to process water or sanitary sewer cross connections.

Instantaneous flow rates measured at manhole 4-8 are compared to the in-line flow meter measurements in the table below.

Manhole 4-8	Instantaneous Flow Rate			Flow Meter Data Logger		
	Depth (in.)	Velocity (fps)	Flow (gpm)	Depth (in.)	Velocity (fps)	Flow (gpm)
Dry Event #1	3	0.39	64.2	2.7	0.2[1]	28.2
Dry Event #2	3	0.1	16.5	2.4	0.2[1]	23.1

Notes:
[1] Default minimum velocity.

The differences in calculated flow rates between the two methods are a function of the level of precision of the methods. It is assumed that the actual flow rate is within the range of values presented in the table.

Instantaneous flow rate measured at the selected sampling points was used to evaluate the change in mass loadings (see below).

For comparison purposes, the peak flow as determined by the rational method was calculated using a runoff coefficient of 0.57 for offsite drainage, based on a drainage area composition of 40% roadway, 30% houses and 30% grass, and 0.8 for onsite drainage, based on drainage area composition of primarily flat, rough concrete (ASCE). An average rainfall intensity for the July 29, 2002 rainfall event of 0.28 in/hr was used as measured at Flint Bishop International Airport. The peak flow was calculated using the rational method to be 10,770 gpm. The peak flow measured by the in-line flow meter during the same wet event was 7,850 gpm.

Sampling and Analysis

Water samples were collected at four locations along the system (manholes 4-23, 4-20, 4-17, 4-13, and 4-8) during the first dry weather event. However, access to manholes was limited during the second and third sampling events by demolition activities. Only locations 4-23, 4-13, and 4-8 were accessible for the second dry weather event, and only locations 4-23, 4-17, and 4-13 were accessible for the wet weather event. Collected samples were submitted for laboratory analysis for PAL VOCs and PCBs. Constituents detected in the samples included MEK, acetone, bromodichloromethane, chloroform, dibromochloromethane, chloroethane, cis-1,2-DCE, TCE, and vinyl chloride. The first five listed constituents can be attributed to laboratory contamination and drinking water treatment processes and are not discussed further.

In the first dry weather event, the most upstream detection of TCE was at manhole 4-13, while the most upstream detection of vinyl chloride was in manhole 4-8. PCBs (Aroclor 1260) were detected in manhole 4-20. In the second dry weather event, the most upstream detection of TCE was in manhole 4-13, while the most upstream detections of chloroethane, cis-1,2-DCE, and vinyl chloride were in manhole 4-8. In the wet weather event, the most upstream detections of cis-1,2-DCE, TCE, and vinyl chloride were in manhole 4-13. Manhole 4-13 is located on GM property within an area with observed dissolved-phase VOC exceedances in groundwater (as measured in 2001 and shown on Figure I-4). Figure I-13 presents the analytical data, which also are summarized in Tables I-1 through I-3.

Mass Loading

The concentrations measured from the above-mentioned sampling events, along with the instantaneous flow measurements, were used to calculate the mass loading across the system. The highest total mass loading of constituents at the most down gradient sampling location, manhole 4-8, was 0.8 g/day. It should be noted that in the case of the wet weather event, manhole 4-8 was not sampled; however, the next most down gradient location, manhole 4-13, had a total mass loading of 6.2 g/day. The data show that the mass loading of constituents increased across the system as stormwater flows from 4-23 (upstream) to 4-8 (downstream); however, the greatest mass loading increase appears to occur between 4-17 and 4-8. Figure I-13 presents the mass loading data. Changes in mass loading are illustrated in Graphs I-6 through I-8.

Booms

Table I-4 provides the monitoring record for the absorbent booms. Booms were placed in manholes 4-8 and 4-13 on June 10, 2002 and were checked approximately every two weeks. The booms in both manholes were replaced twice after becoming saturated with product, on June 17 and July 29, 2002. This indicates that LNAPL is likely infiltrating the Outfall 004 system upstream of this location. LNAPL collected by the boom in manhole 4-8 may have bypassed the boom in manhole 4-13.

Videos

The piping run between manhole 4-11 and 4-17 was videotaped. Evidence of groundwater infiltration was observed most notably between 4-13 and 4-14, which is the reach within the observed contaminant plumes. In addition, the pipe is in poor condition. In particular, approximately 150 feet upstream of 4-13, several blocks are missing from the crown of the pipe.

Piezometers

Temporary piezometers were installed across the piping run between manholes 4-13 and 4-14 (see Figure I-9). The results of the piezometer study indicate that the groundwater table is influenced by infiltration into the storm sewer pipe.

3.3.4 Outfall 005

General Description

The total drainage area associated with Outfall 005 is approximately 28 acres, and is owned by GM. Twelve acres of the drainage area are included in this study. The storm sewer system discharging to Outfall 005 consists of approximately 6,150 linear feet of piping with diameters ranging from 8 to 54 inches. Figure I-5 shows the layout of this storm sewer system and the locations of the investigation activities that were performed.

Storm Sewer Flow

The base flow (non-wet event flow) through Outfall 005 was estimated to be approximately 250 gpm using data from the in-line flow meter that was placed in manhole 5-4. Increases in storm water flow were observed during every wet event (rainfall event) recorded at the Airport. In addition, occasional spikes in storm water system flow occurred during dry weather. Given the detection of constituents associated with water treatment, such as chloroform, some of the base flow is attributable to process water or sanitary sewer cross connections.

Instantaneous flow rates measured at manhole 5-4 are compared to the in-line flow meter measurements in the table below.

Manhole 5-4	Instantaneous Flow Rate			Flow Meter Data Logger		
	Depth (in.)	Velocity (fps)	Flow (gpm)	Depth (in.)	Velocity (fps)	Flow (gpm)
Dry Event #1	2	0.33	29.7	4.5	0.2[1]	52.9
Dry Event #2	2	0.5	45.1	3.0	1.1	177.6
Wet Event	3.6	0.5	107.9	4.4	0.2	57.8

Notes:
[1] Default minimum velocity.

The differences in calculated flow rates between the two methods are a function of the level of precision of the methods. It is assumed that the actual flow rate is within the range of values presented in the table. Instantaneous flow rate measured at the selected sampling points was used to evaluate the change in mass loadings (see below).

For comparison purposes, the peak flow as determined by the rational method was calculated using a runoff coefficient of 0.8 for onsite drainage, based on a drainage area composition of primarily flat, rough concrete (ASCE). An average rainfall intensity for the July 29, 2002 rainfall event of 0.28 in/hr was used as measured at Flint Bishop International Airport. The peak flow was calculated using the rational method to be 1,260 gpm. The peak flow measured by the in-line flow meter during the same wet event was 2,440 gpm.

Sampling and Analysis

Water samples were collected at four locations along the system (manholes 5-13A, 5-10, 5-5, and 5-4) during the two dry weather events and the one wet weather event. Collected samples were submitted for laboratory analysis for PAL VOCs and PCBs. Constituents detected in the samples included MEK, acetone, bromodichloromethane, chloroform, dibromochloromethane, cis-1,2-DCE, and TCE. The first five listed constituents may be attributed to laboratory contamination and drinking water treatment processes and are not discussed further.

In all three sampling events, the most upstream detection of TCE was at manhole 5-5. Cis-1,2-DCE was only detected during the second dry sampling event and the wet sampling event, and in both events the most upstream detection was at manhole 5-5. Figure I-14 presents the analytical data, which also are summarized in Tables I-1 through I-3.

Mass Loading

The concentrations measured from the above-mentioned sampling events, along with the instantaneous flow measurements, were used to calculate the mass loading across the system. The highest total mass loading of constituents at the most down gradient sampling location, manhole 5-4, was 0.7 g/day. The data show that the mass loading of constituents increased between manholes 5-10 and 5-5 during the dry events. The mass loading of constituents increased between 5-10 and 5-5 and between 5-5 and 5-4 during the wet event sampling. Figure I-14 presents the mass loading data. Changes in mass loading are illustrated in Graphs I-9 through I-10.

Booms

Table I-4 provides the monitoring record for the absorbent booms. Booms were placed in manholes 5-5, 5-10, and 5-13A on June 10, 2002 and were checked approximately every two weeks. The booms were replaced twice during the study period in manholes 5-10 and 5-13A and only once in manhole 5-5 after becoming saturated with product.

Videos

The piping run between manhole 5-5 and 5-12 was videotaped. Evidence of groundwater infiltration, in the form of mineral deposits at the pipe joints, was observed along the entire inspected length. Heavy infiltration was noted approximately 129 feet downstream of manhole 5-11. However, a subsequent video inspection in August 2002 revealed the pipe condition to be generally good, with some mineral deposits and no unusual infiltration.

Piezometers

Temporary piezometers were installed across the piping run near manhole 5-9 (see Figure I-10). The results of the piezometer study indicate that the groundwater table is influenced by groundwater infiltration into the storm sewer.

3.3.5 Outfall 011

General Description

Figure I-6 shows the layout of this storm sewer system and the locations of the investigation activities that were performed.

A smaller scale investigation was conducted in the system of Outfall 011. Grab samples and instantaneous flow measurements were collected at two locations. The overall system flow was not assessed because this portion of the investigation is directly related to ongoing RFI work and no storm sewer mitigation measures are anticipated for this system at this time.

Sampling and Analysis

Water samples were collected at two locations along the system (manholes 11-6-2 and 11-3) during the second dry weather event (July 9, 2002) and the wet weather event. Water samples were inadvertently not collected during the first dry weather sampling event in June for manholes 11-6-2 and 11-3. A set of samples was collected from these two manholes on August 2, 2002 to make up for this data gap. The results are included in Table I-1. These samples have been placed in the first dry event category to simplify the reporting and discussion for the remaining majority of samples. Collected samples were submitted for laboratory analysis for PAL VOCs. Constituents detected in the samples included MEK, acetone, dichlorodifluoromethane, MIBK, 1,1,1-TCA, cis-1,2-DCE, o-xylene, and TCE. The first three listed constituents can be attributed to laboratory contamination and drinking water treatment processes and are not discussed further.

In the first dry weather event, 1,1,1-TCA, cis-1,2-DCE, and TCE were detected only in manhole 11-6-2, the most upgradient location. In the second dry weather event, both 1,1,1-TCA and TCE were detected only in manhole 11-3, the most down gradient location. In the wet weather event, o-xylene was detected only in manhole 11-6, while TCE was detected only in manhole 11-3. Figure I-15 presents the analytical results, which also are summarized in Tables I-1 through I-3.

Mass Loading

The concentrations measured from the above-mentioned sampling events, along with the instantaneous flow measurements, were used to calculate the mass loading across the system. Instantaneous flow measurements were not recorded for the wet weather event, and as such, mass loading was only calculated for the second dry weather event. The total mass loading of constituents at the most down gradient sampling location, manhole 11-3, was 0.19 g/day. Figure I-15 presents the mass loading data. Changes in mass loading are illustrated in Graph I-11.

3.4 Investigation Conclusions

Storm Sewer Flow

Base flows ranged from approximately 8 gpm at manhole 3-20 (Outfall 003) to approximately 250 gpm at manhole 5-4 (Outfall 005). Peak flows measured by the data logger during a rain event on July 29, 2002 ranged

from approximately 792 gpm at manhole 3-69 (Outfall 003) to approximately 17,200 gpm at manhole 3-20 (Outfall 003).

Sampling and Analysis

Constituents associated with potable water treatment, including bromodichloromethane, chloroform, and dibromochloromethane were detected in each of the outfall systems indicating at least a portion of the base flow is from potable water supply sources (e.g., infiltration from leaking water supply lines, process water, or sanitary sewer cross connections). In addition, VOCs, including chlorinated VOCs such as TCE, were detected in each of the outfall systems, albeit at relatively low concentrations. PCBs were detected in Outfall 003 storm sewer system at low concentrations.

Mass Loadings

Mass loadings of constituents detected at the most downstream sampling point of each outfall system studied were relatively low. The maximum total mass loadings calculated for each outfall system ranged from approximately 0.19 grams per day (g/day) at manhole 11-3 (Outfall 011) to 7.95 g/day at manhole 3-69 (Outfall 004).

Booms

Floating LNAPL was observed in outfall systems 003, 004, and 005 as oily sheens. No measurable LNAPL was observed to have accumulated behind the booms, but the booms were replaced at least once.

Videos

Evidence of groundwater infiltration into outfall systems 002, 003, 004, and 005 was observed as mineral deposits at pipe joints. Evidence of substantial infiltration in isolated sections of systems 004 and 005 was observed as gaps or damage along the pipe.

Piezometers

The results of the piezometer study indicate the water table near storm sewer systems 003, 004, and 005 is influenced by infiltration into the storm sewer. The Outfall 004 and 005 systems are situated in and near the Leith Street underpass constructed below the surrounding grade using concrete retaining walls. Previous hydrogeological data reveal a significant depression in the groundwater table in this area. Representative groundwater elevations are presented in Figures I-9 and I-10. No piezometers were installed along the 002 system because groundwater levels observed in existing monitoring wells indicate the sewer to be located above the groundwater table. However, it was later determined that the portion of the storm sewer system upstream of manhole 2-20 sometimes intersects the water table. Refer to Section 4.1 for a related discussion.

4. Supplemental Investigation

Additional investigations have been conducted to supplement the first phase of activities described in Section 3 of this appendix. These investigations were conducted in November 2002 and March 2003, and included the:

- Measurement of water levels associated with Outfall 002 storm sewer to confirm the sewer inverts were above the water table; and
- Collection of water samples from additional manholes associated with the Outfall 004 storm sewer system to confirm the length of sewer pipe that may require lining.

4.1 Outfall 002

Water levels were measured in monitoring wells near the Outfall 002 storm sewer to compare water table elevations to sewer pipe invert elevations. Water levels were measured on March 18 and 19, 2003, which is representative of seasonally high groundwater levels. The locations of these wells are presented on Figure I-2. The following table provides groundwater elevations and manhole invert elevations for the manhole nearest each monitoring well:

Monitoring Well	Date Measured	LNAPL Thickness	Elevation, LNAPL	Elevation, Water	Nearest Manhole	Nearest Manhole Invert Elevation
RFI-36-03	3/19/03	N/A	N/A	737.20	2-39	745.26
RFI-36-05	3/19/03	N/A	N/A	737.22	2-39	745.26
36-FP2	3/19/03	N/A	N/A	736.99	2-38	744.76
36-FP3	3/18/03	0.26	737.34	737.08	2-35	744.27
36-FP6	3/18/03	2.33	739.55	737.22	2-35	744.27
36-FP7	3/18/03	1.83	736.66	734.83	2-35	744.27
RFI-36-43	3/19/03	0.19	739.02	738.83	2-33	743.59
20-102	3/19/03	N/A	N/A	740.60	2-20	737.66
20-502	3/19/03	1.53	740.09	738.56	2-20	737.66
20-503	3/19/03	0.78	739.29	738.51	2-20	737.66

Note:
All measurements in feet above mean sea level

As indicated by this table, groundwater and LNAPL elevations are below manhole invert elevations for the storm sewer pipe upstream of manhole 2-20. Therefore, groundwater intrusion is possible only in the stretch of the Outfall 002 storm sewer downstream of a point just upstream of manhole 2-20. Localized water-level measurements indicate that the water table does intersect the storm sewer immediately upstream of manhole 2-20, providing the potential for infiltration of impacted groundwater in this area into the sewer. This section of sewer was subject to video reconnaissance in March 2005. During the course of these activities, no visual evidence of LNAPL infiltration was observed. While infiltration was evident in the study area, an oily sheen was not observed. This suggests that significant amounts of LNAPL may not be in contact with the storm sewer in this area. The limits of the plume shown on Figure 5-1 are inferred from observations of LNAPL in local monitoring wells. Therefore, the actual limits of the plume could be more discontinuous (i.e., including gaps

without LNAPL). However, water levels in this area have fluctuated over a range of approximately three feet, potentially rising above the top of a portion of the storm sewer in this area. During periods when the water table was near or above the top of the pipe, LNAPL infiltration, if present, would be effectively stopped.

Routine outfall inspections conducted by GM personnel and occasional inspections conducted by BBL staff have occasionally revealed very light sheens at Outfall 002 at the Flint River. However, a substantial drainage area drains to the portion of the storm sewer system downstream of manhole 2-20, including city street catch basins located offsite of GM property, which provides other possible sources.

On November 19, 2002, a water sample was collected at manhole 2-20 from the storm sewer leading to Outfall 002. Collected samples were submitted for laboratory analysis of PAL VOCs. On the same date, GM collected a water sample from manhole 2-19 as part of NPDES permit requirements and it was not analyzed for all of the PAL VOCs. The analytical data are summarized in Table I-5.

VOCs detected in both water samples included chloroethane, 1,1-DCA, and 1,1,1-TCA. Also, trans-1,2-DCE, TCE, and vinyl chloride were detected in the sample collected from manhole 2-20 at concentrations less than the reporting limit used by the laboratory that analyzed the sample collected from manhole 2-19. The detection of VOCs suggests that some intrusion of contaminated groundwater is likely occurring. A dissolved groundwater plume containing concentrations of TCE and vinyl chloride, as well as an LNAPL plume, exists in the area just upstream of manhole 2-20 and may be the source of the VOCs detected in the sewer.

4.2 Outfall 004

On November 20, 2002, water samples were collected at manholes 4-8, 4-11, 4-13, 4-17, and 4-20 from the storm sewer leading to Outfall 004. These water samples were collected to better define the portions of the sewer that may benefit from lining. Two manholes important to this analysis, manholes 4-14 and 4-15, were not located during the sampling event. Storm water system samples were collected under dry weather flow conditions. On November 21, 2002, water samples were collected from the same six manholes following a wet weather event. Collected samples were submitted for laboratory analysis of PAL VOCs. The analytical data are summarized in Table I-5.

VOCs detected in the water samples included acetone, MEK, chloroethane, chloroform, 1,1-DCA, 1,1-DCE, cis-1,2-DCE, 4-methyl-2-pentanone (methyl isobutyl ketone), 1,1,1-TCA, TCE, and vinyl chloride. However, the sum of the detected VOCs was less than 20 micrograms per liter (ug/L) in each sample collected from the Outfall 004 storm sewer system. The detection of VOCs indicates that some intrusion of contaminated groundwater is likely occurring in the Outfall 004 storm sewer system upstream of manhole 4-13. However, infiltration of contaminants downstream of manhole 4-13 has not been eliminated as a possibility. LNAPL has previously observed during the study period within the Outfall 004 sewer system.

5. Outfall 004 & 006 LNAPL Release Summary

This section summarizes releases of LNAPL at Outfall 006 on October 10, 2002 and Outfall 004 on May 10, 2003.

5.1 Summary of Activities – Outfall 006 Release

On October 10, 2002, LNAPL was observed at Outfall 006 and was contained within a floating non-absorbent oil boom previously installed at the outfall. The probable source of this LNAPL was discovered on October 11, 2002 to be a hydraulic cylinder for an elevator that had been recently removed from the former Building 02 as part the demolition of Site areas located South of Leith Street (the Buick City complex). An unknown volume of oil was released to the ground surface near a storm sewer manhole from the hydraulic cylinder, and flowed into a storm sewer lateral of the Outfall 006 system located along the west side of the former Building 02. Surface cleanup of the release was performed immediately upon its identification by the demolition contractor, MCM, Inc. Daily notifications to federal, state, and local authorities were subsequently performed from October 10, through 22, 2002, as well as periodic updates to federal, state, and local authorities after October 22, 2002.

5.2 Summary of Activities – Outfall 004 Release

On May 10, 2003, during a heavy rainstorm, a release of oil was observed at Outfall 004. Oil releases at Outfall 004 have been successfully controlled in the past by a floating non-absorbent oil boom and routine pumping to remove the oil. The May 10 release involved a greater quantity of oil than previously observed, but was mostly contained by the existing oil boom. An oil sheen was observed outside the boom. GM and its subcontractors immediately commenced response activities that included:

- Placement of additional containment and absorbent booms at the outfall mouth;
- Collection of oily sheens via vacuum truck;
- Notifications to federal, state, and local authorities on May 11, 2003; and
- Periodic updates to federal, state, and local authorities after May 11, 2003.

5.3 Current Conditions

Some oil sheens continue to be observed periodically within the boomed areas of Outfalls 003, 004, and 005. These sheens are controlled by absorbent booms and periodic pumping to vacuum truck. The potential source(s) of oil observed at these outfalls may include sources upstream of GM facility, road and parking lot runoff, as well as subsurface LNAPL infiltration. Given the magnitude of the area serviced by the storm sewer and the complexity and age of the storm sewer system, identifying all the sources of LNAPL sheens at the outfalls is not likely. However, an additional phase of investigation activities is ongoing, and is described in Section 6 of this appendix, with the goal to further enhance the corrective measure design information. This information will be used in developing remedial approaches that address LNAPL infiltration into the storm sewer.

On July 20, 2004, the Outfall 006 storm sewer system was permanently plugged at the GM property boundary, and no sheens have been observed at the outfall since that time.

6. Storm Sewer Interim Measures

Based on the results of the investigation performed on the site storm sewers, as documented in the previous sections, including the additional knowledge gained by the emergency response activities associated with the LNAPL releases to Outfalls 004 and 006 discussed in the previous section, interim remedial measures have either been performed or are on-going. This section describes the interim measures associated with the Outfalls 002, 003, 004, 005, and 006 storm sewers.

6.1 Outfall 002 Interim Measures

As discussed in Section 4.1, video reconnaissance activities were completed to assess potential LNAPL releases to the Outfall 002 system from the reach that runs adjacent to former Tank Farm 37 area (upstream of manhole 2-19). As previously noted in Section 4.1, this video reconnaissance was conducted on March 1, 2005, and revealed no visual evidence of LNAPL infiltration. Options for further addressing these conditions will be evaluated in the Corrective Measures Proposal (CMP).

6.2 Outfall 003 Interim Measures

Based on the age, magnitude, and complexity of the Outfall 003 storm sewer system and related impacts, the design strategy for the system is "end-of-pipe" control using an oil interceptor, and other controls. GM is currently conducting the design of a system to direct dry-weather flow and a portion of wet-weather flow to an oil-water separator and the former wastewater aeration lagoon (east lagoon). The purpose of this system will be to remove oil sheen from stormwater prior to discharge to the Flint River. The final remedy of this condition will be evaluated in the CMP.

6.3 Outfall 004 Interim Measures

Based on the age, magnitude, and complexity of the Outfall 004 storm sewer system and related impacts, the design strategy for the system is "end-of-pipe" control using an oil interceptor. GM is currently conducting the design of a system to direct dry-weather flow and a portion of wet-weather flow to an oil-water separator. The purpose of this system will be to remove oil sheen from stormwater prior to discharge to the Flint River. The final remedy of this condition will be evaluated in the CMP.

6.4 Outfall 005 Interim Measures

Releases of LNAPL to the Outfall 005 storm sewer were isolated to two areas. The first area was a pipe draining to the storm sewer inside Factory 83/84. This pipe was permanently plugged with concrete at manhole 5-19 (see Figure I-3). The second area was the French drain system behind the north retaining wall of the Leith Street underpass. To address this issue, sewer reconnaissance and follow-up activities were performed as described below.

On September 15, 2004, approximately 945 linear feet of storm sewer was inspected from the outfall at the river upstream to manhole 5-3, which is located near the eastern East Leith Street security gate (see Figure I-5). This portion of the storm sewer is constructed of 60-inch diameter reinforced concrete pipe (RCP). This sewer

appeared to be in very good condition, with some groundwater infiltration and mineral deposits at select joints. It appeared that the mastic joint compound in most joints has sagged over time, and the joints are not tightly sealed. On September 21, 2004, an additional 1,400-linear foot section of this sewer was inspected from manhole 5-3 westward to manhole 5-12. The storm sewer between manholes 5-3 and 5-6 is constructed of 60-inch diameter RCP. The pipe between manholes 5-6 and 5-10 is constructed of an elliptical 60-inch 'Hi-Flo' RCP. The pipe between manholes 5-10 and 5-12 is constructed of 42-inch diameter RCP.

It was initially noted during the September 15 inspection that LNAPL appeared to be infiltrating into the Outfall 005 storm sewer system through several joints in a reach that is adjacent to the eastern security gate (between manholes 5-2 and 5-3); however, upon closer examination, this material was not observed to be resulting in any oil sheens. As a result, it was presumed that the indications of LNAPL infiltration were not likely, and that this condition was more likely the result of sagging mastic joint compound. This reach was re-inspected on September 21 and a small amount of water infiltration was confirmed. Otherwise, no other significant issues were noted for the Outfall 005 storm sewer system.

On September 16, 2004, a video inspection was conducted involving select manholes as well as drain tiles associated with the French drain system present along the northern retaining wall of the East Leith Street underpass. The inspection was conducted to assess the condition of this drainage system, and to investigate this system as a potential source(s) of oil sheens discharging to the Flint River (river) via connections to the Site's Outfall 005 storm sewer system. The inspections were performed using a video truck, a jetter/vac truck, and a work crew capable of accessing the drainage/sewer systems under appropriate confined space entry protocol to clean various pipes to facilitate videotaping.

The French drain system consists of an 8-inch diameter perforated vitrified clay pipe (VCP) installed in granular backfill at the base of the interior side of the retaining wall. The perforated VCP connects two access manholes located behind the northern retaining wall on either side of the railroad bridge and extends approximately 100 feet to either side (east and west) of these manholes. The manholes then each discharge through an 8-inch VCP to a pair of catchbasins located approximately 20 feet south in the west-bound lane of East Leith Street on either side of the existing railroad bridge, which in turn discharge to the Outfall 005 storm sewer system. A summary of the inspection is provided below.

Eastern Manhole

The eastern manhole consists of 4-foot diameter precast concrete manhole sections set on a cast-in-place concrete base. The structure is approximately 16.5 feet deep, with inlet pipes entering from the east and west, and the outlet pipe running south, all at the base of the structure.

The 8-inch diameter perforated vitrified clay pipe (VCP) running east was videotaped and appeared to be in fair condition, with observed mineral deposits and some misaligned tile sections, and an estimated flow of 2 gallons per minute (gpm) of clear water. The inspection was abandoned at approximately 52 feet from the manhole, when the camera was at risk of overturning due to increasing mineral deposits in the pipe.

The 8-inch VCP running west was videotaped, and appeared to be in very poor condition, with numerous cracks and collapsed portions of the pipe being observed. An estimated 2 gpm of water was flowing from the west. LNAPL was visible on the water flowing into the manhole, which in turn flowed south to the eastern catchbasins along Leith Street, and subsequently to the Outfall 005 storm sewer system. The inspection was abandoned when the camera could not pass obstructions approximately 18 feet west of the manhole. An attempt was made with the jetter/vac to clean obstructions from this pipe, but the jetter head met refusal at 18 feet from the manhole.

The outlet pipe was inspected and measured for the purpose of installing a 'P'-trap to limit the release of LNAPL to the Outfall 005 storm sewer. The 'P'-trap was successfully installed on September 30, 2004. It consists of 6-inch diameter Schedule 40 polyvinyl chloride (PVC) pipe and fittings. The 'P'-trap was inserted into the 8-inch VCP and sealed with hydraulic cement. It resulted in raising the water level in the manhole approximately 2 feet, and appears to prevent LNAPL from flowing from the French drain system to the Outfall 005 storm sewer system. An absorbent pad was placed in the manhole to collect any LNAPL trapped inside, but none has appeared since the 'P'-trap was installed.

Eastern Catchbasins

The eastern catchbasins consist of two side-by-side collection basins that receive discharge from the eastern manhole described above via an 8-inch diameter VCP. The catchbasins are approximately 3 feet in diameter by 2-1/2 feet deep, and separated by about 2 feet. There was evidence that the sidewalk adjacent to the catchbasin had been undermined. It had subsided approximately 1.5 inches, presumably due to water scouring along the retaining wall and along the length of the 8-inch VCP. Another 8-inch diameter VCP was observed running west to the matching set of catchbasins mentioned previously. This pipe was videotaped was found to be blocked by a piece of concrete approximately 10 feet west of the catchbasin. An estimated 2 gallons per minute of clear water was noted to be continuously flowing in this pipe from the west. The blockage could not be removed using the jetter/vac truck.

Absorbent booms were placed and secured in this catchbasin to intercept the floating LNAPL from the eastern manhole before it reached the Outfall 005 storm sewer system. Subsequent inspections performed prior to installing the 'P'-trap revealed the booms were containing LNAPL that continued to flow from the manhole. Following installation of the 'P'-trap, water in the manhole was observed to be clear and LNAPL appears to have ceased flowing from the eastern manhole.

Western Manhole

The western manhole has a similar construction to the eastern manhole with 4-foot diameter precast concrete manhole sections set on a cast-in-place concrete base. The structure is approximately 26.5 feet deep, with inlet pipes entering from the east and west, and the outlet pipe running south, all at the base of the structure. There was approximately 1.5 feet of standing water in the manhole that was removed by vac truck.

The section of 8-inch diameter, perforated VCP running east could not be accessed because of sediment in the pipe. The sediment could not be cleaned out as the manhole was too deep for the equipment at hand. However, when the manhole was dewatered using a vacuum truck, no water flowed in, and it was assumed that this pipe was blocked.

The section of 8-inch VCP running west could not be accessed because of a vertical 4-inch diameter pipe blocking the entrance. The purpose of this pipe is unknown. After the manhole was dewatered, there was a steady flow of an estimated 1 gpm of water from the 8-inch pipe. A layer of LNAPL was observed on the water flowing into the manhole from this pipe after vacuuming ceased. Water or LNAPL was prevented from discharging to the western catchbasins in Leith Street because the outlet pipe had been was previously plugged with concrete by GM several years ago in an effort to stop LNAPL flowing to the storm sewer.

In preparation for a possible re-establishment of the discharge line from the western manhole to the western catchbasins, a 'P'-trap, similar in design and construction to the one installed in the eastern manhole, was installed in the western manhole.

Western Catchbasins

The western catchbasins consist of two side-by-side collection basins that originally received discharge from the western manhole described above via an 8-inch diameter VCP. The western basins are constructed similarly to the eastern basins. A section of the sidewalk adjacent to the catchbasin was undermined and had collapsed, presumably due to water scouring along the retaining wall and along the length of the 8-inch VCP. The collapse was protected by safety barriers placed by GM personnel. The catchbasin structures were also being undermined. An 8-inch diameter VCP was observed running east presumably to the eastern set of catchbasins. This line was noted to be substantially blocked by concrete that was poured into the catchbasin by GM to block the flow of LNAPL from the French drain into the Outfall 005 storm sewer system as mentioned above. No flow was observed exiting this catchbasin to the Outfall 005 storm sewer system.

GM re-established the discharge line from the western manhole to the western catchbasin and rebuilt these catchbasins in 2005.

Currently both of the p-traps are performing as intended, and LNAPL sheen is not visible in these manholes or in the main line of the Outfall 005 storm sewer. The final remedy of this condition will be evaluated in the CMP.

6.5 Outfall 006 Interim Measures

Releases of LNAPL have also been observed from Outfall 006, as noted above. This storm sewer system services portions of the recently demolished areas of the Site south of Leith Street. It does not receive flow from off-site areas upstream of the Site, as is the case with some of the other outfall networks. In July 2004, the Outfall 006 network was permanently plugged at the furthest down gradient point of the storm sewer that is on GM property (i.e., immediately west of the railroad tracks adjacent to the former Building 02). Prior to doing so, the sewer line was temporarily plugged upstream and downstream of a portion of this storm sewer traversing the former Building 12 area, where considerable LNAPL has been observed (some infiltrating this sewer line). Water levels and LNAPL thickness in monitoring wells in this area were periodically monitored to verify that plugging this storm sewer would not have an adverse impact on the stability of the LNAPL plume(s) in the area. Accumulated stormwater does not appear to discharge to the surface and apparently disperses via overland flow and percolation into the soil.

7. References

American Society of Civil Engineers (ASCE). *Design and Construction of Sanitary and Storm Sewers*. M&R No. 37; WPCF MOP9; 1986.

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BBL. *Description of Current Conditions for Areas North of Leith Street*. November 26, 2000.

Tables

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TABLE I-1

GENERAL MOTORS CORPORATION
NAO FLINT OPERATIONS SITE - FLINT, MICHIGAN
STORM SEWER STUDY AND BASIS OF DESIGN REPORT

ANALYTICAL RESULTS FOR DRY-WEATHER EVENT #1 - JUNE 27 AND 28, 2002

Sample ID	2-39	2-20	2-20	3-26	3-23	3-22-1	3-20	3-15	3-76-8	3-65
Date	6/28/2002	6/28/2002	6/28/2002	6/27/2002	6/27/2002	6/27/2002	6/27/2002	6/27/2002	6/28/2002	6/28/2002
Time	15:00	15:30	15:30	0:00	16:40	16:10	16:35	15:45	12:00	11:00
Constituent										
VOCs										
1,1,1-Trichloroethane	ND	ND	0.59 J	ND	ND	4.1	ND	ND	ND	ND
1,1-Dichloroethane	ND	1.9	2.4	0.81 J	ND	35	2.2	1.8	ND	ND
2-Butanone (MEK)	1.5 J	4.9 J	4.2 J	2.8 J	ND	ND	ND	ND	3.0 J	ND
Acetone	3.0 J	15 J	12 J	9.1 J	ND	ND	4.2 J	ND	13 J	8.7 J
Bromodichloromethane	0.54 J	ND	ND	ND	2.7	ND	1.9	1.4	ND	0.53 J
Chloroethane	ND	0.68 J	1.7	ND	ND	25	ND	ND	ND	ND
Chloroform	1.1	ND	ND	0.53 J	5.5	ND	3.7	3.1	ND	1.1
cis-1,2-Dichloroethene	ND	59	60	1.4	ND	ND	1.1	0.92 J	ND	5
Dibromochloromethane	ND	ND	ND	ND	1.1	ND	0.82 J	0.63 J	ND	ND
Methylene chloride	ND	ND	ND	ND	ND	0.79 J	ND	ND	ND	ND
trans-1,2-Dichloroethene	ND	2.5	2.3	ND	ND	ND	ND	ND	ND	0.80 J
Trichloroethene	ND	8	8.8	ND	ND	ND	2.7	2.2	ND	0.54 J
Vinyl chloride	ND	1.7	1.8	ND	ND	ND	0.99 J	0.64 J	ND	4.7
PCBs										
Aroclor-1248	NA	NA	NA	ND	ND	2.4	ND	0.18	ND	NA
Aroclor-1260	NA	NA	NA	ND	ND	ND	ND	ND	ND	NA

Sample ID	4-23	4-20	4-17	4-13	4-8	5-13A	5-10	5-5	5-4	11-6-2	11-3
Date	6/27/2002	6/27/2002	6/27/2002	6/27/2002	6/27/2002	6/27/2002	6/27/2002	6/27/2002	6/27/2002	8/2/2002	8/2/2002
Time	15:20	14:30	14:00	13:30	13:00	11:15	11:05	10:45	10:10		
Constituent											
VOCs											
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.3	ND
1,1-Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Butanone (MEK)	ND	ND	ND	ND	ND	1.2 J	ND	ND	ND	ND	ND
Acetone	ND	ND	ND	ND	ND	2.7 J	ND	ND	ND	2.9 J	3.6 J
Bromodichloromethane	ND	1.9	1.9	1.3	0.89 J	2.6	2.6	1.5	1.3	ND	ND
Chloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	ND	2.1	2.4	1.5	1.2	3.6	2.9	2	2.3	ND	ND
cis-1,2-Dichloroethene	ND	ND	ND	ND	1.5	ND	ND	ND	ND	0.60 J	ND
Dibromochloromethane	ND	1.1	1.3	0.89 J	ND	1.1	1.3	0.91 J	0.75 J	ND	ND
Methylene chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	ND	ND	0.84 J	0.96 J	ND	ND	0.62 J	0.51 J	0.63 J	ND
Vinyl chloride	ND	ND	ND	ND	1.2	ND	ND	ND	ND	ND	ND
PCBs											
Aroclor-1248	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA
Aroclor-1260	ND	1.1	ND	ND	ND	ND	ND	ND	ND	NA	NA

Notes:
All concentrations in ug/L.
Only constituents that were detected are listed in this table.
J = estimated value.
NA = constituent not analyzed for.
ND = constituent not detected.

TABLE I-2

GENERAL MOTORS CORPORATION
NAO FLINT OPERATIONS SITE - FLINT, MICHIGAN
STORM SEWER STUDY AND BASIS OF DESIGN REPORT

ANALYTICAL RESULTS FOR DRY-WEATHER EVENT #2 - JULY 9, 2002

Sample ID	3-26	3-23	3-22-1	3-20	3-15	3-65	4-23	4-13	4-8	5-13A	5-10	5-5	5-4	11-6	11-3
Date	7/9/2002	7/9/2002	7/9/2002	7/9/2002	7/9/2002	7/9/2002	7/9/2002	7/9/2002	7/9/2002	7/9/2002	7/9/2002	7/9/2002	7/9/2002	7/9/2002	7/9/2002
Time	14:15	13:50	13:15	13:05	12:45	12:05	11:15	10:40	9:00	16:05	15:50	15:15	15:40	16:55	16:40
Constituent															
VOCs															
1,1,1-Trichloroethane	0.67 J	ND	3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.7
1,1-Dichloroethane	1.6	ND	37	1.3	1.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.6 J
2-Butanone (MEK)	4.2 J	3.3 J	3.1 J	5.0 J	3.7 J	5.3 J	13 J	7.8 J	3.0 J	2.6 J	2.5 J	2.8 J	3.3 J	3.9 J	7.4 J
Acetone	6.4 J	4.6 J	2.6 J	4.1 J	4.4 J	3.1 J	3.0 J	2.6 J	5.0 J	2.9 J	3.0 J	2.8 J	3.5 J	9.2 J	ND
Bromodichloromethane	ND	4	ND	ND	ND	ND	ND	ND	ND	3	1.7	0.94 J	0.87 J	ND	ND
Chloroethane	ND	ND	27	0.55 J	ND	ND	ND	ND	0.58 J	ND	ND	ND	ND	ND	ND
Chloroform	2.3	8.9	ND	7.2	7	0.91 J	ND	1.6	0.99 J	7.3	3.4	1.8	1.7	ND	ND
cis-1,2-Dichloroethene	2.3	ND	ND	0.93 J	0.71 J	7.6	ND	ND	2.4	ND	ND	0.51 J	ND	ND	ND
Dibromochloromethane	ND	1.5	ND	1.4	1.3	ND	ND	ND	ND	1.2	0.85 J	ND	ND	ND	ND
Dichlorodifluoromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.4	ND
Methylene chloride	ND	ND	0.90 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND	ND	ND	1.1	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	0.89 J	ND	ND	1.9	1.6	0.67 J	ND	1.8	1.7	ND	ND	1.4	1	ND	2
Vinyl chloride	ND	ND	ND	0.70 J	ND	7.3	ND	ND	1.7	ND	ND	ND	ND	ND	ND
PCBs															
Aroclor-1248	ND	ND	0.17	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA
Aroclor-1260	ND	ND	ND	ND	ND	1	ND	ND	ND	ND	ND	ND	ND	NA	NA

Notes:
All concentrations in ug/L.
Only constituents that were detected are listed in this table.
J = estimated value.
NA = constituent not analyzed for.
ND = constituent not detected.

TABLE I-3

GENERAL MOTORS CORPORATION
NAO FLINT OPERATIONS SITE - FLINT, MICHIGAN
STORM SEWER STUDY AND BASIS OF DESIGN REPORT

ANALYTICAL RESULTS FOR WET-WEATHER EVENT - JULY 29, 2002

Sample ID	2-41-4	2-41	2-39	2-38	2-35	2-33	2-31	2-22	2-20	3-26	3-23	3-22-1	3-20
Date	7/29/2002	7/29/2002	7/29/2002	7/29/2002	7/29/2002	7/29/2002	7/29/2002	7/29/2002	7/29/2002	7/29/2002	7/29/2002	7/29/2002	7/29/2002
Time	19:50	19:35	19:20	19:05	18:50	18:30	18:10	17:50	17:30	18:50	18:40	18:15	18:00
Constituent													
VOCs													
1,1-Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.3	ND
4-Methyl-2-pentanone (MIBK)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acetone	8.8 J	9.4 J	8.2 J	10 J	7.7 J	7.2 J	4.1 J	6.7 J	7.3 J	4.5 J	3.9 J	5.5 J	5.5 J
Bromodichloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.53 J	ND	ND
Chloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.2	ND
Chloroform	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.5	ND	ND
cis-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dichlorodifluoromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
o-Xylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PCBs													
Aroclor-1242	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	3	ND

Sample ID	3-15	3-76-8	3-69	3-65	4-23	4-17	4-13	5-13A	5-10	5-5	5-4	11-6	11-3
Date	7/29/2002	7/29/2002	7/29/2002	7/29/2002	7/29/2002	7/29/2002	7/29/2002	7/29/2002	7/29/2002	7/29/2002	7/29/2002	7/29/2002	7/29/2002
Time	17:40	19:50	19:30	19:10	20:45	20:30	20:10	21:20	21:00	20:45	20:25		
Constituent													
VOCs													
1,1-Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-Methyl-2-pentanone (MIBK)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.65 J	0.77 J
Acetone	5.8 J	2.4 J	2.7 J	2.7 J	3.6 J	2.8 J	3.1 J	3.1 J	2.7 J	1.5 J	1.9 J	3.4 J	4.6 J
Bromodichloromethane	ND	ND	ND	ND	ND	ND	ND	3.7	2.1	ND	0.93 J	ND	ND
Chloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	ND	ND	0.69 J	0.68 J	ND	0.68 J	0.52 J	7.9	4.4	2.2	2	ND	ND
cis-1,2-Dichloroethene	ND	ND	3.3	3.2	ND	ND	6.9	ND	ND	0.54 J	ND	ND	ND
Dibromochloromethane	ND	ND	ND	ND	ND	ND	ND	1.7	1.2	0.68 J	0.56 J	ND	ND
Dichlorodifluoromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.5	1.1
o-Xylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.8	ND
trans-1,2-Dichloroethene	ND	ND	0.51 J	0.53 J	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	ND	ND	ND	ND	ND	5.8	ND	ND	1.4	1.2	ND	1.5
Vinyl chloride	ND	ND	4.3	3.6	ND	ND	1.4	ND	ND	ND	ND	ND	ND
PCBs													
Aroclor-1242	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA

Notes:
All concentrations in ug/L
Only constituents that were detected are listed in this table.
J = estimated value.
NA = constituent not analyzed for.
ND = constituent not detected.

TABLE I-4

GENERAL MOTORS CORPORATION
NAO FLINT OPERATIONS SITE - FLINT, MICHIGAN
STORM SEWER STUDY AND BASIS OF DESIGN REPORT

SUMMARY OF ABSORBENT BOOM INSPECTION

Manhole No.	6/10/02	6/14/02	6/17/02	6/21/02	6/25/02	7/1/02	7/15/02	7/18/02	7/23/02	7/26/02	7/29/02	7/31/02
2-39	Booms Installed	Clean, storm sewer dry	Slight non-petro. staining	Moderate black staining (non-petro.)	Moderate black staining (non-petro.)	Slight orange staining (rust)	Moderate rust/ black staining (non-petro.)	Moderate staining (non-petro.)	Boom saturated	Boom saturated	Changed boom	Slight staining (non-petro.)
2-33	Booms Installed		Clean	Clean	Clean	Slight staining (non-petro.)	Slight staining (non-petro.)	Slight staining (non-petro.)		Boom saturated	Changed boom	Clean
3-23	Booms Installed	Clean	Slight petro. staining	Heavy black petro. staining, changed boom	Clean	Slight petro. staining	Slight petro. staining	Moderate petro. staining	Boom saturated	Boom saturated	Changed boom	Slight to moderate petro. staining
3-72	Booms Installed			Moderate black petro. staining, with heavy orange deposits (rust)	Moderate black petro. staining						Changed boom	
3-10	Booms Installed			Moderate black petro. staining	Moderate black petro. staining	Heavy orange staining (rust)	Heavy rust staining	Heavy rust staining	Boom saturated	Boom saturated	Changed boom	Slight to moderate rust staining
4-13	Booms Installed	Clean	Heavy petro. staining, changed boom	Moderate black petro. staining		Slight petro. staining	Moderate petro. staining	Moderate petro. staining	Boom saturated	Boom saturated	Changed boom	Slight yellow petro. staining
4-8	Booms Installed	Slight petro. staining	Heavy petro. staining, changed boom	Slight to moderate petro. staining	Slight to moderate petro. staining	Slight petro. staining	Moderate petro. staining	Moderate petro. staining	Boom saturated	Boom saturated	Changed boom	Slight yellow petro. staining
5-13A	Booms Installed	Clean	Heavy staining, (slight petro.) changed boom	Clean	Clean	Slight petro. staining	Slight petro. staining	Moderate petro. staining	Boom saturated	Boom saturated	Changed boom	Slight to moderate petro. staining
5-10	Booms Installed	Clean	Slight petro. staining, chlorine odor	Unable to access	Unable to access	Heavy petro. staining	Heavy petro. staining, changed boom	Light petro. staining	Boom saturated	Boom saturated	Changed boom	Slight petro. staining
5-5	Booms Installed	Clean	Slight to moderate petro. staining, yellow	Moderate yellow petro. staining	Mod. yellow petro staining	Slight orange staining (rust) with petro.	Slight petro. staining	Moderate petro. staining	Boom saturated	Boom saturated	Changed boom	Slight rust staining

Note:
petro. = petroleum.

TABLE I-5

GENERAL MOTORS CORPORATION
NAO FLINT OPERATIONS SITE - FLINT, MICHIGAN
STORM SEWER STUDY AND BASIS OF DESIGN REPORT

STORM SEWER GRAB SAMPLE ANALYTICAL DATA
(results in ug/L)

Outfall 002 Data:

Sample ID: / Date Collected:	MH 02-19[1] 11/19/02	MH 02-20 11/19/02
Volatiles		
1,1,1-Trichloroethane	350	2.5
1,1-Dichloroethane	140	10
1,1-Dichloroethene	26	ND(1)
2-Butanone (Methyl Ethyl Ketone)	NA	ND(25)
4-Methyl-2-pentanone	NA	ND(50)
Acetone	NA	3.1 J
Bromodichloromethane	ND(10)	ND(1)
Chloroethane	62	20
Chloroform (Trichloromethane)	ND(10)	ND(1)
cis-1,2-Dichloroethene	NA	31
trans-1,2-Dichloroethene	ND(10)	1.2
Trichloroethene	ND(10)	7.7
Vinyl chloride	ND(10)	1.5

Outfall 004 Data:

Sample ID: / Date Collected:	MH 4-8 11/20/02	MH 4-8 11/21/02	MH 4-11 11/20/02	MH 4-11 11/21/02	MH 4-13 11/20/02	MH 4-13 11/21/02	MH 4-17 11/20/02	MH 4-17 11/21/02	MH 4-20 11/20/02	MH 4-20 11/21/02
Volatiles										
1,1,1-Trichloroethane	ND(1)	3.5	ND(1)	1.4	ND(1)	1.4	ND(1)	ND(1)	ND(1)	ND(1)
1,1-Dichloroethane	ND(1)	1.9	ND(1)	0.80 J	ND(1)	0.76 J	ND(1)	ND(1)	ND(1)	ND(1)
1,1-Dichloroethene	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)
2-Butanone (Methyl Ethyl Ketone)	ND(25)	1.9 J	ND(25)	1.9 J	ND(25)	1.9 J	ND(25)	1.9 J	ND(25)	1.7 J
4-Methyl-2-pentanone	ND(50)	ND(50)	ND(50)	1.2 J	ND(50)	1.1 J	ND(50)	0.82 J	ND(50)	0.63 J
Acetone	1.4 J	6.8 J	ND(25)	6.9 J	ND(25)	8.4 J	3.9 J	8.3 J	2.5 J	8.5 J
Bromodichloromethane	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	0.58 J	ND(1)
Chloroethane	ND(1)	ND(1)	0.81 J	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)
Chloroform (Trichloromethane)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	0.54 J	ND(1)	0.86 J	ND(1)
cis-1,2-Dichloroethene	6	0.77 J	7.6	ND(1)	1.1	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)
trans-1,2-Dichloroethene	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)
Trichloroethene	3.7	ND(1)	4.6	ND(1)	1.4	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)
Vinyl chloride	3.7	ND(1)	5.1	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)

Notes:

1. Sample collected from manhole 2-19 by General Motors for compliance with NPDES reporting requirements and were not analyzed for all of the PAL VOCs.
2. Samples collected November 20, 2002 during dry weather flow conditions.
3. Samples collected November 21, 2002 following wet weather flow conditions.
4. ND () = constituent not detected above method detection limit (detection limit in parenthesis).
5. NA = constituent not analyzed.
6. J = estimated value.

Table I-6

GENERAL MOTORS CORPORATION
NAO FLINT OPERATIONS SITE - FLINT, MICHIGAN
STORM SEWER STUDY AND BASIS OF DESIGN REPORT

STORM SEWER FLOW VOLUME CALCULATIONS

INSTANTANEOUS FLOW RATE

Manhole ID	Event	Pipe Diameter (D) (inches)	Water Depth (d) (inches)	Flow Area (A) (square inches)	Floww Area (A/144) (square feet)	Velocity (v) (feet per second)	Flow Volume (Q = A x v) (cubic feet per second)	Flow Volume (Q x 448.83) (gallons per minute)
2-20	Dry #1	42	0.5	3.044	0.021	0.2	0.004	1.90
2-20	Dry #2	42	NA	NA	NA	NA	NA	NA
2-20	Wet	42	3.5	55.144	0.383	0.15	0.057	25.78
3-20	Dry #1	66	1.5	19.764	0.137	0.3	0.041	18.48
3-20	Dry #2	66	2	30.965	0.215	0.5	0.108	48.26
3-20	Wet	66	4.9	115.112	0.799	4.2	3.357	1506.92
3-69	Dry #1	42	NA	NA	NA	NA	NA	NA
3-69	Dry #2	42	NA	NA	NA	NA	NA	NA
3-69	Wet	42	4.2	72.104	0.501	0.8	0.401	179.79
4-8	Dry #1	54	3	52.853	0.367	0.39	0.143	64.25
4-8	Dry #2	54	3	52.853	0.367	0.1	0.037	16.47
4-8	Wet	54	NA	NA	NA	NA	NA	NA
5-4	Dry #1	60	2	28.918	0.201	0.33	0.066	29.74
5-4	Dry #2	60	2	28.918	0.201	0.5	0.100	45.07
5-4	Wet	60	3.6	69.262	0.481	0.5	0.240	107.94

DATALOGGER

Manhole ID	Event	Pipe Diameter (D) (inches)	Water Depth (d) (inches)	Flow Area (A) (square inches)	Floww Area (A/144) (square feet)	Velocity (v) (feet per second)	Flow Volume (Q = A x v) (cubic feet per second)	Flow Volume (Q x 448.83) (gallons per minute)
3-20	Dry #1	66	5.8	147.251	1.023	0.2	0.205	91.79
3-20	Dry #2	66	6.6	178.053	1.236	0.2	0.247	110.99
5-4	Dry #1	60	4.5	96.341	0.669	0.2	0.134	60.06

Notes:

Dry #1	Sampling event under dry weather flow conditions (June 27/28, 2002)
Dry #2	Sampling event under dry weather flow conditions (July 9, 2002)
Wet	Sampling event under wet weather flow conditions (July 29, 2002)
NA	Data not available.

Figures

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engineers & scientists

NORTH END SOUTH END

NORTH END SOUTH END

FORMER AERATION LAGOONS

LEGEND:

- PROPERTY BOUNDARY
- PROPERTY PREVIOUSLY OWNED BY GM
- OUTFALL 001 DRAINAGE AREA
- OUTFALL 002 DRAINAGE AREA
- OUTFALL 003 DRAINAGE AREA
- OUTFALL 004 DRAINAGE AREA
- OUTFALL 004A DRAINAGE AREA
- OUTFALL 005 DRAINAGE AREA
- OUTFALL 005A DRAINAGE AREA
- OUTFALL 005B DRAINAGE AREA
- OUTFALL 006 DRAINAGE AREA
- OUTFALL 007 DRAINAGE AREA
- OUTFALL 007A DRAINAGE AREA
- OUTFALL 008 DRAINAGE AREA
- OUTFALL 010 DRAINAGE AREA
- OUTFALL 011 DRAINAGE AREA
- OUTFALL 012 DRAINAGE AREA
- OUTFALL 013 DRAINAGE AREA
- AREAS WITH NO DIRECT DRAINAGE TO THE STORM SEWER
- AREAS THAT DRAIN TO PROCESS WASTE LINES
- DRAINAGE AREAS CAN NOT BE DIFFERENTIATED AMONG OUTFALLS BASED ON INFORMATION AVAILABLE

NOTES:

1. BASE MAP INFORMATION FROM A SURVEY BY BMJ, INC. DATED APRIL 2001, AT A SCALE OF 1:100.
2. DRAINAGE AREAS ILLUSTRATED BASED ON INFORMATION OBTAINED FROM CITY OF FLINT AND GM, TO THE EXTENT SUCH INFORMATION IS AVAILABLE.

0 400' 800'
GRAPHIC SCALE

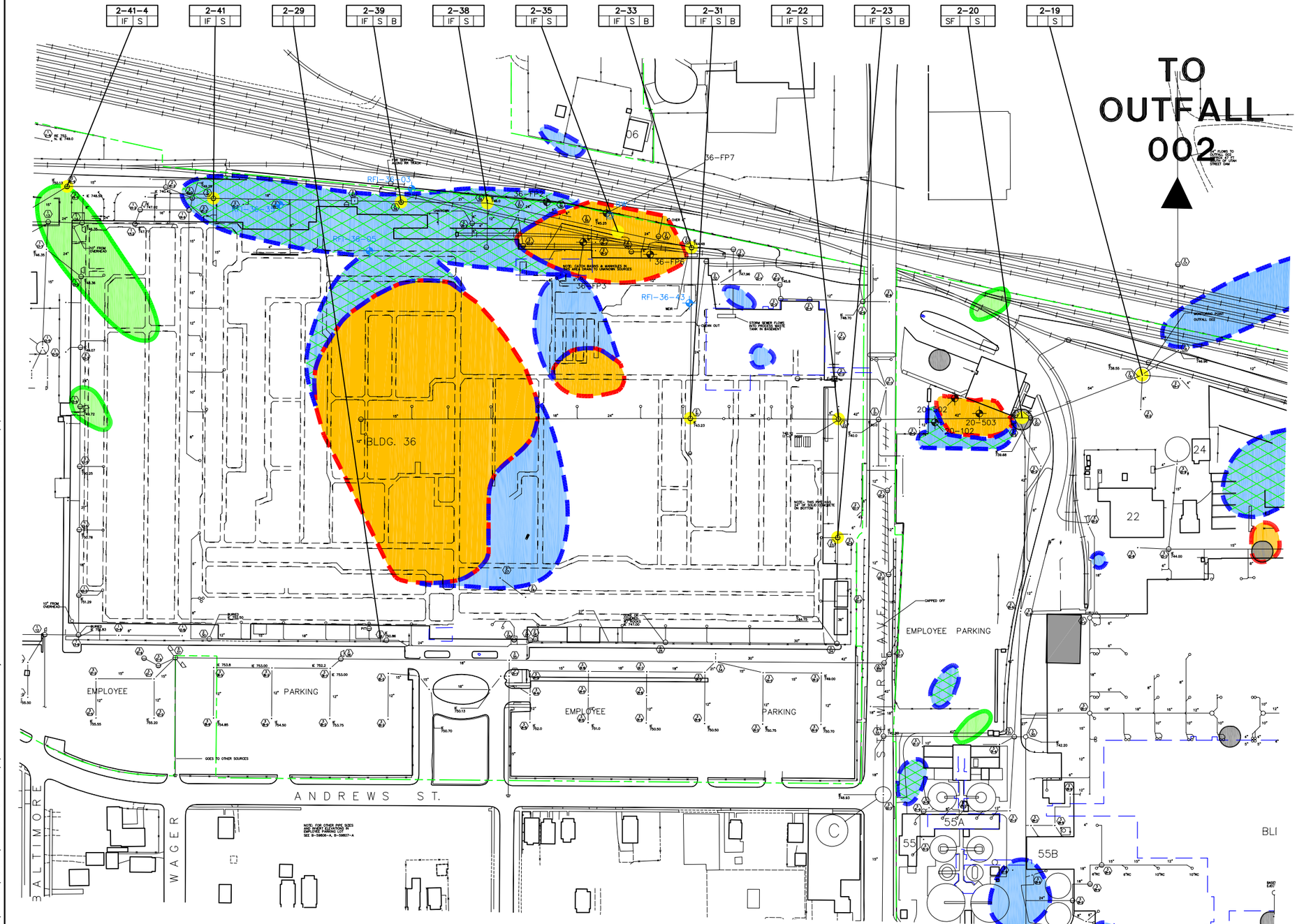
GENERAL MOTORS CORPORATION
NAO FLINT OPERATIONS

OUTFALL DRAINAGE AREAS

BBL BLASLAND, BOUCK & LEE, INC.
engineers, scientists, economists

FIGURE
I-1

X: 64410X01.DWG, 64410X03.DWG, 64410X07.DWG
L: ON=*, OFF=*REF*, |SHD-BUILDING, |SHD-RIVER
P: PAGESET/SYR-DL
3/27/06 SYR-85-GMS DJP GMS
64410112/DRAINAGE/64410G01.DWG



LEGEND:

- EXISTING MONITORING WELL
- SAMPLE LOCATION
- STORM SEWER LINE
- FALL 2001 DISSOLVED PHASE VOC EXCEEDENCES IN GROUNDWATER
- SUMMER 2002 ESTIMATED NAPL EXTENT
- FALL 2001 DISSOLVED PHASE METALS EXCEEDENCES IN GROUNDWATER
- EXISTING IM

KEY:

LOCATION ID. (SF | IF | S | B)
- B = LNAPL INSPECT BOOM
- S = SAMPLE
- IF = INSTANT FLOW
- SF = SYSTEM FLOW

NOTES:

1. BASE MAP INFORMATION FROM A SURVEY BY BMJ, INC. DATED APRIL 2001, AT A SCALE OF 1:100.

0 100' 200'
APPROXIMATE GRAPHIC SCALE

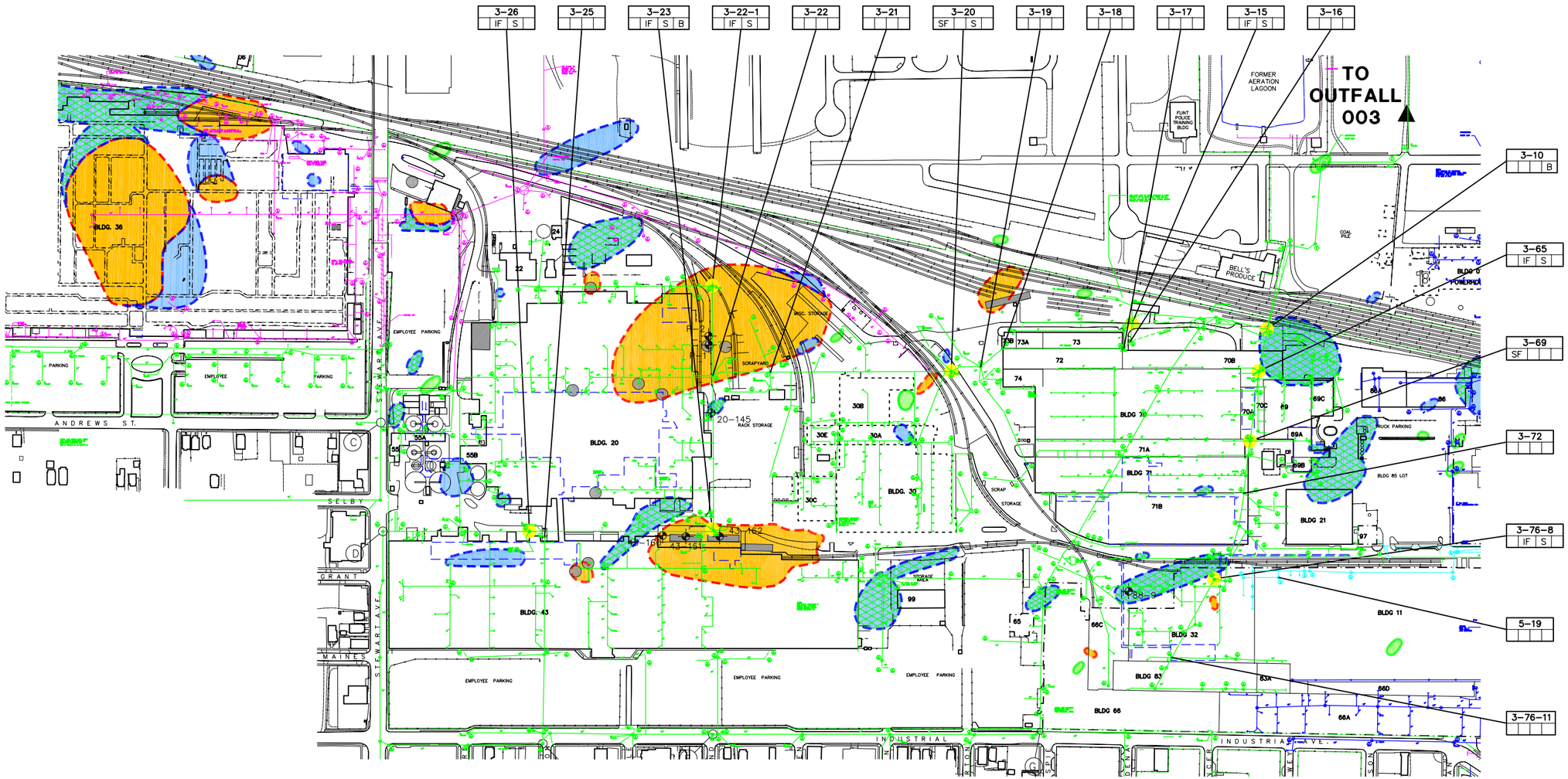
GENERAL MOTORS CORPORATION
NAO FLINT OPERATIONS SITE
FLINT, MICHIGAN

OUTFALL 002 STORM SEWER SYSTEM

BLASLAND, BOUCK & LEE, INC.
engineers, scientists, economists

FIGURE
I-2

SYR-85-NES SDL GMS LAYER: ON=*; OFF=*REF*; |SHD-BUILDING, |subutility, |subutilitysm, |subutilitysd, |HIST_SB_BH, |NAPL_EVID, |NAPL_OBS , |RFI_SB_SB
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PROJECTNAME: -----
IMAGES:
XREFS:
64410X01
64410X07
64410X05
64410X3A



LEGEND:

- EXISTING MONITORING WELL
- SAMPLE LOCATION
- STORM SEWER LINE
- FALL 2001 DISSOLVED PHASE VOC EXCEEDENCES IN GROUNDWATER
- SUMMER 2002 ESTIMATED NAPL EXTENT
- FALL 2001 DISSOLVED PHASE METALS EXCEEDENCES IN GROUNDWATER
- EXISTING IM

KEY:

LOCATION ID. | SF | IF | S | B

- LOCATION ID.
- B = LNAPL INSPECT BOOM
- S = SAMPLE
- IF = INSTANT FLOW
- SF = SYSTEM FLOW

NOTES:

1. BASE MAP INFORMATION FROM A SURVEY BY BMJ, INC. DATED APRIL 2001, AT A SCALE OF 1:100.

0 200' 400'
APPROXIMATE GRAPHIC SCALE

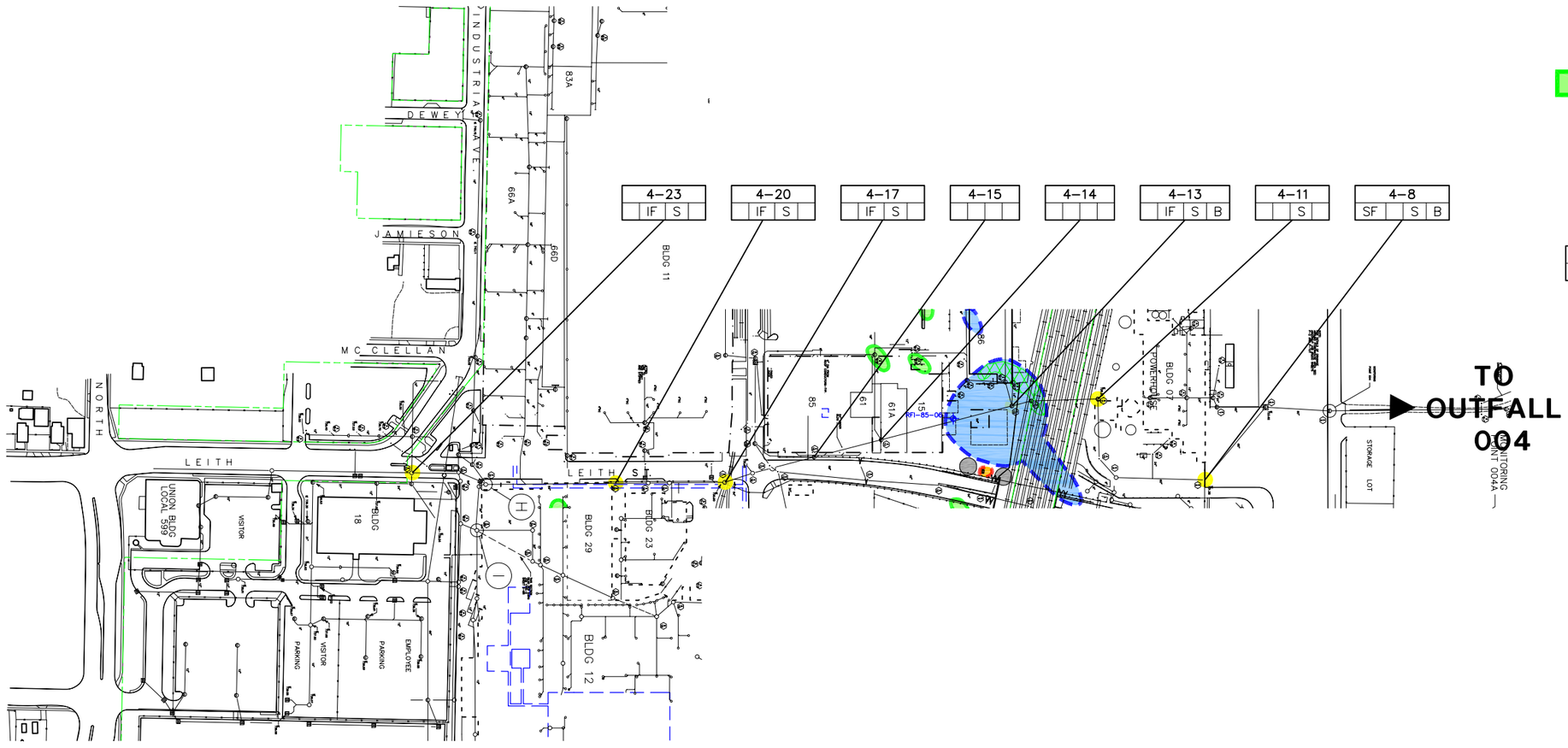
GENERAL MOTORS CORPORATION
NAO FLINT OPERATIONS SITE
FLINT, MICHIGAN

OUTFALL 003 STORM SEWER SYSTEM

BBL BLASLAND, BOUCK & LEE, INC. engineers, scientists, economists

FIGURE I-3

SYR-85-SDL DMW GMS LAYER: ON=*; OFF=*REF*
G:\CAD\ACTIVE\-DWG\ACT\64410112\HISTORIC\64410B02.DWG SAVED:6/6/2007 3:35 PM LAYOUT:Layout1 PAGESETUP:DL2B-PDF-SYR PENTABLE:PLTFULL.CTB PRINTED:6/6/2007 3:35 PM BY:GSTOWELL
PROJECTNAME:----
XREFS: IMAGES:
64410X07
64410X05
64410X01



LEGEND:

- EXISTING MONITORING WELL
- SAMPLE LOCATION
- STORM SEWER LINE
- FALL 2001 DISSOLVED PHASE VOC EXCEEDENCES IN GROUNDWATER
- SUMMER 2002 ESTIMATED NAPL EXTENT
- FALL 2001 DISSOLVED PHASE METALS EXCEEDENCES IN GROUNDWATER
- EXISTING IM

KEY:

LOCATION ID.
SF | IF | S | B

- LOCATION ID.
- B = LNAPL INSPECT BOOM
- S = SAMPLE
- IF = INSTANT FLOW
- SF = SYSTEM FLOW

NOTES:

1. BASE MAP INFORMATION FROM A SURVEY BY BMJ, INC. DATED APRIL 2001, AT A SCALE OF 1:100.

0 150' 300'
APPROXIMATE GRAPHIC SCALE

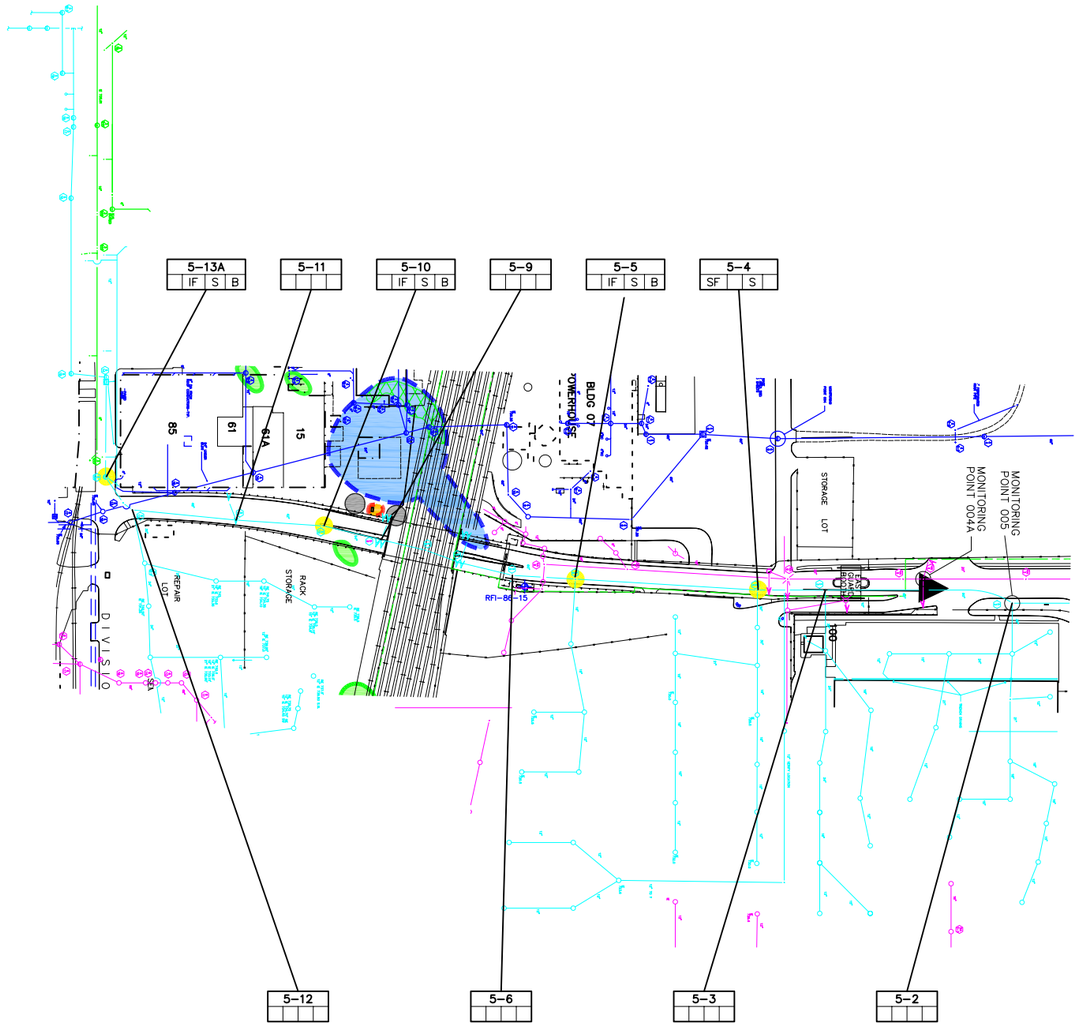
GENERAL MOTORS CORPORATION
NAO FLINT OPERATIONS SITE
FLINT, MICHIGAN

OUTFALL 004 STORM SEWER SYSTEM

BLASLAND, BOUCK & LEE, INC.
engineers, scientists, economists

FIGURE
I-4

SYR-85-NES SDL GMS LAYER: ON=*; OFF=*REF, |SHD-BUILDING, |subutility|m, |subutilsd
G:\CAD\ACTIVE\-DWG\ACT\64410112\HISTORIC\64410B03.DWG SAVED:6/6/2007 12:00 PM LAYOUT:Layout1 PAGESETUP:DL2B-PDF-SYR PENTABLE:PLTFULL.CTB PRINTED:6/6/2007 12:02 PM BY:GSTOWELL
PROJECTNAME:----
XREFS: IMAGES:
64410X01
64410X07
64410X05



TO OUTFALL 005

LEGEND:

- EXISTING MONITORING WELL
- SAMPLE LOCATION
- STORM SEWER LINE
- FALL 2001 DISSOLVED PHASE VOC EXCEEDENCES IN GROUNDWATER
- SUMMER 2002 ESTIMATED NAPL EXTENT
- FALL 2001 DISSOLVED PHASE METALS EXCEEDENCES IN GROUNDWATER
- EXISTING IM

KEY:

LOCATION ID.
SF IF S B

- LOCATION ID.
- B = LNAPL INSPECT BOOM
- S = SAMPLE
- IF = INSTANT FLOW
- SF = SYSTEM FLOW

NOTES:

1. BASE MAP INFORMATION FROM A SURVEY BY BMJ, INC. DATED APRIL 2001, AT A SCALE OF 1:100.

0 150' 300'
APPROXIMATE GRAPHIC SCALE

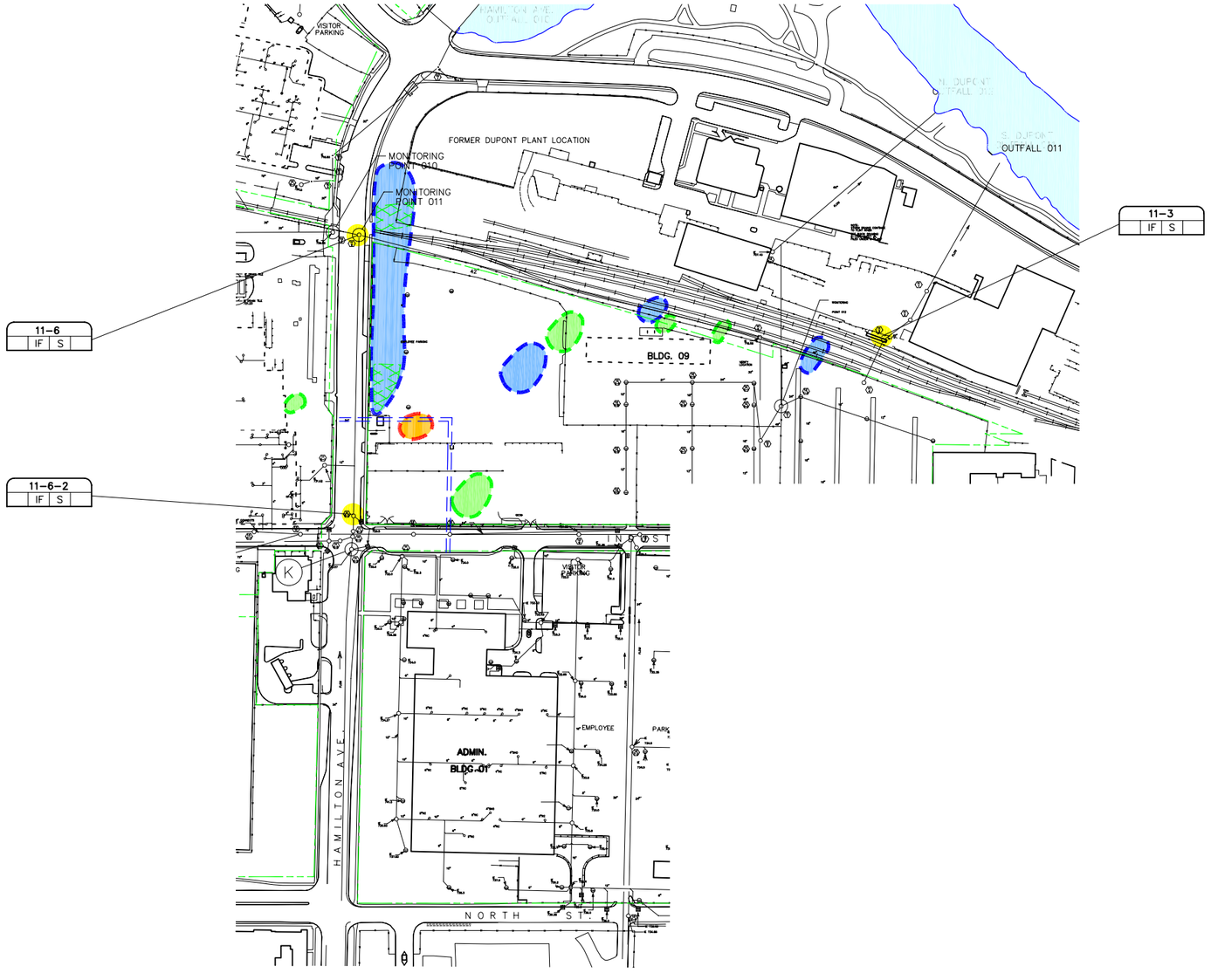
GENERAL MOTORS CORPORATION
NAO FLINT OPERATIONS SITE
FLINT, MICHIGAN

OUTFALL 005 STORM SEWER SYSTEM

BLASLAND, BOUCK & LEE, INC.
engineers, scientists, economists

FIGURE
I-5

SYR-85-NES SDL GMS LAYER: ON=*; OFF=*REF, |SHD-BUILDING, |subutilityim, |subutilsnd
G:\CAD\ACTIVE\-DWG\ACT\64410112\HISTORIC\64410B04.DWG SAVED:6/6/2007 3:41 PM LAYOUT:Layout1 PAGESETUP:DLZB-PDF-SYR PENTABLE:PLTFULL.CTB PRINTED:6/6/2007 3:41 PM BY:GSTOWELL
PROJECTNAME:----
XREFS: IMAGES:
64410X01
64410X07
64410X05



LEGEND:

- ESTIMATED AREA WHERE VOCs & SVOCs EXCEED MICHIGAN PART 201 GENERIC SCREENING CRITERIA IN GROUNDWATER
- SUMMER 2002 ESTIMATED NAPL EXTENT
- ESTIMATED AREA WHERE DISSOLVED METALS EXCEED MICHIGAN PART 201 GENERIC SCREENING CRITERIA IN GROUNDWATER
- STORM SEWER LINE
- PROPERTY BOUNDARY
- SAMPLE LOCATION

LOCATION ID (SF | IF | S | B)
- LOCATION ID
- B= LNAPL INSPECT BOOM
- S= SAMPLE
- IF= INSTANT FLOW
- SF= SYSTEM FLOW

NOTE:

BASE MAP INFORMATION FROM A SURVEY BY BMJ INC., DATED APRIL 2001, AT A SCALE OF 1:100.

0 150' 300'
APPROXIMATE GRAPHIC SCALE

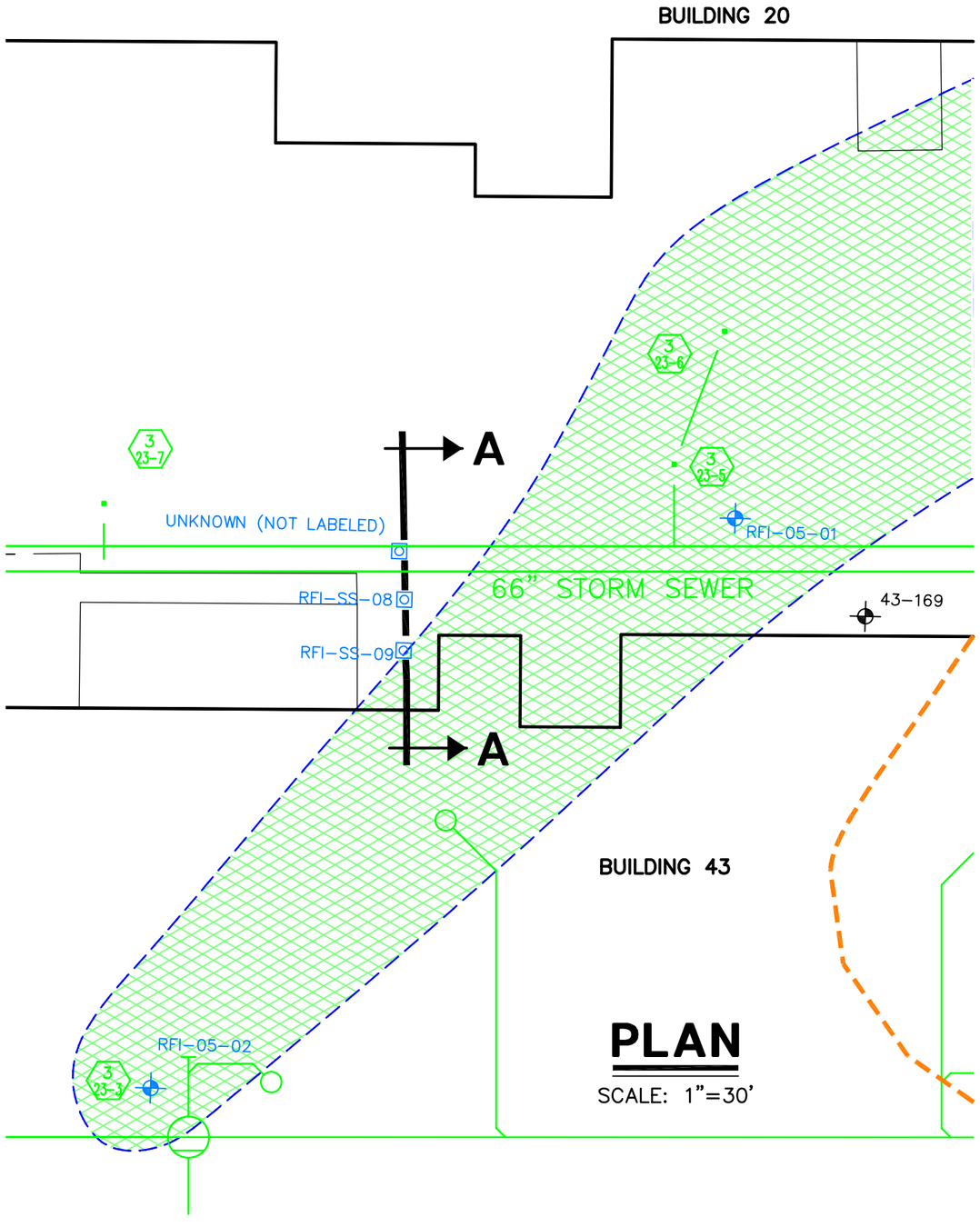
GENERAL MOTORS CORPORATION
NAO FLINT OPERATIONS SITE
FLINT, MICHIGAN

OUTFALL 011 STORM SEWER SYSTEM

BBL BLASLAND, BOUCK & LEE, INC. engineers, scientists, economists

FIGURE
I-6

X: 64410X01, X03, X05, X07.DWG
L: ON=*, OFF=*REF*, |SHD-BUINDING, |HIST_MW, |HIST_MW_NOTGM, *|HIST_SB, |NAPL_OBS, |RFI_MW, *|RFI_SB, |RFI_SB_SB_PROP
P: PAGESET/SYR-DL
3/24/06 SYR-85-GMS DJP GMS
64410112/HISTORIC/64410B05.DWG



PLAN

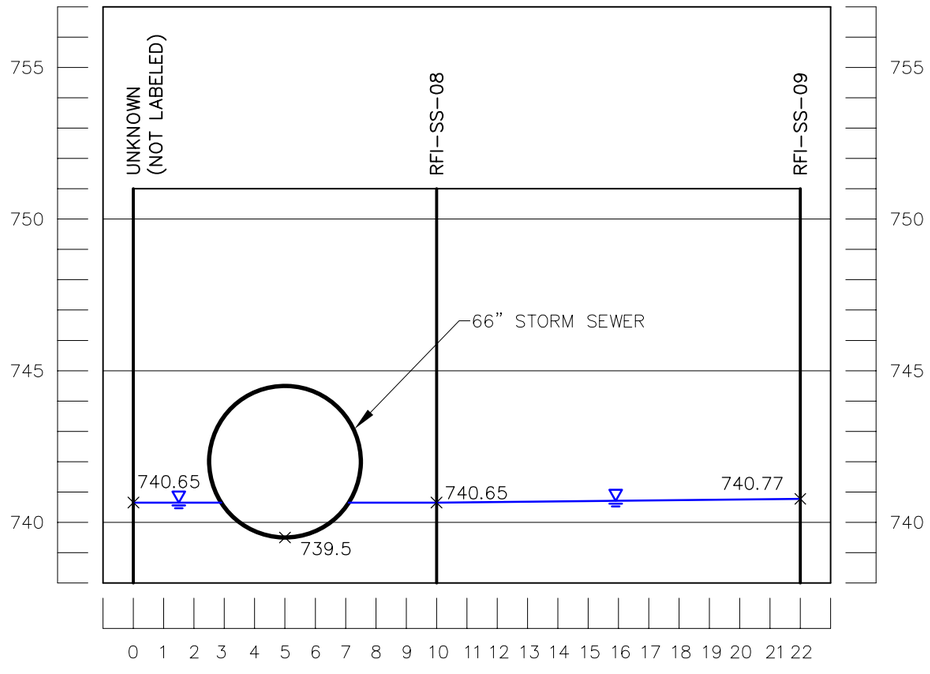
SCALE: 1"=30'

LEGEND:

- EXISTING MONITORING WELL
- PIEZOMETER LOCATION
- STORM SEWER LINE
- STORM SEWER CATCH BASIN (3 / 23-7)
- FALL 2001 DISSOLVED PHASE VOC EXCEEDENCES IN GROUNDWATER
- SUMMER 2002 ESTIMATED NAPL EXTENT
- FALL 2001 DISSOLVED PHASE METALS EXCEEDENCES IN GROUNDWATER
- EXISTING IM

NOTES:

1. BASE MAP INFORMATION FROM A SURVEY BY BMJ, INC. DATED APRIL 2001, AT A SCALE OF 1:100.



SECTION A-A

HORIZONTAL SCALE: 1"=5'
VERTICAL SCALE: 1"=5'

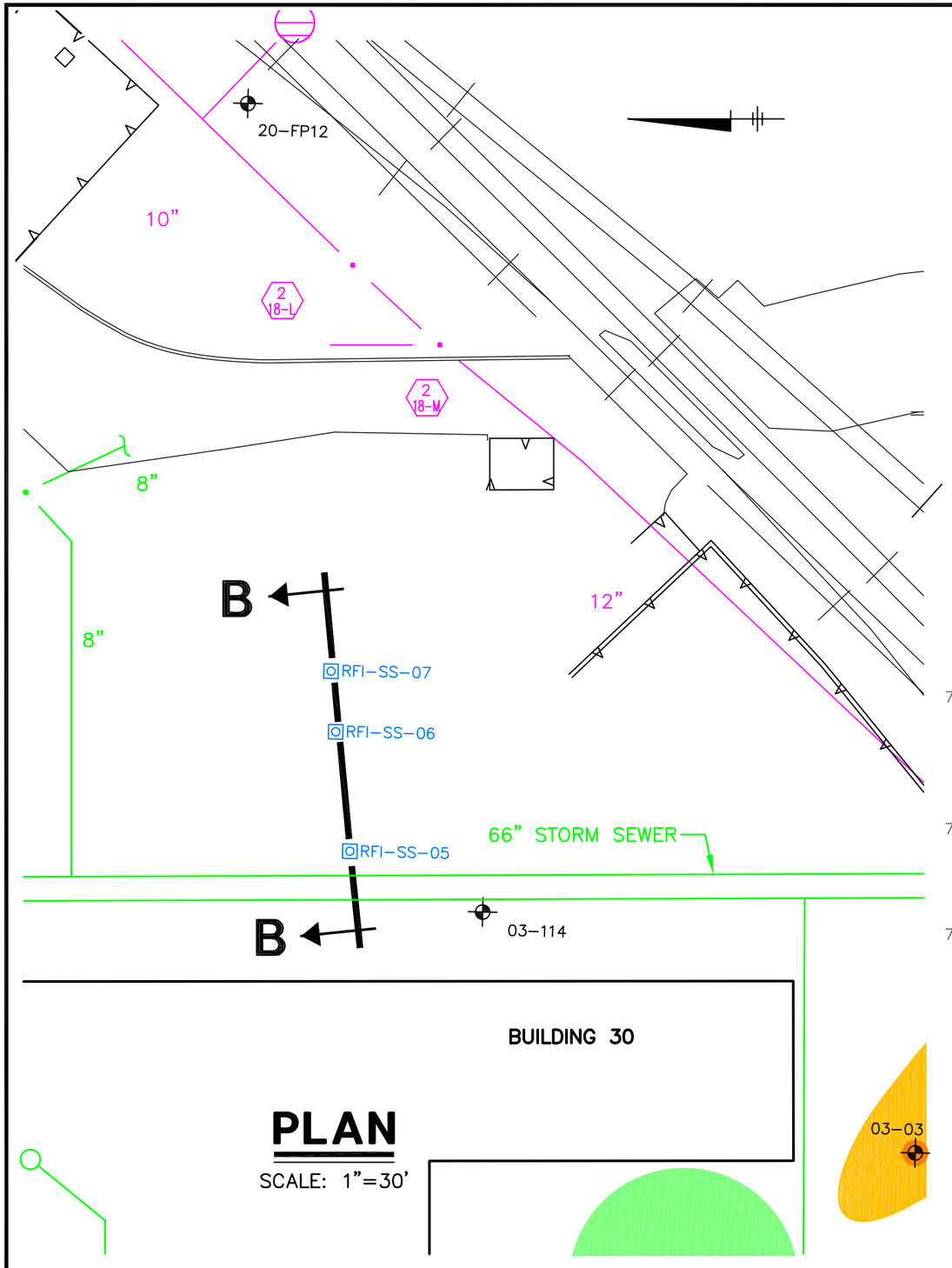
GENERAL MOTORS CORPORATION
NAO FLINT OPERATIONS SITE
FLINT, MICHIGAN

FACTORY 05
PIEZOMETER LOCATIONS

BBL BLASLAND, BOUCK & LEE, INC. engineers, scientists, economists

FIGURE
I-7

L: ON=*, OFF=REF
P: PAGESET/SYR-BL
3/24/06 SYR-85-NES LAF GMS
64410112/HISTORIC/64410B06.DWG



PLAN

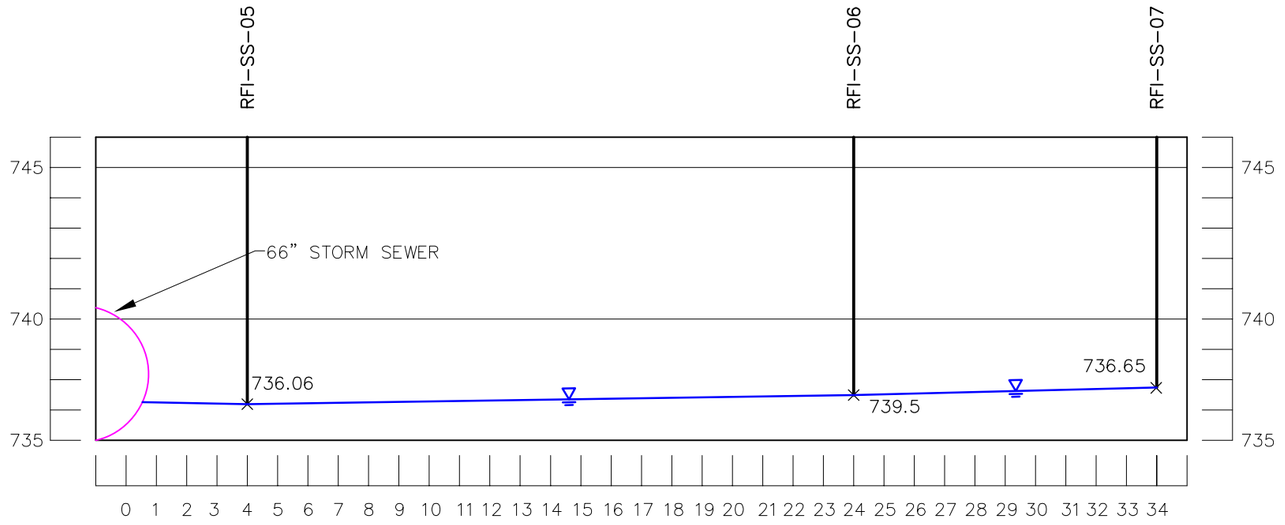
SCALE: 1”=30’

LEGEND:

- EXISTING MONITORING WELL
- PIEZOMETER LOCATION
- STORM SEWER LINE
- STORM SEWER CATCH BASIN (2 / 18–L)
- FALL 2001 DISSOLVED PHASE VOC EXCEEDENCES IN GROUNDWATER
- SUMMER 2002 ESTIMATED NAPL EXTENT
- FALL 2001 DISSOLVED PHASE METALS EXCEEDENCES IN GROUNDWATER
- EXISTING IM

NOTES:

1. BASE MAP INFORMATION FROM A SURVEY BY BMJ, INC. DATED APRIL 2001, AT A SCALE OF 1:100.



SECTION B-B

HORIZONTAL SCALE: 1”=5’
VERTICAL SCALE: 1”=5’

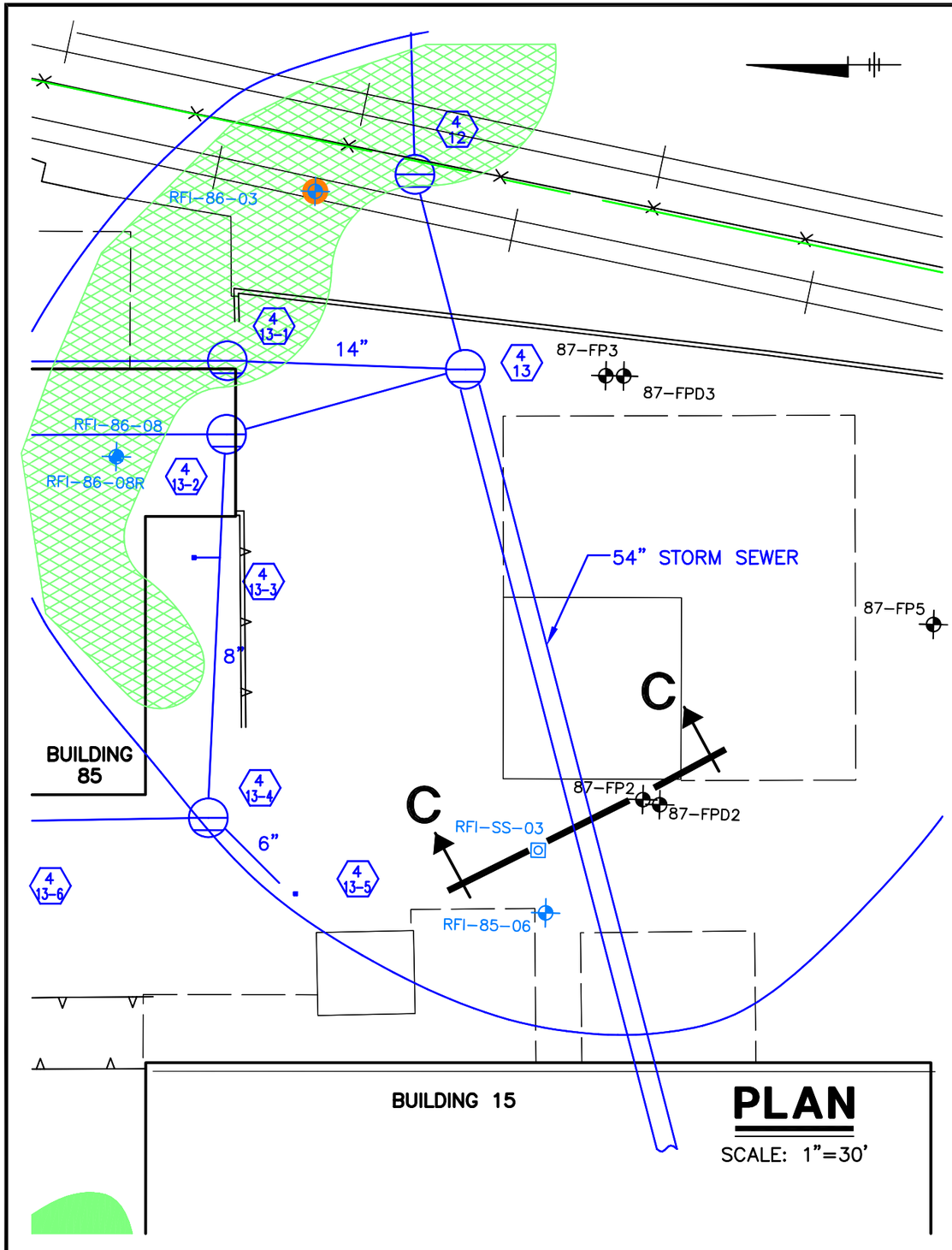
GENERAL MOTORS CORPORATION
NAO FLINT OPERATIONS SITE
FLINT, MICHIGAN

BUILDING 30
PIEZOMETER LOCATIONS

BBL BLASLAND, BOUCK & LEE, INC. engineers, scientists, economists

FIGURE
I-8

L: ON=*, OFF=REF
P: PAGESET/SYR–BL
3/24/06 SYR–85–NES LAF GMS
64410112/HISTORIC/64410B07.DWG



PLAN

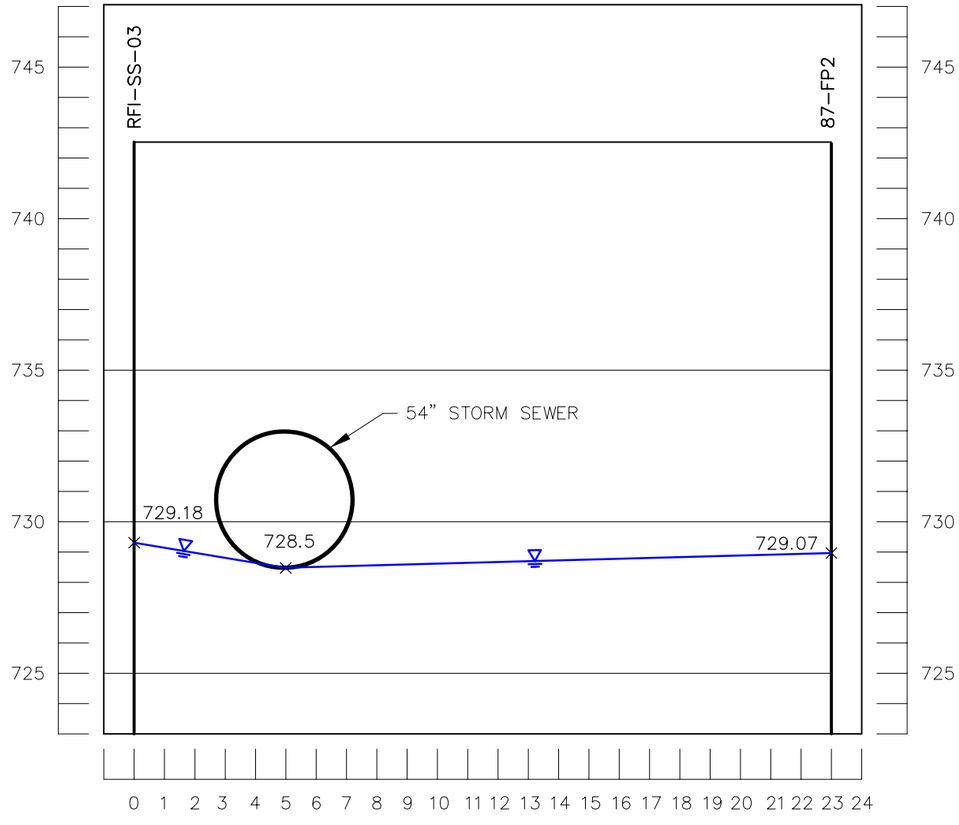
SCALE: 1"=30'

LEGEND:

- EXISTING MONITORING WELL
- PIEZOMETER LOCATION
- STORM SEWER LINE
- STORM SEWER CATCH BASIN (4 / 13-4)
- FALL 2001 DISSOLVED PHASE VOC EXCEEDENCES IN GROUNDWATER
- SUMMER 2002 ESTIMATED NAPL EXTENT
- FALL 2001 DISSOLVED PHASE METALS EXCEEDENCES IN GROUNDWATER
- EXISTING IM

NOTES:

1. BASE MAP INFORMATION FROM A SURVEY BY BMJ, INC. DATED APRIL 2001, AT A SCALE OF 1:100.



SECTION C-C

HORIZONTAL SCALE: 1"=5'
VERTICAL SCALE: 1"=5'

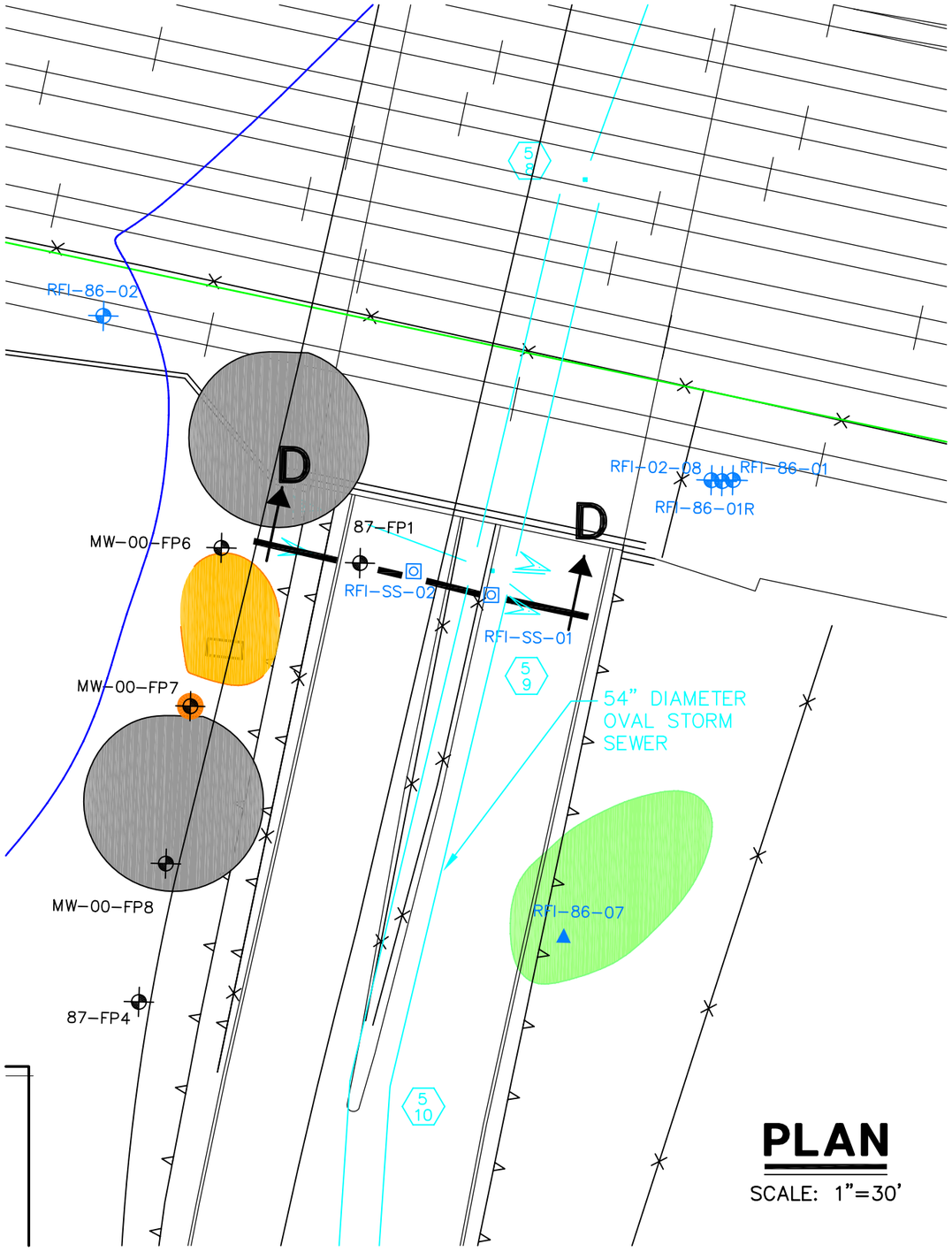
GENERAL MOTORS CORPORATION
NAO FLINT OPERATIONS SITE
FLINT, MICHIGAN

BUILDING 85
PIEZOMETER LOCATIONS

BBL BLASLAND, BOUCK & LEE, INC. engineers, scientists, economists

FIGURE
I-9

L: ON=*, OFF=REF
P: PAGESET/SYR-BL
3/24/06 SYR-85-NES LAF GMS
64410112/HISTORIC/64410B08.DWG



PLAN

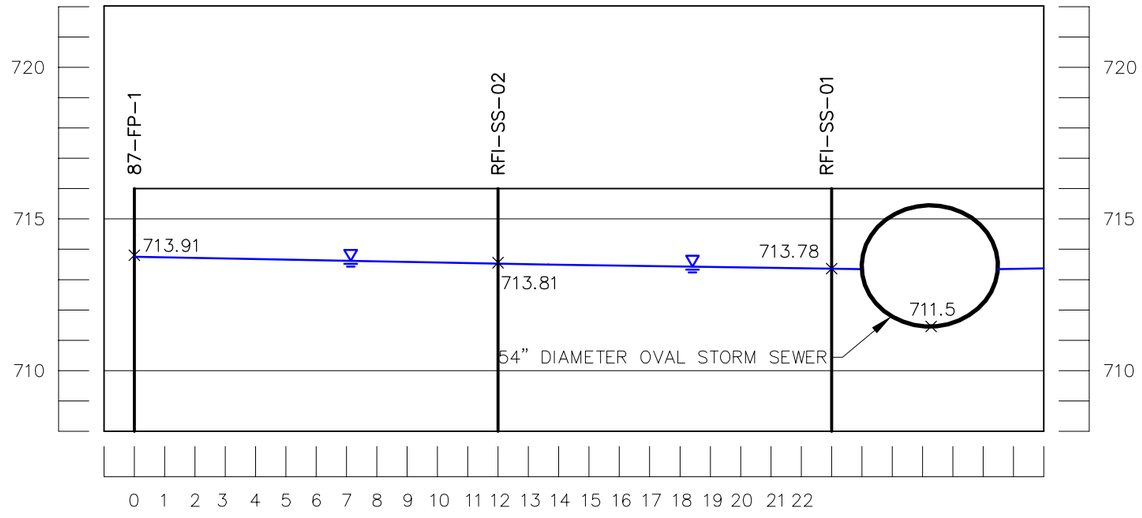
SCALE: 1"=30'

LEGEND:

- EXISTING MONITORING WELL
- PIEZOMETER LOCATION
- STORM SEWER LINE
- STORM SEWER CATCH BASIN (5 / 10)
- FALL 2001 DISSOLVED PHASE VOC EXCEEDENCES IN GROUNDWATER
- SUMMER 2002 ESTIMATED NAPL EXTENT
- FALL 2001 DISSOLVED PHASE METALS EXCEEDENCES IN GROUNDWATER
- EXISTING IM

NOTES:

1. BASE MAP INFORMATION FROM A SURVEY BY BMJ, INC. DATED APRIL 2001, AT A SCALE OF 1:100.



SECTION D-D

HORIZONTAL SCALE: 1"=5'
VERTICAL SCALE: 1"=5'

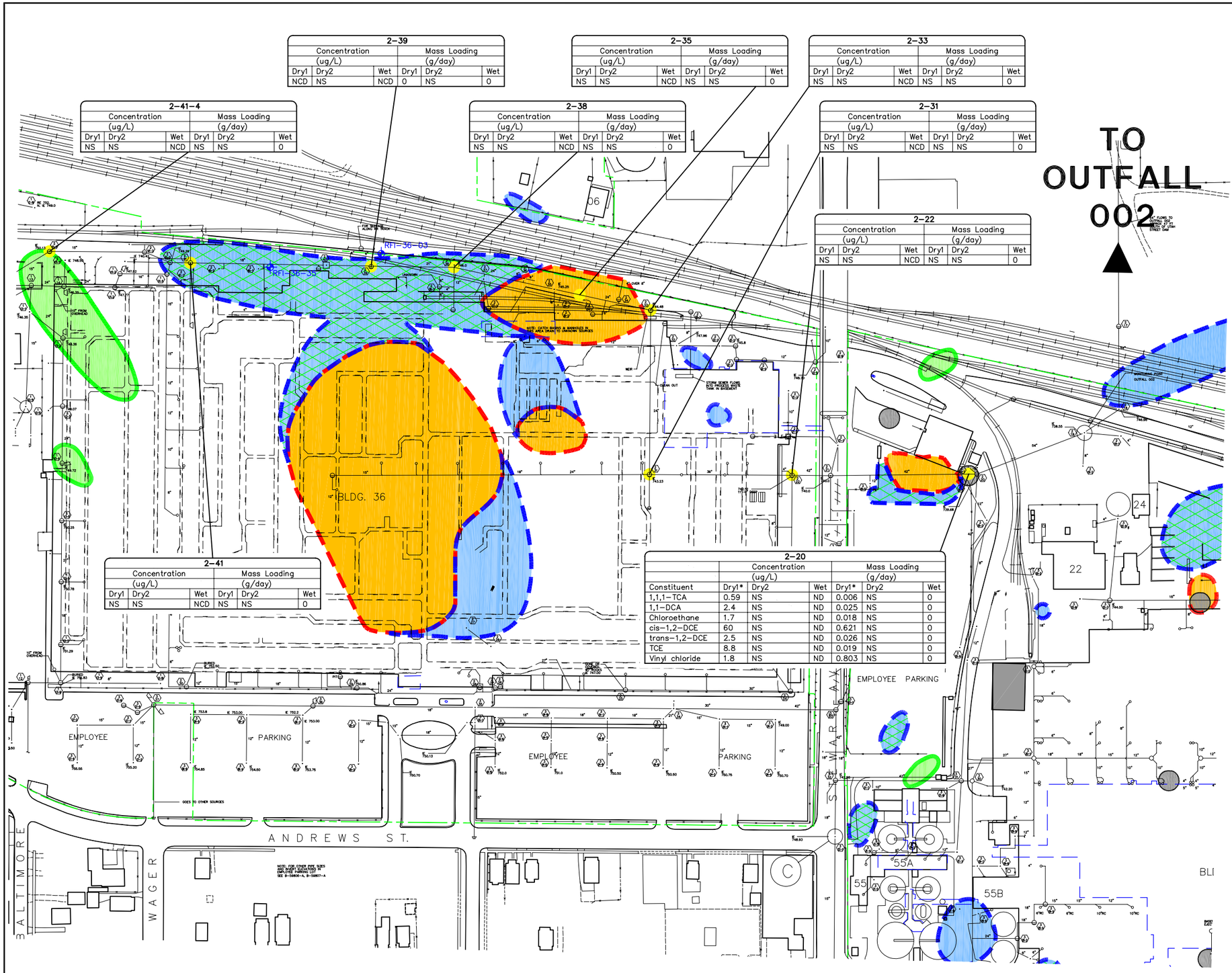
GENERAL MOTORS CORPORATION
NAO FLINT OPERATIONS SITE
FLINT, MICHIGAN

LEITH STREET
PIEZOMETER LOCATIONS

BBL BLASLAND, BOUCK & LEE, INC. engineers, scientists, economists

FIGURE
I-10

L: ON=*, OFF=REF
P: PAGESET/SYR-BL
3/24/06 SYR-85-NES LAF GMS
64410112/HISTORIC/64410B09.DWG



X: 64410X01.DWG, 64410X05.DWG, 64410X07.DWG
L: ON=*, OFF=*REF*, *SHD-BUILDING, |SUBUTILITYLIM, |SUBUTILSHD
P: PAGESET/SYR-DL
3/24/06 SYR-85-NES SDL GMS
64410112/HISTORIC/64410C01.DWG

GENERAL MOTORS CORPORATION
NAO FLINT OPERATIONS SITE
FLINT, MICHIGAN

OUTFALL 002 DATA BOX MAP

BBL BLASLAND, BOUCK & LEE, INC. engineers, scientists, economists

FIGURE I-11

3-22-1						
		Concentration (ug/L)			Mass Loading (g/day)	
Constituent	Dry1	Dry2	Wet	Dry1	Dry2	Wet
1,1,1-TCA	4.1 J	3	ND	0.029	0.215	0
1,1-DCA	35 J	37	2.3	0.250	2.647	1.064
Chloroethane	25 J	27	2.2	0.179	1.932	1.018
Aroclor-1242	ND	ND	3	0	0	1.388
Aroclor-1248	2.4	0.17	ND	0.017	0.012	0

3-20						
		Concentration (ug/L)			Mass Loading (g/day)	
Constituent	Dry1	Dry2	Wet	Dry1	Dry2	Wet
1,1-DCA	2.2 J	1.3	ND	0.222	0.342	0
Chloroethane	ND	0.55 J	ND	0	0.145	0
cis-1,2-DCE	1.1 J	0.93 J	ND	0.111	0.245	0
TCE	2.7 J	1.9	ND	0.272	0.500	0
Vinyl chloride	0.99 J	0.7 J	ND	0	0.184	0

3-15						
		Concentration (ug/L)			Mass Loading (g/day)	
Constituent	Dry1	Dry2	Wet	Dry1	Dry2	Wet
1,1-DCA	1.8 J	1.2	ND	1.024	0.683	0
cis-1,2-DCE	0.92 J	0.71 J	ND	0.524	0.404	0
TCE	2.2 J	1.6	ND	1.252	0.911	0
Vinyl chloride	0.64 J	ND	ND	0.364	0	0
Aroclor-1248	0.18	ND	ND	0.102	0	0

3-26						
		Concentration (ug/L)			Mass Loading (g/day)	
Constituent	Dry1	Dry2	Wet	Dry1	Dry2	Wet
1,1,1-TCA	ND	0.67 J	ND	0	0.005	0
1,1-DCA	0.81 J	1.6	ND	0.008	0.012	0
cis-1,2-DCE	1.4	2.3	ND	0.014	0.018	0
TCE	ND	0.89 J	ND	0	0.007	0

3-65						
		Concentration (ug/L)			Mass Loading (g/day)	
Constituent	Dry1	Dry2	Wet	Dry1	Dry2	Wet
cis-1,2-DCE	5 J	7.6	3.2	0.400	1.014	1.202
trans-1,2-DCE	0.8 J	1.1	0.53 J	0.064	0.147	0.199
TCE	0.54 J	0.67 J	ND	0.043	0.089	0
Vinyl chloride	4.7 J	7.3	3.6	0.376	0.974	1.352
Aroclor-1260	NA	1 J	ND	0	0.133	0

3-69						
		Concentration (ug/L)			Mass Loading (g/day)	
Constituent	Dry1	Dry2	Wet	Dry1	Dry2	Wet
cis-1,2-DCE	NS	NS	3.3	NS	NS	3.234
trans-1,2-DCE	NS	NS	0.51 J	NS	NS	0.500
Vinyl chloride	NS	NS	4.3	NS	NS	4.214

3-23					
Concentration (ug/L)			Mass Loading (g/day)		
Dry1	Dry2	Wet	Dry1	Dry2	Wet
NCD	NCD	NCD	0	0	0

3-76-8					
Concentration (ug/L)			Mass Loading (g/day)		
Dry1	Dry2	Wet	Dry1	Dry2	Wet
NCD	NS	NCD	0	NS	0

TO OUTFALL 003

FORMER AERATION LAGOON

FLINT POLICE TRAINING BLDG

BELL'S PRODUCE

BLDG. 36

EMPLOYEE PARKING

SCRAP YARD

MDC. STORAGE

20-145 RACK STORAGE

BLDG. 20

BLDG. 43

BLDG. 30

BLDG. 71

BLDG. 32

BLDG 83

BLDG 66

BLDG 85 LOT

TRUCK PARKING

SCRAP STORAGE

SELBY

GRANT AVE.

INDUSTRIAL AVE.

SPRUCE

CASS

LEGEND:

- EXISTING MONITORING WELL
- SAMPLE LOCATION
- STORM SEWER LINE
- FALL 2001 DISSOLVED PHASE VOC EXCEEDENCES IN GROUNDWATER
- SUMMER 2002 ESTIMATED NAPL EXTENT
- FALL 2001 DISSOLVED PHASE METALS EXCEEDENCES IN GROUNDWATER
- EXISTING IM

KEY:

1,1,1-TCA = 1,1,1-Trichloroethane
1,1-DCA = 1,1-Dichloroethane
cis-1,2-DCE = cis-1,2-Dichloroethene
trans-1,2-DCE = trans-1,2-Dichloroethene
TCE = Trichloroethene
ND = CONSTITUENT NOT DETECTED ABOVE METHOD DETECTION LIMITS
NCD = NO CONSTITUENTS DETECTED ABOVE METHOD DETECTION LIMITS
NS = SAMPLE NOT COLLECTED
* = SAMPLE ANALYZED TWICE – HIGHEST CONCENTRATION IN TABLE
J = ESTIMATED VALUE

NOTES:

1. BASE MAP INFORMATION FROM A SURVEY BY BMJ, INC. DATED APRIL 2001, AT A SCALE OF 1:100.

0 200' 400'
APPROXIMATE GRAPHIC SCALE

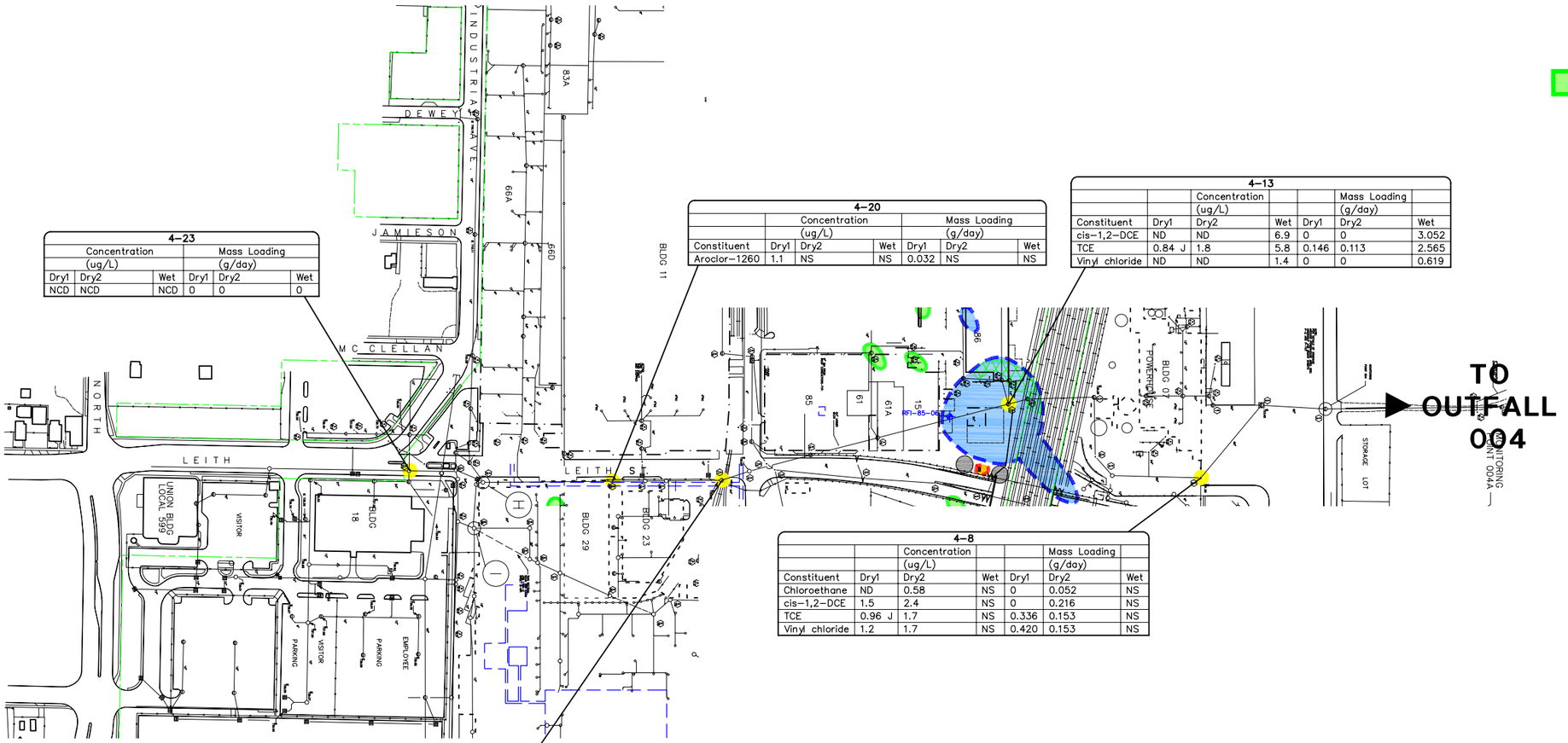
X: 64410X01.DWG, 64410X05.DWG, 64410X07.DWG
L: ON=*, OFF=*REF* ,ISUB*, ISHD-BUILDING
P: PAGESET/SYR-DL
3/28/06 SYR-85-NES SDL GMS
64410112/HISTORIC/64410C02.DWG

GENERAL MOTORS CORPORATION
NAO FLINT OPERATIONS SITE
FLINT, MICHIGAN

OUTFALL 003 DATA BOX MAP

BLASLAND, BOUCK & LEE, INC.
engineers, scientists, economists

FIGURE
I-12



4–23					
Concentration (ug/L)			Mass Loading (g/day)		
Dry1	Dry2	Wet	Dry1	Dry2	Wet
NCD	NCD	NCD	0	0	0

4–20						
	Concentration (ug/L)			Mass Loading (g/day)		
Constituent	Dry1	Dry2	Wet	Dry1	Dry2	Wet
Aroclor–1260	1.1	NS	NS	0.032	NS	NS

4–13						
		Concentration (ug/L)			Mass Loading (g/day)	
Constituent	Dry1	Dry2	Wet	Dry1	Dry2	Wet
cis–1,2–DCE	ND	ND	6.9	0	0	3.052
TCE	0.84 J	1.8	5.8	0.146	0.113	2.565
Vinyl chloride	ND	ND	1.4	0	0	0.619

4–8						
		Concentration (ug/L)			Mass Loading (g/day)	
Constituent	Dry1	Dry2	Wet	Dry1	Dry2	Wet
Chloroethane	ND	0.58	NS	0	0.052	NS
cis–1,2–DCE	1.5	2.4	NS	0	0.216	NS
TCE	0.96 J	1.7	NS	0.336	0.153	NS
Vinyl chloride	1.2	1.7	NS	0.420	0.153	NS

4–17					
Concentration (ug/L)			Mass Loading (g/day)		
Dry1	Dry2	Wet	Dry1	Dry2	Wet
NCD	NS	NCD	0	NS	0

LEGEND:

- EXISTING MONITORING WELL
- SAMPLE LOCATION
- STORM SEWER LINE
- FALL 2001 DISSOLVED PHASE VOC EXCEEDENCES IN GROUNDWATER
- SUMMER 2002 ESTIMATED NAPL EXTENT
- FALL 2001 DISSOLVED PHASE METALS EXCEEDENCES IN GROUNDWATER
- EXISTING IM

KEY:

1,1,1–TCA = 1,1,1–Trichloroethane
1,1–DCA = 1,1–Dichloroethene
cis–1,2–DCE = cis–1,2–Dichloroethene
trans–1,2–DCE = trans–1,2–Dichloroethene
TCE = Trichloroethene
ND = CONSTITUENT NOT DETECTED ABOVE METHOD DETECTION LIMITS
NCD = NO CONSTITUENTS DETECTED ABOVE METHOD DETECTION LIMITS
NS = SAMPLE NOT COLLECTED
* = SAMPLE ANALYZED TWICE – HIGHEST CONCENTRATION IN TABLE
J = ESTIMATED VALUE

NOTES:

1. BASE MAP INFORMATION FROM A SURVEY BY BMJ, INC. DATED APRIL 2001, AT A SCALE OF 1:100.

0 150' 300'
APPROXIMATE GRAPHIC SCALE

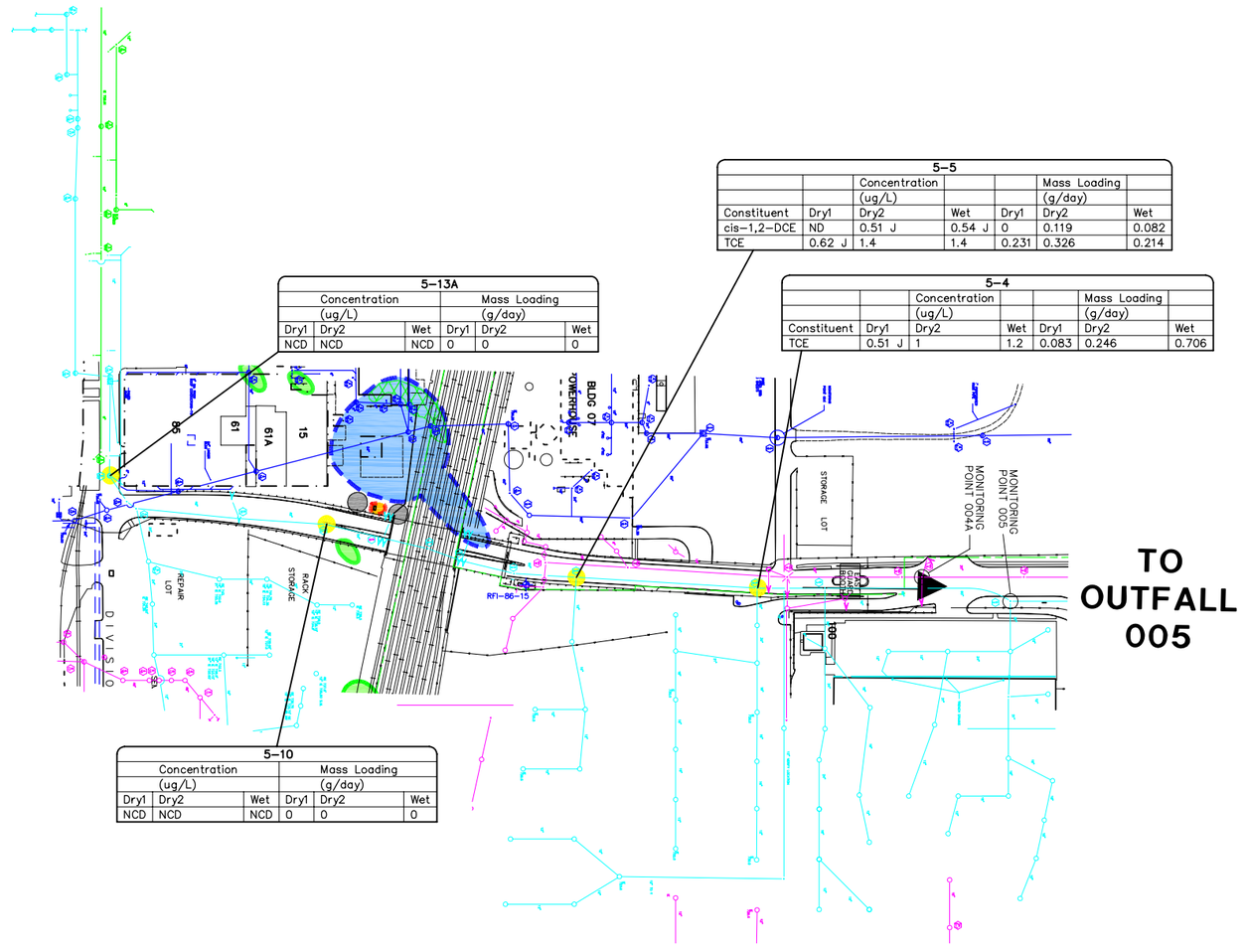
GENERAL MOTORS CORPORATION
NAO FLINT OPERATIONS SITE
FLINT, MICHIGAN

OUTFALL 004 DATA BOX MAP

BLASLAND, BOUCK & LEE, INC.
engineers, scientists, economists

FIGURE
I-13

X: 64410X01.DWG, 64410X05.DWG, 64410X07.DWG
L: ON=*, OFF=*REF*
P: PAGESET/SYR-DL
3/24/06 SYR-85-NES SDL GMS
64410112/HISTORIC/64410C03.DWG



LEGEND:

- EXISTING MONITORING WELL
- SAMPLE LOCATION
- STORM SEWER LINE
- FALL 2001 DISSOLVED PHASE VOC EXCEEDENCES IN GROUNDWATER
- SUMMER 2002 ESTIMATED NAPL EXTENT
- FALL 2001 DISSOLVED PHASE METALS EXCEEDENCES IN GROUNDWATER
- EXISTING IM

KEY:

1,1,1-TCA = 1,1,1-Trichloroethane
1,1-DCA = 1,1-Dichloroethane
cis-1,2-DCE = cis-1,2-Dichloroethene
trans-1,2-DCE = trans-1,2-Dichloroethene
TCE = Trichloroethene
ND = CONSTITUENT NOT DETECTED ABOVE METHOD DETECTION LIMITS
NCD = NO CONSTITUENTS DETECTED ABOVE METHOD DETECTION LIMITS
NS = SAMPLE NOT COLLECTED
* = SAMPLE ANALYZED TWICE - HIGHEST CONCENTRATION IN TABLE
J = ESTIMATED VALUE

NOTES:

1. BASE MAP INFORMATION FROM A SURVEY BY BMJ, INC. DATED APRIL 2001, AT A SCALE OF 1:100.

0 300' 600'

APPROXIMATE GRAPHIC SCALE

GENERAL MOTORS CORPORATION
NAO FLINT OPERATIONS SITE
FLINT, MICHIGAN

OUTFALL 005 DATA BOX MAP

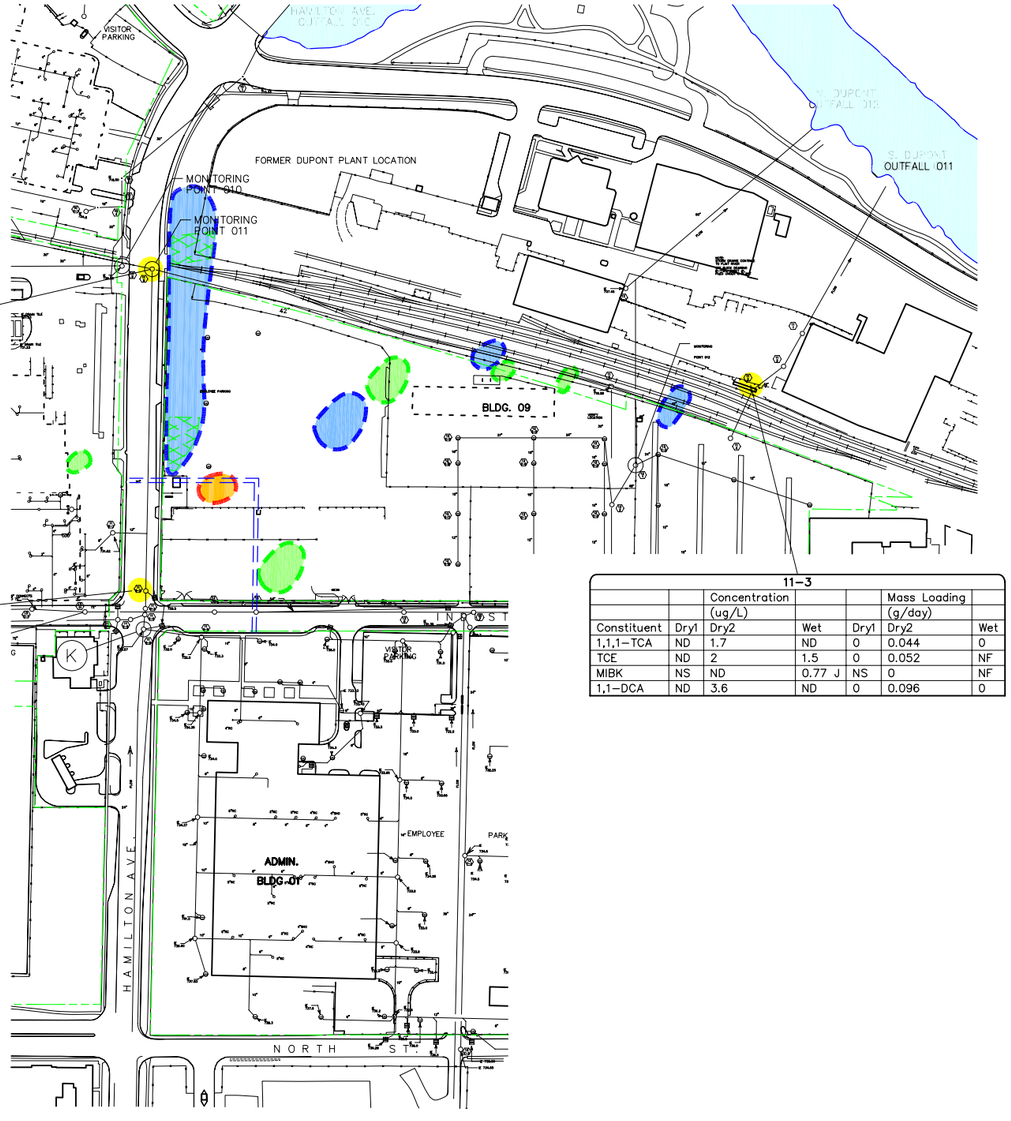
BLASLAND, BOUCK & LEE, INC.
engineers, scientists, economists

FIGURE
I-14

X: 64410X01.DWG, 64410X05.DWG, 64410X07.DWG
L: ON=*, OFF=*REF*, *|SHD-BUILDING, *|SUB*
P: PAGESET/SYR-DL
3/24/06 SYR-85-NES SDL GMS
64410112/HISTORIC/64410C04.DWG

11–6						
		Concentration (ug/L)			Mass Loading (g/day)	
Constituent	Dry1	Dry2	Wet	Dry1	Dry2	Wet
o–Xylene	NS	ND	1.8	NS	0	NF
MIBK	NS	ND	0.65 J	NS	0	NF

11–6–2						
		Concentration (ug/L)			Mass Loading (g/day)	
Constituent	Dry1	Dry2	Wet	Dry1	Dry2	Wet
1,1,1–TCA	1.3	NS	NS	NF	NS	NS
cis 1,2–DCE	0.60J	NS	NS	NF	NS	NS
TCE	0.63J	NS	NS	NF	NS	NS



11–3						
		Concentration (ug/L)			Mass Loading (g/day)	
Constituent	Dry1	Dry2	Wet	Dry1	Dry2	Wet
1,1,1–TCA	ND	1.7	ND	0	0.044	0
TCE	ND	2	1.5	0	0.052	NF
MIBK	NS	ND	0.77 J	NS	0	NF
1,1–DCA	ND	3.6	ND	0	0.096	0

LEGEND:

- ESTIMATED AREA WHERE VOCs & SVOCs EXCEED MICHIGAN PART 201 GENERIC SCREENING CRITERIA IN GROUNDWATER
- SUMMER 2002 ESTIMATED NAPL EXTENT
- ESTIMATED AREA WHERE DISSOLVED METALS EXCEED MICHIGAN PART 201 GENERIC SCREENING CRITERIA IN GROUNDWATER
- STORM SEWER LINE
- PROPERTY BOUNDARY
- SAMPLE LOCATION

KEY:

1,1,1–TCA = 1,1,1–Trichloroethane
1,1–DCA = 1,1–Dichloroethane
cis–1,2–DCE = cis–1,2–Dichloroethene
trans–1,2–DCE = trans–1,2–Dichloroethene
MIBK = 4–Methyl–2–Pentanone
TCE = Trichloroethene
ND = CONSTITUENT NOT DETECTED ABOVE METHOD DETECTION LIMITS
NCD = NO CONSTITUENTS DETECTED ABOVE METHOD DETECTION LIMITS
NS = SAMPLE NOT COLLECTED
NF = NO FLOW DATA
* = SAMPLE ANALYZED TWICE – HIGHEST CONCENTRATION IN TABLE
J = ESTIMATED VALUE

NOTE:

BASE MAP INFORMATION FROM A SURVEY BY BMJ INC., DATED APRIL 2001, AT A SCALE OF 1:100.

0 150' 300'
APPROXIMATE GRAPHIC SCALE

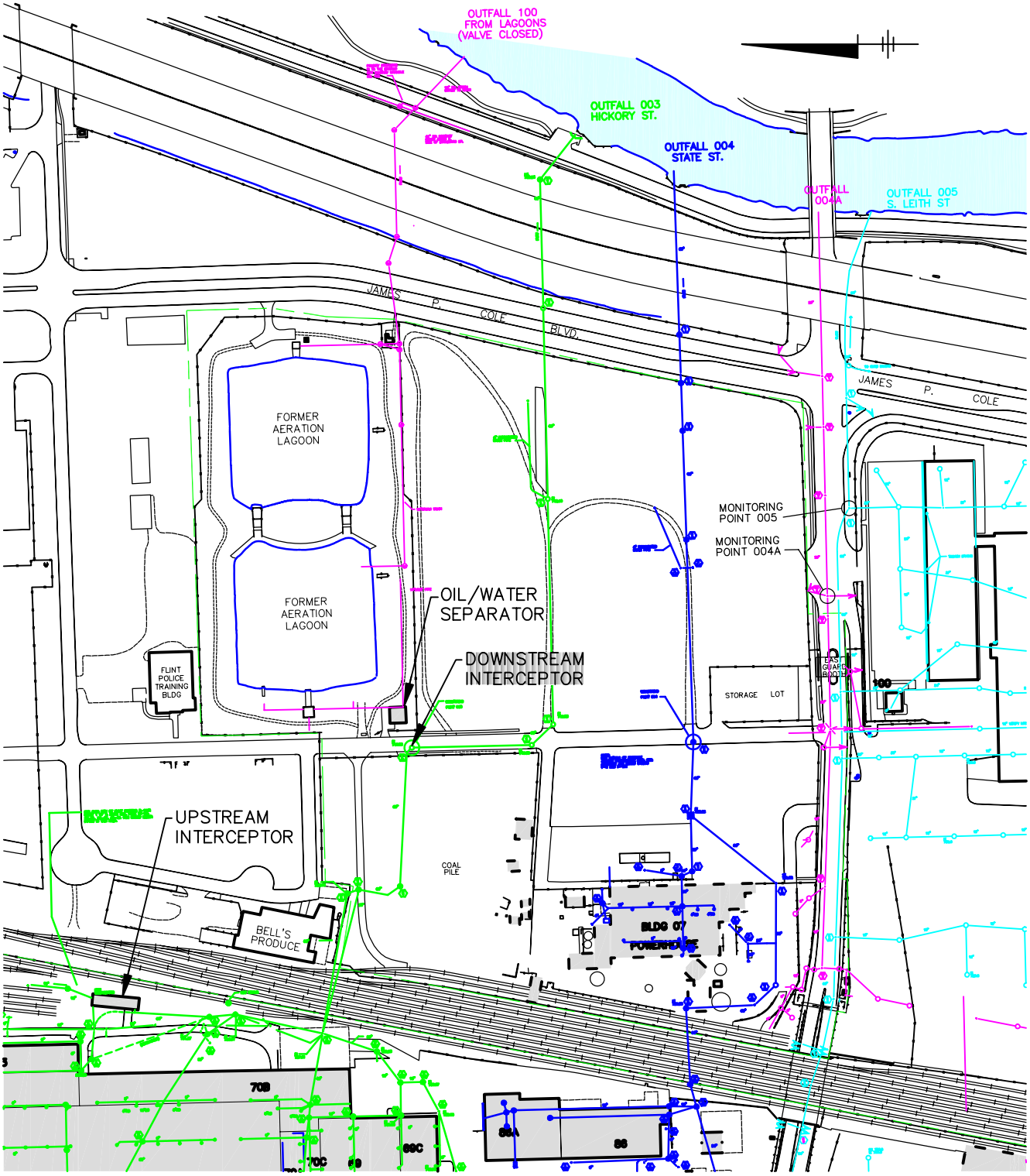
GENERAL MOTORS CORPORATION
NAO FLINT OPERATIONS SITE
FLINT, MICHIGAN

OUTFALL 011 DATA BOX MAP

BLASLAND, BOUCK & LEE, INC.
engineers, scientists, economists

FIGURE
I-15

X: 64410X01, X05, X07.DWG
L: ON=*, OFF=*REF*, |SHD–BUILDING
P: PAGESET/SYR–DL
3/24/06 SYR–54–GMS LAF GMS
64410112/HISTORIC/64410C05.DWG



NOTES:

1. BASE MAP SUPPLIED BY GENERAL MOTORS CORPORATION, POWERTRAIN DIVISION, FLINT, MICHIGAN, DRAWING NO. C71255-C, DATED 5/1/91, @ A SCALE OF 1" = 200'.

LEGEND:

- STORM WATER SEWER 002
- STORM WATER OUTFALL 003
- STORM WATER OUTFALL 004
- STORM WATER OUTFALL 005

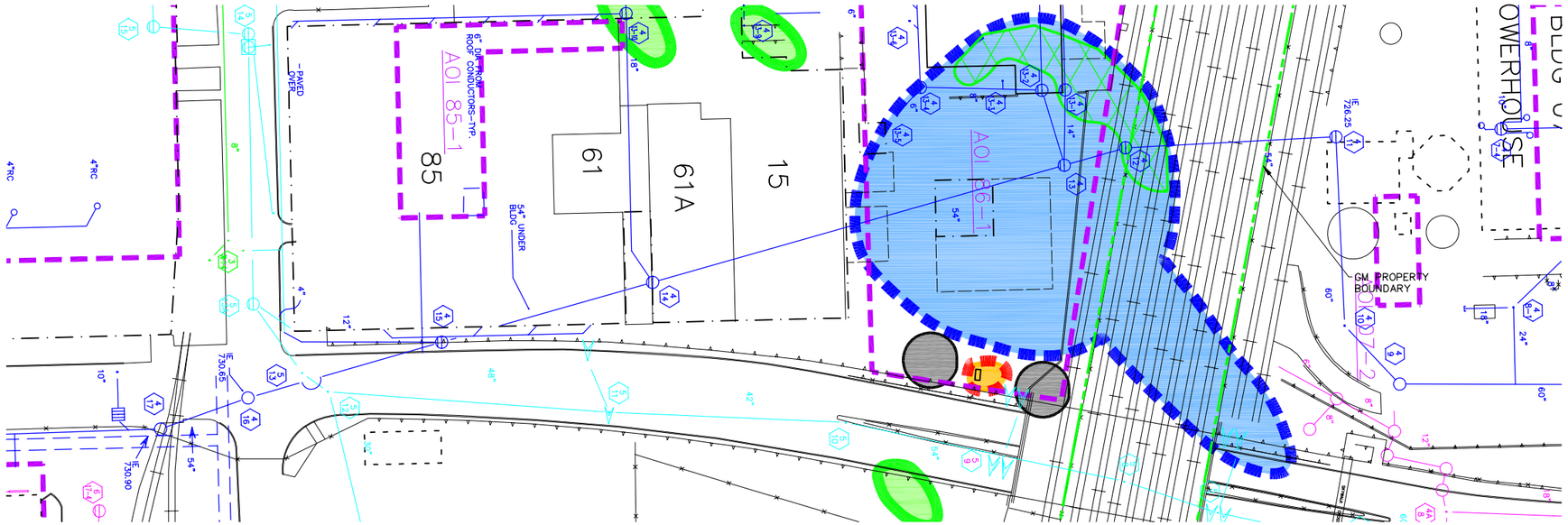
X: 64410X01, 64410X07.DWG
L: ON=* OFF=*REF*
P: PAGESET/SYR-AP
3/24/06 SYR-85-NES GMS
64410112/HISTORIC/64410B10.DWG

GENERAL MOTORS CORPORATION
NAO FLINT OPERATIONS SITE
FLINT, MICHIGAN

OUTFALL 003 AREA OF INTEREST

BBL
BLASLAND, BOUCK & LEE, INC.
engineers, scientists, economists

FIGURE
I-16



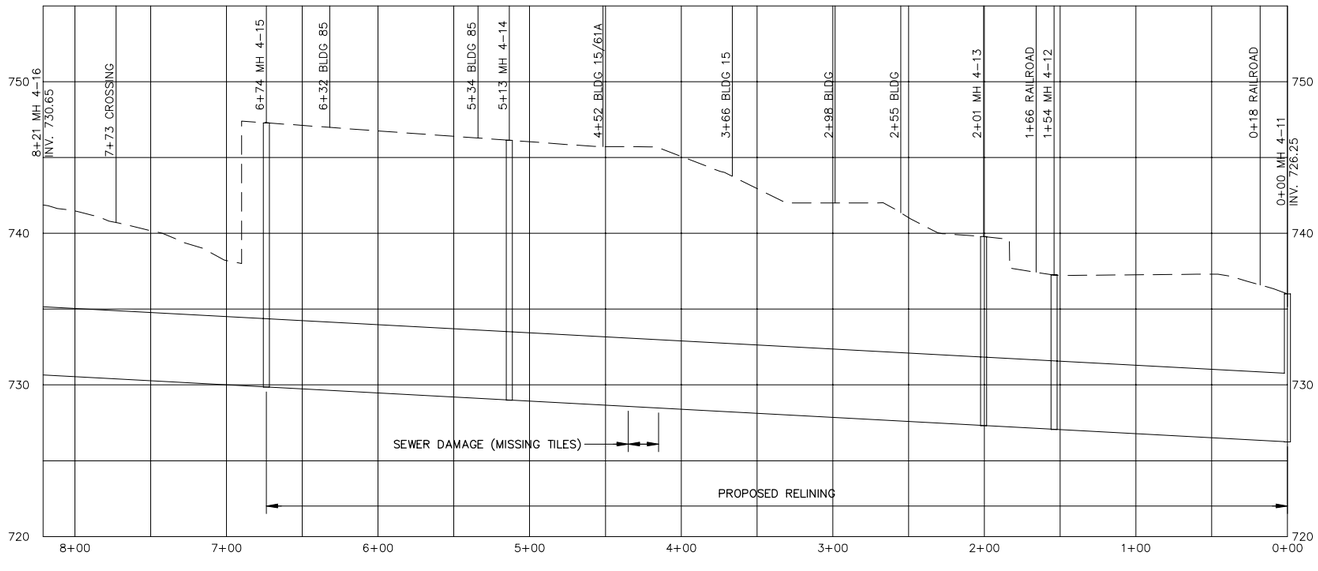
LEGEND:

- FALL 2001 DISSOLVED PHASE VOC EXCEEDENCES IN GROUNDWATER
- SUMMER 2002 ESTIMATED NAPL EXTENT
- FALL 2001 DISSOLVED PHASE METALS EXCEEDENCES IN GROUNDWATER
- EXISTING IM
- STORM SEWER LINE

NOTES:

1. BASE MAP INFORMATION FROM A SURVEY BY BMJ, INC. DATED APRIL 2001, AT A SCALE OF 1:100.

0 50' 100'
GRAPHIC SCALE



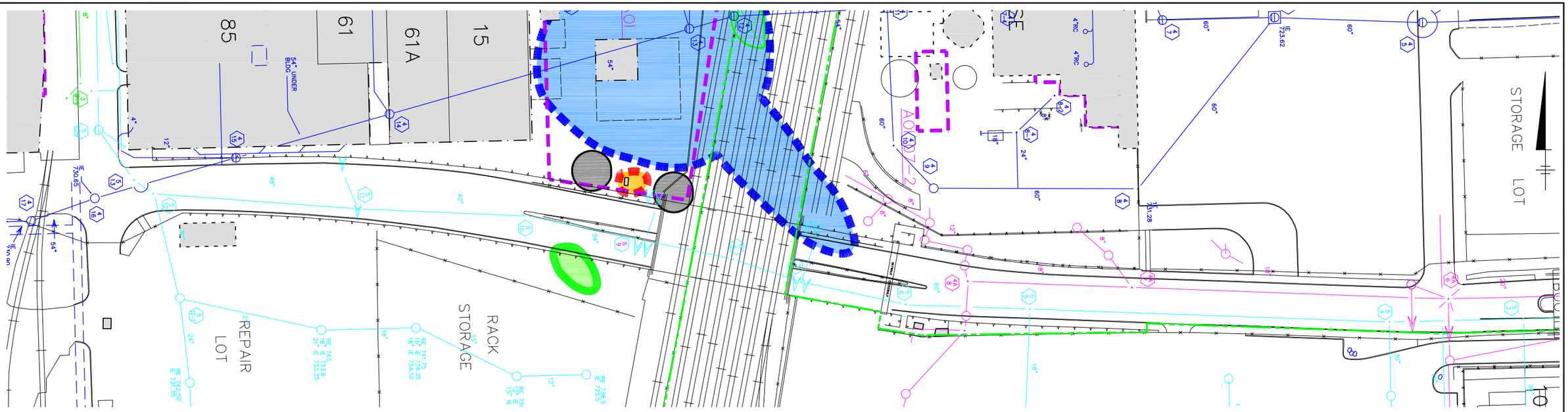
GENERAL MOTORS CORPORATION
NAO FLINT OPERATIONS SITE
FLINT, MICHIGAN

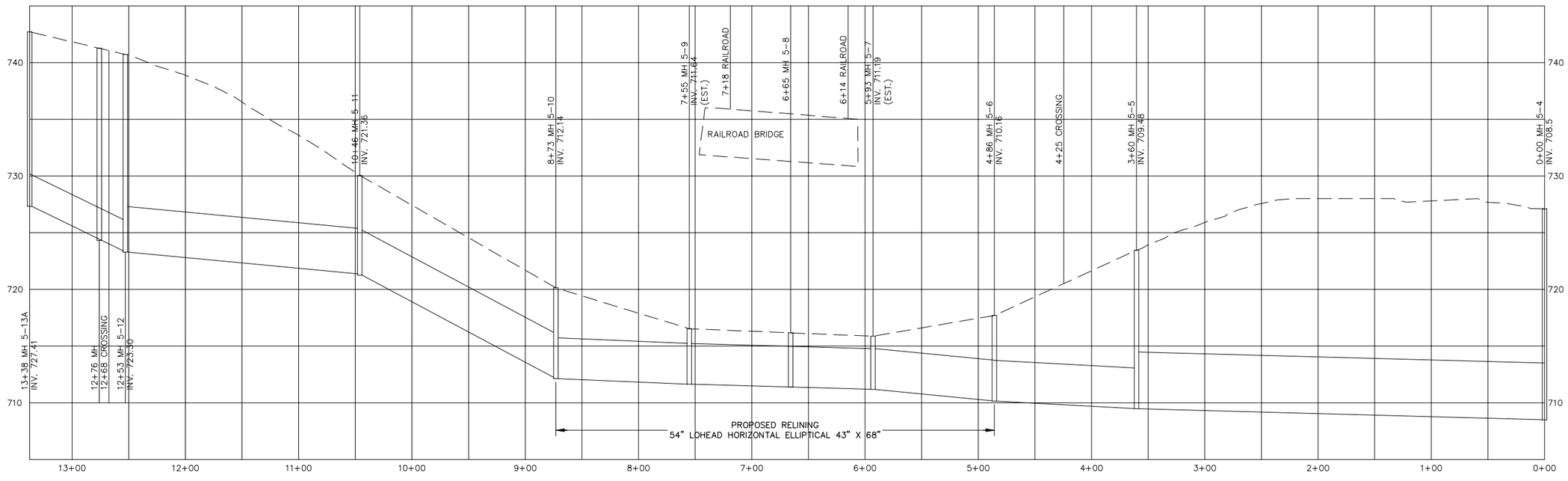
OUTFALL 004 STORM SEWER AREA OF INTEREST

BLASLAND, BOUCK & LEE, INC.
engineers, scientists, economists

FIGURE
I-17

X: 64410X01, X02, X05, X07.DWG
L: ON=*, OFF=*REF*, |SHD-BUILDING, *|SUB
P: PAGESET/SYR-DL
3/24/06 SYR-85-NES KMD GMS
64410112/HISTORIC/64410B11.DWG





LEGEND:

- FALL 2001 DISSOLVED PHASE VOC EXCEEDENCES IN GROUNDWATER
- SUMMER 2002 ESTIMATED NAPL EXTENT
- FALL 2001 DISSOLVED PHASE METALS EXCEEDENCES IN GROUNDWATER
- EXISTING IM
- STORM SEWER LINE

NOTES:

1. BASE MAP INFORMATION FROM A SURVEY BY BMJ, INC. DATED APRIL 2001, AT A SCALE OF 1:100.

GENERAL MOTORS CORPORATION
NAO FLINT OPERATIONS SITE
FLINT, MICHIGAN

OUTFALL 005 STORM SEWER AREA OF INTEREST

BLASLAND, BOUCK & LEE, INC.
engineers, scientists, economists

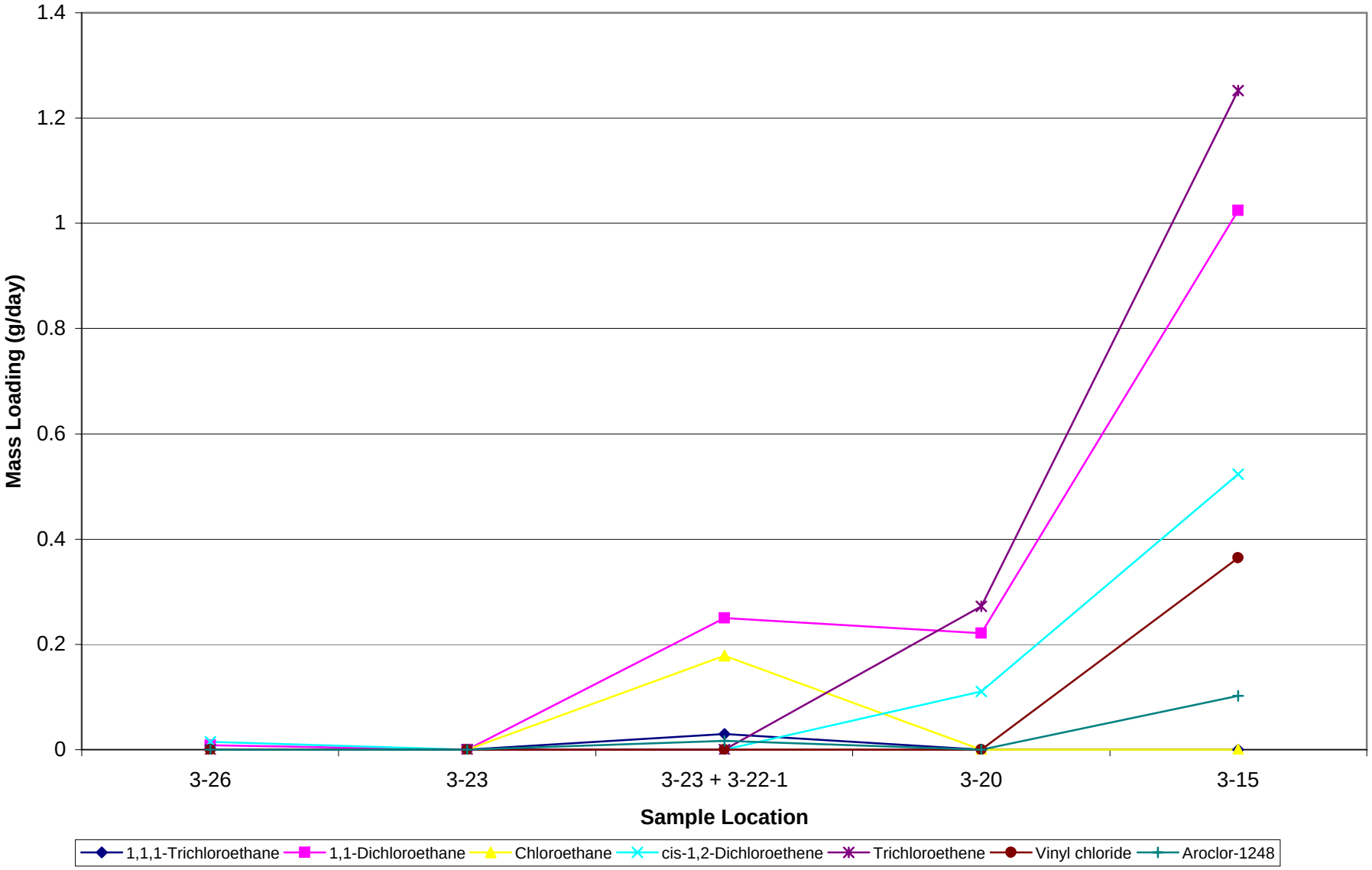
FIGURE
I-18

X: 64410X01, X02, X05, X07.DWG
L: ON=*, OFF=*REF*, *ISUB
P: PAGESET/SYR-DL
3/24/06 SYR-85-NES KMD GMS
64410112/HISTORIC/64410B12.DWG

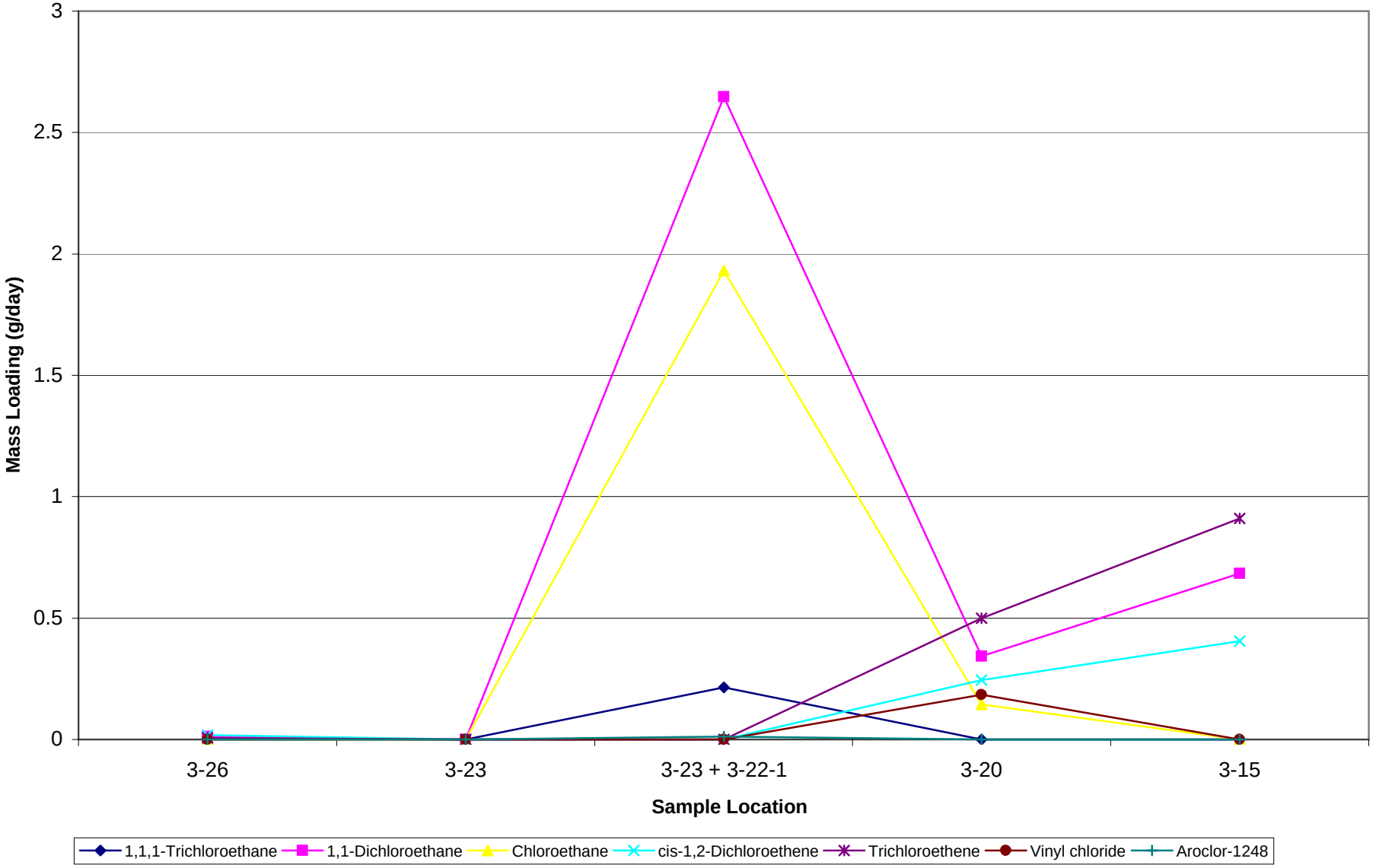
Graphs

BBL®
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

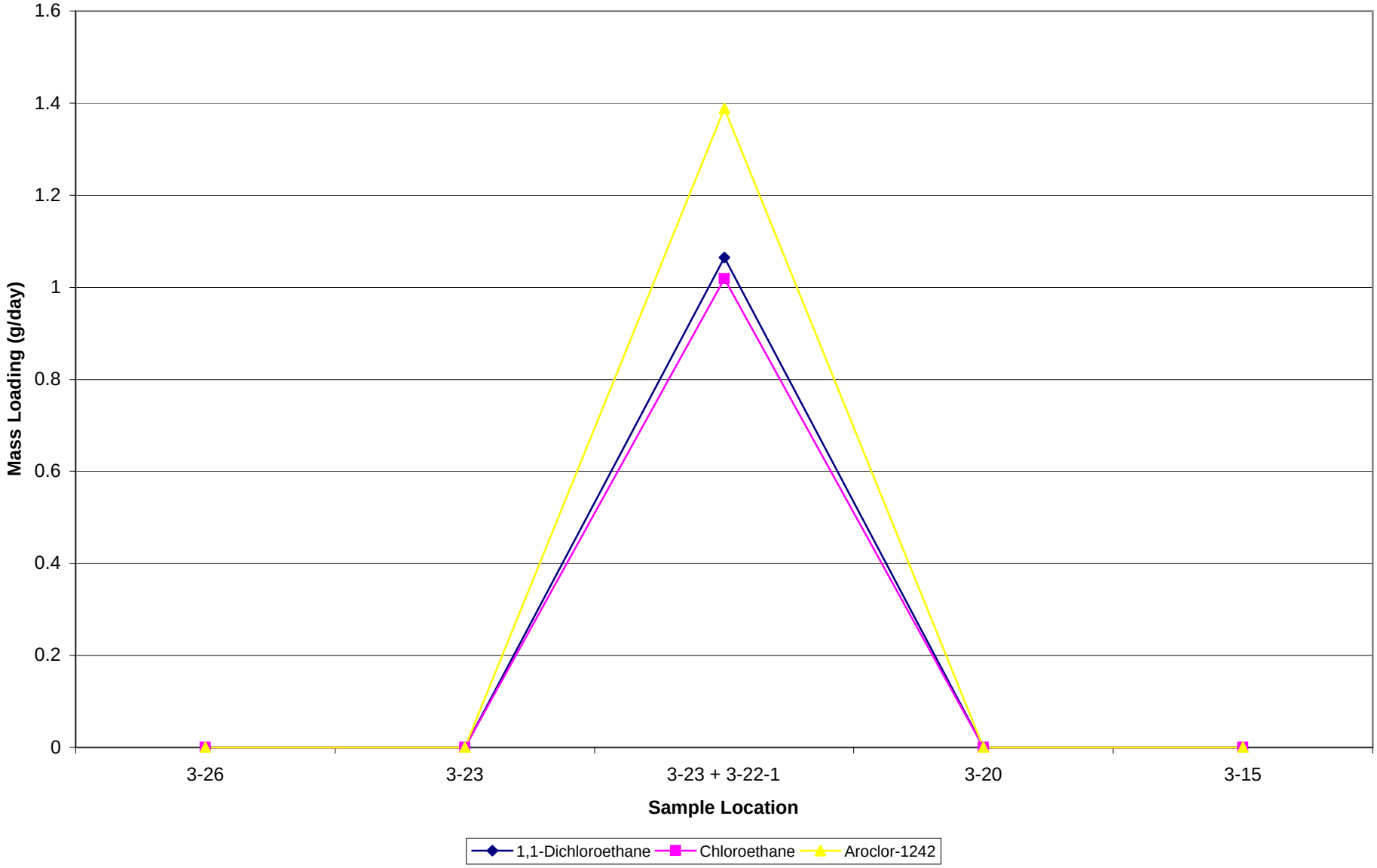
Graph I-1
Outfall 003 - North Section
Dry Weather Event #1
June 27, 2002



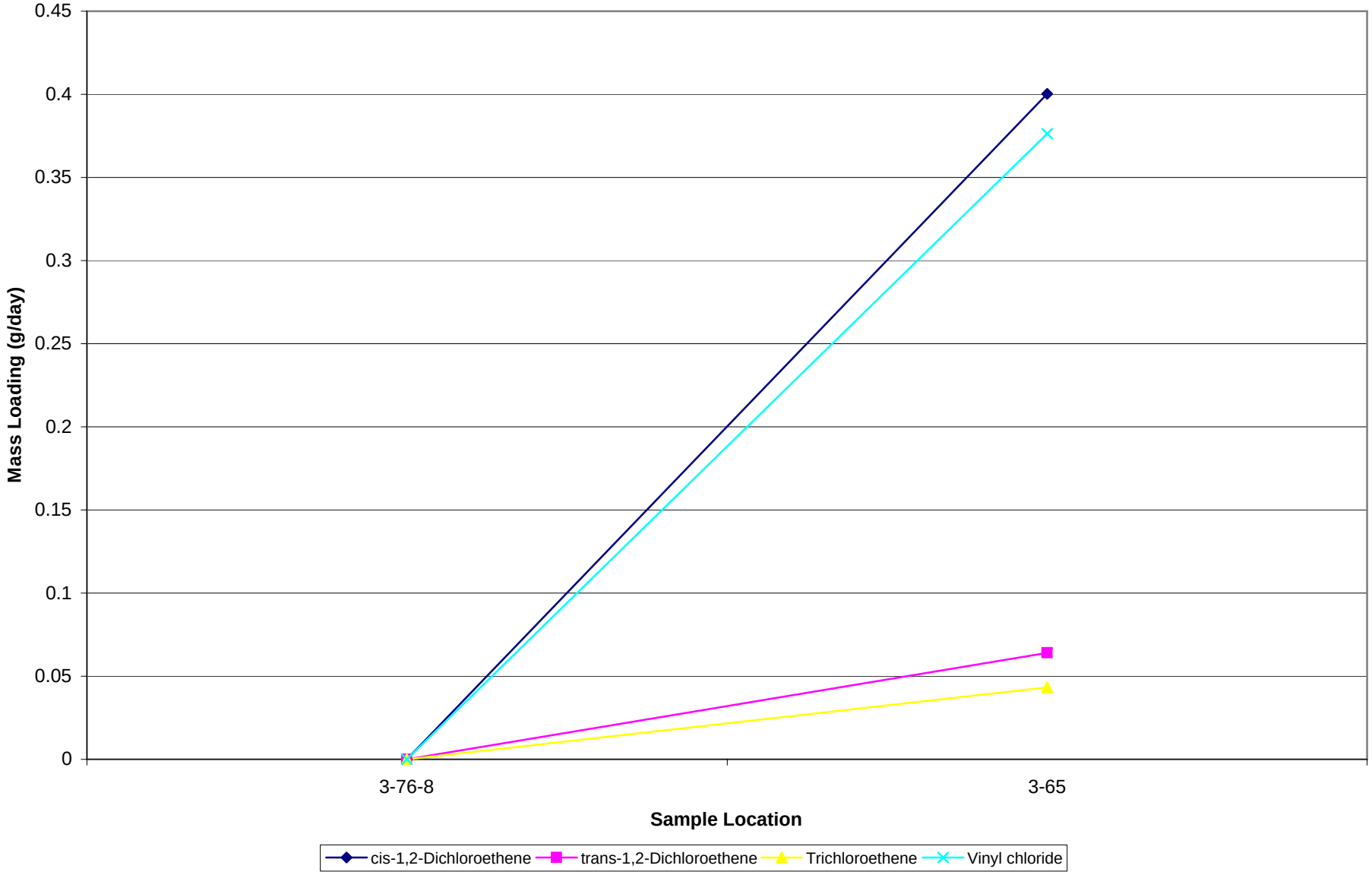
Graph I-2
Outfall 003 - North Section
Dry Weather Event #2
July 9, 2002



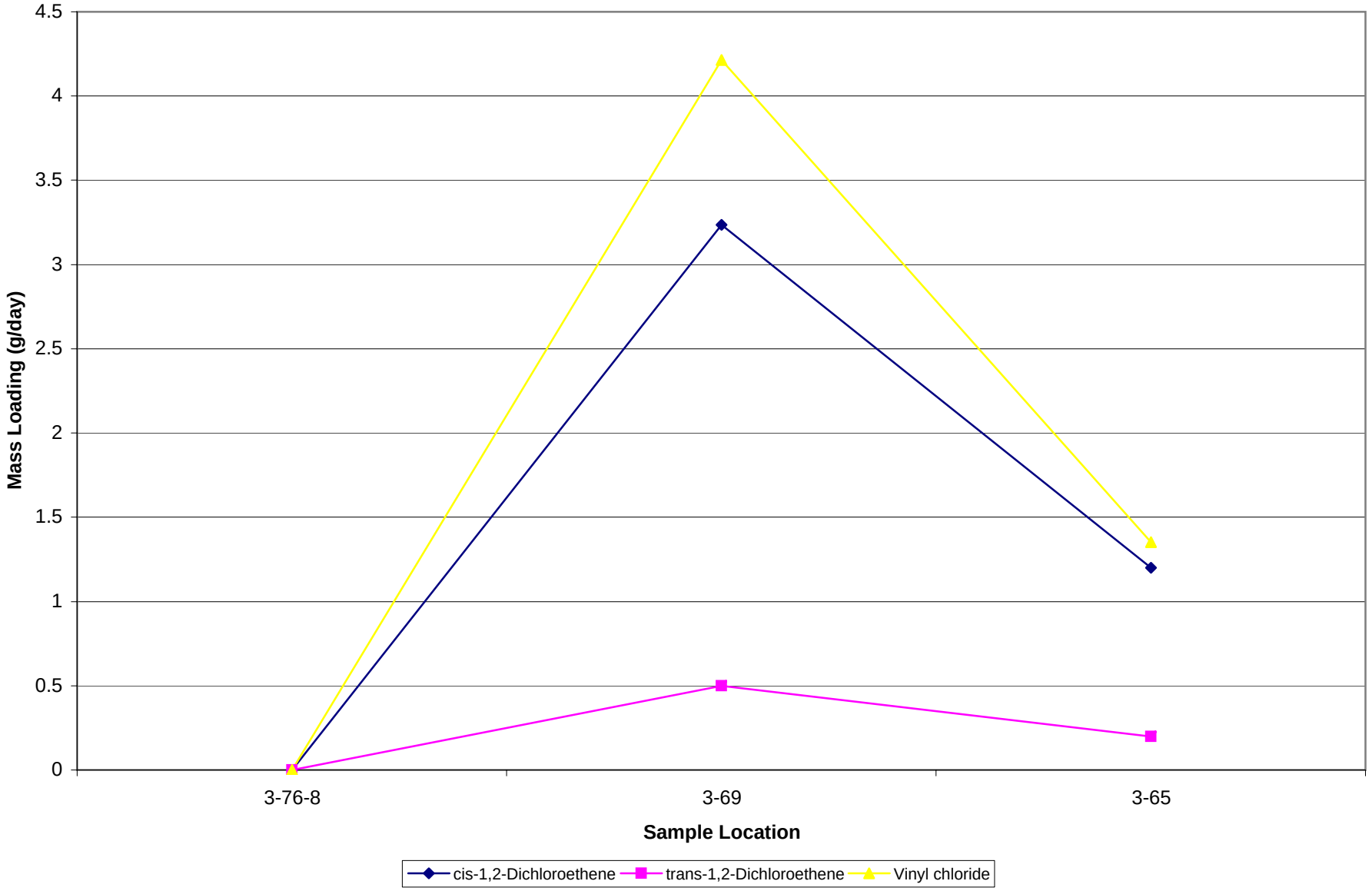
Graph I-3
Outfall 003 - North Section
Wet Weather Event
July 29, 2002



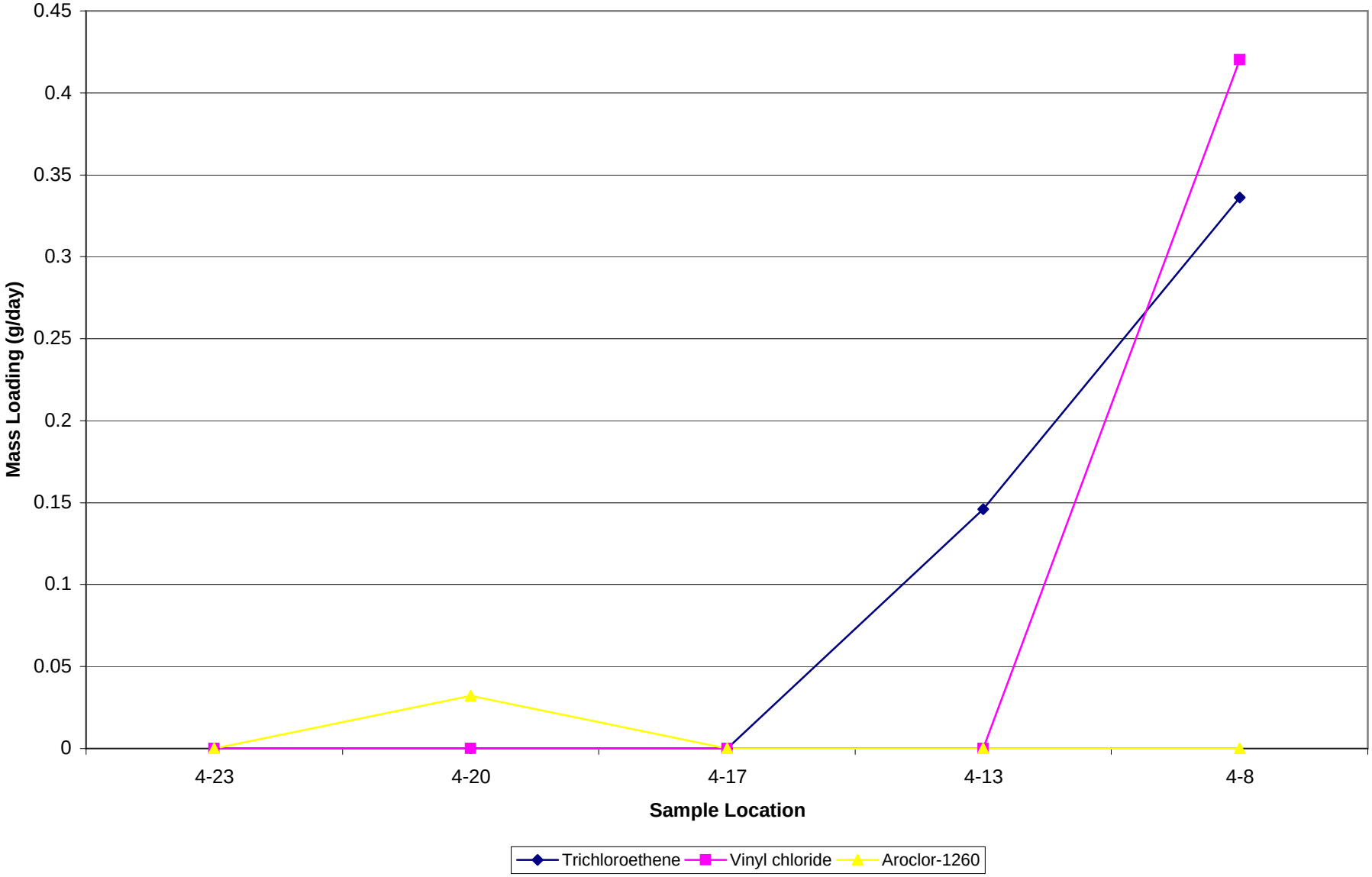
Graph I-4
Outfall 003 - South Section
Dry Weather Event #1
June 27, 2002



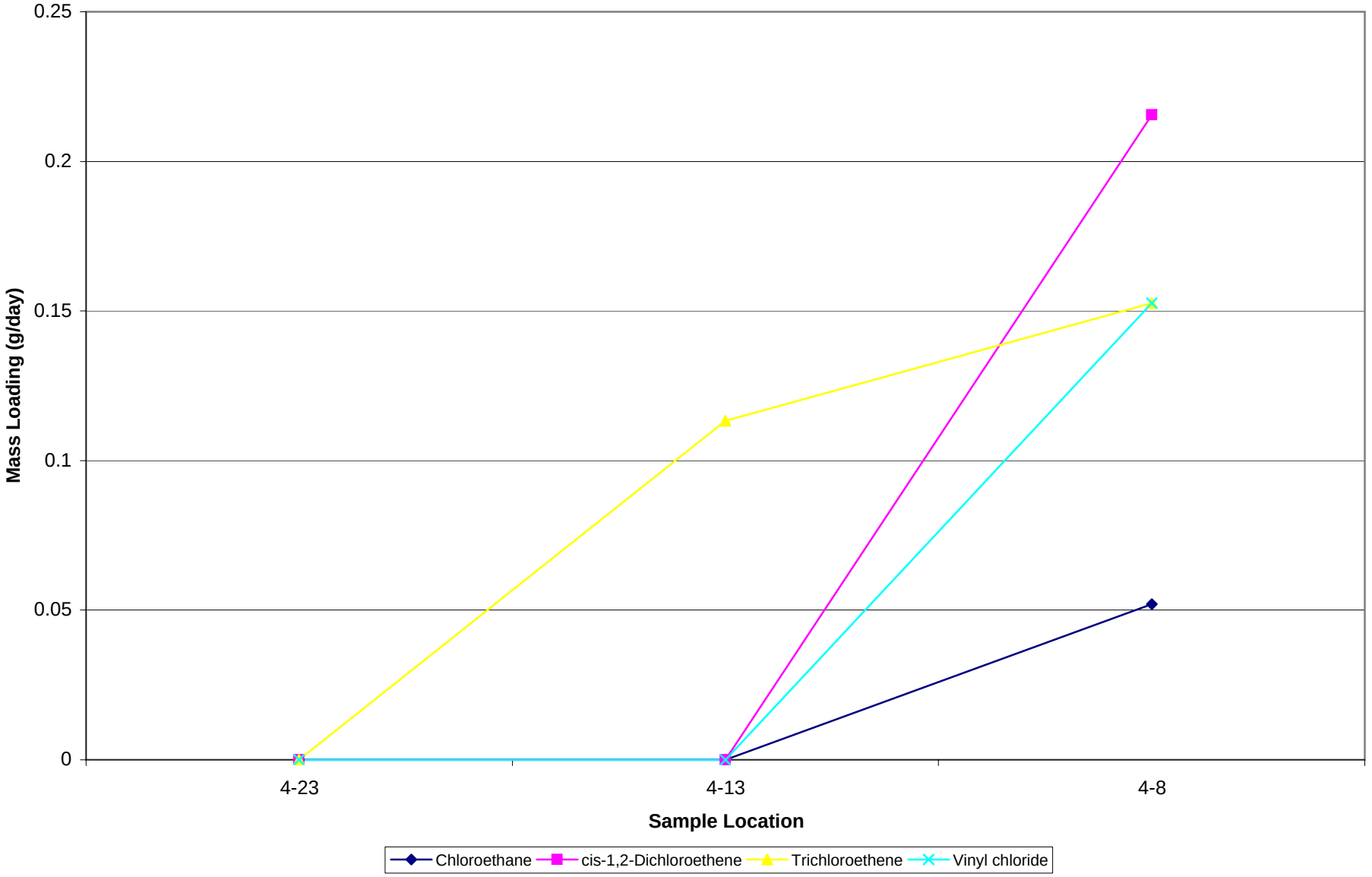
Graph I-5
Outfall 003 - South Section
Wet Weather Event
July 29, 2002



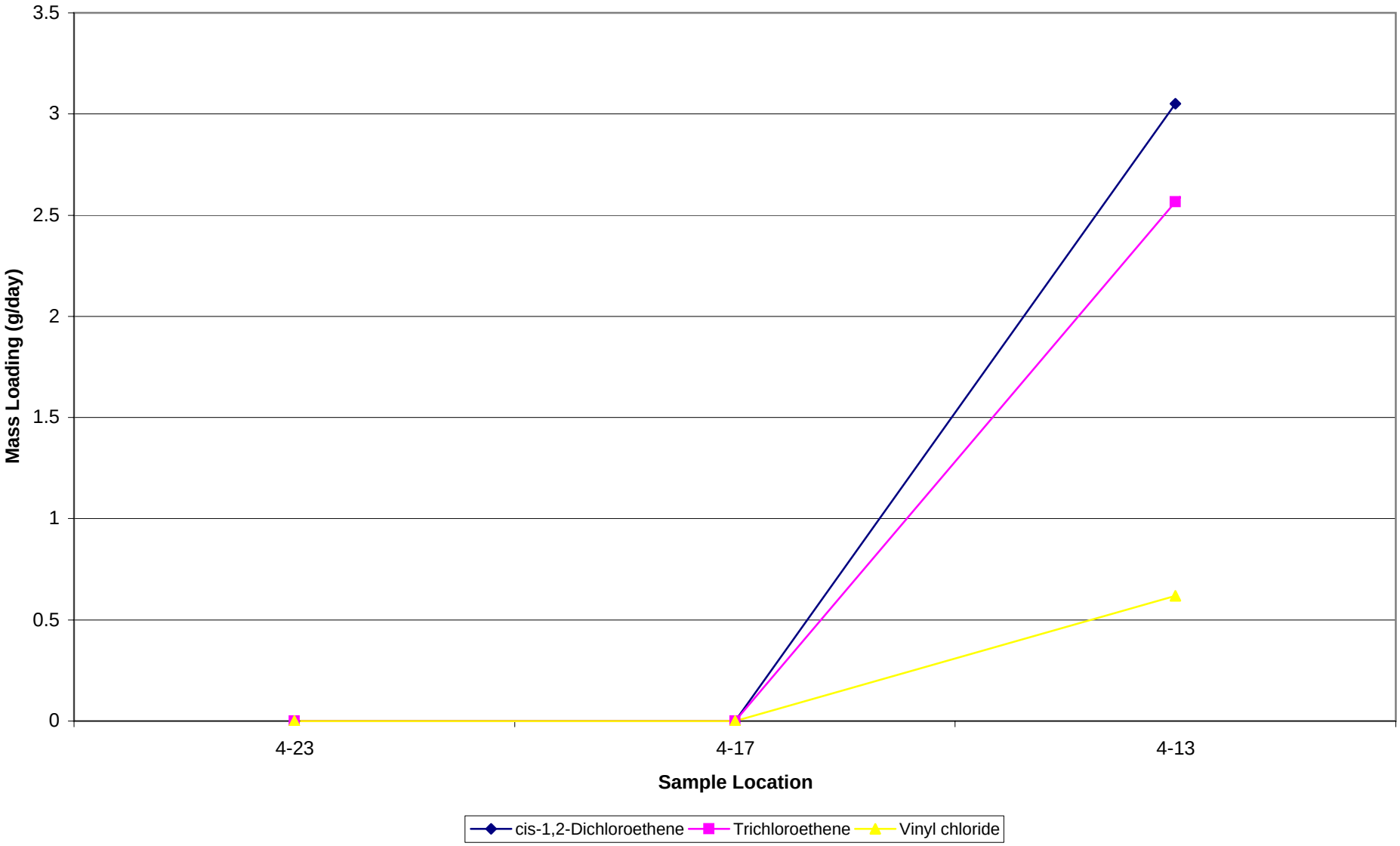
Graph I-6
Outfall 004
Dry Weather Event #1
June 27, 2002



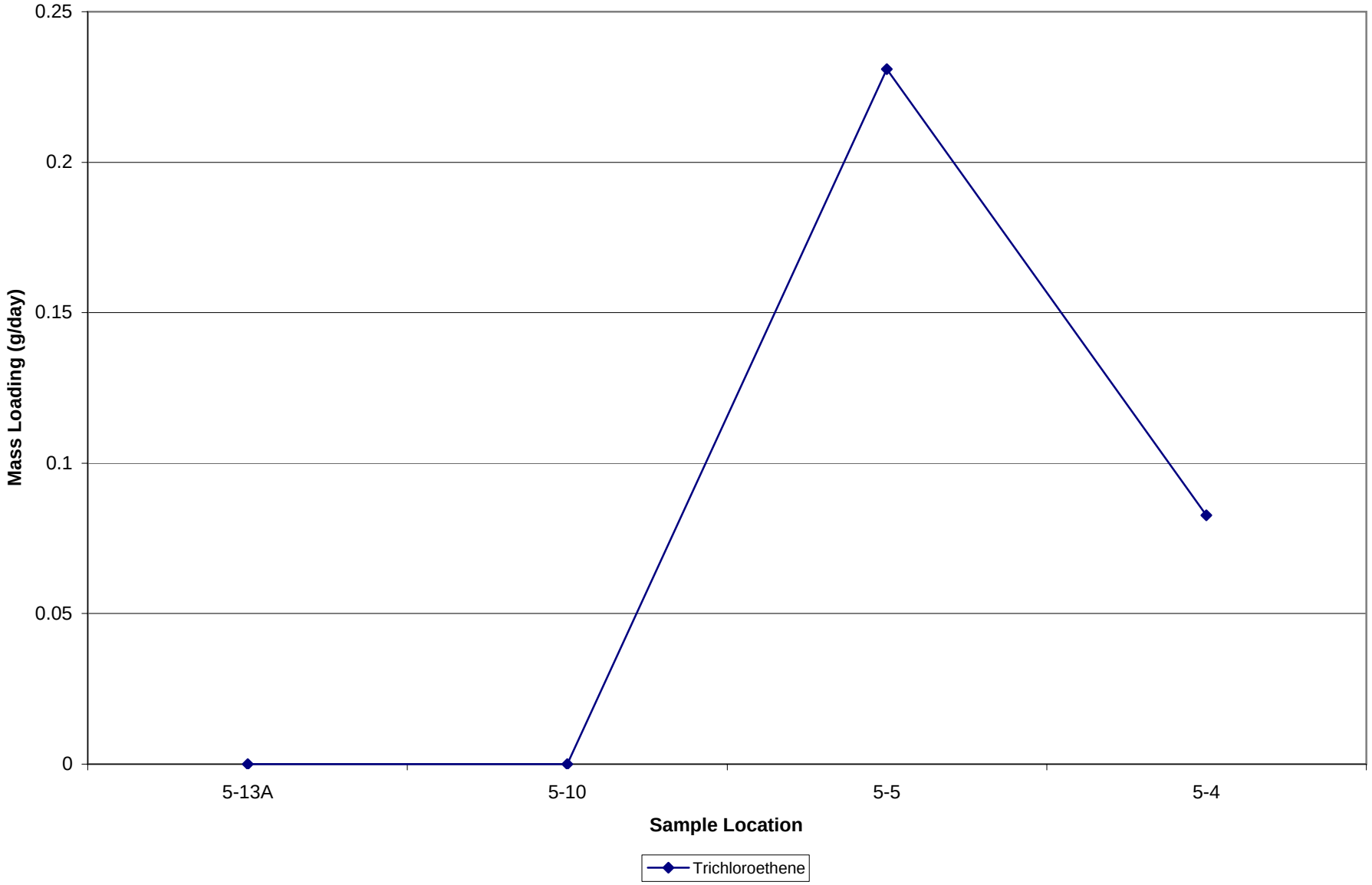
Graph I-7
Outfall 004
Dry Weather Event #2
July 9, 2002



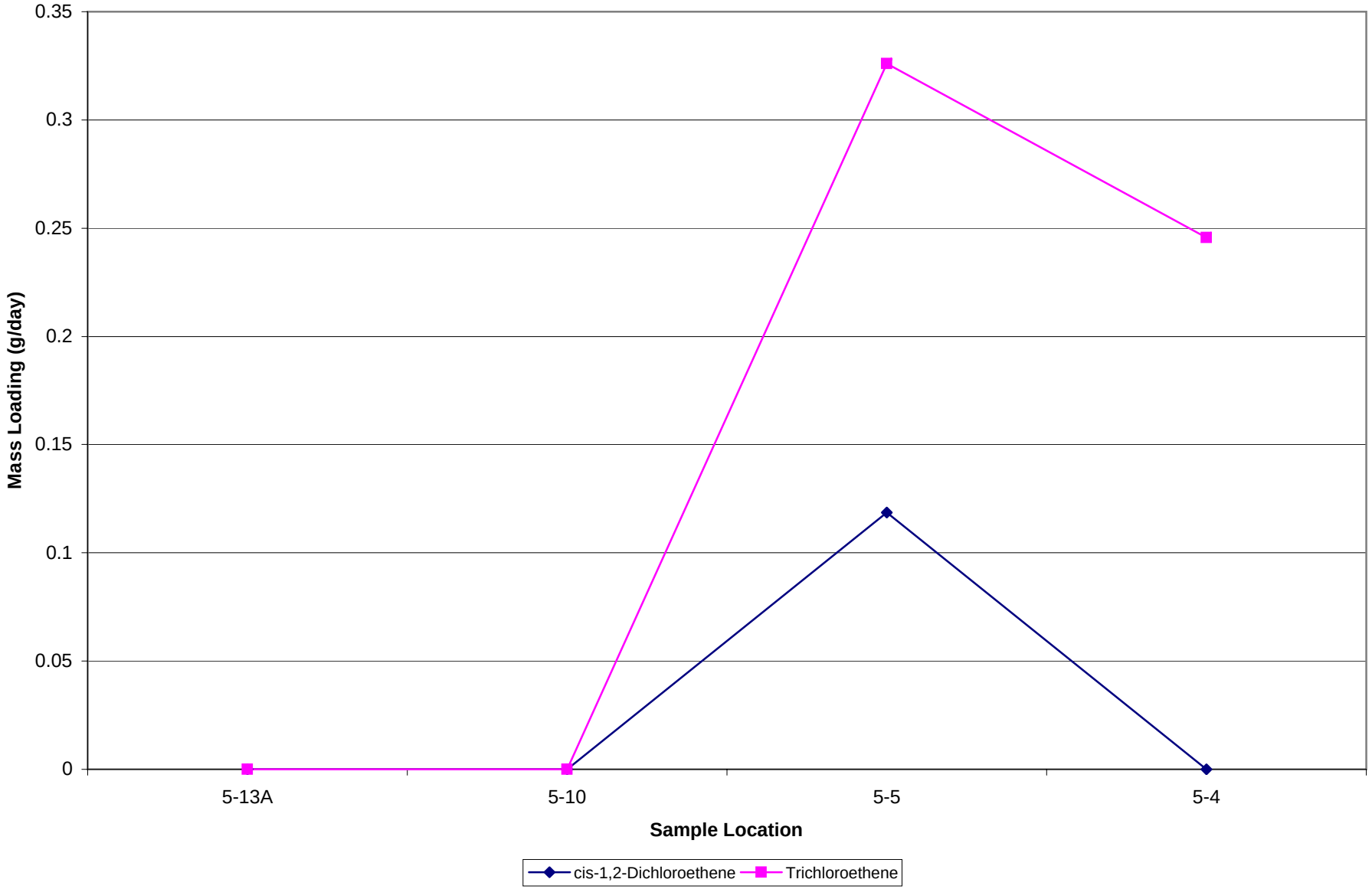
Graph I-8
Outfall 004
Wet Weather Event
July 29, 2002



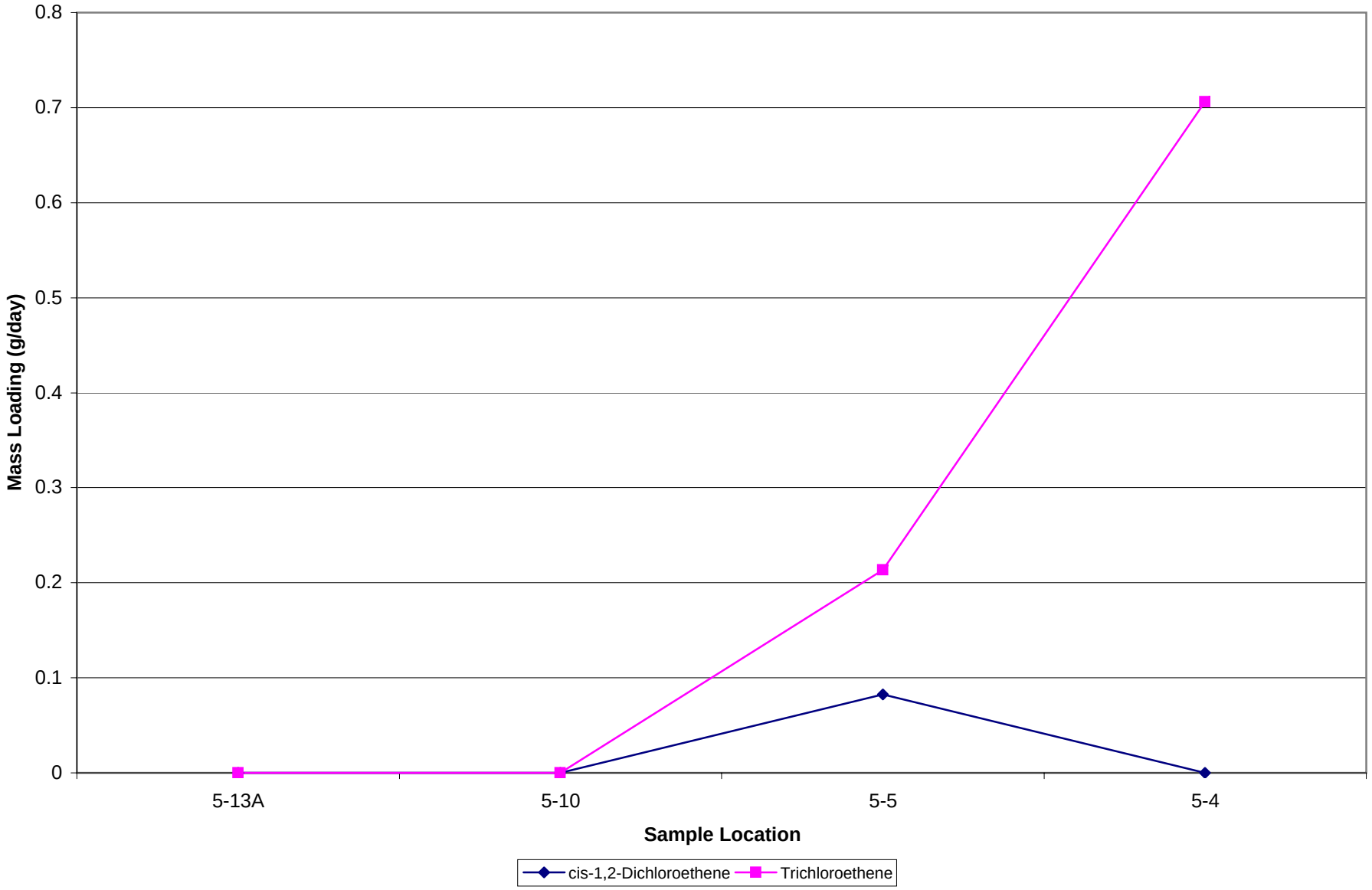
Graph I-9
Outfall 005
Dry Weather Event #1
June 27, 2002



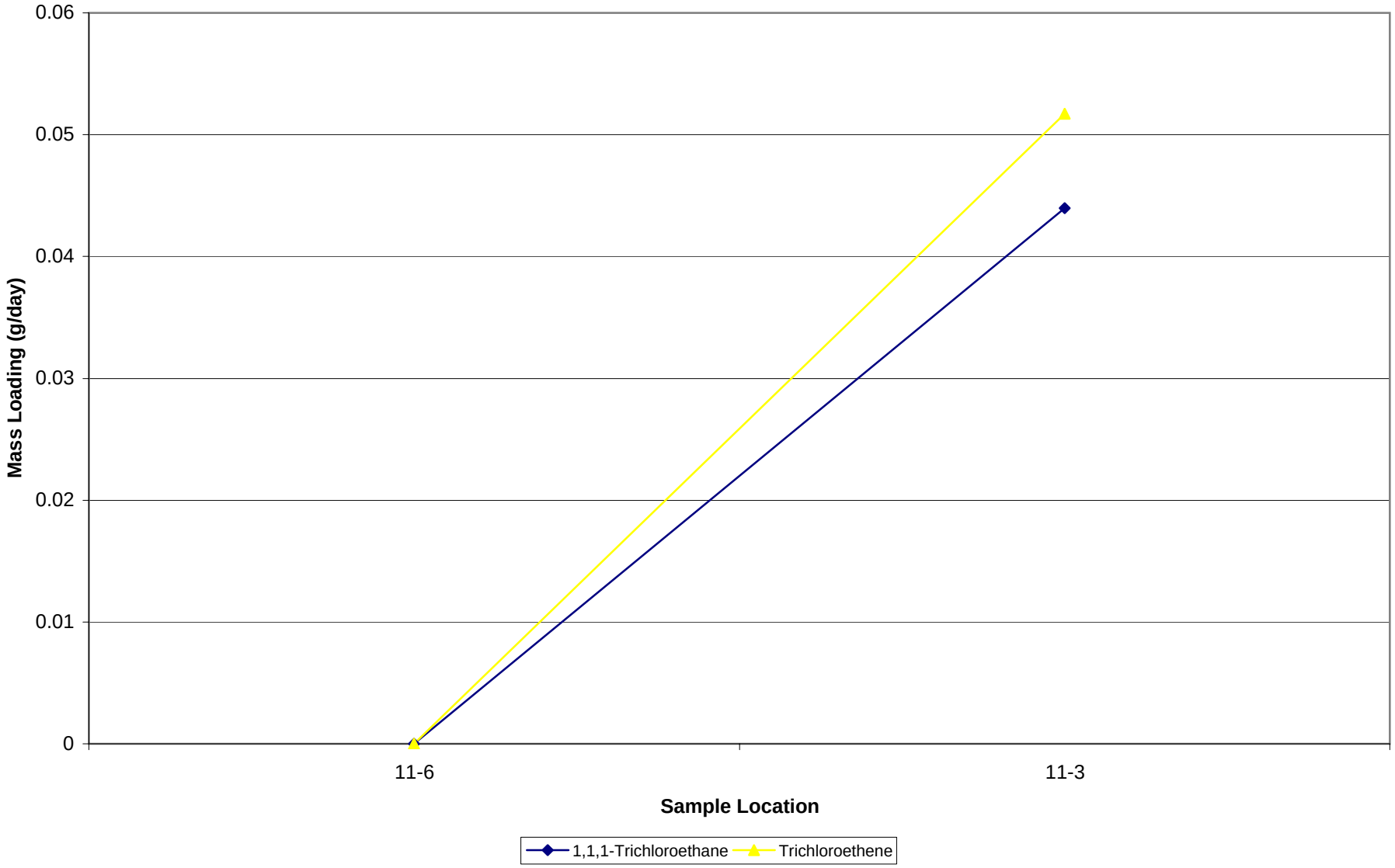
Graph I-10
Outfall 005
Dry Weather Event #2
July 9, 2002



Graph I-11
Outfall 005
Wet Weather Event
July 29, 2002



Graph I-12
Outfall 011
Dry Weather Event #2
July 9, 2002



Attachments

BBL®
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

Attachment I-1 - Previous Investigations

In 1996 and 1997, GM conducted a series of storm sewer investigation activities that focused on storm sewers tributary to Outfalls 003, 004, and 005. These storm sewers provide drainage for most of the northern portion of the Site (area north of Leith Street). These investigations provided preliminary information regarding potential infiltration of LNAPL and dissolved-phase constituents. The following tables are provided as a summary of this information.

- Storm sewer site reconnaissance:

  Table 1 – Identification of Proposed On-Site Storm Sewer Manhole Sample Locations
  Table 2 – Identification of Proposed Off-Site (Upgradient and Downgradient) Storm Sewer Manhole Sample Locations
  Table 3 – Identification of Storm Sewer Manholes/Pipelines with Environmental Significance Requiring Cleaning
  Table 5 – Identification of Storm Sewer Manholes/Pipelines without Environmental Significance Requiring Cleaning
  Table 6 – Identification of Storm Sewers Requiring Television Inspection Due to Potential Environmental Significance

- Storm sewer sediment sampling:

  Table 1 – Storm Sewer Sediment Laboratory Analytical Results
  Table 2 – Storm Sewer Sediment Composite Samples

- Storm sewer cleaning:

  Table 3 – Storm Sewer Cleaning Summary

- Storm Sewer Monitoring Log for Manholes:

  3-10, 3-12, 3-15,3-21, 3-22-1, 3-22-2, 3-23, 3-27, 3-29, 3-30, 3-31, 3-38, 3-48, 3-70, 3-73, 3-76-1, 4-8, 4-13, 4-17, 4-20, 4-23, 5-4, 5-10, 5-13A,

- Focused Storm Sewer Investigation

  Table 1 – Focused Storm Sewer Investigation – Summary of Storm Sewer Monitoring/Sampling Locations
  Table 2 – Focused Storm Sewer Investigation – Groundwater Elevations
  Table 3 – Focused Storm Sewer Investigation – Summary of Constituents above Laboratory Analytical Detection Limits

TABLE 1

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS

Identification of Proposed On-Site Storm Sewer Manhole
Sample Locations

Manhole/Pipeline Sample Location	Sample Parameters	Justification for Sampling
Outfall 001		
1-3	PCBs VOCs, Metals, Oil & Grease	Immediately downgradient to Building 38.
Outfall 002		
2-18	PCBs VOCs, Metals, Oil & Grease	Most downgradient on-site location.
2-20	PCBs VOCs, Metals, Oil & Grease	Adjacent to Tank Farm 37.
2-22	PCBs VOCs, Metals, Oil & Grease	Potential process contributions from Building 36.
2-27	PCBs VOCs, Metals, Oil & Grease	Potential process contributions from Building 36.
2-37	PCBs VOCs, Metals, Oil & Grease	Potential process contribution (solvent-like odor).
Outfall 003		
3-6	PCBs VOCs, Metals, Oil & Grease	Most downgradient on-site location.
3-10	PCBs VOCs, Metals, Oil & Grease	Intersection point of major interceptors.
3-12	PCBs VOCs, Metals, Oil & Grease	Effluent from oil/water separator.
3-17-1	PCBs VOCs, Metals, Oil & Grease	Close proximity to Plant 81 FFP area.
3-19	PCBs VOCs, Metals, Oil & Grease	Petroleum migrating into manhole.
3-21	PCBs VOCs, Metals, Oil & Grease	Intersection point of major interceptors.
3-22-2	PCBs VOCs, Metals, Oil & Grease	Intersection point of major interceptors, potential process contributions.
3-22-7	PCBs VOCs, Metals, Oil & Grease	Potential process contributions.
3-23	PCBs VOCs, Metals, Oil & Grease	Visible sheen.
3-30	PCBs VOCs, Metals, Oil & Grease	Potential ground water/process contribution from Building 20.
3-31	PCBs VOCs, Metals, Oil & Grease	Close proximity to PCB water storage area.
3-38	PCBs VOCs, Metals, Oil & Grease	Most downgradient location of interceptor branch.
3-48	PCBs VOCs, Metals, Oil & Grease	Upgradient on-site sampling location.
3-69	PCBs VOCs, Metals, Oil & Grease	Potential process contributions.
3-72-2	PCBs VOCs, Metals, Oil & Grease	Potential ground water contribution from Building 21.
3-75	PCBs VOCs, Metals, Oil & Grease	Potential ground water contribution from Building 21.
3-76-1	PCBs VOCs, Metals, Oil & Grease	Potential process contributions.
Outfall 004		
4-5	PCBs VOCs, Metals, Oil & Grease	Most downgradient on-site location.
4-7	PCBs VOCs, Metals, Oil & Grease	Potential contributor from Power House.

TABLE 1

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS

Identification of Proposed On-Site Storm Sewer Manhole
Sample Locations

Manhole/Pipeline Sample Location	Sample Parameters	Justification for Sampling
4-10	PCBs VOCs, Metals, Oil & Grease	Close proximity to FFP area.
4-13	PCBs VOCs, Metals, Oil & Grease	Close proximity to FFP area.
4-19	PCBs VOCs, Metals, Oil & Grease	Downgradient from potential process contribution.
Outfall 004A		
4A-2	PCBs VOCs, SVOCs, Metals, Oil & Grease	Most downgradient sampling location.
Outfall 005		
5-3	PCBs VOCs, Metals, Oil & Grease	Most downgradient on-site sampling location, FFP observed.
Drainage grate north of 5-9	PCBs VOCs, Metals, Oil & Grease	FFP near former tank farm.
5-10	PCBs VOCs, Metals, Oil & Grease	Upgradient sampling locations, close proximity to Power House.
5-15	PCBs VOCs, Metals, Oil & Grease	Potential process contributions.
Outfall 005A		
5A-1	PCBs VOCs, SVOCs, Metals, Oil & Grease	Most downgradient on-site sampling location.
Outfall 006		
6-2	PCBs VOCs, Metals, Oil & Grease	Most downgradient on-site sampling location.
6-2-1	PCBs VOCs, Metals, Oil & Grease	Intersect point of major storm water interceptor.
6-3	PCBs VOCs, Metals, Oil & Grease	Intersect point of major storm water interceptor.
6-6	PCBs VOCs, Metals, Oil & Grease	Intersect point of major storm water interceptor.
6-10	PCBs VOCs, Metals, Oil & Grease	Potential process contributions.
6-17	PCBs VOCs, Metals, Oil & Grease	Petroleum historically detected at this location.
Outfall 007		
7-1	PCBs VOCs, SVOCs, Metals, Oil & Grease	Most downgradient on-site sampling location.
Outfall 007A		
7A-1	PCBs VOCs, SVOCs, Metals, Oil & Grease	Most downgradient on-site sampling location.
Outfall 008		
8-1	PCBs VOCs, SVOCs, Metals, Oil & Grease	Most downgradient on-site sampling location.
8-2-4	PCBs VOCs, Metals, Oil & Grease	Location of interceptor branch.
8-2-12	PCBs VOCs, Metals, Oil & Grease	Adjacent to former tank farm location, Building 84.
8-3	PCBs VOCs, Metals, Oil & Grease	Location of interceptor branch.

TABLE 1

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS

Identification of Proposed On-Site Storm Sewer Manhole
Sample Locations

Manhole/Pipeline Sample Location	Sample Parameters	Justification for Sampling
Outfall 010		
10-4	PCBs VOCs, SVOCs, Metals, Oil & Grease	Most downgradient sampling location.
10-4-1	PCBs VOCs, Metals, Oil & Grease	Major interceptor branch.
10-7	PCBs VOCs, Metals, Oil & Grease	Major interceptor branch.
10-7-3	PCBs VOCs, Metals, Oil & Grease	Upgradient location of interceptor branch.
10-8	PCBs VOCs, Metals, Oil & Grease	Upgradient location of interceptor branch.
Outfall 011		
11-6-8	PCBs VOCs, Metals, Oil & Grease	Upgradient location of interceptor branch.
11-7	PCBs VOCs, Metals, Oil & Grease	Major interceptor branch.
11-10	PCBs VOCs, Metals, Oil & Grease	Close proximity to Building 16.
Outfall 012		
12-1	PCBs VOCs, SVOCs, Metals, Oil & Grease	Most downgradient on-site sampling location.
Outfall 013		
13-6	PCBs VOCs, Metals, Oil & Grease	Most downgradient on-site sampling location.
13-7	PCBs VOCs, Metals, Oil & Grease	Most upgradient location.
13-11-2	PCBs VOCs, Metals, Oil & Grease	Major interception branch.
13-12	PCBs VOCs, Metals, Oil & Grease	Major interception branch.

Notes:
1. FFP - Free-Floating Product.
2. Water samples (grab) to be collected from all sampling locations.
3. Sampling methods to be determined in the future.

TABLE 2

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS

Identification of Proposed Off-Site (Upgradient and Downgradient) Storm Sewer
Manhole Sample Locations

Manhole/Pipeline Sample Location	Sample Parameters	Comments
Outfall 001		
1-1-3	PCBs, VOCs, SVOCs, Metals, Oil & Grease	Downgradient off-site location
1-7	PCBs, VOCs, SVOCs, Metals, Oil & Grease	Upgradient off-site location
1-12	PCBs, VOCs, SVOCs, Metals, Oil & Grease	Upgradient off-site location
Outfall 002		
2-1	PCBs, VOCs, SVOCs, Metals, Oil & Grease	Downgradient off-site location
Outfall 003		
3-25-3	PCBs, VOCs, SVOCs, Metals, Oil & Grease	Upgradient off-site location
3-28-4	PCBs, VOCs, SVOCs, Metals, Oil & Grease	Upgradient off-site location
3-32	PCBs, VOCs, SVOCs, Metals, Oil & Grease	Upgradient off-site location
3-35-1	PCBs, VOCs, SVOCs, Metals, Oil & Grease	Upgradient off-site location (No dry weather flow noted at time of inspection)
3-37	PCBs, VOCs, SVOCs, Metals, Oil & Grease	Upgradient off-site location (No dry weather flow noted at time of inspection)
3-52	PCBs, VOCs, SVOCs, Metals, Oil & Grease	Upgradient off-site location
Outfall 004		
4-23	PCBs, VOCs, SVOCs, Metals, Oil & Grease	Upgradient off-site location
Outfall 005		
5-1	PCBs, VOCs, SVOCs, Metals, Oil & Grease	Downgradient off-site location
Outfall 011		
11-6	PCBs, VOCs, SVOCs, Metals, Oil & Grease	Downgradient off-site location
11-6-9	PCBs, VOCs, SVOCs, Metals, Oil & Grease	Upgradient off-site location
Outfall 013		
13-7-4	PCBs, VOCs, SVOCs, Metals, Oil & Grease	Upgradient off-site location
13-14	PCBs, VOCs, SVOCs, Metals, Oil & Grease	Upgradient off-site location

Notes:
1. Water samples (grab) to be collected from all sampling locations.
2. Sampling methods to be determined in the future.

TABLE 3

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS

Identification of Storm Sewer Manholes/Pipelines With
Environmental Significance Requiring Cleaning

Manhole/Pipeline Cleaning Location	Justification for Cleaning	Estimated Sediment Volume Cubic Yards
Outfall 002		
Pipeline connecting 2-18 through 2-20	Surcharged pipeline	
Drainage grate 2-21-2 and connecting pipeline	Surcharged pipeline	
Drainage grate 2-21-3 and connecting pipeline	Surcharged pipeline	
Manholes/pipelines connecting 2-32 through 2-32-5	6-8" sediment depth within pipeline	
Manholes/pipelines connecting 2-33 through 2-41	3-4" sediment depth within pipeline	
Outfall 003		
Manholes/pipelines connecting 3-10 through 3-10-3	Surcharged pipeline	
Pipeline connecting 3-17-1 to 3-17	3-4" sediment depth within pipeline	
Manhole 3-19-2 and connecting pipeline	1-2" sediment depth within pipeline	
Manholes/pipelines connecting 3-20-30 to 3-20-29	Surcharged pipeline	
Drainage grate 3-20-31 and connecting pipeline	Surcharged pipeline	
Manholes/pipelines connecting 3-22-1 through 3-22-8	5-6" sediment depth within pipeline	
Drainage grate 3-28-2 and connecting pipeline	Surcharged pipeline	
Drainage grate 3-28-3 and connecting pipeline	Surcharged pipeline	
Manholes/pipelines connecting 3-30 through 3-32	1-2" sediment depth within pipeline	
Manholes/pipelines connecting 3-31-1 to 3-31-4	8" sediment depth within pipeline	
3-31-B and associated pipeline	Surcharged pipeline	
3-31-6 and associated pipeline	1-2" sediment depth within pipeline	
Pipeline connecting 3-72-2 to 3-72	6-8" sediment depth within pipeline	
Pipeline connecting 3-72-5 to 3-72-2	6-8" sediment depth within pipeline	
3-75 and associated pipeline	Surcharged pipeline	
Outfall 006		
Manholes/pipelines connecting 6-10-1, 6-10-2 to 6-10	4-5" sediment depth within pipeline	
Outfall 008		
Manholes/pipelines connecting 8-2-4 through 8-2-12	Significant debris	
Outfall 010		
Manholes/pipelines connecting 10-4-1 through 10-4-3	Significant debris	
Manholes/pipelines connecting 10-7 through 10-13	Surcharged pipeline	
Manhole/pipeline connecting 10-8-1 to 10-8	Surcharged pipeline	

Notes:

1. All cleaning locations require sampling before the initiation of the cleaning efforts to assist in material disposal and address any heath and safety items.
2. Sampling methods to be determined in the future.
3. Sediment volume estimates to be completed at a future date.

TABLE 5

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS

Identification of Storm Sewer Manholes/Pipelines
Without Environmental Significance Requiring Cleaning

Manhole/Pipeline Cleaning Location	Comments	Estimated Sediment Volume (cubic yards)
Outfall 001		
Manholes/pipelines connecting 1-3-1 through 1-3-2	Significant debris	
Manholes/pipelines connecting 1-9 through 1-9-2	Significant debris	
Manholes/pipelines connecting 1-10-1 through 1-10-3	Significant debris	
Manhole 1-13-11 and pipeline connecting to 1-10-1	Significant debris	
Outfall 002		
Pipeline connecting 2-33 to 2-33-1	Significant debris	
Manholes/pipelines connecting 2-41-3 through 2-41-5	1-2" sediment depth within pipeline	
Outfall 003		
Manhole/pipelines connecting 3-30-3 to 3-30-2	1-2" sediment depth within pipeline	
Manholes/pipelines connecting 3-73-1 through 3-73-3	4-6" sediment depth within pipeline	
Manholes/pipelines connecting 3-76-1-1 through 3-76-1-4	Surcharged pipeline	
Manholes/pipelines connecting 3-76-9 to 3-76-10, and 3-46-19	Significant debris	
Outfall 004		
Manholes/pipelines connecting 4-22-1 through 4-22-3	12" sediment depth within pipeline	
Outfall 004A		
Manholes/pipelines and associated drainage grates connecting 4A-7 and 4A-8	8" sediment depth within pipeline	
Outfall 007		
Manholes/pipelines connecting 7-3 to 7-6	Surcharged pipeline	
Outfall 011		
Drainage grate 11-6-1 and connecting pipelines	Significant debris	
Manholes/pipelines connecting 11-6-5 through 11-6-7	Significant debris	

Notes:

1. Sediment volume estimates to be completed at a future date.

TABLE 6

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS

Identification of Storm Sewers Requiring Television Inspection
Due to Potential Environmental Significance
(Pipelines Identified for Television Inspection are Presented in Order of Priority)

Manhole/Pipeline Reach	Approximate Pipeline Length (Feet)	Approximate Pipeline Diameter (Inches)	Justification for Televising (See Notes)
Outfall 003			
Pipelines Connecting 3-76-1 to 3-76-2 to 3-76-8, 3-76-11, 3-76-13, and 3-76-14	550'	30"	2, 4, 6
Pipelines Connecting 3-38 through 3-45	675'	60"	3, 4
Pipeline Connecting 3-74 to 3-75 to South along Building 21	420'	12"	3
Pipeline Connecting 3-72-5 to Building 21	100'	12"	3
Pipeline Connecting 3-72-2 to Building 21	100'	12"	3
Pipelines Connecting 3-10 through 3-10-5	450'	10-24"	1, 3
Pipelines Connecting 3-17-1 to 3-17-2	375'	18"	1, 3
Pipeline Connecting 3-19 to 3-19-10 and 3-19-11	250'	12"	1, 4
Pipeline with Flapper Gate to West from 3-19	Estimated 500'	15"	1, 3
Pipeline to west from 3-19-2	Estimated 500'	12"	3, 4
Pipelines from 3-21-1 and 3-21-2 to 3-21	200'	8-10"	1, 3, 4
Pipeline from 3-22 to beneath Building 20	450'	24"	1
Pipelines Connecting 3-22 through 3-22-7	950'	18"	1, 2, 3
Pipeline Connecting 3-30 to beneath Building 20	400'	27"	1, 2, 3
Pipeline Connecting 3-31 to 3-32	250'	42"	1, 3, 4, 6
Pipeline Connecting 3-31 to 3-31-1 to 3-31-4	300'	12"	2, 3
Pipeline Connecting 3-31 to 3-31-6 and lines associated with 3-31-6	Estimated 150'	8"	1, 3
Pipelines associated with 3-31-B	Estimated 200'	Unknown	4
Outfall 002			
Pipeline upstream of 2-27	Estimated 400'	36"	2
Pipeline Connecting 2-33 through 2-41	1000'	18-24"	1
Pipeline Connecting 2-33 to 2-33-1 to process waste tank	200'	8"	1
Pipeline Connecting 2-32 through 2-32-5	300'	12"	1
Pipeline Connecting 2-18 to 2-19	100'	54"	1, 3, 6
Pipeline Connecting	250'	54"	1, 3, 6

TABLE 6

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS

Identification of Storm Sewers Requiring Television Inspection
Due to Potential Environmental Significance
(Pipelines Identified for Television Inspection are Presented in Order of Priority)

Manhole/Pipeline Reach	Approximate Pipeline Length (Feet)	Approximate Pipeline Diameter (Inches)	Justification for Televising (See Notes)
2-19 to 2-20			
Pipeline Connecting 2-20 to 3-31A	375'	42"	3, 4, 6
Outfall 005			
Pipeline Connecting 5-3 through 5-18	2500'	48-60"	1, 2, 4
Outfall 006			
Pipeline Connecting 6-10 through upstream of 6-10-3	650'	18"	2, 3
Pipeline connecting 6-6 through 6-17	1100'	48"	3, 4, 6
Pipeline from 6-2-1 to west	Estimated 500'	18"	3
Outfall 008			
Pipeline from 8-3 to beneath Building 28 and 84	400'	20"	2, 3
Pipeline Connecting 8-2-9 through 8-2-12	275'	18"	1, 4
Pipeline from 8-2-12 to beneath Building 84	375'	10-15"	1, 4
Outfall 010			
Pipeline Connecting 10-7 through 10-7-3 to 10-4 through 10-4-3	250'	20"	3
Pipeline connecting 10-4 Through 10-4-3	900'	18"	3
Pipeline Connecting 10-4 through 10-13	2000'	24"	3
Pipeline Connecting 10-8 to 10-8-1	300'	8"	3
Outfall 011			
Pipeline Connecting 11-6 through 11-10	1600'	30"	1, 3
Pipeline Connecting 11-6 to 11-4	1200'	42"	1, 3, 6

Notes: Criteria for Televising

1. Located near an Area of Interest/ground water contains constituents of interest.
2. Potential process line cross connection.
3. Observed dry-weather flow/ground water infiltration/close proximity to ground water.
4. Observed sheen/free-floating product.
5. Previous video identified potential concern.
6. Major interceptor.

Table 1

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS SITE

STORM SEWER SEDIMENT LABORATORY ANALYTICAL RESULTS

Manhole ID	Laboratory ID	Date Sampled	Oil & Grease (mg/kg)	Total PCBs (mg/kg)
2-21-2	AA43950	02/11/1997	25,800	ND
2-21-3	AA43949	02/11/1997	5,220	ND
2-32-3	AA43948	02/11/1997	28,100	ND
2-33	AA43947	02/11/1997	10,200	ND
2-37	AA43946	02/11/1997	8,000	ND
3-10-4	AA43938	02/12/1997	43,600	ND
3-19-2	AA43939	02/12/1997	961	ND
3-20-30	AA43937	02/12/1997	29,900	ND
3-22-2	AA43954	02/11/1997	1,720	ND
3-22-8	AA43951	02/11/1997	56,600	ND
3-28-2	AA43952	02/11/1997	3,780	ND
3-28-3	AA43940	02/12/1997	9,340	ND
3-31	AA43953	02/11/1997	487	ND
3-31-3	AA43957	02/11/1997	31,200	ND
3-31-B	AA43956	02/11/1997	141,000	ND
3-31-6	AA43955	02/11/1997	66,700	50
3-31-6 (Dup.)	AA43942	02/12/1997	150,000	3.66
3-75	AA43944	02/12/1997	1,380	ND
6-10-2	AA43945	02/12/1997	1,230	ND
8-2-5	AA43936	02/12/1997	48	ND
10-4-1	AA43941	02/12/1997	581	ND
10-10	AA43943	02/12/1997	3,970	ND

Notes:

1. Storm sewer sediment samples collected by Fire & Environmental Consulting Laboratories, Inc. (FECL) with the assistance of Blasland, Bouck & Lee, Inc. (BBL) on February 11-12, 1997.
2. Storm sewer sediment samples were analyzed for Oil & Grease using Method 413.1 and polychlorinated biphenyls (PCBs) using Method 8081.
3. ND - Compound was analyzed for, but not detected.
4. (Dup.) - Field duplicate analysis.

Table 2

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS SITE

STORM SEWER SEDIMENT COMPOSITE SAMPLES

Sample ID	Laboratory ID	Date Sampled	Discrete Sediment Sample Utilized for Composite	Laboratory Analysis
Composite A	AA44069	02/11/1997	10-4-1, 10-10	TCLP Metals, TCLP Volatiles, TCLP Herbicides & Pesticides, TCLP Semivolatiles
Composite B	AA44070	02/11/1997	8-2-5, 6-10-2	TCLP Metals, TCLP Volatiles, TCLP Herbicides & Pesticides, TCLP Semivolatiles
Composite C	AA44071	02/11/1997	3-22-2, 3-22-8, 3-31, 3-31B, 3-31-6, 3-31-3	TCLP Metals, TCLP Volatiles, TCLP Herbicides & Pesticides, TCLP Semivolatiles
Composite D	AA44072	02/11/1997	3-20-30, 2-32-3, 2-21-3, 3-10-4, 3-75, 2-21-2, 3-19-2, 2-37, 3-28-3, 2-33, 3-28-2	TCLP Metals, TCLP Volatiles, TCLP Herbicides & Pesticides, TCLP Semivolatiles

Notes:

1. Storm sewer sediment samples collected by Fire & Environmental Consulting Laboratories, Inc. (FECL) with the assistance of Blasland, Bouck & Lee, Inc. (BBL) on February 11-12, 1997.

Table 3

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS SITE

STORM SEWER CLEANING SUMMARY

Manhole/Pipeline Reach	Approximate Pipeline Length (feet)	Approximate Pipeline Diameter (inches)	Estimated Volume of Material Removed (cubic yards)	Comments
2-33 thru 2-41	920	18-24	14	Material removed from pipe contained a significant amount of oil/grease sludge and metal chips.
2-32 thru 2-32-2	120	12	0.25	Mostly sand/gravel material from surface run-off.
2-32-2 thru 2-32-5	180	12	0.75	Pipe was 3/4 filled with sandy/gravel material. This material had a 1/2 inch to 1 inch top crust layer consisting of a chalky white "grout like" material.
3-10 thru 3-10-1	115	24	minimal	
3-19-2 to west	22	12	minimal	Encountered blockage at 22 feet west of manhole 3-19-2. Pipe was not cleaned beyond 22 feet.
3-72-2 to 3-72-5	55	8	minimal	Pipe is 1/2 to 3/4 plugged with a concrete type material. Pieces of brick were removed during cleaning.
3-72-5 to Bldg. 21	42	8	minimal	Cleaning nozzle was unable to clean beyond 42 feet south of manhole 3-72-5 due to unknown blockage. Pipe invert is below manhole invert due to a buildup of concrete material within manhole. For this reason, pipe remains filled with water.
3-73 to 3-75	110	12	0.5	Pipe contained 3 to 6 inches of sludge material containing a significant amount of oil/grease.
3-75 to south	290	8	1	Pipe was 1/2 filled with a material that appeared to be similar to foundry sand. Cleaning nozzle was unable to clean beyond 290 feet due to unknown obstruction.
10-7A to south	270	24	3	Pipe contained 4 to 6 inches of black sludge material prior to cleaning. Blockage or bend in pipe prevented the cleaning nozzle from cleaning beyond 270 feet south of manhole 10-7A.
10-7B to north	420	24	7	Pipe contained 6 to 8 inches of black sludge material. Pipe was cleaned to the length of hose (420 ft.) available on jet-rodder. Unable to locate upstream manhole at time of pipe cleaning.
10-8, 10-9, 10-10, 10-12	0	unknown	0	Attempts to remove surcharged water using vacuum truck were unsuccessful as recovery of water exceeded the rate that it could be removed.

TABLE 1

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS SITE

FOCUSED STORM SEWER INVESTIGATION
SUMMARY OF STORM SEWER MONITORING/SAMPLING LOCATIONS

Manhole ID	Absorbent Boom Location	Monitoring Location	Stormwater Sample Rounds		Stormwater Analytical Parameters		Field Duplicate and Matrix Spike/Matrix Spike Duplicate(MS/MSD) Designation
			Weekend	First & Second Shift	PCBs(total & dissolved), VOCs, TPH	SVOCs	
3-10	X	X	X	X	X	X	Dup-4(9/23/97)
3-12	X	X	X	X	X		MS/MSD(9/24/97)
3-15	X	X	X	X	X		MS/MSD(9/23/97)
3-19	X	X	X	X	X		Dup-2(9/20/97)
3-21	X	X	X	X	X		
3-22-1	X	X	X	X	X		
3-22-2	X	X					
3-23	X	X	X	X	X		MS/MSD(9/20/97)
3-25-3			X	X	X		
3-27	X	X	X	X	X		
3-28-4			X	X	X	X	
3-29	X	X	X	X	X		
3-30	X	X	X	X	X		Dup-5(9/24/97)
3-31	X	X	X	X	X	X	
3-31-6			X	X	X		Dup-3(9/23/97)
3-32			X	X	X		
3-35-1			X	X	X	X	
3-37			X	X	X	X	
3-38	X	X	X	X	X		
3-48	X	X	X	X	X		
3-52			X	X	X	X	
3-70	X	X	X	X	X		
3-72-2			X	X	X		
3-73	X	X		X	X		
3-75			X	X	X		
3-76-1	X	X	X	X	X		
4-2			X	X	X	X	Dup-1(9/20/97), MS/MSD(9/24/97)
4-7			X	X	X		
4-8	X	X	X	X	X		
4-13	X	X	X	X	X		
4-17		X	X	X	X		
4-20	X	X	X	X	X		
4-23	X	X	X	X	X	X	MS/MSD(9/20/97)
5-2			X	X	X	X	Dup-6(9/24/97)
5-4	X	X	X	X	X		
5-9(grate)			X		X		
5-10		X	X	X	X		
5-13A	X	X	X	X	X	X	MS/MSD(9/23/97)

Notes:

1. Absorbent Boom Location: X- indicates storm sewer manhole locations that received absorbent booms for visual inspection during investigation activities.
2. Monitoring Location: X- indicates storm sewer manhole locations monitored for stormwater velocity, flow, pH, total dissolved solids (TDS), and temperature during investigation activities.
3. Stormwater Sample Rounds: X- indicates storm sewer manhole locations included for the collection of stormwater samples on three occasions(weekend, first shift, and second shift) during investigation activities.
4. Stormwater Analytical Parameters: x- indicates laboratory analytical parameters associated with each stormwater sample location.

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS SITE

Focused Storm Sewer Investigation
Groundwater Elevations

Monitoring Well ID	Date	Top of Casing Elevation	Depth to Water	Groundwater Elevation
20-120	09/22/97	750.42*	7.95	742.47
20-145	09/22/97	749.98	9.2	740.78
20-160	09/22/97	753.42	11.28	742.14
20-163	09/22/97	751.8*	9.87	741.93
30-100	09/22/97	unknown	10.61	
43-101	09/22/97	753.23	10.45	742.78
43-102	09/22/97	751.23	9.2	742.03
43-162	09/22/97	750.87	12.2	738.67
70-100	09/22/97	743	5.84	737.16
70-107	09/25/97	743.24	6.95	736.29
70-109	09/22/97	742.19	3.38	738.81

*Outer casing rim elevation.

TABLE 3

GENERAL MOTORS CORPORATION
NAO - FLINT OPERATIONS SITE

FOCUSED STORM SEWER INVESTIGATION
SUMMARY OF CONSTITUENTS ABOVE LABORATORY ANALYTICAL DETECTION LIMITS
(Results Presented in Micrograms per Liter(ppb))

Location ID:	3-10shift1	Dup-4(3-10)shift1	3-10shift2	3-12weekend	3-12shift1	3-12shift2	3-15weekend	3-15shift1	3-15shift2	3-19weekend	Dup-2(3-19)weekend
Date:	09/23/97	09/23/97	09/24/97	09/20/97	09/23/97	09/24/97	09/20/97	09/23/97	09/24/97	09/20/97	09/20/97
Time:	1305		1945	2005	1255	1920	1935	1230	1910	1905	
VOCs											
Bromodichloromethane	-	-	-	-	-	-	-	-	-	-	-
Bromoform	-	-	-	-	-	-	-	-	-	-	-
Chloroform	-	-	-	1	-	-	1	1	1	2	2
Dibromochloromethane	-	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	-	-	-	1	4	4	3	4	4	2	6
1,1-Dichloroethene	-	-	-	-	-	-	-	-	-	-	2
cis-1,2-Dichloroethene	6	7	7	2	3	3	3	4	4	4	6
trans-1,2-Dichloroethene	-	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	-	-	-	-	-	-	-	-	-	-	-
1,1,1-Trichloroethane	-	-	-	12	16	17	19	17	20	29	34
Trichloroethene	-	-	-	4	7	6	6	6	7	8	10
Vinyl Chloride	-	-	-	-	-	-	-	-	-	-	-
p,m-Xylene	-	-	-	-	-	-	-	-	-	-	-
SVOCs											
Di-n-octyl phthalate	-	-	-	NA	NA	NA	NA	NA	NA	NA	NA
PCBs											
1254(unfiltered)	-	-	-	-	-	-	-	-	-	-	-
1260(unfiltered)	-	-	-	-	-	-	-	-	-	-	-
1242(unfiltered)	-	-	-	-	-	-	-	-	-	-	-
TPH											
TPH	-	-	6,000	-	-	-	-	26,000	-	7,000	-

TABLE 3

GENERAL MOTORS CORPORATION
NAO - FLINT OPERATIONS SITE

FOCUSED STORM SEWER INVESTIGATION
SUMMARY OF CONSTITUENTS ABOVE LABORATORY ANALYTICAL DETECTION LIMITS
(Results Presented in Micrograms per Liter(ppb))

Location ID:	3-19shift1	3-19shift2	3-21weekend	3-21shift1	3-21shift1	3-22-1weekend	3-22-1shift1	3-22-1shift2	3-23weekend	3-23shift1	3-23shift2
Date:	09/23/97	09/24/97	09/20/97	09/23/97	09/24/97	09/20/97	09/23/97	09/24/97	09/20/97	09/23/97	09/24/97
Time:	1210	1900	1830	1135	1740	1840	1125	1730	1800	1115	1715
VOCs											
Bromodichloromethane	-	-	-	-	-	1	1	-	-	-	-
Bromoform	-	-	-	-	-	-	-	-	-	-	-
Chloroform	2	1	2	2	2	4	5	5	2	2	2
Dibromochloromethane	-	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	6	5	6	8	9	4	4	5	10	14	14
1,1-Dichloroethene	1	-	-	2	2	-	-	-	3	5	4
cis-1,2-Dichloroethene	6	6	7	8	10	-	-	-	-	3	3
trans-1,2-Dichloroethene		-	-	-	-	-	-	-	-	-	-
Ethylbenzene		-	-	-	-	-	-	-	-	-	-
1,1,1-Trichloroethane	25	27	48	45	49	2	-	-	72	101	93
Trichloroethene	11	11	13	18	20	-	-	-	-	-	-
Vinyl Chloride	-	-	-	-	-	-	-	-	-	-	-
p,m-Xylene	-	-	-	-	-	-	-	-	-	-	-
SVOCs											
Di-n-octyl phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PCBs											
1254(unfiltered)	28	-	-	-	-	-	-	-	-	-	-
1260(unfiltered)	16	-	-	-	-	-	-	-	-	-	-
1242(unfiltered)	82	-	-	-	-	5	-	-	-	-	-
TPH											
TPH	147,000	2,000	-	-	-	5,000	-	-	-	10,000	9,000

TABLE 3

GENERAL MOTORS CORPORATION
NAO - FLINT OPERATIONS SITE

FOCUSED STORM SEWER INVESTIGATION
SUMMARY OF CONSTITUENTS ABOVE LABORATORY ANALYTICAL DETECTION LIMITS
(Results Presented in Micrograms per Liter(ppb))

Location ID:	3-25-3shift1	3-27weekend	3-27shift1	3-27shift2	3-29weekend	3-29shift1	3-29shift2	3-30shift1	3-32shift2	3-37weekend	3-38weekend
Date:	09/23/97	09/20/97	09/23/97	09/24/97	09/20/97	09/23/97	09/24/97	09/23/97	09/24/97	09/20/97	09/20/97
Time:	1600	1750	1100	1710	1740	1055	1700	1010	1455	1355	1955
VOCs											
Bromodichloromethane	-	-	-	-	-	-	-	-	-	-	-
Bromoform	-	-	-	-	-	-	-	-	-	-	-
Chloroform	-	-	-	-	-	-	-	-	-	-	2
Dibromochloromethane	-	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	-	46	150	120	62	170	120	-	-	-	-
1,1-Dichloroethene	-	17	50	50	22	60	50	-	-	-	-
cis-1,2-Dichloroethene	-	6	30	20	12	30	20	2	-	-	-
trans-1,2-Dichloroethene	-	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	-	-	-	-	-	-	-	-	-	-	-
1,1,1-Trichloroethane		329	1,000	850	415	1,190	840	-	-	-	-
Trichloroethene	-	2	-	-	2	-	-	-	-	-	-
Vinyl Chloride	-	9	30	-	12	40	-	-	-	-	-
p,m-Xylene	-	-	-	-	-	-	-	-	-	-	-
SVOCs											
Di-n-octyl phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	20	NA
PCBs											
1254(unfiltered)	-	-	-	-	-	-	-	-	-	-	-
1260(unfiltered)	-	-	-	-	-	-	-	-	-	-	-
1242(unfiltered)	-	-	-	-	-	-	-	-	-	-	-
TPH											
TPH	2,000	9,000	-	-	-	-	-	-	1,000	-	-

TABLE 3

GENERAL MOTORS CORPORATION
NAO - FLINT OPERATIONS SITE

FOCUSED STORM SEWER INVESTIGATION
SUMMARY OF CONSTITUENTS ABOVE LABORATORY ANALYTICAL DETECTION LIMITS
(Results Presented in Micrograms per Liter(ppb))

Location ID:	3-48weekend	3-70weekend	3-70shift1	3-70shift2	3-72-2weekend	3-72-2shift2	3-73shift1	3-73shift2	3-75weekend	3-75shift1	3-75shift2
Date:	09/20/97	09/20/97	09/23/97	09/24/97	09/20/97	09/24/97	09/23/97	09/24/97	09/20/97	09/23/97	09/24/97
Time:	1850	2030	1420	1850	2040	1845	1355	1835	2050	1345	1825
VOCs											
Bromodichloromethane	-	-	-	-	-	-	-	-	-	-	-
Bromoform	-	-	-	-	-	-	-	-	-	-	-
Chloroform	3	-	-	-	-	-	-	-	-	-	-
Dibromochloromethane	-	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	-	2	2	2	-	-	-	-	7	6	5
1,1-Dichloroethene	-	-	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	-	16	14	16	-	2	-	-	-	-	-
trans-1,2-Dichloroethene	-	3	2	2	-	-	-	-	-	-	-
Ethylbenzene	-	-	-	-	-	-	-	-	-	-	-
1,1,1-Trichloroethane	-	-	-	-	-	-	-	-	-	-	-
Trichloroethene	-	2	1	2	-	-	-	2	-	-	-
Vinyl Chloride	-	25	-	27	-	-	-	-	-	-	-
p,m-Xylene	-	-	-	-	-	-	-	-	-	-	-
SVOCs											
Di-n-octyl phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PCBs											
1254(unfiltered)	-	-	-	-	-	-	-	-	-	-	-
1260(unfiltered)	-	-	-	-	-	-	-	-	-	-	-
1242(unfiltered)	-	-	-	-	-	-	-	-	-	-	-
TPH											
TPH	-	3,000	9,000	8,000	5,000	-	5,496,000	9,000	-	-	-

TABLE 3

GENERAL MOTORS CORPORATION
NAO - FLINT OPERATIONS SITE

FOCUSED STORM SEWER INVESTIGATION
SUMMARY OF CONSTITUENTS ABOVE LABORATORY ANALYTICAL DETECTION LIMITS
(Results Presented in Micrograms per Liter(ppb))

Location ID:	3-76-1weekend	3-76-1shift1	3-76-1shift2	4-2weekend	4-2shift1	Dup-1(4-2)weekend	4-2shift2	4-8weekend	4-8shift1	4-8shift2	4-13weekend
Date:	09/20/97	09/23/97	09/24/97	09/20/97	09/23/97	09/20/97	09/24/97	09/20/97	09/23/97	09/24/97	09/20/97
Time:	2100	1330	1800	1540	845		2015	2145	905	2120	2250
VOCs											
Bromodichloromethane	-	-	-	-	3	-	3	2	6	4	2
Bromoform	-	-	-	-	-	-	-	-	-	-	-
Chloroform	-	-	-	2	5	2	5	4	8	6	5
Dibromochloromethane	-	-	-	-	2	-	3	-	6	4	-
1,1-Dichloroethane	-	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethene	-	-	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	-	-	-	-	2	-	2	3	3	3	-
trans-1,2-Dichloroethene	-	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	-	-	-	-	-	-	-	-	-	-	-
1,1,1-Trichloroethane	-	-	-	-	-	-	-	-	-	-	-
Trichloroethene	-	-	-	-	-	-	-	-	-	1	-
Vinyl Chloride	-	-	-	-	-	-	-	-	-	-	-
p,m-Xylene	-	-	-	-	-	-	-	-	-	-	-
SVOCs											
Di-n-octyl phthalate	NA	NA	NA	-	-	-	-	NA	NA	NA	NA
PCBs											
1254(unfiltered)	-	-	-	-	-	-	-	-	-	-	-
1260(unfiltered)	-	-	-	-	-	-	-	-	-	-	-
1242(unfiltered)	-	-	-	-	-	-	-	-	-	-	-
TPH											
TPH	6,000	85,000	7,000	-	-	-	-	-	-	-	-

TABLE 3

GENERAL MOTORS CORPORATION
NAO - FLINT OPERATIONS SITE

FOCUSED STORM SEWER INVESTIGATION
SUMMARY OF CONSTITUENTS ABOVE LABORATORY ANALYTICAL DETECTION LIMITS
(Results Presented in Micrograms per Liter(ppb))

Location ID:	4-13shift1	4-13shift2	4-17weekend	4-17shift1	4-17shift2	4-20weekend	4-20shift1	4-20shift2	4-23weekend	4-23shift1	4-23shift2
Date:	09/23/97	09/24/97	09/20/97	09/23/97	09/24/97	09/20/97	09/23/97	09/24/97	09/20/97	09/23/97	09/24/97
Time:	915	2215	2305	925	2230	2325	935	2240	2345	945	2255
VOCs											
Bromodichloromethane	7	5	-	5	4	-	2	2	-	1	3
Bromoform	1	-	-	1	1	-	-	1	-	-	1
Chloroform	10	8	3	7	5	2	4	3	3	4	4
Dibromochloromethane	6	4	-	5	4	-	-	2	-	-	4
1,1-Dichloroethane	-	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethene	-	-	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	-	-	-	-	-	-	-	-	-	-	-
trans-1,2-Dichloroethene	-	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	-	-	-	-	-	-	-	-	-	-	-
1,1,1-Trichloroethane	-	-	-	-	-	-	-	-	-	-	-
Trichloroethene	-	-	-	-	-	-	-	-	-	-	-
Vinyl Chloride	-	-	-	-	-	-	-	-	-	-	-
p,m-Xylene	-	-	-	-	-	-	-	-	-	-	-
SVOCs											
Di-n-octyl phthalate	NA	NA	NA	NA	NA	NA	NA	NA	-	-	-
PCBs											
1254(unfiltered)	-	-	-	-	-	-	-	-	-	-	-
1260(unfiltered)	-	-	-	-	-	-	-	-	-	-	-
1242(unfiltered)	-	-	-	-	-	-	-	-	-	-	-
TPH											
TPH	-	-	-	-	-	-	-	-	-	-	-

TABLE 3

GENERAL MOTORS CORPORATION
NAO - FLINT OPERATIONS SITE

FOCUSED STORM SEWER INVESTIGATION
SUMMARY OF CONSTITUENTS ABOVE LABORATORY ANALYTICAL DETECTION LIMITS
(Results Presented in Micrograms per Liter(ppb))

Location ID:	5-2weekend	5-2shift1	5-2shift2	Dup-6(5-2)shift2	5-4weekend	5-4shift1	5-4shift2	5-9(grate)weekend	5-10weekend	5-10shift1	5-10shift2
Date:	09/20/97	09/23/97	09/24/97	09/24/97	09/20/97	09/23/97	09/24/97	09/20/97	09/20/97	09/23/97	09/24/97
Time:	1525	830	2040		2120	820	2105	2155	2205	815	2150
VOCs											
Bromodichloromethane	-	3	2	2	-	3	3	-	4	6	7
Bromoform	-	-	-	-	-	-	-	-	-	-	-
Chloroform	2	4	4	4	3	4	4	-	7	16	14
Dibromochloromethane	-	2	2	2	-	2	2	-	4	4	4
1,1-Dichloroethane	-	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethene	-	-	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	-	-	-	-	-	-	-	-	-	-	-
trans-1,2-Dichloroethene	-	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	-	-	-	-	-	-	-	1	-	-	-
1,1,1-Trichloroethane	-	-	-	-	-	-	-	-	-	-	-
Trichloroethene	-	-	-	-	-	-	-	-	-	-	-
Vinyl Chloride	-	-	-	-	-	-	-	-	-	-	-
p,m-Xylene	-	-	-	-	-	-	-	5	-	-	-
SVOCs											
Di-n-octyl phthalate	-	-	-	-	NA	NA	NA	NA	NA	NA	NA
PCBs											
1254(unfiltered)	-	-	-	-	-	-	-	-	-	-	-
1260(unfiltered)	-	-	-	-	-	-	-	-	-	-	-
1242(unfiltered)	-	-	-	-	-	-	-	-	-	-	-
TPH											
TPH	-	-	-	-	-	-	-	270,000,000	-	-	-

TABLE 3

GENERAL MOTORS CORPORATION
NAO - FLINT OPERATIONS SITE

FOCUSED STORM SEWER INVESTIGATION
SUMMARY OF CONSTITUENTS ABOVE LABORATORY ANALYTICAL DETECTION LIMITS
(Results Presented in Micrograms per Liter(ppb))

Location ID:	5-13Aweekend	5-13Ashift1	5-13Ashift2
Date:	09/20/97	09/23/97	09/24/97
Time:	2230	745	2200
VOCs			
Bromodichloromethane	6	6	5
Bromoform	-	-	-
Chloroform	16	17	17
Dibromochloromethane	3	3	2
1,1-Dichloroethane	-	-	-
1,1-Dichloroethene	-	-	-
cis-1,2-Dichloroethene	-	-	-
trans-1,2-Dichloroethene	-	-	-
Ethylbenzene	-	-	-
1,1,1-Trichloroethane	-	-	-
Trichloroethene	-	-	-
Vinyl Chloride	-	-	-
p,m-Xylene	-	-	-
SVOCs			
Di-n-octyl phthalate	-	-	-
PCBs			
1254(unfiltered)	-	-	-
1260(unfiltered)	-	-	-
1242(unfiltered)	-	-	-
TPH			
TPH	-	-	-

Notes:

1. Only samples that exibited constituents with concentrations greater than laboratory analytical detection limits are presented in this table.

2. Samples were collected by Blasland, Bouck & Lee, Inc.(BBL)and submitted to Fire & Environmental Consulting Laboratories, Inc.(FECL) for Laboratory Analysis.

3. Storm sewer water samples were analyzed for Volatile Organic Compounds(VOCs) using Method 8260, Total Petroleum Hydrocarbons(TPH) using Method 418.1, Total and Dissolved Polychlorinated Biphenyls(PCBs) using Method 8081, and select samples for Semi-Volatile Organic Compounds(SVOCs) using Method 8270.

4. NA = Not Analyzed
   - = Compound was analyzed for, but not detected.

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS
Storm Sewer Monitoring Log

Manhole ID: 3-10
Pipe Monitored(influent/effluent): effluent
Pipe Diameter: 60 inch
Pipe Construction: Tile

MH Rim elev. 742.33
MH inv. elev. 726.10

Sampling Personnel: Gerald P. Cummins, Peter Weir

Date	Day	Time	Depth of Water (inches)	Water Velocity (feet/second)	Temperature (Degrees F)	pH	TDS (uS)	Type of Flow (Dry Weather/ Wet Weather)	Oil Sheen Observed (yes/no)	Absorbent Boom Installed (yes/no)	Absorbent Boom Observations	Comments
09/15/97	Mon.	1250						dry	yes(slight)	yes	Placed absorbent boom.	MH too deep to measure velocity or collect sample.
09/17/97	Wed.	1035	11	1.03	68	7.2	310	wet	no	yes	Boom not functional due to rain.	Rain event.
09/17/97	Wed.	1730			67	7.7	210	wet/dry	no	yes	No oil identified.	Rain to 1130 am.
09/18/97	Thurs.	800			66	7.4	1220	dry	no	yes		Sunny. Manhole is slightly offset, can not measure depth of flow.
09/18/97	Thurs.	1535			68	7.6	1390	dry	no	yes	Oil layer behind boom.	
09/19/97	Fri.	805			66	7.4	1990	dry	no	yes	Oil layer behind boom.	Cloudy, windy-rain pending.
09/19/97	Fri.	1515	5.5	0.57	68	7.5	610	wet/dry	yes	yes	Boom not functional due to rain.	Began raining at 1230, rain ending at 1400
09/20/97	Sat.	830		1.21	67	7.4	800	wet/dry	no	yes		Overcast, Thundershower at 1800 on 09/19/97.
09/21/97	Sun.	1135			66	7.4	1780	dry	no	yes	No oil behind boom.	Sunny, cool.
09/22/97	Mon.	1135		0.65	67	7.4	1350	dry	no	yes		Partly cloudy, cool.
09/22/97	Mon.	1755			67	7.6	670	dry	no	yes	Thin oil layer behind boom.	Partly cloudy, cool.
09/23/97	Tues.	2050				7.8	1250	dry	no	yes	Thin oil layer behind boom.	Partly cloudy, cool. Temperature probe not working.
09/24/97	Wed.	1215			69	7.7	960	dry	no	yes		Sunny, warm.
09/25/97	Thurs.	1314			66	7.3	>2000	dry	yes	yes	Rainbow colored sheen is very visible.	Sunny, warm.
09/25/97	Thurs.	1847			66	7.4		dry	yes	yes	Rainbow colored sheen is very visible.	Sunny, warm.
09/26/97	Fri.	905			65			dry	no	yes		Boom removed and placed in drum.

(See Legend for observation descriptions.)

General Notes: Due to manhole configuration, entire flow is not visible from surface.

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS
Storm Sewer Monitoring Log

Manhole ID: 3-12
Pipe Monitored(influent/effluent): effluent
Pipe Diameter: 36 inch
Pipe Construction: concrete

MH Rim elev. 743.47
MH inv. elev. 729.63

Sampling Personnel: Gerald P. Cummins, Peter Weir

Date	Day	Time	Depth of Water (Inches)	Water Velocity (feet/second)	Temperature (Degrees F)	pH	TDS (uS)	Type of Flow (Dry Weather/ Wet Weather)	Oil Sheen Observed (yes/no)	Absorbent Boom Installed (yes/no)	Absorbent Boom Observations	Comments
09/15/97	Mon.	1320	3.25	0.66				dry	yes	yes	Boom placed in position.	Thin oil layer behind boom, noted immediately following placement.
09/17/97	Wed.	1115	11	2.26	68	8.5	68	wet	no	yes	Boom not functional due to rain event.	Rain event.
09/17/97	Wed.	1740	2.75	1.39	69	8	470	wet/dry	yes	yes	Rainbow colored sheen is visible.	Rain in morning to 1130 am.
09/18/97	Thurs.	818	2	1.02	69	7.4	900	dry	no	yes	Boom is oil saturated.	Sunny
09/18/97	Thurs.	1545	2	1.3	71	7.6	1030	dry	no	yes	Boom is oil saturated.	Sunny.
09/19/97	Fri.	815	3.5	1.1	70	7.4	1360	dry	no	yes	Boom is oil saturated.	Cloudy, windy-rain pending.
09/19/97	Fri.	1520	5	1.46	69	7.6	410	wet/dry	no	yes	Boom not functional due to rain.	Rain between 1200-1400.
09/20/97	Sat.	845	3.5	1.24	69	7.4	580	wet/dry	no	yes	No oil layer behind boom.	Overcast.
09/21/97	Sun.	1150	2.5	0.55	68	7.4	1240	dry	no	yes		Sunny, cool.
09/22/97	Mon.	1130	2.25	1.27	67	7.2	1190	dry	no	yes		Sunny, cool.
09/22/97	Mon.	1750	2.5	1.08	68	7.4	1250	dry	yes	yes (slight)	Rainbow colored sheen is visible.	Partly cloudy.
09/23/97	Tues.	2042	2.3	0.59		7.8	1070	dry	no	yes		Partly cloudy, cool. Temperature probe not working .
09/24/97	Wed.	1210	2	0.86	67	7.8	900	dry	no	yes		Sunny, warm.
09/25/97	Thurs	1310	2.25	1.58	68	7.4	1700	dry	no	yes		Sunny, warm.
09/25/97	Thurs.	1845	2.5	1.3	69	7.4		dry	no	yes		Sunny, warm
09/26/97	Fri.	900	2.5	1.3	68	7.6		dry	no	yes		

(See Legend for observation descriptions.)

General Notes:

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS
Storm Sewer Monitoring Log

Manhole ID: 3-15
Pipe Monitored(influent/effluent): effluent
Pipe Diameter: 66 inch
Pipe Construction: concrete

MH Rim Elev. 742.99
MH Inv. Elev. 730.44

Sampling Personnel: Gerald P. Cummins, Peter Weir

Date	Day	Time	Depth of Water (inches)	Water Velocity (feet/second)	Temperature (Degrees F)	pH	TDS (uS)	Type of Flow (Dry Weather/ Wet Weather)	Oil Sheen Observed (yes/no)	Absorbent Boom Installed (yes/no)	Absorbent Boom Observations	Comments
09/15/97	Mon.	1410	3.5	0.5				dry	yes(slight)	yes	Boom placed in position.	
09/17/97	Wed.	1155	6	1.01	70	8.3	250	wet	no	yes	Boom not functional due to rain.	Rain event. Rain stopped at approx. 1130.
09/17/97	Wed.	1755	3	0.54	71	7.6	910	wet/dry	yes	yes	Rainbow colored sheen.	Rain to 1130.
09/18/97	Thurs.	840	2	<0.5	71	7.5	1160	dry	yes	yes	Rainbow colored sheen.	Sunny.
09/18/97	Thurs.	1556	2.75	0.4	73	7.5	1170	dry	yes	yes	Rainbow colored sheen present. Boom is absorbing oil.	Sunny.
09/19/97	Fri.	840	2.5	0.38	72	7.6	1460	dry	yes(slight)	yes	Rainbow colored sheen.	Cloudy, windy-rain pending.
09/19/97	Fri.	1533	3.33	0.77	70	7.6	410	wet/dry	yes(slight)	yes	Boom not functional due to rain.	Rain from 1200-1400.
09/20/97	Sat.	900	2.33	0.75	69	7.4	790	wet/dry	yes(slight)	yes	Rainbow colored sheen.	Overcast.
09/21/97	Sun.	1200	2	0.5	70	7.6	1330	dry	yes	yes	Boom is becoming oil saturated.	Sunny, cool.
09/22/97	Mon.	1115	1.5	0.54	69	7.6	1340	dry	yes	yes	Flow noted from pipe leading north.	Sunny, cool.
09/22/97	Mon.	1740	2.25	0.37	70	7.6	1280	dry	yes	yes	Oil layer behind boom. Oil is similar to that observed at mh 3-19.	Partly cloudy.
09/23/97	Tues.	2035	2.5	0.59		7.8	1100	dry	no	yes	Boom is oil saturated.	Partly cloudy, cool. Temperature probe not working.
09/24/97	Wed.	1155	1.75	0.3	69	7.8	940	dry	yes	yes	Boom is oil saturated. Rainbow colored sheen is very visible.	Sunny, warm.
09/25/97	Thurs.	1255	3		70	7.1	1670	dry	yes	yes	Oil layer behind boom. Rainbow colored sheen is very visible.	Sunny, warm. Flow too low to measure with meter.
09/25/97	Thurs.	1835	3.25		71	7.1		dry	yes	yes		Sunny, warm.
09/26/97	Fri.	855	3.25		70	7.6		dry	yes	yes		Boom removed and placed in drum.

(See Legend for observation descriptions.)

General Notes: Due to manhole configuration, entire flow is not visible from surface.

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS
Storm Sewer Monitoring Log

Manhole ID: 3-19
Pipe Monitored(influent/effluent): effluent
Pipe Diameter: 66 inch
Pipe Construction: concrete

MH Rim Elev. 742.34
MH Inv. Elev. 732.55

Sampling Personnel: Gerald P. Cummins, Peter Weir

Date	Day	Time	Depth of Water (inches)	Water Velocity (feet/second)	Temperature (Degrees F)	pH	TDS (uS)	Type of Flow (Dry Weather/ Wet Weather)	Oil Sheen Observed (yes/no)	Absorbent Boom Installed (yes/no)	Absorbent Boom Observations	Comments
09/15/97	Mon.	1445	4.5	0.21				dry	yes	yes	Boom placed in position.	
09/17/97	Wed.	1203	6.5	1	70	8	300	wet	yes(heavy)	No	Rain event destroyed boom.	Rain event. Rain stopped at approx. 1130.
09/17/97	Wed.	1800	4.75		72	7.5	920	wet/dry	yes	yes	Replaced boom.	Rain event stopped at 1130.
09/18/97	Thurs.	855	4.5	*0.19	72	7.4	1210	dry	yes(heavy)	yes	Thick oil layer (dark colored).	Sunny.
09/18/97	Thurs.	1605	4.5	*0.1	73	7.4	1220	dry	yes(heavy)	yes	Thick oil layer (dark colored).	Sunny.
09/19/97	Fri.	850	4.75	*0.15	73	7.4	1480	dry	yes(heavy)	yes	Thick oil layer (dark colored).	Cloudy, windy-rain pending.
09/19/97	Fri.	1540	5.5	0.55	70	7.2	470	wet/dry	yes	yes	Boom not functional due to rain.	Rain from 1200-1400.
09/20/97	Sat.	905	4.75	*0.3	70	7.5	870	wet/dry	yes(slight)	yes		Overcast.
09/21/97	Sun.	1205	4.75	*0.13	71	7.5	1270	dry	yes	yes	Oil layer (dark colored) behind boom.	Sunny, cool.
09/22/97	Mon.	1100	4.5	*0.22	71	7.4	1261	dry	yes	yes	Dark colored sheen is very visible.	Sunny ,cool.
09/22/97	Mon.	1725	4.5	*0.14	71	7.4	1280	dry	yes	yes	Thick oil layer (dark colored) behind boom.	Broken clouds, warm.
09/23/97	Tues.	2025	5.75			7.7	1150	dry	yes	yes	Thick oil layer (several gallons, dark colored) behind boom.	Partly cloudy, cool. Could not measure velocity due to quantity of oil behind boom.
09/24/97	Wed.	1140	4.75		72	7.8	950	dry	yes	yes	Thick oil layer (several gallons, dark colored) behind boom.	Sunny, warm.
09/25/97	Thurs.	1245			71	7.3	1700	dry	yes	yes	Thick oil layer (several gallons, dark colored) behind boom.	Sunny, warm.
09/25/97	Thurs.	1830			72	7.2		dry	yes	yes	Thick oil layer (several gallons, dark colored) behind boom.	Sunny, warm.
09/26/97	Fri.	845	4.5		72	7.4		dry	yes	yes	Thick oil layer (several gallons, dark colored) behind boom.	Boom removed and placed in drum.

(See Legend for observation descriptions.)

General Notes: *Velocity measured by timing a floating ping-pong ball over a measured distance.

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS
Storm Sewer Monitoring Log

Manhole ID: 3-21
Pipe Monitored(influent/effluent): effluent
Pipe Diameter: 66 inch
Pipe Construction: tile

MH Rim Elev. 748.60
MH Inv. Elev. 736.21

Sampling Personnel: Gerald P. Cummins, Peter Weir

Date	Day	Time	Depth of Water (inches)	Water Velocity (feet/second)	Temperature (Degrees F)	pH	TDS (uS)	Type of Flow (Dry Weather/ Wet Weather)	Oil Sheen Observed (yes/no)	Absorbent Boom Installed (yes/no)	Absorbent Boom Observations	Comments
09/15/97	Mon.	1505	2	1.23				dry	yes	yes	Boom placed in position	
09/17/97	Wed.	1215	5	1.5	70	7.8	320	wet	yes(slight)	yes	Boom not functional due to rain event.	Rain event. Rain stopped at approx. 1130.
09/17/97	Wed.	1825	2.75	1.5	74	7.7	930	wet/dry	yes	yes	Boom is oil saturated.	Rain to approximately 1130
09/18/97	Thurs.	905	1.75	0.77	74	7.4	1190	dry	yes	yes	Boom is oil saturated.	Sunny.
09/18/97	Thurs.	1620	3	1	76	7.5	1150	dry	yes(slight)	yes	Rainbow colored sheen.	Sunny.
09/19/97	Fri.	905	2.5	1.38	74	7.4	1440	dry	yes	yes	Boom not across flow , repositioned	Cloudy, windy-rain pending.
09/19/97	Fri.	1550	4.5	1.2	71	7.2	490	wet/dry	no	yes	Boom not functional due to rain.	Rain from 1200-1400.
09/20/97	Sat.	910	3	1.8	70	7.6	900	wet/dry	yes(slight)	yes	Rainbow colored sheen.	Overcast.
09/21/97	Sun.	1215	2.5	0.57	72	7.6	1270	dry	yes	yes	Rainbow colored sheen.	Sunny, cool.
09/22/97	Mon.	955	3.25		71	7.5	1440	dry	yes	yes	Rainbow colored sheen is very visible.	Partly cloudy, cool. Velocity too low to measure with meter.
09/22/97	Mon.	1720	2.75	0.35	72	7.4	1350	dry	yes(slight)	yes	Rainbow colored sheen.	Partly cloudy, warm.
09/23/97	Tues.	1945	2.5		72	7.6	1280	dry	no	yes		Partly cloudy, cool. Velocity too low to measure with meter.
09/24/97	Wed.	1103	3.5	0.24	72	7.6	1020	dry	yes	yes	Thick oil layer behind boom, oil is similar to that observed at mh 3-19.	Sunny, warm.
09/25/97	Thurs.	1200	4.5	0.3	74	7.4	1800	dry	no	yes	Boom is oil saturated.	Sunny, warm.
09/25/97	Thurs.	1740	4	0.24	73	7.2		dry	no	yes		Sunny, warm
09/26/97	Fri.	840	4	0.3	72	7.4		dry	no	yes		Boom removed and placed in drum.

(See Legend for observation descriptions.)

General Notes: Due to manhole configuration, entire flow is not visible from surface.

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS
Storm Sewer Monitoring Log

Manhole ID: 3-22-1
Pipe Monitored(influent/effluent): influent
Pipe Diameter: 18 inch
Pipe Construction: tile

MH Rim Elev. _____
MH Inv. Elev. _____

Sampling Personnel: Gerald P. Cummins, Peter Weir

Date	Day	Time	Depth of Water (inches)	Water Velocity (feet/second)	Temperature (Degrees F)	pH	TDS (uS)	Type of Flow (Dry Weather/ Wet Weather)	Oil Sheen Observed (yes/no)	Absorbent Boom Installed (yes/no)	Absorbent Boom Observations	Comments
09/18/97	Thurs.	945	1.25	0.66	69	7.4	770	dry	yes	yes	Boom placed in position at effluent.	Sunny. Flow measured at influent.
09/18/97	Thurs.	1630	1.25	0.44	70	7.4	790	dry	no	yes		Sunny.
09/19/97	Fri.	922	1.5	0.44	69	7.4	830	dry	yes(slight)	yes	Rainbow colored sheen.	Cloudy, windy, rain pending.
09/19/97	Fri.	1555	1.33	0.69	68	7.4	630	wet/dry	yes(slight)	yes	Boom not functional due to rain.	Rain from 1200-1400.
09/20/97	Sat.	922	1.25	0.52	67	7.4	880	wet/dry	yes(slight)	yes	Rainbow colored sheen.	Overcast.
09/21/97	Sun.	1220	1.25	0.62	67	7.6	870	dry	yes(slight)	yes	Rainbow colored sheen.	Sunny, cool.
09/22/97	Mon.	950	1.5	0.9	67	7.4	780	dry	yes(slight)	yes	Rainbow colored sheen.	Partly cloudy.
09/22/97	Mon.	1710	1.1	0.4	68	7.5	780	dry	yes	yes	Rainbow colored sheen.	Partly cloudy, warm.
09/23/97	Tues.	1940	1	0.62	66	7.8	840	dry	yes	yes	Rainbow colored sheen is very visible.	Partly cloudy, cool.
09/24/97	Wed.	1055	1.25	0.5	67	7.5	680	dry	yes	yes	Rainbow colored sheen is very visible.	Sunny, warm.
09/25/97	Thurs.	1150	1	0.48	68	7.2	1100	dry	yes (slight)	yes	Rainbow colored sheen.	Sunny, warm.
09/25/97	Thurs.	1733	1.25	0.5	68	7.2		dry	yes (slight)	yes	Rainbow colored sheen.	Sunny, warm.
09/26/97	Fri.	830	0.75	0.4	66	7.4		dry	yes (slight)	yes	Rainbow colored sheen.	Boom removed and placed in drum.

(See Legend for observation descriptions.)

General Notes: _____

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS
Storm Sewer Monitoring Log

Manhole ID: 3-22-2
Pipe Monitored(influent/effluent): effluent
Pipe Diameter: 18 inch
Pipe Construction: concrete

MH Rim Elev. 753.66
MH Inv. Elev. 740.46

Sampling Personnel: Gerald P. Cummins, Peter Weir

Date	Day	Time	Depth of Water (inches)	Water Velocity (feet/second)	Temperature (Degrees F)	pH	TDS (uS)	Type of Flow (Dry Weather/ Wet Weather)	Oil Sheen Observed (yes/no)	Absorbent Boom Installed (yes/no)	Absorbent Boom Observations	Comments
09/15/97	Mon.	1538	5.25					yes	no	yes	Boom placed in position.	Velocity too low to measure. Foam from contributing flow noted.
09/17/97	Wed.	1222	6		71	7.9	240	wet	no	yes		Rain event. Rain stopped at approx. 1130.
09/17/97	Wed.	1835	5.5		70	7.9	310	wet/dry	no	yes		Rain event. rain stopped at approx. 1130
09/18/97	Thurs.	915	5.5		69	7.6	360	dry	no	yes		Sunny.
09/18/97	Thurs.	1640	6.5		70	7.5	360	dry	no	yes		Sunny.
09/19/97	Fri.	925	6.1		70	7.4	440	dry	no	yes		Cloudy, windy-rain pending.
09/19/97	Fri.	1605	6.6		70	7.5	250	wet/dry	no	yes		Rain from 1200-1400.
09/20/97	Sat.	930	6.75		68	7.6	330	wet/dry	no	yes		Broken clouds.
09/21/97	Sun.	1230	6		68	7.7	370	dry	no	yes		Sunny, cool.
09/22/97	Mon.	940	6.1		67	7.6	430	dry	no	yes		Partly cloudy, cool.
09/22/97	Mon.	1705	6.5		69	7.6	380	dry	no	yes		Partly cloudy, warm.
09/23/97	Tues.	1935						dry		yes		Could not measure, trailer parked over mh.
09/24/97	Wed.	1050	6.75		67	7.9	340	dry	no	yes		Sunny, warm.
09/25/97	Thurs.	1145	7		68	7.4	450	dry	no	yes		Sunny, warm.
09/25/97	Thurs.	1730	6.5		68	7.4		dry	no	yes		Sunny, warm.
09/26/97	Fri.	825	6.5		66	7.5		dry	no	yes		Boom removed and placed in drum.

(See Legend for observation descriptions.)

General Notes: A yellow/white "mucus" like material noted as collecting behind boom during entire monitoring program.

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS
Storm Sewer Monitoring Log

Manhole ID: 3-23
Pipe Monitored(influent/effluent): effluent
Pipe Diameter: 66 inch
Pipe Construction: concrete

MH Rim Elev. 749.77
MH Inv. Elev. 738.36

Sampling Personnel: Gerald P. Cummins, Peter Weir

Date	Day	Time	Depth of Water (inches)	Water Velocity (feet/second)	Temperature (Degrees F)	pH	TDS (uS)	Type of Flow (Dry Weather/ Wet Weather)	Oil Sheen Observed (yes/no)	Absorbent Boom Installed (yes/no)	Absorbent Boom Observations	Comments
09/15/97	Mon.	1545	2.5					dry	yes	yes	Boom placed in position.	Velocity is too low to measure.
09/17/97	Wed.	1230	4	0.7	72	8.1	210	wet	yes	yes	Boom is oil saturated.	Rain event, rain stopped at 1130
09/17/97	Wed.	1835	3		78	8.1	520	wet/dry	yes	yes	Boom is oil saturated.	Rain in morning to 1130.
09/18/97	Thurs.	1010	2.5	*0.14	79	7.6	930	dry	yes	yes	Boom is oil saturated. Oil layer behind boom.	Sunny.
09/18/97	Thurs.	1650	2.25	*0.28	82	7.6	840	dry	yes(heavy)	yes	Thick oil layer behind boom.	Sunny.
09/19/97	Fri.	955	2.5	*0.28	79	7.6	1210	dry	yes(heavy)	yes	Oil behind boom is similar to that observed at mh 3-19.	Cloudy, windy-rain pending.
09/19/97	Fri.	1610	3.5	0.6	73	7.4	340	wet/dry	yes	yes	Boom not functional due to rain.	Rain from 1200-1400.
09/20/97	Sat.	935	3.1	0.47	73	7.6	560	wet/dry	yes(slight)	yes	Debris behind boom (candy wrappers).	Broken clouds.
09/21/97	Sun.	1238	3.2	*0.22	76	7.7	970	dry	yes(slight)	yes	Debris behind boom.	Sunny, cool.
09/22/97	Mon.	935	2.6	*0.11	74	7.8	1290	dry	yes	yes	Rainbow colored sheen.	Partly cloudy, cool.
09/22/97	Mon.	1700	2.75	*0.13	79	7.8	1050	dry	yes	yes	Rainbow colored sheen is very visible.	Partly cloudy, warm.
09/23/97	Tues.	1930	2.6	*0.22	77	7.8	1090	dry	yes(slight)	yes	Boom is oil saturated.	Partly cloudy, cool.
09/24/97	Wed.	1040	1.6	*0.22	79	7.9	950	dry	yes	yes	Oil layer behind boom.	Sunny, warm.
09/25/97	Thurs.	1135	2.6	*0.22	78	7.6	1440	dry	yes	yes	Thick oil layer (dark colored) behind boom.	Sunny, warm.
09/25/97	Thurs.	1725	2.75	*0.22	80	7.7		dry	yes	yes	Rainbow colored sheen is very visible.	Sunny, warm.
09/26/97	Fri.	820	2.5		78	7.8		dry	yes	yes		Boom removed and placed in drum.

(See Legend for observation descriptions.)

General Notes: *Velocity measured by timing a floating ping-pong ball over a measured distance.

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS
Storm Sewer Monitoring Log

Manhole ID: 3-27
Pipe Monitored(influent/effluent): effluent
Pipe Diameter: 42 inch
Pipe Construction: concrete

MH Rim Elev. 754.20
MH Inv. Elev. 740.39

Sampling Personnel: Gerald P. Cummins, Peter Weir

Date	Day	Time	Depth of Water (inches)	Water Velocity (feet/second)	Temperature (Degrees F)	pH	TDS (uS)	Type of Flow (Dry Weather/ Wet Weather)	Oil Sheen Observed (yes/no)	Absorbent Boom Installed (yes/no)	Absorbent Boom Observations	Comments
09/15/97	Mon.	1600	7					dry	yes	yes	Boom placed in position	Velocity too low to measure.
09/17/97	Wed.	1240						wet				Car parked over manhole, could not monitor.
09/17/97	Wed.	1842	6		68	7.8	810	wet/dry	yes(slight)	yes	Silver colored sheen.	Rain in morning to 1130.
09/18/97	Thurs.	1020						dry		yes		Sunny. Car parked over manhole, could not monitor.
09/18/97	Thurs.	1700	6.75		67	7.1	1530	dry	yes(slight)	yes	Boom is clean. Silver colored sheen.	Sunny.
09/19/97	Fri.	1000	7.25		67	7.1	1950	dry	yes(very slight)	yes	Silver colored sheen.	Cloudy, windy-rain pending.
09/19/97	Fri.	1615	7.8		68	7.3	420	wet/dry	no	yes		Rain from 1200-1400.
09/20/97	Sat.	948	7.3		67	7.3	780	wet/dry	no	yes		Broken clouds.
09/21/97	Sun.	1245	7.25		67	7.4	1580	dry	yes	yes	Some buildup of stringy product behind boom.	Sunny, cool.
09/22/97	Mon.	930	7.3		66	7.4	1800	dry	yes	yes	Thin oil layer (silver colored) behind boom.	Partly cloudy, cool.
09/22/97	Mon.	1655	7.6		66	7.4	1720	dry	yes(very slight)	yes	Thin oil layer (silver colored) similar to that observed at mh 3-30.	Broken clouds, warm.
09/23/97	Tues.	1925	7		65	7.4	1890	dry	no	yes		Partly cloudy, cool.
09/24/97	Wed.	1035	7.25		66	7.6	1550	dry	no	yes	Thin oil layer (silvered colored) behind boom.	Sunny, warm.
09/25/97	Thurs.	1130	6.5		66	7.1	>2000	dry	yes	yes	Thin oil layer (silvered colored) behind boom.	Sunny, warm.
09/25/97	Thurs.	1720	6.4		66	7.2		dry	yes	yes	Thin oil layer (silvered colored) behind boom.	Sunny, warm.
09/26/97	Fri.	815	7.6		65	7.2		dry	yes	yes	Thin oil layer (silvered colored) behind boom.	Boom removed and placed in drum.

(See Legend for observation descriptions.)

General Notes:

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS
Storm Sewer Monitoring Log

Manhole ID: 3-29
Pipe Monitored(influent/effluent): effluent
Pipe Diameter: 42 inch
Pipe Construction: concrete

MH Rim Elev. 747.16
MH Inv. Elev. 739.87

Sampling Personnel: Gerald P. Cummins, Peter Weir

Date	Day	Time	Depth of Water (inches)	Water Velocity (feet/second)	Temperature (Degrees F)	pH	TDS (uS)	Type of Flow (Dry Weather/ Wet Weather)	Oil Sheen Observed (yes/no)	Absorbent Boom Installed (yes/no)	Absorbent Boom Observations	Comments
09/15/97	Mon.	1615	11.5					dry	yes	yes	Boom placed in position.	Velocity too low to measure.
09/17/97	Wed.	1245	14		69	8	220	wet	yes	yes	Thin oil layer behind boom.	Rain event. Rain stopped at approx. 1130.
09/17/97	Wed.	1850	10.75		67	7.3	1970	wet/dry	yes	yes	Thin oil layer behind boom.	Rain in morning to 1130.
09/18/97	Thurs.	1023	12		68	7.1	1570	dry	yes(heavy)	yes	Oil layer behind boom.	
09/18/97	Thurs.	1710	9.75	*0.06	67	7.1	1880	dry	yes(slight)	yes	Thin oil layer behind boom.	Sunny.
09/19/97	Fri.	1010	11.75	*0.04	66	7	>2000	dry	yes(very slight)	yes	Thin oil layer (silver colored) behind boom.	Cloudy, windy-rain pending.
09/19/97	Fri.	1624	13	0	68	7.4	360	wet/dry	no	yes	Debris behind boom(grass clippings, wood chips)	Rain from 1200-1400.
09/20/97	Sat.	950	12.5	*0.06	67	7.4	1000	wet/dry	yes(slight)	yes	Debris behind boom (cig. butts, leaves).	Broken clouds.
09/21/97	Sun.	1255	10.75	0	66	7.3	1900	dry	yes(slight)	yes	Thin oil layer (silver colored) behind boom.	Sunny, warm
09/22/97	Mon.	923	11.25	0	65	7.5	>2000	dry	yes	yes	Thin oil layer (silver colored) behind boom.	Partly cloudy, cool.
09/22/97	Mon.	1648	10.75		66	7.1	1660	dry	yes(slight)	yes	Thin oil layer (silver colored) behind boom.	Broken clouds, warm.
09/23/97	Tues.	1923	12		64	7.4	>2000	dry	yes	yes	Thin oil layer (silver colored) behind boom.	Partly cloudy, cool.
09/24/97	Wed.	1023	11.5		66	7.4	1620	dry	no	yes	Thin oil layer (silver colored) behind boom.	Sunny, warm.
09/25/97	Thurs.	1125	12		66	7.1	>2000	dry	yes	yes	Thin oil layer (silver colored) behind boom.	Sunny, warm.
09/25/97	Thurs.	1717	12		66	7.2		dry	no	yes		Sunny,warm.
09/26/97	Fri.	810	12		63	7.2		dry	yes	yes	Thin oil layer (silver colored) behind boom.	Boom removed and placed in drum.

(See Legend for observation descriptions.)

General Notes: *Velocity measured by timing a floating ping-pong ball over a measured distance.

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS
Storm Sewer Monitoring Log

Manhole ID: 3-30
Pipe Monitored(influent/effluent): effluent
Pipe Diameter: 42 inch
Pipe Construction: concrete

MH Rim Elev. _____
MH Inv. Elev. _____

Sampling Personnel: Gerald P. Cummins, Peter Weir

Date	Day	Time	Depth of Water (inches)	Water Velocity (feet/second)	Temperature (Degrees F)	pH	TSD (uS)	Type of Flow (Dry Weather/ Wet Weather)	Oil Sheen Observed (yes/no)	Absorbent Boom Installed (yes/no)	Absorbent Boom Observations	Comments
09/15/97	Mon.	1620	2.5					dry	no	yes	Boom placed in position.	Velocity in effluent too low to measure. Est 50-75 gpm at influent.
09/17/97	Wed.	1253	2.5		68	7.8	540	wet	no	yes		Rain event. Rain stopped at approx. 1130.
09/17/97	Wed.	1857			66	7.7	1100	wet/dry	no	yes	Little quantity of oil absorbed into boom.	Rain in morning to 1130.
09/18/97	Thurs.	1040	3.5		65	7.5	1530	dry	yes	yes	Oil layer behind boom. Boom is saturated.	Sunny.
09/18/97	Thurs.	1720	5.5		65	7.6	1950	dry	yes	yes	Oil layer behind boom.	Sunny.
09/19/97	Fri.	1020	7.25		67	7.4	>2000	dry	yes	yes	Thin oil layer (silver colored) behind boom.	Cloudy, windy-rain pending.
09/19/97	Fri.	1630	8.5		67	7.4	810	wet/dry	yes	yes	Thin oil layer (silver colored) behind boom.	Rain from 1200-1400. Beginning to sprinkle.
09/20/97	Sat.	1005	8.25		66	7.6	1250	wet/dry	no	yes	Thin oil layer (silver colored) behind boom.	Broken clouds. Flow appears slightly higher than previous observations.
09/21/97	Sun.	1300	7.25		64	7.6	1810	dry	yes	yes	Thin oil layer (silver colored) behind boom.	Sunny, warm. Flow visually appears the same as production days.
09/22/97	Mon.	920	7.25		62	7.8	1950	dry	yes	yes	Thin oil layer (silver colored) behind boom.	Flow est. 20-25 gpm.
09/22/97	Mon.	1645	7.5		63	7.7	1490	dry	yes(slight)	yes	Thin oil layer (silver colored) behind boom.	Broken clouds.
09/23/97	Tues.	1920	7		62	7.8	1880	dry	yes(slight)	yes	Thin oil layer (silver colored) behind boom.	Partly cloudy, cool.
09/24/97	Wed.	1015	5.5		64	7.4	1630	dry	no	yes	Thin oil layer (silver colored) behind boom.	Sunny, warm.
09/25/97	Thurs.	1118	6.1		63	7	>2000	dry	yes	yes	Thin oil layer (silver colored) behind boom.	Sunny, warm.
09/25/97	Thurs.	1715	6		64	7.6		dry	yes	yes	Thin oil layer (silver colored) behind boom.	Sunny, warm.
09/26/97	Fri.	800	6.5		64	7.5	>2000	dry	yes	yes	Thin oil layer (silver colored) behind boom.	Boom removed and placed in drum.

(See Legend for observation descriptions.)

General Notes: _____

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS
Storm Sewer Monitoring Log

Manhole ID: 3-31
Pipe Monitored(influent/effluent): effluent
Pipe Diameter: 42 inch
Pipe Construction: tile

MH Rim Elev. 754.35
MH Inv. Elev. 740.96

Sampling Personnel: Gerald P. Cummins, Peter Weir

Date	Day	Time	Depth of Water (inches)	Water Velocity (feet/second)	Temperature (Degrees F)	pH	TDS (uS)	Type of Flow (Dry Weather/ Wet Weather)	Oil Sheen Observed (yes/no)	Absorbent Boom Installed (yes/no)	Absorbent Boom Observations	Comments
09/20/97	Sat.	1010	1.5	*0.43	65	7.8	1010	wet/dry	no	yes	Boom placed in position.	Broken clouds. Significant sediment deposits in pipe.
09/21/97	Sun.	1305	1.2		62	7.7	1820	dry	no	yes		Sunny, warm. Flow noted as coming from east in mh 3-32 during sampling on 9/20/97.
09/22/97	Mon.	910	0.75		62	7.7	1910	dry	no	yes	Boom is clean.	Sunny, cool. Sediment deposits prevent measurement of flow. Estimated flow 3-5 gpm.
09/22/97	Mon.	1640	0.6		63	7.6	1470	dry	no	yes	Boom is clean.	Broken clouds.
09/23/97	Tues.	1915	0.5		62	7.6	1660	dry	no	yes	Boom is clean.	Partly cloudy, cool.
09/24/97	Wed.	1015	0.25		63	7.6	1420	dry	no	yes	Boom is clean.	Sunny, warm.
09/25/97	Thurs.	1115	0.25		63	7.6	>2000	dry	no	yes	Boom is clean.	Sunny, warm.
09/25/97	Thurs.	1710	0.25		64	7.9		dry	no	yes	Boom is clean.	Sunny,warm.
09/26/97	Fri.	805	0.25		62	7.6		dry	no	yes	Boom removed and placed in drum.	

(See Legend for observation descriptions.)

General Notes: *Velocity measured by timing a floating ping-pong ball over a measured distance.

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS
Storm Sewer Monitoring Log

Manhole ID: 3-38
Pipe Monitored(influent/effluent): effluent
Pipe Diameter: 60 inch
Pipe Construction: concrete

MH Rim Elev. 743.66
MH Inv. Elev. 727.78

Sampling Personnel: Gerald P. Cummins, Peter Weir

Date	Day	Time	Depth of Water (inches)	Water Velocity (feet/second)	Temperature (Degrees F)	pH	TDS (uS)	Type of Flow (Dry Weather/ Wet Weather)	Oil Sheen Observed (yes/no)	Absorbent Boom Installed (yes/no)	Absorbent Boom Observations	Comments
09/15/97	Mon.	1340	6.75					dry	yes(slight)	yes	Absorbent boom placed in position.	Slight flow noted visually. Velocity too low to measure.
09/17/97	Wed.	1125	6.75		68	7.9	130	wet	yes	yes	Boom not functional due to rain. Some debris behind boom.	Rain event. Rain has just stopped. Could not measure velocity.
09/17/97	Wed.	1750	8		66	7.9	650	wet/dry	yes(heavy)	yes	Oil layer behind boom.	Rain in moring to 1130. Slight flow noted.
09/18/97	Thurs.	828	6.75	0	65	8	900	dry	yes(slight)	yes	Thin oil layer behind boom.	Sunny.
09/18/97	Thurs.	1550	7.4		66	8.1	970	dry	yes(slight)	yes	No buildup noted behind boom.	Sunny.
09/19/97	Fri.	835	7.5		65	7.4	1410	dry	yes(very slight)	yes	Thin oil layer (silver colored) behind boom.	Cloudy, windy-rain pending.
09/19/97	Fri.	1530	8.25		67	7.9	170	wet/dry	no	yes	Debris behind boom (bottles, grass etc.)	Rain from 1200-1400.
09/20/97	Sat.	850	7		66	7.8	450	wet/dry	no	yes	Debris behind boom.	Overcast.
09/21/97	Sun.	1155	8		63	8.1	1070	dry	no	yes		Sunny,cool.
09/22/97	Mon.	1120	8.75		68	7.6	290	dry	yes(slight)	yes		Sunny, cool. Slight flow noted, velocity too low to measure.
09/22/97	Mon.	1745	8.5		68	7.9	260	dry	no	yes	Thin oil layer (silver colored) behind boom.	Broken clouds, warm.
09/23/97	Tues.	2038	8.5			8.2	870	dry	no	yes	Water is clear.	Partly cloudy, cool. Temperature probe not working.
09/24/97	Wed.	1203	8.5		64	8.1	670	dry	no	yes	Lawnmower cut the rope holding the boom. Boom was repaired.	Sunny, warm.
09/25/97	Thurs.	1300	8.5		64	7.6	1750	dry	no	yes		Sunny, warm.
09/25/97	Thurs.	1840	8		64	7.8		dry	no	yes		Sunny, warm.
09/26/97	Fri.	900	6		63	63		dry	no	yes		

(See Legend for observation descriptions.)

General Notes: *Velocity measured by timing a floating ping-pong ball over a measured distance.

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS
Storm Sewer Monitoring Log

Manhole ID: 3-48
Pipe Monitored(influent/effluent): effluent
Pipe Diameter: 60 inch
Pipe Construction: Tile

MH Rim Elev. _____
MH Inv. Elev. _____

Sampling Personnel: Gerald P. Cummins, Peter Weir

Date	Day	Time	Depth of Water (inches)	Water Velocity (feet/second)	Temperature (Degrees F)	pH	TDS (uS)	Type of Flow (Dry Weather/ Wet Weather)	Oil Sheen Observed (yes/no)	Absorbent Boom Installed (yes/no)	Absorbent Boom Observations	Comments
09/15/97	Mon.	1640	0.5					dry	no	yes	Boom placed in position.	Flow too shallow to measure with velocity meter.
09/17/97	Wed.	1335	0.5		68	8.3	1290	wet	no	yes		Rain event. Rain stopped at approx. 1130.
09/17/97	Wed.	1906	0.5		67	8.5	600	wet/dry	no	yes		Rain in morning to 1130.
09/18/97	Thurs.	1050	0.25	*1	65	8.1	680	dry	no	yes		Sunny.
09/18/97	Thurs.	1730	0.33	*1.2	67	8.1	680	dry	no	yes	Boom is clean.	Sunny.
09/19/97	Fri.	1035	0.5	*1	66	8.2	690	dry	no	yes		Cloudy, windy-rain pending.
09/19/97	Fri.	1630	0.75	2	66	7.4	230	wet/dry	no	yes		rain from 1200-1400, beginning to sprinkle 1615.
09/20/97	Sat.	1018	0.5	*1.2	66	8.1	520	wet/dry	no	yes		Broken clouds.
09/21/97	Sun.	1310	0.5	*0.8	60	8.1	720	dry	no	yes		Sunny, warm.
09/22/97	Mon.	900	0.33	*0.66	61	8.1	730	dry	no	yes		Sunny, cool.
09/22/97	Mon.	1630	0.25	*0.66	63	8	570	dry	no	yes		Partly cloudy.
09/23/97	Tues.	1955	0.25			8.1	650	dry	no	no	Rope has been disconnected from boom.	Partly cloudy, cool. Temperature probe not working. Flow too shallow.
09/24/97	Wed.	1110	0.25	*0.66	61	8.1	510	dry	no	no		Sunny, warm.
09/25/97	Thurs.	1205	0.15		62	7.8	800	dry	no	no		Sunny, warm. Flow too low to measure, est. 3-5 gpm.
09/25/97	Thurs	1745	0.15		62	7.5		dry	no	no		Sunny, warm.
09/26/97	Fri.	945	0.15		59			dry	no	no		Boom removed and placed in drum.

(See Legend for observation descriptions.)

General Notes: *Velocity measured by timing a floating ping-pong ball over a measured distance.

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS
Storm Sewer Monitoring Log

Manhole ID: 3-70
Pipe Monitored(influent/effluent): effluent
Pipe Diameter: 42 inch
Pipe Construction: Tile

MH Rim Elev. 743.67
MH Inv. Elev. 726.94

Sampling Personnel: Gerald P. Cummins, Peter Weir

Date	Day	Time	Depth of Water (inches)	Water Velocity (feet/second)	Temperature (Degrees F)	pH	TDS (uS)	Type of Flow (Dry Weather/ Wet Weather)	Oil Sheen Observed (yes/no)	Absorbent Boom Installed (yes/no)	Absorbent Boom Observations	Comments
09/15/97	Mon.	1645	2.5					dry	yes	yes	Boom placed in position.	
09/17/97	Wed.	1330	3		69	7.5	1650	wet	yes	yes	Oil layer behind boom.	Rain event. Rain stopped at approx. 1130.
09/17/97	Wed.	1920	3		67	7.6	1160	wet/dry	yes	yes	Thick oil layer behind boom.	Rain in morning to 1130.
09/18/97	Thurs.	1100	2.8	*0.02	67	7.1	1820	dry	yes(heavy)	yes	Thick oil layer behind boom.	Sunny.
09/18/97	Thurs.	1745	2.75	*0.07	67	7.2	1920	dry	yes(heavy)	yes	Thick oil layer behind boom.	Sunny.
09/19/97	Fri.	1042	2.9	est. 0.1	66	7.1	1950	dry	yes	yes	Oil layer behind boom.	Cloudy-rain pending.
09/19/97	Fri.	1645	3	*0.13	66	7.1	1530	wet/dry	yes(heavy)	yes	Thick oil layer behind boom.	Rain from 1200-1400.
09/20/97	Sat.	1025	3	*0.08	66	7.3	1770	wet/dry	no	yes		Broken clouds.
09/21/97	Sun.	1317	3.25	*0.03	66	7.3	>2000	dry	yes	yes	Thick oil layer behind boom.	Sunny,warm
09/22/97	Mon.	855	3	*0.02	66	7.1	>2000	dry	yes	yes	Thick oil layer behind boom.	Sunny, cool.
09/22/97	Mon.	1620	2.75		66	7.3	1550	dry	yes	yes	Thick oil layer behind boom.	Sunny, warm. Velocity too low to measure.
09/23/97	Tues.	2015	2.75	*0.04		7.5	1480	dry	yes(slight)	yes	Thin oil layer behind boom.	Partly cloudy, cool. Temperature probe not working.
09/24/97	Wed.	1130	3		66	7.6	1260	dry	yes	yes	Sheen is similar in nature to that observed at mh 3-72-2 and 3-75 during sampling.	Sunny, warm. Velocity too low to measure, it is lunch hour.
09/25/97	Thurs.	1225	3	*0.08	66	6.8	>2000	dry	yes(slight)	yes	Silver colored sheen.	Sunny, warm.
09/25/97	Thurs.	1820	3	*0.02	66	7.1		dry	yes(slight)	yes	Silver colored sheen.	Sunny, warm.
09/26/97	Fri.	915	2.75		65			dry	yes(slight)	yes	Silver colored sheen.	Boom removed and placed in drum.

(See Legend for observation descriptions.)

General Notes: *Velocity measured by timing a floating ping-pong ball over a measured distance.

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS
Storm Sewer Monitoring Log

Manhole ID: 3-73
Pipe Monitored(influent/effluent): effluent
Pipe Diameter: 42 inch
Pipe Construction: tile

MH Rim Elev. 746.50
MH Inv. Elev. 733.17

Sampling Personnel: Gerald P. Cummins, Peter Weir

Date	Day	Time	Depth of Water (inches)	Water Velocity (feet/second)	Temperature (Degrees F)	pH	TDS (uS)	Type of Flow (Dry Weather/ Wet Weather)	Oil Sheen Observed (yes/no)	Absorbent Boom Installed (yes/no)	Absorbent Boom Observations	Comments
09/15/97	Mon.	1700	6					dry	yes	yes	Boom placed in position.	Could not measure velocity, manhole too deep. Need extension.
09/17/97	Wed.	1400	5.3		69	7.3	1420	wet	yes	yes	Oil layer behind boom.	Rain event, Rain ended at 1130
09/17/97	Wed.	1930	6		67	7.5	1220	wet/dry	yes	yes	Oil layer behind boom.	Rain in morning to 1130.
09/18/97	Thurs.	1240	7.5		67	7.3	1330	dry	yes	yes	Oil layer behind boom.	Sunny.
09/18/97	Thurs.	1800	6		67	7.2	1600	dry	yes	yes	Thick oil layer (dark colored) behind boom.	Sunny.
09/19/97	Fri.	1100	11		67	7.1	850	dry	yes(heavy)	yes	Thick oil layer (dark colored) behind boom.	Cloudy, windy-rain pending.
09/19/97	Fri.	1655	9		66	7	1460	wet/dry	yes(heavy)	yes	Thick oil layer (dark colored) behind boom.	Rain from 1200-1400.
09/20/97	Sat.	1035						wet/dry		yes		Broken clouds. Could not monitor, crates over mh.
09/21/97	Sun.	1325						dry		yes		Sunny, warm. Could not measure, crates over mh.
09/22/97	Mon.	850	8.25		66	7.4	1220	dry	no	yes		Sunny,cool. Could not monitor, crates over mh.
09/23/97	Tues.	2010	11			7.5	1370	dry	yes	yes	Thick oil layer (dark colored) behind boom.	Partly cloudy, cool. Temperature probe not working.
09/24/97	Tues.	1125	11		66	7.4	1150	dry	yes	yes	Thick oil layer (dark colored) behind boom.	Sunny, warm.
09/25/97	Thurs	1220	11		66	7.2	>2000	dry	yes	yes	Thick oil layer (dark colored) behind boom.	Sunny, warm.
09/25/97	Thurs.	1755	11		66	7.1		dry	yes	yes	Thick oil layer (dark colored) behind boom.	Sunny, warm.
09/26/97	Fri.	920	6.75		65			dry	yes	yes		Boom removed and placed in drum.

(See Legend for observation descriptions.)

General Notes: _____

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS
Storm Sewer Monitoring Log

Manhole ID: 3-76-1
Pipe Monitored(influent/effluent): effluent
Pipe Diameter: 36 inch
Pipe Construction: concrete

MH Rim Elev. 742.89
MH Inv. Elev. 730.75

Sampling Personnel: Gerald P. Cummins, Peter Weir

Date	Day	Time	Depth of Water (inches)	Water Velocity (feet/second)	Temperature (Degrees F)	pH	TDS (uS)	Type of Flow (Dry Weather/ Wet Weather)	Oil Sheen Observed (yes/no)	Absorbent Boom Installed (yes/no)	Absorbent Boom Observations	Comments
09/17/97	Wed.	1000	2	4.36				wet	no	yes	Boom placed in position.	Raining since approx. 4 am.
09/17/97	Wed.	1410	1		73	7.7	200	wet/dry	yes	yes	Emulsified oil collecting on boom.	Rain event. Rain stopped at approx. 1130. Flow much lower.
09/17/97	Wed.	1945	0.25		72	8.1	380	wet/dry	yes(slight)	yes	Emulsified oil collecting on boom.	Rain in morning to 1130.
09/18/97	Thurs.	1300	0.25		72	7.6	430	dry	yes	yes	Emulsified oil collecting on boom.	Sunny.
09/18/97	Thurs.	1810	0.25		72	7.5	510	dry	yes(slight)	yes	Rainbow colored sheen.	Sunny. Flow is very low, approx. 5-10 gpm.
09/19/07	Fri.	1120	0.25		72	7.5	320	dry	yes	yes	Boom becoming oil saturated.	Cloudy, windy-rain pending.
09/19/97	Fri.	1705	0.25		71	7.1	200	wet/dry	yes	yes	Rainbow colored sheen very visible.	Rain from 1200-1400.
09/20/97	Sat.	1045	0.1		70	7.8	270	wet/dry	yes	yes	Rainbow colored sheen very visible.	Broken clouds.
09/21/97	Sun.	1330	0.25		70	7.5	540	dry	yes	yes	Thin oil layer behind boom. Oil behind boom appears similar to mh 3-73.	Sunny, warm. Flow appears slightly lower than during production.
09/22/97	Mon.	840	0.25		68	7.1	620	dry	yes(slight)	yes	Thin oil layer behind boom. Boom is oil saturated.	Sunny, cool.
09/22/76	Mon.	1600	0.25		71	7.7	500	dry	yes	yes	Rainbow colored sheen.	Sunny.
09/23/97	Tues.	2005	0.25			8.2	540	dry	no	yes		Partly cloudy, cool. Temperature probe not working.
09/23/97	Wed.	1120	0.25		70	7.9	460	dry	yes	yes	Rainbow colored sheen.	Sunny, warm.
09/25/97	Thurs.	1215	0.25		70	7.6	850	dry	yes	yes	Rainbow colored sheen.	Sunny, warm.
09/25/97	Thurs.	1750	0.25		70	7.6		dry	yes	yes	Rainbow colored sheen.	Sunny, warm.
09/26/97	Fri.	930	0.25		68			dry	yes	yes		Boom removed and placed in drum.

(See Legend for observation descriptions.)

General Notes: _____

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS
Storm Sewer Monitoring Log

Manhole ID: 4-8
Pipe Monitored(influent/effluent): effluent
Pipe Diameter: 54 inch
Pipe Construction: concrete

MH Rim Elev. 732.32
MH Inv. Elev. 722.73

Sampling Personnel: Gerald P. Cummins, Peter Weir

Date	Day	Time	Depth of Water (inches)	Water Velocity (feet/second)	Temperature (Degrees F)	pH	TDS (uS)	Type of Flow (Dry Weather/ Wet Weather)	Oil Sheen Observed (yes/no)	Absorbent Boom Installed (yes/no)	Absorbent Boom Observations	Comments
09/17/97	Wed.	1515	3	0.68	72	8.1	500	wet/dry	yes(heavy)	yes	Boom placed in position.	Rain in morning to 1130 am.
09/18/97	Thurs.	1305	3.3	0.64	73	7.8	500	dry	yes	yes	Thin oil layer (silver colored) behind boom.	Sunny.
09/18/97	Thurs.	1820	3.6	0.9	72	7.8	530	dry	yes	yes	Thin oil layer (yellow colored) behind boom.	Sunny.
09/19/97	Fri.	1135	3.75	0.8	72	7.6	350	dry	yes(heavy)	yes	Thin oil layer (yellow colored) behind boom.	Cloudy, windy-rain pending.
09/19/97	Fri.	1710	4	0.7	71	7.6	450	wet/dry	yes(heavy)	yes	Boom not functional due to rain. Rainbow sheen.	Rain from 1200-1400. Slight sprinkle.
09/20/97	Sat.	1053	3.33	0.52	66	7.6	650	wet/dry	yes(heavy)	yes	Rainbow colored sheen very visible.	Broken clouds.
09/21/97	Sun.	1340	3	0.56	66	7.8	680	dry	yes	yes	Yellow colored oil collecting on boom.	Sunny, warm.
09/22/97	Mon.	1215	3.75	0.65	70	7.9	600	dry	yes	yes	Yellow colored oil collecting on boom.	Cloudy, cool.
09/22/97	Mon.	1830	4.25	0.85	67	8	770	dry	yes(slight)	yes	Rainbow colored sheen	Partly cloudy, cool.
09/23/97	Tues.	1910	3.75	0.78	68	7.9	560	dry	yes	yes	Yellow colored oil collecting on boom.	Partly cloudy, cool.
09/24/97	Wed.	1003	3.75	0.73	68	8	440	dry	yes	yes	Yellow colored oil collecting on boom. Rainbow colored sheen.	Sunny, warm.
09/25/97	Thurs.	1425	3.5	0.73	72	8.2		dry	yes(heavy)	yes	Rainbow colored sheen very visible.	Sunny, warm.
09/25/97	Thurs.	1905	3.75	0.81	70	8		dry	yes	yes	Oil layer (yellow colored) behind boom. Rainbow colored sheen.	Sunny, warm.
09/26/97	Fri.	1010	3.6	0.77	69			dry	yes	yes	Rainbow colored sheen.	Boom removed and placed in drum.

(See Legend for observation descriptions.)

General Notes: _____

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS
Storm Sewer Monitoring Log

Manhole ID: 4-13
Pipe Monitored(influent/effluent): effluent
Pipe Diameter: 54 inch
Pipe Construction: tile

MH Rim Elev. 739.78
MH Inv. Elev. 725.88

Sampling Personnel: Gerald P. Cummins, Peter Weir

Date	Day	Time	Depth of Water (inches)	Water Velocity (feet/second)	Temperature (Degrees F)	pH	TDS (uS)	Type of Flow (Dry Weather/ Wet Weather)	Oil Sheen Observed (yes/no)	Absorbent Boom Installed (yes/no)	Absorbent Boom Observations	Comments
09/17/97	Wed.	1535	1.5	2.08	73	8	510	wet/dry	no	yes	Boom placed in position.	Rain in morning to 1130 am.
09/18/97	Thurs.	1320	1.5	1.69	74	7.8	510	dry	no	yes	Oil collecting on boom.	Sunny.
09/18/97	Thurs.	1825	2	2.03	72	7.8	500	dry	no	yes	Boom becoming oil saturated.	Sunny.
09/19/97	Fri.	1145	1.75	1.62	72	7.6	380	dry	no	yes	Velocity of water too high to catch material behind boom.	Cloudy, windy-beginning to rain.
09/19/97	Fri.	1720	3	2	71	7.6	460	wet/dry	no	yes		Rain from 1200-1400. sprinkling.
09/20/97	Sat.	1100	2.5	1.24	65	7.8	630	wet/dry	yes	yes		Broken clouds.
09/21/97	Sun.	1415	2	1.5	66	7.8	650	dry	yes	yes	Silver colored sheen.	Sunny, warm.
09/22/97	Mon.	1205	1.75	2.11	70	7.9	570	dry	yes(slight)	yes	Oil collecting on boom.	Broken clouds, cool.
09/22/97	Mon.	1820	2	2.6	67	8.1	760	dry	no	yes	Very noticible diesel type smell in vicinity of mh.	Broken clouds, cool.
09/23/97	Tues.	1845	1.25	1.76	70	7.9	550	dry	no	yes		Partly cloudy, cool.
09/24/97	Wed.	940	2.6	1.44	70	7.8	450	dry	yes(slight)	yes	Rainbow colored sheen.	Sunny, warm.
09/25/97	Thurs.	1410	1.5	1.83	72	8.1		dry	yes	yes	Rainbow colored sheen.	Sunny, warm. TDS meter not working.
09/25/97	Thurs.	1915	2.25	1.5	71	8		dry	yes	yes	Rainbow colored sheen very visible.	Sunny, warm.
09/26/97	Fri.	1015	3	1.97	70			dry	yes	yes	Rainbow colored sheen very visible.	Boom removed and placed in drum.

(See Legend for observation descriptions.)

General Notes: _____

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS
Storm Sewer Monitoring Log

Manhole ID: 4-17
Pipe Monitored(influent/effluent): effluent
Pipe Diameter: 54 inch
Pipe Construction: tile

MH Rim Elev. 742.81
MH Inv. Elev. 729.47

Sampling Personnel: Gerald P. Cummins, Peter Weir

Date	Day	Time	Depth of Water (inches)	Water Velocity (feet/second)	Temperature (Degrees F)	pH	TDS (uS)	Type of Flow (Dry Weather/ Wet Weather)	Oil Sheen Observed (yes/no)	Absorbent Boom Installed (yes/no)	Absorbent Boom Observations	Comments
09/17/97	Wed.	1550	0.75	1.5	68	8	520	wet/dry	no	no		Morning rain ending at 1130
09/18/97	Thurs.	1330	0.8	1.46	67	7.7	540	dry	no	no		Sunny.
09/18/97	Thurs.	1835	1.5	1.4	67	7.8	510	dry	no	no		Sunny.
09/19/97	Fri.	1155	1.25	1.35	69	7.5	420	dry	yes	no	Rainbow colored sheen.	Cloudy-beginning to rain.
09/19/97	Fri.	1725	1.5	1.77	66	7.6	440	wet/dry	no	no		Rain from 1200-1400. Sprinkling.
09/20/97	Sat.	1105	1	1.36	64	7.8	650	wet/dry	yes	no	Rainbow colored sheen very visible.	Broken clouds.
09/21/97	Sun.	1425	1	1	64	7.7	700	dry	no	no		Sunny, warm.
09/22/97	Mon.	1155	1.1	1.44	64	7.8	630	dry	yes	no	Rainbow colored sheen.	Partly cloudy, cool.
09/22/97	Mon.	1815	1.75	2.06	63	8.1	800	dry	yes	no	Rainbow colored sheen.	Partly cloudy, cool.
09/23/97	Tues.	1840	1	1.3	63	7.7	560	dry	yes	no	Rainbow colored sheen.	Partly cloudy, cool.
09/24/97	Wed.	935	1.25	1.48	64	7.7	440	dry	yes(slight)	no	Rainbow colored sheen.	Sunny, cool.
09/25/97	Thurs.	1405	1	1.16	65	8.1	610	dry	yes(slight)	no	Rainbow colored sheen.	Sunny, warm.
09/25/97	Thurs.	1925	1.25	1.25	65	8		dry	yes	no	Rainbow colored sheen.	Sunny, warm.
09/26/97	Fri.	1035	1.25	1.4	65			dry	yes	no	Rainbow colored sheen.	

(See Legend for observation descriptions.)

General Notes: _____

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS
Storm Sewer Monitoring Log

Manhole ID: 4-20
Pipe Monitored(influent/effluent): effluent
Pipe Diameter: 54 inch
Pipe Construction: tile

MH Rim Elev. 743.92
MH Inv. Elev. 730.23

Sampling Personnel: Gerald P. Cummins, Peter Weir

Date	Day	Time	Depth of Water (inches)	Water Velocity (feet/second)	Temperature (Degrees F)	pH	TDS (uS)	Type of Flow (Dry Weather/ Wet Weather)	Oil Sheen Observed (yes/no)	Absorbent Boom Installed (yes/no)	Absorbent Boom Observations	Comments
09/17/97	Wed.	1615	5.5		68	8.1	480	wet/dry	no	yes	Boom placed in position.	Morning rain ending at 1130. Velocity too low to measure.
09/18/97	Thurs.	1335	5	*0.26	66	7.6	570	dry	yes	yes	Silver colored sheen.	Sunny.
09/18/97	Thurs.	1845	5	*0.27	67	7.8	500	dry	yes	yes	Silver colored sheen.	Sunny.
09/19/97	Fri.	1207	5	*0.27	66	7.4	490	dry	yes(slight)	yes	Silver colored sheen.	Cloudy, beginning to rain.
09/19/97	Fri.	1733	5.25	*0.29	65	7.6	430	wet/dry	yes(slight)	yes	Silver colored sheen.	Rain from 1200-1400. Sprinkling.
09/20/97	Sat.	1115	5	*0.25	65	7.8	630	wet/dry	no	yes	Silver colored sheen.	Broken clouds.
09/21/97	Sun.	1435	4.75	*0.13	64	7.7	680	dry	no	yes	Silver colored sheen.	Sunny, warm.
09/22/97	Mon.	1150	5	*0.27	65	7.9	520	dry	no	yes		Partly cloudy, cool.
09/22/97	Mon.	1807	5.5	*0.4	63	8.1	780	dry	no	yes		Partly cloudy, cool.
09/23/97	Tues.	1835	4.5	*0.2	64	7.6	550	dry	no	yes		Partly cloudy, cool.
09/24/97	Wed.	930	5	*0.2	64	7.6	410	dry	no	yes	Silver colored sheen.	Sunny, cool.
09/25/97	Thurs.	1400	4.75	*0.16	65	8	560	dry	no	yes		Sunny, warm.
09/25/97	Thurs.	1930	5		65	8		dry	yes(very slight)	yes	Silver colored sheen.	Clear, warm.
09/26/97	Fri.	1030	5	*0.21	65			dry	no	yes		Boom removed and placed in drum.

(See Legend for observation descriptions.)

General Notes: *Velocity measured by timing a floating ping-pong ball over a measured distance.

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS
Storm Sewer Monitoring Log

Manhole ID: 4-23
Pipe Monitored(influent/effluent): effluent
Pipe Diameter: 54 inch
Pipe Construction: tile

MH Rim Elev. 741.09
MH Inv. Elev. 731.72

Sampling Personnel: Gerald P. Cummins, Peter Weir

Date	Day	Time	Depth of Water (inches)	Water Velocity (feet/second)	Temperature (Degrees F)	pH	TDS (uS)	Type of Flow (Dry Weather/ Wet Weather)	Oil Sheen Observed (yes/no)	Absorbent Boom Installed (yes/no)	Absorbent Boom Observations	Comments
09/17/97	Wed.	1625	1	1.05	66	7.8	500	wet/dry	no	yes	Boom placed in position.	Rain event, rain stopped at 1130.
09/18/97	Thurs.	1350	1	0.7	65	7.6	630	dry	no	yes	Thin oil layer (yellow colored) collecting on boom.	Sunny.
09/18/97	Thurs.	1850	1.25	0.78	65	7.6	600	dry	yes(slight)	yes	Thin oil layer (yellow colored) collecting behind boom.	Sunny.
09/19/97	Fri.	1215	1.33	1	64	7.4	440	dry	yes(slight)	yes		Cloudy-beginning to rain
09/19/97	Fri.	1740	1.2	1	64	7.6	540	wet/dry	no	yes		Rain from 1200-1400. light rain
09/20/97	Sat.	1123	2	1.09	63	7.6	520	wet/dry	no	yes		Broken clouds.
09/21/97	Sun.	1440	1	0.9	64	7.7	610	dry	no	yes	Thin film of road grime/grease collecting on boom.	Sunny, warm.
09/22/97	Mon.	1140	1.3	0.8	64	7.7	610	dry	no	yes		Partly cloudy, cool.
09/22/97	Mon.	1800	1.75	1.72	62	8.1	830	dry	no	yes	Clean boom placed in position.	Partly cloudy, cool.
09/23/97	Tues.	1825	1.25	1.18	62	7.4	570	dry	no	yes		Partly cloudy, cool.
09/24/97	Wed.	925	1.25	1.08	63	7.4	450	dry	no	yes		Sunny, cool.
09/25/97	Thurs.	1355	1	0.8	64	8	460	dry	no	yes		Sunny, cool.
09/25/97	Thurs.	1935	1	1.2	63	7.8		dry	no	yes		
09/26/97	Fri.	1020	1.25	0.88	63			dry	no	yes		Boom removed and placed in drum.

(See Legend for observation descriptions.)

General Notes:

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS
Storm Sewer Monitoring Log

Manhole ID: 5-4
Pipe Monitored(influent/effluent): effluent
Pipe Diameter: 60 inch
Pipe Construction: concrete

MH Rim Elev. 727.66
MH Inv. Elev. 708.50

Sampling Personnel: Gerald P. Cummins, Peter Weir

Date	Day	Time	Depth of Water (inches)	Water Velocity (feet/second)	Temperature (Degrees F)	pH	TDS (uS)	Type of Flow (Dry Weather/ Wet Weather)	Oil Sheen Observed (yes/no)	Absorbent Boom Installed (yes/no)	Absorbent Boom Observations	Comments
09/17/97	Wed.	1550	3.5	0.86	69	7.9	850	wet/dry	no	yes	Boom placed in position.	Rain event, rain stopped at 1130.
09/18/97	Thurs.	1356	3.25	0.9	69	7.6	810	dry	no	yes	Thin oil layer (yellow colored) behind boom.	Sunny
09/18/97	Thurs.	1900	3	0.9	69	7.5	880	dry	no	yes	Thin oil layer (yellow colored) behind boom.	Sunny.
09/19/97	Fri.	1240	7.5	0.4	67	7.4	790	wet/dry	yes	yes		Beginning to rain.
09/19/97	Fri.	1800										Did not monitor due to lightning.
09/20/97	Sat.	1140	6.8		65	7.6	1180	wet/dry	yes(slight)	yes	Oil layer behind boom.	Broken clouds. Flow too low to measure with velocity meter.
09/21/97	Sun.	1350	7.75		65	7.6	1110	dry	yes	yes	Thick oil layer (yellow colored) behind boom.	Sunny, warm. Can not measure flow as mh is surcharged due to rise river elevation.
09/22/97	Mon.	1235	10.5		67	7.7	840	dry	yes	yes	Thick oil layer (yellow colored) behind boom.	Partly cloudy, cool. Can not measure flow due to oil layer in mh.
09/22/97	Mon.	1850	10		67	7.7	820	dry	yes	yes	Thick oil layer (yellow colored) behind boom.	Partly cloudy, cool. Can not measure flow due to oil layer in mh.
09/23/97	Tues.	1905	9.5		66	7.8	790	dry	yes	yes	Thick oil layer (yellow colored) behind boom.	Partly cloudy, cool. Can not measure flow due to oil layer in mh.
09/24/97	Wed.	958	5.5	0.37	66	7.7	640	dry	yes	yes		Sunny, warm. River elevation has dropped eliminating surcharge condition within mh.
09/25/97	Thurs.	1340	2.7	0.86	67	7.9	860	dry	no	yes		Sunny, warm.
09/25/97	Thurs.	1905	3.5	0.7	68	7.8		dry	no	yes	Thick oil layer (yellow colored and light brown oil) at river outfall.	Sunny, warm.
09/26/97	Fri.	1005	3.6	0.94	65			dry		yes		

(See Legend for observation descriptions.)

General Notes:

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS
Storm Sewer Monitoring Log

Manhole ID: 5-10
Pipe Monitored(influent/effluent): effluent
Pipe Diameter: 42 inch
Pipe Construction: concrete

MH Rim Elev. 720.14
MH Inv. Elev. 712.14

Sampling Personnel: Gerald P. Cummins, Peter Weir

Date	Day	Time	Depth of Water (inches)	Water Velocity (feet/second)	Temperature (Degrees F)	pH	TDS (uS)	Type of Flow (Dry Weather/ Wet Weather)	Oil Sheen Observed (yes/no)	Absorbent Boom Installed (yes/no)	Absorbent Boom Observations	Comments
09/17/97	Wed.	1700	1	3.49	70	8.3	400	wet/dry	no	no	Velocity too high to boom.	Rain event, rain stopped at 1130.
09/18/97	Thurs.	1405	1.5	3	70	7.8	410	dry	no	no		Sunny.
09/18/97	Thurs.	1910	1.25	3.02	71	7.8	430	dry	no	no		Sunny.
09/19/97	Fri.	1235	1.5	4.64	69	7.6	320	dry/wet	yes	no	Rainbow colored sheen very visible.	Beginning to rain.
09/19/97	Fri.	1753						dry/wet		no		Rain from 1200-1400. light rain. Stopped monitoring due to lightning.
09/20/97	Sat.	1135	0.75	1.95	66	7.8	580	wet/dry	no	no		Broken clouds.
09/21/97	Sun.	1400	1	1.85	66	7.8	620	dry	no	no		Sunny, warm.
09/22/97	Mon.	1230	1.5	3.15	68	7.8	430	dry	no	no		Partly cloudy, cool.
09/22/97	Mon.	1840	1	2.4	68	8	450	dry	no	no		Partly cloudy, cool.
09/23/97	Tues.	1900	0.75	3	67	8.1	450	dry	no	no		Partly cloudy, cool.
09/24/97	Wed.	955	1.25	3.09	67	7.9	340	dry	no	no		Sunny, warm.
09/25/97	Thurs.	1330	1.25	3.1	69	8.3	400	dry	no	no		Sunny, warm.
09/25/97	Thurs.	1900	1.25	3.14	70	8		dry	no	no		Sunny, warm.
09/26/97	Fri.	1000	1.25	2.57	67			dry	no	no		

(See Legend for observation descriptions.)

General Notes:

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS
Storm Sewer Monitoring Log

Manhole ID: 5-13A
Pipe Monitored(influent/effluent): effluent
Pipe Diameter: 36 inch
Pipe Construction: concrete

MH Rim Elev. 742.41
MH Inv. Elev. 727.41

Sampling Personnel: Gerald P. Cummins, Peter Weir

Date	Day	Time	Depth of Water (inches)	Water Velocity (feet/second)	Temperature (Degrees F)	pH	TDS (uS)	Type of Flow (Dry Weather/ Wet Weather)	Oil Sheen Observed (yes/no)	Absorbent Boom Installed (yes/no)	Absorbent Boom Observations	Comments
09/17/97	Wed.	1715	2.5	1.18	70	8.1	280	wet/dry	no	yes	Boom placed in position.	Rain event, rain stopped at 1130.
09/18/97	Thurs.	1415	2.5	1.5	71	7.8	270	dry	no	yes	Oil (yellow colored) collecting on boom.	Sunny.
09/18/97	Thurs.	1915	2.75	1.06	71	7.7	280	dry	yes(slight)	yes	Oil (yellow colored) collecting on boom.	Sunny
09/19/97	Fri.	1227	2.25	1.11	69	7.6	260	dry	yes(heavy)	yes	Rainbow colored sheen very visible.	Cloudy, starting to rain.
09/19/97	Fri.	1745	1.6	1.64	68	7.6	280	wet/dry	no	yes	Boom not functional due to rain.	Rain from 1200-1400. light rain.
09/20/97	Sat.	1130	1.9	0.7	66	7.8	330	wet/dry	no	yes	Chlorine type smell coming from mh.	Broken clouds.
09/21/97	Sun.	1405	2.5	1	66	8	340	dry	no	yes	Oil (yellow colored) collecting on boom.	Sunny, warm.
09/22/97	Mon.	1225	3.1	1.49	68	7.8	270	dry	yes	yes	Rainbow colored sheen.	Partly cloudy, cool.
09/22/97	Mon.	1835	2.1	1.28	68	8	290	dry	no	yes		Partly cloudy, cool.
09/23/97	Tues.	1855	2.75	0.65	68	8.1	300	dry	no	yes		Partly cloudy, cool.
09/24/97	Wed.	947	3	1.22	68	8	240	dry	no	yes	Oil (yellow colored) collecting on boom.	Sunny, warm.
09/25/97	Thurs.	1317	2.75	1.38	69	8.3	280	dry	yes	yes	Oil (yellow colored) collecting on boom.	Sunny, warm.
09/25/97	Thurs.	1850	3	0.68	70	8.1		dry	yes	yes	Rainbow colored sheen.	Sunny, warm.
09/26/97	Fri.	955	2.5		67			dry	no	yes		Boom removed and placed in drum.

(See Legend for observation descriptions.)

General Notes: _____

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS

Storm Sewer Flow Calculations

Manhole ID	Date Measured	Time	Pipe Diameter (inches)	Depth of Water (inches)	Measured Velocity (feet/second)	Area (square feet)	Flow (gpm)
3-10	09/17/97	1035	60	11.00	1.03	2.47	1141
3-10	09/19/97	1515	60	5.50	0.57	0.90	230

Disclaimer:
Flow measurements were obtained using a Global water velocity meter, Model No. G10FP101. Please be aware that all measurements are approximate with velocity measurements being impacted by depth of flow, manhole configuration, and sediment accumulation. As such, all flow measurements should be considered order of magnitude approximations.

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS

Storm Sewer Flow Calculations

Manhole ID	Date Measured	Time	Pipe Diameter (inches)	Depth of Water (inches)	Measured Velocity (feet/second)	Area (square feet)	Flow (gpm)
3-12	09/15/97	1320	36	3.25	0.66	0.32	94
3-12	09/17/97	1115	36	11.00	2.26	1.83	1856
3-12	09/17/97	1740	36	2.75	1.39	0.25	154
3-12	09/18/97	818	36	2.00	1.02	0.15	71
3-12	09/18/97	1545	36	2.00	1.30	0.15	90
3-12	09/19/97	815	36	3.50	1.10	0.35	174
3-12	09/19/97	1520	36	5.00	1.46	0.59	390
3-12	09/20/97	845	36	3.50	1.24	0.35	196
3-12	09/21/97	1150	36	2.50	0.55	0.21	53
3-12	09/22/97	1130	36	2.25	1.27	0.18	105
3-12	09/22/97	1750	36	2.50	1.08	0.21	104
3-12	09/23/97	2042	36	2.30	0.59	0.19	50
3-12	09/24/97	1210	36	2.00	0.86	0.15	60
3-12	09/25/97	1310	36	2.25	1.58	0.18	130
3-12	09/25/97	1845	36	2.50	1.30	0.21	125
3-12	09/26/97	900	36	2.50	1.30	0.21	125

Disclaimer:
Flow measurements were obtained using a Global water velocity meter, Model No. G10FP101. Please be aware that all measurements are approximate with velocity measurements being impacted by depth of flow, manhole configuration, and sediment accumulation. As such, all flow measurements should be considered order of magnitude approximations.

Notes: Flow calculated using Q-VA
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15-Mar-04

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS

Storm Sewer Flow Calculations

Manhole ID	Date Measured	Time	Pipe Diameter (inches)	Depth of Water (inches)	Measured Velocity (feet/second)	Area (square feet)	Flow (gpm)
3-15	09/15/97	1410	66	3.50	0.50	0.48	109
3-15	09/17/97	1155	66	6.00	1.01	1.07	487
3-15	09/17/97	1755	66	3.00	0.54	0.39	93
3-15	09/18/97	840	66	2.00	0.50	0.21	47
3-15	09/18/97	1556	66	2.75	0.40	0.34	61
3-15	09/19/97	840	66	2.50	0.38	0.29	50
3-15	09/19/97	1533	66	3.33	0.77	0.45	156
3-15	09/20/97	900	66	2.33	0.75	0.26	89
3-15	09/21/97	1200	66	2.00	0.50	0.21	47
3-15	09/22/97	1115	66	1.50	0.54	0.14	33
3-15	09/22/97	1740	66	2.25	0.37	0.25	42
3-15	09/23/97	2035	66	2.50	0.59	0.29	78
3-15	09/24/97	1155	66	1.75	0.30	0.17	23

Disclaimer:
Flow measurements were obtained using a Global water velocity meter, Model No. G10FP101. Please be aware that all measurements are approximate with velocity measurements being impacted by depth of flow, manhole configuration, and sediment accumulation. As such, all flow measurements should be considered order of magnitude approximations.

Notes: Flow calculated using Q-VA
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GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS

Storm Sewer Flow Calculations

Manhole ID	Date Measured	Time	Pipe Diameter (inches)	Depth of Water (inches)	Measured Velocity (feet/second)	Area (square feet)	Flow (gpm)
3-19	09/15/97	1445	66	4.50	0.21	0.70	66
3-19	09/17/97	1203	66	6.50	1.00	1.21	543
3-19	09/18/97	855	66	4.50	0.19	0.70	60
3-19	09/18/97	1605	66	4.50	0.10	0.70	32
3-19	09/19/97	850	66	4.75	0.15	0.76	51
3-19	09/19/97	1540	66	5.50	0.55	0.95	233
3-19	09/20/97	905	66	4.75	0.30	0.76	103
3-19	09/21/97	1205	66	4.75	0.13	0.76	44
3-19	09/22/97	1100	66	4.50	0.22	0.70	69
3-19	09/22/97	1725	66	4.50	0.14	0.70	44

Disclaimer:
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Notes: Flow calculated using Q-VA
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15-Mar-04

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS

Storm Sewer Flow Calculations

Manhole ID	Date Measured	Time	Pipe Diameter (inches)	Depth of Water (inches)	Measured Velocity (feet/second)	Area (square feet)	Flow (gpm)
3-21	09/15/97	1505	66	2.00	1.23	0.21	116
3-21	09/17/97	1215	66	5.00	1.50	0.82	553
3-21	09/17/97	1825	66	2.75	1.50	0.34	228
3-21	09/18/97	905	66	1.75	0.77	0.17	60
3-21	09/18/97	1620	66	3.00	1.00	0.39	173
3-21	09/19/97	905	66	2.50	1.38	0.29	182
3-21	09/19/97	1550	66	4.50	1.20	0.70	379
3-21	09/20/97	910	66	3.00	1.80	0.39	311
3-21	09/21/97	1215	66	2.50	0.57	0.29	75
3-21	09/22/97	1720	66	2.75	0.35	0.34	53
3-21	09/24/97	1103	66	3.50	0.24	0.48	52
3-21	09/25/97	1200	66	4.50	0.30	0.70	95
3-21	09/25/97	1740	66	4.00	0.24	0.59	64
3-21	09/26/97	840	66	4.00	0.30	0.59	80

Disclaimer:
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Notes: Flow calculated using Q-VA
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15-Mar-04

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS

Storm Sewer Flow Calculations

Manhole ID	Date Measured	Time	Pipe Diameter (inches)	Depth of Water (inches)	Measured Velocity (feet/second)	Area (square feet)	Flow (gpm)
3-22-1	09/18/97	945	18	1.25	0.66	0.05	16
3-22-1	09/18/97	1630	18	1.25	0.44	0.05	11
3-22-1	09/19/97	922	18	1.50	0.44	0.07	14
3-22-1	09/19/97	1555	18	1.33	0.69	0.06	18
3-22-1	09/20/97	922	18	1.25	0.52	0.05	13
3-22-1	09/21/97	1220	18	1.25	0.62	0.05	15
3-22-1	09/22/97	950	18	1.50	0.90	0.07	28
3-22-1	09/22/97	1710	18	1.10	0.40	0.04	8
3-22-1	09/23/97	1940	18	1.00	0.62	0.04	11
3-22-1	09/24/97	1055	18	1.25	0.50	0.05	12
3-22-1	09/25/97	1150	18	1.00	0.48	0.04	8
3-22-1	09/25/97	1733	18	1.25	0.50	0.05	12
3-22-1	09/26/97	830	18	0.75	0.40	0.03	5

Disclaimer:
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Notes: Flow calculated using Q-VA
J:\Doc03\64410\att1_40.qpw

15-Mar-04

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS

Storm Sewer Flow Calculations

Manhole ID	Date Measured	Time	Pipe Diameter (inches)	Depth of Water (inches)	Measured Velocity (feet/second)	Area (square feet)	Flow (gpm)
3-23	09/17/97	1230	66	4.00	0.70	0.59	186
3-23	09/18/97	1010	66	2.50	0.14	0.29	18
3-23	09/18/97	1650	66	2.25	0.28	0.25	32
3-23	09/19/97	955	66	2.50	0.28	0.29	37
3-23	09/19/97	1610	66	3.50	0.60	0.48	131
3-23	09/20/97	935	66	3.10	0.47	0.40	85
3-23	09/21/97	1238	66	3.20	0.22	0.42	42
3-23	09/22/97	935	66	2.60	0.11	0.31	15
3-23	09/22/97	1700	66	2.75	0.13	0.34	20
3-23	09/23/97	1930	66	2.60	0.22	0.31	31
3-23	09/24/97	1040	66	1.60	0.22	0.15	15
3-23	09/25/97	1135	66	2.60	0.22	0.31	31
3-23	09/25/97	1725	66	2.75	0.22	0.34	33

Disclaimer:
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15-Mar-04

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS

Storm Sewer Flow Calculations

Manhole ID	Date Measured	Time	Pipe Diameter (inches)	Depth of Water (inches)	Measured Velocity (feet/second)	Area (square feet)	Flow (gpm)
3-29	09/18/97	1710	42	9.75	0.06	1.69	46
3-29	09/19/97	1010	42	11.75	0.04	2.20	40
3-29	09/20/97	950	42	12.50	0.06	2.40	65

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Notes: Flow calculated using Q-VA
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15-Mar-04

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS

Storm Sewer Flow Calculations

Manhole ID	Date Measured	Time	Pipe Diameter (inches)	Depth of Water (inches)	Measured Velocity (feet/second)	Area (square feet)	Flow (gpm)
3-48	09/18/97	1050	60	0.25	1.00	0.01	4
3-48	09/18/97	1730	60	0.33	1.20	0.01	7
3-48	09/19/97	1035	60	0.50	1.00	0.03	11
3-48	09/19/97	1630	60	0.75	2.00	0.05	42
3-48	09/20/97	1018	60	0.50	1.20	0.03	14
3-48	09/21/97	1310	60	0.50	0.80	0.03	9
3-48	09/22/97	900	60	0.33	0.66	0.01	4
3-48	09/22/97	1630	60	0.25	0.66	0.01	3
3-48	09/24/97	1110	60	0.25	0.66	0.01	3

Disclaimer:
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Notes: Flow calculated using Q-VA

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS

Storm Sewer Flow Calculations

Manhole ID	Date Measured	Time	Pipe Diameter (inches)	Depth of Water (inches)	Measured Velocity (feet/second)	Area (square feet)	Flow (gpm)
3-70	09/18/97	1100	42	2.80	0.02	0.28	2
3-70	09/18/97	1745	42	2.75	0.07	0.27	8
3-70	09/19/97	1042	42	2.90	0.10	0.29	13
3-70	09/19/97	1645	42	3.00	0.13	0.31	18
3-70	09/20/97	1025	42	3.00	0.08	0.31	11
3-70	09/21/97	1317	42	3.25	0.03	0.34	5
3-70	09/22/97	855	42	3.00	0.02	0.31	3
3-70	09/23/97	2015	42	2.75	0.04	0.27	5
3-70	09/25/97	1225	42	3.00	0.08	0.31	11
3-70	09/25/97	1820	42	3.00	0.02	0.31	3

Disclaimer:
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Notes: Flow calculated using Q-VA

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS

Storm Sewer Flow Calculations

Manhole ID	Date Measured	Time	Pipe Diameter (inches)	Depth of Water (inches)	Measured Velocity (feet/second)	Area (square feet)	Flow (gpm)
4-8	09/17/97	1515	54	3.00	0.68	0.35	106
4-8	09/18/97	1305	54	3.30	0.64	0.40	115
4-8	09/18/97	1820	54	3.60	0.90	0.46	184
4-8	09/19/97	1135	54	3.75	0.80	0.48	174
4-8	09/19/97	1710	54	4.00	0.70	0.53	167
4-8	09/20/97	1053	54	3.33	0.52	0.41	95
4-8	09/21/97	1340	54	3.00	0.56	0.35	87
4-8	09/22/97	1215	54	3.75	0.65	0.48	141
4-8	09/22/97	1830	54	4.25	0.85	0.58	222
4-8	09/23/97	1910	54	3.75	0.78	0.48	169
4-8	09/24/97	1003	54	3.75	0.73	0.48	158
4-8	09/25/97	1425	54	3.50	0.73	0.44	143
4-8	09/25/97	1905	54	3.75	0.81	0.48	176
4-8	09/26/97	1010	54	3.60	0.77	0.46	157

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Notes: Flow calculated using Q-VA
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GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS

Storm Sewer Flow Calculations

Manhole ID	Date Measured	Time	Pipe Diameter (inches)	Depth of Water (inches)	Measured Velocity (feet/second)	Area (square feet)	Flow (gpm)
4-13	09/17/97	1535	54	1.50	2.08	0.12	116
4-13	09/18/97	1320	54	1.50	1.69	0.12	94
4-13	09/18/97	1825	54	2.00	2.03	0.19	173
4-13	09/19/97	1145	54	1.75	1.62	0.16	113
4-13	09/19/97	1720	54	3.00	2.00	0.35	312
4-13	09/20/97	1100	54	2.50	1.24	0.27	148
4-13	09/21/97	1415	54	2.00	1.50	0.19	128
4-13	09/22/97	1205	54	1.75	2.11	0.16	148
4-13	09/22/97	1820	54	2.00	2.60	0.19	222
4-13	09/23/97	1845	54	1.25	1.76	0.09	75
4-13	09/24/97	940	54	2.60	1.44	0.28	182
4-13	09/25/97	1410	54	1.50	1.83	0.12	102
4-13	09/25/97	1915	54	2.25	1.50	0.23	153
4-13	09/26/97	1015	54	3.00	1.97	0.35	307

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Notes: Flow calculated using Q-VA
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GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS

Storm Sewer Flow Calculations

Manhole ID	Date Measured	Time	Pipe Diameter (inches)	Depth of Water (inches)	Measured Velocity (feet/second)	Area (square feet)	Flow (gpm)
4-17	09/17/97	1550	54	0.75	1.50	0.04	30
4-17	09/18/97	1330	54	0.80	1.46	0.05	32
4-17	09/18/97	1835	54	1.50	1.40	0.12	78
4-17	09/19/97	1155	54	1.25	1.35	0.09	57
4-17	09/19/97	1725	54	1.50	1.77	0.12	98
4-17	09/20/97	1105	54	1.00	1.36	0.07	41
4-17	09/21/97	1425	54	1.00	1.00	0.07	30
4-17	09/22/97	1155	54	1.10	1.44	0.08	50
4-17	09/22/97	1815	54	1.75	2.06	0.16	144
4-17	09/23/97	1840	54	1.00	1.30	0.07	39
4-17	09/24/97	935	54	1.25	1.48	0.09	63
4-17	09/25/97	1405	54	1.00	1.16	0.07	35
4-17	09/25/97	1925	54	1.25	1.25	0.09	53
4-17	09/26/97	1035	54	1.25	1.40	0.09	59

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GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS

Storm Sewer Flow Calculations

Manhole ID	Date Measured	Time	Pipe Diameter (inches)	Depth of Water (inches)	Measured Velocity (feet/second)	Area (square feet)	Flow (gpm)
4-20	09/18/97	1335	54	5.00	0.26	0.74	86
4-20	09/18/97	1845	54	5.00	0.27	0.74	90
4-20	09/19/97	1207	54	5.00	0.27	0.74	90
4-20	09/19/97	1733	54	5.25	0.29	0.79	103
4-20	09/20/97	1115	54	5.00	0.25	0.74	83
4-20	09/21/97	1435	54	4.75	0.13	0.69	40
4-20	09/22/97	1150	54	5.00	0.27	0.74	90
4-20	09/22/97	1807	54	5.50	0.40	0.85	153
4-20	09/23/97	1835	54	4.50	0.20	0.63	57
4-20	09/24/97	930	54	5.00	0.20	0.74	66
4-20	09/25/97	1400	54	4.75	0.16	0.69	49
4-20	09/26/97	1030	54	5.00	0.21	0.74	70

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15-Mar-04

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS

Storm Sewer Flow Calculations

Manhole ID	Date Measured	Time	Pipe Diameter (inches)	Depth of Water (inches)	Measured Velocity (feet/second)	Area (square feet)	Flow (gpm)
4-23	09/17/97	1625	54	1.00	1.05	0.07	32
4-23	09/18/97	1350	54	1.00	0.70	0.07	21
4-23	09/18/97	1850	54	1.25	0.78	0.09	33
4-23	09/19/97	1215	54	1.33	1.00	0.10	46
4-23	09/19/97	1740	54	1.20	1.00	0.09	40
4-23	09/20/97	1123	54	2.00	1.09	0.19	93
4-23	09/21/97	1440	54	1.00	0.90	0.07	27
4-23	09/22/97	1140	54	1.30	0.80	0.10	36
4-23	09/22/97	1800	54	1.75	1.72	0.16	120
4-23	09/23/97	1825	54	1.25	1.18	0.09	50
4-23	09/24/97	925	54	1.25	1.08	0.09	46
4-23	09/25/97	1355	54	1.00	0.80	0.07	24
4-23	09/25/97	1935	54	1.00	1.20	0.07	36
4-23	09/26/97	1020	54	1.25	0.88	0.09	37

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Notes: Flow calculated using Q-VA
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GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS

Storm Sewer Flow Calculations

Manhole ID	Date Measured	Time	Pipe Diameter (inches)	Depth of Water (inches)	Measured Velocity (feet/second)	Area (square feet)	Flow (gpm)
5-4	09/17/97	1550	60	3.50	0.86	0.46	178
5-4	09/18/97	1356	60	3.25	0.90	0.41	167
5-4	09/18/97	1900	60	3.00	0.90	0.37	148
5-4	09/19/97	1240	60	7.50	0.40	1.42	254
5-4	09/24/97	958	60	5.50	0.37	0.90	149
5-4	09/25/97	1340	60	2.70	0.86	0.31	121
5-4	09/25/97	1905	60	3.50	0.70	0.46	145
5-4	09/26/97	1005	60	3.60	0.94	0.48	203

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Notes: Flow calculated using Q-VA

GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS

Storm Sewer Flow Calculations

Manhole ID	Date Measured	Time	Pipe Diameter (inches)	Depth of Water (inches)	Measured Velocity (feet/second)	Area (square feet)	Flow (gpm)
5-10	09/17/97	1700	42	1.00	3.49	0.06	93
5-10	09/18/97	1405	42	1.50	3.00	0.11	147
5-10	09/18/97	1910	42	1.25	3.02	0.08	113
5-10	09/19/97	1235	42	1.50	4.64	0.11	227
5-10	09/20/97	1135	42	0.75	1.95	0.04	34
5-10	09/21/97	1400	42	1.00	1.85	0.06	49
5-10	09/22/97	1230	42	1.50	3.15	0.11	154
5-10	09/22/97	1840	42	1.00	2.40	0.06	64
5-10	09/23/97	1900	42	0.75	3.00	0.04	52
5-10	09/24/97	955	42	1.25	3.09	0.08	115
5-10	09/25/97	1330	42	1.25	3.10	0.08	116
5-10	09/25/97	1900	42	1.25	3.14	0.08	117
5-10	09/26/97	1000	42	1.25	2.57	0.08	96

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Notes: Flow calculated using Q-VA
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GENERAL MOTORS CORPORATION
NAO-FLINT OPERATIONS

Storm Sewer Flow Calculations

Manhole ID	Date Measured	Time	Pipe Diameter (inches)	Depth of Water (inches)	Measured Velocity (feet/second)	Area (square feet)	Flow (gpm)
5-13A	09/17/97	1715	36	2.50	1.18	0.21	114
5-13A	09/18/97	1415	36	2.50	1.50	0.21	145
5-13A	09/18/97	1915	36	2.75	1.06	0.25	118
5-13A	09/19/97	1227	36	2.25	1.11	0.18	92
5-13A	09/19/97	1745	36	1.60	1.64	0.11	82
5-13A	09/20/97	1130	36	1.90	0.70	0.14	45
5-13A	09/21/97	1405	36	2.50	1.00	0.21	96
5-13A	09/22/97	1225	36	3.10	1.49	0.30	197
5-13A	09/22/97	1835	36	2.10	1.28	0.17	95
5-13A	09/23/97	1855	36	2.75	0.65	0.25	72
5-13A	09/24/97	947	36	3.00	1.22	0.28	154
5-13A	09/25/97	1317	36	2.75	1.38	0.25	153
5-13A	09/25/97	1850	36	3.00	0.68	0.28	86

Disclaimer:
Flow measurements were obtained using a Global water velocity meter, Model No. G10FP101. Please be aware that all measurements are approximate with velocity measurements being impacted by depth of flow, manhole configuration, and sediment accumulation. As such, all flow measurements should be considered order of magnitude approximations.

Notes: Flow calculated using Q-VA
J:\Doc03\64410\att1_40.qpw

15-Mar-04

Attachment 2

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ATTACHMENT 2

APPENDIX I
RFI PHASE II REPORT

STORM SEWER ANALYTICAL DATA
(Results presented in milligrams per liter)

Sample ID: / Date Collected:	MH 2-20 06/28/02	MH 2-20 07/29/02	MH 02-20 11/19/02	MH 2-22 07/29/02	MH 2-29 06/28/02	MH 2-31 07/29/02	MH 2-33 07/29/02	MH 2-35 07/29/02
Volatiles								
1,1,1-Trichloroethane	ND(0.0010)	ND(0.0010)	0.0025	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,1,2,2-Tetrachloroethane	ND(0.0010) J	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,1,2-Trichloroethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,1-Dichloroethane	0.0019	ND(0.0010)	0.010	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,1-Dichloroethene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,2,4-Trichlorobenzene	ND(0.0050) J	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
1,2-Dibromo-3-chloropropane	ND(0.0010) J	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,2-Dibromoethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,2-Dichlorobenzene	ND(0.0010) J	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,2-Dichloroethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,2-Dichloropropane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,3-Dichlorobenzene	ND(0.0010) J	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,4-Dichlorobenzene	ND(0.0010) J	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
2-Butanone	0.0049 J	ND(0.025)	ND(0.025)	ND(0.025)	0.0015 J	ND(0.025)	ND(0.025)	ND(0.025)
2-Hexanone	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050) J	ND(0.050)
4-Methyl-2-Pentanone	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050) J	ND(0.050)
Acetone	0.015 J	0.0073 J	0.0031 J	0.0067 J	0.0030 J	0.0041 J	0.0072 J	0.0077 J
Benzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Bromodichloromethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00054 J	ND(0.0010)	ND(0.0010) J	ND(0.0010)
Bromoform	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Bromomethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Carbon disulfide	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Carbon tetrachloride	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Chlorobenzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Chloroethane	0.00068 J	ND(0.0010)	0.020	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Chloroform	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0011	ND(0.0010)	ND(0.0010)	ND(0.0010)
Chloromethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
cis-1,2-Dichloroethene	0.059	ND(0.0010)	0.031	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
cis-1,3-Dichloropropene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cyclohexane	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
Dibromochloromethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Dichlorodifluoromethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Ethylbenzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Isopropylbenzene	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Methyl acetate	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
Methyl cyclohexane	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
Methyl Tert Butyl Ether	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Methylene chloride	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050) J	ND(0.0050)
Styrene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Tetrachloroethene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Toluene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
trans-1,2-Dichloroethene	0.0025	ND(0.0010)	0.0012	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
trans-1,3-Dichloropropene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Trichloroethene	0.0080(RDW,IDW)	ND(0.0010)	0.0077(RDW,IDW)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Trichlorofluoromethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Trifluorotrichloroethane	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
Vinyl chloride	0.0017	ND(0.0010)	0.0015	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
m&p-Xylene	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
o-Xylene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Xylenes (total)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
PCBs								
Aroclor-1016 (PCB-1016)	NS	NS	NS	NS	NS	NS	NS	NS
Aroclor-1221 (PCB-1221)	NS	NS	NS	NS	NS	NS	NS	NS
Aroclor-1232 (PCB-1232)	NS	NS	NS	NS	NS	NS	NS	NS
Aroclor-1242 (PCB-1242)	NS	NS	NS	NS	NS	NS	NS	NS
Aroclor-1248 (PCB-1248)	NS	NS	NS	NS	NS	NS	NS	NS
Aroclor-1254 (PCB-1254)	NS	NS	NS	NS	NS	NS	NS	NS
Aroclor-1260 (PCB-1260)	NS	NS	NS	NS	NS	NS	NS	NS
Total PCBs	NS	NS	NS	NS	NS	NS	NS	NS

ATTACHMENT 2

APPENDIX I
RFI PHASE II REPORT

STORM SEWER ANALYTICAL DATA
(Results presented in milligrams per liter)

Sample ID:	MH 2-38	MH 2-39	MH 2-41	MH 2-41-4	MH 3-15	MH 3-15	MH 3-15	MH 3-20	MH 3-20
Date Collected:	07/29/02	07/29/02	07/29/02	07/29/02	06/27/02	07/09/02	07/29/02	06/27/02	07/09/02
Volatiles									
1,1,1-Trichloroethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,1,2,2-Tetrachloroethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,1,2-Trichloroethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,1-Dichloroethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0018 J	0.0012	ND(0.0010)	0.0022 J	0.0013
1,1-Dichloroethene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,2,4-Trichlorobenzene	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
1,2-Dibromo-3-chloropropane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,2-Dibromoethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,2-Dichlorobenzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,2-Dichloroethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,2-Dichloropropane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,3-Dichlorobenzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,4-Dichlorobenzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
2-Butanone	ND(0.025)	ND(0.025)	ND(0.025)	ND(0.025)	ND(0.025)	ND(0.025)	ND(0.025)	ND(0.025)	ND(0.025)
2-Hexanone	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
4-Methyl-2-Pentanone	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
Acetone	0.010 J	0.0082 J	0.0094 J	0.0088 J	ND(0.025)	0.0044 J	0.0058 J	0.0042 J	0.0041 J
Benzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Bromodichloromethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0014 J	0.0034	ND(0.0010)	0.0019	0.0036
Bromoform	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Bromomethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Carbon disulfide	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Carbon tetrachloride	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Chlorobenzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Chloroethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00055 J
Chloroform	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0031 J	0.0070	ND(0.0010)	0.0037 J	0.0072
Chloromethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
cis-1,2-Dichloroethene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00092 J	0.00071 J	ND(0.0010)	0.0011 J	0.00093 J
cis-1,3-Dichloropropene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cyclohexane	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
Dibromochloromethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00063 J	0.0013	ND(0.0010)	0.00082 J	0.0014
Dichlorodifluoromethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Ethylbenzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Isopropylbenzene	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Methyl acetate	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
Methyl cyclohexane	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030) J	ND(0.0030)	ND(0.0030)	ND(0.0030) J	ND(0.0030)
Methyl Tert Butyl Ether	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Methylene chloride	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Styrene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Tetrachloroethene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Toluene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
trans-1,2-Dichloroethene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
trans-1,3-Dichloropropene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Trichloroethene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0022 J	0.0016	ND(0.0010)	0.0027 J	0.0019
Trichlorofluoromethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Trifluorotrichloroethane	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
Vinyl chloride	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00064 J	ND(0.0010)	ND(0.0010)	0.00099 J	0.00070 J
m&p-Xylene	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
o-Xylene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Xylenes (total)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
PCBs									
Aroclor-1016 (PCB-1016)	NS	NS	NS	NS	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Aroclor-1221 (PCB-1221)	NS	NS	NS	NS	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Aroclor-1232 (PCB-1232)	NS	NS	NS	NS	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Aroclor-1242 (PCB-1242)	NS	NS	NS	NS	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Aroclor-1248 (PCB-1248)	NS	NS	NS	NS	0.00018	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Aroclor-1254 (PCB-1254)	NS	NS	NS	NS	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Aroclor-1260 (PCB-1260)	NS	NS	NS	NS	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Total PCBs	NS	NS	NS	NS	0.00018	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)

ATTACHMENT 2

APPENDIX I
RFI PHASE II REPORT

STORM SEWER ANALYTICAL DATA
(Results presented in milligrams per liter)

Sample ID:	MH 3-20	MH 3-22-1	MH 3-22-1	MH 3-22-1	MH 3-23	MH 3-23	MH 3-23	MH 3-26
Date Collected:	07/29/02	06/27/02	07/09/02	07/29/02	06/27/02	07/09/02	07/29/02	06/27/02
Volatiles								
1,1,1-Trichloroethane	ND(0.0010)	0.0041 J	0.0030	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,1,2,2-Tetrachloroethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,1,2-Trichloroethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,1-Dichloroethane	ND(0.0010)	0.035 J	0.037	0.0023	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00081 J
1,1-Dichloroethene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,2,4-Trichlorobenzene	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
1,2-Dibromo-3-chloropropane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,2-Dibromoethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,2-Dichlorobenzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,2-Dichloroethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,2-Dichloropropane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,3-Dichlorobenzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,4-Dichlorobenzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
2-Butanone	ND(0.025)	ND(0.025)	ND(0.025)	ND(0.025)	ND(0.025)	ND(0.025)	ND(0.025)	0.0028 J
2-Hexanone	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
4-Methyl-2-Pentanone	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
Acetone	0.0055 J	ND(0.025)	0.0026 J	0.0055 J	ND(0.025)	0.0046 J	0.0039 J	0.0091 J
Benzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Bromodichloromethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0027	0.0040	0.00053 J	ND(0.0010)
Bromoform	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Bromomethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Carbon disulfide	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Carbon tetrachloride	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Chlorobenzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Chloroethane	ND(0.0010)	0.025 J	0.027	0.0022	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Chloroform	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0055	0.0089	0.0015	0.00053 J
Chloromethane	ND(0.0010)	ND(0.0010)	ND(0.0010) J	ND(0.0010)	ND(0.0010)	ND(0.0010) J	ND(0.0010)	ND(0.0010)
cis-1,2-Dichloroethene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0014
cis-1,3-Dichloropropene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cyclohexane	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
Dibromochloromethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0011	0.0015	ND(0.0010)	ND(0.0010)
Dichlorodifluoromethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Ethylbenzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Isopropylbenzene	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Methyl acetate	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
Methyl cyclohexane	ND(0.0030)	ND(0.0030) J	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
Methyl Tert Butyl Ether	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Methylene chloride	ND(0.0050)	0.00079 J	0.00090 J	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Styrene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Tetrachloroethene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Toluene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
trans-1,2-Dichloroethene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
trans-1,3-Dichloropropene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Trichloroethene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Trichlorofluoromethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Trifluorotrichloroethane	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
Vinyl chloride	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
m&p-Xylene	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
o-Xylene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Xylenes (total)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
PCBs								
Aroclor-1016 (PCB-1016)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Aroclor-1221 (PCB-1221)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Aroclor-1232 (PCB-1232)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Aroclor-1242 (PCB-1242)	ND(0.00010)	ND(0.00010)	ND(0.00010)	0.0030(RDW,IDW)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Aroclor-1248 (PCB-1248)	ND(0.00010)	0.0024(RDW,IDW)	0.00017	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Aroclor-1254 (PCB-1254)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Aroclor-1260 (PCB-1260)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Total PCBs	ND(0.00010)	0.0024(RDW,IDW)	0.00017	0.0030(RDW,IDW)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)

ATTACHMENT 2

APPENDIX I
RFI PHASE II REPORT

STORM SEWER ANALYTICAL DATA
(Results presented in milligrams per liter)

Sample ID: / Date Collected:	MH 3-26 07/09/02	MH 3-26 07/29/02	MH 3-65 06/28/02	MH 3-65 07/09/02	MH 3-65 07/29/02	MH 3-69 07/29/02
Volatiles						
1,1,1-Trichloroethane	0.00067 J	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,1,2,2-Tetrachloroethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,1,2-Trichloroethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,1-Dichloroethane	0.0016	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,1-Dichloroethene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,2,4-Trichlorobenzene	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
1,2-Dibromo-3-chloropropane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,2-Dibromoethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,2-Dichlorobenzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,2-Dichloroethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,2-Dichloropropane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,3-Dichlorobenzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,4-Dichlorobenzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
2-Butanone	ND(0.025)	ND(0.025)	ND(0.025)	ND(0.025)	ND(0.025)	ND(0.025)
2-Hexanone	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
4-Methyl-2-Pentanone	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
Acetone	0.0064 J	0.0045 J	0.0087 J	0.0031 J	0.0027 J	0.0027 J
Benzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Bromodichloromethane	0.0012	ND(0.0010)	0.00053 J	ND(0.0010)	ND(0.0010)	ND(0.0010)
Bromoform	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Bromomethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Carbon disulfide	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Carbon tetrachloride	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Chlorobenzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Chloroethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Chloroform	0.0023	ND(0.0010)	0.0011 J	0.00091 J	0.00068 J	0.00069 J
Chloromethane	ND(0.0010) J	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
cis-1,2-Dichloroethene	0.0023	ND(0.0010)	0.0050 J	0.0076	0.0032	0.0033
cis-1,3-Dichloropropene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cyclohexane	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
Dibromochloromethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Dichlorodifluoromethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Ethylbenzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Isopropylbenzene	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Methyl acetate	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
Methyl cyclohexane	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
Methyl Tert Butyl Ether	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Methylene chloride	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050) J
Styrene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Tetrachloroethene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Toluene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
trans-1,2-Dichloroethene	ND(0.0010)	ND(0.0010)	0.00080 J	0.0011	0.00053 J	0.00051 J
trans-1,3-Dichloropropene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Trichloroethene	0.00089 J	ND(0.0010)	0.00054 J	0.00067 J	ND(0.0010)	ND(0.0010)
Trichlorofluoromethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Trifluorotrichloroethane	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
Vinyl chloride	ND(0.0010)	ND(0.0010)	0.0047 J(RDW,IDW)	0.0073(RDW,IDW)	0.0036(RDW,IDW)	0.0043(RDW,IDW)
m&p-Xylene	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
o-Xylene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Xylenes (total)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
PCBs						
Aroclor-1016 (PCB-1016)	ND(0.00010)	ND(0.00010)	NS	R	ND(0.00010)	ND(0.00010)
Aroclor-1221 (PCB-1221)	ND(0.00010)	ND(0.00010)	NS	R	ND(0.00010)	ND(0.00010)
Aroclor-1232 (PCB-1232)	ND(0.00010)	ND(0.00010)	NS	R	ND(0.00010)	ND(0.00010)
Aroclor-1242 (PCB-1242)	ND(0.00010)	ND(0.00010)	NS	R	ND(0.00010)	ND(0.00010)
Aroclor-1248 (PCB-1248)	ND(0.00010)	ND(0.00010)	NS	R	ND(0.00010)	ND(0.00010)
Aroclor-1254 (PCB-1254)	ND(0.00010)	ND(0.00010)	NS	R	ND(0.00010)	ND(0.00010)
Aroclor-1260 (PCB-1260)	ND(0.00010)	ND(0.00010)	NS	0.0010 J	ND(0.00010)	ND(0.00010)
Total PCBs	ND(0.00010)	ND(0.00010)	NS	0.0010(RDW,IDW)	ND(0.00010)	ND(0.00010)

ATTACHMENT 2

APPENDIX I
RFI PHASE II REPORT

STORM SEWER ANALYTICAL DATA
(Results presented in milligrams per liter)

Sample ID: / Date Collected:	MH 3-76-8 06/28/02	MH 3-76-8 07/29/02	MH 4-8 06/27/02	MH 4-8 07/09/02	MH 4-8 11/20/02	MH 4-8 11/21/02	MH 4-11 11/20/02	MH 4-11 11/21/02
Volatiles								
1,1,1-Trichloroethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0035	ND(0.0010)	0.0014
1,1,2,2-Tetrachloroethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,1,2-Trichloroethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,1-Dichloroethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0019	ND(0.0010)	0.00080 J
1,1-Dichloroethene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,2,4-Trichlorobenzene	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050) J	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
1,2-Dibromo-3-chloropropane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,2-Dibromoethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,2-Dichlorobenzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,2-Dichloroethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,2-Dichloropropane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,3-Dichlorobenzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,4-Dichlorobenzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
2-Butanone	0.0030 J	ND(0.025)	ND(0.025)	ND(0.025)	ND(0.025)	0.0019 J	ND(0.025)	0.0019 J
2-Hexanone	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
4-Methyl-2-Pentanone	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	0.0012 J
Acetone	0.013 J	0.0024 J	ND(0.025)	0.0050 J	0.0014 J	0.0068 J	ND(0.025)	0.0069 J
Benzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Bromodichloromethane	ND(0.0010)	ND(0.0010)	0.00089 J	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Bromoform	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Bromomethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Carbon disulfide	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Carbon tetrachloride	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010) J	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Chlorobenzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Chloroethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00058 J	ND(0.0010)	ND(0.0010)	0.00081 J	ND(0.0010)
Chloroform	ND(0.0010)	ND(0.0010)	0.0012	0.00099 J	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Chloromethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
cis-1,2-Dichloroethene	ND(0.0010)	ND(0.0010)	0.0015	0.0024	0.0060	0.00077 J	0.0076	ND(0.0010)
cis-1,3-Dichloropropene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cyclohexane	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
Dibromochloromethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Dichlorodifluoromethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Ethylbenzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010) J	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Isopropylbenzene	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Methyl acetate	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
Methyl cyclohexane	ND(0.0030)	ND(0.0030)	ND(0.0030) J	ND(0.0030) J	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
Methyl Tert Butyl Ether	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Methylene chloride	ND(0.0050)	ND(0.0050) J	ND(0.0050)	ND(0.0050) J	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Styrene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Tetrachloroethene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Toluene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
trans-1,2-Dichloroethene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
trans-1,3-Dichloropropene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Trichloroethene	ND(0.0010)	ND(0.0010)	0.00096 J	0.0017	0.0037	ND(0.0010)	0.0046	ND(0.0010)
Trichlorofluoromethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Trifluorotrichloroethane	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
Vinyl chloride	ND(0.0010)	ND(0.0010)	0.0012	0.0017	0.0037(RDW,IDW)	ND(0.0010)	0.0051(RDW,IDW)	ND(0.0010)
m&p-Xylene	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020) J	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
o-Xylene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Xylenes (total)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
PCBs								
Aroclor-1016 (PCB-1016)	ND(0.00010)	ND(0.00010)	ND(0.00011)	ND(0.00010)	NS	NS	NS	NS
Aroclor-1221 (PCB-1221)	ND(0.00010)	ND(0.00010)	ND(0.00011)	ND(0.00010)	NS	NS	NS	NS
Aroclor-1232 (PCB-1232)	ND(0.00010)	ND(0.00010)	ND(0.00011)	ND(0.00010)	NS	NS	NS	NS
Aroclor-1242 (PCB-1242)	ND(0.00010)	ND(0.00010)	ND(0.00011)	ND(0.00010)	NS	NS	NS	NS
Aroclor-1248 (PCB-1248)	ND(0.00010)	ND(0.00010)	ND(0.00011)	ND(0.00010)	NS	NS	NS	NS
Aroclor-1254 (PCB-1254)	ND(0.00010)	ND(0.00010)	ND(0.00011)	ND(0.00010)	NS	NS	NS	NS
Aroclor-1260 (PCB-1260)	ND(0.00010)	ND(0.00010)	ND(0.00011)	ND(0.00010)	NS	NS	NS	NS
Total PCBs	ND(0.00010)	ND(0.00010)	ND(0.00011)	ND(0.00010)	NS	NS	NS	NS

ATTACHMENT 2

APPENDIX I
RFI PHASE II REPORT

STORM SEWER ANALYTICAL DATA
(Results presented in milligrams per liter)

Sample ID:	MH 4-13	MH 4-13	MH 4-13	MH 4-13	MH 4-13	MH 4-17	MH 4-17	MH 4-17
Date Collected:	06/27/02	07/09/02	07/29/02	11/20/02	11/21/02	06/27/02	07/29/02	11/20/02
Volatiles								
1,1,1-Trichloroethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0014	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,1,2,2-Tetrachloroethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,1,2-Trichloroethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,1-Dichloroethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00076 J	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,1-Dichloroethene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,2,4-Trichlorobenzene	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
1,2-Dibromo-3-chloropropane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,2-Dibromoethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,2-Dichlorobenzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,2-Dichloroethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,2-Dichloropropane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,3-Dichlorobenzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,4-Dichlorobenzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
2-Butanone	ND(0.025)	ND(0.025)	ND(0.025)	ND(0.025)	0.0019 J	ND(0.025)	ND(0.025)	ND(0.025)
2-Hexanone	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
4-Methyl-2-Pentanone	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	0.0011 J	ND(0.050)	ND(0.050)	ND(0.050)
Acetone	ND(0.025)	0.0026 J	0.0031 J	ND(0.025)	0.0084 J	ND(0.025)	0.0028 J	0.0039 J
Benzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Bromodichloromethane	0.0013	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0019 J	ND(0.0010)	ND(0.0010)
Bromoform	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Bromomethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Carbon disulfide	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Carbon tetrachloride	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Chlorobenzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Chloroethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Chloroform	0.0015	0.0016	0.00052 J	ND(0.0010)	ND(0.0010)	0.0024 J	0.00068 J	0.00054 J
Chloromethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
cis-1,2-Dichloroethene	ND(0.0010)	ND(0.0010)	0.0069	0.0011	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
cis-1,3-Dichloropropene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cyclohexane	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
Dibromochloromethane	0.00089 J	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0013 J	ND(0.0010)	ND(0.0010)
Dichlorodifluoromethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Ethylbenzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Isopropylbenzene	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Methyl acetate	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
Methyl cyclohexane	ND(0.0030) J	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030) J	ND(0.0030)	ND(0.0030)
Methyl Tert Butyl Ether	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Methylene chloride	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050) J	ND(0.0050)
Styrene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Tetrachloroethene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Toluene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
trans-1,2-Dichloroethene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
trans-1,3-Dichloropropene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Trichloroethene	0.00084 J	0.0018	0.0058(RDW,IDW)	0.0014	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Trichlorofluoromethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Trifluorotrichloroethane	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
Vinyl chloride	ND(0.0010)	ND(0.0010)	0.0014	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
m&p-Xylene	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
o-Xylene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Xylenes (total)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
PCBs								
Aroclor-1016 (PCB-1016)	ND(0.00011)	ND(0.00010)	ND(0.00010)	NS	NS	ND(0.00010)	ND(0.00010)	NS
Aroclor-1221 (PCB-1221)	ND(0.00011)	ND(0.00010)	ND(0.00010)	NS	NS	ND(0.00010)	ND(0.00010)	NS
Aroclor-1232 (PCB-1232)	ND(0.00011)	ND(0.00010)	ND(0.00010)	NS	NS	ND(0.00010)	ND(0.00010)	NS
Aroclor-1242 (PCB-1242)	ND(0.00011)	ND(0.00010)	ND(0.00010)	NS	NS	ND(0.00010)	ND(0.00010)	NS
Aroclor-1248 (PCB-1248)	ND(0.00011)	ND(0.00010)	ND(0.00010)	NS	NS	ND(0.00010)	ND(0.00010)	NS
Aroclor-1254 (PCB-1254)	ND(0.00011)	ND(0.00010)	ND(0.00010)	NS	NS	ND(0.00010)	ND(0.00010)	NS
Aroclor-1260 (PCB-1260)	ND(0.00011)	ND(0.00010)	ND(0.00010)	NS	NS	ND(0.00010)	ND(0.00010)	NS
Total PCBs	ND(0.00011)	ND(0.00010)	ND(0.00010)	NS	NS	ND(0.00010)	ND(0.00010)	NS

ATTACHMENT 2

APPENDIX I
RFI PHASE II REPORT

STORM SEWER ANALYTICAL DATA
(Results presented in milligrams per liter)

Sample ID: / Date Collected:	MH 4-17 11/21/02	MH 4-20 06/27/02	MH 4-20 11/20/02	MH 4-20 11/21/02	MH 4-23 06/27/02	MH 4-23 07/09/02	MH 4-23 07/29/02	MH 5-4 06/27/02
Volatiles								
1,1,1-Trichloroethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,1,2,2-Tetrachloroethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,1,2-Trichloroethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,1-Dichloroethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,1-Dichloroethene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,2,4-Trichlorobenzene	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
1,2-Dibromo-3-chloropropane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,2-Dibromoethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,2-Dichlorobenzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,2-Dichloroethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,2-Dichloropropane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,3-Dichlorobenzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,4-Dichlorobenzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
2-Butanone	0.0019 J	ND(0.025)	ND(0.025)	0.0017 J	ND(0.025)	ND(0.025)	ND(0.025)	ND(0.025)
2-Hexanone	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
4-Methyl-2-Pentanone	0.00082 J	ND(0.050)	ND(0.050)	0.00063 J	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
Acetone	0.0083 J	ND(0.025)	0.0025 J	0.0085 J	ND(0.025)	0.0030 J	0.0036 J	ND(0.025)
Benzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Bromodichloromethane	ND(0.0010)	0.0019 J	0.00058 J	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0013 J
Bromoform	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Bromomethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Carbon disulfide	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050) J	ND(0.0050)
Carbon tetrachloride	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Chlorobenzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Chloroethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Chloroform	ND(0.0010)	0.0021 J	0.00086 J	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0023 J
Chloromethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
cis-1,2-Dichloroethene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
cis-1,3-Dichloropropene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cyclohexane	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
Dibromochloromethane	ND(0.0010)	0.0011 J	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00075 J
Dichlorodifluoromethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Ethylbenzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Isopropylbenzene	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Methyl acetate	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
Methyl cyclohexane	ND(0.0030)	ND(0.0030) J	ND(0.0030)	ND(0.0030)	ND(0.0030) J	ND(0.0030)	ND(0.0030)	ND(0.0030) J
Methyl Tert Butyl Ether	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Methylene chloride	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050) J	ND(0.0050)
Styrene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Tetrachloroethene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Toluene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
trans-1,2-Dichloroethene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
trans-1,3-Dichloropropene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Trichloroethene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00051 J
Trichlorofluoromethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Trifluorotrichloroethane	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
Vinyl chloride	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
m&p-Xylene	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
o-Xylene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Xylenes (total)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
PCBs								
Aroclor-1016 (PCB-1016)	NS	ND(0.00010)	NS	NS	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00011)
Aroclor-1221 (PCB-1221)	NS	ND(0.00010)	NS	NS	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00011)
Aroclor-1232 (PCB-1232)	NS	ND(0.00010)	NS	NS	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00011)
Aroclor-1242 (PCB-1242)	NS	ND(0.00010)	NS	NS	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00011)
Aroclor-1248 (PCB-1248)	NS	ND(0.00010)	NS	NS	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00011)
Aroclor-1254 (PCB-1254)	NS	ND(0.00010)	NS	NS	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00011)
Aroclor-1260 (PCB-1260)	NS	0.0011	NS	NS	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00011)
Total PCBs	NS	0.0011(RDW,IDW)	NS	NS	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00011)

ATTACHMENT 2

APPENDIX I
RFI PHASE II REPORT

STORM SEWER ANALYTICAL DATA
(Results presented in milligrams per liter)

Sample ID:	MH 5-4	MH 5-4	MH 5-5	MH 5-5	MH 5-5	MH 5-10	MH 5-10	MH 5-10
Date Collected:	07/09/02	07/29/02	06/27/02	07/09/02	07/29/02	06/27/02	07/09/02	07/29/02
Volatiles								
1,1,1-Trichloroethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,1,2,2-Tetrachloroethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,1,2-Trichloroethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,1-Dichloroethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,1-Dichloroethene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,2,4-Trichlorobenzene	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
1,2-Dibromo-3-chloropropane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,2-Dibromoethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,2-Dichlorobenzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,2-Dichloroethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,2-Dichloropropane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,3-Dichlorobenzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,4-Dichlorobenzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
2-Butanone	ND(0.025)	ND(0.025)	ND(0.025)	ND(0.025)	ND(0.025)	ND(0.025)	ND(0.025)	ND(0.025)
2-Hexanone	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
4-Methyl-2-Pentanone	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
Acetone	0.0035 J	0.0019 J	ND(0.025)	0.0028 J	0.0015 J	ND(0.025)	0.0030 J	0.0027 J
Benzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Bromodichloromethane	0.00087 J	0.00093 J	0.0015 J	0.00094 J	0.0012	0.0026 J	0.0017	0.0021
Bromoform	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Bromomethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Carbon disulfide	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Carbon tetrachloride	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Chlorobenzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Chloroethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Chloroform	0.0017	0.0020	0.0020	0.0018	0.0022	0.0029 J	0.0034	0.0044
Chloromethane	ND(0.0010) J	ND(0.0010)	ND(0.0010)	ND(0.0010) J	ND(0.0010)	ND(0.0010)	ND(0.0010) J	ND(0.0010)
cis-1,2-Dichloroethene	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00051 J	0.00054 J	ND(0.0010)	ND(0.0010)	ND(0.0010)
cis-1,3-Dichloropropene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cyclohexane	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
Dibromochloromethane	ND(0.0010)	0.00056 J	0.00091 J	ND(0.0010)	0.00068 J	0.0013 J	0.00085 J	0.0012
Dichlorodifluoromethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Ethylbenzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Isopropylbenzene	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Methyl acetate	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
Methyl cyclohexane	ND(0.0030)	ND(0.0030)	ND(0.0030) J	ND(0.0030)	ND(0.0030)	ND(0.0030) J	ND(0.0030)	ND(0.0030)
Methyl Tert Butyl Ether	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Methylene chloride	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Styrene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Tetrachloroethene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Toluene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
trans-1,2-Dichloroethene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
trans-1,3-Dichloropropene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Trichloroethene	0.0010	0.0012	0.00062 J	0.0014	0.0014	ND(0.0010)	ND(0.0010)	ND(0.0010)
Trichlorofluoromethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Trifluorotrichloroethane	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
Vinyl chloride	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
m&p-Xylene	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
o-Xylene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Xylenes (total)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
PCBs								
Aroclor-1016 (PCB-1016)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00011)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Aroclor-1221 (PCB-1221)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00011)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Aroclor-1232 (PCB-1232)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00011)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Aroclor-1242 (PCB-1242)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00011)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Aroclor-1248 (PCB-1248)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00011)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Aroclor-1254 (PCB-1254)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00011)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Aroclor-1260 (PCB-1260)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00011)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Total PCBs	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00011)	ND(0.00010)	ND(0.00010)	ND(0.00010)

ATTACHMENT 2

APPENDIX I
RFI PHASE II REPORT

STORM SEWER ANALYTICAL DATA
(Results presented in milligrams per liter)

Sample ID: / Date Collected:	MH 5-13A 06/27/02	MH 5-13A 07/09/02	MH 5-13A 07/29/02	MH 11-3 07/09/02	MH 11-3 07/29/02	MH 11-3 08/02/02	MH 11-6 07/09/02	MH 11-6-2 08/02/02
Volatiles								
1,1,1-Trichloroethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0017	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0013
1,1,2,2-Tetrachloroethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,1,2-Trichloroethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,1-Dichloroethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,1-Dichloroethene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,2,4-Trichlorobenzene	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
1,2-Dibromo-3-chloropropane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,2-Dibromoethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,2-Dichlorobenzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,2-Dichloroethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,2-Dichloropropane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,3-Dichlorobenzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
1,4-Dichlorobenzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
2-Butanone	ND(0.025)	ND(0.025)	ND(0.025)	ND(0.025)	ND(0.025)	ND(0.025)	ND(0.025)	ND(0.025)
2-Hexanone	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
4-Methyl-2-Pentanone	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	0.00077 J	ND(0.050)	ND(0.050)	ND(0.050)
Acetone	0.0027 J	0.0029 J	0.0031 J	0.0074 J	0.0046 J	0.0036 J	0.0092 J	0.0029 J
Benzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Bromodichloromethane	0.0026	0.0030	0.0037	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Bromoform	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Bromomethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010) J	ND(0.0010)	ND(0.0010) J
Carbon disulfide	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050) J	ND(0.0050)	ND(0.0050) J
Carbon tetrachloride	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Chlorobenzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Chloroethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Chloroform	0.0036	0.0073	0.0079	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Chloromethane	ND(0.0010)	ND(0.0010) J	ND(0.0010)	ND(0.0010) J	ND(0.0010)	ND(0.0010)	ND(0.0010) J	ND(0.0010)
cis-1,2-Dichloroethene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00060 J
cis-1,3-Dichloropropene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cyclohexane	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
Dibromochloromethane	0.0011	0.0012	0.0017	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Dichlorodifluoromethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0011 J	ND(0.0010)	0.0014	ND(0.0010)
Ethylbenzene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Isopropylbenzene	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Methyl acetate	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
Methyl cyclohexane	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
Methyl Tert Butyl Ether	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Methylene chloride	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Styrene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Tetrachloroethene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00063 J
Toluene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
trans-1,2-Dichloroethene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
trans-1,3-Dichloropropene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Trichloroethene	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0020	0.0015	ND(0.0010)	ND(0.0010)	0.0017
Trichlorofluoromethane	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Trifluorotrichloroethane	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
Vinyl chloride	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
m&p-Xylene	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
o-Xylene	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Xylenes (total)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
PCBs								
Aroclor-1016 (PCB-1016)	ND(0.00010)	ND(0.00010)	ND(0.00010)	NS	NS	NS	NS	NS
Aroclor-1221 (PCB-1221)	ND(0.00010)	ND(0.00010)	ND(0.00010)	NS	NS	NS	NS	NS
Aroclor-1232 (PCB-1232)	ND(0.00010)	ND(0.00010)	ND(0.00010)	NS	NS	NS	NS	NS
Aroclor-1242 (PCB-1242)	ND(0.00010)	ND(0.00010)	ND(0.00010)	NS	NS	NS	NS	NS
Aroclor-1248 (PCB-1248)	ND(0.00010)	ND(0.00010)	ND(0.00010)	NS	NS	NS	NS	NS
Aroclor-1254 (PCB-1254)	ND(0.00010)	ND(0.00010)	ND(0.00010)	NS	NS	NS	NS	NS
Aroclor-1260 (PCB-1260)	ND(0.00010)	ND(0.00010)	ND(0.00010)	NS	NS	NS	NS	NS
Total PCBs	ND(0.00010)	ND(0.00010)	ND(0.00010)	NS	NS	NS	NS	NS

Appendix J

Indoor Air Analytical Data

General Motors
902 E. Hamilton
Flint Mich.
48550

Fax Cover Sheet

DATE: April 23, 2002 TIME: 8:04 AM

TO: DEREK KAIDING PHONE: 248-377-9162

FAX : 248-377-9413

FROM: Dennis Hopwood PHONE: 8-466-1691
Worldwide Facilities Group FAX: 810-236-0994

RE: BASIS SAMPLES YOU REQUESTED FACTORY 36-01 ROD DEPT.

DENNIS HOPWOOD

Number of pages including cover sheet: 2

]

B A S I S S T A N D A R D R E P O R T

UNIT: 19492 GMPT - FLINT ENGINE V-6

SAMPLE RESULTS WITH EXPOSURE LIMITS
AND LOCATION DESCRIPTION BY DEPARTMENT
PERSONAL AND GENERAL CONDITION SAMPLES
WITH SAMPLE DATES FROM: JANUARY 1, 2001 THRU: DECEMBER 31, 2001
CONTAMINANT(S): BENZ$ ETBZ TOL XYL
CONTANINANT GROUP(S): $$$
REPORT NAME: AIRRPT04 GENERATED: 04-18-2002 15.28.11

DEPT	S T	SAMPLE DATE	SAMPLE ID	LAST NAME	F I	EMPLOYE ID	CONTAMINANT	R C	RESULT	PEL	OEG TWA	TLV TWA	UNITS
3601	G	06/19/01	0388 2001 0078				BENZENE	<	.260	1.000	1.000	.500	PPM
							ETHYL BENZENE	<	.970	100.000	100.000	100.000	PPM
							TOLUENE	<	1.120	200.000	100.000	50.000	PPM
							XYLENE	<	.970	100.000	100.000	100.000	PPM
					LOC DESC:		FACT. 36 DEPT. 01 ROD DEPT. AT MAIN N-S-AISLE SAMPLING REQUESTED BY DEREK KAIDING						
			0388 2001 0079				BENZENE	<	.250	1.000	1.000	.500	PPM
							ETHYL BENZENE	<	.920	100.000	100.000	100.000	PPM
							TOLUENE	<	1.060	200.000	100.000	50.000	PPM
							XYLENE	<	.920	100.000	100.000	100.000	PPM
					LOC DESC:		FACT. 36 DEPT. 01 ROD DEPT. AT MAIN N-S-AISLE SAMPLING REQUESTED BY DEREK KAIDING						

Dennis E. Hopwood
10/30/2003 10:50 AM

To: "DEREK KAIDING" <DCK@bbl-inc.com>
cc:
Subject: Re: Air Samples

Hi

Yes we do have all the data back at this point . It was all non-detect. I will put a summary report together for you.

Dennis

"DEREK KAIDING" <DCK@bbl-inc.com>



"DEREK KAIDING" <DCK@bbl-inc.com>
10/27/2003 11:00 AM

To: <dennis.e.hopwood@gm.com>
cc: <robert.metcalf@gm.com>
Subject: Air Samples

Dennis, do you have the final results of the Factory 36 and Factory 81 air samples collected in September 2003?

Derek

This information contained in this e-mail message is intended only for the personal and confidential use of the recipient(s) named above. This message may be an attorney-client communication and as such is privileged and confidential. If the reader of this message is not the intended recipient, you are hereby notified that you have received this message in error and that any review, dissemination, distribution, or copying of this message is strictly prohibited. If you have received this message in error, please notify the sender immediately by e-mail, and delete the original message.

B A S I S S T A N D A R D R E P O R T

REPORT NAME: AIRRPT04 GENERATED: 10-28-2003 14.18.39 FROM: XZ55DT

ANSWERS YOU PROVIDED TO PROMPTS AND THAT LIMITED THIS REPORT:

PUNIT(S) : 19492 19493

CONTAMINANT(S): $$$$$

CONTAMINANT GROUP(S): $$$

DEPT CODE(S) : $$$$

(EXCLUDES BLANK DEPARTMENT SAMPLES)

SAMPLE TYPE : PERSONAL AND GENERAL CONDITION SAMPLES

SAMPLE DATE RANGE: SEPTEMBER 8, 2003 THRU SEPTEMBER 12, 2003

B A S I S S T A N D A R D R E P O R T

UNIT: 19492 GMPT - FLINT ENGINE V-6

SAMPLE RESULTS WITH EXPOSURE LIMITS
AND LOCATION DESCRIPTION BY DEPARTMENT
PERSONAL AND GENERAL CONDITION SAMPLES
WITH SAMPLE DATES FROM: SEPTEMBER 8, 2003 THRU: SEPTEMBER 12, 2003
CONTAMINANT(S): $$$$$
CONTAMINANT GROUP(S): $$$
REPORT NAME: AIRRPT04 GENERATED: 10-28-2003 14.18.39

DEPT	S T	SAMPLE DATE	SAMPLE ID	LAST NAME	F I	EMPLOYE ID	CONTAMINANT	R C	RESULT	PEL	OEG TWA	TLV TWA	UNITS
3606	G	09/08/03	0388 2003 0378				ACETONE	<	.910	1000.000	750.000	500.000	PPM
							BENZENE	<	.190	1.000	1.000	.500	PPM
							BUTYL ACETATE	<	.580	150.000	150.000	150.000	PPM
							CYCLOHEXANONE	<	.190	50.000	25.000	20.000	PPM
							CHLOROBENZENE	<	.640	75.000	75.000	10.000	PPM
							1,2-DICHLOROETHANE	<	.320	50.000	1.000	10.000	PPM
							DECANE	<	.320	.000	.000	.000	PPM
							DIOXANE	<	.700	100.000	25.000	20.000	PPM
							ETHYL ACETATE	<	.700	400.000	400.000	400.000	PPM
							ETHYL BENZENE	<	.180	100.000	100.000	100.000	PPM
							HEPTANE	<	.370	500.000	400.000	400.000	PPM
							HEXANE	<	.390	500.000	50.000	50.000	PPM
							ISOOCTANE	<	.350	.000	.000	.000	PPM
							METHYL ETHYL KETONE	<	.200	200.000	200.000	200.000	PPM
							METHYLENE CHLORIDE	<	.330	25.000	25.000	50.000	PPM
							METHYL ISOBUTYL KETO	<	.180	100.000	50.000	50.000	PPM
							OCTANE	<	.350	500.000	300.000	300.000	PPM
							PENTANE	<	.420	1000.000	600.000	600.000	PPM
							PERCHLOROETHYLENE	<	.230	100.000	25.000	25.000	PPM
							N-PROPYL ACETATE	<	.350	200.000	200.000	200.000	PPM
							STYRENE	<	1.520	100.000	50.000	20.000	PPM
							TRICHLOROETHYLENE	<	.260	100.000	50.000	50.000	PPM
							1,1,1-TRICHLOROETHAN	<	.260	350.000	350.000	350.000	PPM
							TETRAHYDROFURAN	<	.790	200.000	200.000	200.000	PPM
							TRIMETHYLBENZENE (MI	<	.720	.000	25.000	25.000	PPM
							TOLUENE	<	.180	200.000	100.000	50.000	PPM
							XYLENE	<	.180	100.000	100.000	100.000	PPM
					LOC DESC:		FACT. 36 DEPT 06 AIR SAMPLING FOR SCAN 1 REQUESTED BY SHERYL COSTELLO FOR CAPPED WELL SEPAGE. BADGE # RS4557 BADGE AT N/W PALLET ELEV. # 1A S/E DOCK AT AISLE.						
			0388 2003 0379				ACETONE	<	.910	1000.000	750.000	500.000	PPM
							BENZENE	<	.190	1.000	1.000	.500	PPM
							BUTYL ACETATE	<	.580	150.000	150.000	150.000	PPM
							CYCLOHEXANONE	<	.190	50.000	25.000	20.000	PPM
							CHLOROBENZENE	<	.640	75.000	75.000	10.000	PPM
							1,2-DICHLOROETHANE	<	.320	50.000	1.000	10.000	PPM
							DECANE	<	.320	.000	.000	.000	PPM
							DIOXANE	<	.700	100.000	25.000	20.000	PPM
							ETHYL ACETATE	<	.700	400.000	400.000	400.000	PPM
							ETHYL BENZENE	<	.180	100.000	100.000	100.000	PPM

B A S I S S T A N D A R D R E P O R T

UNIT: 19492 GMPT - FLINT ENGINE V-6

SAMPLE RESULTS WITH EXPOSURE LIMITS
AND LOCATION DESCRIPTION BY DEPARTMENT
PERSONAL AND GENERAL CONDITION SAMPLES
WITH SAMPLE DATES FROM: SEPTEMBER 8, 2003 THRU: SEPTEMBER 12, 2003
CONTAMINANT(S): $$$$$
CONTAMINANT GROUP(S): $$$
REPORT NAME: AIRRPT04 GENERATED: 10-28-2003 14.18.39

DEPT	S T	SAMPLE DATE	SAMPLE ID	LAST NAME	F I	EMPLOYE ID	CONTAMINANT	R C	RESULT	PEL	OEG TWA	TLV TWA	UNITS
3606	G	09/08/03	0388 2003 0379				HEPTANE	<	.370	500.000	400.000	400.000	PPM
							HEXANE	<	.390	500.000	50.000	50.000	PPM
							ISOOCTANE	<	.350	.000	.000	.000	PPM
							METHYL ETHYL KETONE	<	.200	200.000	200.000	200.000	PPM
							METHYLENE CHLORIDE	<	.330	25.000	25.000	50.000	PPM
							METHYL ISOBUTYL KETO	<	.180	100.000	50.000	50.000	PPM
							OCTANE	<	.350	500.000	300.000	300.000	PPM
							PENTANE	<	.420	1000.000	600.000	600.000	PPM
							PERCHLOROETHYLENE	<	.230	100.000	25.000	25.000	PPM
							N-PROPYL ACETATE	<	.350	200.000	200.000	200.000	PPM
							STYRENE	<	1.520	100.000	50.000	20.000	PPM
							TRICHLOROETHYLENE	<	.260	100.000	50.000	50.000	PPM
							1,1,1-TRICHLOROETHAN	<	.260	350.000	350.000	350.000	PPM
							TETRAHYDROFURAN	<	.790	200.000	200.000	200.000	PPM
							TRIMETHYLBENZENE (MI	<	.720	.000	25.000	25.000	PPM
							TOLUENE	<	.180	200.000	100.000	50.000	PPM
							XYLENE	<	.180	100.000	100.000	100.000	PPM
					LOC DESC:		FACT. 36 DEPT 06 AIR SAMPLING FOR SCAN 1 REQUESTED BY SHERYL COSTELLO FOR CAPPED WELL SEPAGE. BADGE # RS4546 BADGE AT S-PALLET ELEV. # 2B S/E DOCK.						
			0388 2003 0380				ACETONE	<	.870	1000.000	750.000	500.000	PPM
							BENZENE	<	.180	1.000	1.000	.500	PPM
							BUTYL ACETATE	<	.550	150.000	150.000	150.000	PPM
							CYCLOHEXANONE	<	.180	50.000	25.000	20.000	PPM
							CHLOROBENZENE	<	.620	75.000	75.000	10.000	PPM
							1,2-DICHLOROETHANE	<	.310	50.000	1.000	10.000	PPM
							DECANE	<	.310	.000	.000	.000	PPM
							DIOXANE	<	.670	100.000	25.000	20.000	PPM
							ETHYL ACETATE	<	.670	400.000	400.000	400.000	PPM
							ETHYL BENZENE	<	.180	100.000	100.000	100.000	PPM
							HEPTANE	<	.350	500.000	400.000	400.000	PPM
							HEXANE	<	.370	500.000	50.000	50.000	PPM
							ISOOCTANE	<	.340	.000	.000	.000	PPM
							METHYL ETHYL KETONE	<	.190	200.000	200.000	200.000	PPM
							METHYLENE CHLORIDE	<	.320	25.000	25.000	50.000	PPM
							METHYL ISOBUTYL KETO	<	.170	100.000	50.000	50.000	PPM
							OCTANE	<	.340	500.000	300.000	300.000	PPM
							PENTANE	<	.400	1000.000	600.000	600.000	PPM
							PERCHLOROETHYLENE	<	.220	100.000	25.000	25.000	PPM
							N-PROPYL ACETATE	<	.330	200.000	200.000	200.000	PPM
							STYRENE	<	1.460	100.000	50.000	20.000	PPM

B A S I S S T A N D A R D R E P O R T

UNIT: 19492 GMPT - FLINT ENGINE V-6

SAMPLE RESULTS WITH EXPOSURE LIMITS
AND LOCATION DESCRIPTION BY DEPARTMENT
PERSONAL AND GENERAL CONDITION SAMPLES
WITH SAMPLE DATES FROM: SEPTEMBER 8, 2003 THRU: SEPTEMBER 12, 2003
CONTAMINANT(S): $$$$$
CONTAMINANT GROUP(S): $$$
REPORT NAME: AIRRPT04 GENERATED: 10-28-2003 14.18.39

DEPT	S T	SAMPLE DATE	SAMPLE ID	LAST NAME	F I	EMPLOYE ID	CONTAMINANT	R C	RESULT	PEL	OEG TWA	TLV TWA	UNITS
3606	G	09/08/03	0388 2003 0380				TRICHLOROETHYLENE	<	.250	100.000	50.000	50.000	PPM
							1,1,1-TRICHLOROETHAN	<	.250	350.000	350.000	350.000	PPM
							TETRAHYDROFURAN	<	.760	200.000	200.000	200.000	PPM
							TRIMETHYLBENZENE (MI	<	.700	.000	25.000	25.000	PPM
							TOLUENE	<	.180	200.000	100.000	50.000	PPM
							XYLENE	<	.180	100.000	100.000	100.000	PPM
						LOC DESC:	FACT. 36 DEPT 06 AIR SAMPLING FOR SCAN 1 REQUESTED BY SHERYL COSTELLO FOR CAPPED WELL SEPAGE. BADGE # RS4483 BADGE AT FENCE NEAR HOLE N/W SIDE OF AISLE INTERSECTION.						
			0388 2003 0381				ACETONE	<	.890	1000.000	750.000	500.000	PPM
							BENZENE	<	.190	1.000	1.000	.500	PPM
							BUTYL ACETATE	<	.560	150.000	150.000	150.000	PPM
							CYCLOHEXANONE	<	.180	50.000	25.000	20.000	PPM
							CHLOROBENZENE	<	.630	75.000	75.000	10.000	PPM
							1,2-DICHLOROETHANE	<	.310	50.000	1.000	10.000	PPM
							DECANE	<	.310	.000	.000	.000	PPM
							DIOXANE	<	.680	100.000	25.000	20.000	PPM
							ETHYL ACETATE	<	.680	400.000	400.000	400.000	PPM
							ETHYL BENZENE	<	.180	100.000	100.000	100.000	PPM
							HEPTANE	<	.360	500.000	400.000	400.000	PPM
							HEXANE	<	.370	500.000	50.000	50.000	PPM
							ISOOCTANE	<	.340	.000	.000	.000	PPM
							METHYL ETHYL KETONE	<	.320	200.000	200.000	200.000	PPM
							METHYLENE CHLORIDE	<	.320	25.000	25.000	50.000	PPM
							METHYL ISOBUTYL KETO	<	.170	100.000	50.000	50.000	PPM
							OCTANE	<	.340	500.000	300.000	300.000	PPM
							PENTANE	<	.410	1000.000	600.000	600.000	PPM
							PERCHLOROETHYLENE	<	.770	100.000	25.000	25.000	PPM
							N-PROPYL ACETATE	<	.340	200.000	200.000	200.000	PPM
							STYRENE	<	1.480	100.000	50.000	20.000	PPM
							TRICHLOROETHYLENE	<	.250	100.000	50.000	50.000	PPM
							1,1,1-TRICHLOROETHAN	<	.250	350.000	350.000	350.000	PPM
							TETRAHYDROFURAN	<	.770	200.000	200.000	200.000	PPM
							TRIMETHYLBENZENE (MI	<	.700	.000	25.000	25.000	PPM
							TOLUENE	<	.180	200.000	100.000	50.000	PPM
							XYLENE	<	.180	100.000	100.000	100.000	PPM

B A S I S S T A N D A R D R E P O R T

UNIT: 19492 GMPT - FLINT ENGINE V-6

SAMPLE RESULTS WITH EXPOSURE LIMITS
AND LOCATION DESCRIPTION BY DEPARTMENT
PERSONAL AND GENERAL CONDITION SAMPLES
WITH SAMPLE DATES FROM: SEPTEMBER 8, 2003 THRU: SEPTEMBER 12, 2003
CONTAMINANT(S): $$$$$
CONTAMINANT GROUP(S): $$$
REPORT NAME: AIRRPT04 GENERATED: 10-28-2003 14.18.39

DEPT	S T	SAMPLE DATE	SAMPLE ID	LAST NAME	F I	EMPLOYE ID	CONTAMINANT	R C	RESULT	PEL	OEG TWA	TLV TWA	UNITS
							LOC DESC: FACT. 36 DEPT 06 AIR SAMPLING FOR SCAN 1 REQUESTED BY SHERYL COSTELLO FOR CAPPED WELL SEPAGE. BADGE # RS4535 BADGE AT FENCE NEAR HOLE S/W SIDE OF AISLE INTERSECTION.						
3606	G	09/08/03	0388 2003 0382				ACETONE	<	.890	1000.000	750.000	500.000	PPM
							BENZENE	<	.190	1.000	1.000	.500	PPM
							BUTYL ACETATE	<	.560	150.000	150.000	150.000	PPM
							CYCLOHEXANONE	<	.180	50.000	25.000	20.000	PPM
							CHLOROBENZENE	<	.630	75.000	75.000	10.000	PPM
							1,2-DICHLOROETHANE	<	.310	50.000	1.000	10.000	PPM
							DECANE	<	.310	.000	.000	.000	PPM
							DIOXANE	<	.680	100.000	25.000	20.000	PPM
							ETHYL ACETATE	<	.680	400.000	400.000	400.000	PPM
							ETHYL BENZENE	<	.180	100.000	100.000	100.000	PPM
							HEPTANE	<	.360	500.000	400.000	400.000	PPM
							HEXANE	<	.370	500.000	50.000	50.000	PPM
							ISOOCTANE	<	.340	.000	.000	.000	PPM
							METHYL ETHYL KETONE	<	.200	200.000	200.000	200.000	PPM
							METHYLENE CHLORIDE	<	.320	25.000	25.000	50.000	PPM
							METHYL ISOBUTYL KETO	<	.170	100.000	50.000	50.000	PPM
							OCTANE	<	.340	500.000	300.000	300.000	PPM
							PENTANE	<	.410	1000.000	600.000	600.000	PPM
							PERCHLOROETHYLENE	<	.220	100.000	25.000	25.000	PPM
							N-PROPYL ACETATE	<	.340	200.000	200.000	200.000	PPM
							STYRENE	<	1.480	100.000	50.000	20.000	PPM
							TRICHLOROETHYLENE	<	.250	100.000	50.000	50.000	PPM
							1,1,1-TRICHLOROETHAN	<	.250	350.000	350.000	350.000	PPM
							TETRAHYDROFURAN	<	.770	200.000	200.000	200.000	PPM
							TRIMETHYLBENZENE (MI	<	.700	.000	25.000	25.000	PPM
							TOLUENE	<	.180	200.000	100.000	50.000	PPM
							XYLENE	<	.180	100.000	100.000	100.000	PPM
							LOC DESC: FACT. 36 DEPT 06 AIR SAMPLING FOR SCAN 1 REQUESTED BY SHERYL COSTELLO FOR CAPPED WELL SEPAGE. BADGE # RS4627 BADGE AT FENCE NEAR HOLE W SIDE OF AISLE NEAR STAIRS TO BATHROOM.						

B A S I S S T A N D A R D R E P O R T

UNIT: 19493 GMPT - FLINT COMPONENTS

SAMPLE RESULTS WITH EXPOSURE LIMITS
AND LOCATION DESCRIPTION BY DEPARTMENT
PERSONAL AND GENERAL CONDITION SAMPLES
WITH SAMPLE DATES FROM: SEPTEMBER 8, 2003 THRU: SEPTEMBER 12, 2003
CONTAMINANT(S): $$$$$
CONTAMINANT GROUP(S): $$$
REPORT NAME: AIRRPT04 GENERATED: 10-28-2003 14.18.39

DEPT	ST	SAMPLE DATE	SAMPLE ID	LAST NAME	FI	EMPLOYE ID	CONTAMINANT	RC	RESULT	PEL	OEG TWA	TLV TWA	UNITS
8108	G	09/12/03	0388 2003 0384				ACETONE	<	.890	1000.000	750.000	500.000	PPM
							BENZENE	<	.190	1.000	1.000	.500	PPM
							BUTYL ACETATE	<	.560	150.000	150.000	150.000	PPM
							CYCLOHEXANONE	<	.180	50.000	25.000	20.000	PPM
							CHLOROBENZENE	<	.630	75.000	75.000	10.000	PPM
							1,2-DICHLOROETHANE	<	.310	50.000	1.000	10.000	PPM
							1,1-DICHLOROETHYLENE	<	.280	.000	1.000	5.000	PPM
							DECANE	<	.310	.000	.000	.000	PPM
							DIOXANE	<	.680	100.000	25.000	20.000	PPM
							ETHYL ACETATE	<	.680	400.000	400.000	400.000	PPM
							ETHYL BENZENE	<	.180	100.000	100.000	100.000	PPM
							HEPTANE	<	.360	500.000	400.000	400.000	PPM
							HEXANE	<	.370	500.000	50.000	50.000	PPM
							ISOOCTANE	<	.340	.000	.000	.000	PPM
							METHYL ETHYL KETONE	<	.200	200.000	200.000	200.000	PPM
							METHYLENE CHLORIDE	<	.320	25.000	25.000	50.000	PPM
							METHYL ISOBUTYL KETO	<	.170	100.000	50.000	50.000	PPM
							OCTANE	<	.340	500.000	300.000	300.000	PPM
							PENTANE	<	.410	1000.000	600.000	600.000	PPM
							PERCHLOROETHYLENE	<	.220	100.000	25.000	25.000	PPM
							N-PROPYL ACETATE	<	.340	200.000	200.000	200.000	PPM
							STYRENE	<	1.480	100.000	50.000	20.000	PPM
							TRICHLOROETHYLENE	<	.250	100.000	50.000	50.000	PPM
							1,1,1-TRICHLOROETHAN	<	.250	350.000	350.000	350.000	PPM
							1,1,2-TRICHLORO-1,2,	<	.350	1000.000	1000.000	1000.000	PPM
							TETRAHYDROFURAN	<	.770	200.000	200.000	200.000	PPM
							TRIMETHYLBENZENE (MI	<	.700	.000	25.000	25.000	PPM
							TOLUENE	<	.180	200.000	100.000	50.000	PPM
							XYLENE	<	.180	100.000	100.000	100.000	PPM
					LOC DESC:		GMPT FLINT NORTH , DEPT. 81-08 , BAY I-30 GENERAL SAMPLE LOCATED AT SOUTH END OF PART INSP TABLE , 10 FEET EAST OF WELL LOCATION N/SIDE OF E/W AISLE,						
			0388 2003 0386				1,1-DICHLOROETHANE	<	.630	100.000	100.000	100.000	PPM

B A S I S S T A N D A R D R E P O R T

UNIT: 19493 GMPT - FLINT COMPONENTS

SAMPLE RESULTS WITH EXPOSURE LIMITS
AND LOCATION DESCRIPTION BY DEPARTMENT
PERSONAL AND GENERAL CONDITION SAMPLES
WITH SAMPLE DATES FROM: SEPTEMBER 8, 2003 THRU: SEPTEMBER 12, 2003
CONTAMINANT(S): $$$$$
CONTAMINANT GROUP(S): $$$
REPORT NAME: AIRRPT04 GENERATED: 10-28-2003 14.18.39

DEPT	S T	SAMPLE DATE	SAMPLE ID	LAST NAME	F I	EMPLOYE ID	CONTAMINANT	R C	RESULT	PEL	OEG TWA	TLV TWA	UNITS
							LOC DESC: GMPT FLINT NORTH , DEPT. 81-08 , BAY I-30 GENERAL SAMPLE LOCATED AT E-1 DISCONNECT FOR VISION INSP OP 110 , 8 FEET S/W OF WELL						
8108	G	09/12/03	0388 2003 0387				1,1,2-TRICHLORO-1,2,	<	.350	1000.000	1000.000	1000.000	PPM
							LOC DESC: FLINT NORTH, DEPT. 8108 BAY I-30 GENERAL SAMPLE LOCATED AT SHUTTLE VALVE EAST OF OPER. STATION 8 FEET NORTH OF WELL SOUTH SIDE OF PART WASHER						
			0388 2003 0388				1,1-DICHLOROETHYLENE	<	.630	.000	1.000	5.000	PPM
							LOC DESC: FLINT NORTH, DEPT. 81-08, BAY I-30 GENERAL SAMPLE AT BT 2547736 CONTROL PANEL NORTH SIDE EAST/WEST AISLE 30 FEET S/E OF WELL N/SIDE OF AISLE						