November 9, 2006

SITE SOURCE CONTROL (SSC) WORK PLAN ADDENDUM NO. 5

Spring 018 Area

GM POWERTRAIN BEDFORD FACILITY
105 GM DRIVE
BEDFORD, INDIANA

EPA ID# IND006036099

DISCLAIMER:
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NOVEMBER 2006
REF. NO. 013968 (205)

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LIST OF ACRONYMS

Agreement	RCRA Corrective Action Agreement
AOC	Administrative Order by Consent
AOI	Area of Interest
CRA	Conestoga-Rovers and Associates
Facility	GM Powertrain Bedford Plant
GM	General Motors Corporation
GPR	Ground Penetrating Radar
MSDS	Material Safety Data Sheet
mL	milliliters
PCB	polychlorinated biphenyls
ppt	parts per trillion
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
RA	Removal Action
RCRA	Resource Conservation and Recovery Act
ROW	Right-of-Way
RFI	RCRA Facility Investigation
SSC	Site Source Control
SSC Addendum No. 5	Site Source Control Work Plan Addendum No. 5
Spring 018 Area	Spring 018 Study Area
SOW	Scope of Work
STL	Severn-Trent Laboratories
SVOC	Semi-Volatile Organic Compound
TAL	Target Analyte List
TCL	Target Compound List
U.S. EPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound
Willowstick	Willowstick Technologies, LLC.

1.0 INTRODUCTION

This document presents Addendum No. 5 to the Site Source Control Work Plan (SSC Addendum No. 5) for the General Motors Corporation (GM) Powertrain Bedford Facility (Facility) located in Bedford, Indiana (U.S. EPA ID# IND006036099). This SSC Addendum No. 5 has been developed to present changes to the Site Source Control Work Plan (SSC Work Plan, November 2003), in accordance with the Administrative Order on Consent (Docket Number V-W-'03-C-747, effective July 31, 2003)(AOC).

1.1 GENERAL

The Facility is located at 105 GM Drive, Bedford, Lawrence County, Indiana, 47421 (Figure 1.1). The Facility produces aluminum casting products, such as transmission cases, pistons, and engine blocks. Major aluminum production processes include die casting and permanent molding. The Bedford Facility has been operating as an aluminum foundry since 1942, with major facility modifications completed in 1950, 1953, 1966, 1971, 1974, 1977, 1979, and 1980.

1.2 PURPOSE

The purpose of this SSC Addendum No. 5 is to present additional investigation activities in the Spring 018 Study Area (Spring 018 Area). The Spring 018 Area includes the former springs Spring 018, Spring 018B, Spring 021-002, Spring 021-003, Spring 021-004, Spring 021-005, and the existing Spring 018C which now combines the water from the former noted springs. The investigations will serve to further define groundwater flow pathways previously identified during completion of two separate geophysical surveys, and to further delineate the area of the Spring 018 groundwater drainage basin. The proposed Scope of Work (SOW) includes the installation of 10 to 15 coreholes and three dye trace investigations along interpreted groundwater flowpaths in the Spring 018 Area.

2.0 REVIEW OF EXISTING CONDITIONS

2.1 BACKGROUND

Spring 018 is located along Bailey's Branch, at the boundary of Parcels 15, 20, and 216 (see Figure 1.1). A plan of the Spring 018 Area is presented on Figure 2.1. The surface expression of the spring is exposed along the rock sidewall of the excavated stream. The area is heavily forested and topographically varied. The stream banks in this reach are steep sided rock cliffs. Extensive work has been completed during the ongoing Removal Action (RA) in this area, exposing sections of the underlying bedrock in the stream and on the banks.

Two dye trace investigations completed in July 2004 demonstrated that surface water from Bailey's Branch and Tributary 3, which had previously entered the underlying karstic bedrock via swallets (a fracture system in the bedrock within the upper portion of the streambed), discharged from the karst system at the Spring 018 Area. Groundwater in the karst system originating to the east, outside the creek channel, also discharges to the Spring 018 Area.

The swallets have been a source of low level PCB contamination because creek water containing PCBs entered the swallets and thus, the karst pathways near the creek. As water and sediment passes through these karstic fractures, a portion of the accumulated clay particles can become dislodged from the walls of the fracture and flow with the groundwater ultimately discharging at Spring 018.

Each of the swallets, located within the upstream portion of the Spring 018 Area, were sealed with concrete in 2005, in order to reduce the groundwater discharge at Spring 018 (this reduced the flow of water to be treated prior to discharge to the creek). This activity was performed during initial streambed restoration completed in the summer of 2005. Discharge at the Spring 018 Area has been reduced by approximately 90% (based on qualitative and quantitative assessments) from 3,000 to 5,000 gpm to 300 to 500 gpm. The water is currently being collected and treated prior to discharge to the creek. In addition, sealing of the swallets with concrete reduced the potential for clay particles to be dislodged by reducing the scour velocity within Spring 018. However, residual levels of PCBs continue to be detected at Spring 018, although with lower flow rates.

2.2 SUMMARY OF PREVIOUS INVESTIGATIONS

2.2.1 GEOLOGICAL

The surficial geology of the Spring 018 Area generally consists of a relatively thin layer of unconsolidated deposits of sand, clay, and chert produced by the weathering of limestone bedrock (regolith) and loess. The unconsolidated, or overburden materials, vary in thickness across this area from a few inches near the edge of the streambed to approximately 10 to 15 feet beneath the crests of the surrounding hillsides. Thicker deposits of proglacial outwash and lake sediment, and recent alluvium, occur along the major stream valleys, including Bailey's Branch Creek, although not within the Spring 018 Area.

The uppermost or youngest bedrock unit encountered within the Spring 018 Area is the Salem Formation. This massively bedded limestone consists of medium to coarse-grained calcarenite. The base of this formation is characterized by microfossils and grains of broken fossils which are cemented with calcite. The Salem Formation grades into and conformably overlies the Harrodsburg Formation.

The Harrodsburg Formation generally consists of medium to coarse-grained limestone with beds of variable thickness. Calcareous shale is present in beds and as thin laminae throughout the formation (argillaceous) but is more dominant toward the base. The Harrodsburg Formation has been divided in the literature into an Upper and a Lower Unit. The Upper Unit of the Harrodsburg Formation consists of coarse-grained biocalcirudite and bioclastic calcarenite. The Lower Unit of the Harrodsburg Formation consists of a fine to medium-grained calcarenite which is interbedded with shale beds and shale laminae. The base of the lower Harrodsburg Formation contains numerous siliceous geodes. The contact between the Harrodsburg Formation and the underlying Ramp Creek Formation is conformable and distinct, and can be mapped in the field based on a distinguishable change in lithology. The pre-excavation outlet of Spring 018 to Bailey's Branch was also identified along the contact between the Harrodsburg and Ramp Creek Formations.

The Ramp Creek Formation consists of medium grained calcarenite and is interbedded with fine-grained dolomitic limestone, shale, and chert. Geodes are abundant throughout the approximate 20 feet thickness of the Ramp Creek Formation. The contact between the Ramp Creek Formation and the underlying Edwardsville Formation is characterized by disconformity, observed in the field as a sharp lithologic break. The Edwardsville Formation ranges in composition from a siltstone to a sandy shale, with

occasional thin interbeds of limestone. A thin bed of glauconite is typically found marking the top of the Edwardsville Formation.

Additional information on the Spring 018 Area geology is presented in the RFI Work Plan (CRA, October 2001) and Technical Memorandum RFI, Soil, Sediment, Surface Water, Wipe Sampling (CRA, April 2004).

2.2.2 DYE TRACE

Two dye trace studies were completed in July 2004 as part of the original swallet investigation to determine the flow characteristics of these swallets. The dye injection was completed as two tests (one at each of the two main swallets at separate times). These activities were described in the RCRA Facility Investigation (RFI) Work Plan Addendum No. 6 (CRA, September 2004).

As part of the first dye trace study, 60 milliliters (mL) of Rhodamine WT was injected into Swallet #1 (See Figure 2.1), approximately 500 feet away from Spring 018. Visual evidence of dye was observed at Spring 018 approximately 36 minutes after injection. Dye was also observed at Spring 021-002, Spring 021-003, and at Spring 021-004 at approximately 37, 38, and 55 minutes after injection, respectively. These springs are approximately 600, 700, and 800 feet away from Swallet #1, respectively. Recovery monitoring was continued for approximately four days.

During the second dye trace study, dye injection took place at Swallet #2 (see Figure 2.1) where 40 mL of Rhodamine WT was used for the injection during this test. The recovery monitoring frequency was increased to every five minutes to account for the rapid transport through the system that was observed during the initial test at Swallet #1. Visual evidence of dye was observed at Spring 018 approximately 24 minutes after injection. Dye was also observed at Spring 021-002, Spring 021-003, and at Spring 021-004 at approximately 24, 25, and 45 minutes after injection, respectively. This test was discontinued at Spring 018 when the Facility's discharge was significantly reduced, resulting in limited amounts of surface water entering the swallets and no flow at Spring 018.

These tests identified relatively fast travel times from the swallets to the springs thereby indicating a well developed open flow pathway.

The results of both dye trace studies are presented in detail in the RFI Technical Memorandum for Swallet Testing (CRA, September 2004).

2.2.3 VIDEO

CRA conducted a video inspection of the Spring 018 opening in June 2005. Review of the video indicated that fractures and select bedding planes have been subject to selective dissolution and infilling with clay. Water flow within this karstic system appears to be along voids between bedding planes and also within vertical fractures. The video inspections provided a general understanding of the flow pathway orientation in the vicinity of the spring opening, extending into a larger conduit within the karstic rock to approximately 30 feet (where refusal occurred).

2.2.4 GEOPHYSICAL

In order to better understand flow within the karstic rock within the Spring 018 Area, CRA directed the performance of various geophysical testing studies using a variety of methods. The purpose of conducting several studies was to compare and contrast the results to better understand actual flow paths and conditions.

2.2.4.1 WILLOWSTICK

Willowstick Technologies, LLC (Willowstick) was retained as a subcontractor to CRA to perform an assessment using electromagnetic gradients in the groundwater regime. The purpose of the Willowstick study was to identify and map the groundwater flow pathways from the swallets to the current spring (Spring 018C) in order to assist in determining RA strategies.

The Willowstick geophysical technology identified electrically conductive subsurface zones and preferential groundwater flow pathways potentially capable of channeling subsurface flow as it moves into and beneath the Spring 018 Area. The Willowstick AquaTrack Geophysical Investigation Report was provided to the United States Environmental Protection Agency (U.S. EPA) on April 13, 2006. A summary interpretation of the AquaTrack geophysical results with the identified subsurface groundwater flowpaths is presented on Figure 2.2.

2.2.4.2 GROUND PENETRATING RADAR (GPR)

CRA conducted a GPR survey over the Spring 018 Area in the summer of 2005. The GPR study focused on the identification of potential highly fractured zones that could represent preferred groundwater flow pathways to the existing Spring 018C. The GPR Spring 018 Area consisted of the hillside located between Spring 018C and the upstream swallets. The complete GPR Memorandum was provided to U.S. EPA on April 13, 2006.

Review of the GPR survey results for the Spring 018 Area indicates that the bedding planes were strong reflectors, and produced a very strong response, as presented on Figure 2.3. The strata generally appeared as sub-horizontal bedding planes; however, there was evidence of vertical fractures based on the discontinuous nature of the bedding planes. In addition to the suspected subsurface conduit system, numerous other fractures were interpreted based on the GPR results. In general, fractures appear to occur along two main orientations, namely as shallow-dipping features to the west and as vertical to sub-vertical fractures dipping steeply to the east. A cross section of the interpreted trend of the suspected conduit is presented on Figure 2.4. The cross section illustrates the GPR response over suspected Spring 018 conduit for GPR Lines D through N.

2.2.5 ANALYTICAL RESULTS

Spring 018/018C has been sampled routinely over the past couple of years. Available analytical results are summarized in Table 2.1. Figure 2.5 presents these results in graphical form.

3.0 SCOPE OF WORK

This section outlines the proposed investigations and methods, which will be utilized to achieve the objectives presented in Section 1.0. The information acquired through these investigations will be used to determine if further investigation is warranted and to support the design of a RA strategy for the Spring 018 Area.

The investigations are summarized as follows:

- installation of 10 to 15 coreholes to further define the stratigraphy of the bedrock and to provide ground truthing of the Spring 018 Area to delineate the area of the spring drainage basin (Figure 3.1); and
- three proposed dye tracer investigations, as outlined below.

3.1 COREHOLE INSTALLATION AND DESIGN

RFI protocols (RFI Work Plan, CRA, October 2001) will be followed to complete the corings. At each location, the overburden material will be sealed from the bedrock with a four-inch steel casing, grouted into the upper portion of the bedrock surface. The grout will be allowed to cure for a minimum of 48 hours prior to continuing the advancement of the corehole. The bedrock will then be cored using a HQ (approximately 3.8-inch diameter) core barrel. Cores will be observed and described at ten-foot increments during advancement.

Upon completion to the final depth, each corehole will be immediately developed by flushing with water and will be completed as an open-hole with a 2-foot PVC sump at the bottom of the corehole and left available for future evaluation.

Each corehole will be completed with a locking, hinged cap, welded into place on the four-inch outer casing.

Selected samples may be collected, where appropriate, to evaluate whether PCBs are present in the groundwater conduit system in a particular area. Bedrock and/or clay seam samples from the corehole locations may be also collected during the drilling program, should the suspected conduit system (from fractures at an appropriate elevation) be encountered while advancing the corehole. All collected samples will be submitted to STL for analysis of PCBs. All sampling activities conducted in accordance with RFI protocols.

Bedrock cores will be retrieved from the core barrel and immediately placed into wooden core boxes. Core boxes are 4 feet in length and consist of three rows for core placement, thus allowing for approximately 12 feet of core in each box. The top of the retrieved core will be placed in the upper left-hand corner (i.e., laid out from left to right, and from top to bottom). Each core box will be labeled as to contents on the top and front, photographed, and placed into a storage container located at the Facility, or other secured location, as necessary.

To supplement the mapping near Spring 018, the field geologist will map the outcrops in the area of the dye trace.

3.2 DYE TRACE INVESTIGATIONS

Three separate qualitative dye trace investigations will be conducted as part of this SSC Addendum No. 5. The purposes of the proposed dye trace investigations are:

1) evaluating of the effectiveness of the concrete sealing of the streambed in the vicinity of the swallets;
2) monitoring and evaluation of various potential groundwater flowpaths between Swallet 1A and Spring 018C; and
3) monitoring and evaluation of potential groundwater flowpaths from the east (upgradient).

The following presents the details of the proposed SOW and will be conducted in sequence, as presented. The proposed dye trace investigation locations are presented on Figure 3.2. Background, or baseline, water and charcoal samples will be collected at each sampling location prior to dye injection.

3.2.1 DYE TRACE STUDY #1

Injection of dye (eosine) is proposed within the stream flow of the main channel of Bailey's Branch during a low flow event, located upstream of the swallets, with subsequent monitoring at Spring 018C discharge and the newly installed coreholes. The objective of this study is to evaluate the effectiveness of the concrete sealing within the streambed in the vicinity of the swallets.

It is proposed that 500 to 1,000 mL of eosine dye be injected directly within the surface water flow upstream of the swallets. The injection will occur over approximately 15 minutes in order to allow for a slow release of the dye into the surface water. This slow release will increase the potential for the dye to seep into the underlying bedrock and potentially be detected at Spring 018C.

3.2.2 DYE TRACE STUDY #2

Injection of dye (rhodamine WT) is proposed within a new corehole to be located at the former Swallet 1A; and subsequent monitoring at various proposed coreholes along the interpreted groundwater flowpaths, and at the Spring 018C discharge.

The objective of this dye trace test is to determine if the newly installed coreholes are appropriately placed within the underground groundwater flow pathways, as determined through the previously conducted geophysical studies. The injection will consist of approximately 100 mL of rhodamine WT dye with water flow to flush the dye through the system.

3.2.3 DYE TRACE STUDY #3

Injection of dye (fluoroscein) is proposed to be conducted into a sinkhole located east of Spring 018C on Parcel 14. Monitoring points will consist of the newly installed coreholes and springs in the vicinity.

The objective of this dye trace test is to determine if the sinkholes located to the east of the Spring 018 Area are significantly contributing to the discharge at Spring 018C. Approximately 500 to 1,000 mL (actual amount will depend upon actual site conditions at the time of the injection) of fluoroscein dye will be injected at the sinkhole, which will be subsequently flushed with 2,000 to 3,000 gallons of potable water. The timing of this test may occur ahead of the others, should a significant precipitation event be anticipated.

3.2.4 DYE RECOVERY/MONITORING

Monitoring will occur at the newly installed coreholes and at springs in the area. The actual proposed monitoring network and frequency of sample collection is provided on Figure 3.3/Table 3.1.

Three methods of sample collection will be used during the dye trace testing: water grab samples, passive detectors, and ISCO continuous water samples. A passive detector is a material such as activated charcoal that allows the dye to accumulate on its surface over time. This method allows dye detection for very low concentrations in water. The charcoal samples are washed and covered with a mixture of ammonium hydroxide, ethanol, and distilled water for three hours. After the three-hour period, the resulting solution is analyzed for the presence of the dye. Charcoal packages are best used to establish either the absence or presence of dye at a monitoring location, while grab samples are best used to establish a dye concentration in water. Both types of sampling will be utilized in this study, along with automated water sample collection using ISCO devices.

Monitoring will be discontinued after it is determined that useful data is no longer being collected (approximately one to two weeks after commencement but no longer than one month after commencement).

3.2.5 LABORATORY PROCEDURE

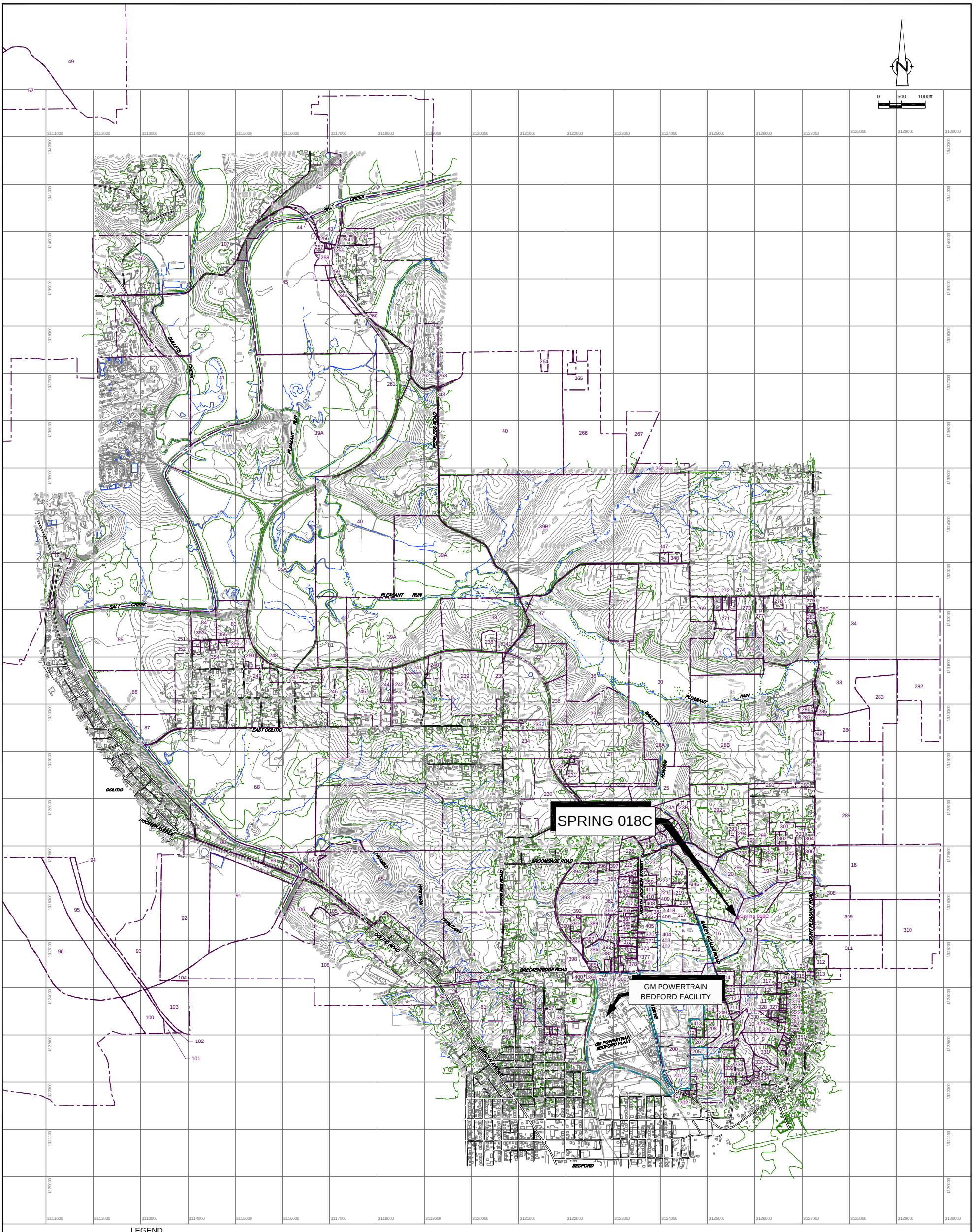
All samples (grab, charcoal, or ISCO) will be analyzed on the Shimadzu 5000U scanning spectrofluorophotometer. The instrument can detect dyes in the parts per trillion (ppt) ranges. It produces a fluorogram of intensity vs. wavelength (nanometers) for each sample analyzed. The intensity will be converted to concentration allowing for construction of a breakthrough curve of time vs. concentration. Water samples allow for construction of the breakthrough curve that can give an accurate time of arrival, apparent velocity, and information concerning the mode of transport. If the breakthrough curve is a sharp peak of short duration it indicates rapid flow along a fracture. Broader peaks with a long duration indicate a more diffuse pathway of groundwater flow. A table of common dyes and the wavelength for fluorescence is presented in Table 3.2.

A calibration curve will be constructed for aqueous dye solutions, and also for the elutant in equilibrium with charcoal samples. The instrumentation excitation and emission parameters will be 5 x 5 nanometers (nm) for both water and charcoal (different slit widths may also be used for confirmation purposes). Dilutions will be performed on samples with higher dye concentrations, as necessary. In addition, blanks will be employed for both water and charcoal as well as a daily mid-range dye standards, as appropriate.

4.0 REPORTING AND SCHEDULE

The results of this SSC Addendum No. 5 will be presented to the U.S. EPA and the Indiana Department of Environmental Management (IDEM) in a Technical Memorandum.

The SOW presented in this SSC Addendum No. 5 will be initiated as soon as is practicable based upon U.S. EPA approval, contracting, and weather conditions.



LEGEND

- EXISTING GROUND SURFACE ELEVATION CONTOURS (feet AMSL)
- EXISTING VEGETATION
- EXISTING BUILDINGS
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- APPROXIMATE SURFACE WATER LOCATION
- APPROXIMATE GM PROPERTY BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY

NOTE: PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

Nº	Revision	Date	Initial

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

SSC WORK PLAN ADDENDUM No.5

SITE LOCATION

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI. APRIL 2001
AND CRA SURVEYS, 2002 TO 2006

Project Manager:	Reviewed By:	Date:	
J.D.	J.S.	MAY 2006	
Scale: AS SHOWN	Project Nº: 13968-00	Report Nº: 205	Drawing Nº: figure 1.1

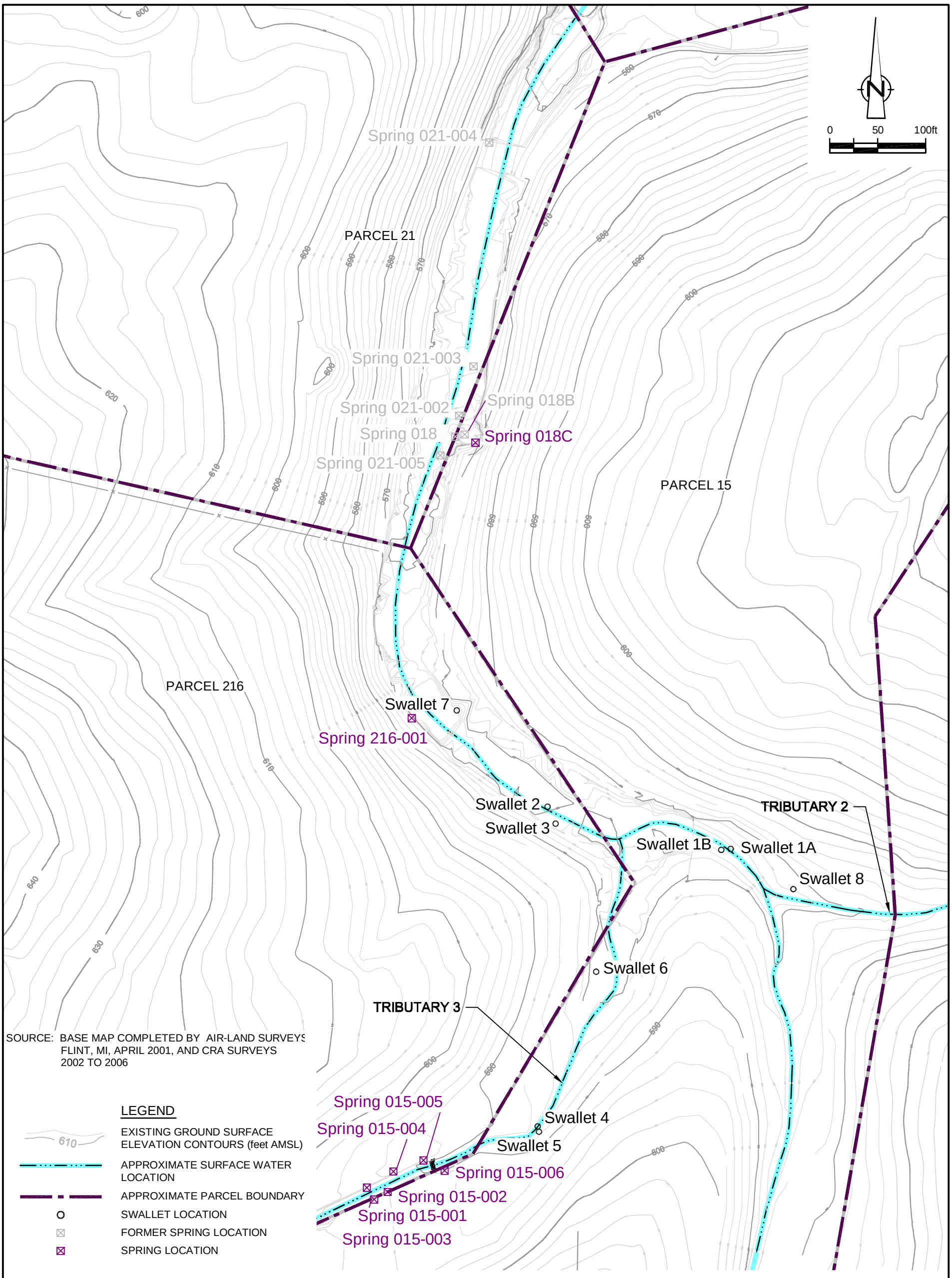


figure 2.1

SPRING 018 LOCATION
SSC WORK PLAN ADDENDUM No.5
GM POWERTRAIN BEDFORD FACILITY
Bedford, Indiana

NOTE: PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

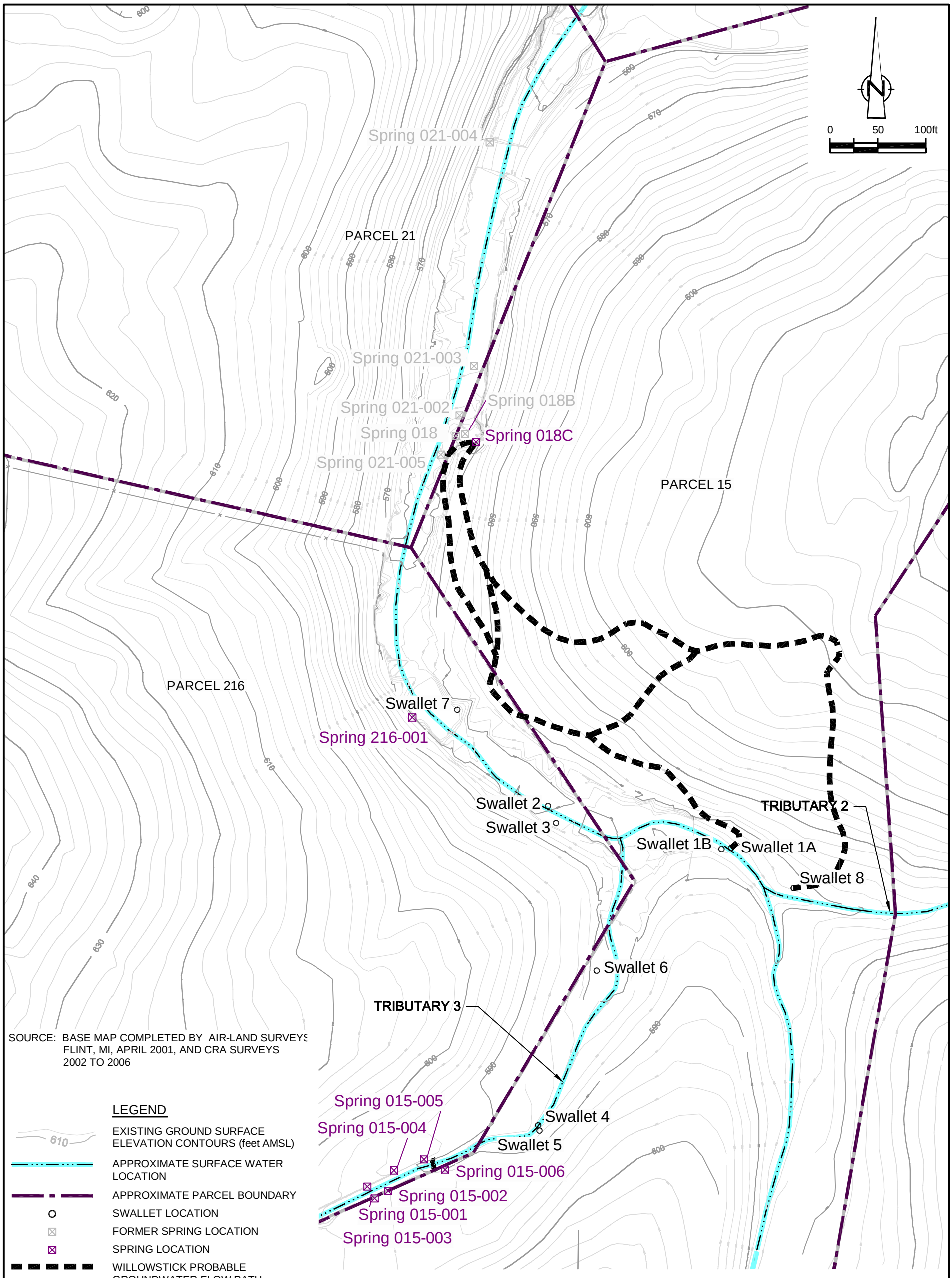


figure 2.2

WILLOWSTICK PROBABLE GROUNDWATER FLOWPATH
SSC WORK PLAN ADDENDUM No.5
GM POWERTRAIN BEDFORD FACILITY
Bedford, Indiana

NOTE: PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

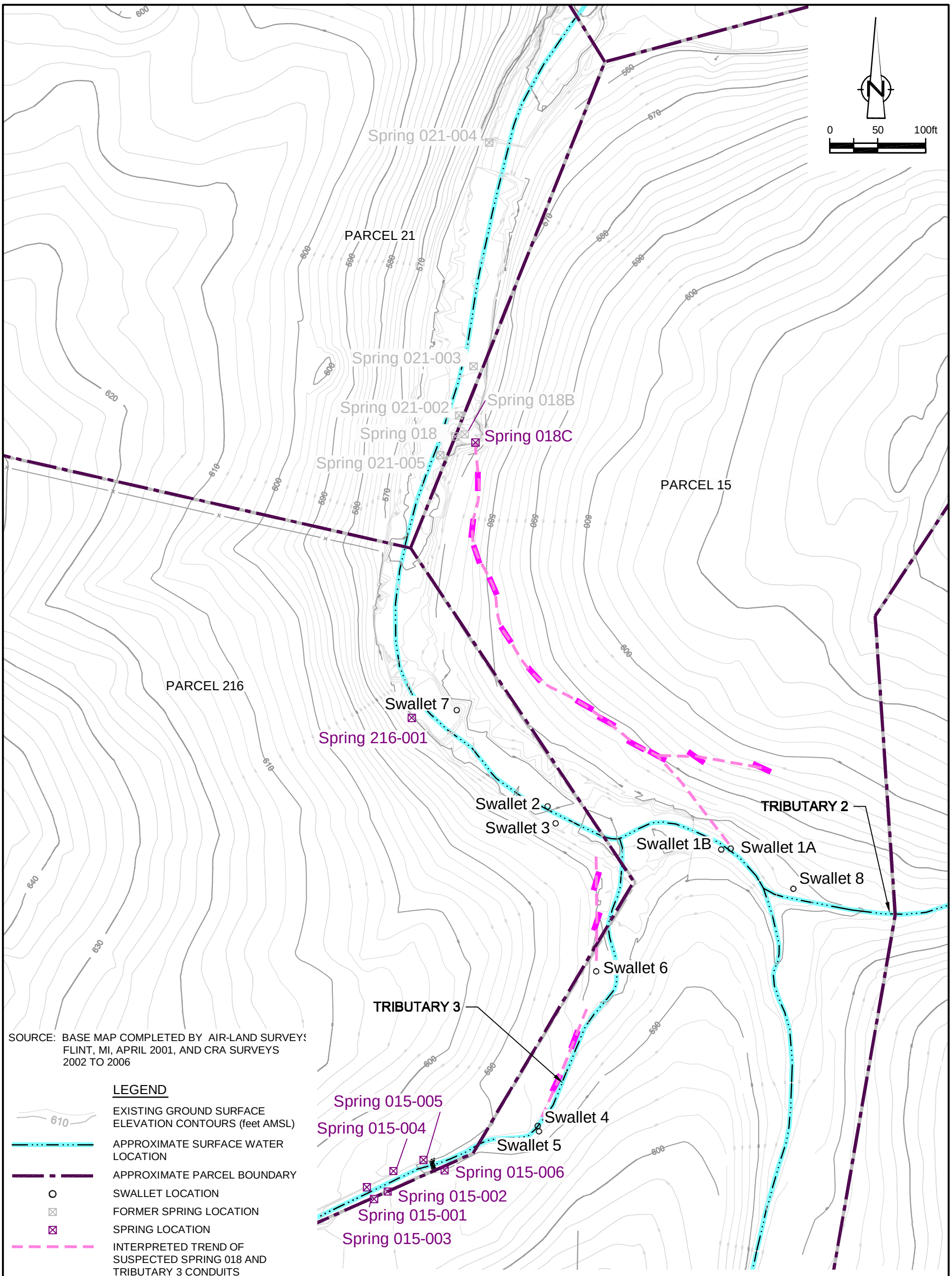
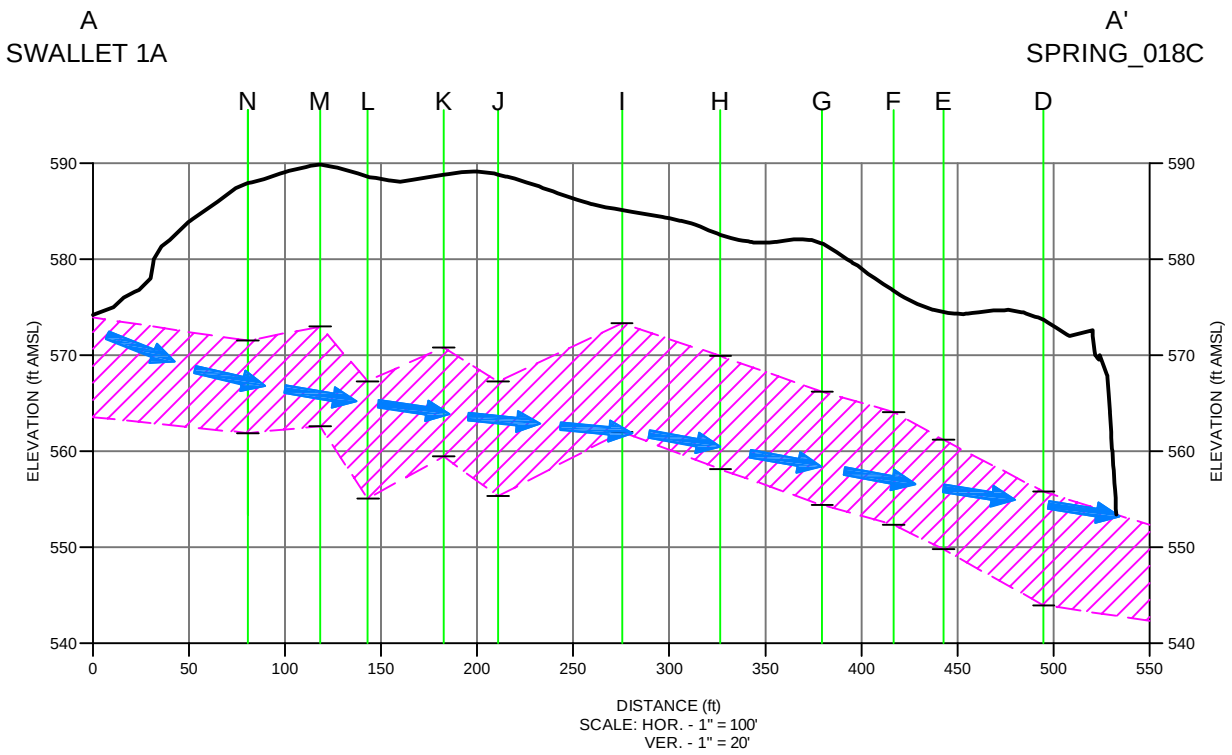
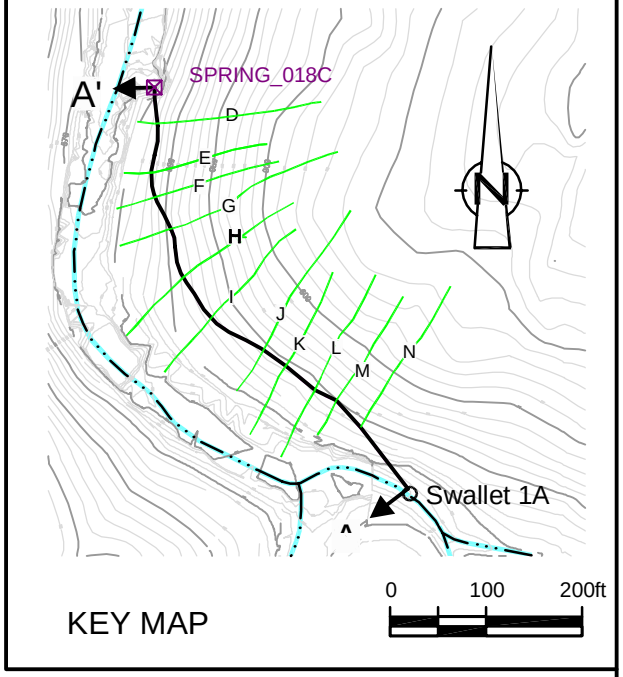


figure 2.3

GPR PROBABLE GROUNDWATER FLOWPATH
SSC WORK PLAN ADDENDUM No.5
GM POWERTRAIN BEDFORD FACILITY
Bedford, Indiana

NOTE: PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES





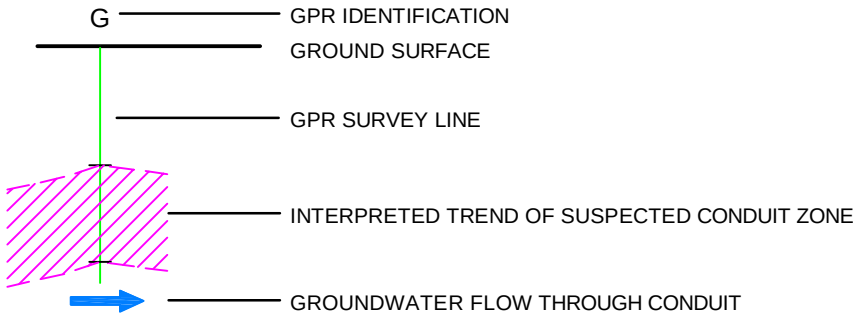


figure 2.4

GPR PROPABLE GROUNDWATER FLOWPATH - CROSS-SECTION A-A'
SSC WORK PLAN ADDENDUM No.5
GM POWERTRAIN BEDFORD FACILITY
Bedford, Indiana

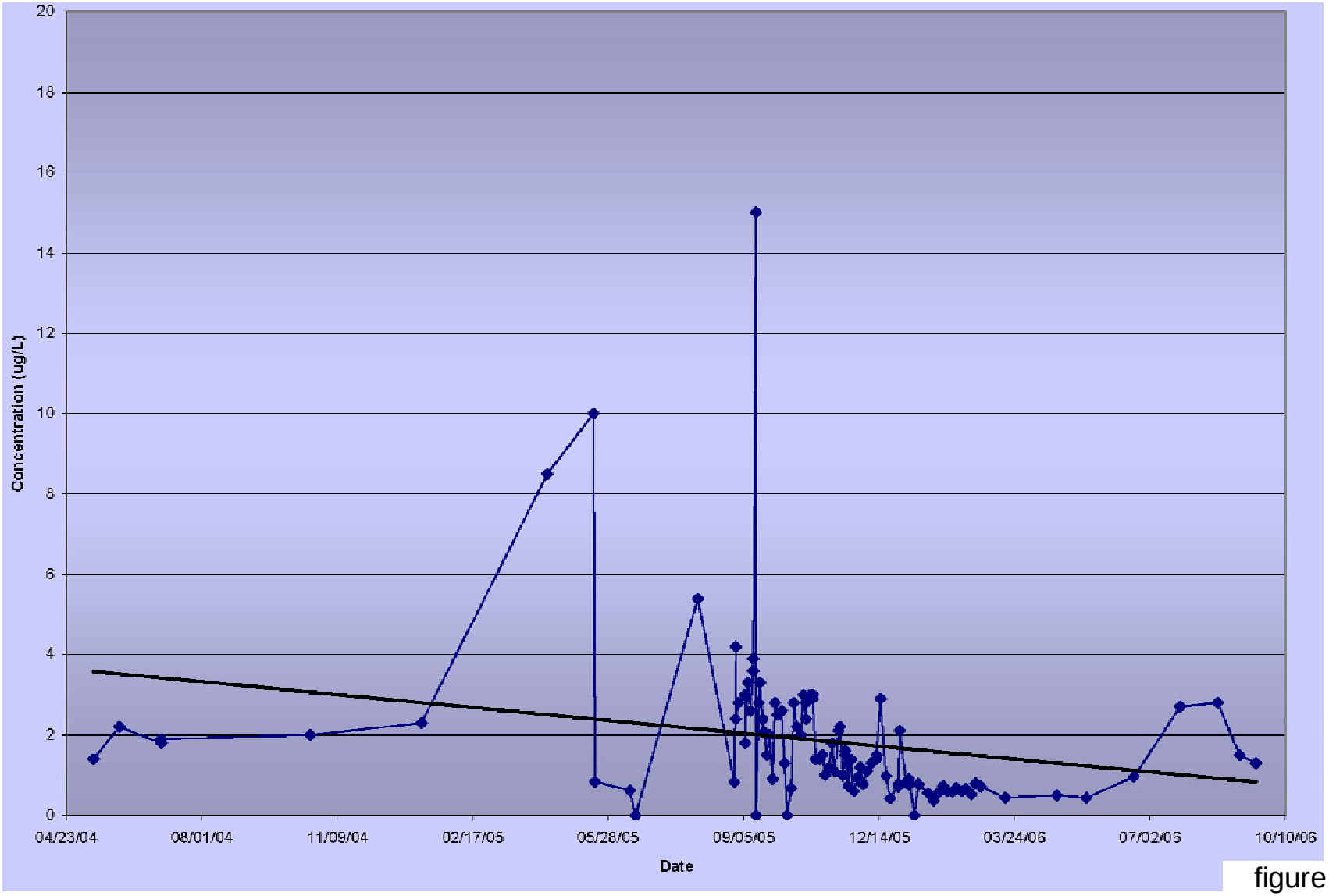
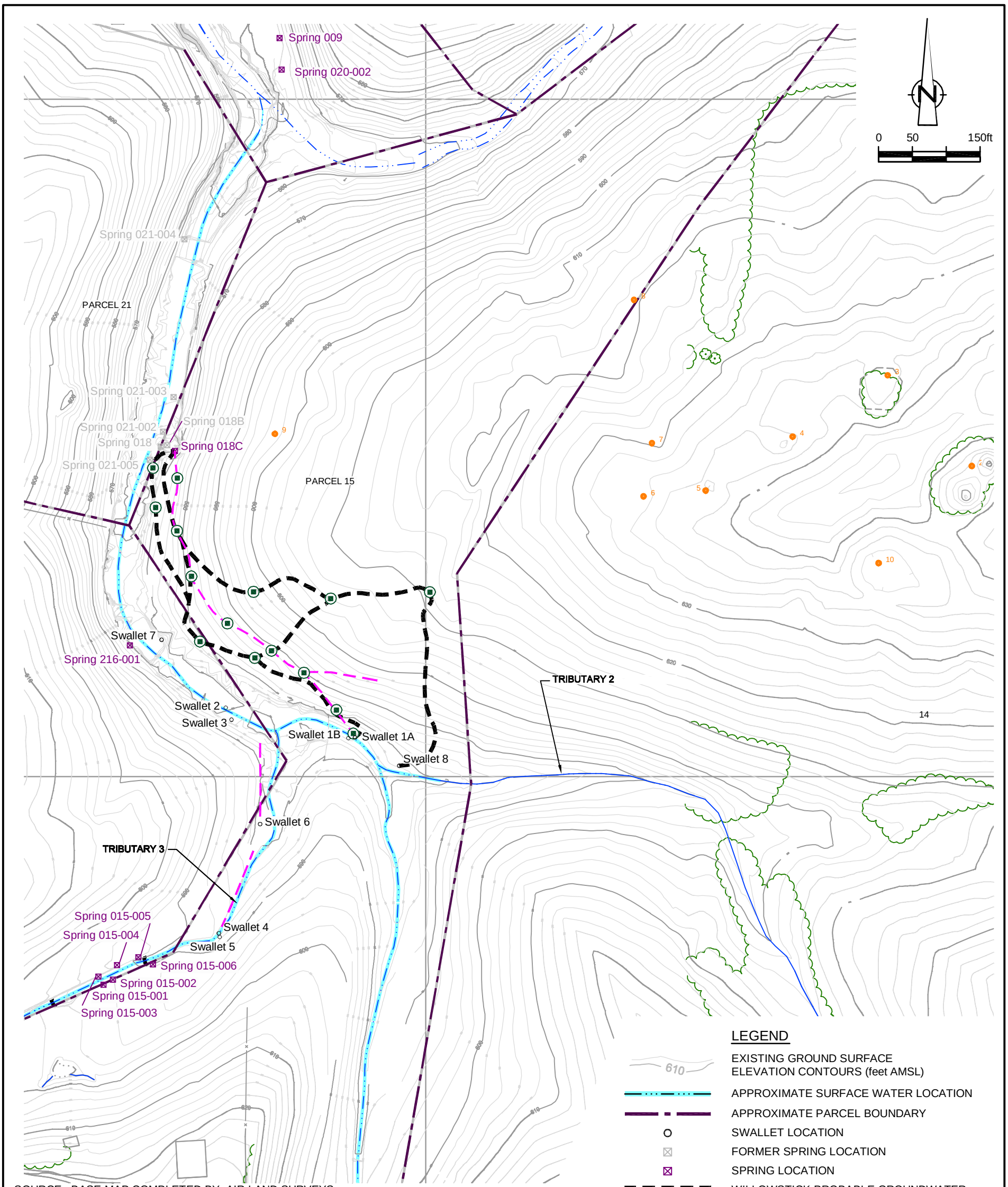


figure 2.5

GRAPH OF SPRING 18 PCB ANALYTICAL RESULTS
SSC WORK PLAN ADDENDUM No.5
GM POWERTRAIN BEDFORD FACILITY
Bedford, Indiana

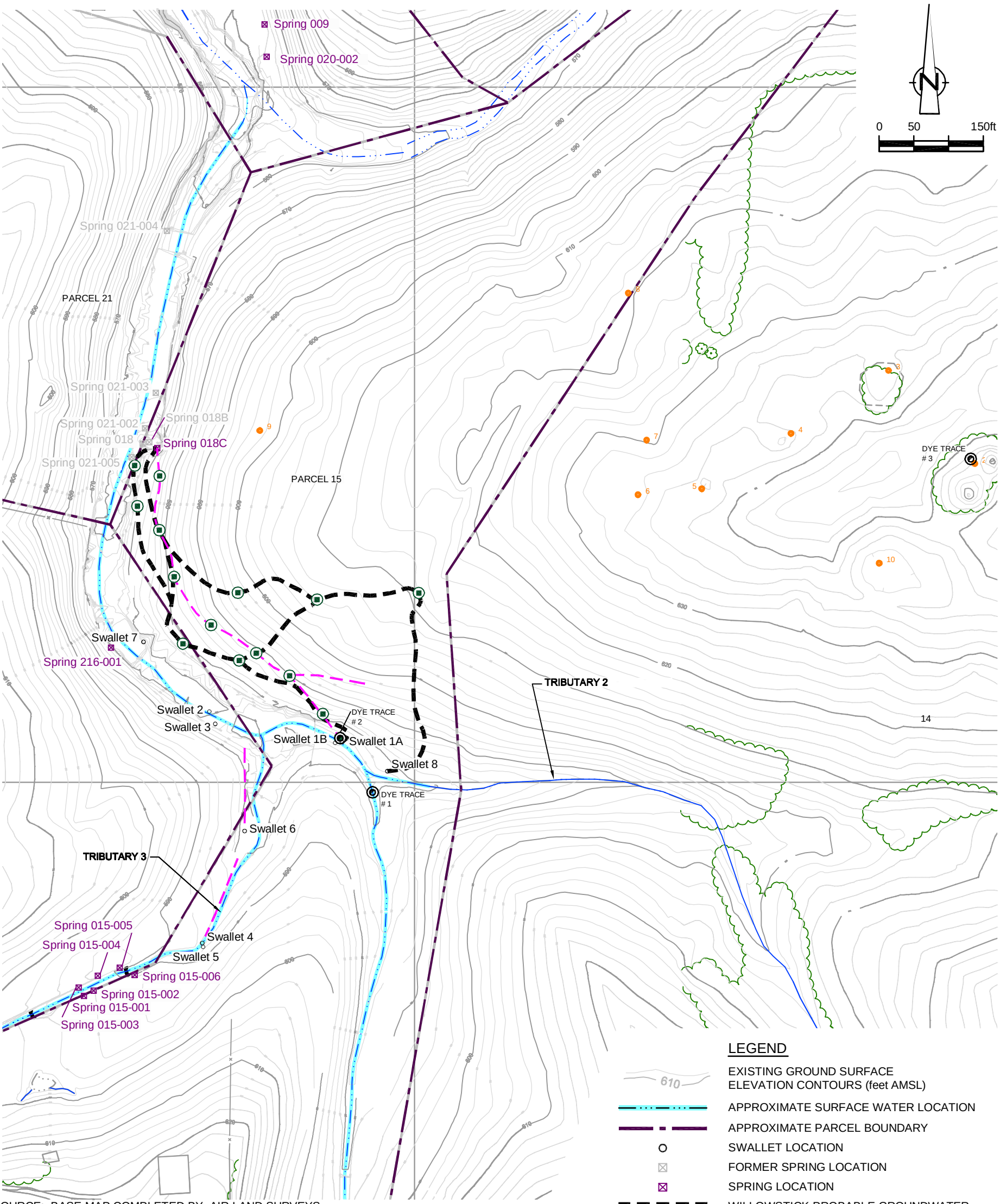


SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001, AND CRA SURVEYS 2002 TO 2006

NOTE: PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

figure 3.1

PROPOSED GROUND TRUTHING COREHOLE LOCATIONS
SSC WORK PLAN ADDENDUM No.5
GM POWERTRAIN BEDFORD FACILITY
Bedford, Indiana



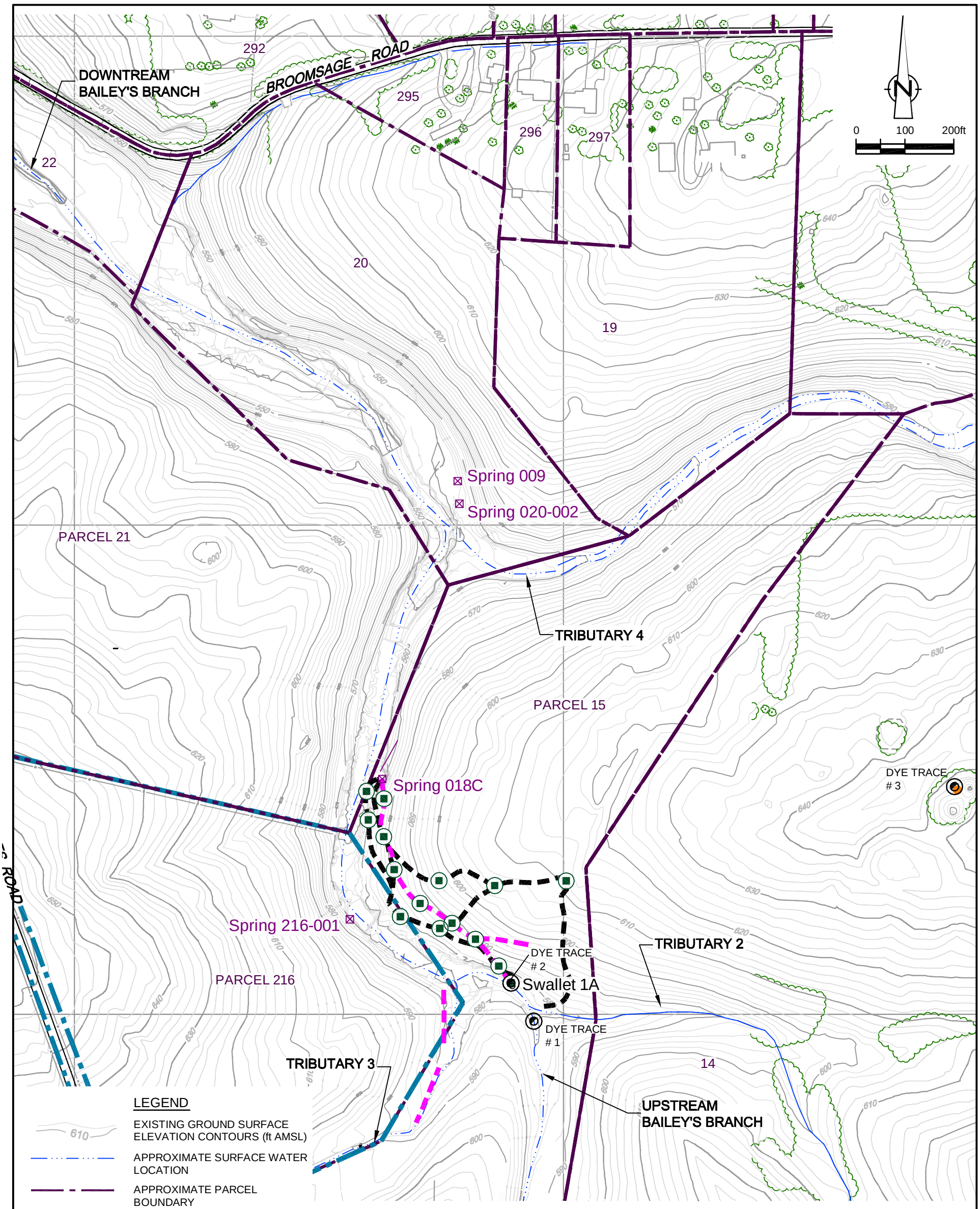
SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001, AND CRA SURVEYS 2002 TO 2006

NOTE: PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

figure 3.2

PROPOSED DYE TRACE INVESTIGATION LOCATIONS LOCATIONS
SSC WORK PLAN ADDENDUM No.5
GM POWERTRAIN BEDFORD FACILITY
Bedford, Indiana

13968-00(205)GN-WA007 NOV 09/2006



SOURCE: BASE MAP COMPLETED BY AIR-LAND SURVEYS, FLINT, MI, APRIL 2001, AND CRA SURVEYS 2002 TO 2006

NOTE: PROPERTY BOUNDARY LOCATIONS APPROXIMATED FROM THE LAWRENCE COUNTY SURVEY PLATS. LOCATIONS MAY NOT ACCURATELY REPRESENT THE TRUE BOUNDARIES

figure 3.3

DYE RECOVERY MONITORING LOCATIONS
SSC WORK PLAN ADDENDUM No.5
GM POWERTRAIN BEDFORD FACILITY
Bedford, Indiana

13968-00(205)GN-WA010 NOV 09/2006

TABLE 2.1

SPRING 018 SURFACE WATER SAMPLING RESULTS
GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

Sample Name	*Sample Date*	*Total PCBs (µg/L)*	*Total PCBs (Dissolved) (µg/L)*	*Comment*
SW-052202-JW-5047	5/22/2002	1.2	ND	--
SW-051304-JN-5204	5/13/2004	1.4 J	ND	--
SW-060104-KMV-5220	6/1/2004	2.2 J	ND	--
SW-070204-KMV-5228	7/2/2004	1.8 J	ND	--
SW-070204-KMV-5229	7/2/2004	1.9 J	ND	Duplicate of 5228
SW-102004-JN-5280	10/20/2004	2	ND	--
SW-011005-JN-5312	1/10/2005	2.3	ND	--
SW-216-041305-CL-7542	4/13/2005	8.5	- -	--
SW-015-051705-CL-7754	5/17/2005	10	- -	--
SW-051805-JN-5398	5/18/2005	0.84	ND	--
SW-015-061305-CL-7849	6/13/2005	0.63	- -	--
SW-061705-JN-5431	6/17/2005	ND	ND	--
	7/15/2005			Filling of the swallets initiated
SW-015-072005-CL-7910	7/20/2005	ND	- -	Rock busting initiated
SW-015-072005-CL-7911	7/20/2005	0.12	- -	--
SW-021-072005-CL-7912	7/20/2005	13	- -	Collected from Spring 018 after Spring 018 area (but not the spring itself) was broken out.
SW-080205-CH-7945	8/2/2005	5.4		Filling of the swallets completed
	8/3/2005			Rock busting creek bottom 3ft down at north end. Powerwashed vertical fracture
	8/4/2005			Powerwashed rebusted sidewalls and floor in area
	8/5/2005			Powerwashed creek bottom and spring fracture
	8/16/2005			Started rock busting back overburden approx. 6-7ft southeast
	8/17/2005			Rock busting approx. 3ft east southeast
SW-015-082905-DM-7985	8/29/2005	0.83	ND	Collected prior to rain event.
SW-015-083005-DM-7991	8/30/2005	ND	ND	Collected prior to rain event.
SW-015-083005-DM-7992	8/30/2005	4.2	ND	Collected prior to rain event.
SW-015-083005-DM-7993	8/30/2005	2.4	ND	Collected prior to rain event.
SW-021-090105-DM-7994	9/1/2005	2.8	ND	--
SW-021-090605-DM-7997	9/6/2005	3	ND	--
SW-021-090605-DM-7998	9/6/2005	1.8 J	ND	Duplicate of 7997
SW-015-090805-DM-11004	9/8/2005	3.3 J	0.75	--
SW-015-091005-KH-11024	9/10/2005	2.6 J	ND	--
SW-015-091205-DM-11035	9/12/2005	3.9 J	ND	--
SW-091205-CG-5512	9/12/2005	3.6 J	ND	--
SW-015-091405-DM-11035	9/14/2005	15	0.82	--
SW-091405-CG-5515	9/14/2005	ND	ND	--
SW-015-091605-DM-11045	9/16/2005	2.8	ND	--
SW-015-091705-DM-11046	9/17/2005	3.3	ND	--
SW-015-091905-JS-11062	9/19/2005	2.4	ND	--
SW-015-092005-DM-11074	9/20/2005	2.065 J	0.181 J	--
SW-015-092205-DM-11104	9/22/2005	1.5	ND	--
SW-015-092405-CH-11110	9/24/2005	2	ND	--
SW-015-092605-JS-11111	9/26/2005	0.91	ND	--
SW-015-092805-DM-11130	9/28/2005	2.8 J	ND	--
SW-015-093005-DM-11154	9/30/2005	2.5	ND	--
SW-015-100305-DM-11163	10/3/2005	2.6	0.38	--
SW-015-100505-DM-11173	10/5/2005	1.3	ND	--
SW-015-100705-DM-11191	10/7/2005	ND	ND	--
SW-015-101005-DG-11192	10/10/2005	0.67 J	0.31	--
SW-015-101205-DM-11211	10/12/2005	2.8	ND	--
SW-015-101405-DM-11237	10/14/2005	2.2	ND	--
SW-015-101705-DM-11265	10/17/2005	2	ND	--
SW-015-101905-DM-11278	10/19/2005	3	ND	--
SW-015-102105-DM-11294	10/21/2005	2.4	ND	--
SW-015-102105-DM-11295	10/21/2005	2.8	ND	Duplicate of 11294
SW-015-102405-KH-11303	10/24/2005	3	ND	--
SW-015-102605-DM-11315	10/26/2005	2.9	ND	--
SW-015-102605-DM-11316	10/26/2005	3	ND	Duplicate of 11315
SW-015-102805-DM-11342	10/28/2005	1.4	ND	--
SW-015-103105-DM-11347	10/31/2005	1.4	ND	--

TABLE 2.1

SPRING 018 SURFACE WATER SAMPLING RESULTS
GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

Sample Name	*Sample Date*	*Total PCBs* (µg/L)	*Total PCBs (Dissolved)* (µg/L)	*Comment*
SW-015-103105-DM-11348	10/31/2005	1.4	ND	Duplicate of 11347
SW-015-110205-DM-11362	11/2/2005	1.5	ND	--
SW-015-110405-AH-11375	11/4/2005	1 J	ND	--
SW-015-110705-AH-11386	11/7/2005	1.2 J	ND	--
SW-015-110905-AH-11402	11/9/2005	1.8 J	2 J	--
SW-015-111105-KH-11405	11/11/2005	1.1 J	ND	--
SW-015-111405-AH-11406	11/14/2005	2.1	ND	--
SW-015-111505-AH-11412	11/15/2005	2.2	0.718 J	--
SW-015-111705-AH-11416	11/17/2005	0.99	ND	--
SW-015-111905-AH-11419	11/19/2005	1.5	0.11 J	--
SW-015-111905-AH-11420	11/19/2005	1.6	ND	Duplicate of 11419
SW-015-112105-AH-11427	11/21/2005	1.3	0.08 J	--
SW-112105-JS-5536	11/21/2005	0.73 J	0.068 J	--
SW-015-112305-AH-11428	11/23/2005	1.4	0.13 J	--
SW-015-112505-CH-11429	11/25/2005	0.61	0.11 J	--
SW-015-112805-AH-11433	11/28/2005	0.93	0.11 J	--
SW-015-113005-AH-11434	11/30/2005	1.2	ND	--
SW-015-120205-AH-11441	12/2/2005	0.78	ND	--
SW-015-120505-AH-11442	12/5/2005	1.1	0.13 J	--
SW-015-120805-JF-11459	12/8/2005	1.3	ND	--
SW-015-121205-KH-11464	12/12/2005	1.4	0.33	--
SW-015-121205-KH-11465	12/12/2005	1.5	0.26	Duplicate of 11464
SW-015-121505-AH-11477	12/15/2005	2.9	0.16 J	--
SW-015-121905-AH-11478	12/19/2005	0.98	ND	--
SW-015-122205-AH-11482	12/22/2005	0.42 J	ND	--
SW-122805-JN-5594	12/28/2005	0.78	ND	--
SW-122805-JN-5595	12/28/2005	0.72	ND	Duplicate of 5594
SW-015-122905-AH-11496	12/29/2005	2.1	ND	--
SW-015-010306-KH-11503	1/3/2006	0.82	ND	--
SW-015-010506-AH-11510	1/5/2006	0.77	ND	--
SW-015-010506-AH-11511	1/5/2006	0.91	ND	Duplicate of 11510
SW-015-010906-AH-11515	1/9/2006	ND	ND	--
SW-015-011206-AH-11524	1/12/2006	0.78	ND	--
SW-015-011906-KH-11531	1/19/2006	0.56	ND	--
SW-015-012306-AH-11545	1/23/2006	0.37	ND	--
SW-015-012606-AH-11549	1/26/2006	0.54	ND	--
SW-015-013006-CL-11550	1/30/2006	0.73	ND	--
SW-015-020206-KH-11568	2/2/2006	0.6	ND	--
SW-015-020606-KH-11569	2/6/2006	0.58 J	ND	--
SW-015-020906-AH-11589	2/9/2006	0.69	ND	--
SW-015-021306-KH-11597	2/13/2006	0.6	0.093 J	--
SW-015-021606-AH-11599	2/16/2006	0.66	ND	--
SW-015-022006-AH-11604	2/20/2006	0.52	ND	--
SW-015-022306-AH-11612	2/23/2006	0.79	ND	--
SW-015-022706-AH-11618	2/27/2006	0.72	ND	--
SW-015-031706-KH-11632	3/17/2006	0.44	ND	--
SW-015-042406-AH-11673	4/24/2006	0.49	ND	--
SW-015-051606-DL-11773	5/16/2006	0.44	ND	--
SW-015-062006-AH-11846	6/20/2006	0.96	ND	--
SW-015-072406-KH-11919	7/24/2006	2.7	ND	--
SW-015-082106-AH-11939	8/21/2006	2.8	ND	--
SW-090606-JN-5786	9/6/2006	1.5	ND	--
SW-091806-JN-5833	9/18/2006	1.3	ND	--

Notes:
ND - Not Detected

TABLE 3.1

DYE RECOVERY MONITORING LOCATIONS
AREA OF INTEREST 004
GM POWERTRAIN - BEDFORD FACILITY
Bedford, Indiana

	Dye Test #1		*Dye Test #2*		*Dye Test #3*		
Sample Location	*Sample Type*	*Backup*	*Sample Type*	*Backup*	*Sample Type*	*Backup*	*Comment*
Coreholes							
CH15-1	Grab Sample	Charcoal	Grab Sample	Charcoal	Grab Sample	Charcoal	An additional ISCO may be deployed depending upon results of the corehole installation
CH15-2	Grab Sample	Charcoal	Grab Sample	Charcoal	Grab Sample	Charcoal	
CH15-3	Grab Sample	Charcoal	Grab Sample	Charcoal	Grab Sample	Charcoal	
CH15-4	Grab Sample	Charcoal	Grab Sample	Charcoal	Grab Sample	Charcoal	
CH15-5	Grab Sample	Charcoal	Grab Sample	Charcoal	Grab Sample	Charcoal	
CH15-6	Grab Sample	Charcoal	Grab Sample	Charcoal	Grab Sample	Charcoal	
CH15-7	Grab Sample	Charcoal	Grab Sample	Charcoal	Grab Sample	Charcoal	
CH15-8	Grab Sample	Charcoal	Grab Sample	Charcoal	Grab Sample	Charcoal	
CH15-9	Grab Sample	Charcoal	Grab Sample	Charcoal	Grab Sample	Charcoal	
CH15-10	Grab Sample	Charcoal	Grab Sample	Charcoal	Grab Sample	Charcoal	
CH15-11	Grab Sample	Charcoal	Grab Sample	Charcoal	Grab Sample	Charcoal	if necessary
CH15-12	Grab Sample	Charcoal	Grab Sample	Charcoal	Grab Sample	Charcoal	if necessary
CH15-13	Grab Sample	Charcoal	Grab Sample	Charcoal	Grab Sample	Charcoal	if necessary
CH15-14	Grab Sample	Charcoal	Grab Sample	Charcoal	Grab Sample	Charcoal	if necessary
CH15-15	Grab Sample	Charcoal	Grab Sample	Charcoal	Grab Sample	Charcoal	if necessary
Individual Springs							
Spring 018C	ISCO	Charcoal	ISCO	Charcoal	ISCO	Charcoal	
Spring 216-001	Grab Sample	Charcoal	Grab Sample	Charcoal	Grab Sample	Charcoal	
Spring 009	Grab Sample	Charcoal	Grab Sample	Charcoal	Grab Sample	Charcoal	
Spring 020-002	Grab Sample	Charcoal	Grab Sample	Charcoal	Grab Sample	Charcoal	
Spring 021-002	Grab Sample	Charcoal	Grab Sample	Charcoal	Grab Sample	Charcoal	
Spring 021-003	Grab Sample	Charcoal	Grab Sample	Charcoal	Grab Sample	Charcoal	
Spring 021-004	Grab Sample	Charcoal	Grab Sample	Charcoal	Grab Sample	Charcoal	
Spring 021-005	Grab Sample	Charcoal	Grab Sample	Charcoal	Grab Sample	Charcoal	
Spring 021-006	Grab Sample	Charcoal	Grab Sample	Charcoal	Grab Sample	Charcoal	
Spring 022-006	Grab Sample	Charcoal	Grab Sample	Charcoal	Grab Sample	Charcoal	
Spring 022-007	Grab Sample	Charcoal	Grab Sample	Charcoal	Grab Sample	Charcoal	
SURFACE WATER GRAB SAMPLES							
Tributary 2	Grab Sample	Charcoal	NA	NA	Grab Sample	Charcoal	
Tributary 3	Grab Sample	Charcoal	Grab Sample	Charcoal	Grab Sample	Charcoal	
Tributary 4	Grab Sample	Charcoal	Grab Sample	Charcoal	Grab Sample	Charcoal	
Downstream Bailey's Branch	Grab Sample	Charcoal	NA	NA	Grab Sample	Charcoal	
Upstream Bailey's Branch	Grab Sample	Charcoal	Grab Sample	Charcoal	Grab Sample	Charcoal	

TABLE 3.2

COMMON DYES AND WAVELENGTHS
GM POWERTRAIN - BEDFORD FACILITY
BEDRORD, INDIANA

COMMON DYES AND WAVELENGTHS	
Dye	***Wavelength (nanometers)***
Optical Brighteners	435±5 and 410±5
Direct Yellow	452±5
Fluorescein	510±518
Eosine	535±5
Rhodamine WT	577±5

APPENDIX A

PHLOXINE B MATERIAL SAFETY DATA SHEET

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Identification

Product Name: Chromatint Red X-1822
Chemical Name: Phloxine B
Chemical Family: Xanthene
CAS Number: 18472-87-2

Company Identification

Chromatech Inc.
7723 Market St.
Canton, MI 48187 USA
734-451-1230 (For questions and emergencies)

2. COMPOSITION/INFORMATION ON INGREDIENTS

COMPONENT LISTING:

Chemical Name	Amount	CAS Number
CHROMATINT RED X-1822	100.0 %	18472-87-2

(See Section 8 for exposure guidelines)

(See Section 15 for regulatory information)

HAZARDS DISCLOSURE

This product contains no known hazardous materials as defined by the OSHA Hazard Communication Standard 29 CFR 1910.1200.

As defined under Sara 311 and 312, this product contains no known hazardous materials.

3. HAZARDS IDENTIFICATION

********** EMERGENCY OVERVIEW **********

CAUTION

May cause eye and skin irritation.

****

(section 3 continued)

HMIS Rating -

Health:	0
Flammability:	0
Reactivity:	0
Personal Protection Index:	-

POTENTIAL HEALTH EFFECTS

EYE:
Contact may cause eye irritation.

SKIN:
May cause skin irritation with discomfort or rash.

INHALATION:
Inhalation of dusts can cause irritation of nose and throat.

INGESTION:
Ingestion may result in gastric disturbances.

TARGET ORGAN:
Prolonged or repeated overexposure may cause lung damage.

4. FIRST AID MEASURES

EYE CONTACT FIRST AID:
Flush eye with water for 15 minutes. If redness or irritation occurs, seek medical attention.

SKIN CONTACT FIRST AID:
Wash skin with soap and water. If irritation occurs, seek medical attention. Wash contaminated clothing before reuse. Do not take clothing home to be laundered.

INHALATION FIRST AID:
Get victim to fresh air. Give artificial respiration or oxygen if breathing has stopped. Get prompt medical attention.

INGESTION FIRST AID:
If swallowed, immediately give 2 glasses of water. Never give anything by mouth to an unconscious person. Induce vomiting. Get immediate medical attention.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES
COC Flash Point: N/A
Autoignition Temperature: N/A

FLAMMABLE LIMITS IN AIR
LEL: %
UEL: %

EXTINGUISHING MEDIA:
Water, Carbon dioxide, foam, or dry powder.

FIRE & EXPLOSION HAZARDS:
Dusts at sufficient concentrations can form explosive mixtures with air.

FIRE FIGHTING INSTRUCTIONS:
As in any fire, wear self-contained breathing apparatus pressure-demand MSHA/NIOSH (approved or equivalent) and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

INITIAL CONTAINMENT:
Spills should be swept up and placed in containers. Avoid runoff to sewers and bodies of water. Wear proper protective equipment. Absorb on suitable absorbant materials. Clean up by scrubbing with soap and water. Collect cleaning wastes, or remove contaminated soils. Place in proper containers.

LARGE SPILLS PROCEDURE:
Treat or dispose of waste material in accordance with all local, state/provincial, and national requirements.

SMALL SPILLS PROCEDURE:
Spill should be swept up and placed in containers. Small quantities may be treated in aerobic wastewater treatment systems.

7. HANDLING AND STORAGE

HANDLING (PERSONNEL):
Mimimize exposure in accordance with good hygiene practice. Avoid contact with eyes, skin, and clothing. Avoid breathing (dust, vapor, mist, gas).

HANDLING (PHYSICAL ASPECTS):
Close container after each use.

STORAGE PRECAUTIONS:
Keep container closed when not in use.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

(section 8 continued)

EYE / FACE PROTECTION REQUIREMENTS:
Use chemical splash goggles and face shield.

SKIN PROTECTION REQUIREMENTS:
Use butyl rubber or nitrile gloves.

RESPIRATORY PROTECTION REQUIREMENTS:
If airborne concentrations exceed the OSHA TWA, a NIOSH approved dust mask is recommended. Under normal use conditions, with adequate ventilation, no special handling equipment is required.

MISCELLANEOUS:
Use good personal hygiene practices; limit exposure to product whenever possible to minimize clean-up.

EXPOSURE GUIDELINES:
No Information Available.

MISCELLANEOUS:
OSHA Permissible exposure limit:

Total Dust: 10 mg/Cubic Meter.

Respirable dust: 5 mg/cubic meter.

9. PHYSICAL AND CHEMICAL PROPERTIES

FORM ..... :	Powder
COLOR ..... :	Dark Red
ODOR ..... :	No odor
BOILING POINT ..... :	N/A C
SOLUBILITY IN WATER ..... :	Soluble
SPECIFIC GRAVITY ..... :	N/A (Water = 1)
BULK DENSITY ..... :	0.29 - 0.33
MELTING/FREEZING POINT ... :	N/A C
PH ..... :	Not established

10. STABILITY AND REACTIVITY

STABILITY:
Stable.

POLYMERIZATION:
Product will not undergo polymerization.

INCOMPATIBILITY WITH OTHER MATERIALS:
Avoid contact with strong oxidizing agents.

(section 10 continued)

DECOMPOSITION:
Thermal decomposition may produce oxides of carbon, nitrogen, and sulfur.

11. TOXICOLOGICAL INFORMATION

MISCELLANEOUS:
No information available.

12. ECOLOGICAL INFORMATION

MISCELLANEOUS:
No information available.

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL:
Treat or dispose of waste material in accordance with all local, state/provincial, and national requirements. Due to the highly concentrated color, avoid washing material into sewer systems without proper treatment and authorization by the treatment facility management.

14. TRANSPORTATION INFORMATION

PRODUCT LABEL .....:	Chromatint Red X-1822
D.O.T. SHIPPING NAME .....:	Not Regulated
TECHNICAL SHIPPING NAME ...:	N/A
D.O.T. HAZARD CLASS .....:	Non-Hazardous
UN NUMBER .....:	N/A

15. REGULATORY INFORMATION

MISCELLANEOUS INFORMATION:
This material or all of its components are listed on the Inventory of Existing Chemical Substances under the Toxic Substance Control Act (TSCA).

16. OTHER INFORMATION

REASON FOR ISSUE ...:	New
PREPARED BY .....:	John Russell
APPROVAL DATE .....:	DRAFT COPY
SUPERCEDES DATE ....:	May 12, 2004
RTN NUMBER .....:	00001573 (Draft Copy)