Appendix I

Storm Sewer Investigations

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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:

$$\mathbf{Q_p = C\mathit{i}A}$$

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

<u>North - Manholes 3-26, 3-25, and 3-23 through 3-15</u>

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.

<u>Eastern Manhole</u>

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.

<u>Eastern Catchbasins</u>

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.

<u>Western Manhole</u>

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.

Blasland, Bouck & Lee, Inc. (BBL). *Resource Conservation and Recovery Act Facility Investigation Work Plan (Volumes V and VI)*. 2001

BBL. *Description of Current Conditions for Areas North of Leith Street*. November 26, 2000.

Tables

BLASLAND, BOUCK & LEE, INC.
engineers & scientists

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 Date Time Constituent	2-39 6/28/2002 15:00	2-20 6/28/2002 15:30	2-20 6/28/2002 15:30	3-26 6/27/2002 0:00	3-23 6/27/2002 16:40	3-22-1 6/27/2002 16:10	3-20 6/27/2002 16:35	3-15 6/27/2002 15:45	3-76-8 6/28/2002 12:00	3-65 6/28/2002 11:00
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 Date Time Constituent	4-23 6/27/2002 15:20	4-20 6/27/2002 14:30	4-17 6/27/2002 14:00	4-13 6/27/2002 13:30	4-8 6/27/2002 13:00	5-13A 6/27/2002 11:15	5-10 6/27/2002 11:05	5-5 6/27/2002 10:45	5-4 6/27/2002 10:10	11-6-2 8/2/2002	11-3 8/2/2002
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 / Date / Time / Constituent	3-26 7/9/2002 14:15	3-23 7/9/2002 13:50	3-22-1 7/9/2002 13:15	3-20 7/9/2002 13:05	3-15 7/9/2002 12:45	3-65 7/9/2002 12:05	4-23 7/9/2002 11:15	4-13 7/9/2002 10:40	4-8 7/9/2002 9:00	5-13A 7/9/2002 16:05	5-10 7/9/2002 15:50	5-5 7/9/2002 15:15	5-4 7/9/2002 15:40	11-6 7/9/2002 16:55	11-3 7/9/2002 16:40
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 / Date / Time / Constituent	2-41-4 7/29/2002 19:50	2-41 7/29/2002 19:35	2-39 7/29/2002 19:20	2-38 7/29/2002 19:05	2-35 7/29/2002 18:50	2-33 7/29/2002 18:30	2-31 7/29/2002 18:10	2-22 7/29/2002 17:50	2-20 7/29/2002 17:30	3-26 7/29/2002 18:50	3-23 7/29/2002 18:40	3-22-1 7/29/2002 18:15	3-20 7/29/2002 18:00
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 / Date / Time / Constituent	3-15 7/29/2002 17:40	3-76-8 7/29/2002 19:50	3-69 7/29/2002 19:30	3-65 7/29/2002 19:10	4-23 7/29/2002 20:45	4-17 7/29/2002 20:30	4-13 7/29/2002 20:10	5-13A 7/29/2002 21:20	5-10 7/29/2002 21:00	5-5 7/29/2002 20:45	5-4 7/29/2002 20:25	11-6 7/29/2002	11-3 7/29/2002
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

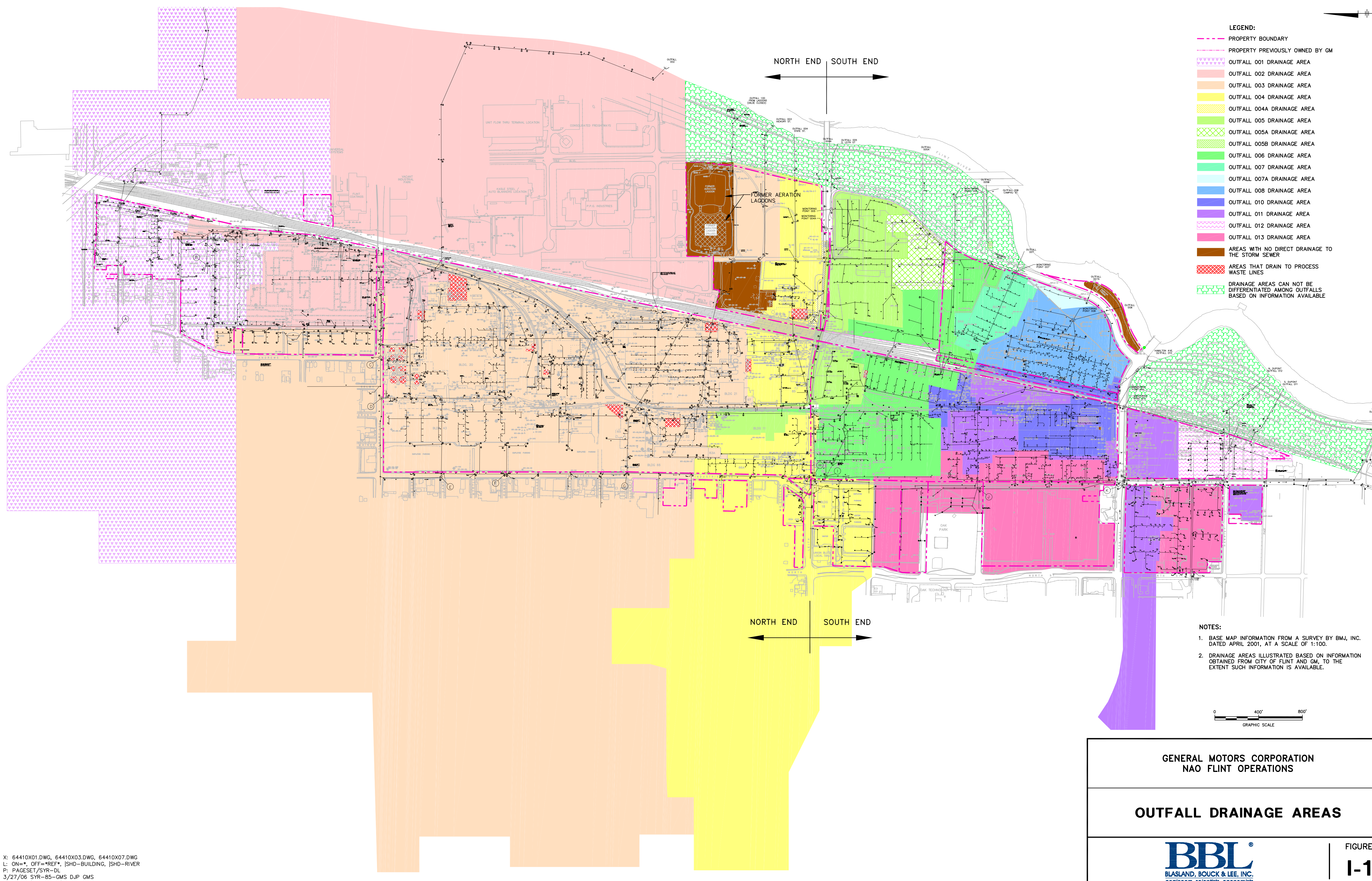
Manhole ID	Event	Pipe Diameter (D) (inches)	Water Depth (d) (inches)	Flow Area (A) (square inches)	Floww Area (A/144) (square feet)	Velocity (v) (feet per second)	Flow Volume (Q = A x v) (cubic feet per second)	Flow Volume (Q x 448.83) (gallons per minute)
3-20	Dry #1	66	5.8	147.251	1.023	0.2	0.205	91.79
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

BLASLAND, BOUCK & LEE, INC.
engineers & scientists

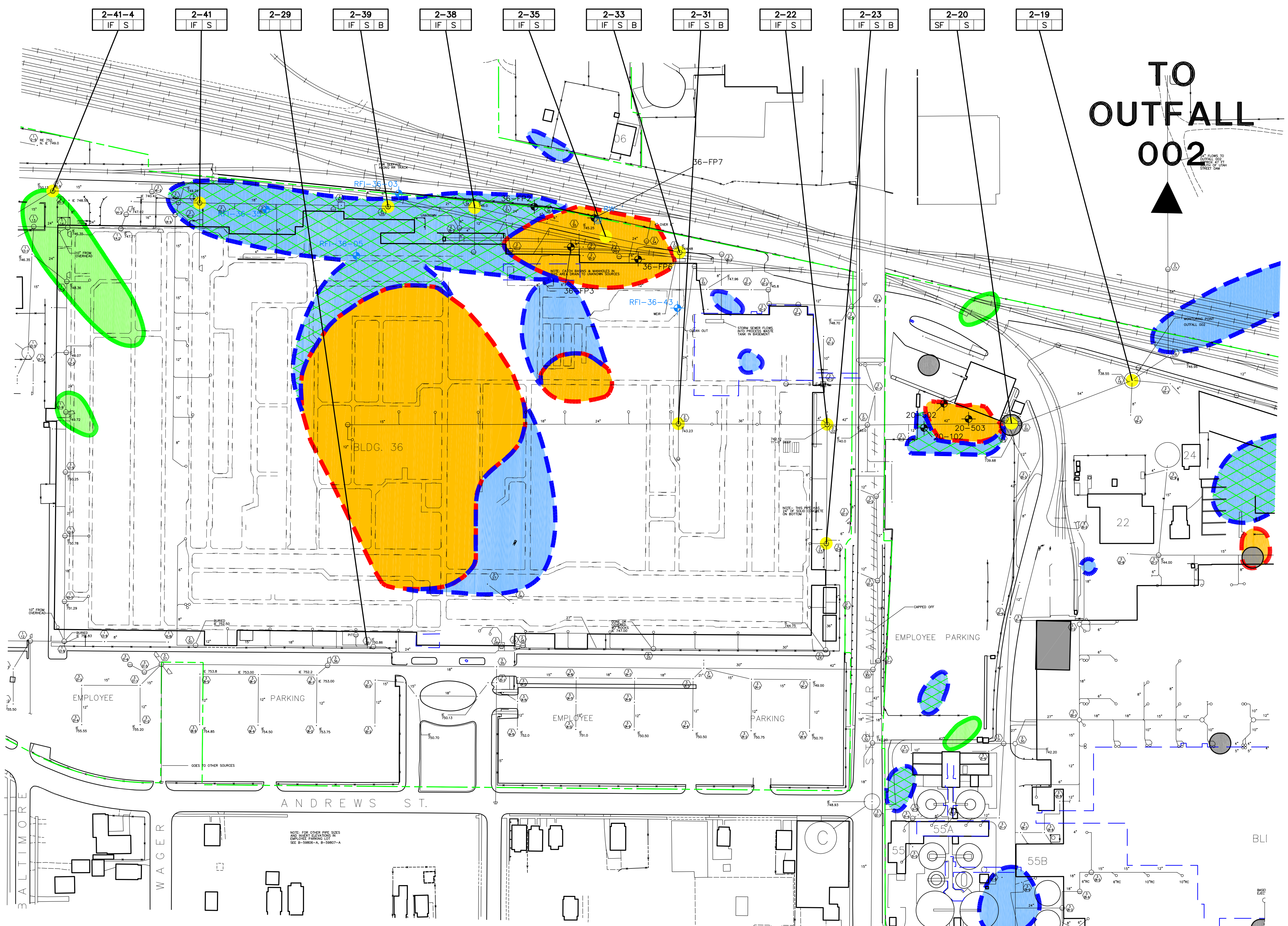


GENERAL MOTORS CORPORATION
NAO FLINT OPERATIONS

OUTFALL DRAINAGE AREAS

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

FIGURE
I-1



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.

0 100' 200'
APPROXIMATE GRAPHIC SCALE

GENERAL MOTORS CORPORATION
NAO FLINT OPERATIONS SITE
FLINT, MICHIGAN

OUTFALL 002 STORM SEWER SYSTEM

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

FIGURE
I-2

G:\CAD\ACTIVE\-DWG\ACT\64410112\HISTORIC\64410B01.DWG SAVED: 6/5/2007 1:52 PM PRINTED: 6/5/2007 1:52 PM BY: GSTOWELL
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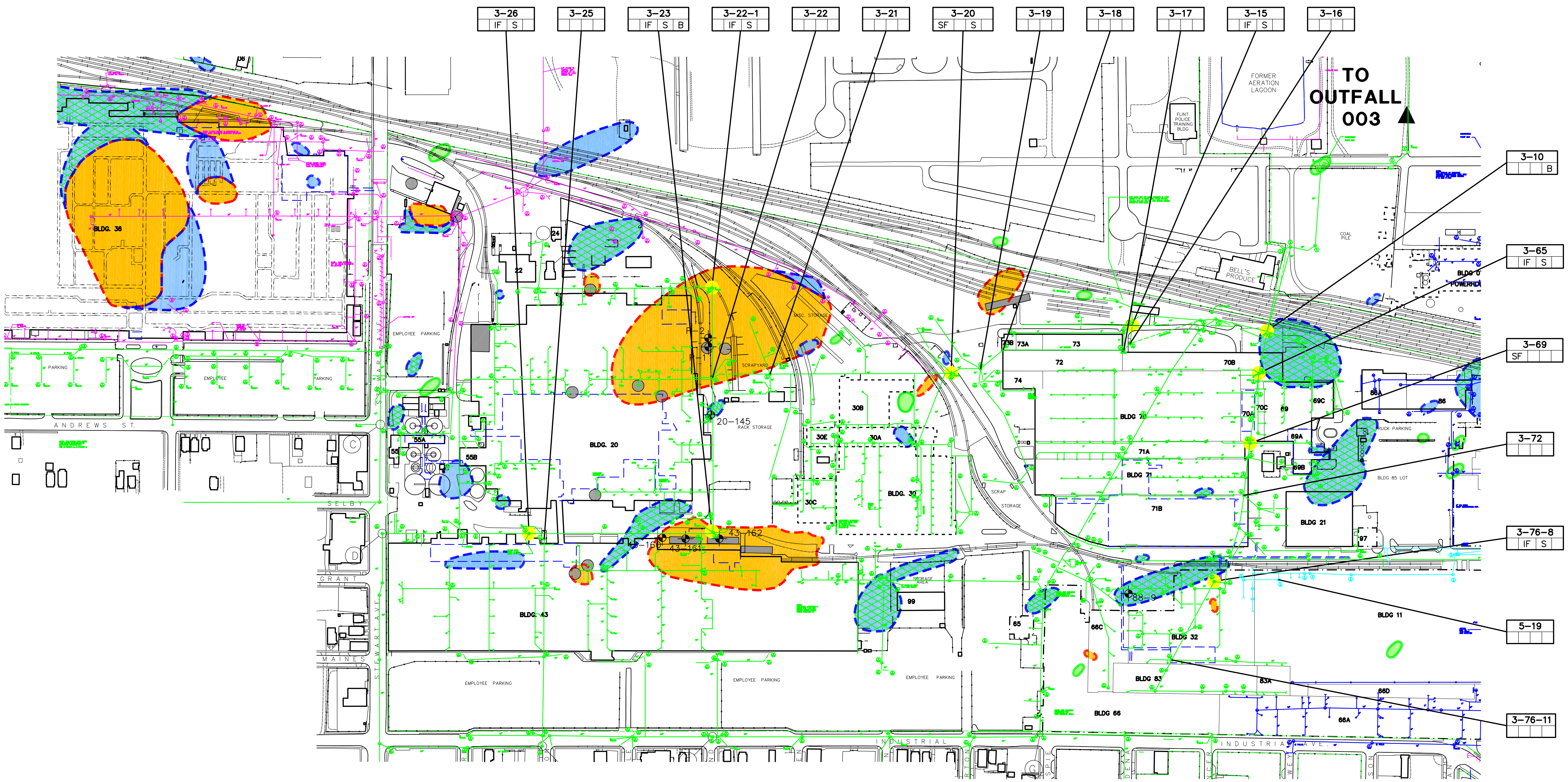

LEGEND:

- 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

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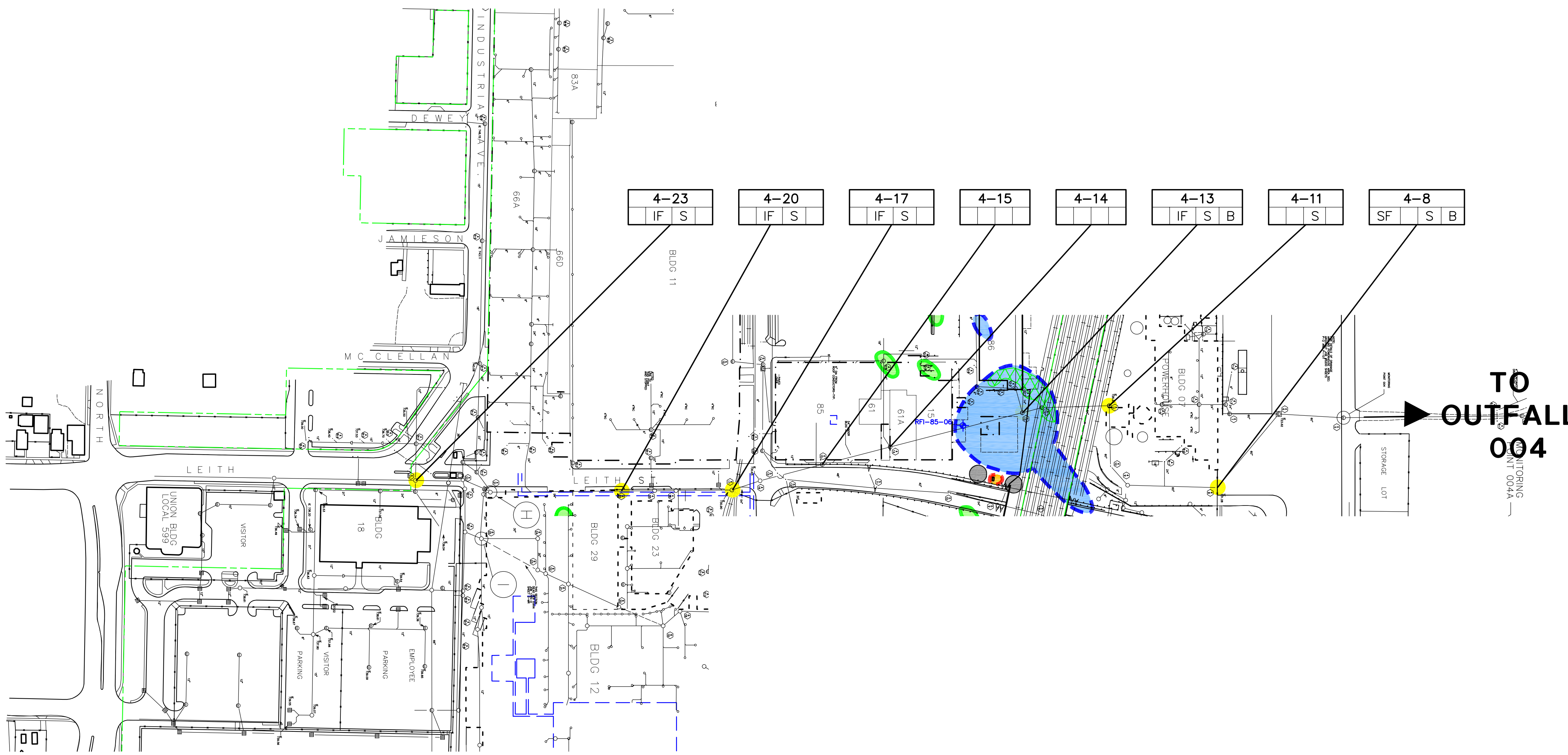
FIGURE
I-3

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

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engineers, scientists, economists

FIGURE
I-4

SYR-85-NES SDL GMS LAYER: ON=*, OFF=*REF, (SHD=BUILDING, (sububtility(m, (sububtlshd
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
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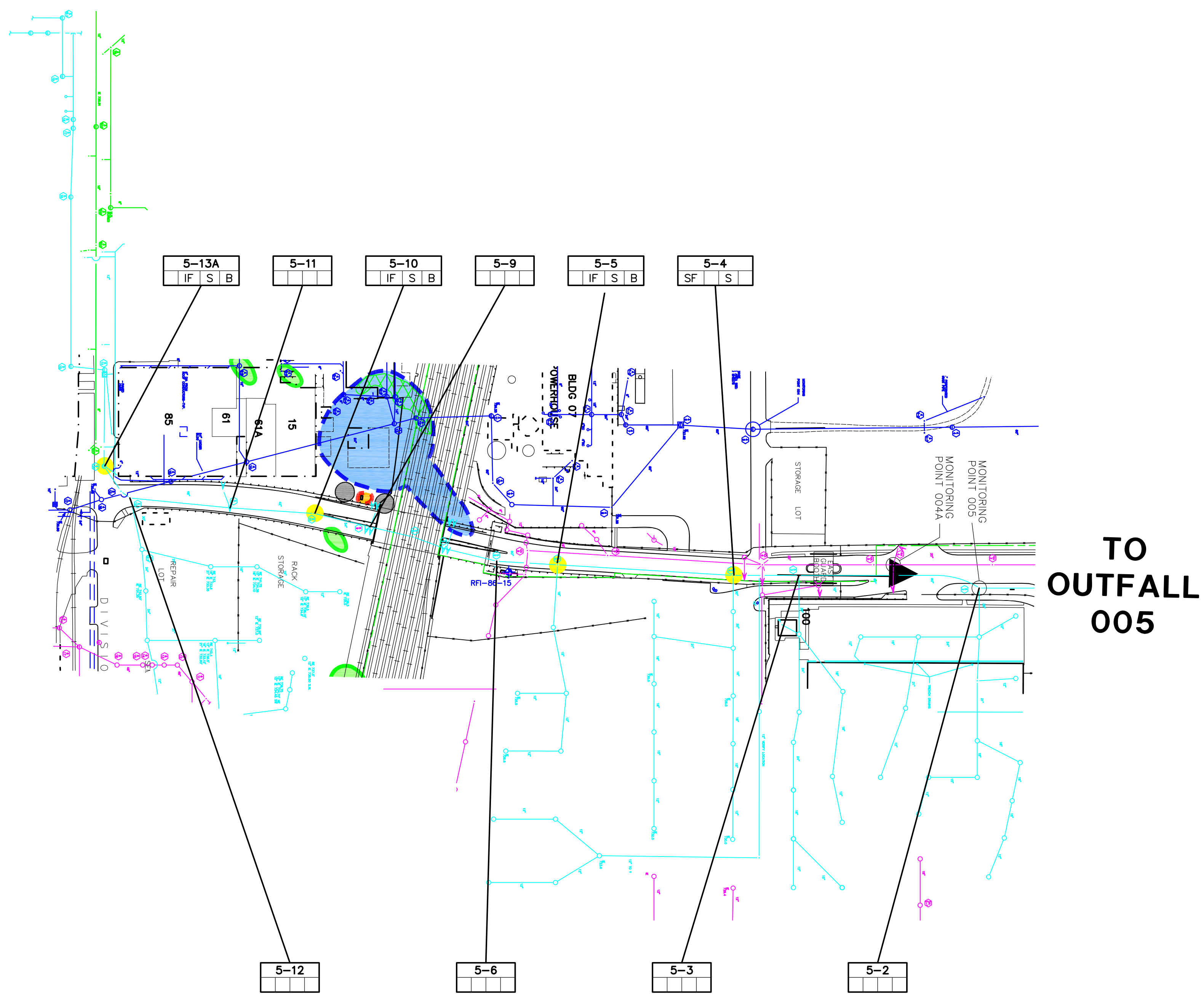
64410X01
64410X07
64410X05



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

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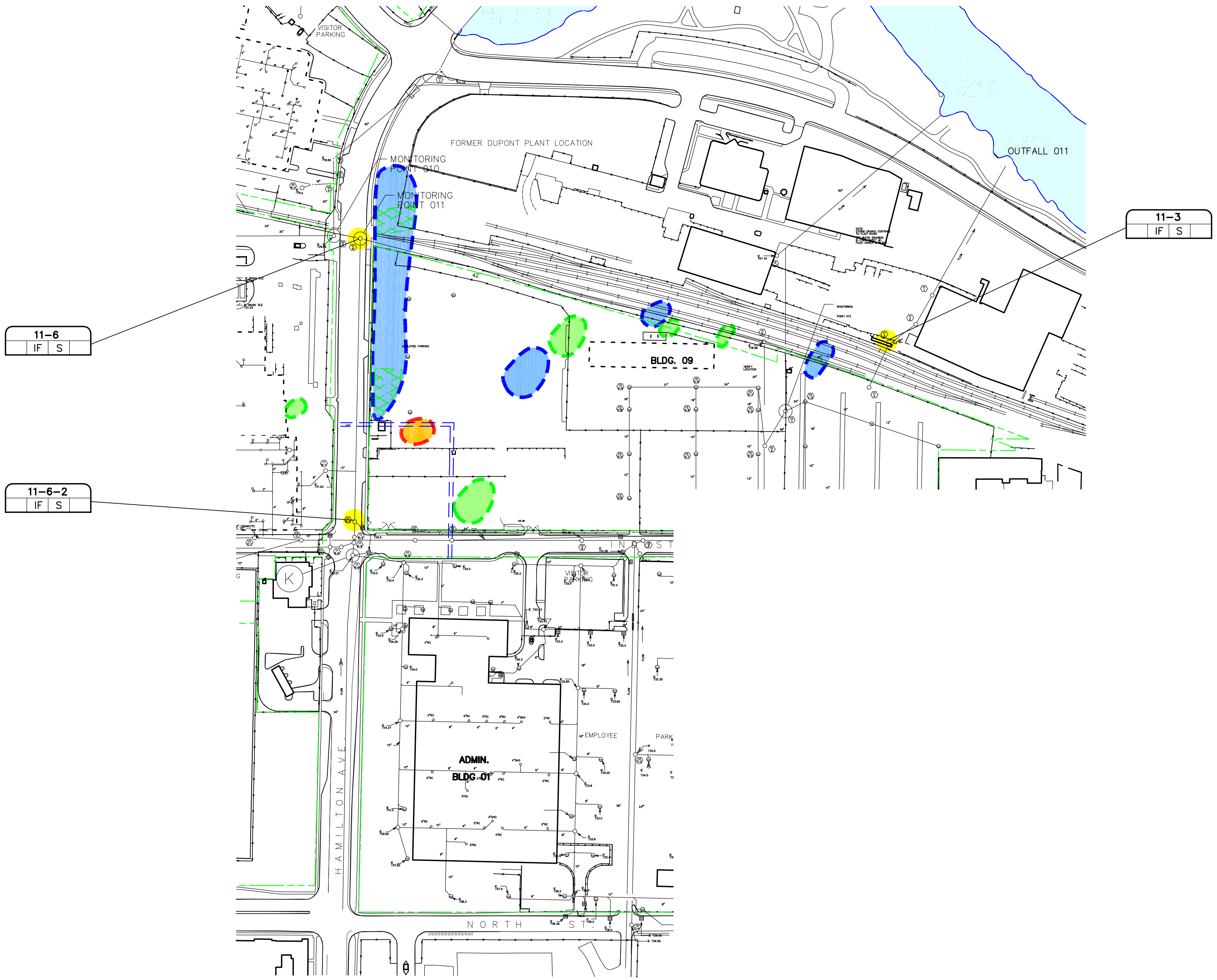
FIGURE
I-5



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

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engineers, scientists, economists

FIGURE
I-6

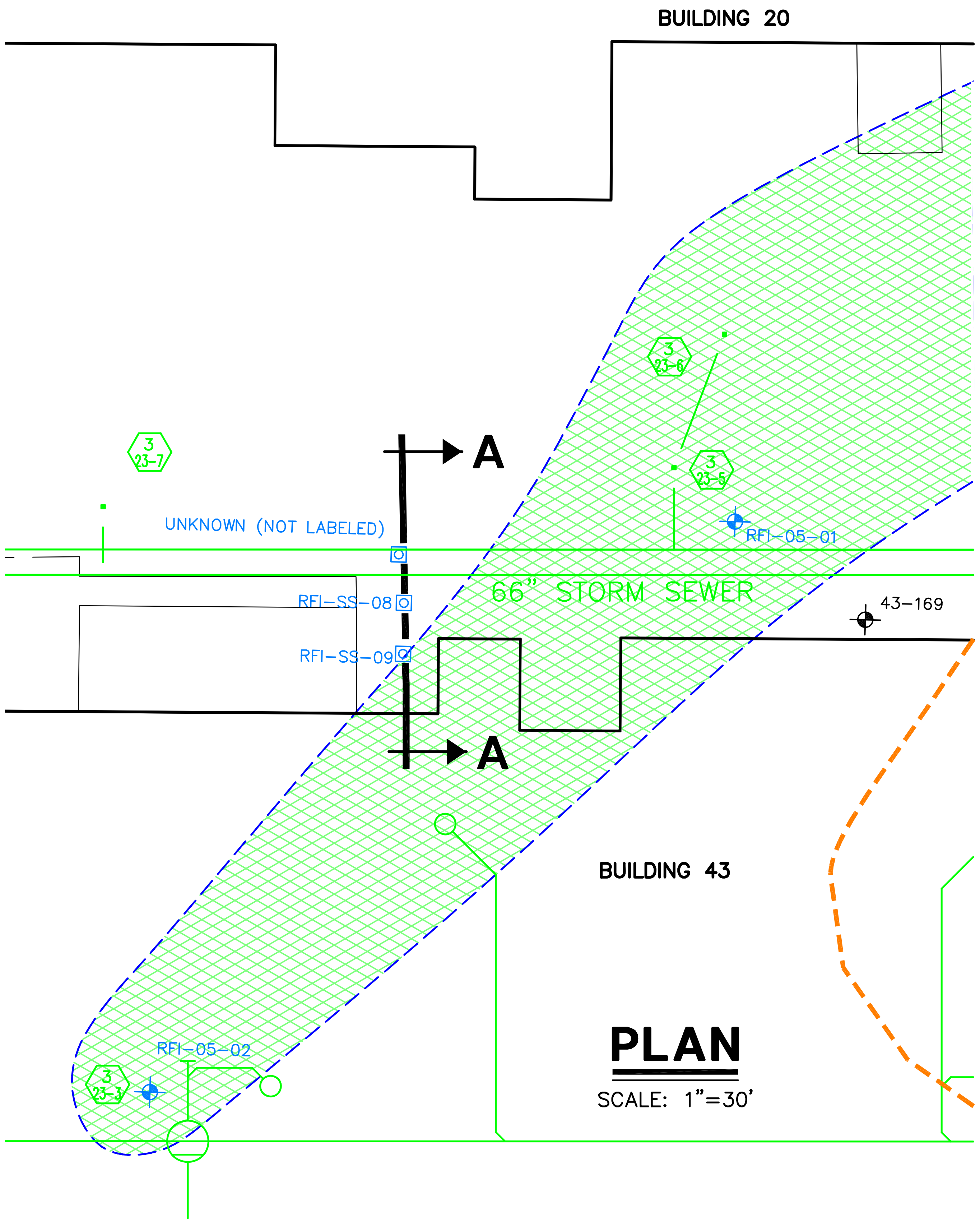
X: 64410X01, X03, X05, X07.DWG
L: ON=*, OFF=*REF*, |SHD-BUINDING, |HIST_MW, |HIST_MW_NOTGM, *|HIST_SB, |NAPL_OBS, |RFI_MW, *|RFI_SB, |RFI_SB_SB_PROP
P: PAGESET/SYR-DL
3/24/06 SYR-85-GMS DJP GMS
64410112/HISTORIC/64410B05.DWG

LEGEND:

- EXISTING MONITORING WELL
- PIEZOMETER LOCATION
- STORM SEWER LINE
- STORM SEWER CATCH BASIN
- FALL 2001 DISSOLVED PHASE VOC EXCEEDENCES IN GROUNDWATER
- SUMMER 2002 ESTIMATED NAPL EXTENT
- FALL 2001 DISSOLVED PHASE METALS EXCEEDENCES IN GROUNDWATER
- EXISTING IM

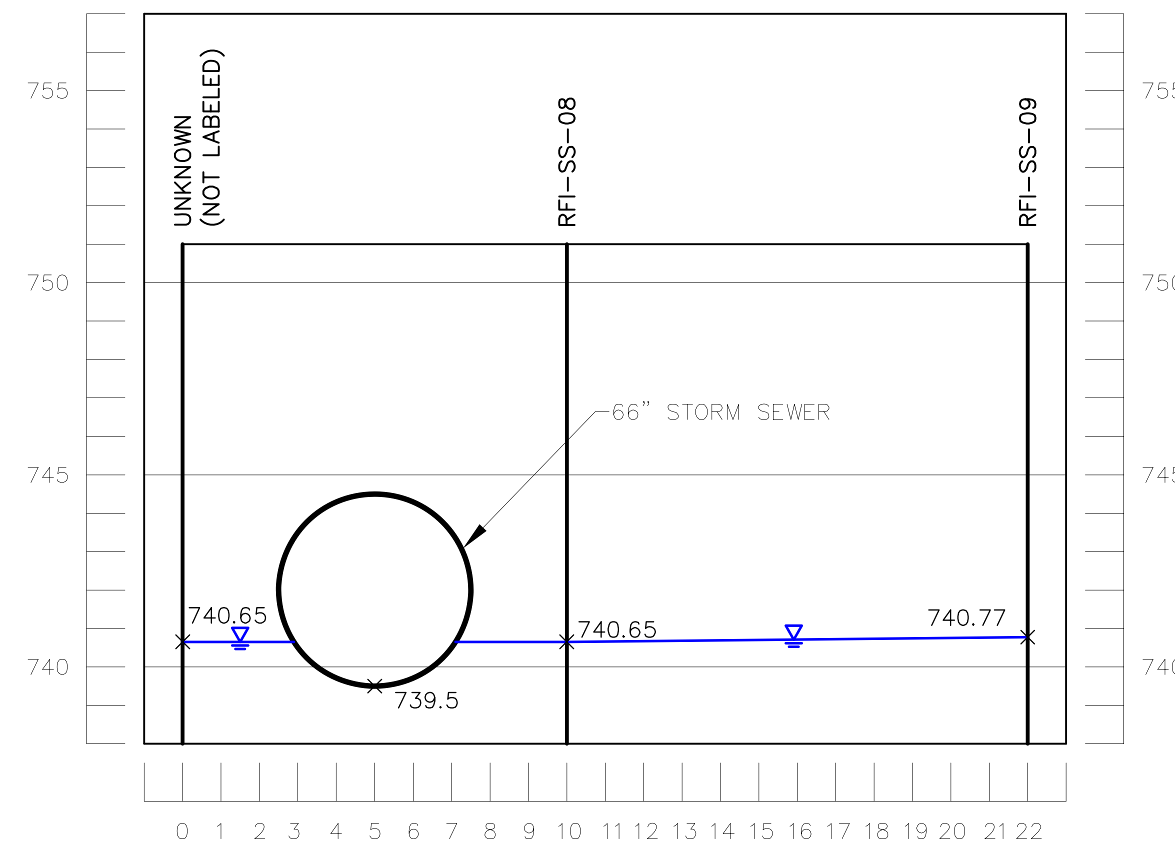
NOTES:

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



PLAN

SCALE: 1"=30'



SECTION A-A

HORIZONTAL SCALE: 1"=5'
VERTICAL SCALE: 1"=5'

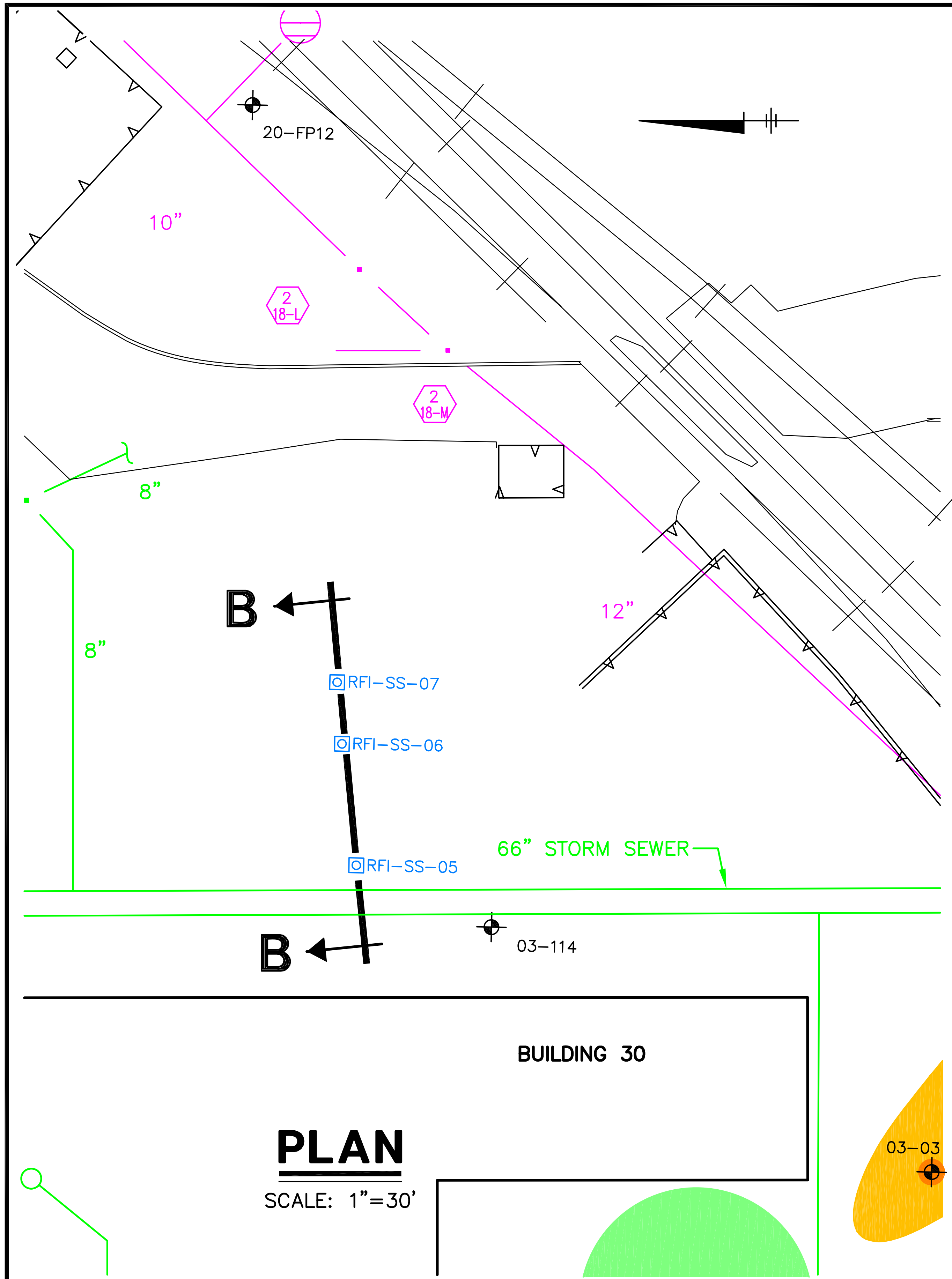
GENERAL MOTORS CORPORATION
NAO FLINT OPERATIONS SITE
FLINT, MICHIGAN

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

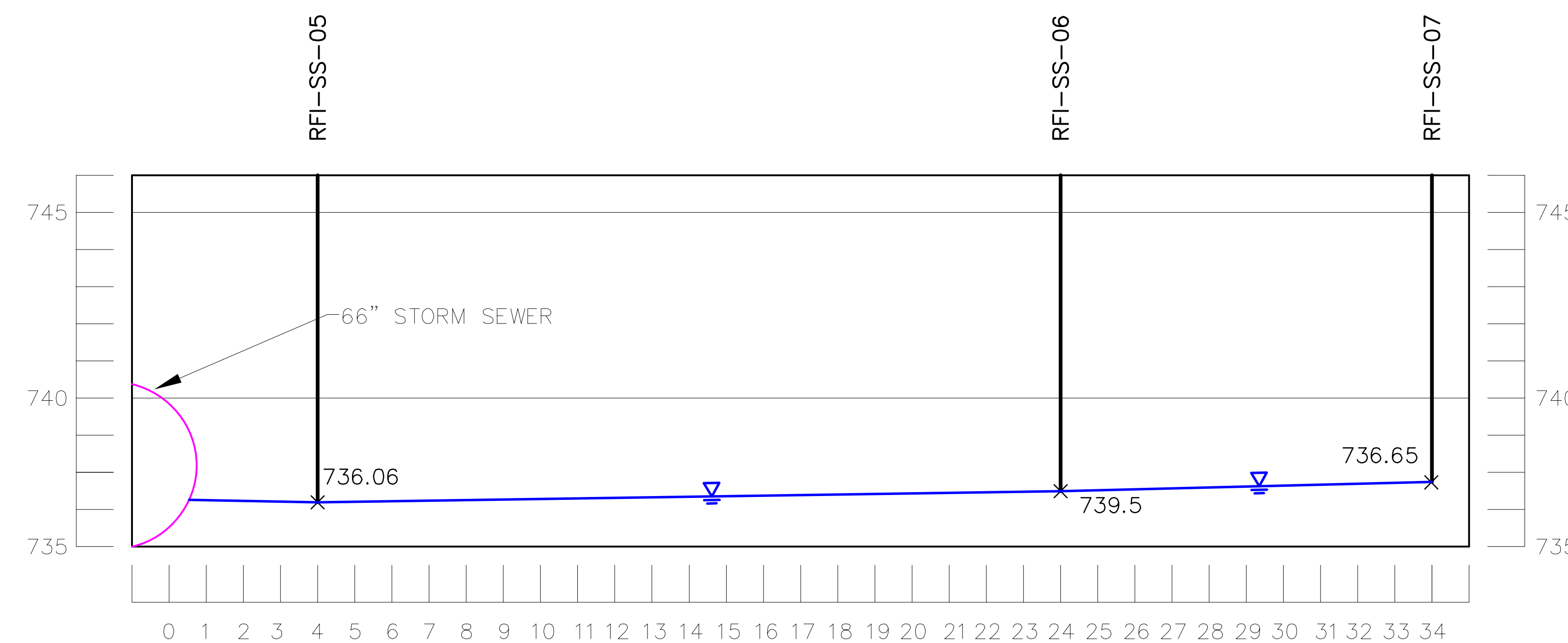
SCALE: 1"=30'

LEGEND:

- EXISTING MONITORING WELL
- PIEZOMETER LOCATION
- STORM SEWER LINE
- STORM SEWER CATCH BASIN
- 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

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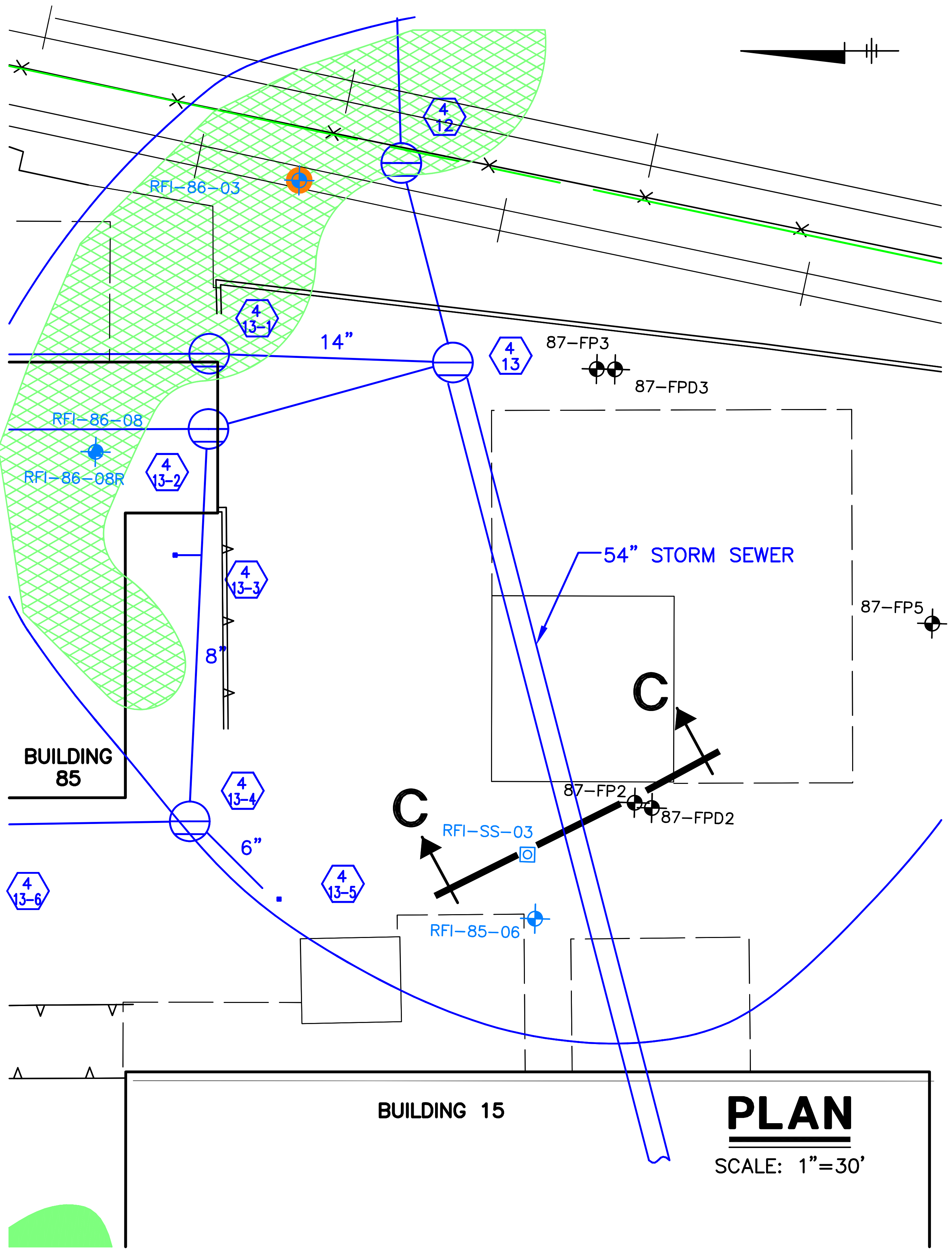
BLASLAND, BOUCK & LEE, INC.
engineers, scientists, economists

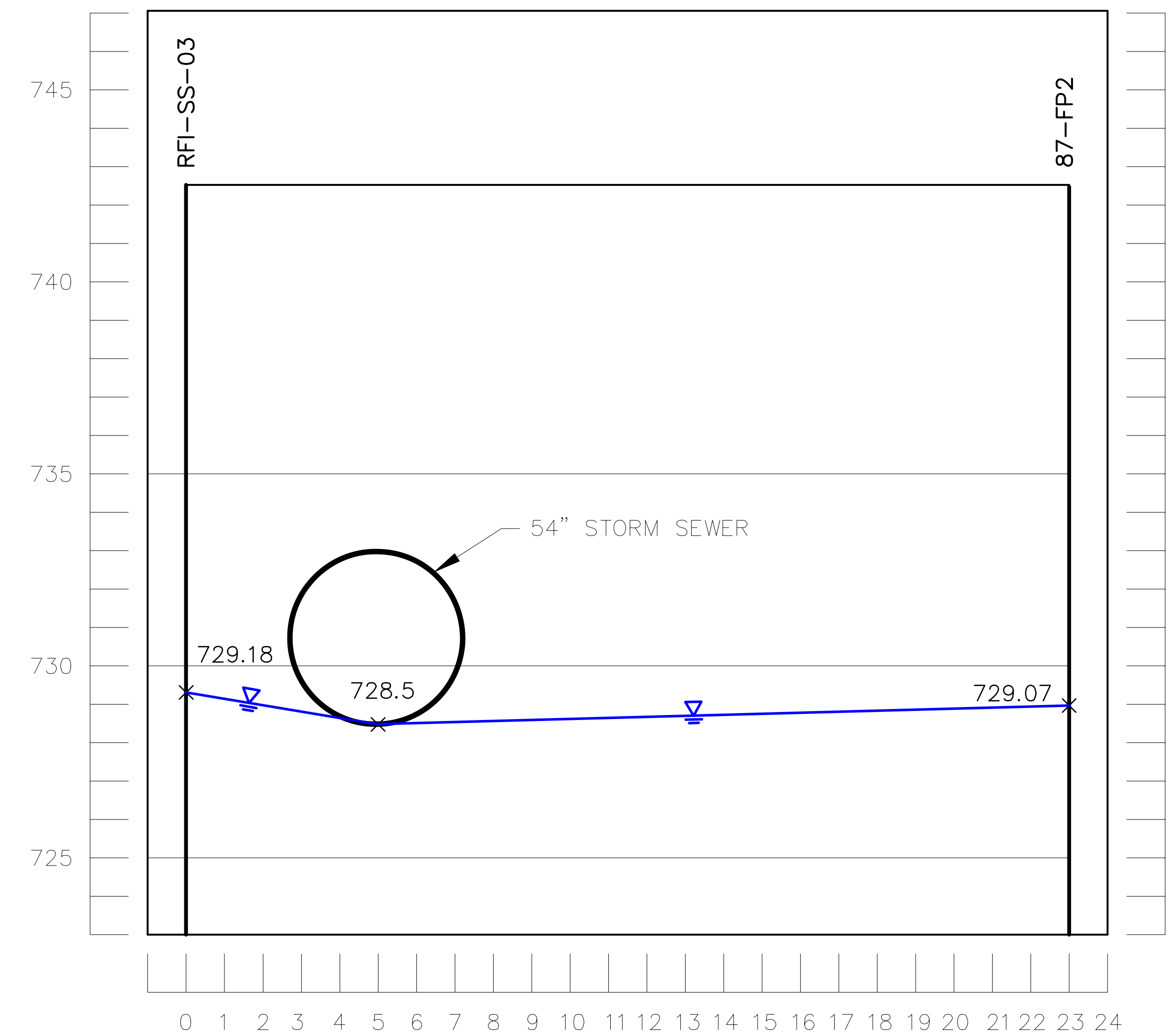
FIGURE
I-8

L: ON=*, OFF=REF
P: PAGESET/SYR-BL
3/24/06 SYR-85-NES LAF GMS
64410112/HISTORIC/64410B07.DWG



PLAN

SCALE: 1"=30'



SECTION C-C

HORIZONTAL SCALE: 1"=5'
VERTICAL SCALE: 1"=5'

LEGEND:

- EXISTING MONITORING WELL
- PIEZOMETER LOCATION
- STORM SEWER LINE
- STORM SEWER CATCH BASIN
- 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.

GENERAL MOTORS CORPORATION
NAO FLINT OPERATIONS SITE
FLINT, MICHIGAN

BUILDING 85
PIEZOMETER LOCATIONS

BBL
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engineers, scientists, economists

FIGURE
I-9

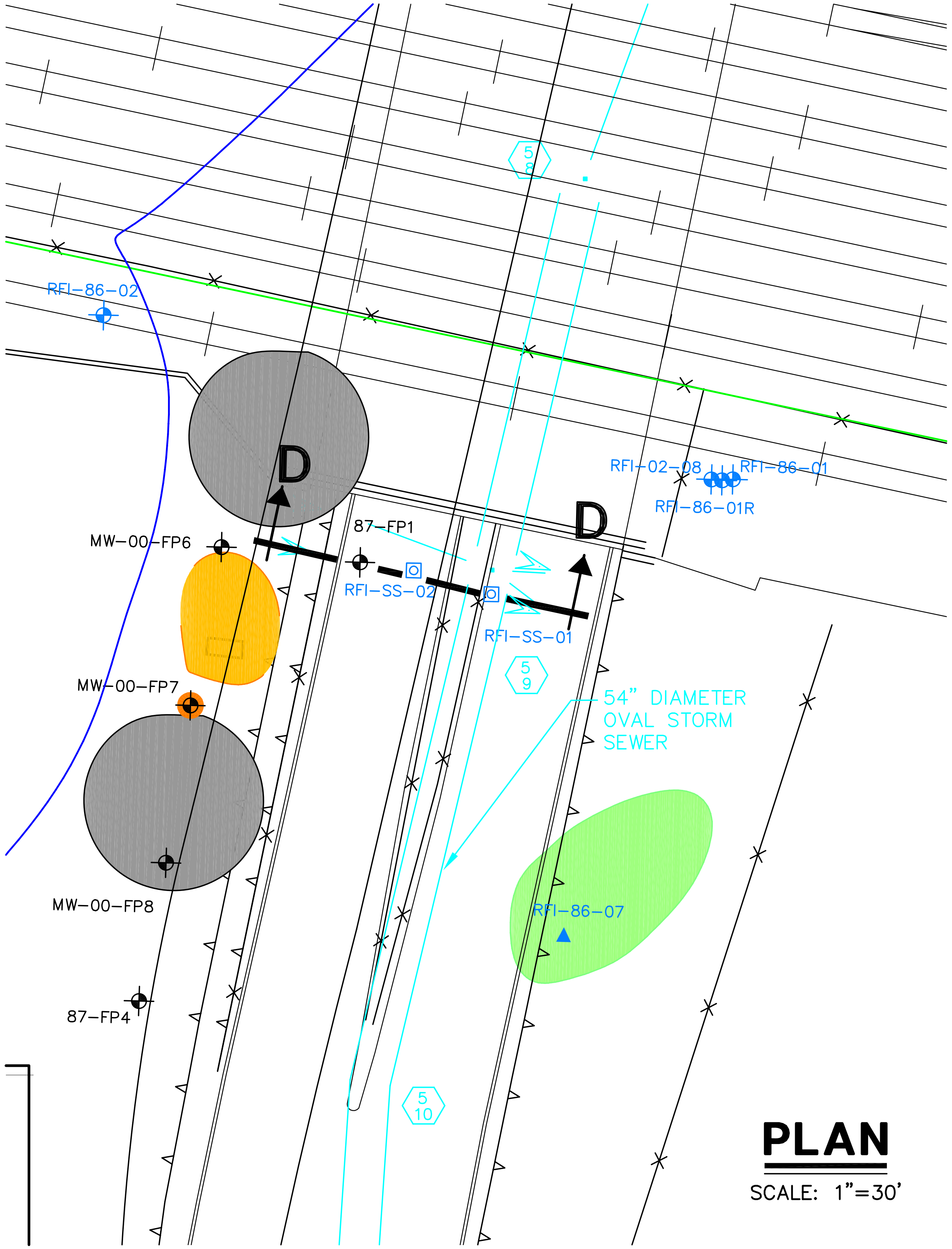
L: ON=*, OFF=REF
P: PAGESET/SYR-BL
3/24/06 SYR-85-NES LAF GMS
64410112/HISTORIC/64410B08.DWG

LEGEND:

- EXISTING MONITORING WELL
- PIEZOMETER LOCATION
- STORM SEWER LINE
- STORM SEWER CATCH BASIN
- FALL 2001 DISSOLVED PHASE VOC EXCEEDENCES IN GROUNDWATER
- SUMMER 2002 ESTIMATED NAPL EXTENT
- FALL 2001 DISSOLVED PHASE METALS EXCEEDENCES IN GROUNDWATER
- EXISTING IM

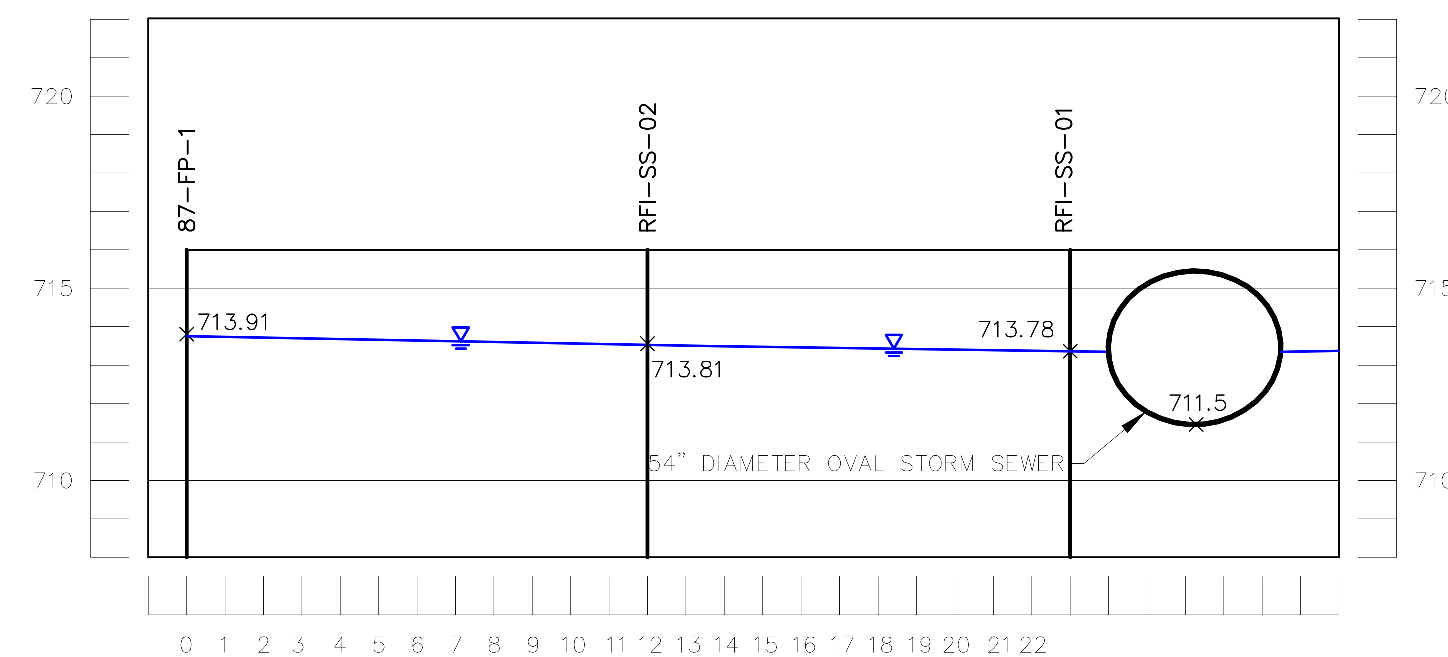
NOTES:

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



PLAN

SCALE: 1"=30'



SECTION D-D

HORIZONTAL SCALE: 1"=5'
VERTICAL SCALE: 1"=5'

GENERAL MOTORS CORPORATION
NAO FLINT OPERATIONS SITE
FLINT, MICHIGAN

LEITH STREET PIEZOMETER LOCATIONS

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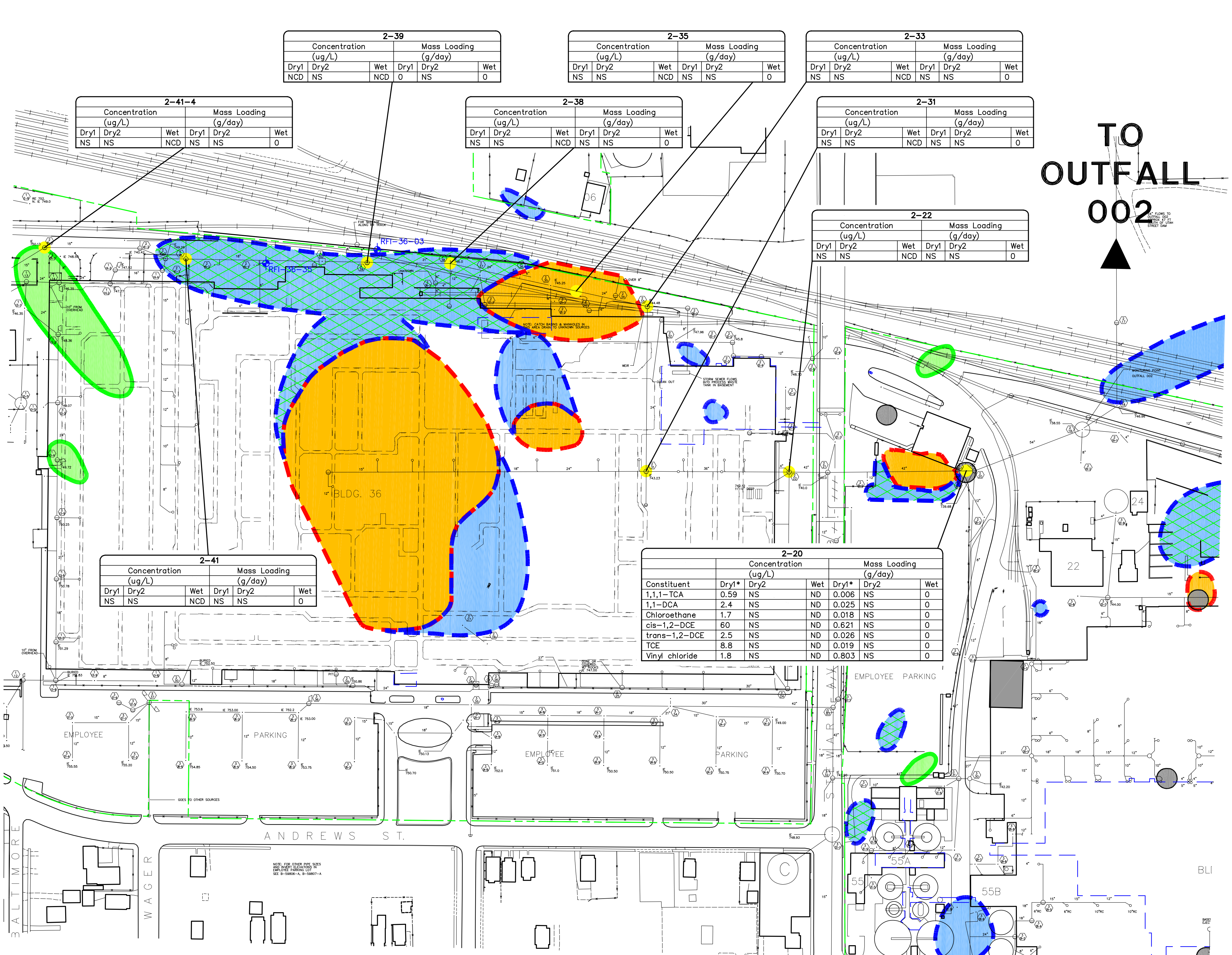
FIGURE **I-10**

L: ON=*, OFF=REF
P: PAGESET/SYR-BL
3/24/06 SYR-85-NES LAF GMS
64410112/HISTORIC/64410B09.DWG



2-39					
Concentration (ug/L)			Mass Loading (g/day)		
Dry1	Dry2	Wet	Dry1	Dry2	Wet
NCD	NS	NCD	0	NS	0

2-35					
Concentration (ug/L)			Mass Loading (g/day)		
Dry1	Dry2	Wet	Dry1	Dry2	Wet
NS	NS	NCD	NS	NS	0

2-33					
Concentration (ug/L)			Mass Loading (g/day)		
Dry1	Dry2	Wet	Dry1	Dry2	Wet
NS	NS	NCD	NS	NS	0

2-41-4					
Concentration (ug/L)			Mass Loading (g/day)		
Dry1	Dry2	Wet	Dry1	Dry2	Wet
NS	NS	NCD	NS	NS	0

2-38					
Concentration (ug/L)			Mass Loading (g/day)		
Dry1	Dry2	Wet	Dry1	Dry2	Wet
NS	NS	NCD	NS	NS	0

2-31					
Concentration (ug/L)			Mass Loading (g/day)		
Dry1	Dry2	Wet	Dry1	Dry2	Wet
NS	NS	NCD	NS	NS	0

2-22					
Concentration (ug/L)			Mass Loading (g/day)		
Dry1	Dry2	Wet	Dry1	Dry2	Wet
NS	NS	NCD	NS	NS	0

2-41					
Concentration (ug/L)			Mass Loading (g/day)		
Dry1	Dry2	Wet	Dry1	Dry2	Wet
NS	NS	NCD	NS	NS	0

2-20						
	Concentration (ug/L)			Mass Loading (g/day)		
Constituent	Dry1*	Dry2	Wet	Dry1*	Dry2	Wet
1,1,1-TCA	0.59	NS	ND	0.006	NS	0
1,1-DCA	2.4	NS	ND	0.025	NS	0
Chloroethane	1.7	NS	ND	0.018	NS	0
cis-1,2-DCE	60	NS	ND	0.621	NS	0
trans-1,2-DCE	2.5	NS	ND	0.026	NS	0
TCE	8.8	NS	ND	0.019	NS	0
Vinyl chloride	1.8	NS	ND	0.803	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-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

NOTES:

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

0 100' 200'
GRAPHIC SCALE

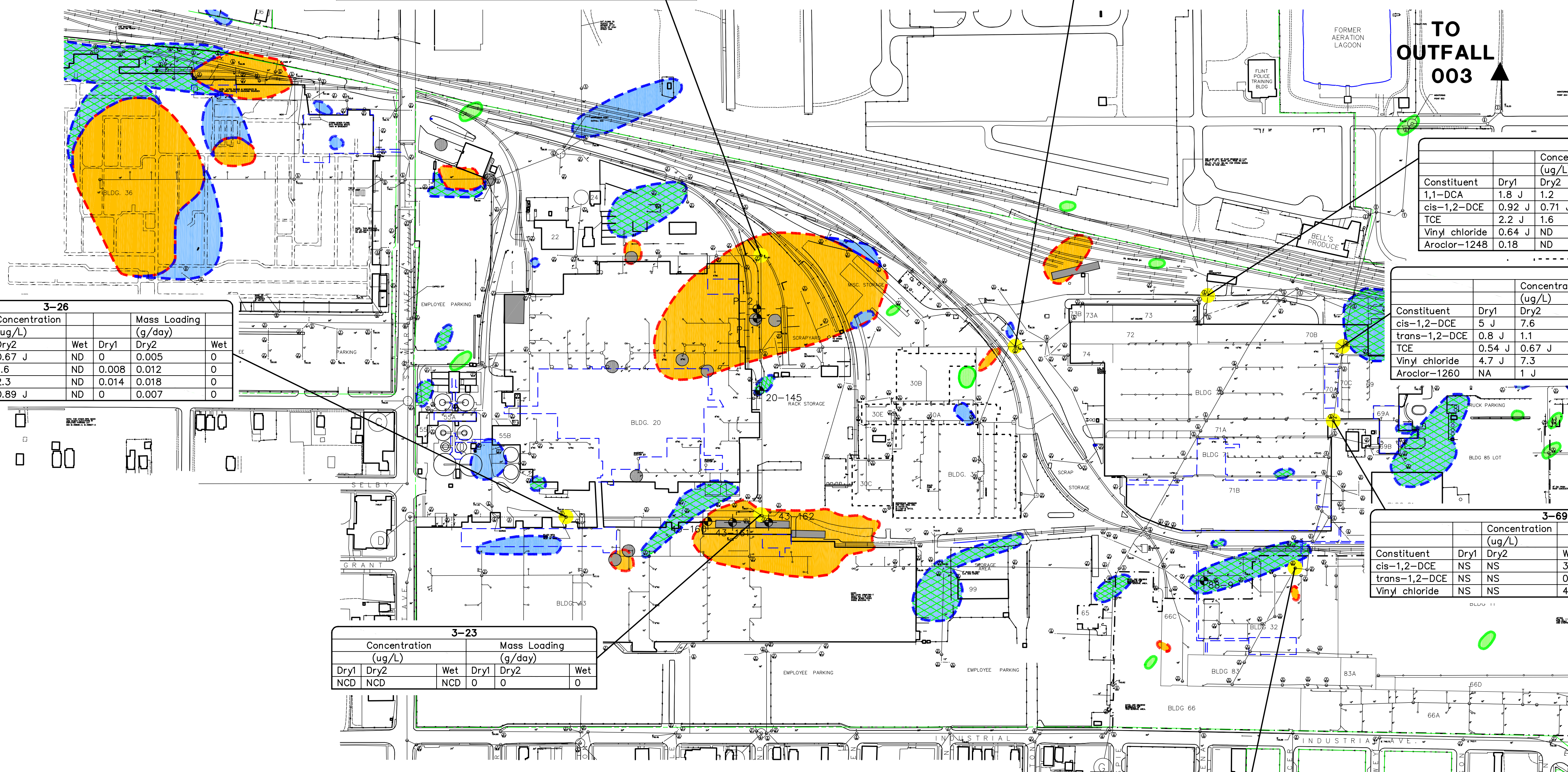
GENERAL MOTORS CORPORATION
NAO FLINT OPERATIONS SITE
FLINT, MICHIGAN

OUTFALL 002 DATA BOX MAP

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

FIGURE
I-11

X: 64410X01.DWG, 64410X05.DWG, 64410X07.DWG
L: ON=*, OFF=*REF*, *SHD-BUILDING, [SUBUTILYLIM, [SUBUTILSHD
P: PAGESET/SYR-DL
3/24/06 SYR-85-NES SDL GMS
64410112/HISTORIC/64410C01.DWG



3-22-1

Constituent	Concentration (ug/L) Dry1	Dry2	Wet	Mass Loading (g/day) 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

Constituent	Concentration (ug/L) Dry1	Dry2	Wet	Mass Loading (g/day) 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

Constituent	Concentration (ug/L) Dry1	Dry2	Wet	Mass Loading (g/day) 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

3-65

Constituent	Concentration (ug/L) Dry1	Dry2	Wet	Mass Loading (g/day) 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

3-26

Constituent	Concentration (ug/L) Dry1	Dry2	Wet	Mass Loading (g/day) 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

3-69

Constituent	Concentration (ug/L) Dry1	Dry2	Wet	Mass Loading (g/day) 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) Dry1	Dry2	Wet	Mass Loading (g/day) Dry1	Dry2	Wet
NCD	NCD	NCD	0	0	0

3-76-8

Concentration (ug/L) Dry1	Dry2	Wet	Mass Loading (g/day) 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-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

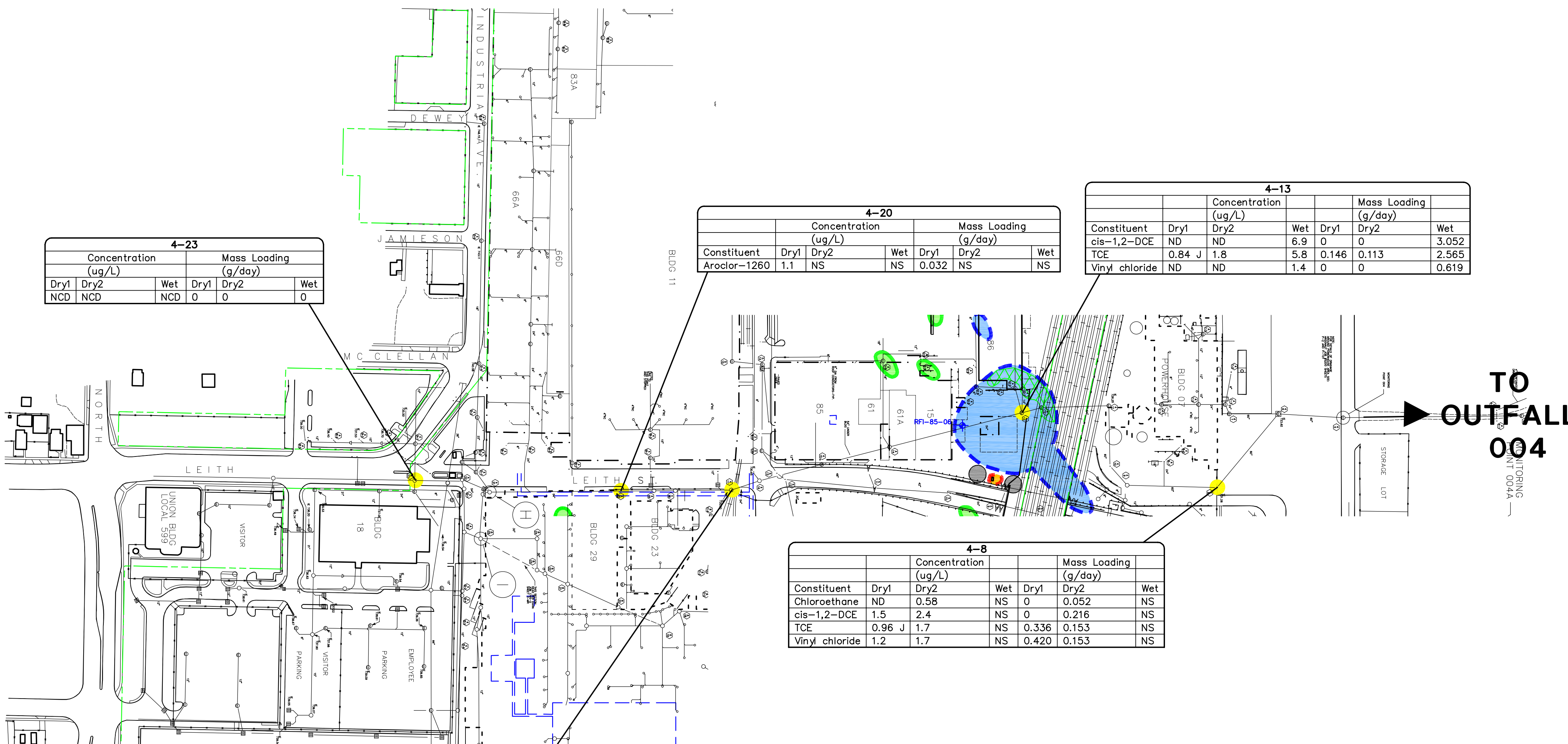
X: 64410X01.DWG, 64410X05.DWG, 64410X07.DWG
L: ON=*, OFF=*REF* ,ISUB*, ISHD-BUILDING
P: PAGESET/SYR-DL
3/28/06 SYR-85-NES SDL GMS
64410112/HISTORIC/64410C02.DWG

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-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.

0 150' 300'
APPROXIMATE GRAPHIC SCALE

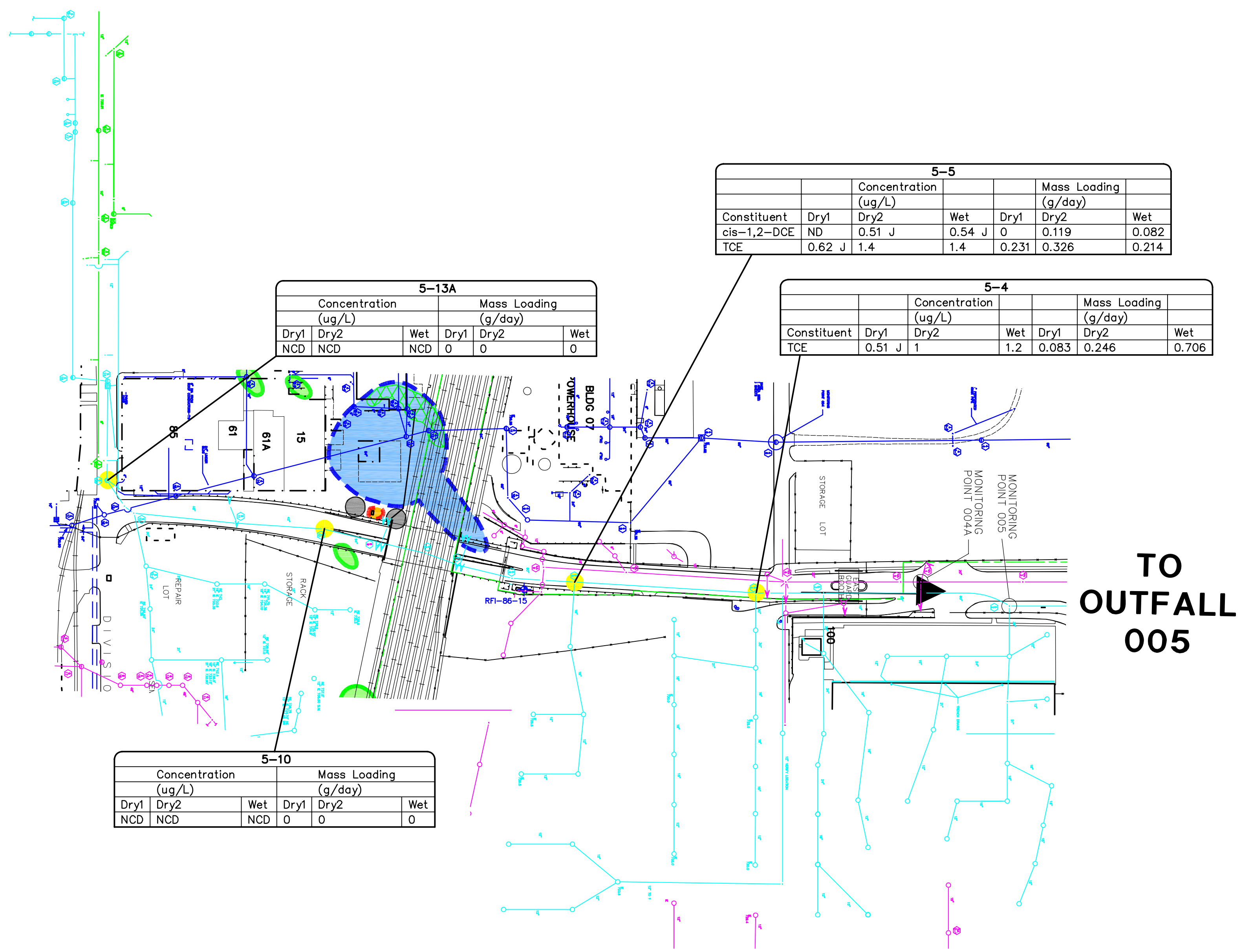
GENERAL MOTORS CORPORATION
NAO FLINT OPERATIONS SITE
FLINT, MICHIGAN

OUTFALL 004 DATA BOX MAP

BBL®
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



5-5

Constituent	Concentration (ug/L) Dry1	Concentration (ug/L) Dry2	Concentration (ug/L) Wet	Mass Loading (g/day) Dry1	Mass Loading (g/day) Dry2	Mass Loading (g/day) Wet
cis-1,2-DCE	ND	0.51 J	0.54 J	0	0.119	0.082
TCE	0.62 J	1.4	1.4	0.231	0.326	0.214

5-13A

Concentration (ug/L) Dry1	Concentration (ug/L) Dry2	Concentration (ug/L) Wet	Mass Loading (g/day) Dry1	Mass Loading (g/day) Dry2	Mass Loading (g/day) Wet
NCD	NCD	NCD	0	0	0

5-4

Constituent	Concentration (ug/L) Dry1	Concentration (ug/L) Dry2	Concentration (ug/L) Wet	Mass Loading (g/day) Dry1	Mass Loading (g/day) Dry2	Mass Loading (g/day) Wet
TCE	0.51 J	1	1.2	0.083	0.246	0.706

5-10

Concentration (ug/L) Dry1	Concentration (ug/L) Dry2	Concentration (ug/L) Wet	Mass Loading (g/day) Dry1	Mass Loading (g/day) Dry2	Mass Loading (g/day) Wet
NCD	NCD	NCD	0	0	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-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

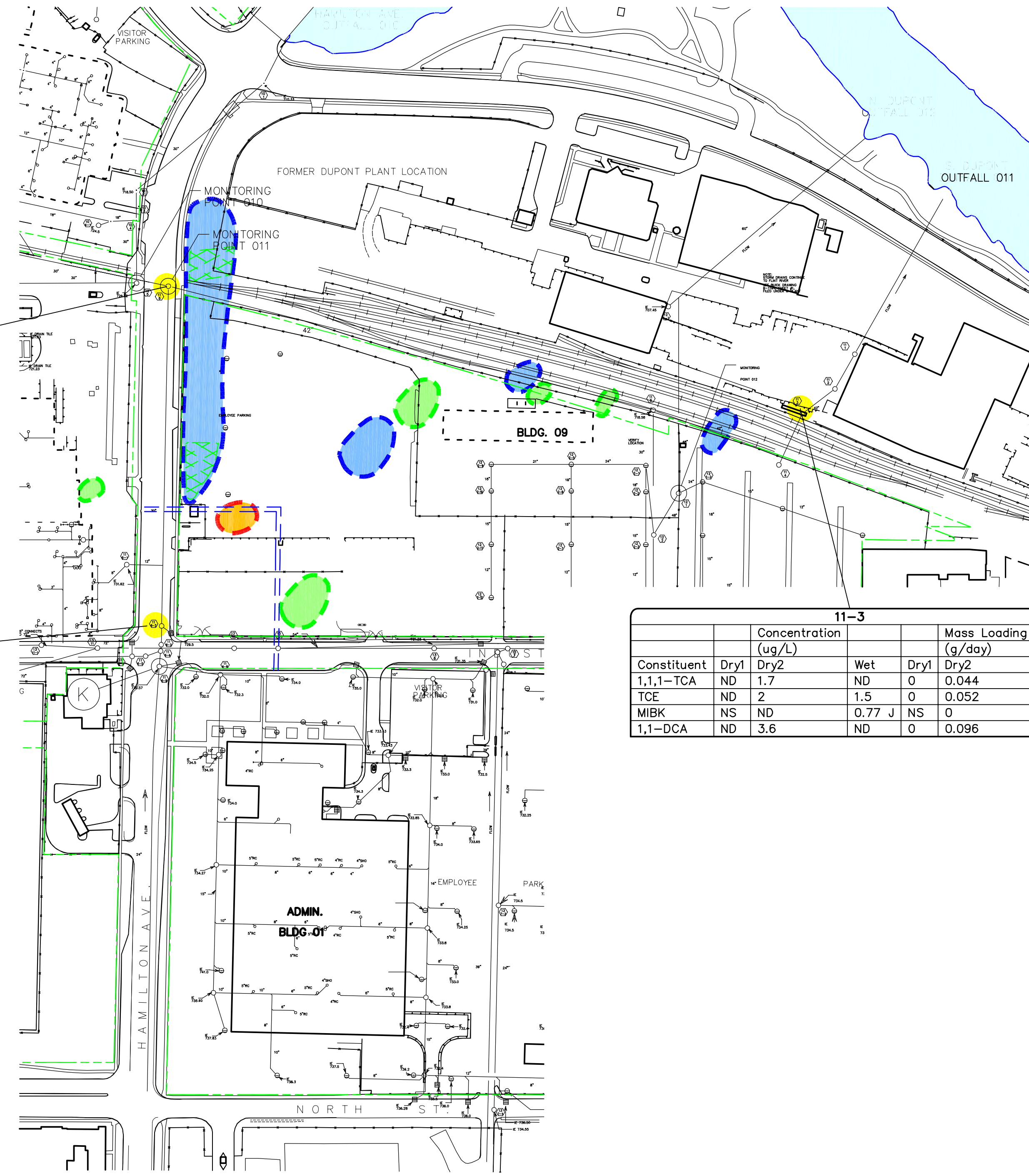
GENERAL MOTORS CORPORATION
NAO FLINT OPERATIONS SITE
FLINT, MICHIGAN

OUTFALL 005 DATA BOX MAP

BBL® 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

Constituent	Concentration (ug/L) Dry1	Dry2	Wet	Mass Loading (g/day) Dry1	Dry2	Wet
o-Xylene	NS	ND	1.8	NS	0	NF
MIBK	NS	ND	0.65 J	NS	0	NF

11-6-2

Constituent	Concentration (ug/L) Dry1	Dry2	Wet	Mass Loading (g/day) 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

Constituent	Concentration (ug/L) Dry1	Dry2	Wet	Mass Loading (g/day) 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

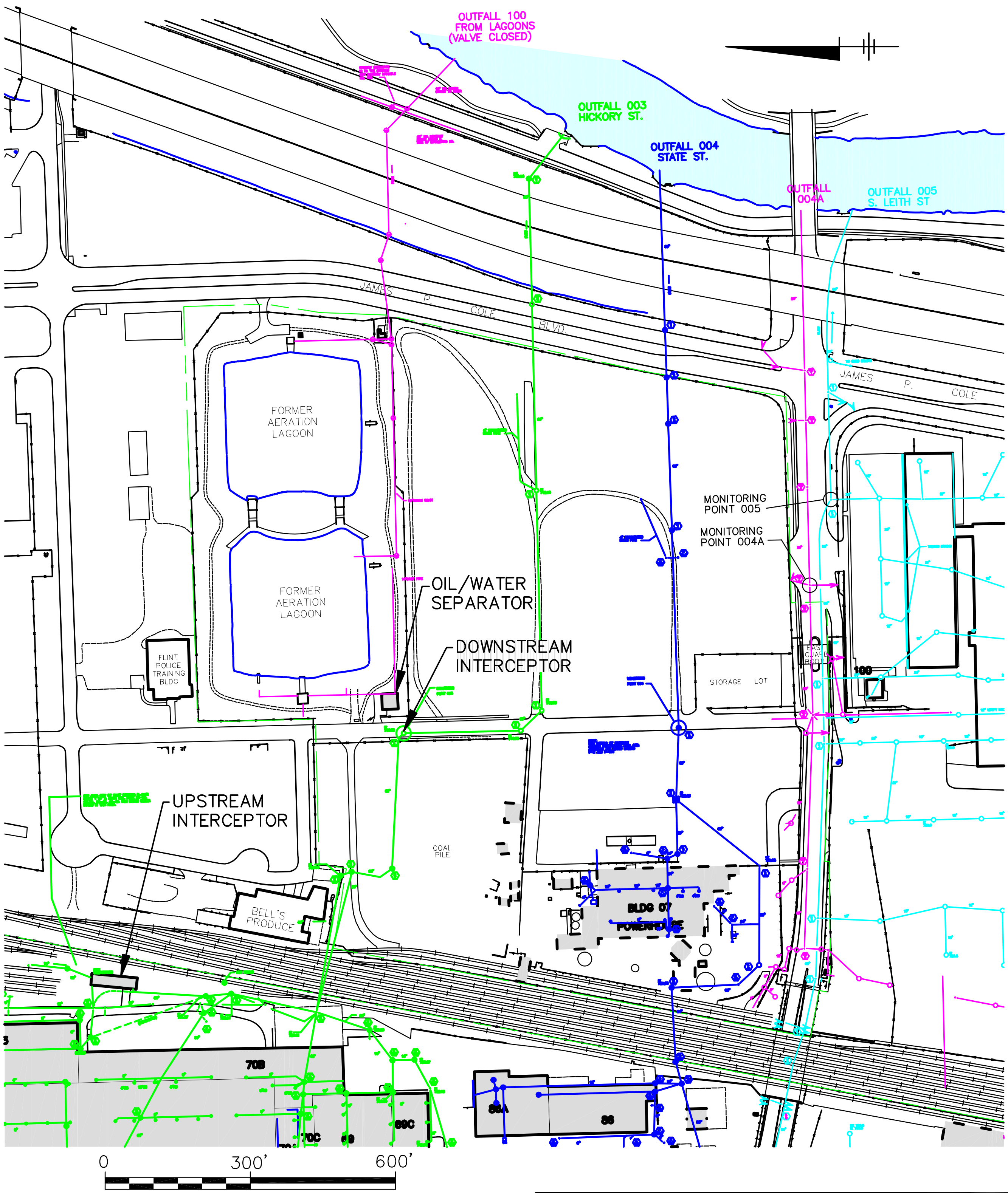
GENERAL MOTORS CORPORATION
NAO FLINT OPERATIONS SITE
FLINT, MICHIGAN

OUTFALL 011 DATA BOX MAP

BBL
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

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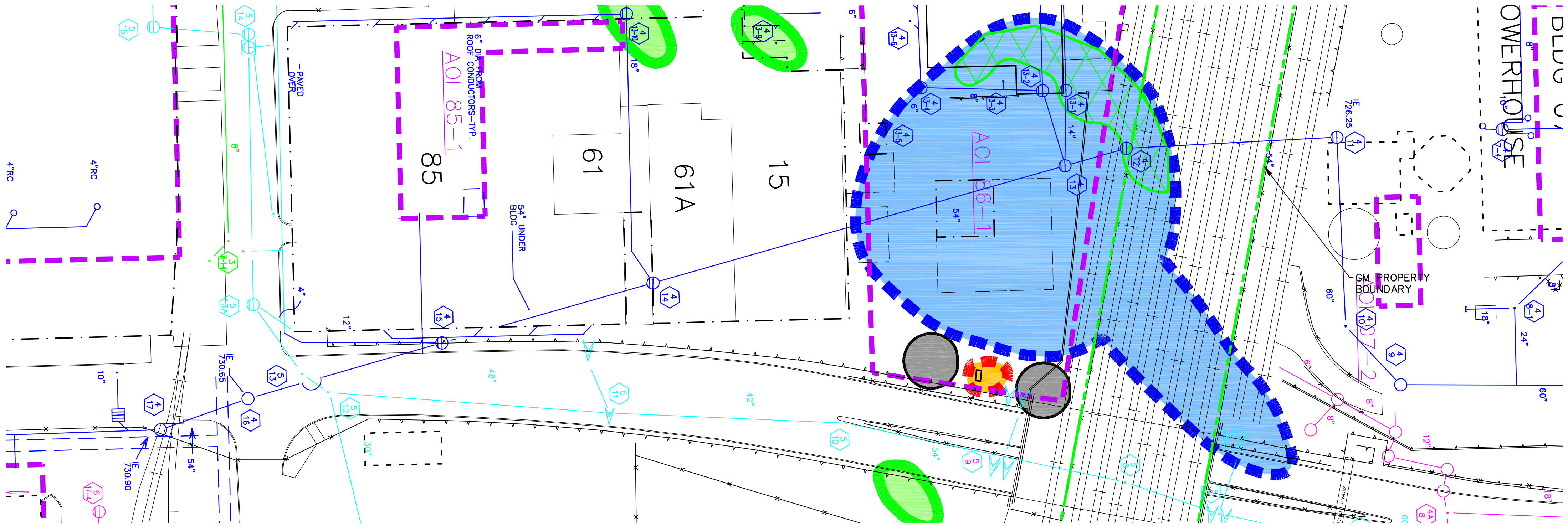
engineers, scientists, economists

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

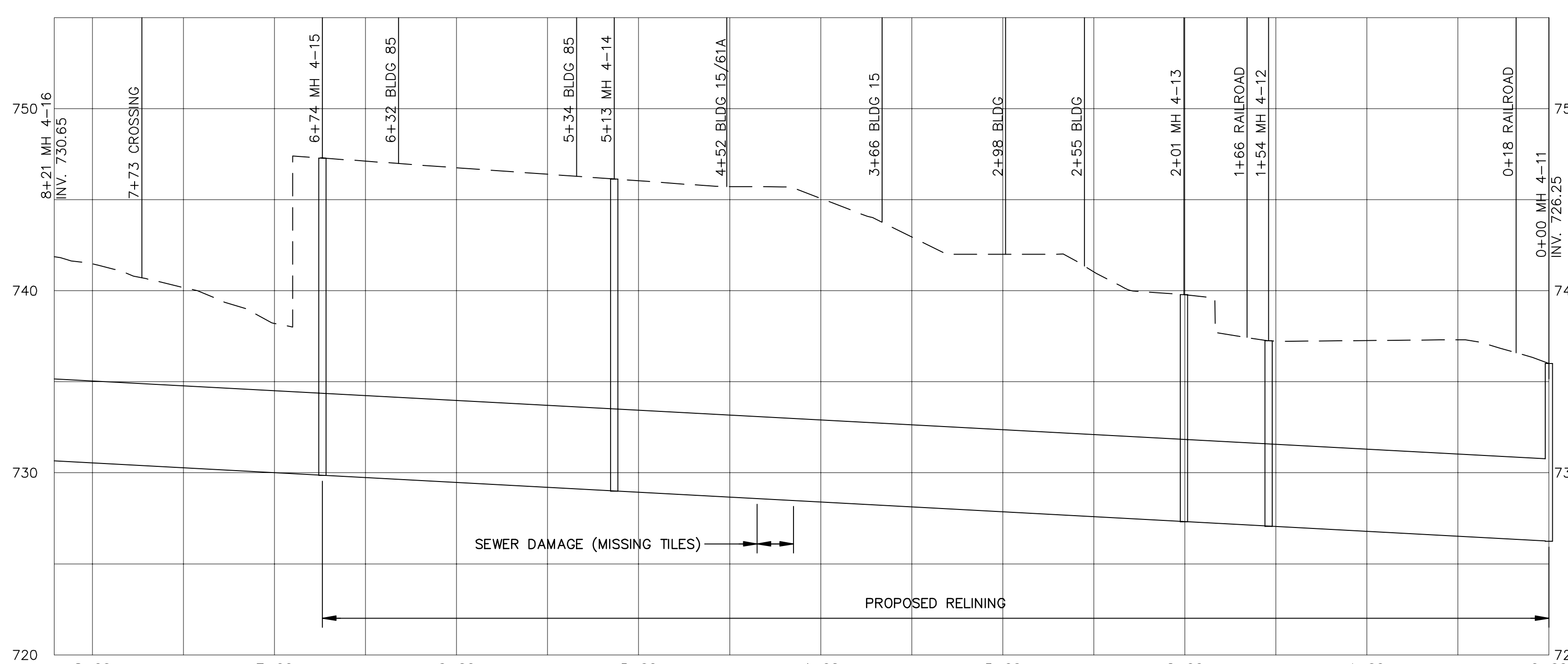
EXISTING IM

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



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

GENERAL MOTORS CORPORATION
NAO FLINT OPERATIONS SITE
FLINT, MICHIGAN

OUTFALL 004 STORM SEWER AREA OF INTEREST

BBL
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engineers, scientists, economists

FIGURE
I-17

GENERAL MOTORS CORPORATION
NAO FLINT OPERATIONS SITE
FLINT, MICHIGAN

OUTFALL 005 STORM SEWER AREA OF INTEREST

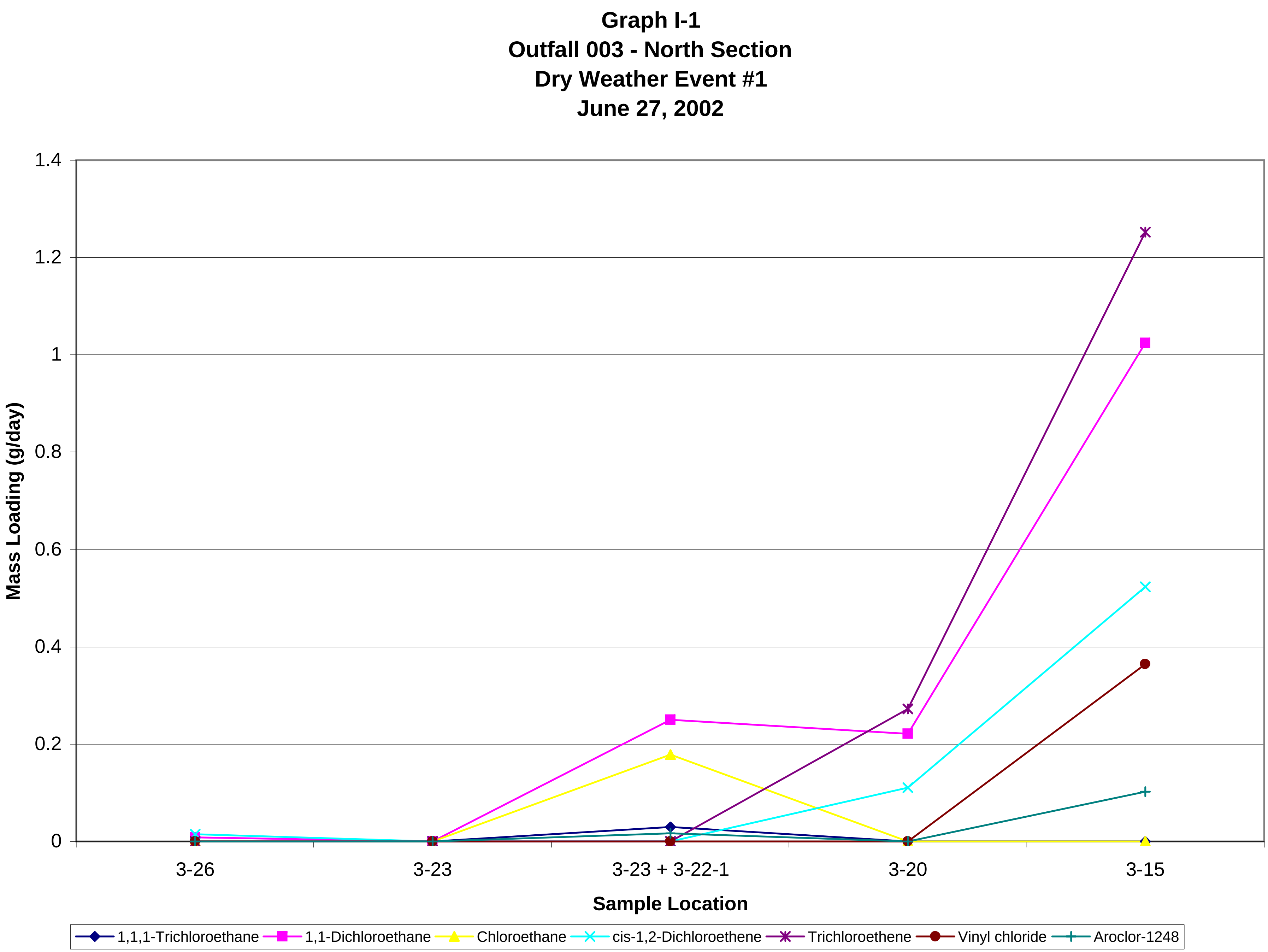
BBL
BLASLAND, BOUCK & LEE, INC.
engineers, scientists, economists

FIGURE
I-18

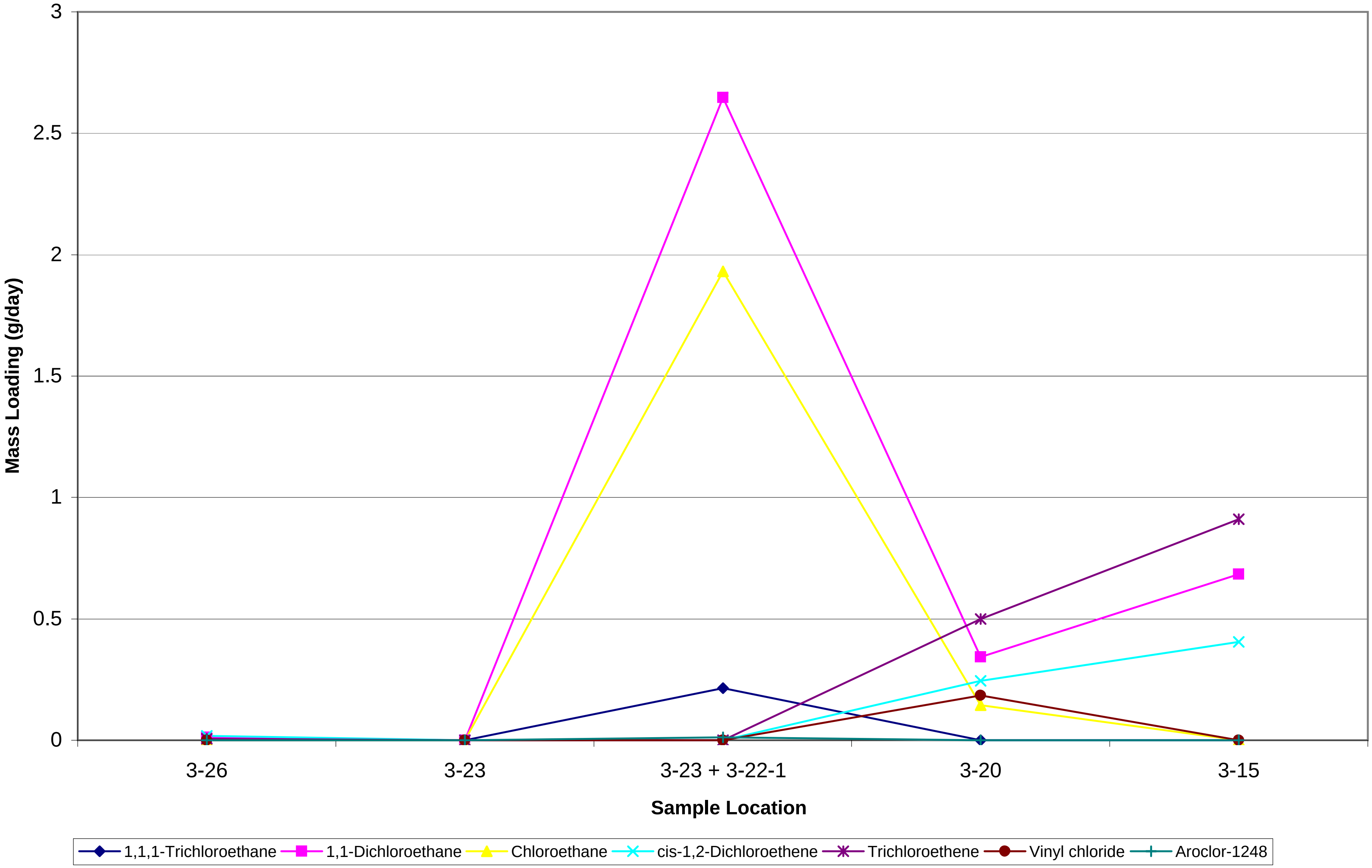
X: 64410X01, X02, X05, X07.DWG
L: ON=*, OFF=*REF*, *|SUB
P: PAGESET/SYR-DL
3/24/06 SYR-85-NES KMD GMS
64410112/HISTORIC/64410B12.DWG

Graphs

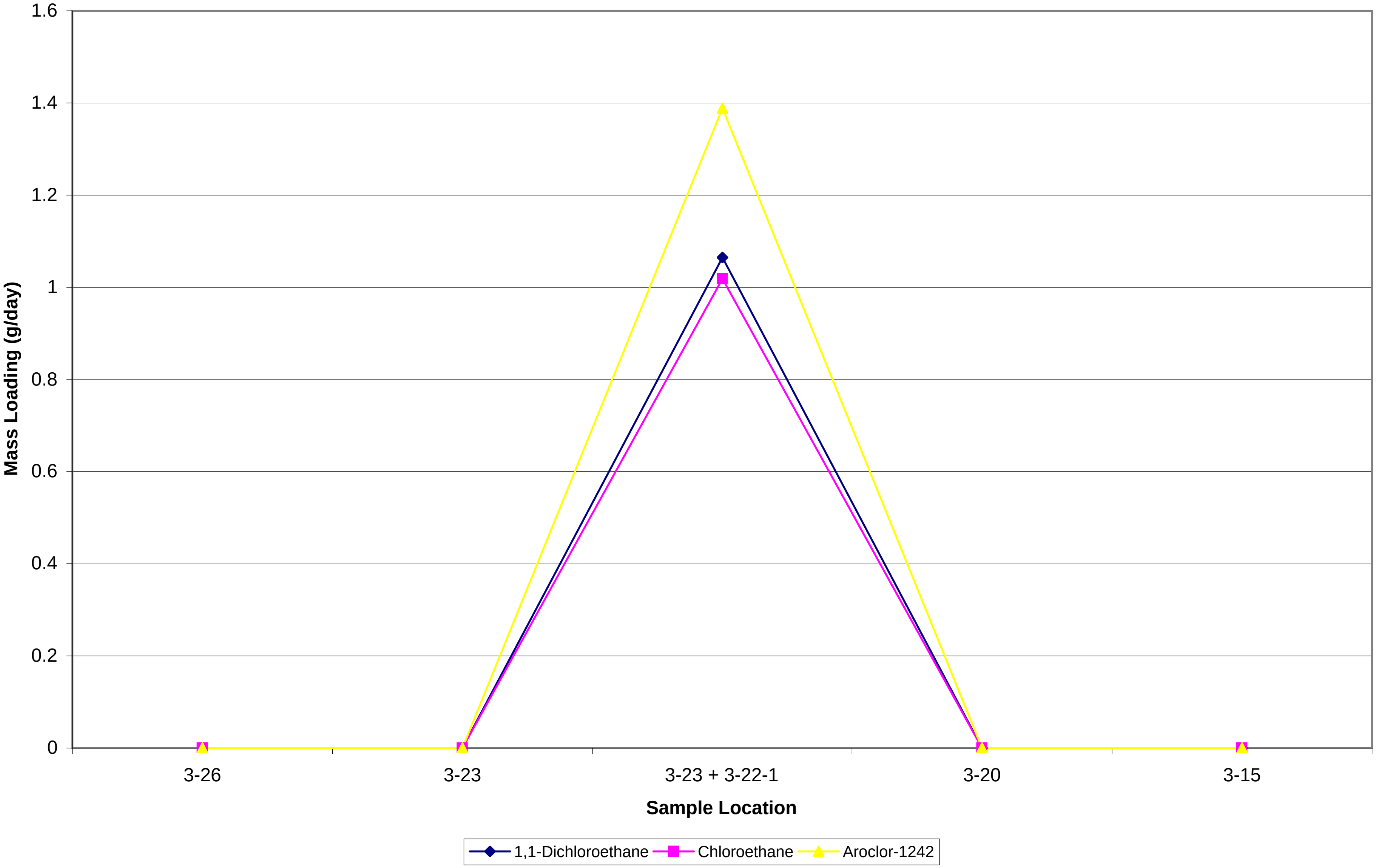
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

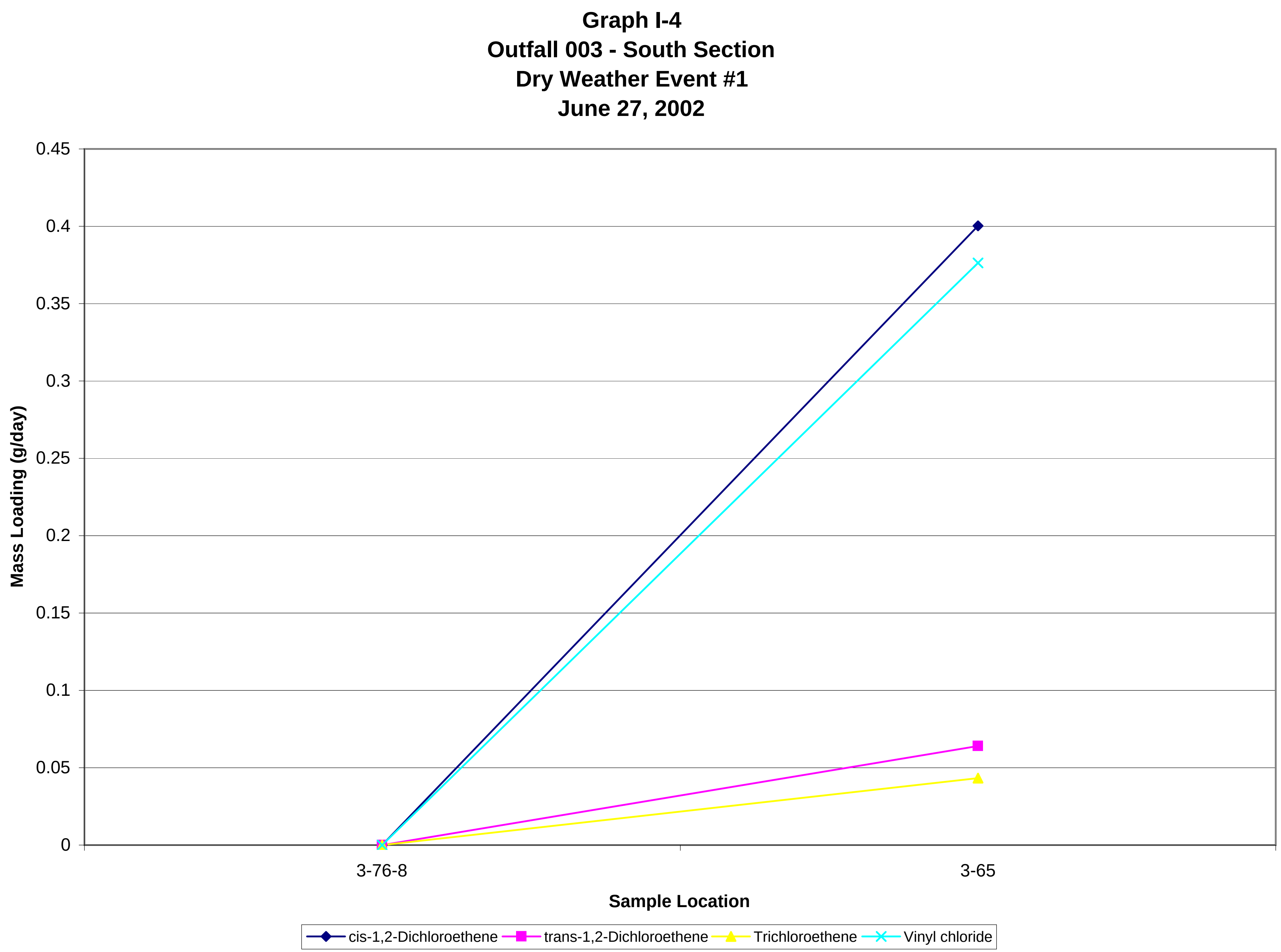

Graph I-1
Outfall 003 - North Section
Dry Weather Event #1
June 27, 2002
Mass Loading (g/day)
1.4
1.2
1
0.8
0.6
0.4
0.2
0
3-26
3-23
3-23 + 3-22-1
3-20
3-15
Sample Location
1,1,1-Trichloroethane
1,1-Dichloroethane
Chloroethane
cis-1,2-Dichloroethene
Trichloroethene
Vinyl chloride
Aroclor-1248

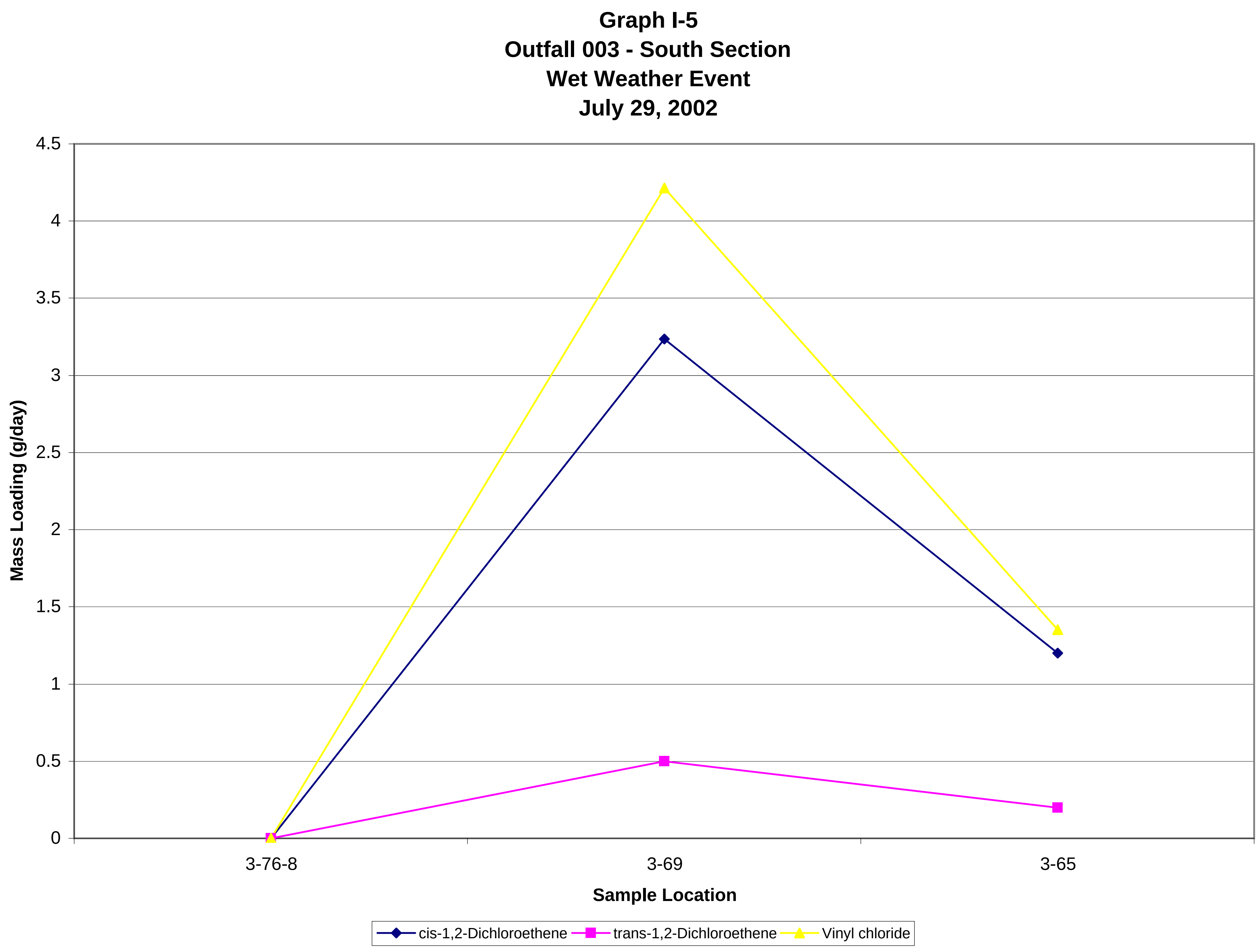
Graph I-2
Outfall 003 - North Section
Dry Weather Event #2
July 9, 2002



Graph I-3
Outfall 003 - North Section
Wet Weather Event
July 29, 2002

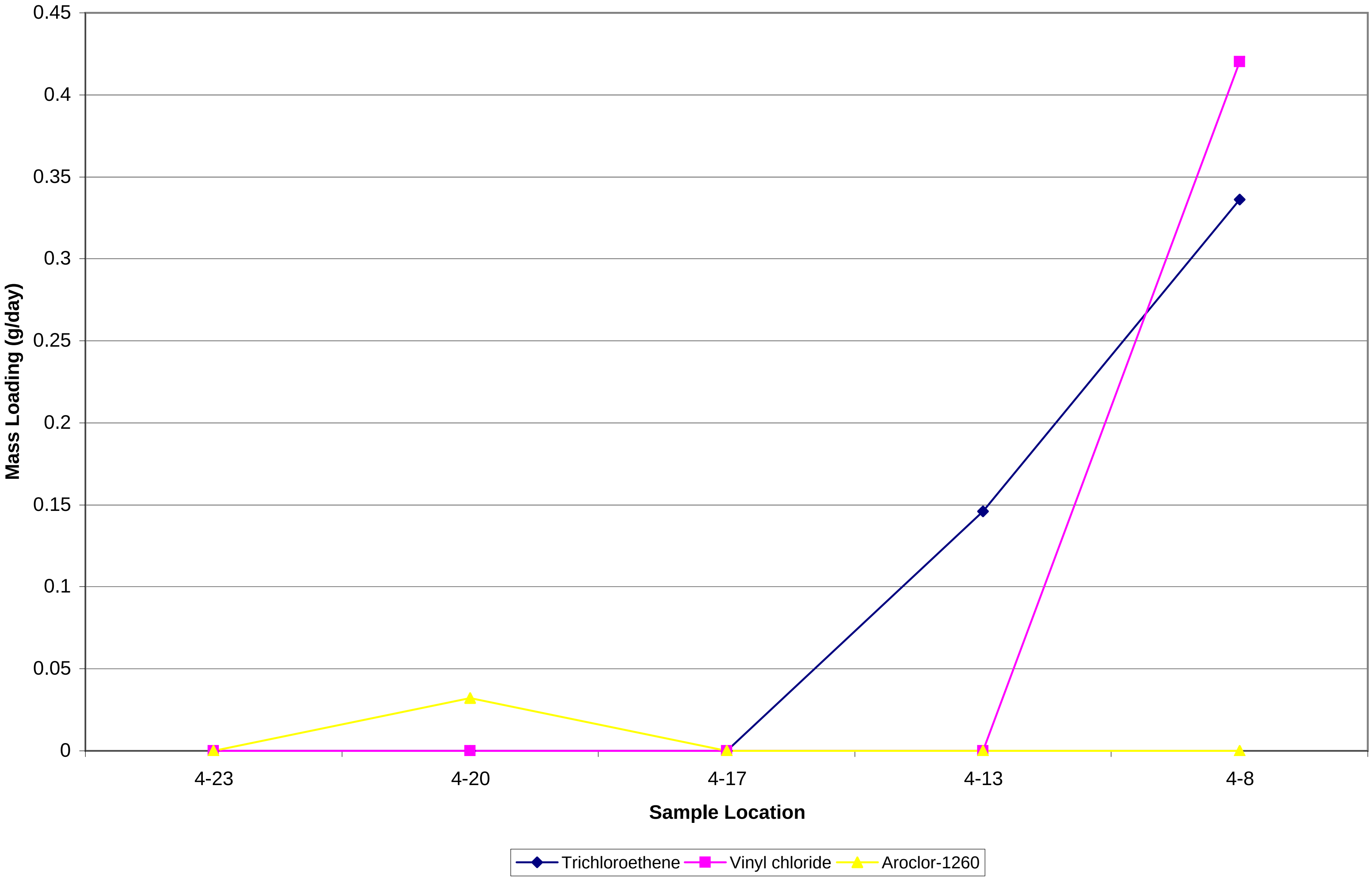



Graph I-4
Outfall 003 - South Section
Dry Weather Event #1
June 27, 2002
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
Mass Loading (g/day)
3-76-8
3-65
Sample Location
cis-1,2-Dichloroethene
trans-1,2-Dichloroethene
Trichloroethene
Vinyl chloride

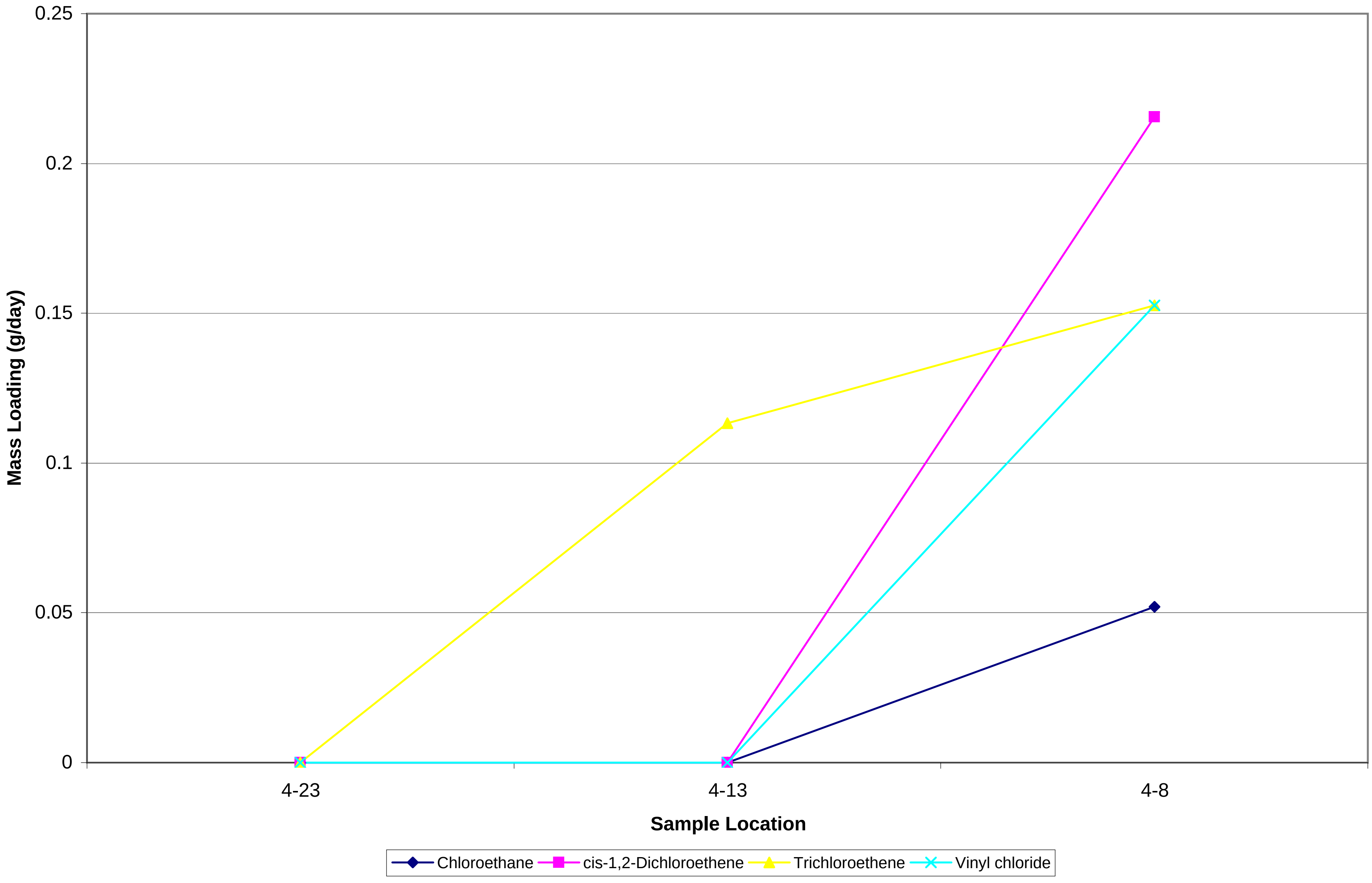


Graph I-5
Outfall 003 - South Section
Wet Weather Event
July 29, 2002
Mass Loading (g/day)
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
3-76-8
3-69
3-65
Sample Location
cis-1,2-Dichloroethene
trans-1,2-Dichloroethene
Vinyl chloride

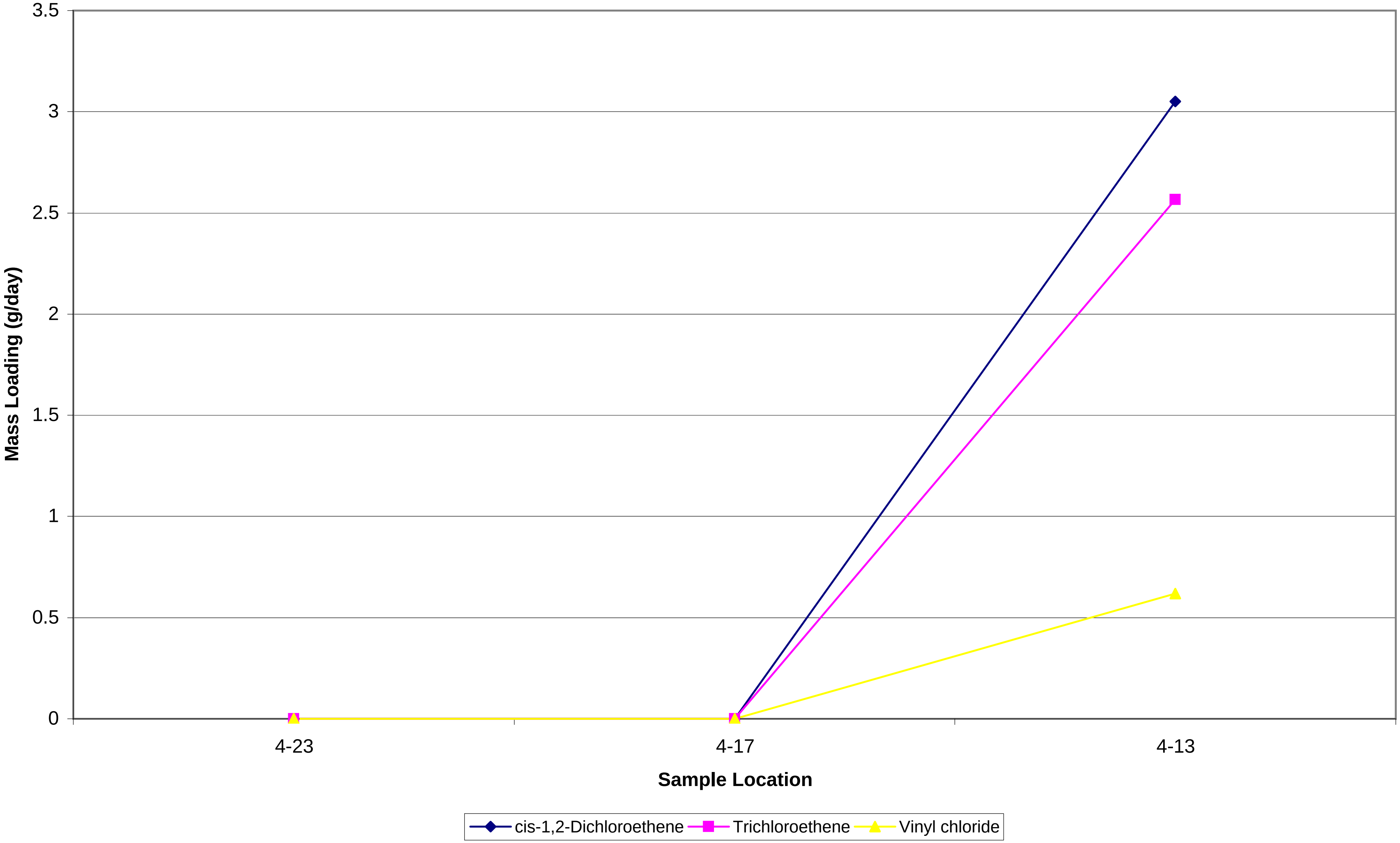
Graph I-6
Outfall 004
Dry Weather Event #1
June 27, 2002

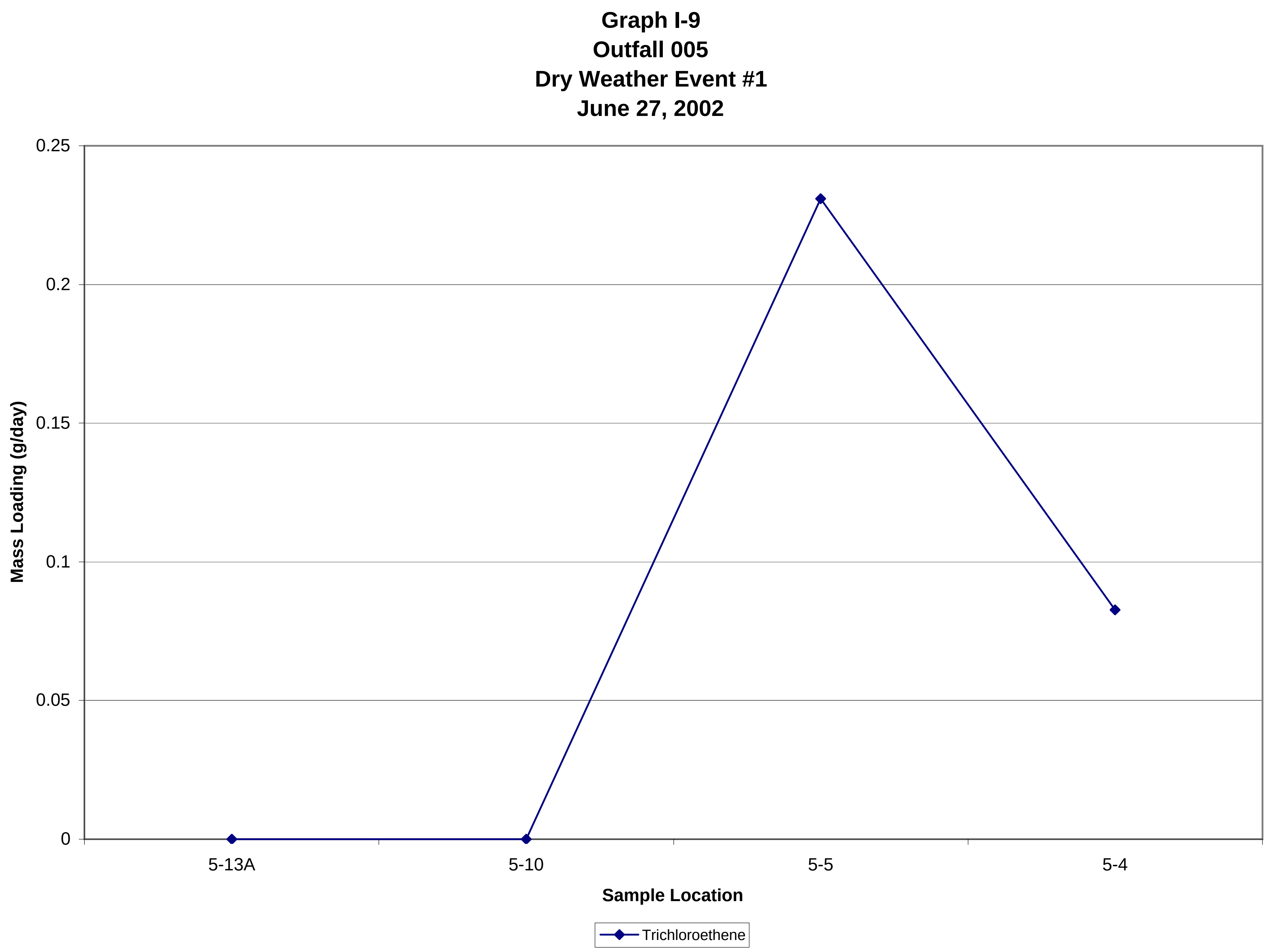


Graph I-7
Outfall 004
Dry Weather Event #2
July 9, 2002



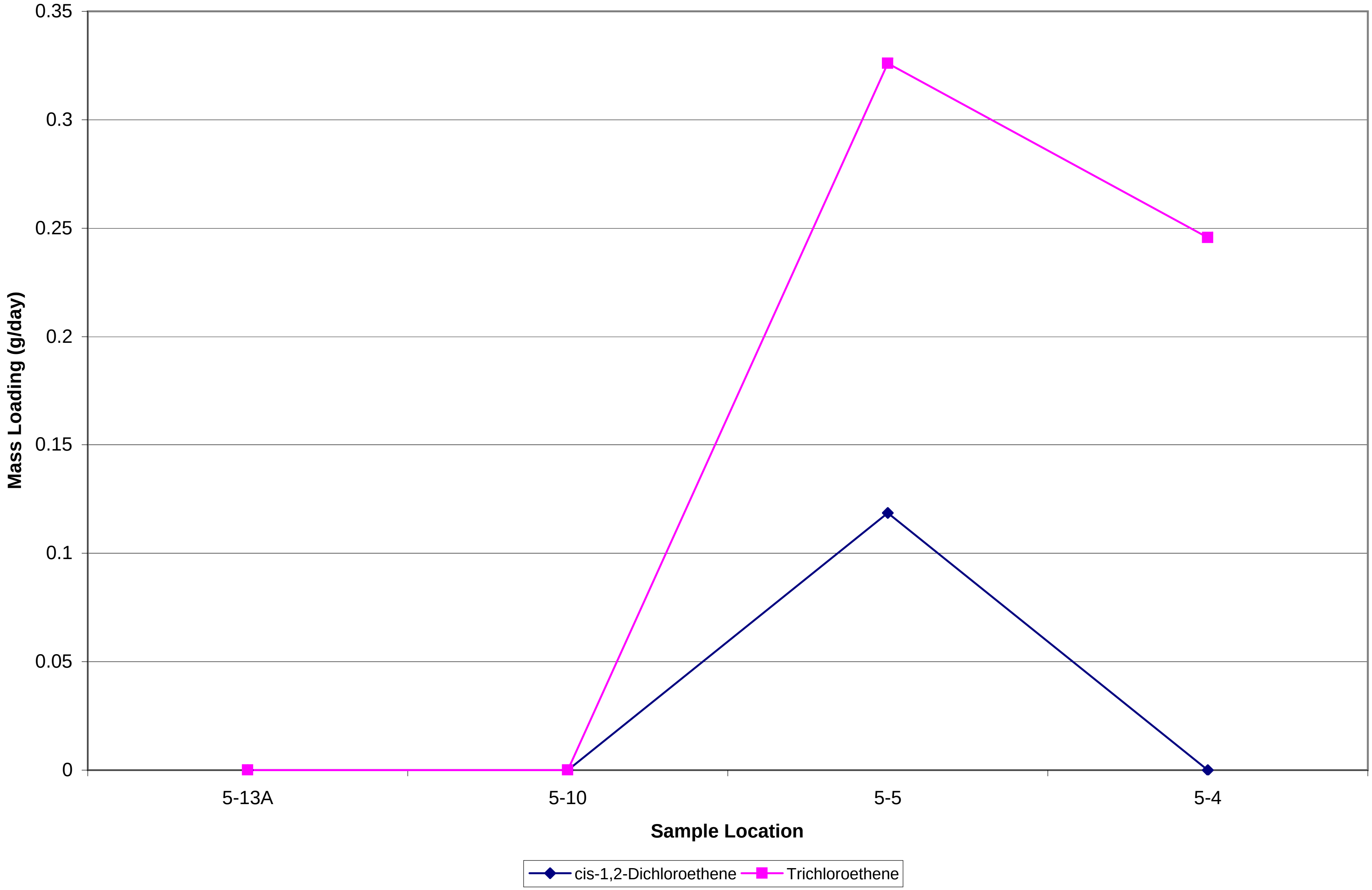
Graph I-8
Outfall 004
Wet Weather Event
July 29, 2002

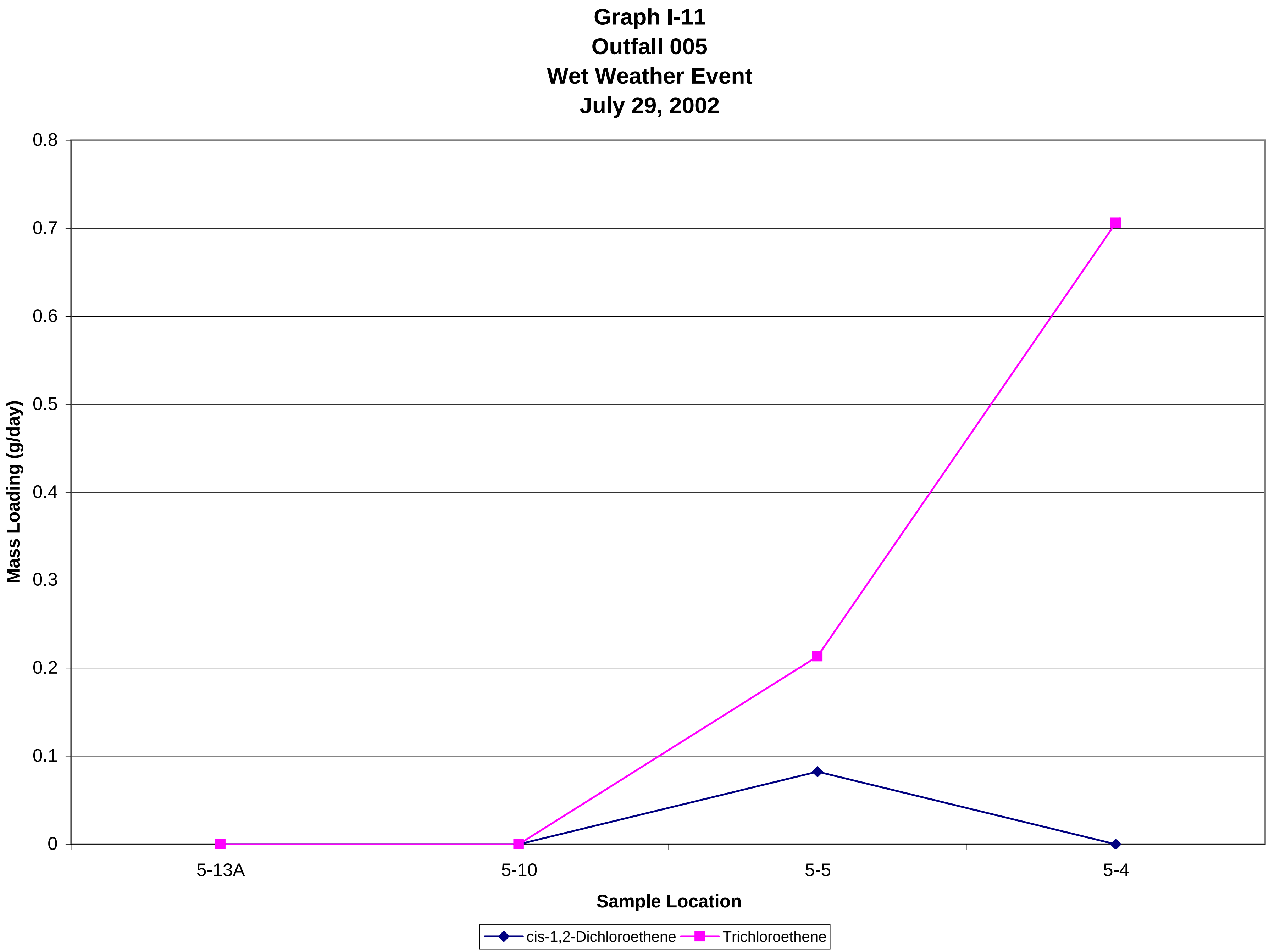


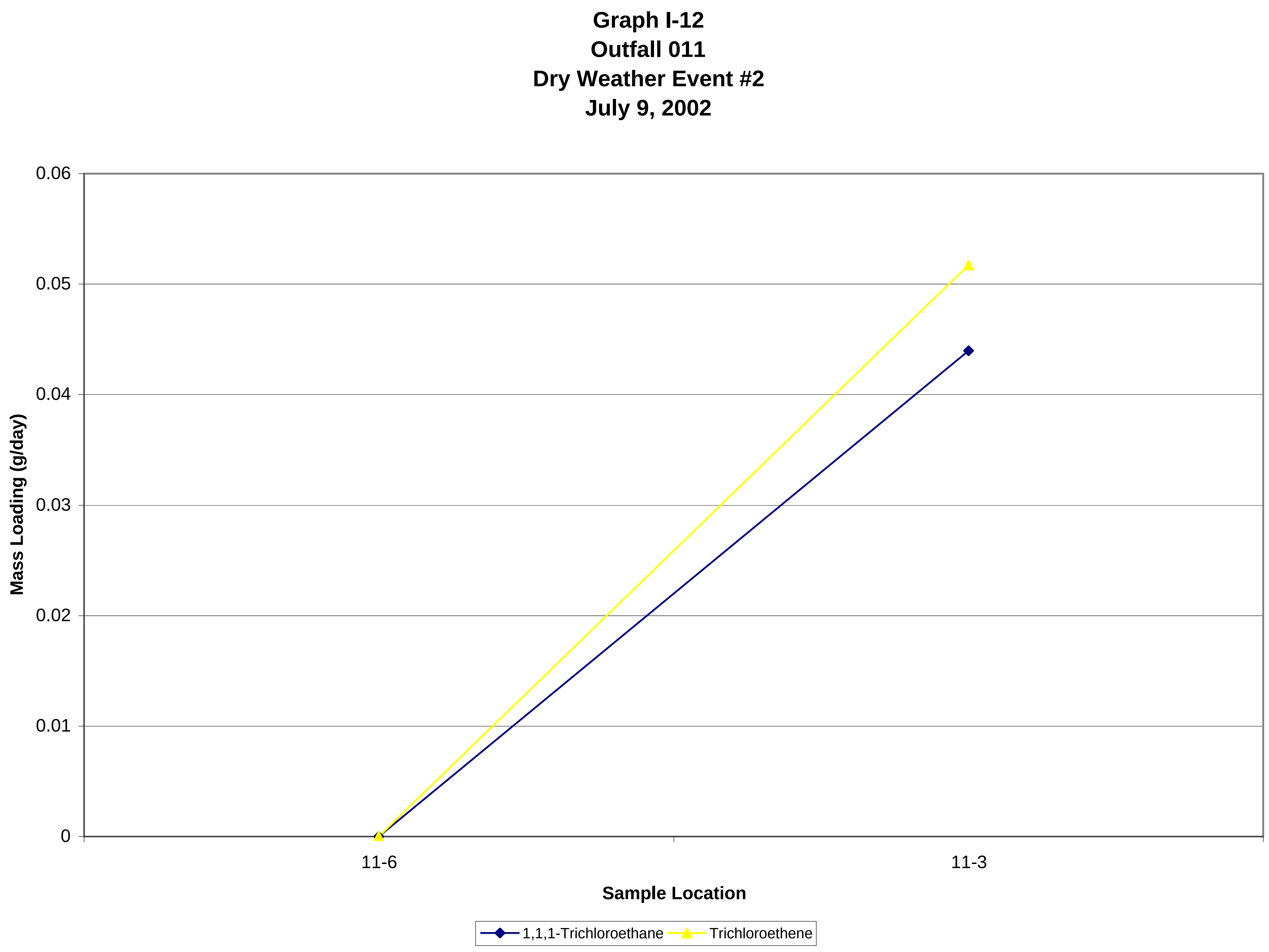


Graph I-9
Outfall 005
Dry Weather Event #1
June 27, 2002
Mass Loading (g/day)
0.25
0.2
0.15
0.1
0.05
0
5-13A
5-10
5-5
5-4
Sample Location
Trichloroethene

Graph I-10
Outfall 005
Dry Weather Event #2
July 9, 2002




Graph I-11
Outfall 005
Wet Weather Event
July 29, 2002
Mass Loading (g/day)
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
5-13A
5-10
5-5
5-4
Sample Location
cis-1,2-Dichloroethene
Trichloroethene


Graph I-12
Outfall 011
Dry Weather Event #2
July 9, 2002
0.06
0.05
0.04
0.03
0.02
0.01
0
Mass Loading (g/day)
11-6
11-3
Sample Location
1,1,1-Trichloroethane
Trichloroethene

Attachments

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.

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)
3-12	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

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:
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

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

GENERAL MOTORS CORPORATION
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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:
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
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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:
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

GENERAL MOTORS CORPORATION
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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

Disclaimer:
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Notes: Flow calculated using Q-VA

GENERAL MOTORS CORPORATION
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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

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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:
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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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

Disclaimer:
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Notes: Flow calculated using Q-VA

GENERAL MOTORS CORPORATION
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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

Disclaimer:
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Notes: Flow calculated using Q-VA
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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

Disclaimer:
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Notes: Flow calculated using Q-VA
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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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Notes: Flow calculated using Q-VA
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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

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)
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

Disclaimer:
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Notes: Flow calculated using Q-VA

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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

Disclaimer:
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Notes: Flow calculated using Q-VA

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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

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Notes: Flow calculated using Q-VA
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15-Mar-04

Attachment 2

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

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: / Date Collected:	**MH 2-38 07/29/02**	**MH 2-39 07/29/02**	**MH 2-41 07/29/02**	**MH 2-41-4 07/29/02**	**MH 3-15 06/27/02**	**MH 3-15 07/09/02**	**MH 3-15 07/29/02**	**MH 3-20 06/27/02**	**MH 3-20 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: / Date Collected:	MH 3-20 07/29/02	MH 3-22-1 06/27/02	MH 3-22-1 07/09/02	MH 3-22-1 07/29/02	MH 3-23 06/27/02	MH 3-23 07/09/02	MH 3-23 07/29/02	MH 3-26 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: / Date Collected:	MH 4-13 06/27/02	MH 4-13 07/09/02	MH 4-13 07/29/02	MH 4-13 11/20/02	MH 4-13 11/21/02	MH 4-17 06/27/02	MH 4-17 07/29/02	MH 4-17 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: Date Collected:	MH 5-4 07/09/02	MH 5-4 07/29/02	MH 5-5 06/27/02	MH 5-5 07/09/02	MH 5-5 07/29/02	MH 5-10 06/27/02	MH 5-10 07/09/02	MH 5-10 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