CURRENT CONDITIONS REPORT

GM POWERTRAIN BEDFORD FACILITY
105 GM DRIVE
BEDFORD, INDIANA

EPA ID# IND006036099

Volume I – Text, Figures, and Tables

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LIST OF ACRONYMS AND TERMS

Agreement:	Voluntary Corrective Action Agreement
AOI:	Area of Interest
AST:	Aboveground Storage Tank
Bedford Facility	GM Powertrain Bedford Plant
BOD:	biological oxygen demand
BTEX:	benzene, toluene, ethylbenzene, and xylene
CCR:	Current Conditions Report
CDM:	Camp Dresser & McKee
CFD:	Central Foundry Division
CRA:	Conestoga-Rovers & Associates
CSI:	Compliance Sampling Inspection
CWM:	Chemical Waste Management
DWB:	Drinking Water Branch
EA:	Environmental Assessment
EI:	Environmental Indicators
EMA:	Environmental Management Act
ENRAC:	Chemical Waste Management – Environmental Remedial Action Division
ESA:	Environmental Site Assessment
FCA:	Fish Consumption Advisory
FEMA:	Federal Emergency Management Agency
GM:	General Motors Corporation
GPR:	Ground Penetrating Radar
IDEM:	Indiana Department of Environmental Management
IDNR:	Indiana Department of Natural Resources
IEC:	Indiana Emergency Center
IEMA:	Indiana Environmental Management Act
ISBH:	Indiana State Board of Health
ISPCB:	Indiana State Pollution Control Board
IWI:	Index of Watershed Indicators
LCHD:	Lawrence County Health Department
MPC:	Minerals Processing Corporation
MTBE:	methyl (tert) butylether
NOAA:	National Oceanic and Atmospheric Administration
NOV:	Notice of Violation
NPDES:	National Pollution Discharge Elimination System
NRC:	National Response Center
PCB:	Polychlorinated Biphenyl
POTW:	Publicly Owned Treatment Works

LIST OF ACRONYMS AND TERMS

PVC:	Polyvinyl Chloride
PWS:	Public Water Supply
RCRA:	Resource Conservation and Recovery Act
SPCC:	Spill Prevention Control and Countermeasure Plan
TCLP:	Toxic Characteristic Leachate Procedure
TPH:	Total Petroleum Hydrocarbons
TSCA:	Toxic Substances Control Act
U.S.EPA:	United States Environmental Protection Agency
USDA:	United States Department of Agriculture
USGS:	United States Geological Survey
UST:	Underground Storage Tank
WWTP:	Wastewater Treatment Plant

UNITS OF MEASUREMENT

amsl	above mean sea level
bgs:	below ground surface
cfs:	cubic feet per second
cms:	centimeter per second
°F	degrees Fahrenheit
gpd:	gallons per day
gpm:	gallons per minute
mgd:	million gallons per day
mg/kg:	milligram per kilogram
mg/L:	milligram per liter
mm	millimeter
ppb:	parts per billion
ppm:	parts per million
μg/L:	microgram per liter

1.0 INTRODUCTION

This document presents the Current Conditions Report (CCR) for the General Motors (GM) Powertrain Bedford Plant (Bedford Facility or Facility) located at 105 GM Drive, Bedford, Indiana (United States Environmental Protection Agency (U.S.EPA) Identification Number IND006036099). The Facility location is presented on Figure 1.1. A Facility plan is presented on Figure 1.2. Conestoga-Rovers & Associates (CRA) was retained by GM to prepare this document entitled "Current Conditions Report– General Motors Powertrain Bedford Facility". GM signed a Voluntary Corrective Action Agreement (Agreement) with the U.S.EPA for the Bedford Facility on March 20, 2001. The signed Agreement identifies that GM will work voluntarily to define the nature and extent of releases of hazardous waste and/or hazardous constituents at or from the Bedford Facility. A copy of the Agreement is included as Appendix A.

The Voluntary Corrective Action Agreement lists the following primary scheduling deadlines:

Item	*Description*	*Due Date*
1.	Current Conditions Report	7/18/01 (120 days following effective date of Agreement)
2.	Meet Human Exposure Environmental Indicator (EI)	01/30/05
3.	Meet Groundwater EI	04/30/07
4.	Final Corrective Measures Proposal	12/31/07

This document fulfills the requirements of the CCR submittal.

1.1 GENERAL

The GM Powertrain Bedford 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 & 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.

The Facility, located on 152.5 acres, contains approximately 915,000 square feet of floor space and employs approximately 1,200 people (Figure 1.2).

1.2 PURPOSE AND SCOPE OF CCR

The purpose of this CCR is to describe the current and historical conditions at the Bedford Facility resulting from treatment, storage, or disposal of hazardous waste or hazardous constituents. Those areas with the potential for a release to the environment are identified as Areas of Interest (AOIs). AOIs are identified in this report and summarized in Section 7.0. The AOIs are summarized on Table 1.1, with their locations shown on Figure 1.3. In addition, potential impacts to areas outside of the Bedford Facility from releases from the Facility are discussed.

To meet these requirements, the following activities have been completed:

- Conducted a review of available documents concerning historical remediation, treatment, storage, releases, or disposal of hazardous waste;
- Conducted interviews with Bedford Facility employees;
- Performed a visual site inspection of the Bedford Facility;
- Conducted a review of available information regarding local land use, climate, geology, hydrogeology, surface water hydrology, and ecology;
- Prepared a summary of remedial activities completed at the Bedford Facility;
- Prepared a summary of previous environmental investigations; and
- Completed an evaluation of existing data to identify AOIs at the Facility.

This CCR was compiled based on a review of information contained in General Motors files, U.S.EPA files, and Indiana Department of Environmental Management (IDEM) files. In addition, other resources, including United States Geological Survey (USGS) data, were used to obtain information regarding local land-use, climate, geology, hydrogeology, surface water hydrology, and ecology. Due to the large volume of information obtained and reviewed for the Facility, not all material was appended to this report. Relevant information has been summarized within the contents of this report and referenced and/or appended where appropriate. The entire file is available at GM and any specific referenced document and/or data can be made available upon request.

1.3 REPORT ORGANIZATION

This CCR is organized as follows:

Section 1.0
Introduction
This Section presents an introduction to, and organization of, the CCR.

Section 2.0
Description of Facility
This Section summarizes the Bedford Facility location, current and historical operations and adjacent property ownership, surrounding land-use adjacent to the Bedford Facility, and an overview of hazardous waste, solid waste, wastewater, and stormwater management activities.

Section 3.0
Regional Environmental Setting
This Section summarizes regional topography, land-use, water supply, demographics, climate, regional geology, regional hydrogeology, and regional ecology.

Section 4.0
Facility Environmental Setting
This Section summarizes the local topography, land-use, geology, hydrogeology, and surface water hydrology at the Bedford Facility.

Section 5.0
Summary of Previous Remedial Actions
This Section outlines previous remedial actions conducted at the Bedford Facility. The actual summaries of these remedial actions are contained in the AOI discussion in Section 7.0.

Section 6.0
Summary of Previous Environmental Investigations
This Section outlines previous environmental investigations conducted at or in proximity to the Bedford Facility. Environmental investigations related to the individual AOIs are discussed in Section 7.0.

Section 7.0
<u>Areas of Interest</u>

This Section summarizes information on the AOIs; including their location within the Bedford Facility, historical operations, previous investigations, response and remedial actions, and current status.

Section 8.0
<u>References</u>

This Section provides a list of publications and government information sources that were utilized as general background references in preparation of this CCR. Pertinent information obtained from GM files is included in Appendices where appropriate, and attached to this report. A list of Appendices is included in the Table of Contents.

2.0 DESCRIPTION OF FACILITY

2.1 FACILITY LOCATION

The Bedford Plant operations consist of approximately 915,000 square feet of operating floor space and are located on the northeast side of the City of Bedford in Shawswick Township, Lawrence County, Indiana. The address of the Facility is 105 GM Drive (GM Drive was formerly named Jackson Street). The Bedford Facility lies on approximately 152.5 acres of land on either side of GM Drive and extending north along Bailey Scales Road. A Facility Location Map and Facility Plan are presented on Figures 1.1 and 1.2, respectively.

2.2 FACILITY OWNERSHIP AND SURROUNDING LAND USE

Circa 1890 until the early 1940's, Stone City Construction Company owned the Bedford Facility property and operated limestone mills. In the early 1940's the U.S. Government acquired the property for military production to assist with the war effort. In 1942, GM leased the former stone mills from the U.S. Government for aluminum foundry production.

In 1946, GM purchased the Bedford Facility from the government, at which time the Bedford Facility became known as the Allison Bedford Foundry. In 1950, the Fabricast Division of GM was formed and control of the property was transferred to Fabricast. In 1959, Fabricast consolidated with GM's existing Central Foundry Division (CFD). GM's CFD, later merged into GM Powertrain, with Powertrain operating the Bedford Facility since 1991.

Currently, the Bedford Facility is bordered by residential and undeveloped areas to the north; to the south by the Canadian and Pacific Railway, IMCO (a Kaiser aluminum recycling facility), and residential property; to the east by residential and undeveloped areas; and to the west by the railway, industrial and residential properties and a cemetery. The Bedford Facility property boundaries, buildings, and support facilities are presented on Figure 1.2.

2.3 PHYSICAL LAYOUT AND OPERATIONS

2.3.1 HISTORIC OPERATIONS ON THE PROPERTY

Stone City Construction, Railroad Maintenance Operations, and U.S. Government Operations (1890 - 1942)

The property was initially developed as a limestone-cutting mill circa 1890 (Stone City Construction). The mill was located on the southern portion of the current Bedford Facility property (see Sanborn Maps in Appendix B.1). Until the early 1940s, the property operated as a mill cutting large limestone blocks for fine building stone. Portions of the former stone mill walls are still visible in the Die Cast Building.

Railroad maintenance shops and a turn-around yard (roundhouse) were built in the 1880's by the Evansville-Richmond Railroad. The railroad maintenance shops and roundhouse were located to the south of the stone mills in the southern portion of the current Bedford Facility (see Sanborn Maps in Appendix B.1). The Evansville-Richmond Railroad became the Southern Indiana Railroad owned by J.R. Walsh circa 1890-1900. In 1922, the railroad yard became the Chicago-Milwaukee-Pacific-St. Paul Railroad Yard. During a strike in 1923 to 1924, the company moved the freight building operations and repair operations to Terre Haute, Indiana. During the 1920's, a fire destroyed one of the two existing buildings on the property. The stonemills and railroad buildings are shown in Historical Photographs 1, 2, and 3 in Appendix B.2. The former railroad maintenance operations are identified as an AOI (AOI 1) and are discussed further in Section 7.1.

Delco Remy Operation (1942 - 1946)

In 1942, GM leased the U.S. Government-owned property and the mill was converted to an aluminum foundry. Operations began in 1943 as an aluminum sand casting foundry to produce aircraft cylinder heads. Sand casting involved the pouring of molten metal into molds made from sand. The sand was blended with additives (including bentonite and sea coal) to form the molds. The spent sand was commonly referred to as foundry sand. From 1943 until 1945, the Delco Remy Division of GM produced cylinder heads for Detroit Diesel Allison and Packard Merlin aircraft engines (see Historical Photograph 4).

Detroit Diesel Allison Operation (1946 - 1950)

GM constructed service buildings and transported equipment from other GM facilities following purchase of the property in 1946. The Allison Bedford Foundry, as it was known at the time, produced jet engine midframes, tank transmissions, blower parts, and miscellaneous housings and covers from 1946 to 1949. Additional land was purchased and an additional building was erected to produce iron cylinder liners for Detroit Diesel Allison, a Division of GM. The iron cylinder liner production schedule did not materialize as expected and the Bedford Facility began to develop a heat resistant alloy casting facility to utilize the idle iron facilities.

Fabricast Division Operation (1950 - 1959)

In 1950, Fabricast Division of GM was formed and took over operations at the Bedford Facility. Buick transmission converters, tank transmission cases, Allison heavy alloy blades and vanes, barometric controls, range finders, and pistons were produced. In 1952, aluminum die casting development was started to provide replacement volumes for the declining aluminum defense business. Aluminum die casting and piston operations were expanded to help utilize the idle capacity resulting from lost business with the U.S. Government. However, by 1957, the Bedford Facility only operated at 50 percent of its two-shift capacity; and by 1958 had further declined to 37 percent of capacity. Fabricast operated at the Bedford Facility until 1959, at which time Fabricast consolidated with CFD. A 1952 historical photograph is included as Historical Photograph 5.

Central Foundry Division (1959 1991)

The aluminum manifold for the X-100 car engines was scheduled for the Bedford Facility in 1959. Die casting facilities were expanded to produce transmission cases for the Hydra-Matic Division of GM. In 1962, timing gear and bell housing production was moved to the Bedford Facility. Heat resistant alloy production increased. Modernization costs were incurred in the early 1960s in sand, open hearth, maintenance, material control, as well as die casting operations. By 1965, the die casting volume increased with car-build schedules. The modernization program provided smaller, but more efficient, more flexible productive capacity and lower fixed costs.

In 1971, Minerals Processing Corporation (MPC) (a dross reclaimer of aluminum salts) began operations on the portion of the property formerly occupied by the railroad maintenance operations. MPC leased the property from the railroad, who still owned the property in 1971 . MPC's operations are included with the railroad maintenance operations identified as AOI 1, since they operated in the same area. In 1977 GM purchased the property from the railroad that was formerly occupied by the railroad roundhouse and maintenance operations, and at the time was being leased from the railroad by MPC. MPC continued to operate the reclamation facility and leased the property from GM after GM assumed ownership. Other undeveloped parcels have also been purchased over the years to the north, east, and south of the original property boundaries.

From 1950 to 1980, the Bedford Facility underwent several major plant modifications. In 1950, the Facility established a foam plaster line to produce transmission converter requirements and portion of the current Piston Building were constructed. In 1952, a new building was constructed for the increased Allison tank program volumes. The secondary waste water treatment system was constructed in 1974 and two one million gallons aboveground storage tanks were constructed in 1980.

In 1980, the Bedford Facility produced various aluminum automotive components including piston heads, transmission housings and intake manifolds, as well as, turbine blades made of various heat-resistant alloys. The Bedford Facility used 48 large (2,000 to 3,000 ton) die-casting machines and 21 small (800 ton) die-casting machines, with trim presses associated with each. Historical Photograph 6 through 21 shows the Bedford Facility during this time.

2.3.2 CURRENT OPERATIONS ON THE PROPERTY

GM's CFD merged with GM Powertrain Division in 1991. Currently, the Bedford Facility operates within the Powertrain Division and produces aluminum casting products such as transmission casings, pistons, and engine blocks. Major aluminum production processes include die-casting and permanent molding. Descriptions of the manufacturing processes are summarized below.

Die Casting Operations:

Die casting is the process in which molten alloy is injected under pressure into a cast iron or steel die where rapid solidification occurs. The casting is the product that results from the solidification of molten metal in a mold or die. The cavity is the space within the die that is the size and shape of the part to be cast. The molten metal flows into this space and is held until it has solidified. The die is a tool used to impart the shape to the casting. Specifically, two matching cast iron or steel blocks with their cavities shape the molten metal until it solidifies. A die casting machine holds the die, opens and closes the die, holds the die closed with enough force to withstand the force of the metal injection, operates the ejection system in the die, and injects the molten metal into the die, producing die castings. Die lubes are sprayed on the dies to allow for release of the casting.

In low pressure die casting operations, molten metal is displaced vertically upwards into a die by means of low pressure on the liquid metal. The die cavity is filled slowly upwards which ensures no entrained air and high soundness. Low-pressure castings, therefore, have better metallurgical integrity than traditional die castings, and they can be heat-treated. The dies are typically made from cast iron. Tool steel inserts may be used for high production runs of complex castings.

Permanent Molding Operations:

Permanent molding operations refers to the tooling used to produce aluminum castings (i.e., aluminum is poured into a mold). Molds are built from cast iron or tool steel material. The permanent mold process offers high mechanical properties, dimensional repeatability, and a good surface finish. The aluminum flows into the mold cavity through the runner system. When the aluminum has solidified, the mold is opened and the casting is removed. Subsequently, another casting is poured in the same mold cavity. Currently, pistons are cast at the Bedford Facility utilizing the permanent mold process.

2.4 OVERVIEW OF WASTE MANAGEMENT ACTIVITIES

An overview of the waste management activities conducted at the Bedford Facility is provided below. Additional information regarding waste management practices that may have the potential to impact the environment are discussed in the AOI Section of this report.

2.4.1 HAZARDOUS WASTE MANAGEMENT ACTIVITIES

In 1980, the Bedford Facility obtained a Resource Conservation Recovery Act (RCRA) Part A Permit for the storage of hazardous waste in excess of 90 days. The Hazardous Waste Storage Area was located in the northeast corner of the Waste Storage Area (Figure 1.3). GM obtained their Part B Permit for Storage in 1983. The Hazardous Waste Storage Area was closed consistent with GM's approved closure plan in 1989, as it was no longer needed. Additional information regarding the permitting and closure of the RCRA Hazardous Waste Storage Area is included in the discussion of AOI 2 in Section 7.0.

Currently, hazardous wastes are stored (less than 90 days) in a self-contained cabinet, capable of holding and providing secondary containment for a maximum of two, 55-gallon drums. The cabinet is located within the Waste Storage Area (AOI 2 on Figure 1.3). The Bedford Facility's current RCRA status is a Small Quantity Generator.

2.4.2 SOLID WASTE MANAGEMENT AREAS

The Waste Storage Area (also referred to as the Drum Storage Area and/or Oil House) is located to the north of the Piston Building. The Waste Storage Area (AOI 2) is located within a fenced area and is utilized for storing incoming liquid product, miscellaneous solid wastes, and hazardous waste materials. The entire Waste Storage Area is paved with secondary containment provided via a concrete curb and open drain leading to a sump. The sump is located on the southeast corner of the containment area and drains on site directly to the wastewater treatment plant (WWTP).

Other areas around the Facility have been used to store various waste materials (such as used mineral oils and polychlorinated biphenyl (PCB) containing hydraulic oils). Additional discussion of several of these areas can be found in Section 7.0 (AOI 3).

The Bedford Facility currently utilizes several types of fuels, lubricating oils, and production chemicals that could result in hazardous materials/wastes. In accordance with 40 CFR 112, 40 CFR 265, and 29 CFR 1910.120 the Bedford Facility has developed a comprehensive Release Plan which consolidates the required Spill Prevention Control and Countermeasures (SPCC) Plan, Contingency Plan, and Emergency Spill Response Plan (HAZWOPER) into a single document. A copy of the current Release Plan is attached as Appendix B.3.

Historically, between the late 1950's and 1984, solid wastes generated at the Facility were placed in the North Disposal Area (AOI 4). This area is located northeast of the former North Lagoon (see Figure 1.3).

In 1985, GM began placing excavated soil and demolition debris from a major on-site construction project, along with foundry sand fill, along the east edge of the salary parking lot in order to expand the parking lot. This area is referred to as the Former East Sand Disposal Area (AOI 5) as shown on Figure 1.3. Disposal in this area was discontinued in 1987 and the area was graded and covered with two feet of clay.

GM has operated several forms of wastewater and stormwater treatment facilities during the history of the Facility operations. The history and nature of these operations is discussed in the Section 2.4.3. In 1959, a series of lagoons were installed to treat wastewater and separate oil from the discharge. On several occasions sludges were removed from a lagoon and placed in prepared pits (AOI 6) on Bedford Facility property. These pits were typically excavated into clay and the sludges were placed in the pits to dry. Upon drying, the sludge was covered with soil. These pits are located to the south and east of the salary parking lot. Currently, a portion of this area is used for fire training exercises.

2.4.3 WASTEWATER MANAGEMENT

The nearest publicly owned treatment works (POTW) to the Bedford Facility is the City of Bedford POTW. The only existing discharge to the City of Bedford POTW is for sanitary wastewater (cafeteria and rest rooms only). Historically, portions of the process water from the Piston Area were discharged to the City POTW, but this practice was discontinued when the on-site WWTP was constructed in the mid-1970s. Currently all process water from the plant is discharged to the on-site Bedford Facility WWTP for treatment. The treated wastewater then is either recycled for process water for the Facility or passed through a carbon filter prior to discharge through Outfall 002.

Stormwater from the Bedford Facility flows through a stormwater sewer system to the Stormwater Lagoon (Appendix B.4). The stormwater in the Stormwater Lagoon is sent to the Bedford Facility WWTP. During high stormwater flow conditions overflow from the lagoon is discharged through Outfall 003. Figure 2.1 shows a simplified water flow diagram for the Bedford Facility. The following is a history of wastewater treatment at the Bedford Facility.

The treatment of the wastewater generated at the Bedford Facility has undergone many changes during the history of the Bedford Facility. Initially, some process water from the Bedford Facility operations was discharged to the former North Lagoon (AOI 7), which primarily served to collect stormwater runoff from the northern portion of the Bedford Facility. Non-contact cooling water, roof drains, and floor drains located in several of the manufacturing departments within the Bedford Facility were also routed to the former North Lagoon and discharged to surface water through Outfall 001. In 1974, the Bedford Facility received a National Pollutant Discharge Elimination System (NPDES) permit for Outfall 001 (NPDES Process Discharge Permit No. IN 0003573). A copy of the NPDES permit is included as Appendix B.5.

In 1959, five lagoons (AOI 8) (South Lagoons #1 through #5) were constructed to treat process water prior to discharge to a local stream (later permitted through the NPDES permit IN 0003573 as Outfall 002).

In 1965, the Bedford Facility began using Pydraul 312, a PCB-containing hydraulic fluid, because of its fire retardant properties. In 1966, the Bedford Facility instituted a reclamation program for hydraulic fluid in order to recover oil leaking from the die cast machines (approximately 14,000 to 15,000 gallons per month). The hydraulic fluid was collected in a tunnel system that allowed the fluid to gravity flow to the former South Lagoons, where the heavy oil was recovered.

The service tunnels (AOI 9), identified as North Make #'s 1, 2, 3, 4, and 5 and South Make #1, are still in operation and are shown in Appendix B.6. The hydraulic fluid, which leaked from the machines, collected in the service tunnels and flowed by gravity to the Bedford Facility WWTP (refer to Section 7.9 for additional details on the service tunnels).

From 1970 to 1973, the Bedford Facility utilized clay and polymer to pre-treat wastewater entering the lagoons in order to improve the discharge water quality at Outfall 002 (see Figure 1.3). In response to problems with oil and solids being discharged from the South Lagoons, GM installed straw filters between South Lagoons #3 and #4, between South Lagoons #4 and #5 and at the discharge point of South Lagoon #5 (Outfall 002) in July 1971. A permanent concrete basin with two separate compartments was installed in 1972 to house straw filter material. Each compartment held approximately 200 bales of straw. The double compartment allowed one to be used while the other was cleaned and replaced. Straw filters were also added at the discharge of South Lagoon #4.

Following approval from the Indiana State Pollution Control Board (ISPCB) and Indiana State Board of Health (ISBH) in January 1973 (Appendices B.7 and B.8), the Bedford Facility constructed a primary WWTP to reclaim hydraulic fluid from the wastewater originating from the Die Cast Department. The purpose of the primary wastewater treatment system was to separate storm and process water by allowing the stormwater to flow directly to South Lagoon #4 while the process water flowed to the new primary treatment system. The primary system consisted of a diversion chamber, two clarithickeners, a hydraulic fluid tank, and a heater and centrifuge. Construction and installation of the primary system took place at the location of South Lagoons #1, #2, and #3, thereby necessitating the draining, filling, and cleaning out of sludge from the former South Lagoons #1, #2, and #3 (AOI 8).

In March 1974, both the ISPCB and the ISBH approved construction plans for a secondary wastewater treatment system with 90 percent recycle capacity of treated plant wastewater. The secondary water treatment system included a collection chamber, flash mix basin where chemicals were added, flume and splitter box, two clarifiers, sludge thickener, centrifuge, clearwell, filters, and a backwash reservoir. Wastewater from the air pollution scrubbers and the Piston and Heat Resistant Alloy Departments bypassed the primary treatment system and flowed directly into the secondary system. Effluent from the clarithickeners also flowed into the secondary treatment system. Water passing through the secondary system was recycled through the Bedford Facility and used as process water with the overflow going into South Lagoons #4 and #5. Sludge generated from the filters was disposed of at the Lawrence County landfill.

Over time, PCB-containing sludge collected in South Lagoons #4 and #5. In late 1976, South Lagoon #5 was drained, cleaned, and filled and an aboveground concrete holding basin was constructed in its place (see AOI 8).

In June 1978, a Calgon carbon adsorption filter unit was installed to further reduce PCBs in the discharge from Outfall 002. In June 1980, the Bedford Facility began removing sludges (via pumping) from the former South Lagoon #4. These sludges were dewatered on-site with a filter press and transported for disposal to the CECOS International, Inc.'s (CECOS) disposal facility (Secure Chemical Management Facility) near Williamsburg, Ohio. Dewatered sludge generated from the wastewater treatment process was also disposed of at the CECOS facility in Ohio until late 1984, when the CECOS facility was closed. The Bedford Facility then began shipping the dewatered sludge to Chemical Waste Management, Inc.'s chemical waste landfill in Emelle, Alabama, until the CECOS Ohio facility reopened in mid-1985. See Section 7.8 for a discussion on the closure of South Lagoon #4.

In late 1979, the City of Bedford approached the GM Bedford Facility regarding assistance in handling PCB contaminated sludge at the City of Bedford POTW. The City had been notified by the ISBH in correspondence dated August 27, 1979, of PCB contamination detected in the sludge at the City POTW. The City's raw sludge from the primary clarifier had PCBs detected at 64.7 mg/kg (reported on a dry weight basis). Sludges from the City's secondary digester and sludge drying lagoon had PCB levels reported at 115.2 mg/kg and 589.2 mg/kg (dry weight) respectively. The State also collected a sample of GM's wastewater discharge to the City's sewer system. GM's discharge to the POTW had a PCB concentration of 17 μg/L.

Construction of the new Stormwater Lagoon (AOI 10) began in January 1981, pursuant to a construction permit issued by the ISPCB. The 14 million-gallon stormwater retention lagoon was constructed to replace the North Lagoon as Phase 4 of the WWTP expansion. It was designed to capture runoff from the entire Bedford Facility. The water in the Stormwater Lagoon is pumped to the aeration basins in the wastewater treatment system where it is combined with process wastewater and flows through the remainder of the treatment process (Figure 2.1). Emergency stormwater overflows are allowed under the NPDES permit via Outfall 003. GM is required to test any overflow pursuant to the NPDES permit. This includes daily grab samples for pH, oil and grease, and weekly composites for PCBs. Outfall 003 has zero dry weather discharge and is monitored for discharges exceeding a 15-year, 24-hour stormwater event. The Stormwater Lagoon discharged through Outfall 003 in July 1984 and November 1988. According to an interview with Facility personnel, the Stormwater Lagoon only discharged once to Outfall 003 in the last three years.

In late 1982, biological treatment was added to the process WWTP. The biological treatment system included aeration tanks, aerobic digesters and associated effluent pump station, and return sludge pumps. The overall waste treatment facility consisted of primary separators, secondary aerobic biological treatment followed by clarification, gravity filtration, chlorination, and final carbon adsorption. Sludge digesters and filter presses were used to process the wastewater treatment sludge.

From approximately mid-1983 through mid-1985, the WWTP discharge at Outfall 002 experienced problems with elevated biological oxygen demand (BOD), phenol, and foaming. During this time, only half of the secondary treatment system was operational while repairs were being made. In mid-1985, the treatment system was entirely back on-line, although it did not perform at the levels achieved before the extensive repairs. The Bedford Facility initiated various studies to determine the cause of the poor performance of the treatment systems. Review of the studies indicated that the primary treatment system was not properly removing sludge and heavy and light oils from the raw process water, therefore, inhibiting the secondary system from operating properly. Based on these findings, GM made several changes to the treatment system operation.

The Bedford Facility currently reuses approximately 85 to 90 percent (2 to 3 million gallons per day [mgd]) of the treated wastewater. An average of 350,000 gallons per day (gpd) of treated water is discharged to Bailey's Branch of Pleasant Run Creek via an unnamed ditch originating at Outfall 002 (see Figure 1.1). Appendix B.4 includes a diagram showing the sewer system at the Bedford Facility.

3.0 REGIONAL ENVIRONMENTAL SETTING

3.1 TOPOGRAPHY

The State of Indiana covers an area of approximately 36,300-square miles. The state's topography ranges from 324 to 1,257 feet above mean sea level (amsl). The lowest point of elevation is in the southwest corner of Indiana, where the Wabash River flows into the Ohio River. The highest point is in Wayne County in east central Indiana. Facility-specific topography is discussed in Section 4.1.

3.2 LAND USE

Land use in Indiana primarily consists of farming with the primary crops being corn, soybeans, feed grains, and hay. Industry and dairy farming is important nearby urban areas. Farming is central to the economy of Indiana and its counties. Oil and gas (in the east central section) was discovered in 1889, however, this resource was depleted by 1912. There are also several oil fields located in the southwestern portion of Indiana. Facility-specific land use is discussed in Section 4.2. (United States Department of Agriculture (USDA), http://www.usda.gov, 2001)

3.3 WATER SUPPLY/GROUNDWATER USE

The IDEM, Office of Water Management, Drinking Water Branch (DWB) is the primary administrator of the Indiana Public Water Supply Supervision Program. The IDEM-DWB maintains an inventory of all public water supplies (PWSs). Each PWS is required to collect and analyze drinking water samples for various contaminants (IDEM, DWB, http://www.ai.org/serv/idem_dwb_inventory, 2001). The water sample analysis data are compiled to ensure that public water systems do not exceed the maximum contaminant levels established by the State of Indiana and the U.S.EPA.

There are approximately 4,200 active PWSs in Indiana. Drinking water in Indiana comes from groundwater sources via wells or surface water sources such as lakes or rivers. Some public water systems purchase water from other PWSs and distribute the water to their customers. Ninety-six percent of all public water systems are classified as groundwater systems. (IDEM-DWB http://www.ai.org/serv/idem_dwb_inventory, 2001)

Between 60 to 72 percent of Indiana's population relies on groundwater for drinking and household use. In 1995, it was estimated that 1.52 million people were supplied water from private domestic wells and PWSs supplied 2.1 million people from a groundwater source. Approximately 303 mgd of groundwater was pumped by PWSs registered as significant water withdrawal facilities (100,000 gpd capacity) in 1992. Approximately 4,200 PWSs and countless industries use groundwater as their source of water (IDEM-DWB, http://www.ai.org/serv/idem_dwb_inventory, 2001).

Information regarding water wells within a five-mile radius of the Bedford Facility was obtained from the IDNR water well records. Recorded wells within a five-mile radius of the Bedford Facility are presented on Figure 3.1. The water well logs are provided in Appendix C.1.

CRA performed a preliminary water well reconnaissance surrounding the Bedford Facility in February 2001 via automobile. A total of 39 water wells were identified, most of which were not identified through the water well records obtained by CRA from Indiana Department of Natural Resources (IDNR) (IDNR, http://www.state.in.us/dnr, 2001). There may have been additional wells not identified during this reconnaissance due to their location on the properties and limited access with an automobile. All wells were "pitcher-pump" style. Garden hoses were attached to some wells. It was not possible to determine if all wells were being used.

3.4 DEMOGRAPHICS

The Bedford Facility is located in Lawrence County, Indiana. The majority of the Facility property, including all the manufacturing operations, are located within the limits of the City of Bedford. According to the 1999 U.S. Bureau of Census, Lawrence County has a population of approximately 45,752. The population racial mix in Lawrence County is approximately 97.9 percent Caucasian; 0.4 percent African American; 0.3 percent American Indian and Alaska Native; 0.3 percent Asian; 0.3 percent persons reporting some other race; and 0.8 percent persons reporting two or more races. The male population in Lawrence County is approximately 22,242 and the female population is approximately 23,510 (U.S. Bureau of Census, http://www.census.gov, 2001).

Lawrence County's major employers include GM, Ford Electronics & Refrigeration Corporation, Indiana Limestone Company, Brunner Engineering, Preferred Technical

Group, Regal-Beloit Corporation, and Lehigh Portland Cement Company (U.S. Bureau of Census, http://www.census.gov, 2001).

3.5 CLIMATE

The climate in Lawrence County, Indiana is temperate with warm summers, cold winters, and no distinguishable wet or dry seasons. Precipitation is generally evenly distributed throughout the year, although, precipitation is somewhat greater from March through July.

According to the National Oceanic and Atmospheric Administration (NOAA), the average length of the growing season, or freeze-free period, ranges from 173 days in northeastern Indiana to 199 days in southwestern Indiana. According to meteorological data from the National Climatic Data Center, the average annual precipitation in Indiana ranges from 44 inches in the south to 36 inches in the northeast; average annual snowfall ranges from 10 inches in the south to 40 inches in northern Indiana. Average annual temperature ranges from 50 degrees Fahrenheit (°F) in the north to 56°F in the southwest (NOAA, www.outlook.noaa.gov, 2001).

3.6 REGIONAL GEOLOGY

3.6.1 OVERBURDEN

The Bedford Facility lies within an area of Indiana that was not glaciated (driftless area) during the last glacial period on the North American continent. The maximum progression of the Illinoian Glacial advance (the furthest advance of the Laurentide Ice Sheet) lies to the west, north, and east of the immediate region surrounding the Bedford Facility (Figure 3.1). Consequently, the surficial geology of the area generally consists of a relatively thin layer of unconsolidated deposits of sand, clay, and chert produced by the weathering of limestone bedrock (regolith, which is more commonly referred to as terre rosa in this area due to its reddish color) and wind-deposited silty material, known as loess. Thicker deposits of proglacial outwash, lake sediment, and recent colluvium occurs along the major stream valleys (Figure 3.2). The surficial deposits range in thickness from zero feet along bedrock outcrops to approximately 100 feet thick along Salt Creek and the East Fork of the White River.

3.6.2 BEDROCK

The bedrock within the region is near the eastern margin of a structure known as the Illinois Basin. The bedrock formations in this area generally dip to the west at approximately 20 to 25 feet per mile. The Cincinnati Arch lies to the east of the Illinois Basin and covers much of Indiana (Figure 3.3) (Indiana Geological Survey, www.adamite.igs.indiana.edu/index.htm, 2001).

Two regional structures are within the vicinity of the Bedford Facility, the Leesward Anticline and the Mt. Carmel fault (Figure 3.3). The Leesward Anticline is located to the north and east of Bedford and plunges to the south-southeast. The Mt. Carmel fault is a normal fault with the downthrown side located to the west of the fault. This fault is located to the north and east of the Bedford Facility and truncates the Leesward Anticline on its western side. The Mt. Carmel fault generally acts as a hinge line, with gentler dips to the west of the fault and slightly steeper dips to the east (Melhorn and Smith, 1959).

Bedrock within the immediate vicinity of the Bedford Facility (Figure 3.4) consists of the lower beds of the Middle Mississippian St. Louis Limestone (the oldest formation within the Blue River Group) and is only approximately 25 feet thick in the immediate vicinity of the Bedford Facility (Melhorn and Smith, 1959). Immediately underlying the St. Louis Limestone, and outcropping to the east of the Bedford Facility, are the Salem Limestone and the Harrodsburg Limestone, respectively. These two Mississippian formations make up most of the Sanders Group. The Salem Limestone is approximately 70 to 80 feet thick, where preserved, and the Harrodsburg Limestone is approximately 80 to 90 feet thick in the area (Melhorn and Smith, 1959). Figure 3.5 presents a generalized stratigraphic column for Paleozoic formations in Indiana.

The Borden Group, which underlies the Sanders Group and outcrops further to the east, consists of approximately 500 to 800 feet of siltstone and shale, interbedded with some sandstone and minor limestone. The New Providence Shale formation makes up the bottom of the Borden Group, and is approximately 200 thick.

The Sanders and Blue River Groups have been described to consist mostly of carbonates, with minor amounts of chert, shale, siltstone, anhydrite, gypsum, and calcareous sandstone. A thin bed of brown dolomitic limestone commonly marks the bottom of the St. Louis Limestone. The Salem Limestone, which is more massively bedded limestone, is known as the Indiana Limestone, the Bedford Limestone, or the Oolitic Limestone and is quarried as fine building stone. However, some horizons may contain geodes, joints and solution fractures, which render the formation less suitable for quarrying. The Salem Limestone is approximately 25 to 30 feet thick in the vicinity of the Bedford Facility (Fenelon and Greeman, 1994).

Numerous joints and fractures are present in these formations with master sets trending east-west within the St. Louis Limestone, with minor sets 90 degrees to the master sets (Powell, 1976 and 2001). Karst topography is present near the top of the St. Louis limestone. Numerous sinkholes can be observed on the USGS topographic quadrangles approximately 5 to 10 miles to the west of the Bedford Facility. Several caverns have been mapped in Lawrence County, including one of the largest mapped caverns in the United States, the Blue Springs Cavern, located approximately five miles southwest of the City of Bedford. Other mapped caverns in the area include the Shiloh Cave, the No Sweat Cave, the Dog Hill Cave, the Donnehue Cave, and the Salt Creek Cave. Other unmapped caverns within close proximity to the Bedford Facility include: Mouse Hole Cave, located one mile east-northeast; Eighteenth Street Cave, located one and one-half miles to the south-southeast; and Armstrong Caves I and II, located one and one-half miles to the west-southwest (Etzel, 1982).

3.7 REGIONAL HYDROGEOLOGY

Groundwater resources are found in Lawrence County along the valleys of the major rivers or streams and within the thick Mississippian carbonate aquifer system (within the western portion of Lawrence County) and the Silurian-Devonian carbonate bedrock aquifer (within the eastern portion of Lawrence County).

There are two basic types of aquifers: consolidated and unconsolidated. Unconsolidated aquifers in Lawrence County generally occur along the Salt Creek and the East Fork of the White River within the proglacial outwash deposits, glaciolacustrine deposits, and recent alluvium. The tops of unconsolidated aquifers are often exposed to the surface or have a very thin covering of non-aquifer material, generally comprised of silt and clay (Fenelon and Bobay, 1994).

Groundwater flow within the consolidated (carbonate) aquifers takes place along the joints, fractures, and bedding planes that eventually may become enlarged by solution to cave passages or Karst features. Recharge to a karst system occurs through surface openings that vary in scale from narrow, solutionally widened joints to large sinkholes. Discharge typically occurs through springs, which are solutionally widened joints or bedding planes, but may be enlarged, to sizable cave openings. Most groundwater within this aquifer system discharges to the major rivers, to underground rivers, and to springs. (Etzel, 1982)

3.8 REGIONAL SURFACE WATER HYDROLOGY

Most of the rivers in the East Fork White River Basin drain to the southwest. According to USGS Water Resources Division, the current stream flow recorded at the East Fork White River gauging station, located 7.8 miles southeast of Bedford in Lawrence County, is 4,210 cubic feet per second (cfs). There are eighteen total watersheds in Lawrence County. According to U.S.EPA Index of Watershed Indicators (IWI) 1 through 6, the Lawrence County watershed has less serious water quality problems and a higher vulnerability (number 4 IWI). (U.S.EPA, http://www.epa.gov/iwi/counties/18093, 2001).

Major tributaries to the East Fork White River include the Muscatatuck River, Salt Creek, Driftwood River, Flatrock River, and the Big Blue River. Drainages in the East Fork White River Basin include the Lost River, Sugar Creek, Graham Creek, Clifty Creek, Big Creek, Indian Creek, White Creek, Brandywine Creek, and the Little Blur River.

Rivers in the eastern half of the East Fork White River Basin have a subparallel drainage. Those rivers include the Sugar Creek, Big Blue River, Little Blur River, Flatrock River, Clifty Creek, Sand Creek, Vernon Forth, Graham Creek, and the East Fork White River from Medora to Jonesville (see Figure 3.6 for the Lower East Fork White River Drainage Map).

Drainage of the Mitchell Plain in the central Lawrence County, northeast Orange County, and Monroe County is different from the rest of the East Fork White River Basin. In the streams that flow across the Mitchell Plain, surface water is intercepted by swallow holes and diverted underground into the groundwater system or subterranean channels.

3.9 REGIONAL ECOLOGICAL SETTING

The City of Bedford lies within the Ohio River Basin, which is formed by the confluence of the Allegheny and Monongahela Rivers, and flows 981 miles in a southwesterly direction to its confluence with the Mississippi River at Cairo, Illinois. Major ecological sub-divisions include the Appalachia Plateau, Central Lowlands, and the Low Plateau. The Appalachia Plateau is located in the eastern portion of the Ohio River Basin and characterized by rugged topography and extensive forest cover. The Central Lowlands occupies the northwestern third of the Ohio River Basin and is the result of several glaciations, which resulted in the deposition of soil that provides some of the richest agricultural lands in the Ohio River Basin. The City of Bedford is located in the Interior Low Plateau, which occupies the southwestern third of the Ohio River Basin, and is dominated by limestone rock, with characteristic rolling terrain (U.S. Department of Fish and Wildlife, http://www.fws.gov, 2001).

According to IDEM, Indiana Water Quality Report 2000, the Pleasant Run Creek and the Salt Creek were listed on the Office of Water Management 2000 303 (d) List of Impaired Waterbodies. Fish Consumption Advisories (FCA) were in effect in 2000 for all Indiana County rivers and streams for PCBs and mercury in at least some species of fish (IDEM, http://www.state.in.us/isdh/dataandstats/fish/fish_2000/streams.htm). The extent and level of FCA issued for a given stream is based on levels of PCBs and mercury found in fish tissue. Samples were taken of bottom-feeding fish, top feeding fish, and fish feeding in the water column in streams across the state. The statewide database includes over 1,600 fish tissue samples, which were analyzed for PCBs, pesticides, and heavy metals. Numerical sample results of the FCA were not published.

Fish species covered by FCA in Lawrence County streams near Bedford include:

Pleasant Run Creek – all species

Salt Creek – all species

East Fork of White River - carp, channel catfish, drum, bigmouth buffalo, flathead catfish, largemouth bass, river carpsucker, sauger, shorthead redhorse, smallmouth buffalo, spotted bass, spotted sucker, and striped bass.

Fish species, size classes, and level of advisory in Indiana streams are shown in the attached table from the IDEM website (Appendix C.2).

Two hundred years ago, the dominant habitat in southern Indiana primarily consisted of hardwood forests, with areas of tall grass prairie, and numerous wetlands. Originally, there were more than 20 million acres of hardwood forest covering the State, though a "prairie peninsula" projected well into northwest Indiana.

Today, only 20 percent of the forests and less than 13 percent of the wetlands remain. In Lawrence County, approximately 25 percent of the plant cover is classified as "Forest-Riparian" and approximately 75 percent as "Agricultural/Urban Riparian". Available information indicates that the principal wetland cover types are primarily palustrine, unconsolidated bottom, intermittently exposed, and diked and impounded artificial wetlands, based on a 1990 Natural Wetlands Inventory map (U.S. Department of Interior, http://www.doi.gov, 1990) (Appendix C.3).

According to the Federal Emergency Management Agency (FEMA), Flood Insurance Rate Map, 1987, for Bedford, the Facility does not lie within the 100-year or 500-year floodplain (Appendix C.4) (FEMA, http://www.fema.gov, 2001).

3.9.1 REGIONAL PLANT LIFE

Common plant communities in the region range from obligate wetland to upland forest. Low areas with saturated soils support wetland species such as buttonbush (*Cephalanthus occidentalis*) and several sedge species. The highest and driest sites have a thicker shrub layer full of poison ivy (*Toxicodendron radicans*), spicebush (*Lindera benzoin*), paw paw (*Asimina triloba*), elderberry (*Sambucus Canadensis*), and an occasional possumhaw (*Ilex deciduas*). Some other common herbaceous species include jewelweed (*Impatiens capensis*), bedstraw (*Galium triflorum*), wild rye (*Elymus virginicus*), avens (*Geum canadense*), grape (*Vitis* spp.) and a characteristic plant of the bottomland forest, the woolly pipe vine (*Isotrema tomentosa*). Common woody bushes and trees include azalea (*Rhododendron* sp.), rhododendron (*Rhododendron canadense)*, buckeye (*Aesculus californica)*, hickory (*Carya* spp.), serviceberry (*Amelanchier* spp.), American sycamore (*Platanus occidentalis*), American chestnut (*Castanea dentata*), dogwood (*Cornus spp.*), hawthorn (*Crataegus spp.*), ash (*Fraxinus spp.)*, hackberry (*Caltis occidentalis)*, buttonbush, box-elder (*Acer negundo*), black walnut (*Juglans nigra)*, black cherry (*Prunus serotina*), red oak (*Quercus rubra*), black locust (*Robinia pseudoacacia*), yew (*Taxus spp.*), and red and black maple (*Acer rubrum* and *A. nigrum*). Non-woody plants include larkspur (*Delphinium* spp.), stinging nettle (*Laportea canadensis*), sweetclover (*Melilotus officinalis*), lupine (*Lupinus* spp.), mustard (*Brassica spp*.), milkweed (*Asclepias syriaca)*, and horsetails (*Equisetum spp*.). Common plants that are invasive to Indiana include purple loosestrife (*Lythrum salicaria*), bush honeysuckle-amur (*Lonicera maackii*), tartarian (*Lonicera tatarica* L.), morrow (*Lonicera mortowii*), Japanese honeysuckle (*Lonicera japonica* Thunb.), garlic mustard (*Alliaria petiolata*), buckthorns (*Rhamnus sp*.), autumn olive (*Eleaganus umbellate* Thunb.), crown vetch (*Coronilla varia*), reed canary grass (*Phalaris arundinaceae*), common reed, (*Phragmites australis*), and Oriental bittersweet (*Celastrus orbiculatus*) (United States Department of Agriculture (USDA), National Resource Conservation Service, http://www.usda.gov, 2001).

3.9.2 <u>REGIONAL ANIMAL LIFE</u>

Native woodland birds common to Lawrence County include the pileated and red-bellied woodpeckers (*Dryocopus pileatus* and *Melanerpes carolinus*), eastern wood pewee (*Contopus virens*), Acadian flycatcher (*Empidonax virescens*), wood thrush (*Hylocichla mustelina*), red-eyed vireo (*Vireo olivaceous*), Summer and scarlet tanagers (*Piranga rubra* and *Piranga olivacea)*, and Kentucky and worm-eating warblers (*Oporornis formosus* and *Helmitheros vermivorus*), bluebirds (*Sialia* spp.) and red-headed woodpeckers (*Melanerpes erythrocephalus*). The large sycamores, which are abundant in the region, host northern parulas (*Parula Americana*) and Yellow-throated warblers (*Dendroica dominica*). Other common native birds include owls (Strigidae), woodpeckers (Picidae), vireos (*Vireo* spp.), tanagers (*Piranga spp*.), tits (*Parus* spp.), finches (Fringillidae), and sparrows (*Spizella* spp.).

Mammalian wildlife native to Lawrence County include the beaver (*Castor canadensis*), raccoon (*Procyon lotor*), deer (*Odocoileus spp*.), groundhog (*Marmota monax*), and bats (Emballonuridae).

There are a number of species known to occur in Indiana which are listed by the Federal or State government as endangered or threatened. The State of Indiana lists the Indiana bat (*Myotis sodalis*) and ring pink (*Obovaria retusa*) as endangered or possibly extirpated; and the bald eagle (*Haliaeetus leucocephalus*) as threatened within Lawrence County.[1] Other regional wildlife (outside of Lawrence County) included on the threatened and endangered species list are the Allegheny woodrat (*Neotoma magister*), American badger

[1] Based on January 21, 2001, correspondence from Kim Mitchell with the U.S. Fish and Wildlife Service, Endangered Species Division (Appendix C.5).

(*Taxidea taxus*), bobcat (*Felis rufus*), evening bat (*Nycticeius humeralis*), ground squirrel (Spermophilus *tridecumlineatus*), river otter (*Lutra canadensis*), southeastern bat (*Myotis austroriparius*), and swamp rabbit (*Sylvilagus aquaticus*). Species of threatened and endangered fish known to occur in Lawrence County include bluebreast darter (*Etheostoma camurum*), gilt darter (*Percina evides*), greater redhorse (*Moxostoma* valenciennesi), lake sturgeon (*Acipenser fulvescens*), southern cavefish (*Typhlichthys subterraneus*), spotted darter (*Etheostoma maculatum*), and redside dace (*Clinostomus elongates*) (U.S. Fish and Wildlife, http://www.fws.gov, 2001).

4.0 FACILITY ENVIRONMENTAL SETTING

4.1 PHYSIOGRAPHY AND TOPOGRAPHY

The Bedford Facility is located within the East Fork White River Basin. The East Fork White River Basin lies within several counties including Lawrence, Henry, Brown, Marion, Monroe, and Orange counties. Principal cities include Bedford, Bloomington, Columbus, Franklin, North Vernon, and Shelbyville.

The Bedford Facility is located on the Mitchell Plain area underlain by Mississippian limestones. The area is a low relief karst plain that is pitted in some areas by thousands of sinkholes. This low-lying karst plateau is developed on soluble limestones of the Blue River Group, sloping approximately 30 feet per mile westward (Fenelon and Greeman, 1994).

Based on the USGS 7.5 minute topographical quadrangles (Oolitic, Bartlettsville, Bedford East, and Bedford West Quadrangles), elevations around the Facility in Lawrence County range from 550 feet amsl to 700 feet above amsl. The elevation of the Bailey's Branch and Pleasant Run Creek stream channels range from approximately 550 to 600 feet amsl.

4.2 LAND USE

The Bedford Facility is bordered to the north by residential and undeveloped areas, on the south by the Canadian and Pacific Railway, IMCO (a Kaiser aluminum Facility), and residential property, on the east by residential and undeveloped areas, and on the west by the railway and residential properties, and a cemetery. The property was historically utilized for industrial activities since the 1920's, a railroad since the 1880's, and as a stone mill from 1890 to 1942. The Facility is currently zoned industrial. Surrounding areas include industrial, commercial, and residential property. See Appendix D.1 for City of Bedford Zoning Districts. The manufacturing portions of the Facility are surrounded by a perimeter fence to limit access, and plant security is provided 24-hours a day.

4.3 FACILITY GEOLOGY

4.3.1 OVERBURDEN

The surficial geology of the 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. Thicker deposits of proglacial outwash and lake sediment, and recent colluvium occurs along the major stream valleys (Figure 3.2). However, much of the land at the Bedford Facility has been graded or filled and the thickness of overburden is unknown.

Soil in the vicinity of the Bedford Facility has been mapped by the USDA as Udorthents (or manmade soils). Soil classification includes earth and broken rock materials for road fills and embankments. Fills include: rock, broken brick, concrete, steel, and glass. The natural soil in the immediate vicinity of the Bedford Facility is known as Crider. Crider soil is a fine-grained, silt loam to silty clay loam. Crider soil develops on 20 to 42 inches of silty loess over clayey material derived from limestone (Etzel, 1982).

4.3.2 BEDROCK

The ridge tops and high hill slopes in the vicinity of the Bedford Facility are layered with limestone and thin shales of the Mississippian St. Louis limestone, which is underlain by the Salem Limestone (Figure 3.4). The valley bottoms and walls along the Bailey's Branch and Pleasant Run Creek are developed within the upper part of the Borden Group, consisting of shales, siltstones, sandstones, and some limestone. No sink holes, caverns, or sinking streams have been observed on the Bedford Facility (Etzel, 1982).

The gradient of bedrock and fracture patterns in the area can be observed in quarries and road cuts. The bedrock layers dip to the southwest at approximately 20 to 25 feet per mile in the Bedford area. Near the bedrock surface are identifiable sets of fractures or joints. The fractures provide a network for lateral and vertical movement for any water in limestone in this area (Etzel, 1982).

Other types of joints include sheet, vertical, and inclined. Sheet joints are horizontal fractures occurring at or near the bedrock surface and commonly found in porous, softer limestone beds. Based on data collected from adjacent abandoned quarries, and nearby road and railroad cuts, vertical joints that occur in the limestone bedrock are relatively planar as compared to other fractures. Inclined joints occur is the lower part of the St. Louis Limestone and the upper part of the Salem Limestone at an approximate 60-degree angle from the horizontal (Etzel, 1982).

According to a report titled, "Report of the Soil and Foundation Investigation for the Proposed Water Pollution Clarification System, Bedford, Indiana", prepared by Pittsburgh Testing Laboratory, four borings were drilled to between 7.5 feet to 22 feet below ground surface (bgs), and encountered cohesive clay materials. The borings were located to the east of the former railroad tracks near the WWTP north clarithickener to the south reactor clarifier. At depths of approximately 4 feet to 20 feet bgs, the clay materials in these borings were reported to be very stiff to hard in consistency. At increased depth, the clayey soils generally became siltier and less sandy, containing more moisture. Groundwater observations were made upon completion of the drilling at depths ranging from 5 to 10 feet bgs. The report and boring logs and locations are included in Appendix D.2.

4.4 FACILITY HYDROGEOLOGY

Much of the groundwater flow within the Mississippian carbonate aquifer near the Bedford Facility is subject to the influence of karst topography. The water flow is likely along solution-enlarged joints and fractures of the St. Louis limestone discharging into streams and to the surface through springs.

Several springs can be observed on the Bedford Facility property. Some springs originate as minor seeps, which occasionally disappear into the ground, only to reappear downstream. Some springs on the property provide flow and likely contribute to the baseflow of the unnamed ditches.

Groundwater at the Facility is expected to be encountered within the carbonate bedrock. However, Facility-specific information is generally not known and groundwater may potentially be encountered as perched water within the unconsolidated material.

4.5 FACILITY SURFACE WATER HYDROLOGY

The Bedford Facility is situated high on a ridge such that the Facility is drained by surface runoff primarily to the east and northeast in small valleys (or unnamed ditches) which are tributaries of the Bailey's Branch of Pleasant Run Creek. According to Facility personnel, surface water runoff from the Facility to the west of the Facility is minimal. The ridge top is approximately 150 to 185 feet higher than the valley bottom one-half mile northeast of the Bedford Facility.

Stormwater from the operations portions (e.g., improved surfaces) of the Bedford Facility is currently collected in the Stormwater Lagoon (which is part of the Facility's recycled water system). Stormwater from non-operational portions of the Facility (i.e., property located north and east of the Stormwater Lagoon) drains directly to several unnamed ditches and eventually to Bailey's Branch of Pleasant Run Creek.

4.6 WATER SUPPLY/GROUNDWATER USE

The Facility receives City of Bedford water for domestic and process water use. Public water supply lines are along all major roads throughout Lawrence County. These lines are owned by the Bedford City Utilities, East Lawrence Water Corporation, or North Lawrence Water Corporation. The surface water intake for the City of Bedford is located on the East Fork White River (Appendix D.3). East Lawrence Water Corporation purchases all of their water from the City of Bedford. The North Lawrence Water Corporation purchases water from the City of Bedford for all of their customers located east of Salt Creek. For their customers west of Salt Creek, the North Lawrence Water Corporation supplies water from water supply wells screened in the bedrock (IDEM, http://www.ai.org/serv/idem_dwb_inventory, 2001).

Groundwater use in the area includes public supply, commercial, domestic, industrial, mining, livestock, irrigation, and hydroelectric power. About 85 percent of water used in the East Fork White River Basin originates from surface-water sources; 45 percent of drinking water originates from surface-water sources (IDEM, www.ai.org/serv/idem_dwb_inventory, 2001).

5.0 SUMMARY OF PREVIOUS REMEDIAL ACTIONS

Table 5.1 presents a chronological summary of previous remedial actions conducted at the Facility. A more detailed summary of previous remedial actions is included with the discussion of each AOI, in the Sections indicated in the table. Previously submitted documents, including closure plans and closure verification reports, are also listed. Most of these documents have been included as Appendices to this Report. Those that are not appended are available upon request.

6.0 SUMMARY OF PREVIOUS ENVIRONMENTAL INVESTIGATIONS

6.1 STREAM STUDIES

Complaints were made to the Facility by ISBH about operations at the Bedford Facility relating to surface water quality in the Bailey's Branch of Pleasant Run Creek. The complaints noted a black effluent in the water, and an absence of minnows. The Bedford Facility determined the black effluent to be a colloidal graphite discharge from the former South Lagoons. The colloidal graphite was an ingredient in the release agent (die lube) which was sprayed on the die cast forms. As a result of these findings, the former South Lagoon #1 was dredged to its full depth of 12 feet, and the former South Lagoon #2 was dredged until it was free of the black effluent.

In August 1971, the EnviroChem Division of Monsanto Corporation was retained by GM to perform an engineering analysis of the most efficient ways to comply with State water quality requirements. The Bedford Facility took permanent corrective actions by installing a waste treatment facility to comply with standard codes established by the State of Indiana. The plan included a facility design to recover hydraulic fluid, and recycle as much water as possible for processing needs in order to be permitted to continue discharging water from the North and South Lagoons.

ISHB submitted and reviewed the plan by January 1, 1972. The WWTP was scheduled to be operational by June 1, 1973.

6.1.1 1976 STREAM STUDY

Biological studies conducted by IDEM in streams between Bloomington and Bedford in 1976 indicated the presence of PCBs in fish. IDEM reported PCBs in fish from several locations upstream and outside of the influence of the Bedford Facility. In Spider Creek between Bloomington and Bedford, concentrations were lower, with lowest concentrations reported less than 0.0001 ppm. IDEM reported PCB residues in fish from Clear Creek, just south of Bloomington, ranging from 5 to 224 parts ppm. In the East Fork White River downstream of the Facility, the PCB levels in fish tissue ranged from trace quantities to 0.046 ppm.

6.1.2 1977 STREAM STUDY

In June 1977, GM Bedford contracted the Environmental Sciences Division of Camp Dresser & McKee (CDM) to conduct a qualitative study of PCBs and the aquatic communities in Pleasant Run Creek and its tributaries. CDM also conducted an analysis of potential PCB remediation options. Six sampling stations, labeled A through F, were selected in Bailey's Branch and Pleasant Run Creek (see Figure 1 in Appendix F.1). The CDM report is included as Appendix F.1.

CDM concluded that the PCB concentrations were generally highest in Bailey's Branch. PCB levels in water were measured at 55 ppb and 21 ppb, respectively at Stations A and B, which are located closest to the Facility. PCB concentrations in water at control station C, located in Pleasant Run Creek upstream of the Bailey's Branch confluence, and the "recovery control" station F, located furthest downstream from the Facility, were reported at less than 1 ppb and 7 ppb, respectively.

CDM concluded that PCB levels were higher in "mucky" streambed sediments, as opposed to firm, rockier sediments. Mucky substrate was reported at Station E, located between sample locations D and F, where firmer sediments were noted. PCB concentrations at Stations D and F were reported at 76 ppm and 1.0 ppm respectively. The PCB level at Station E was an order of magnitude higher, with a value of 800 ppm. CDM attributed this to a local depositional environment in the vicinity of Station E.

Fish seining was conducted at Station B only, located in the unnamed tributary leading from the Facility to Pleasant Run Creek. Fish were caught, but not identified or retained. A benthic community survey was performed to determine the "presence or absence of forms having varying degrees of tolerance to contaminants," and also to characterize the species richness of the study area. This study showed that Stations A and B (located in Bailey's Branch), and D and E (Pleasant Run) were dominated by species of oligochaetes (worms) with little or no dipterans (flies) present. The control and recovery control stations (C and F) showed a well-balanced benthic structure with five taxa each of oligochaetes and dipterans. The control and recovery control areas had a variety of species, including *Stichtochironomus* and *Criotopus bicenctus*, which are typically associated with cleaner waters.

CDM concluded that the benthic community in Bailey's Branch may have been impacted by contamination. Alternatively, the benthic diversity in Bailey's Branch may be limited by sediment habitat or other natural conditions. Benthic diversity in Pleasant Run Creek may have been affected by heavy nutrient loading from non-point source (agricultural) discharges. It was noted that any aquatic community in Bailey's Branch is dependent on the flow from the Bedford Facility, since it supplies 100 percent of the dry weather flow.

CDM's engineering division surveyed the affected area, and identified two potential remedial alternatives; fix the sediments in place, or remove the sediment completely. CDM concluded that these remedial options in the creek downstream of the Facility would likely result in unwarranted destruction of the aquatic community.

A draft copy of the CDM report is included as Appendix F.1 (a final copy of the report was not included in the files reviewed).

6.1.3 <u>1981 STREAM STUDY</u>

In 1981, CDM was contracted by GM to conduct further environmental investigations of the drainages downstream from the Bedford Facility pursuant to Stipulation and Consent Order, Cause B-416 (Appendix F.2). Cause B-416, which was signed by the ISPCB in 1980, required GM conduct a stream study to determine the following:

- whether or not a balanced, indigenous aquatic community existed in the areas of PCB contamination, including Periphyton;
- the PCB concentrations in fish tissue;
- how sediments transport PCBs;
- the concentrations of PCBs associated with river bottom sediments; and
- the PCB concentrations in areas prone to flooding events.

The study was conducted in May during high stream stage and in September during low stream stage. The twelve sampling stations from 1977, labeled A through L were located on Salt Creek, Pleasant Run Creek, and Bailey's Branch of Pleasant Run Creek. (See Figure 2 in Appendix F.3) The sampling event conducted in May was representative of conditions existing during exceedingly high stream stage. In September, the samples collected were indicative of the stream during low stage conditions.

During the spring, PCB concentrations detected in the water ranged from 5.6 ppb at Station B in Bailey's Branch, to 0.16 ppb at Station J in Salt Creek. At Stations C and D, located in Pleasant Run upstream from the Bailey's Branch confluence, PCB concentrations were less than 0.1 ppb in the water. In the fall, concentrations were detected at 10.3 and 11.2 ppb at Station B. PCB levels were 0.23 ppb at Station J, and less than 0.1 ppb at Station C.

CDM attributed the relatively higher concentration of PCBs during the fall to the much lower stream flow and lower dilution effects. Also, the report concluded that heavy rainfall events in the fall might have added PCBs to the stream by increasing overland runoff of contaminated soils. Station D, located in a flood plain area near the confluence of Bailey's Branch of Pleasant Run Creek, showed relatively higher levels of PCBs in the water at 0.45 ppb during the fall. CDM concluded that PCB concentrations at Station D indicated that the area received greater amounts of runoff than the surrounding stations.

Suspended sediment analyses also indicated that PCB concentrations were lower during the spring sampling event. In the spring, PCB levels ranged from less than 0.0001 ppm to 0.0034 ppm, and from less than 0.0001 ppm to 0.0071 ppm in the fall.

The periphyton community was studied to determine the quality of water in the stream, and to determine which substrate organisms were supported. Periphyton are considered good indicators of water quality because their growth is dependent on a balance of dissolved nutrients, and may be adversely affected by certain contaminants. Physical factors also influence the success and growth of algae.

CDM's study indicated that the assemblage and abundance of Periphyton appear to be largely determined by the type of stream bottom at each sample location. Periphyton abundance was generally lowest at Salt Creek, where blue-green algae were the dominant algal type. CDM attributed this finding to steep eroded banks, high turbidity, and lack of a suitable substrate to support algal growth. The Periphyton species present in all sampled streams appeared to be indigenous.

In May and September, a total of 664 fish, representing 23 species, were collected in Pleasant Run and Salt Creek. The average size of the fish captured was smaller than expected, but the diversity of species was typical of small, warm-water, mid-western streams. The most abundant groups captured were minnows, sunfish, and suckers. Age determination indicated normal growth patterns in the fish. Also, the incidence of visible diseases and abnormalities were in the expected range. Blackspot affected 17.6 percent of sunfish, 50 percent of creek chub, and 2.3 percent of stonerollers.

The diversity and abundance of fish was greatest at Stations C and D (upstream Pleasant Run), and lowest at Station B (Bailey's Branch). The number of fish species and total number of fish was generally lower in Salt Creek than in Pleasant Run. CDM attributed differences between the fish communities of Salt Creek and Pleasant Run to habitat differences. It was more difficult to collect samples effectively from the shore in Salt Creek due to the steepness of the banks and water depth, and this factor may have biased the findings.

The fish chosen for PCB analyses were selected on the basis of their potential as a source of food, as well as their size, since most fish captured were small (ranging from 21 to 241 millimeters [mm]). PCB concentrations found in the fish analyzed during the fall sampling, ranged from 0.14 ppm in longear sunfish at Station C to 571.0 ppm in a white sucker captured at Station F. At location C, PCB levels in the fish were consistently below 1 ppm, with the exception of one detection at 1.42 ppm.

Generally, PCB concentrations greatly varied between species, and within stations. CDM attributed this variability to the ability of the fish to migrate and feed at different locations. Fish that fed from the bottom sediment of the substrate tended to have PCB tissue residues than top feeders. All of the fish analyzed (except at Station C) contained PCB levels exceeding the 5 ppm tolerance limit for fish and shellfish established by the Food and Drug Administration at the time of the study. A copy of the report is included as Appendix F.3.

6.1.4 1983 U.S.EPA PRELIMINARY HEALTH RISK ASSESSMENT FOR SALT CREEK, INDIANA

In September 1982, the U.S.EPA Region 5 requested that the Environmental Criteria and Assessment Office perform a Risk Assessment for Salt Creek. U.S.EPA Region 5 was concerned about PCB contamination from both Pleasant Run Creek and Clear Creek, which drains parts of Bloomington, and the potential risk that PCBs might pose to human health and the environment.

This study included PCB data from both fish tissue fillets and whole body samples of fish in Clear Creek, Salt Creek, and the East Fork of the White River. Fat concentration of PCBs was calculated from measured fat content of the fish. The results for average PCB concentrations in fish fillets for Salt Creek include 1.38 milligram per kilogram (mg/kg) in bluegill, 2.30 mg/kg in Longear sunfish, and 6.06 mg/kg in Largemouth bass. The highest PCBs were measured in fish collected upstream of the confluence of Salt Creek and Pleasant Run, however the data may not be directly comparable, due to variations in the species of fish collected The study concluded that Pleasant Run Creek was probably an important source of PCBs for the lower part of Salt Creek.

Potential health affects were assessed from exposure via fish consumption, via water consumption, and via consumption of sediments. Exposure to PCBs via water consumption was at or below the detection limit of 0.1 microgram per kilogram (μg/L) in four samples from Salt Creek. Three sediment samples from Salt Creek were found to contain PCB concentrations ranging from 1.9 to 2.2 mg/kg. The risk evaluation was not conclusive, though the report concluded that risks to humans or piscivorous wildlife could occur if fish consumption at the contaminant levels then present occurred over a lifetime (Appendix F.4).

6.1.5 1985 STREAM STUDY

On September 11, 1984, the Lawrence County Sanitarian with Lawrence County Health Department (LCHD) received a complaint of an odoriferous foamy discharge in the water flowing from the Bedford Facility. There was a reported fish kill in Pleasant Run Creek downstream from the Bedford Facility. Observed were three to four dead fish, three or four inches in length at Dive Road bridge, approximately two miles from the Facility's Outfall 002. At another location, approximately one mile downstream from Outfall 002, a foam layer was observed on the water surface. Several minnows were reported as swimming on the side of the stream as to avoid the foam. Foam was also observed approximately 1,000 feet from Outfall 002. Water samples and photographs of the foamy discharge were taken by LCHD. The sample results indicated that phenol was being discharged from Outfall 002, at a concentration of 42,000 ppb. LCDH determined that the Bedford Facility had violated the Environmental Management Act (EMA) and the ISPCB rules.

New carbon was installed in the carbon adsorption system and the aeration basin was repaired in an attempt to decrease phenol levels in the stream. An anti-foam agent was also utilized to decrease the amount of foam discharging from Outfall 002. Phenol concentrations from two subsequent water samples were 6 ppm and 16 ppm respectively, indicating an improvement in phenol concentrations.

As a result of the foam and phenol problem, CDM conducted toxicity tests in August 1985 to determine the 48-hour lethal concentration of the effluents present in the stream. Standard *Daphnia pulex* 48-hour acute toxicity bioassay protocols were used to test a dilution series of 1, 3, 10, 30 and 100 percent samples. Samples from Salt Creek, Pleasant Run confluence, and the GM discharge were tested.

The 48-hour survival was greatest in water from Salt Creek at 95.8 percent. The lowest survival rate occurred in the full strength sample from the GM discharge (70 percent). The report is included as Appendix F.5.

6.1.6 1989 IDEM COMPLIANCE SAMPLING INSPECTION

In July 1989, IDEM conducted a Compliance Sampling Inspection (CSI) to document the extent of PCB contamination identified during previous IDEM CSI's. IDEM collected four water samples and seven sediment samples for PCB analysis as part of the July 1989 CSI. Water and sediment samples were collected at the unnamed ditch which Outfall 002 discharges, Bailey's Branch, Pleasant Run Creek upstream from the Bailey's Branch confluence, and Pleasant Run Creek downstream from the Bailey's Branch confluence. Three additional sediment samples were collected from the following locations; Pleasant Run Creek downstream of the confluence of Bailey's Branch, along Salt Creek upstream of the confluence with Pleasant Run Creek, and along Salt Creek downstream of the confluence of Pleasant Run Creek.

Bedford Facility's NPDES permit limits were not exceeded, however, the CSI indicated that significant levels of PCBs were found in the unnamed ditch, Bailey's Branch, Pleasant Run Creek downstream from the Bailey's Branch confluence, and Salt Creek. See Table I in the CSI, which is included as Appendix F.6.

A toxic scan was also conducted, measuring for Volatile Organic Aromatics compounds, metals, base neutrals, phenols, and pesticides. No significant levels were found for any of the parameters in either the water or sediment. A copy of the CSI is included as Appendix F.6.

6.1.7 1990 COMMONWEALTH BIOMONITORING TOXICITY TESTING

In February 1990, Commonwealth Biomonitoring conducted toxicity tests for GM on several species of Daphnids. The objective of this testing was to observe the numbers, fish types, and benthic invertebrates within the Bailey's Branch of the Pleasant Run Creek and determine whether the Facility discharge was adversely affecting the aquatic community of the stream. The Facility's NPDES permit to discharge treated process wastewater and stormwater to an unnamed tributary of the Bailey's Branch expired in 1990. The Bedford Facility anticipated more stringent discharge limits for metals in its new permit, hence, site-specific criteria proposed to U.S.EPA as an alternate to the National Criteria.

The results of the biosurvey indicated that *Ceriodaphnia dubia* were most sensitive to the effluent. All six samples collected showed some degree of toxicity. Three of the six samples exhibited acute toxicity. Benthic invertebrates, such as mayfly larvae, midges and blackflies, were present in each sample collected, however, their numbers were found to be reduced compared to unimpacted streams. Commonwealth Biomonitoring attributed the population decrease to chronic toxicity from chloride. Chloride concentrations were detected at 860 ppm in Bailey's Branch in July 1989. (A copy of the report is included in Appendix F.7).

6.1.8 1990 BIOLOGICAL SURVEY

In June 1990, Commonwealth Biomonitoring conducted a biological survey of Bailey's Branch, Pleasant Run Creek, and Gullet's Creek for GM (all located in Lawrence County, Indiana). The biological survey was intended to determine whether Bailey's Branch and Pleasant Run Creek were attaining their state-designated use for supporting well-balanced, warm water, aquatic communities. Gullet's Creek was chosen as a local reference stream. If impairment of uses were observed, the next objective was to assess the extent and causes of impairment such as toxicity, nutrient enrichment, and low dissolved oxygen. Attention was given to the effects of GM's wastewater discharge to the aquatic communities of these streams. Both fish and benthic communities were evaluated during a period of low flow in September, 1990.

The fish community of all streams surveyed was found to be dominated by minnows, followed by creek chubs, and redfin shiners. Of all the fish observed, none appeared diseased, and the fish biomass was considered normal. There were no apparent alterations in the fish communities of Bailey's Branch or Pleasant Run Creek due to site-related wastewater discharges. The benthic study interpretation indicated that the benthic communities in the streams that receive input from the Facility were relatively low in diversity, and may have been slightly affected by wastewater discharges. A copy of a Commonwealth Biomonitoring's Preliminary report is included as Appendix F.7. A final copy of the report was not included in the documents reviewed.

6.1.9 <u>1996 STREAM STUDY</u>

In December 1995, field biologists with the IDEM observed a small-scale fish kill in Pleasant Run Creek, downstream from its confluence with Bailey's Branch. The fish kill was attributed to the presence of foam observed in the water. A copy of the IDEM Field Inspection Form - 1996 Stream Study is included as Appendix F.8.

As a result of IDEM's observations, GM retained Commonwealth Biomonitoring to conduct a stream investigation on February 22, 1996. A small amount of foam was visible in the water at that time.

Dead creek chubs were observed near the Bedford Facility. Also, there was an abundance of air breathing snails, and blackfly larvae, which are tolerant of raw sewage. Increased algae growth in Bailey's Branch suggested increased nutrient levels. Approximately 1,000 yards upstream from the fish kill, there was evidence of past raw sewage overflows from a lift station. Approximately 100 yards upstream from the lift station, there were several manholes with pooled raw sewage on the ground between manholes indicating a leaking underground sewer. The sewage was flowing into Bailey's Branch at that location.

Water conditions upstream from the leaking sewer were significantly improved, and no signs of degraded water quality were apparent. Commonwealth Biomonitoring concluded that the faulty sewer lines were most likely the cause of the fish kill and degraded stream conditions reported by IDEM (Appendix F.9).

6.1.10 <u>WATER WELL INVESTIGATIONS</u>

In the 1970's, two adjacent property owners to the Bedford Facility contacted GM concerning alleged problems with their residential water wells. The property owners, the McCain's and the Terrell's, were located to the east of the Facility and had potable water wells on their property.

McCain Water Well

An adjacent property owner (Mr. McCain) to the east of the Bedford Facility had a water well on his property that was allegedly contaminated with PCBs. Actions were taken by the ISBH and GM to verify PCB concentrations in the well water. The McCain well was approximately 175 feet deep.

On May 27, 1971, Mr. McCain contacted the Bedford Facility concerning oil content and a sewer odor emanating from his water well. ISBH collected samples from the water well (see Figure 3.1 for location). ISBH laboratory results indicated 13 ppm of oil. On May 27, 1971, Bedford Facility personnel visiting the McCain property inspected and sampled the water well. Additional samples were analyzed at CFD's laboratory. CFD laboratory results indicated 17 ppm of oil in the water.

On June 4, 1971, GM collected additional water samples from the well. GM's analysis indicated 25 ppm of oil and grease. A water sample from the McCain well was then sent to Monsanto to determine if the oil observed in the water contained Pydraul 312. (Monsanto produced the PCB-containing Pydraul 312 hydraulic fluid used by the Facility.) Monsanto's results indicated that the sample from the well had 31 ppb[2] of PCBs in the oil, which was identified as Pydraul 312.

Terrell Water Well

Mr. Terrell, an adjacent property owner to the east, contacted GM on February 1, 1976, concerning oil that was observed in his water well (see Figure 3.1 for location). According to the documents reviewed, Mr. Terrell stated that his well stopped pumping water in April 1976. The filter was clogged with an oil/grease substance that required steam cleaning. GM sampled the water well on February 2 and 3, 1976. The laboratory results were not available in the documents reviewed. However, according to the reviewed material, the County Sanitarian advised Mr. Terrell after reviewing the analytical results that the water was potable and the well should be chlorinated to reduce a bacterial hazard.

[2] Revised July 20, 2001. Unit corrected from ppm to ppb.

Water samples were collected on March 8, 1976, and were analyzed at the Bedford Facility laboratory. The ISBH and U.S. Public Health Service analyzed samples collected by the Lawrence County Sanitarian on March 10, 1976. The results were: pH 7.23; surfactants 0.264 ppm; phenols 0.053 ppm; oil/grease 4.0 ppm; alkalinity 660 ppm; phosphate 0.06 ppm; and bacteria 120 total count.

On April 21, 1976, ISBH collected water samples in Terrell's well. ISBH sample results indicated: alkalinity 362 milligrams per liter (mg/L), chlorides 25 mg/L, oil/grease less than 0.001 mg/L, pH 7.1, phenol 0.004 mg/L, phosphorus 0.13 mg/L, and Fecal Coliform less than 10 per 100 milliliters.

Mr. Terrell suggested that GM should connect him with the PWS. Mr. Terrell offered to split the cost for the connection with GM. GM agreed to pay half of the water line installation. GM later purchased the Terrell property because he had an easement across GM property; his only access. The Terrell well is no longer present on the property.

6.1.11 PCB EQUIPMENT TESTING AND CLEANUP PROGRAM

From 1959 to 1965, GM used a water-based hydraulic fluid for manufacturing processes. In 1965, the Bedford Facility began using Pydraul 312, a fire retardant hydraulic fluid containing approximately 35 percent PCBs in their operations. Due to the high levels of PCBs in Pydraul 312, the Bedford Facility switched to Pydraul 312A in 1972; a phosphate ester based hydraulic fluid that did not contain PCBs. In August of 1972, it was discovered that Pydraul 312A contained 3 to 5 percent PCBs. During this time, the die cast machines had a leakage rate of hydraulic fluid estimated to be 14,000 to 15,000 gallons per month. The leaking fluid was collected in a tunnel system (AOI 9) that channeled the fluid via gravity flow to the former South Lagoons where the fluid was recovered and sent to a reclamation plant.

In September 1972, the Bedford Facility began phasing in Pydraul 65E; a phosphate ester based hydraulic fluid that did not contain PCBs. The Bedford Facility continued to use the Pydraul 312A hydraulic fluid and utilized the Pydraul 65E to replace fluid lost during the die casting and other manufacturing processes. Since the machines were not flushed during the phase-in process, the hydraulic fluid still contained amounts of PCBs. Following approval from the ISPCB and ISBH in January 1973 (Appendix F.10), GM constructed a primary wastewater treatment system to reclaim hydraulic fluid in the wastewater from the die cast department. The primary system consisted of a diversion chamber, two clarithickeners, a hydraulic fluid tank, and a heater and centrifuge.

In 1976, the State of Indiana developed regulations restricting the use of fluids containing PCBs in open systems. The Bedford Facility was required to reduce the PCB concentration of fluids contained in their manufacturing systems to 100 ppm or less by January 1, 1979. As a result, GM could no longer use and recycle their current hydraulic fluid. Toward the end of 1976, GM initiated an extensive Facility-wide PCB cleanup program. The cleanup program, which occurred over a period of eleven years, included changing out and reclaiming the PCB-containing hydraulic fluids in the die cast machines, cleaning the WWTP, cleaning the service tunnels, and closing the North Lagoon and South Lagoons.

The change-out of the hydraulic fluid consisted of draining, flushing and refilling the systems. Reclaimed hydraulic fluid or new mineral oil was used to flush the machines. Samples of the flushing fluid were collected to insure the PCB levels in the machines were less than 100 ppm. By April of 1977, each of the machines were flushed and refilled with PCB levels below 100 ppm. The machines were then tested for PCBs periodically. Any machine found to be above 100 ppm after the initial testing in 1977 was flushed and refilled again. The hydraulic fluid and flushing fluid that contained 100 ppm or greater PCB levels was stored in temporary aboveground storage tanks (until a one million gallon tank was constructed) until it could be reclaimed. The primary and secondary wastewater treatment plants were drained and cleaned in April 1977. After the treatment plants were drained, the PCB-containing sludge was removed and temporarily placed in the Former South Lagoon #4, and later appropriately disposed.

GM retained several companies to develop a method of removing the PCBs from the hydraulic fluid. In 1981, the Bedford Facility began to process the PCB hydraulic fluid on site using vacuum distillation. Early November 1982, the distilled hydraulic fluid was shipped off-site for further treatment. The off-site treatment produced a recycled product that could be used at the Bedford Facility. Treatment of hydraulic fluid for PCB removal continued from 1982 until 1986. During this time, the Bedford Facility treated approximately 1,041,500 gallons of hydraulic fluid for PCB removal. By 1986, GM had completed the reclamation process.

7.0 AREAS OF INTEREST

Twenty-four AOIs have been identified at this Facility. This Section provides a description of each AOI at the Facility. These AOIs were identified based on a review of available files, interviews with Facility personnel, historical investigations and remedial actions, and Facility inspections. AOIs were identified on the basis of past treatment, storage, or disposal of hazardous waste or hazardous constituents having a release or the potential for release to the environment.

Each AOI is discussed with respect to the AOI description, current status, historical operations, and conclusions and recommendations for further investigation and/or remediation.

7.1 AOI 1 – FORMER RAILROAD OPERATIONS AND MINERALS PROCESSING FACILITY

The portion of land southeast of the Die Cast Building was the location of the former railroad maintenance operations and the Minerals Processing Facility. According to Bedford Facility records and historic Sanborn maps, the railroad operations included a railroad roundhouse (turn-around building) and maintenance shops. The Minerals Processing Corporation (MPC), which began operations at this location in 1971, leased the property originally from the railroad until GM purchased the MPC property from the Milwaukee Railroad in 1977. The railroad had ceased maintenance operations at this location in the 1940's. After GM purchased the property from Milwaukee Railroad, MPC continued leasing from GM for their operations. In 1989 Mica Resources, Ltd. acquired MPC. The location of the former roundhouse and Minerals Processing Facility are shown on Figure 1.3.

7.1.1 CURRENT STATUS

The former railroad spurs and roundhouse have been removed. The area formerly utilized by MPC is currently used by GM to temporarily store aluminum sows (a product produced by a secondary aluminum smelter, that are remelted by a manufacturer and require less adjustment of the metal chemistry by the manufacturer).

7.1.2 HISTORICAL OPERATIONS

The roundhouse and rail yard operated from the 1880s until circa 1940s. The rail yard included a turntable and associated railroad tracks, machine shops, engine repair shop, and other miscellaneous structures. Sanborn maps are included as Appendix B.1.

The MPC operation was located on a portion of the former railroad operations property. MPC conducted secondary smelting of aluminum by mixing rock salt, aluminum dross, and grindings to reclaim aluminum. MPC's operations were comprised of an office building, truck scales, two baghouses for emissions collection, three rotary gas-fired furnaces housed in a building (which also contained areas for rock salt storage), hot aluminum dross storage, and cold scrap aluminum storage.

On September 7, 1973, the ISBH requested information from GM regarding the analysis of aluminum dross that MPC was transporting to a local landfill. ISBH stated that the Lawrence County Sanitarian sent ISBH a sample of the material that was sent to the landfill and wanted to know if it would affect the groundwater of the area. It was discovered that the sample produced a byproduct of hydrogen-sulfide gas when dissolved in water. The dross removed from MPC consisted of 18-20 percent soluble salts, such as sodium and potassium chloride, which produced ammonia when wet. MPC put the dross into a reverberatory type furnace, added salts, and heated it with burners fired with fuel oil, in a process to recover aluminum. GM retained purchase rights for the reclaimed aluminum. MPC was also processing dross from other companies.

MPC utilized several aboveground storage tanks (ASTs) for waste oil and fuel storage. Approximately 4,000 gallons of a fuel oil/waste oil mixture was present in one of the ASTs. Analyses of the waste oil in 1979 indicated trace levels of heavy metals and no PCBs. MPC also had two to three small (size unknown) ASTs containing gasoline or diesel fuel and one large (size unknown) vertical AST that was used for fuel storage. The large vertical AST was contained within a concrete diked area with a sand liner.

During an inspection by ISPCB in 1979, two springs were identified; a northern spring located behind the Chemical Treatment Building (old Secondary Treatment Building) and the old backwash filter tank at the treatment plant, and a southern spring south of the WWTP Filter Building along the former railroad tracks. ISPCB believed the northern spring had its origins on the portion of the property formerly occupied by MPC, and the southern spring had its origin from the southern portion of the former railroad property.

During a July 1979 NPDES compliance sampling inspection conducted by ISBH, water samples from the northern spring were collected. The samples indicated elevated chlorides, dissolved solids, and concentrations of PCBs in excess of 41 μg/L (Appendix G.1).

GM had been collecting water samples from the southern spring from 1976 through 1979 and submitted the analytical results to the ISPCB and U.S.EPA in a letter dated September 24, 1979. The analytical results indicated 1.6 ppm and 10.8 ppm PCBs in the oil/water mix on September 27, 1976; 1,453 ppm PCBs in the oil/water mix on April 27, 1978; 1.5 ppm PCB in the oil/water mix on May 29, 1978; 200 ppm PCBs in the oil/water mix on June 25, 1979; 33 ppm PCBs in the oil/water mix on June 27 and 28, 1979; and 70 ppm PCB in the oil/water mix on August 22, 1979. On August 27, 1979, sample results from the southern spring indicated 15,000 ppm chlorides in the water. A copy of the September 24, 1979 letter to the ISPCB is included as Appendix G.2.

On October 21, 1980, a Stipulation and Consent Order (Cause No. B-416) was issued and included an Order item for the management of the two springs (Appendix F.2). As a result of the Stipulation and Consent Order, GM installed sumps at each of the two springs. The collected spring water enters the water recycle system at the water pumping station and is directed to the Stormwater Lagoon.

On March 31, 1981, ISBH collected water and oil samples from the northern spring for PCB analysis. ISBH analytical results indicated 0.003 ppm PCBs in the water and 0.052 ppm PCBs in the oil.

During ISBH's spring inspections in July 1979, ISBH observed that the property leased to MPC by GM, had several oil ASTs in several diked areas with sand bottoms. On September 21, 1979, soil samples containing oil from the ASTs and spillage located within the diked areas were submitted to ISBH's laboratory for PCB analysis. PCB mixtures were defined as those more than 50 ppm. The results were questionable (results were reported as less than 300 ppm) due to potential interference of other compounds in the samples.

ISBH conducted an additional inspection of the four potentially PCB-containing oil ASTs on September 26, 1979. It was noted that standing oil was on the ground within the diked area of the horizontal tanks. MPC was instructed to contact the Solid Waste Section of ISBH before arranging for disposal of the material.

On October 31, 1979, MPC submitted an additional soil sample collected from the diked area to Howard Laboratories, Inc. for PCB analysis. No PCBs were detected.

ERM-Midwest Inc. performed an Environmental Assessment (EA) of MPC Facility in 1988 for Mica Resources, Ltd. as part of their due-diligence prior to acquisition of MPC (Appendix G.3). The EA reported that in 1979, MPC removed and disposed of approximately 900 cubic yards of oil-contaminated sand/soil that had been excavated from a diked area at the location of the former AST. The contaminated material was disposed of at the Southside Landfill located in Vigo County. The EA also indicated that the building showed normal signs of wear, typical for daily operations. Spillage of fuel or gasoline on the ground beneath one of the ASTs was observed. Small quantities of solvent degreasers and lubricating oils kept on site and containerized in 55-gallon metal drums were also identified. The report states that although the City of Bedford had no permits or registrations for underground storage tanks (USTs) at the MPC Facility, the Site Manager recalled that in 1978, two 1,000-gallon capacity USTs (one containing gasoline and one containing fuel oil) were removed from MPC. According to the EA, the site manager indicated that no records existed as to the removals and the report did not indicate a general location of these alleged USTs. ERM-Midwest recommended that due to visual evidence of environmental impact (soil staining near ASTs), MPC should conduct environmental sampling of soil and groundwater.

On February 14, 1989, the owners of MPC renewed the existing lease with GM. MPC subsequently notified GM that the current business was sold to Mica Resources Ltd. On July 31, 1991, the Aluminum Company of America notified Mica concerning the treatment of saltcake as a hazardous waste according to RCRA Reactivity Test for reactive cyanides or sulfides or the RCRA Toxicity Characteristic Leachate Procedure (TCLP) Test for Metals (Appendix G.4). Saltcake tests that failed were handled and disposed of in accordance with the storage, treatment, and disposal requirements of RCRA. The saltcake generated at MPC was disposed of as an Indiana Special Waste at the Worthington Landfill located in Greene County and Southside Landfill located in Vigo County. The results of the characterization are on file at IDEM. Mica dross operations ceased in the 1990's and the lease ended.

There have been no additional investigations or remedial actions conducted in connection with the former Milwaukee Railroad maintenance operations or with the former Minerals Processing Facility.

7.1.3 CONCLUSIONS AND RECOMMENDATIONS

The former railroad maintenance operations and Minerals Processing Facility are considered an AOI as a result of historical operations. In addition, it is possible that two springs which discharge near the WWTP emanate from this area. Insufficient information was available in the records to adequately assess the potential for this AOI to have impacted the environment. Therefore, further action in this area will be conducted.

7.2 AOI 2 - WASTE STORAGE AREA

The Waste Storage Area (also referred to as the Drum Storage Pad) is a secure fenced area located north of the Piston Building. See Figure 1.3 for its location. The Former RCRA Hazardous Waste Storage Area was located in the northeast corner of the Waste Storage Area.

7.2.1 CURRENT STATUS

The entire Waste Storage Area is contained along with the drum storage and is paved with secondary containment provided via a concrete curb. A sump, which drains to the WWTP, is located in the southeast corner of the area. The Former RCRA Hazardous Waste Storage Area located within the Waste Storage Area is closed.

7.2.2 HISTORICAL OPERATIONS

The Waste Storage Area, which includes the former Hazardous Waste Storage Area, is utilized for the storage of incoming liquid products, miscellaneous containerized solid wastes, and hazardous wastes.

In August 1980, The Bedford Facility filed a Notification of Hazardous Waste Activity (Appendix G.5). The U.S.EPA acknowledged receipt of the notification form and assigned U.S.EPA Identification Number IND006036099 (Appendix G.6). In November 1980, the Bedford Facility filed a RCRA Part A permit application (Appendix G.7) and received U.S.EPA approval on February 11, 1982 (Appendix G.8). The Part A Permit was for storage of 154,000 gallons hazardous waste (Agitene cleaning fluids and sodium hydroxide) in excess of 90 days. Agitene is a non-chlorinated petroleum distillate solvent that was used at the Bedford Facility for cleaning (U.S.EPA Hazardous Waste Code D001). The other hazardous waste was Kolene, waste sodium hydroxide sludge. Kolene was classified as a hazardous waste material because of its corrosive characteristic (U.S.EPA Hazardous Waste Code D002). Kolene was used as a cleaning agent to remove iron oxide from diesel piston inserts. The proposed storage area was located north of the Piston Building. GM filed for a RCRA Part B permit in 1982 (Appendix G.9) and was granted the Part B permit by the U.S.EPA in 1983 (Appendix G.10) and by the State of Indiana Environmental Management Board in 1984 (Appendix G.11). The permit authorized GM to store up to 5,500 gallons of hazardous waste in the Hazardous Waste Drum Storage Unit.

The U.S.EPA performed a Preliminary Assessment of the Bedford Facility under the RCRA Program on April 30, 1985. A copy of their report is included as Appendix G.12.

On September 18, 1987, GM notified both the U.S.EPA and IDEM of GM's intent to close its hazardous waste storage facility, in accordance with the previously approved Closure Plan contained within the U.S.EPA Part B Permit and the State's Hazardous Waste Facility Permit. Copies of the notifications are included as Appendix G.13. The RCRA storage pad was no longer necessary, as GM was no longer generating quantities of sodium hydroxide sludge or ignitable Agitene hazardous waste. The diesel pistons that utilized the sodium hydroxide cleaning agent were no longer being produced, and GM's waste minimization efforts had identified a reformulated Agitene cleaning agent that did not exhibit hazardous characteristics. In correspondence dated October 28, 1987 (Appendix G.14), the U.S.EPA acknowledged receipt of the Intent to Close. The approved Closure Plan required GM to notify U.S.EPA at least 180 days prior to implementation of the closure. Therefore, the U.S.EPA stated that closure could begin after March 27, 1988.

GM implemented the approved closure plan, which included removing all drums of material from the storage area; mechanically removing all loose material from the storage area; pressure washing the concrete pad with a steam cleaner and detergent; and, rinsing the pad with the pressure washer and potable water. On January 17, 1989, GM submitted a notification to IDEM that GM's hazardous waste storage Facility had been certified closed in accordance with the approved closure plan. Included with the submittal was a certification report and Certification of Closure by an independent

Indiana Registered Professional Engineer. A copy of the certification is included as Appendix G.15.

In correspondence dated April 23, 1990 (Appendix G.16), IDEM acknowledged receipt of the closure certification and stated; "With the receipt of this certification, total closure is complete as required by 329 IAC 3-21." IDEM verified GM's new status as a hazardous waste generator only.

Spills of materials have been documented in the Waste Storage Area and are outlined below.

During a storage area inspection in May 1986, several drums stored upside down in the Waste Storage Area were identified. The drums were observed to be leaking onto the concrete, however the contents of the drums were not identified.

On May 24, 1990, approximately 20 gallons of 66% sulfuric acid was released from a drum stored in the Waste Storage Area. The National Response Center (NRC), IDEM and Lawrence County Health Department were notified of the release (Appendix G.17). IDEM assigned Incident Number 9005182. The sulfuric acid flowed to an inside perimeter drain in the Waste Storage Area that lead to a pump collection box where the acid was contained and cleaned up. The Bedford Facility contacted Spill Recovery of Indiana, Inc. who repacked the leaking drum and neutralized the residues.

7.2.3 CONCLUSIONS AND RECOMMENDATIONS

The Waste Storage Area is considered an AOI as a result of reported spills and historic operations in that location. Although the RCRA Hazardous Waste Drum Storage Unit located within the Area has received official closure, no subsurface sampling or analysis was conducted during the closure. Insufficient information was available in the records to adequately assess the potential for this AOI to have impacted the environment. Therefore, additional investigation in this area will be conducted.

7.3 AOI 3 – PCB STORAGE AREAS

There have been two PCB storage areas utilized at the Facility. One former PCB storage area consisting of a room was located in the west side of the Die Cast Building and an existing PCB storage area is currently located in the WWTP Filter Building. See Figure 1.3 for the locations of the former and existing PCB storage areas.

7.3.1 CURRENT STATUS

Former PCB Storage Room

The Former PCB Storage Area has been removed and the area is used for general storage.

Existing PCB Storage Area

The existing PCB storage area is located in the WWTP Filter Building. The area is curbed on a concrete floor with a blind sump. A 55-gallon drum is for the storage of PCB material (e.g., miscellaneous rags, gloves and cleanup materials) is located in the bermed area.

7.3.2 HISTORICAL OPERATIONS

Former PCB Storage Room

A former PCB storage area was located along the interior west wall of the Warehouse in the Die Cast Building. The PCB storage area consisted of a separate locking room where PCB materials were stored. The room was removed in 1990 and wipe sampling was conducted. The files did not include the results of the wipe tests. Interviews with the Bedford Facility personnel indicated that this area may have contained historic releases.

There have been no additional investigations or remedial actions associated with the Former PCB Storage Area.

Existing PCB Storage Area

GM began using the Existing PCB Storage Area located in the WWTP Filter Building in the early 1980's. The Existing PCB Storage Area was inspected and photographed as part of the May 1982 U.S.EPA Federal PCB Disposal and Marking Regulations Inspection (see Appendix G.18). The U.S.EPA inspection photographs indicated staining of the concrete within the PCB storage area, however there have been no documented releases from the storage area.

7.3.3 CONCLUSIONS AND RECOMMENDATIONS

The former and existing PCB storage areas are considered AOIs due to reported staining in the areas. Insufficient information was available in the records to adequately assess the potential for this AOI to have impacted the environment. Therefore, additional investigation in these areas will be conducted.

7.4 AOI 4 – FORMER NORTH DISPOSAL AREA

Beginning in the late 1950s, the Bedford Facility began disposing of waste materials northeast of the former North Lagoon (Figure 1.3). This area has been referred to as the Sand Fill Area, Sand Landfill, Foundry Sand Storage Area, Landfill Storage Area, North Landfill, and Landfill.

7.4.1 CURRENT STATUS

This area is currently covered with grass and is inactive. Several springs, located along the north toe of the disposal area, were observed during a February 2001 site walkover completed for the development of this CCR.

7.4.2 HISTORICAL OPERATIONS

Initially, the area was used to dispose of garbage, cafeteria trash, demolition debris and fill dirt. Later, the area was used to dispose of spent foundry sand, sand cores, refractory materials, oil-soaked straw, miscellaneous metallic scrap, and solid waste from the baghouse.

On September 22, 1971, the Bedford Facility received a letter from ISBH indicating that the Bedford Facility was in violation of unspecified State Laws, Regulation APC 2, and the Refuse Disposal Act. The violations were for stream pollution, open burning and/or improper disposal of combustible material, garbage and trash from the cafeteria, and disposal of liquid wastes (Appendix G.19). The letter also indicated that liquid wastes from the disposal area were entering a ditch that discharged to a stream. According to files reviewed, open burning was terminated in September 1971. In response to the September 1971 ISBH letter, the Bedford Facility began transporting the combustible materials and cafeteria waste to the county landfill. Liquid wastes were held on site pending disposal, and, as an interim measure to eliminate discharges to the stream, a trench around the toe of the disposal area was completed in late 1971.

On March 13, 1981, a trench was cut through the berm of the former North Lagoon to facilitate draining of the contained water. The trench was located approximately 25 feet south of the existing overflow pipe. The water from the former North Lagoon was allowed to flow through the disposal area until March 26, 1981, when the ISBH inspected the trench and ordered the trench to be plugged and all work to be stopped. On March 31, 1981, the ISBH collected samples of water discharging from a corrugated pipe in the disposal area and from 'leachate' at the toe of the disposal area slope. The Bedford Facility split the samples with the State. According to files, the analytical results of the water from the corrugated pipe were 0.016 ppm PCBs for the sample collected by the Bedford Facility (results for the State were not included in the documents reviewed). The analytical results of the leachate indicated 0.010 ppm PCBs for the sample collected by the Bedford Facility. A sample collected from a water seep located at the toe of the North Disposal Area located near Outfall 001 exhibited a PCB concentration of 7.0 μg/L. Analytical results are shown in Table 7.1.

In June 1981, a draft consent order (Cause No. B-802) was prepared (signed and effective March 15, 1983) by ISPCB and Indiana Environmental Management Act (IEMA) (Appendix G.20). Cause B-802 included the stipulated finding that GM did not formally request or receive permission from ISPCB to modify the operation of the North Lagoon, to change the discharge from the lagoon or change its point of discharge prior to cutting the trench. GM was required to conduct six months of PCB monitoring of leachate from the toe of the disposal area and a one-year variance from the refuse disposal regulations. During the one-year variance, the Bedford Facility was to demonstrate the feasibility of using spent foundry sand in its aluminum reclaiming system. Cause B-802 indicated that the North Disposal Area would not be the subject of the Stipulation and Consent Order. GM monitored the PCB concentrations in the water seeping from the northeast toe of the Former North Disposal Area by taking two grab samples per month for six months from the effective date of the Order. The results of the sampling were to be submitted to the ISPCB on a monthly basis. Within 60 days of the last monthly report, GM submitted to the ISPCB an analysis of the data and a proposal for treating the seepage. Review of the documents did not indicate a final outcome for the treatment of the seepage.

On November 22, 1983, GM submitted to the ISPCB a final summary of results and conclusions of the six months of monitoring. Table 7.2 presents the results of this sampling.

In 1984, the Bedford Facility closed the Former North Disposal Area. Closure of the disposal area included covering the area with two feet of clay, grading and seeding.

During a site walkover by CRA in February 2001, a spring was identified on the northern side of the Former North Disposal Area. The soil immediately adjacent to the spring exhibited an orange coloration and a slight organic sheen was evident on the spring water. The spring appeared to be flowing up through the material disposed of in the Former North Disposal Area.

There have been no other investigations or remedial actions conducted in connection with the Former North Disposal Area.

7.4.3 CONCLUSIONS AND RECOMMENDATIONS

This area is considered to be an AOI as a result of the types of materials disposed of in the unlined disposal area. Additional investigation in this area will be conducted. Insufficient information was available in the records to adequately assess the potential for this AOI to have impacted the environment.

7.5 AOI 5 - FORMER EAST SAND DISPOSAL AREA

In 1985, GM began disposing of foundry sand east of the salary parking lot (Figure 1.3). The foundry sand was used as fill to expand the existing parking lot.

7.5.1 CURRENT STATUS

The Former East Sand Disposal Area is no longer used for disposal purposes and is partially covered by asphalt from the salary parking lot and by grass. No other operations have been, or are currently considered in this area.

7.5.2 HISTORICAL OPERATIONS

In 1985, GM began expanding the salary parking lot by using foundry sand for fill. In June 1987, the Bedford Facility received a Notice of Violation from IDEM for the disposal of sand in this area . The letter indicated that the Bedford Facility needed to obtain approval for proper placing of the sand and that the Bedford Facility could temporarily stockpile the sand on site until the State reviewed the appropriate analytical data (Appendix G.21). The Bedford Facility stopped using the foundry sand as fill east of the salary parking lot and began to stockpile it on site pending IDEM's approval of disposing of the sand off-site at a solid waste landfill.

On April 27, 1988, GM submitted a letter to IDEM stating that on site disposal of the foundry sand was discontinued in June 1987. GM performed waste characterization of the foundry sand and stated in the April 1988 letter that the sand contained no hazardous constituents. The Bedford Facility was disposing of the sand at an off-site disposal facility as special waste since September 1987. The April 1988 letter also indicated that excavated soil and solid fill from an on-site major construction project had been placed in the area east of the salary parking lot. A closure plan for the area east of the parking lot was included in the April 1988 letter in which GM proposed to grade all side slopes, cover the area with two feet of clay and topsoil, and seed (Appendix G.22).

In November 1988, IDEM issued a Notice of Compliance letter to the Bedford Facility for closure of the disposal area east of the salary parking lot (Appendix G.23).

There have been no other investigations or remedial actions conducted in connection with the Former East Disposal Area.

7.5.3 CONCLUSIONS AND RECOMMENDATIONS

The Former East Sand Disposal Area is considered an AOI as a result of the historic placement of foundry sand and demolition debris in this area. Insufficient information was available in the records to adequately assess the potential for this AOI to have impacted the environment. Therefore, additional investigation in this area will be conducted.

7.6 AOI 6 - FORMER SLUDGE DISPOSAL AND FIRE TRAINING AREA

The former Sludge Disposal Area was identified from historical aerial photographs and from interviews with Facility personnel. This disposal area was located on Facility property to the east and south of the salary parking lot east of GM Drive (see Figure 1.3). The Facility's fire-training area is located south of the salary parking lot and is situated on top of the former Sludge Disposal Area.

7.6.1 CURRENT STATUS

The former Sludge Disposal Area east of the salary parking lot is currently covered with grass and some trees. The disposal area and fire training area south of the salary lot is also covered with grass and contains several fire-training pits for the Facility.

7.6.2 HISTORICAL OPERATIONS

Several times during the operation of former South Lagoons #1 through #5, sludge was removed from the lagoons and disposed of on the Bedford Facility property east of GM Drive. The first recorded disposal event occurred in 1969 when the Bedford Facility dredged South Lagoons #1 and #2. South Lagoons #4 and #5 were dredged in 1970. The sludge was placed in prepared pits on site and allowed to air dry for several years before covering with clay.

During 1972 and 1973, all five south lagoons were dredged again and the sludge was removed and placed in three prepared pits located to the east and south of the salary parking lot. The sludge in the three pits was allowed to dry for one to two years before it was covered with between four and eight feet of fill. The pits were prepared by excavating a shallow hole and then using the excavated material to cover the filled pit.

The Facility currently utilizes the area south of the salary lot for fire training. There are several pits constructed of metal and the fires are contained in the metal pits. The Facility uses laboratory grade heptane to fuel the fires for training.

There have been no investigations or remedial actions conducted in connection with the former Sludge Disposal Area or Fire Training Area.

7.6.3 CONCLUSIONS AND RECOMMENDATIONS

The former Sludge Disposal Area is considered an AOI due to historical concentrations of PCBs contained in the lagoon sludges buried in this area and because of the potential for residuals from the incomplete combustion of fuels utilized during fire training activities to impact the environment. Insufficient information was available in the records to adequately assess the potential for this AOI to have impacted the environment. Therefore, additional investigation in this area will be conducted.

7.7 AOI 7 - FORMER NORTH LAGOON AND OUTFALL 001

The Stone City Construction Company originally constructed the Former North Lagoon (also referred to as the North Pond, Old Lagoon, and North Stormwater Lagoon) sometime between 1938 and 1942 (Figure 1.3). GM continued the use of the Former North Lagoon for stormwater collection and utilized a portion of the stormwater in the Facility's manufacturing processes on an as-needed basis until 1981.

7.7.1 CURRENT STATUS

The Former North Lagoon is currently a grass field, with the only visible feature being a manhole collection sump. Outfall 001 no longer exists; however, the unnamed ditch that carried the discharge is still present.

7.7.2 HISTORICAL OPERATIONS

The 9 to 11 million gallon Former North Lagoon was constructed by impounding an existing valley with a clay berm on the north-northeast side. The lagoon was lined with clay material obtained from an off-site source. This Former North Lagoon was utilized by the Stone City Construction Company for stormwater retention and as a source of water for their manufacturing needs.

According to documents reviewed, GM had historically used the Former North Lagoon for make-up water and to collect stormwater runoff from the northern portion of the site. Non-contact cooling water, roof drains, and floor drains located in several of the manufacturing departments within the Bedford Facility also discharged to the North Lagoon. The Former North Lagoon discharged to an unnamed ditch on the Facility's property (Outfall 001, located on the northeast side of the lagoon) and eventually to Bailey's Branch of Pleasant Run Creek. Outfall 001 was a permitted discharge through the Facility's NPDES Process Discharge Permit No. IN 0003573.

In 1978, GM proposed to abandon the North Lagoon and construct a new Stormwater Lagoon pursuant to the Stipulation and Consent Order (Cause B-416). Cause B-416, which was signed by the ISPCB in 1980 (Appendix F.2), required that GM eliminate dry weather discharge from Outfall 001. During an inspection by the U.S.EPA and Versar in September 1980, a water sample was collected from Outfall 001. The water sample did not contain PCBs (Aroclor 1242) above the detection limit of 0.5 ppb. A copy of the September 1980 U.S.EPA Inspection Report is included as Appendix G.24.

GM plugged Outfall 001 in January 1981 and began placing the excavated materials from the new Stormwater Lagoon in the southwest portion of the abandoned North Lagoon, pursuant to Order B-416. On March 26, 1981, the ISBH conducted a Facility inspection based on a complaint received from the Lawrence County Sanitarian of a constructed trench which allowed water from the North Lagoon to discharge to the ditch (see Section 7.4). The ISBH indicated that the trench constituted an "unauthorized change to a Water Treatment Facility" and ordered GM to immediately stop draining the water from the North Lagoon. Following this inspection, GM and the ISBH collected several sediment and water samples from the North Lagoon (Table 7.1).

In support of a Closure Plan being developed, GM hired a contractor to advance two borings into the berm, which formed the north-northeast barrier of the North Lagoon. These borings confirmed that the berm was composed of silty clay to a depth of approximately 34.5 feet, at which depth the augers refused further advancement. A Closure Plan was submitted to the U.S.EPA on November 13, 1981, which proposed filling and capping the North Lagoon. Additional analytical results were obtained independently by the U.S.EPA and the Bedford Facility from samples collected at the former North Lagoon during a Facility inspection on May 18, 1982 (two sediment samples were collected from the former North Lagoon and one sediment and one water sample were collected from Outfall 001). These analytical results are summarized on Table 7.3 and the locations are shown on Figure 7.1. Appendix G.18 contains a copy of the May 18 and 19, 1982, U.S.EPA Inspection Report.

In March 1983, ISPCB issued a Stipulation and Consent Order, Cause B-802, to the Facility that included the North Lagoon in its stipulated findings (in order for GM to construct the new stormwater lagoon (part of Cause B-416) the drainage and closure of the North Lagoon was necessary).

In June 1987, U.S.EPA issued a Toxic Substances Control Act (TSCA) Consent Agreement and Final Order (TSCA-V-C-138-87) to the Bedford Facility for the closure of the North Lagoon. A copy of the Consent Agreement is included as Appendix G.25. The Consent Agreement indicated that GM was in violation for storage of PCBs greater than 50 mg/kg in the lagoon; GM failed to remove and dispose of the PCBs, which had been stored in since 1980, in the North Lagoon prior to January 1984; and, GM was in violation of TSCA for uncontrolled discharge of PCBs in concentrations greater than 50 mg/kg by draining the lagoon through the trench cut through the berm in March 1981. A Work Plan for the closure of the North Lagoon was incorporated into the Consent Agreement.

Approximately 750,000 gallons of sediment were removed from the former North Lagoon and dewatered by an on-site filter press during the period between June 6 and August 4, 1987. The sediments were "conditioned" using ferric chloride and lime prior to dewatering. Approximately 1,400 tons of dewatered sludge, or filter cake, were transported and incinerated at a federally-approved treatment site located in Coffeyville, Kansas (Appendix G.26).

Beginning on July 6, 1987, Chemical Waste Management – Environmental Remedial Action Division (CWM-ENRAC) excavated approximately 55,400 tons of PCB-contaminated soil and debris from the former North Lagoon, in accordance with the approved Closure Plan (Appendix G.25). All excavated material was hauled to CWM's Emelle, Alabama disposal facility. Upon removal of visually contaminated material, 43 quadrants were sampled, based on an approximate 50 feet by 50 feet sampling grid (Figure 7.2 and Table 7.4).

During excavation closure activities in 1987 at the North Lagoon, GM noted water entering the bottom of the excavation. As a result of water entering the North Lagoon excavation, a leachate collection system, designed similar to a "Rainey" well system, was installed with the central collection located at the deepest portion of the excavation (northeast corner).

The terms of the final Consent Agreement required that all fill material placed into the lagoon be less than 2 ppm PCBs. After placement of the general fill, six inches of clean topsoil (less than 2 ppm PCBs) was placed in preparation for seeding of the groundcover. Alt & Witzig analyzed the backfill material in the former North Lagoon for percent clay content and permeability. Test results indicated that two grades of clay were available for backfilling. The majority of the general fill placed contained not less than 30 percent clay and the final one-foot of clay contained not less than 60 percent clay.

All layers were compacted using a vibrating roller to 90-95 percent. Final grading and seeding was completed during the week of April 18, 1988. GM submitted a closure report summarizing the closure of the North Lagoon to the U.S.EPA on September 20, 1988 (Final Report Closure Activities on the North Lagoon for Central Foundry Division, Appendix G.26). According to the closure report, the sample results were submitted in a report under separate cover, however, this was not located in the reviewed documents. Table 7.4 presents the results of the closure samples.

7.7.3 CONCLUSIONS AND RECOMMENDATIONS

The Former North Lagoon and Outfall 001 (as later permitted under the NPDES) is considered an AOI as a result of their historic operation. Although a considerable amount of information was available for review for this AOI, additional investigation will be conducted in order to evaluate adequately the potential risk to human health or to the environment.

7.8 AOI 8 - FORMER SOUTH LAGOONS AND OUTFALL 002

GM utilized five lagoons (South Lagoons #1 through #5) at the Bedford Facility for the purpose of treating process waste water prior to discharge to Outfall 002, pursuant to a NPDES permit (IN 0003573), originally issued in 1974. These former South Lagoons (also referred to as the Process Lagoons; South Lagoon #4 also referred to as the Sludge Storage Lagoon) operated in a cascading-type fashion in order to separate and reclaim the heavier hydraulic oils (settled to the bottom) contained in the process wastewater. The process wastewater was primarily from the existing service tunnels beneath the die cast machines – see Section 2.4.3). GM constructed the former South Lagoons in 1959.

7.8.1 CURRENT STATUS

The five South Lagoons have been removed. The existing WWTP occupies the location of Former South Lagoons #1, #2, #3 and #5. Although there have been no documented releases from Former South Lagoons #1, #2, #3, and #5, there is a potential that subsurface conditions may have been impacted due to the nature of the operations of the lagoons.

The location of Former South Lagoon #4 is currently a grass field with a collection sump that transfers any groundwater in the sump to the WWTP. Based on historic operations of South Lagoon #4 and the presence of oil entering the excavation during closure of the lagoon, there is a potential that subsurface conditions may have been impacted.

The Facility currently discharges treated wastewater through Outfall 002.

7.8.2 HISTORICAL OPERATIONS

South Lagoons #1, #2 and #3 were located on the west side of GM Drive and South Lagoons #4 and #5 were located on the east side of GM Drive (Figure 1.3). The following is a description of the South Lagoons and Outfall 002.

South Lagoons #1, #2, and #3

South Lagoon #1 was the first in the series of the five lagoons and measured approximately 60 feet wide by 126 feet long by 9 feet deep. The oil from the die cast machines, which entered South Lagoon #1 from the tunnel system, was recovered and reclaimed (the oil was heavier than water and was collected from the bottom of the lagoon). Water from this lagoon then flowed into South Lagoon #2, located immediately to the east of South Lagoon #1. South Lagoon #2 measured 42 feet wide by 122 feet long by 6 feet deep. South Lagoon #3 was located immediately to the east of South Lagoon #3 and measured 40 feet wide by 120 feet long by 6 feet deep.

The three lagoons were dredged in July and September 1969. Information regarding the disposal of the sludge from the lagoons can be found in Section 7.6.

South Lagoons #1, 2 and 3 were closed in 1973 – 1974 for the construction of the wastewater treatment facilities at this location (Figure 1.3). The sludges from these lagoons were removed and placed in a prepared pit on site. The pit, located east of the salary parking lot, was excavated, filled with the lagoon sludge, allowed to dry, then covered with the excavated material (see Section 7.6). The three lagoons were then filled. A closure report for the three lagoons was not located in the files reviewed.

There have been no investigations or remedial actions conducted in connection with Former South Lagoons #1, #2, and #3.

South Lagoon #4

The Former South Lagoon #4 was the fourth lagoon in the series of five and was located on the east side of Jackson Street (GM Drive) (Figure 1.3). South Lagoon #4 dimensions were approximately 115 feet wide by 220 feet long by 7 feet deep. In September 1970, GM completed the deepening of the lagoon and placed the sludge in prepared pits on site to air dry. The lagoon was dredged again in 1972 – 1973 and the sludge placed in one of three prepared pits on site (Section 7.6).

On June 23, 1976, the ISBH collected samples of the influent, the effluent (Outfall 002), and of sediment at the South Lagoon #4. The results of the sampling indicated PCB concentrations of 0.515 mg/L, 0.760 mg/L, and 29,760 mg/kg, respectively. The ISBH recommended bypassing the South Lagoons #4 and #5, which appeared to contribute PCBs to the discharge at Outfall 002. Subsequently, in late 1976, GM rerouted treated water around the lagoons. After removing South Lagoon #4 from the water treatment process, the lagoon was used to temporarily store sludges from South Lagoon #5 in addition to the sludges it already contained as well as sludges generated from the WWTP (Section 2.4.3).

From late 1976 until 1980, GM examined different disposal methods for the sludge material contained in South Lagoon #4. On April 19, 1978, GM collected samples of the sludge from South Lagoon #4 at the west end, the southeast end, and at the northeast end. PCB analytical results from these samples were 628 mg/kg, 27,000 mg/kg, and 12,000 mg/kg, respectively.

In June 1980, GM began removing sludges (via pumping) from the former #4 Lagoon. These sludges were dewatered on site with a filter press and transported for disposal at CECOS International, Inc. disposal facility (Secure Chemical Management Facility) near Williamsburg, Ohio.

On September 16, 1980, the U.S.EPA and Versar, Inc. (U.S.EPA contractor) conducted an inspection related to the disposal and marking of PCBs at the Bedford Facility. Their report (Appendix G.24) indicated that South Lagoon #4 did not comply with storage for disposal requirements in 40 CFR 761.42. A sediment sample collected from the bank of South Lagoon #4 during this inspection exhibited a PCB concentration of 3,100 mg/kg (Aroclor 1242).

On May 18 and 19, 1982, U.S.EPA and Versar conducted a compliance inspection at the Bedford Facility, including the collection of two samples from the South Lagoon #4 (split with the Bedford Facility). GM's PCB analytical result from the sludge was 27,000 mg/kg (Aroclor 1242) and a concentration of 20,000 mg/L (Aroclor 1242) was detected from an oil/water mixture from South Lagoon #4. Versar's results were 16,000 ppm and 24,000 ppm, respectively. A copy of the May 18 and 19, 1982, Versar report is included as Appendix G.18.

In 1983, GM determined that pumping the sludge from South Lagoon #4 would not remove all of the material prior to the December 31, 1983, regulatory deadline. CECOS subsequently began excavation activities of South Lagoon #4 on August 22, 1983, with excavated soil and sludge being transported under manifest and disposed of at their TSCA approved Secure Chemical Management Facility near Williamsburg, Ohio. The excavation was completed on September 30, 1983.

The completed closure activities at former South Lagoon #4 are summarized in the bullets below:

- The former South Lagoon #4 originally measured approximately 115 feet by 220 feet and was estimated to contain 5 feet of sludge in the east end and 9 feet in the west end. It was estimated that approximately 8,000 tons of sludge was contained within the lagoon.
- Approximately 670 tons of lime were used to stabilize approximately 8,000 tons of sludges that were removed from the former lagoon between August 22, 1983, and September 30, 1983.
- Upon removal of the sludge, all visibly contaminated soil was excavated from the walls and bottom of the former lagoon. Limestone bedrock was encountered across the entire bottom of the former lagoon.
- Upon completion of the sludge and soil removal, the excavation measured 150 feet by 280 feet with an average depth of 20 feet. A total of approximately 13,500 tons of sludge and soil was removed.
- Sampling was conducted on a gridded pattern of the floors (30-foot intervals) and sidewalls (25-foot intervals) of the excavation (the floor samples consisted of chips of limestone). Areas that exceeded 50 ppm were re-excavated and re-sampled until the results were less than 50 ppm for PCBs (Figure 7.3 and Table 7.5).
- On October 5, 1983, GM notified the NRC, the ISBH, and the U.S.EPA that water was flowing into the bottom of the former lagoon, which was observed upon completion of the excavation (Appendix G.27). It was estimated that approximately 1,500 to 2,000 gpd of water were entering the excavation. Small amounts of oil were also observed entering the excavation along with the water. Analytical results of the oil indicated 36,000 mg/L PCBs.
- Prior to backfilling and capping the excavation, a collection system was installed for the purpose of collecting the oil and groundwater. The collection system consisted of four-inch, perforated polyvinyl chloride (PVC) placed around the perimeter of the excavation bottom. Approximately one foot of gravel was used to cover the pipe and a clay berm was constructed around the gravel. The horizontal pipe was drained to a five-foot diameter manhole. An electric pump was placed in the manhole and the system was tied into the existing Wastewater Treatment System.
- Approximately 27,000 tons of clay were used to backfill the excavation in one to two-foot lifts, compacted with a sheepsfoot roller. The final excavation was graded to direct stormwater toward catch basins (and ultimately to the Stormwater Lagoon) and six-inches of topsoil was placed as a final lift and seeded.

GM notified the ISBH and the U.S.EPA of final cleanup of former South Lagoon #4 on January 11, 1984 (Appendix G.28). The installed sump continues to convey groundwater from the collection system to the WWTP.

South Lagoon #5

The Former South Lagoon #5 was the last in the series of the five lagoons prior to discharge to the unnamed ditch via Outfall 002. It was located on the east side of GM Drive (Figure 1.3). South Lagoon #5 measured approximately 120 feet wide by 162 feet long by 9 feet deep.

In September 1970, GM completed the deepening of the lagoon and placed the sludge in prepared pits on site to air dry. The lagoon was dredged again during 1972 – 1973 and the sludge placed in one of three prepared pits on site. Information regarding the disposal of the sludge from the lagoon can be found in Section 7.6.

The South Lagoon #5 was closed in 1976 to make room for a new aboveground concrete basin, as part of the decommissioning of the lagoons (Figure 1.3). The lagoon was drained and all sludge and contaminated waste was transferred to South Lagoon #4 for temporary storage. During construction of the concrete basin, an additional three feet of soil was excavated in part of this lagoon in order to provide a suitable substrate for the concrete basin. Three feet of crushed stone was then used to build the excavation back up to design grade. A concrete holding basin now occupies the site of the former South Lagoon #5.

There have been no additional investigations or remedial actions conducted in connection with Former South Lagoon #5.

Outfall 002

The former South Lagoons discharged through Outfall 002, which was included in the NPDES Process Discharge Permit No. IN 0003573, and discharges to an unnamed ditch on the Facility property and flows to the east/northeast where it joins Bailey's Branch of Pleasant Run Creek. Pleasant Run Creek is a tributary to Salt Creek, which empties into the east fork of the White River southwest of the City of Bedford. On occasion, PCBs have been discharged through Outfall 002 as a result of the PCB concentrations in the former South Lagoons and equipment problems with the carbon adsorption filter unit.

Additionally, Outfall 002 has had NPDES permit exceedances for suspended solids, oil and grease, BOD, phenols, lead and zinc which resulted in Consent Orders.

Outfall 002 was included in the ISPCB Stipulation and Consent Order, Cause No. B-416. Which was signed by the ISPCB on October 21, 1980 A copy of Cause No. B-416 is included as Appendix F.2. Stipulations of Cause B-416 included the following associated with Outfall 002:

- On November 12, 1976, a black discharge with concentrations of PCBs, oil, grease, and suspended solids in excess of the NPDES Permit was observed at Outfall 002. The discharge lasted approximately one-half hour. Analysis of the black discharge indicated 160 ppm of PCBs, however, according to the files, no source of the black discharge was found.
- Acknowledgment of the use of PCB-containing hydraulic fluid at GM prior to 1972, flushing of PCB-containing hydraulic fluid after 1972, discharge of PCB-contaminated wastewater into a ditch which flows into Pleasant Run Creek.

In response to Cause No. B-416, GM installed a carbon adsorption system prior to Outfall 002 (with PCB discharge limit at any time equal to or less than 1.0 μg/L), and increased the degree of water reuse in the water recycle system.

Outfall 002 was included in the September 1980 and the May 1982 inspections by the U.S.EPA. During the 1980 inspection, a water sample collected by the U.S.EPA did not contain PCBs (Aroclor 1242) above 0.5 ppb. A copy of the September 1980 U.S.EPA inspection report is included as Appendix G.24. In May 1982, U.S.EPA collected a water sample from Outfall 002 and a water sample and a sediment sample from the headwaters of Bailey's Branch where Outfall 002 discharges. The water sample from Outfall 002 did not contain detectable PCBs; the water sample from the discharge point into Bailey's Branch contained 7 ppb of Aroclor 1242; and the sediment sample contained 1,000 ppm of Aroclor 1242. The May 1982 U.S.EPA inspection report is included as Appendix G.18.

7.8.3 CONCLUSIONS AND RECOMMENDATIONS

The Former South Lagoons and Outfall 002 are considered an AOI as a result of their historic operation. Although a considerable amount of information was available for review for South Lagoon #4 and Outfall 002, additional investigation will be conducted in order to adequately evaluate the potential risk to human health or to the environment.

Insufficient information was available in the records to adequately assess the potential for South Lagoons #1, #2, #3 and #5 to have impacted the environment. Therefore, to determine what risk those potential impacts may have on human health or the environment additional investigation in this area will be conducted.

7.9 AOI 9 – SERVICE TUNNELS

Six service tunnels are located in the Die Cast Building at the Bedford Facility. The service tunnels are located under the die cast machines and are identified as: North Make #'s 1 through #5 and South Make #1. Their locations are shown in Appendix B.6 and on Figure 1.3.

7.9.1 CURRENT STATUS

Portions of the six service tunnels in the Die Cast Building are currently being utilized for maintaining the die cast machines and to convey hydraulic fluid from the machines to the WWTP. All of the die cast service tunnels are constructed of concrete with portions of the ceiling open to the die cast machines on the operating floor.

The western and eastern ends of the service tunnel for North Make #1 and the eastern two-thirds of the service tunnel for South Make #1 have been closed. Portions were closed pre-1976 and mid-1980 by breaking up the tunnel floors and filling with fill material and unspecified construction debris. Additional portions of the North Make #1 tunnel were closed in 1990 by leaving the tunnel floor intact and filling in the tunnel.

7.9.2 HISTORICAL OPERATIONS

In 1966, the Bedford Facility instituted a reclamation program for hydraulic fluid in order to recover oil leaking from the die cast machines (approximately 14,000 to 15,000 gallons per month). The hydraulic fluid along with process water, was collected in a service tunnel system located in the Die Cast Building. The tunnels allowed the fluid to gravity flow to the former South Lagoons, where the heavy oil was recovered and reclaimed.

PCB-containing hydraulic fluid was used in the die cast machines associated with North Make #1, #4, #5 and South Make #1 service tunnels. In 1977, the Bedford Facility flushed and cleaned the hydraulic fluid collection systems (service tunnels and sewers) that were potentially contaminated by PCB-containing fluids. The Bedford Facility stopped the initial efforts in October 1977, because there was no noticeable improvement in the PCB levels. Because the initial cleaning was determined to be inadequate, GM implemented a second phase of cleaning. The area around and under the machines and equipment was cleaned using new hydraulic fluid. Following this, the service tunnels and sewers were washed down using high-pressure process water and mechanical methods. Then, new hydraulic fluid was introduced to the system in various stages. Sampling indicated that the second phase of cleaning did initially reduce the PCB levels in the collection system; however, it was only for the short term, as recontamination of the system occurred. Currently the service tunnel system continues to be flushed with hydraulic fluid from the die cast machines.

7.9.3 CONCLUSIONS AND RECOMMENDATIONS

The Die Cast Service Tunnels are considered an AOI as a result of their historical operations. Insufficient information was available in the records to adequately assess the potential for this AOI to have impacted the environment. Therefore, additional investigation will be conducted.

7.10 AOI 10 – EXISTING STORMWATER LAGOON AND OUTFALL 003

The Existing Stormwater Lagoon is located northeast of the salary parking lot, east of GM Drive. The Stormwater Lagoon, which discharges to Outfall 003, is allowed emergency stormwater overflows as described below. The emergency overflow from Outfall 003 enters an unnamed ditch and flows to the northeast until the ditch joins with Bailey's Branch of Pleasant Run Creek. The location of the Stormwater Lagoon and Outfall 003 are shown on Figure 1.3.

7.10.1 CURRENT STATUS

This lagoon is still in operation and serves to collect stormwater and is part of the Facility's water recycle system. The water in the Stormwater Lagoon is pumped to the aeration basins in the waste treatment system, where it combines with process wastewater and flows through the remainder of the treatment process (Figure 2.1 and Section 2.4.3).

7.10.2 HISTORIC OPERATIONS

The construction of the existing Stormwater Lagoon (also referred to as the Storm Lagoon and the Stormwater Retention Basin) was first explored in March 1978. The Stormwater Lagoon was constructed to replace the former North Lagoon (Section 7.7) as a more effective manner of managing stormwater from the entire Facility and due to the persistence of PCBs at Outfall 001. Consent Order B-416 was signed on October 21, 1980, by the ISBH. This Consent Order required the following items related to the stormwater management at the Facility:

- Elimination of dry weather discharge from Outfall 001, except as necessary (PCB concentration not to exceed 50 μg/L).
- Facility to increase the degree of water reuse in the recycle system to the maximum extent technically feasible and economically reasonable.
- Facility to construct and operate a new Stormwater Lagoon designed to contain stormwater runoff from improved surfaces expected from a 25-year, 24-hour storm event. The Order required the new Stormwater Lagoon to be fully lined with material equal to or less than a permeability of 10^{-7} centimeters per second (cm/s).
- Stormwater from the new lagoon can be used for make-up water; such that a minimum of a 15-year, 24-hour storm can be contained.

A construction permit was granted by the ISPCB on February 9, 1981. Permission to initiate construction activities was received prior to issuing the permit and construction began in January 1981. The Stormwater Lagoon is clay lined, has an interior slope of 3:1, and is approximately 595 feet long by 260 feet wide by 20 feet deep. The outfall for the Stormwater Lagoon (designated as Outfall 003) was included in the NPDES permit #IN 0003573. Emergency stormwater overflows are allowed under the NPDES permit for discharges exceeding a 15-year, 24-hour stormwater event. GM is required to sample any overflow pursuant to the NPDES permit which includes weekly grab samples for pH and oil and grease, and daily, 24-hour composites for PCBs.

The water in the Stormwater Lagoon is pumped to the aeration basins in the waste treatment system where it combines with process wastewater and flows through the remainder of the treatment process (Figure 2.1 and Section 2.4.3). Outfall 003 is located on the northeast portion of the lagoon and discharges to an unnamed ditch that flows to the northeast.

In early July 1984, GM reported to the ISBH that the Stormwater Lagoon had overflowed due to a combination of storm events during this time period. The rainfall exceeded the Facility's capabilities for treatment. As a result of the overflow, GM received complaints from adjacent property owners to the east that water overflow from the Stormwater Lagoon and flow from a spring (Melvin property) had damaged the properties. GM purchased portions of the properties in question in 1985.

A release of reclaimed hydraulic fluid in September 1984 entered a storm drain that flowed to a pump lift station that is directed to the Stormwater Lagoon. Additional details of the release are included in Section 7.12.

An underground stormwater pipeline broke on January 10, 1986, resulting in a release of an undetermined quantity of untreated stormwater and process water to the unnamed ditch, which flows into Bailey's Branch of Pleasant Run Creek. The underground pipeline broke near the northeast corner of the Diesel Pump House at the Stormwater Lagoon. The pipeline connects the Stormwater Lagoon to the aeration basin at the Facility WWTP. GM took immediate corrective actions to contain the release by shutting off the pump and valves and constructing dikes and trenches around the area to redirect the water back into the Stormwater Lagoon. The NRC, Indiana Emergency Center (IEC), and ISBH were notified of the release by phone in January 1986 and by letter on February 3, 1986 (see Appendix G.29). ISBH assigned Incident Number 860120 to the release.

On November 5 and 6, 1988, approximately 360,000 gallons of water from the Stormwater Lagoon were discharged via Outfall 003 due to a combination of a rain event, equipment failure at the wastewater treatment plant, and unusually high flows from the production facility. IDEM was immediately notified (Appendix G.30) and samples were collected on November 5 and 10, 1988. Analytical results from Outfall 003 indicated oil and grease at a concentration of 15 mg/L and a PCB concentration of 0.0019 mg/L on November 5, 1988, and a PCB concentration of 0.0026 mg/L on November 10, 1988. The Facility measured the pH of the discharge at 7.9 standard units (s.u.). Appendix G.30 includes the notification to IDEM of the release.

According to an interview with Facility personnel, the Stormwater Lagoon has only discharged once in the last three years.

GM installed sumps at two surfacing springs near the WWTP and the sumps discharge the spring water to the Stormwater Lagoon. There has been no additional investigation or remediation conducted at the Stormwater Lagoon.

7.10.3 CONCLUSIONS AND RECOMMENDATIONS

The existing Stormwater Lagoon and Outfall 003 are considered an AOI as a result of two surface water springs piped to the lagoon, a release of reclaimed hydraulic fluid, which entered the sewer system that flows to the lagoon, and it's historic operation. Although considerable amount of information was available for review for this AOI, additional investigation will be conducted in order to evaluate adequately the potential risk to human health or to the environment.

7.11 AOI 11 - ABOVEGROUND STORAGE TANKS

The Bedford Facility has historically utilized several ASTs for storage of various materials including vehicle fuel and PCB-containing fluids. ASTs with documented or suspected releases have been classified as AOIs. These include: Former Used Hydraulic Fluid ASTs; Used Mineral Oil AST Release; and, Temporary Diesel AST Release.

7.11.1 CURRENT STATUS

Former used hydraulic fluid ASTs were located in three bermed areas. The WWTP concrete holding basin currently covers one of the former bermed areas; the second former bermed AST area is covered with gravel west of the WWTP concrete treatment tank; and, the third former bermed AST area is located within the bermed containment for the one-million gallons ASTs. The one million-gallon ASTs remain active and are used as sludge surge tanks for the WWTP. The used mineral oil hydraulic fluid AST which had a release in 1977 and the surrounding asphalt were removed between March and June 1977. The location of the October 2000 diesel fuel release is currently covered with gravel.

7.11.2 HISTORICAL OPERATIONS

Used Hydraulic Fluid ASTs

The Bedford Facility had utilized a total of twenty-nine ASTs in three bermed areas that were located east of GM Drive (see Figure 1.3) to temporarily store PCB-containing hydraulic fluid resulting from the hydraulic fluid replacement and reclamation project of 1976 and 1977. Historically, the twenty-nine ASTs were located within three bermed areas. However, the total number of ASTs in any one of the three areas changed as tanks were moved around. The hydraulic fluid was temporarily stored in the twenty-nine ASTs during the development and construction of the oil reclamation system and the construction of the two one million gallon ASTs. The two one million gallon steel ASTs were constructed to hold primary and secondary sludge from the WWTP and are located northeast of the Sludge Building (Figure 1.3). The two one million gallon ASTs are referred to as the East and West Sludge Surge Tanks. They were constructed in a clay-lined and bermed containment area. The East Sludge Surge tank was completed in the Spring of 1979, and the Facility began placing sludge from the wastewater treatment process into the tank. Transfer of the PCB contaminated hydraulic oil slated for reclamation from the twenty-nine temporary ASTs to the East Sludge Surge Tank took place in 1980. Based on GM's calculations of volumes, the East Sludge Surge Tank was filled in 1980 with 385,000 gallons of oil from the twenty-nine temporary ASTs. The West Sludge Surge Tank was not placed into service for the storage of hydraulic fluids and sludge until 1987.

A Work Plan has been submitted to TSCA to remove the two one million gallon ASTs.

On September 16, 1980, the U.S.EPA and Versar conducted an inspection related to the disposal and marking of PCB-containing equipment at the Bedford Facility. Their report (Appendix G.24) identified soil staining to a depth of two inches within the bermed area containing seven of the temporary storage ASTs. This area was identified as directly east of the South Lagoon #4. Analysis of the stained soil indicated a PCB concentration of 11,000 mg/kg (Aroclor 1242). In 1980, GM transferred the PCB contaminated hydraulic fluid from the twenty-nine ASTs into the East Sludge Surge Tank.

On March 18 and 19, 1982, the U.S.EPA and Versar returned to the site and conducted a TSCA compliance inspection. During their visit, soil samples from two of the temporary AST areas were obtained. The samples were split between GM and U.S.EPA. A copy of the Versar inspection report and a copy of an internal GM correspondence outlining the inspection, sampling locations, and analytical results is attached as Appendix G.18 and G.31 respectively. GM's PCB analytical results for soil samples collected from the former temporary AST storage areas ranged from non-detect to 388 ppm. Versar's analytical results ranged from 420 ppm to 100,000 ppm PCB.

In July 1982, GM's subcontractor, CECOS removed seven of the temporary ASTs along with visually-impacted soil located within the bermed area east of the former South Lagoon #4. This was the area previously sampled by the U.S.EPA during the 1980 and 1982 inspections. CECOS removed the tanks, cut them into sections, and transported and disposed of the tanks at their Williamsburg, Ohio landfill. After removal of the tanks, all visually stained soil was removed from within the bermed area and transported and properly disposed. Six soil samples were taken from the floor within the bermed area, composited, and analyzed for PCBs. GM's analysis of the composite sample indicated 21.2 ppm PCBs. A copy of the CECOS report summarizing the removal activities is attached (Appendix G.32).

Additional temporary ASTs and visually-impacted soil were removed in late 1982 and early 1983, in conjunction with the South Lagoon #4 closure. These materials were shipped to the CECOS landfill in Williamsburg, Ohio. The remaining temporary ASTs were removed in 1987 and shipped to Chemical Waste Management's landfill located in Emelle, Alabama. No further information regarding these later tank removals was available in the files.

<u>1977 Used Mineral Oil AST Release</u>

During an on-site inspection of sanitary discharges on February 22, 1977, State and City representatives identified a release from a used mineral oil AST. The AST contained mineral hydraulic fluid that was used in the flushing of the die cast machines before disposal. Oil had accumulated on the ground surrounding the AST as a result of pumping problems. The release occurred when thawing snow and ground allowed the spilled hydraulic fluid (approximately 5 gallons) to enter a storm sewer that discharged into a drainage ditch that flowed off the Bedford Facility to the west. The unlined drainage ditch, located on the west side of the Facility, was cleaned and the bottom of the ditch was scraped clean. A pump was used to remove the remaining water that exhibited a sheen.

On February 23, 1977, GM notified the ISPCB and LCHD by letter of the release. A copy of the letter is included as Appendix G.33. A discussion of the used mineral oil release was included in a meeting between GM and the State in March 1977. The meeting between GM and the State resulted in the State authorizing a hearing to investigate the release. The release became part of Notice for Hearing for Cause No. B-416.

There have been no additional investigations as a result of the released used mineral hydraulic oil.

Temporary Diesel AST Release

During October 2000, GM was installing secondary containment around the existing gasoline and diesel ASTs in the Gasoline and Diesel Fueling Area. Part of the process included the use of temporary ASTs constructed on support legs. On October 22, 2000, one of the support legs failed, resulting in the tank releasing approximately 150 to 200 gallons of diesel fuel to the ground surface. The spill flowed to the south and pooled prior to flowing down the steep embankment leading to the WWTP (see Figure 1.3). A spill response contractor was sent to the site with a vac truck. The vac truck removed 137 gallons of free liquid from the ground surface and 26 gallons from the AST. The spill response contractor then applied a layer of peat sorb to the affected ground surface to trap any residual product that may have leached from the soil. Another contractor excavated an area approximately 20 feet long by 10 feet wide by 3 feet deep. The soil was placed in two roll-off boxes pending off-site disposal. According to Bedford Facility personnel, visually impacted soil was removed. No soil samples were collected.

There have been no additional investigations or remediation associated with the Temporary Diesel AST release.

7.11.3 CONCLUSIONS AND RECOMMENDATIONS

Used Hydraulic Fluid ASTs

The used hydraulic fluid ASTs are considered an AOI as a result of their historic use for storage of PCB-containing fluids and past inspections. Though considerable amount of information was available for review for this AOI, additional investigation will be conducted in order to evaluate adequately the potential risk to human health or the environment.

<u>1977 Used Mineral Oil AST Release</u>

The area impacted by this release is considered an AOI as a result of the material stored in the AST and that the release occurred to the asphalt and an unlined drainage ditch. Insufficient information was available in the records to adequately assess the potential for this AOI to have impacted the environment. Therefore, additional investigation in this area will be conducted.

<u>Temporary Diesel AST Release</u>

The area affected by the diesel release is considered an AOI as a result of the release occurring to the ground surface and the potential that residual impact from the diesel fuel may still remain in the soil. Insufficient information was available in the records to adequately assess the potential for this AOI to have impacted the environment. Therefore, additional investigation in this area will be conducted.

7.12 AOI 12 – AREA AFFECTED BY THE RECLAIMED HYDRAULIC FLUID RELEASE

A release of reclaimed hydraulic fluid occurred when a tanker ruptured adjacent to the Die Cast Building (See Figure 1.3).

7.12.1 CURRENT STATUS

Two storm drains are located in the area where the release occurred and the area is covered with concrete. During a February 2001 site walkover completed for the development of this CCR, the condition of the concrete was noted to be deteriorated from truck traffic and facility use.

7.12.2 HISTORICAL OPERATIONS

On September 14, 1984, a tanker truck ruptured during unloading and released approximately 2,500 to 3,000 gallons of reclaimed hydraulic fluid. The spill occurred at the hydraulic fluid receiving dock adjacent to the "A" Crib located in the Die Cast Building. The hydraulic fluid spilled onto the concrete and an undetermined quantity of the fluid entered a stormwater drain. The storm drain flowed to a pump lift station that pumps stormwater to the Stormwater Lagoon. GM removed the hydraulic fluid from the lift station and flushed the sewer. Hydraulic fluid that spilled on the roadway was cleaned up using an absorbent material. GM inspected the sewer catch basin and lift station after cleaning and did not find any visual evidence of the hydraulic fluid. GM notified the NRC, IEC and the ISBH that the release occurred (Appendix G.34). ISBH assigned Incident Number 840917.

There have been no additional investigations or remedial actions associated with this hydraulic fluid release.

7.12.3 CONCLUSIONS AND RECOMMENDATIONS

This area is considered an AOI as a result of the condition of the concrete where the release occurred. Insufficient information was available in the records to adequately assess the potential for this AOI to have impacted the environment. Therefore, additional investigation in this area will be conducted.

7.13 AOI 13 - UNDERGROUND STORAGE TANKS

Seven USTs have been utilized at the Facility for the storage of vehicle fuel and ethyl silicate. These USTs were installed between 1950 and 1977 and were removed between 1991 and 1994. Closure reports for the removal of the USTs have been submitted to the IDEM.

7.13.1 CURRENT STATUS

The seven USTs located at the Facility have been removed and closure reports have been submitted to the IDEM. To date IDEM has not responded to the Closure Plan submittals.

7.13.2 HISTORICAL OPERATIONS

There were two areas at the Facility where USTs were in operation. The specific locations and a description of the UST operations are described below.

Oil House UST Area

Historically there were two USTs located near the Oil House on the north side of the Facility (see Figure 1.3). The tanks were made of coated steel and used to store gasoline for fueling vehicles. The tanks were properly registered with the ISBH on April 14, 1986 (copy of original Notification for USTs – EPA Form 7530 is attached in Appendix G.35). The following is a summary of the Oil House UST capacities and contents.

UST No.	*Installation Date*	*Capacity (gallons)*	*Contents*	*Date Removed From Service*
1	1977	2,000	Leaded Gasoline	7/10/91
2	1977	10,000	Unleaded Gasoline	7/10/91

GM notified the IDEM, UST Section, of its intent to close (via removal) the two USTs, on May 24, 1991. IDEM approved the closure notification on June 5, 1991. The Indiana State Fire Marshal and the local Fire Department were also notified of the pending closure. O'Brien & Gere began tank removal activities on July 10, 1991. The initial soil encountered revealed no signs of contamination. However, at a depth of approximately four feet, visual evidence of contamination and petroleum odor was detected. Excavation was continued in order to determine the extent of impacted materials. Excavated materials were stockpiled on plastic sheeting and diking was erected to prevent surface water migration into the pile. Initial observations of the soil conditions indicated that the contamination appeared to be localized to the backfill materials, due to the presence of native clay soil surrounding and beneath the tank excavation. Some perched water was present within the permeable granular backfill materials of the excavation, but this water was not believed to be hydraulically connected to any aquifer systems due to the apparent low hydraulic conductivity of the native clay comprising the remainder of the excavation cavity.

GM representatives contacted the IDEM Emergency Response Commission regarding the contaminated soil (Appendix G.36). IDEM assigned Incident Number 9107058. The NRC was also notified (Appendix G.36), and NRC Case Number 78944 was assigned to the Bedford Facility. GM notified IDEM in writing of the incident on July 12, 1991, (copy of letter notification attached in Appendix G.36) and outlined proposed corrective measures. GM proposed removal of the impacted soil and confirmatory soil sampling of the excavation.

Upon removal of the tanks and impacted backfill materials, GM's environmental consultant (O'Brien & Gere) performed a UST Removal Environmental Site Assessment (ESA). The ESA documenting closure was submitted to IDEM on September 18, 1991. A copy of the ESA is included as Appendix G.37. An updated UST Notification Form changing the status of the tanks to closed via removal was submitted as part of the ESA. Consistent with IDEM's guidance (provided in IDEM's June 5, 1991, approval of GM's intent to close the tanks), a series of twelve confirmatory soil samples were collected from the excavation sidewalls, excavation bottom, and beneath the fuel dispensers, and analyzed for total petroleum hydrocarbons (TPH) via EPA Method 8015 Modified. Sample locations are identified in the ESA, along with a summary of the analytical results. The analytical laboratory reported all excavation soil samples as less than 10 mg/kg TPH. In addition to TPH, the samples were also analyzed for benzene, toluene, ethylbenzene, and xylene (BTEX). These analytical results are also summarized in the ESA. With the exception of two samples, BTEX compounds were not detected above the 0.005 mg/kg analytical detection limit. One soil sample, located beneath the former dispenser, exhibited total xylenes concentration of 0.007 mg/kg, and one of the two samples collected from the west excavation wall exhibited benzene concentrations of 0.200 mg/kg, ethylbenzene of 0.015 mg/kg, and total xylene of 0.016 mg/kg.

Upon completion of removal activities the excavation was backfilled with clean imported granular materials. On August 21, 1991, GM requested approval from IDEM for disposal of the approximately 750 cubic yards of impacted materials removed from the UST excavation at the Rumpke Landfill located in Medora, Indiana. A copy of the request, along with waste characterization sampling results, is included as

Appendix G.38. On October 16, 1991, IDEM approved the impacted material for disposal. Due to historic detection of PCBs in various on-site waste streams, IDEM requested GM to analyze the petroleum-impacted materials for PCBs and forward a copy of the PCB analytical results to IDEM's office prior to off-site disposal. Per IDEM's request, GM forwarded a copy of the PCB analytical results for the contaminated soil (all PCB concentrations were below detection limits) to IDEM in correspondence dated October 23, 1991 (copy attached as Appendix G.39).

South Piston Yard USTs

During construction activities to complete a modification to the Bedford Facility fire suppression system in early 1994, an UST was uncovered. The UST was uncovered in an area of the Bedford Facility generally referred to as the South Piston Yard, located immediately south of the piston manufacturing building and west of the western elevated water tower (see Figure 1.3 for former tank locations). A subsequent review of Bedford Facility record drawings by GM revealed a drawing dated in the mid-1950s which suggested the potential presence of four, 10,000 gallon USTs at this location. It was also reported that gasoline dispensing might have been performed in this area in the past. The tanks had not been utilized since the early 1960s. A ground penetrating radar (GPR) survey was conducted and confirmed the presence of four, or possibly five, USTs at this location.

According to Facility records, the South Piston Yard USTs were effectively taken out of service in the 1960's, and therefore, had not been registered with the State (USTs taken out of service prior to 1974 were not required to be registered under Section 9002 of RCRA, which took effect in May 1986). Since the tanks did not require registration, GM undertook a voluntary closure program to remove the tanks. Although the program was voluntary, GM notified the local State Fire Marshal representative and prepared a Work Plan for removing the USTs for their review. Upon discovery of contamination in the backfill surrounding the USTs, GM notified IDEM and Incident Number 94-05525 was assigned to the Bedford Facility. O'Brien & Gere oversaw the UST removal activities, with activities documented in an UST Closure Report which was submitted to IDEM's UST Section in August 1994. A copy of the Closure completion report, including analytical laboratory data, sample location maps, and data summary tables, is attached as Appendix G.40.

The following is a summary of UST capacities and contents.

UST No.	*Installation Date*	*Capacity (gallons)*	*Contents*	*Date Removed From Service*
3	pre-1974	12,000	Diesel	5/11/94
4	pre-1974	12,000	Diesel	5/11/94
5	pre-1974	12,000	Diesel	5/11/94
6	pre-1974	7,500	Gasoline	5/12/94
7	pre-1974	12,000	Ethyl Silicate	5/12/94

A concrete pad located above the USTs was removed on March 9, 1994. The contents of the five USTs were sampled and analyzed for BTEX and methyl (tert) butylether (MTBE). In addition, visual and olfactory inspection of Tank No. 5 suggested alcohol constituents may have been present in the liquids remaining within the tank, and therefore, alcohols were added to the parameter list for that tank. Four of the five samples collected from the tank contents had detectable concentrations of BTEX and MTBE. The sample from Tank No. 5 also had detectable concentrations of several alcohols. At the time of removal, the USTs contained water with a small amount of residuals. The removed contents were treated at the on-site WWTP or transported off-site for disposal.

The five USTs were removed on May 11 and 12, 1994, and transported off-site for recycling. Additional backfill material surrounding the USTs was removed on May 13, 1994, and stockpiled on plastic sheeting. Removal of the backfill material within the bottom of the excavation revealed the presence of clay. Upon removal of all visually impacted material, twenty-one closure verification soil samples were collected from the floor and sidewalls of the excavation. The samples were analyzed for TPH via EPA Method 8015 Modified. In addition, six samples collected in proximity to Tank No. 5 were analyzed for alcohols. Of the twenty-one samples collected, thirteen samples exhibited concentrations of TPH greater than the IDEM action level of 100 mg/kg. Of the six samples collected in the vicinity of Tank No. 5 and submitted for alcohols, one sample had a concentration of ethanol at 26.7 mg/kg. Additional excavation activities were performed on those areas exceeding IDEM's action level, and a second series of confirmation sampling was conducted in those areas over-excavated. Of the thirteen locations re-sampled, five locations exhibited TPH concentrations above IDEM's 100 mg/kg action level. These five samples were located in the vicinity of Tank Nos. 1 and 2 and along the north wall of the excavation. Additional excavation was performed along the north wall of the excavation. No further excavation was performed in the vicinity of Tank Nos. 1 and 2 due to the presence of a process water sewer line. After completion of the additional excavation, a third closure sample was obtained from the north wall of the excavation. This sample was below detection limits for TPH.

The excavation was backfilled with imported clean granular material and restored to grade. The concrete pad above the UST location that was broken up and removed to provide access to the USTs was transported off-site for disposal at the Rumpke Landfill in Medora, Indiana. Impacted backfill removed from the excavation (approximately 769 cubic yards) was disposed of at the USPCI landfill in Nevada.

In the UST Closure Report, O'Brien & Gere concluded:

- A limited amount of soil remains in the vicinity of Tank Nos. 1 and 2 that exceed TPH concentrations of 100 mg/kg; this soil cannot be removed due to the presence of a process water sewer line which traverses the excavation;
- Groundwater was not detected during closure activities;
- No free product was detected within the UST excavation;
- No inhabitable buildings have been impacted by the former UST site;
- The only utility conduit within the excavation is a process water sewer which carries process wastewater to the treatment plant, it is unlikely that this sewer will be adversely impacted by the remaining soil contamination; and
- The UST site appears to pose little risk to the surrounding population based upon existing site conditions and proximity to the surrounding population and its drinking water.

Based on the aforementioned conclusions, O'Brien & Gere suggested the Bedford Facility would be categorized as a low priority facility in IDEM's system and that no further investigation was recommended. GM submitted the closure report, along with a Notification for Underground Storage Tanks form to IDEM on August 4, 1994.

7.13.3 CONCLUSIONS AND RECOMMENDATIONS

The former USTs are considered an AOI since acknowledgement of closure has not been received from the State. Although a considerable amount of information was available for review for this AOI, and it appears these areas were adequately remediated, the State's concurrence with the finding of the Closure Reports should be verified.

7.14 AOI 14 - MCBRIDE COWS DISPOSAL AREA

In April 1978, GM purchased and euthanized 91 head of cattle from the McBride dairy farm located along Bailey's Branch of Pleasant Run Creek, into which GM discharged its treated wastewater. The cattle had been exposed to PCBs and subsequent testing of the cattle indicated the presence of PCBs in the milk and fat. Documentation indicated that the cattle were properly disposed in accordance with Indiana Code IC-2.1-16-20. Euthanized cattle were placed in a prepared pit where the sidewalls and bottom were plastic-lined and the cattle were covered with four to six feet of clay (Figure 1.3).

7.14.1 CURRENT STATUS

This area is currently inactive and covered with grass. No other facility activity has occurred in this area.

7.14.2 HISTORICAL OPERATIONS

The McBride property is located on Mount Pleasant Road, Bedford, Indiana. This property consists of an approximate 20-acre parcel (Tract 1) which is bisected by Bailey's Branch, into which the Bedford Facility's Outfalls 001 and 002 discharged; and an approximate 80-acre parcel (Tract 2) (see Figure 3.1 for the location of the McBride property). McBride reported that occasionally Bailey's Branch would flood onto approximately 17 acres of Tract 1. Tract 1 was used for grazing pasture for cattle and Tract 2 was used primarily for growing hay and corn for feed.

The ISBH collected a screening sample on March 31, 1977, from the route used to pick up the McBride milk. The March 31, 1977, milk sample showed trace PCBs (documentation of the result was not found in the files reviewed). Subsequently, on August 15, 1977, the ISBH collected a milk sample from a milk storage tank on the McBride farm. The milk sample indicated PCB levels above the government standard of 2.5 ppm (government standard at that time). On September 14, 1977, the ISBH collected a second sample of milk from the McBride milk storage tank. The second sample contained PCBs at a concentration of 9.7 ppm. Based on these results, the ISBH requested that McBride remove his cows from silage and indicated that the ISBH would collect a third milk sample. As a result of this, McBride started to reduce the milk production from a portion of the cows, with remaining cows sent to another farm.

On September 27, 1977, ISBH collected samples at the McBride property from the well water in the milk house, a spring located on Tract 2, surface water in Bailey's Branch along west portion of property, and from city water from an outside faucet at the residence. The water sample from Bailey's Branch indicated a PCB concentration of 12 ppm (Aroclor 1242) and the other three samples were less than $1.0X10^{-7}$ ppm PCBs, as Aroclor 1242 (Table 7.6). McBride shipped milk from the cows until the end of October 1977, when most of the cows stopped giving milk due to lack of milking. However, McBride continued to milk three cows after October 1977 since they had just given birth (two of the cows were recently purchased and one McBride owned for 3 to 6 years). The milk was used for the calves, cats, and dogs. The remaining milk was poured out onto the ground.

On November 22, 1977, GM collected analytical samples from the three cows that were still milking, grass and soil from Tracts 1 and 2, sediment from Bailey's Branch, scrapings from the sealer/cement in the two silos, and silage from the two silos. The results of the milk samples indicated PCB (Aroclor 1254) detected in all the samples based on fat weight, however, the butter fat level was too low in most of the samples to make a reliable fat weight determination. Results of the grass and soil sampling indicated PCB (Aroclor 1248/1254) detected in concentrations ranging from less than 0.001 to 220 ppm. Concentrations of PCBs in Bailey's Branch sediment, silo scrapings, and silage ranged from 17.09 to 825.95 ppm (Aroclor 1242); 0.009 ppm (Aroclor 1248/1254); and 0.032 to 0.059 ppm (Aroclor 1248/1254), respectively. The analytical results are shown in Appendix G.41 along with several drawings showing sample locations.

In early 1978, McBride fenced off Tract 1 to limit access of the cows to the parcel. In March 1978, CDM collected milk and tissue samples from the McBride cows. Results of the tissue samples collected by CDM indicated PCBs, based on fat weight, ranged from 0.44 ppm (Aroclor 1254) to "non-detect" at a detection limit of 84 ppm (the high detection limit is due to the low level of fat extracted from the sample). The results of the milk samples indicated concentrations of PCBs, based on fat weight, ranged from 0.29 to 4.5 ppm (Aroclor 1254) (Appendix G.42).

During early April 1978, GM decided to purchase the McBride cows and destroy them after failed attempts to locate a place to incinerate, landfill, or donate the cows for research at universities or the USDA. According to Bedford Facility records, the State of Indiana gave GM verbal approval to euthanize and dispose the cows on either the McBride or GM property. Both the County and State indicated that disposal at the Lawrence County landfill was unacceptable. The cows were euthanized and disposed in a prepared disposal area on GM property (Figure 1.3) (prepared in accordance with Indiana Code IC-2.1-16-20). The bottom and walls of the excavation were lined with plastic and the cows were covered with four to six feet of clay.

On April 6, 1978, the USDA sent a letter to GM outlining possible uses for Tract 1 of the McBride property and proposed a sampling program for Tract 2 (Appendix G.43). As a preliminary measure, the USDA recommended that Tract 1 not be used as pasture for any class of livestock, produce forage crops for animals; or produce leafy or root vegetables for human consumption. The USDA analyzed soil/manure samples collected on April 13, 1987 - from an area south and west of the milk house on Tract 2. The USDA results indicated PCBs ranging from 0.018 to 0.090 ppm. During late April 1978, CDM collected soil samples from Tract 2 using the sampling program proposed by the USDA in their April 6, 1978, letter. Analytical results indicated low levels of PCBs were detected in the soil ranging from non-detect to 0.34 mg/kg. The analytical results and report can be found in Appendix G.44. At the request of GM, the USDA reviewed the CDM report on sampling Tract 2. The USDA concluded that the land could be used for any agriculture purpose without encountering excessive PCB residuals.

In March 1979, both the McBride's and GM signed a Settlement Agreement and Grant of Right of First Refusal. The Grant of Right of First Refusal stated that the McBride's could not sell all or any portion of the 20 acres which make up Tract 1 without first giving the GM the privilege of purchasing the same piece of property.

There have been no other investigative or remedial activities conducted in connection with the McBride Cows Disposal Area.

7.14.3 CONCLUSIONS AND RECOMMENDATIONS

Cows with PCB contamination were buried in a prepared pit. Due to the potential for differential settling and surface erosion, this area is considered an AOI. Insufficient information was available in the records to adequately assess the potential for this AOI to have impacted the environment. Therefore, additional investigation in this area will be conducted.

7.15 AOI 15 – FORMER EQUIPMENT STORAGE AREA

A review of historical photographs, aerials, drawings and interviews with Facility personnel identified a former Equipment Staging Area located on the east side of GM Drive, north of the former North Lagoon. See Figure 1.3 for the location.

7.15.1 CURRENT STATUS

The former Equipment Storage Area is located north of the former North Lagoon. It is currently covered with gravel, and has a fence on the north, south and west (with a gate) sides. The east side of this area is open. GM currently leases this area to a trucking company for trailer parking.

7.15.2 HISTORICAL OPERATIONS

GM started using the former Equipment Storage Area in the middle to late 1970's for the storage of some pieces of out-of-service equipment. Die cast machines were not stored in this area due to the weight of the equipment and difficulty in transporting to this location. The die cast machines were brought in and out of the Facility by rail.

There have been no previous investigations or remedial actions associated with the former Equipment Staging Area.

7.15.3 CONCLUSIONS AND RECOMMENDATIONS

The former equipment storage area is considered an AOI as a result of past and present operations. Insufficient information was available in the records to adequately assess the potential for this AOI to have impacted the environment. Therefore, additional investigation in this area will be conducted.

7.16 AOI 16 – FORMER EAST ELECTRICAL SUBSTATION

An electrical substation was located west of the aeration basin on the east side of GM Drive (Figure 1.3).

7.16.1 CURRENT STATUS

This area is currently unoccupied and exhibits evidence of soil staining and stressed vegetation.

7.16.2 HISTORICAL OPERATIONS

The former east electrical substation was owned and operated by Cinergy, a regional electrical company, and was removed in 1996. Prior to removing the substation, Cinergy collected a composite soil sample from adjacent to the main transformer, and from two locations east of the main transformer, one of which showed evidence of oil staining. The composite sample locations are included in Appendix G.45. The soil samples were analyzed for PCBs and the results of the composite sampled indicated PCB concentrations less than the detection limit (detection limit was 5.0 mg/kg for Aroclor 1221 and 1.0 mg/kg for all other Aroclors) from samples collected from the two eastern sampling locations and a PCB concentration of 2.9 mg/kg (Aroclor 1260) from the composite sample adjacent to the main transformer. The analytical reports are included in Appendix G.45. According to Cinergy personnel, approximately 27 cubic yards of soil were excavated from the oil stained area shown on the figure in Appendix G.45 and properly disposed. No additional sampling was reported.

7.16.3 CONCLUSIONS AND RECOMMENDATIONS

The former east electrical substation is considered an AOI as a result of soil staining and stressed vegetation in the vicinity of the former substation, which was identified through historic photographs and by visual inspection. Cinergy removed the transformer and visually stained surficial soil, but additional sampling will be conducted to assess the potential for this AOI to have impacted the environment.

7.17 AOI 17 - PISTON BUILDING OIL ACCUMULATIONS

In late 1977, oil accumulations were identified in a ditch along the west side of the current Piston Building.

7.17.1[3] CURRENT STATUS

The area west of the Piston Building is paved and there is no evidence of a former ditch.

7.17.2 HISTORICAL OPERATIONS

Railroad tracks used to bisect the Facility property between the Piston Building and the Die Cast Building. The tracks were removed in 1995 and a ditch adjacent to the tracks was filled in around the same time frame. There have been no previous investigations or remedial actions associated with these oil accumulations.

7.17.3 CONCLUSIONS AND RECOMMENDATIONS

The area along the west side of the Piston Building is considered an AOI as a result of these former oil accumulations and historical operations. Insufficient information was available in the records to adequately assess the potential for this AOI to have impacted the environment. Therefore, additional investigation in this area will be conducted.

7.18 AOI 18 – AREA AFFECTED BY THE HENRY SYSTEM DISCHARGE

On April 7, 1986, waste water from the Henry System located in the Piston Building was discharged onto a concrete slab south of the building, entered a storm sewer and flowed down the steps leading into the WWTP (Figure 1.3). The Henry System is located in the southern portion of the Piston Building.

[3] Revised July 20, 2001. Corrected section heading from 7.18.1 to 7.17.1.

7.18.1 CURRENT STATUS

The Facility has made recent improvements to the Henry System and now reclaims the oil for reuse prior to sending the final discharge to the WWTP via a small service tunnel.

7.18.2 HISTORICAL OPERATIONS

The Henry System is an aluminum chip reclamation/separation system (chips and oil) from machining of the pistons. During the early use of the Henry System, oil was cycled only once through the system and then discharged to the WWTP. There is a small service tunnel associated with this operation that discharges to the WWTP.

There have been no previous investigations or remedial actions associated with the 1986 Henry System discharge.

7.18.3 CONCLUSIONS AND RECOMMENDATIONS

The location of the Henry System discharge is considered to be an AOI as a result of the discharge flowing onto the pavement and down the steps leading to the WWTP and the presence of the tunnel system to convey only wastewater to the WWTP. Insufficient information was available in the records to adequately assess the potential for this AOI to have impacted the environment. Therefore, additional investigation in this area will be conducted.

7.19 AOI 19 – AREA AFFECTED BY PAINT AND THINNER SPILL

In May 1990, spent thinner and paint was spilled on the ground surface north of the concrete pad on the outside of the Paint and Thinner Storage Area at the Oil House (Figure 1.3).

7.19.1 CURRENT STATUS

The Facility currently utilizes the Oil House for storing incoming virgin oils and paint materials. Waste paint and paint solvents are stored in a metal, fire resistant cabinet located within the Waste Storage Area.

7.19.2 HISTORICAL OPERATIONS

Historically, the Oil House has similarly been utilized for the storage of virgin oil and paint materials. The discolored gravel resulting from the May 1990 spill was removed. There have been no previous investigations resulting from the release.

7.19.3 CONCLUSIONS AND RECOMMENDATIONS

The area affected by the release is considered an AOI as a result of historical operations and the visual evidence of staining. Insufficient information was available in the records to adequately assess the potential for this AOI to have impacted the environment. Therefore, additional investigation in this area will be conducted.

7.20 AOI 20 – NORTHERN PORTION OF THE PISTON BUILDING

The Manifold Department was located in the northern portion of the current Piston Building (see Figure 1.3).

7.20.1 CURRENT STATUS

The Robotic Piston Department currently occupies the northern portion of the Piston Building.

7.20.2 HISTORICAL OPERATIONS

In May 1990, a discharge of water from a sump pump (located on the manifold cooling reservoir) onto the ground outside of the manifold area was identified. The discharge of water from the sump was corrected by diverting the water back into the reservoir.

In July of 1990, several tubs stored on the concrete pad north of the Manifold Building were leaking an oily substance. The files indicated that the tubs may have contained material that was removed from around the molding machines or the die cast machines.

There have been no previous investigations or remedial actions associated with the manifold cooling reservoir sump release or the leaking tubs.

7.20.3 CONCLUSIONS AND RECOMMENDATIONS

The northern portion of the current Piston Building is considered an AOI as a result of historic operations. Insufficient information was available in the records to adequately assess the potential for this AOI to have impacted the environment. Therefore, additional investigation in this area will be conducted.

7.21 AOI 21 – FILLED RAVINE NORTH OF DIE CAST BUILDING

Reviews of historic photographs (1945) indicate that a ravine existed north of the current Die Cast Building. It appeared that filling activities were occurring and drums appeared to be stored in this area. See Figure 1.3 for the location of the former ravine.

7.21.1 CURRENT STATUS

This area is currently paved or otherwise occupied by the Bulk Storage, Maintenance Sheet Metal and Fabrication Building, Chip Processing and Crusher Buildings, and the Alloy Storage Building. Chip system residue is still generated from the chip drying process. The residue is disposed at a permitted non-hazardous waste landfill. The existing Equipment Storage Area is paved and is utilized for the storage of equipment.

7.21.2 HISTORICAL OPERATIONS

In reviewing a 1945 historical photograph, it was noted that north of the Die Cast Building appeared to be an area where on-site disposal and filling occurred. Additionally, the historical photograph showed a body of water adjacent to the west railroad tracks. See Historical Photograph 4 in Appendix B.2. Drums were also noted on bare ground adjacent to the east railroad tracks and north of the building.

In May 1986, a roll off box used for transporting the chip system residue for disposal was overfilled with material on the ground. The location of the overflowing roll off box of chip system residue was by the Chip Building (see Figure 1.3). Chip system residue is generated as a result of the chip drying process. Historically, the residue was disposed of in a RCRA hazardous waste landfill since it tested above the TCLP limit for lead.

Presently, incoming chip material is stored in concrete bunkers/bins in the Bulk Storage area north of the Chip Building. The chips are typically centrifuged prior to shipping to the Facility, however they still contain some cutting fluid (oil). The concrete bunkers/bins are constructed of concrete walls on a concrete slab.

The Facility currently utilizes the area north of the Aluminum Chip Storage Area for storing out-of-service equipment. Die cast machines are not stored in this area due to their weight and difficulty in moving them. There have been no documented releases in the existing Equipment Storage Area.

On January 19, 1999, approximately 10 to 20 gallons of hydraulic fluid spilled when a hose on a tanker truck ruptured. The spill occurred outside of the aluminum chip unloading area, north of the Crusher/Chip System Building. Facility personnel cleaned up the release.

There have been no additional investigations or remedial actions associated with the filled ravine and area north of the Die Cast Building.

7.21.3 CONCLUSIONS AND RECOMMENDATIONS

The area north of the Die Cast Building is considered an AOI as a result of the filling of the area and storage of drums on the ground. In addition, the area may have been impacted by the chip system residue of the release. Insufficient information was available in the records to adequately assess the potential for this AOI to have impacted the environment. Therefore, additional investigation in this area will be conducted.

7.22 AOI 22 - TOOL ROOM ANNEX DOCK RELEASE

A release to the Tool Room Annex Dock and adjacent bare rail bed occurred on March 21, 2000. The location of the release is shown on Figure 1.3.

7.22.1 CURRENT STATUS

The location of the Tool Room Annex Dock release in March 2000 still contains a bare rail bed adjacent to the dock.

7.22.2 HISTORICAL OPERATIONS

A spill of Peerless Spray Kleen 901-1 occurred on March 21, 2000, at the Tool Room Annex Dock. Peerless Spray Kleen 901-1 is an all purpose cleaner used by the Facility and has a pH greater than 10. The spill occurred on the dock platform and ran off to the ground surface. The ground surface was comprised of concrete and a bare rail bed. Some of the spilled material entered the rail bed and ground surface. Sorbent material was used to soak up the spill and the sorbent material was disposed. According to an interview with GM, no excavation occurred in this area.

There have been no additional investigations or remedial actions associated with the Tool Room Annex Dock release.

7.22.3 CONCLUSIONS AND RECOMMENDATIONS

The area affected by the release is considered an AOI as a result of the release occurring to bare ground with no soil excavation or sampling conducted. Insufficient information was available in the records to adequately assess the potential for this AOI to have impacted the environment. Therefore, additional investigation in this area will be conducted.

7.23 AOI 23 – AREA AFFECTED BY THE 1996 WASTEWATER TREATMENT FILTER CAKE RELEASE

In October 1996, a release of filter cake waste liquid occurred on a gravel surface outside of the Filter Building (Figure 1.3).

7.23.1 CURRENT STATUS

The area surrounding the Filter Building is covered with gravel.

7.23.2 HISTORICAL OPERATIONS

The Filter Building is located west of GM Drive and houses the anthracite coal filters and disinfectant (chlorine dioxide) addition equipment employed as part of the wastewater treatment process. The WWTP laboratory and offices are also located in the Filter Building. At times, the Facility would utilize the area next to the Filter Building for temporary storage of roll-off boxes containing filter cake from the WWTP. In October 1996, it was noted that filter cake waste liquid was released to the gravel outside of the Filter Building as a result of a roll-off box liner failing. A spill response contractor cleaned up the release.

There have been no previous investigations or remedial actions associated with the 1996 wastewater treatment filter cake release.

7.23.3 CONCLUSIONS AND RECOMMENDATIONS

The area affected by the release of the WWTP filter cake waste liquid is considered an AOI as a result of the release occurring to the ground. Insufficient information was available in the records to adequately assess the potential for this AOI to have impacted the environment. Therefore, additional investigation in this area will be conducted.

7.24 AOI 24 – AREA AFFECTED BY THE JUNE 2000 DIE LUBE 5150 RELEASE

A release of Die Lube 5150 (used on the die cast forms to allow for release of the parts) occurred near the Receiving Office in the Die Cast Building. See Figure 1.3 for the location of AOI 24.

7.24.1 CURRENT STATUS

The Facility continues to utilize the area near the Receiving Office in the Die Cast Building to store new totes awaiting usage.

7.24.2 HISTORICAL OPERATIONS

On June 20, 2000, approximately 250 to 300 gallons of Die Lube 5150 was released on the concrete floor from a tote. The tote was located just east of the Receiving Offices in the Die Cast Building (see Figure 1.3). A review of the records indicated that the Facility made the appropriate notifications. A vac truck cleaned up the release.

7.24.3 CONCLUSIONS AND RECOMMENDATIONS

This area is considered an AOI as a result of the reported release. However, since the release occurred on the concrete inside of the building and did not enter the environment, no investigation is recommended.

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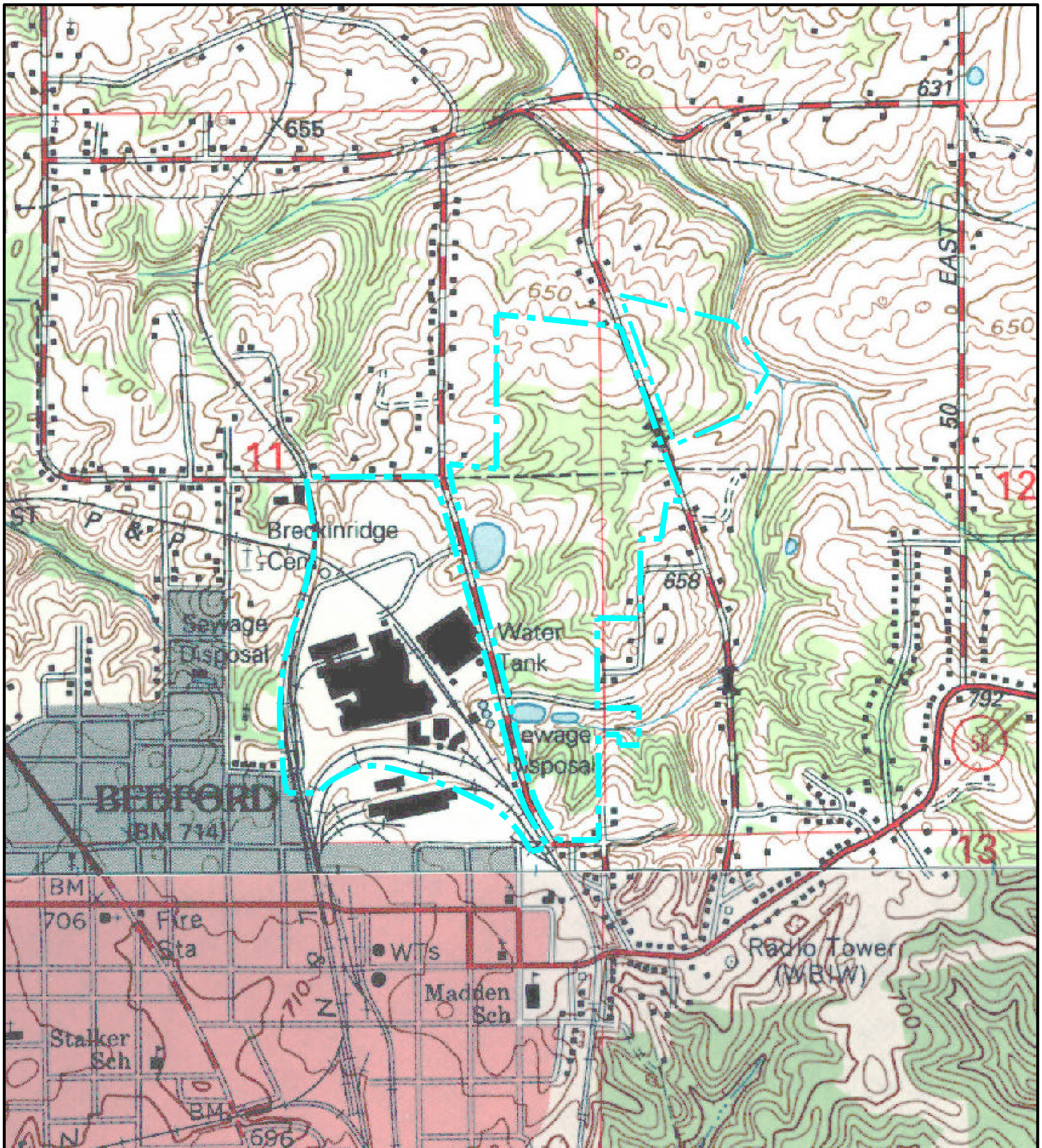
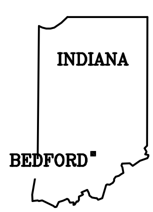


LEGEND:

APPROXIMATE PROPERTY BOUNDARY



BASE SOURCE: USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE;
BARTLETTSVILLE, INDIANA 1994
BEDFORD EAST, INDIANA 1978
BEDFORD WEST, INDIANA 1993
OOLITIC, INDIANA 1987

N

0 500 1000ft

figure 1.1

SITE LOCATION MAP
GM POWERTRAIN BEDFORD FACILITY
Bedford, Indiana

CRA

13968-00(001)GN-CO001 MAY 25/2001

Nº	Revision	Date	Initial

0 100 200ft

LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- BEDFORD CITY LIMIT
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS
- STREAM
- 600 CONTOUR LINE

SCALE VERIFICATION

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

Approved

DRAWING STATUS

Status	Date	Initial

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

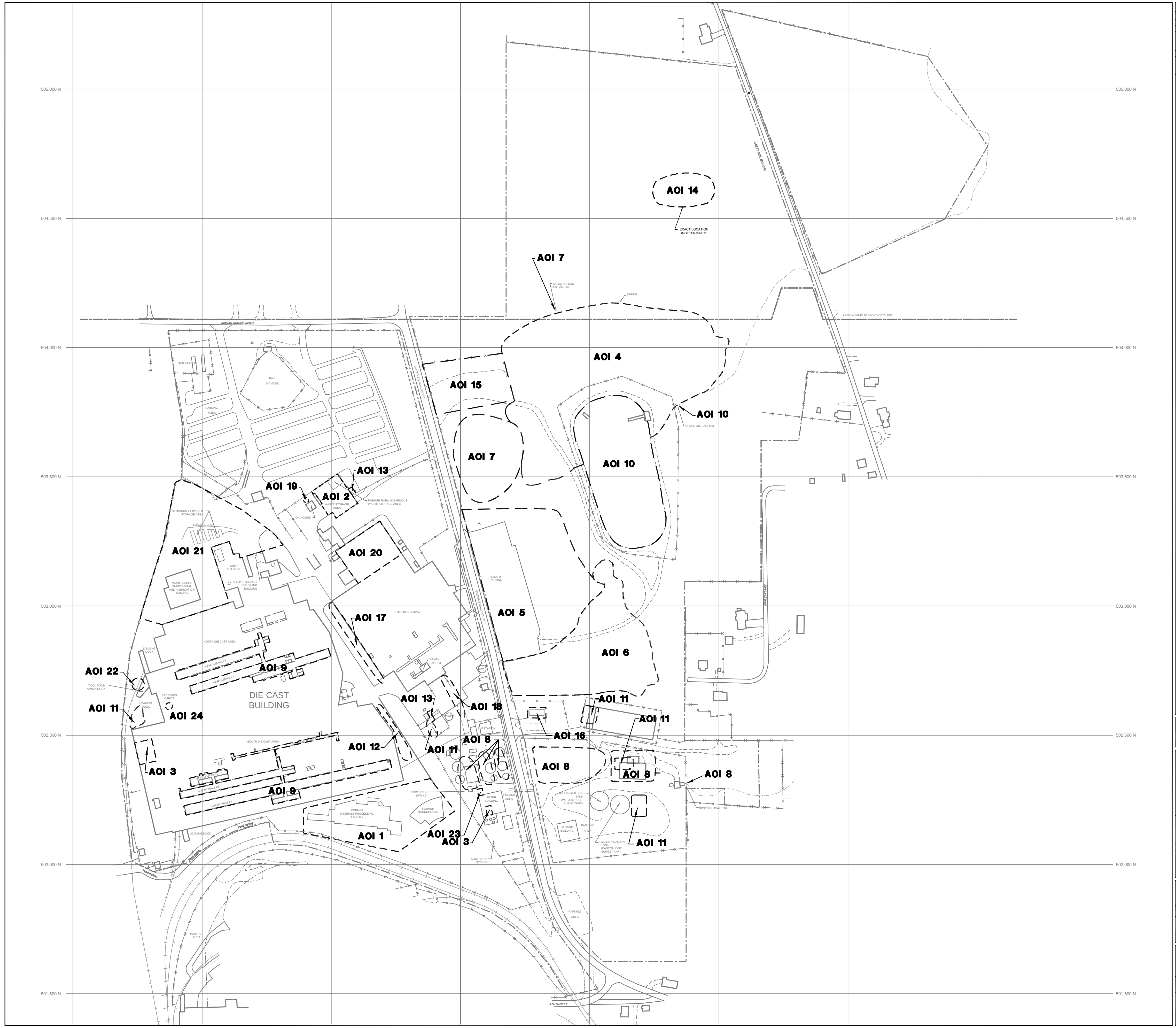
SITE PLAN

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By:	Date:	
JJM	DLR / WKS	MAY 23, 2001	
Scale:	Project Nº:	Report Nº:	Drawing Nº:
as shown	13968-00	001	figure 1.2

13968-00(001)GN-CO012 JUL 06/2001



N°	Revision	Date	Initial

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LEGEND

- FORMER PLANT STRUCTURES
- PROPERTY BOUNDARY
- BEDFORD CITY LIMIT
- STREAMS
- FENCE LINE
- RAILROAD TRACKS
- DIRT ROADS
- ROADS / PAVED AREAS

AOI Summary

AOI ID	Description
AOI 1	Former Railroad Operations and Minerals Processing Facility
AOI 2	Waste Storage Area
AOI 3	PCB Storage Areas
AOI 4	Former North Disposal Area
AOI 5	Former East Sand Disposal Area
AOI 6	Former Sludge Disposal and Fire Training Area
AOI 7	Former North Lagoon and Outfall 001
AOI 8	Former South Lagoons and Outfall 002
AOI 9	Service Tunnels
AOI 10	Existing Stormwater Lagoon and Outfall 003
AOI 11	Aboveground Storage Tanks
AOI 12	Area Affected by the Reclaimed Hydraulic Fluid Release
AOI 13	Underground Storage Tanks
AOI 14	McBride Cows Disposal Area
AOI 15	Former Equipment Storage Area
AOI 16	Former East Electrical Substation
AOI 17	Piston Building Oil Accumulations
AOI 18	Area Affected by the Henry System Discharge
AOI 19	Area Affected by Paint and Thinner Spill
AOI 20	Northern Portion of the Piston Building
AOI 21	Filled Ravine North of Die Cast Building
AOI 22	Tool Room Annex Dock Release
AOI 23	Area Affected by the 1996 Wastewater Treatment Filter Cake Release
AOI 24	Area Affected by the June 2000 Die Lube 5150 Release

SCALE VERIFICATION

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

Approved

DRAWING STATUS

Status	Date	Initial
DRAFT FOR REVIEW		
AOI BOUNDARIES MODIFIED	7/20/01	JM

GM POWERTRAIN BEDFORD FACILITY
BEDFORD, INDIANA

GENERAL MOTORS POWERTRAIN DIVISION

AOI LOCATION MAP

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By: DLR/WKS	Date: JULY 20, 2001	
Scale: as shown	Project N°: 13968-00	Report N°: 001	Drawing N°: figure 1.3

13968-00(001)GN-CO015 JUL 20/2001

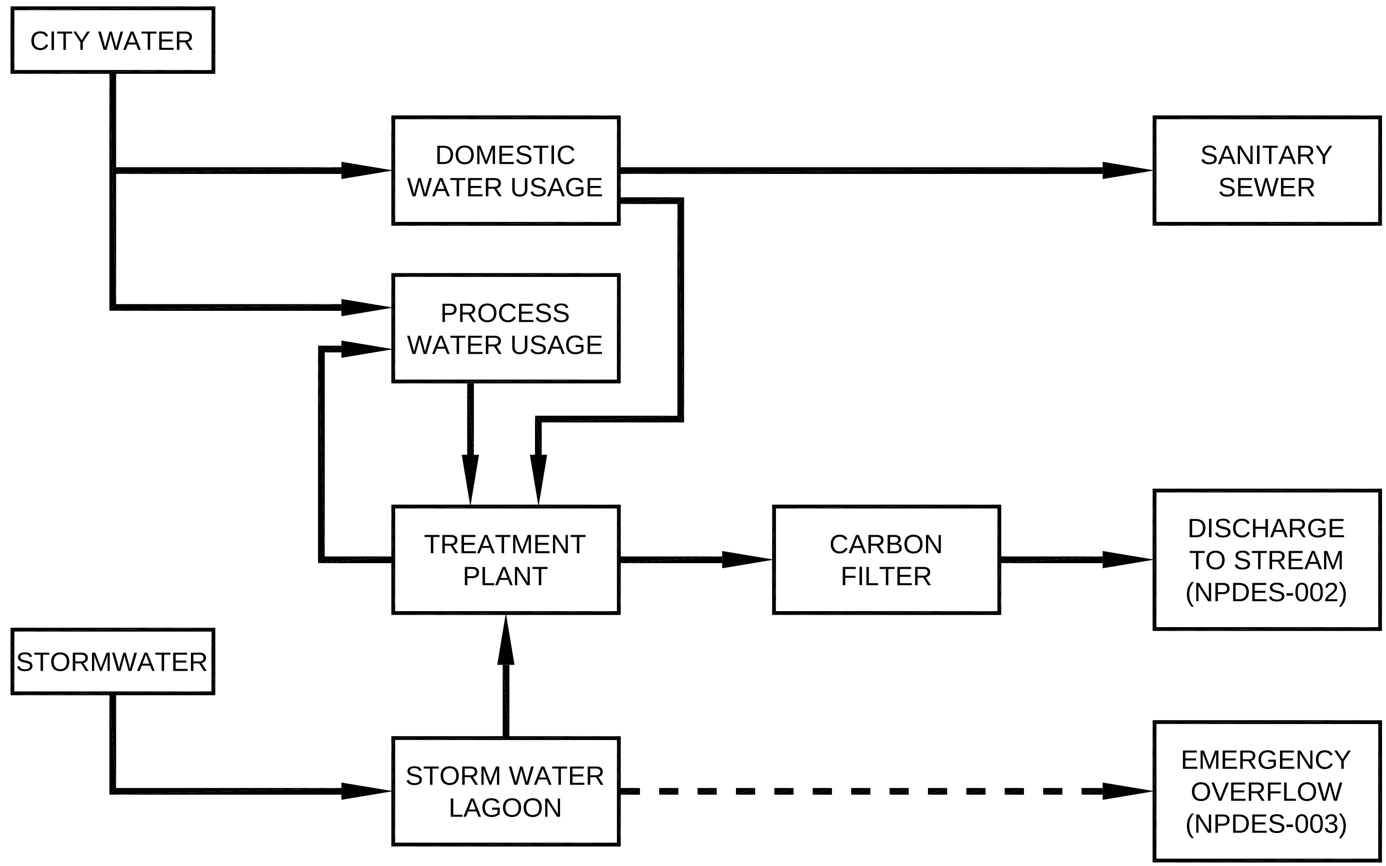
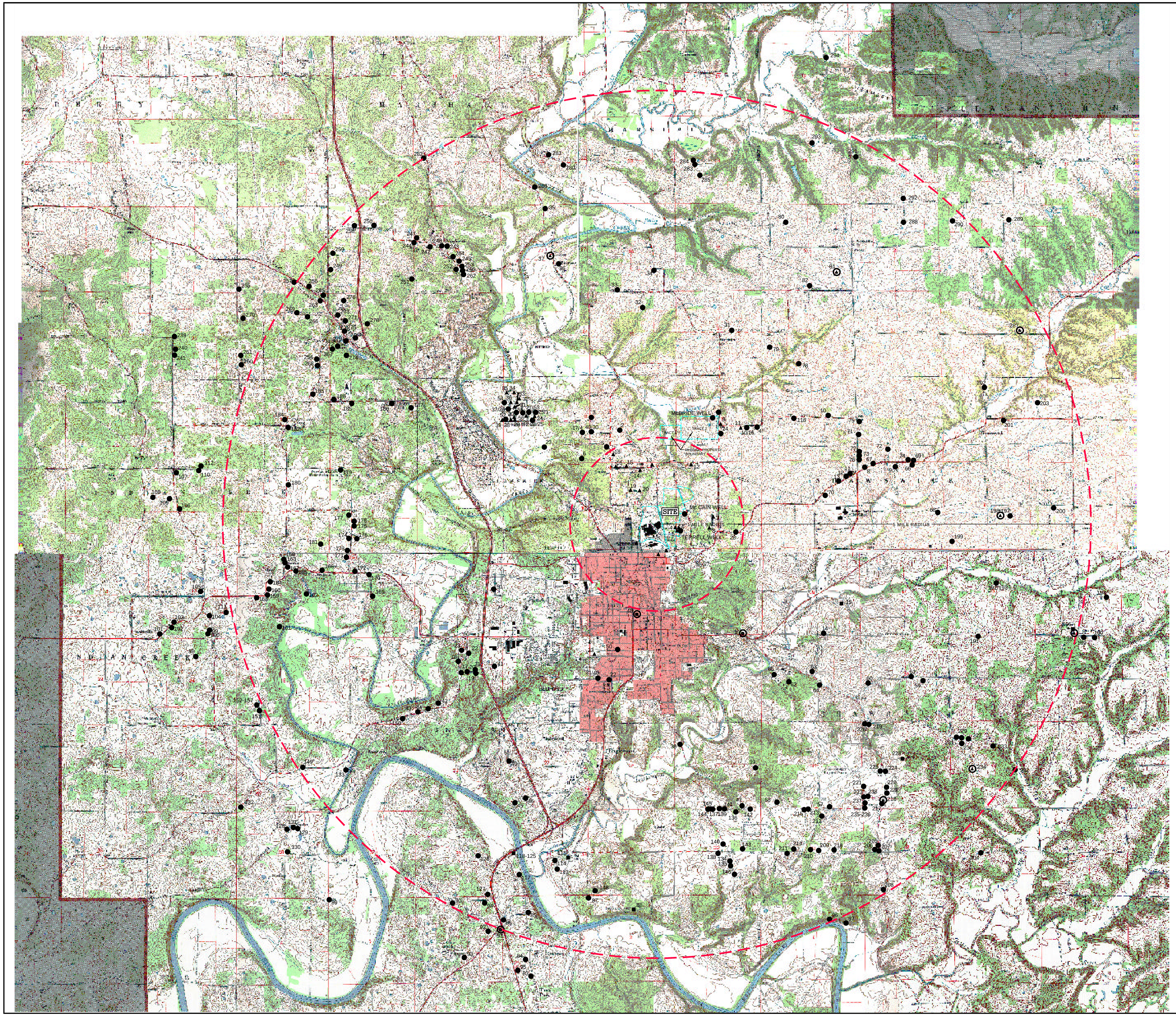


figure 2.1

SIMPLIFIED WATER FLOW DIAGRAM
GM POWERTRAIN BEDFORD FACILITY
Bedford, Indiana

13968-00(001)GN-CO002 MAY 25/2001



Nº	Revision	Date	Initial

N

0 1,500 3,000ft

LEGEND:

- APPROXIMATE PROPERTY BOUNDARY
- 1 ● APPROXIMATE RESIDENTIAL WELL LOCATION AND IDENTIFIER
- 20 ▲ 2/22/01 RECONNAISSANCE WELL LOCATIONS
- 228 ■ APPROXIMATE PUBLIC SUPPLY WELL LOCATION AND IDENTIFIER
- 29 ◉ APPROXIMATE INDUSTRIAL WELL LOCATION AND IDENTIFIER
- 81 APPROXIMATE DRY HOLE LOCATION AND IDENTIFIER
- 48 APPROXIMATE TEST WELL LOCATION AND IDENTIFIER
- 10/16 RECONNAISSANCE WELL NUMBER / WELL LOG NUMBER

INDIANA

BEDFORD

BASE SOURCE: USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE;
BARTLETTSVILLE, INDIANA 1994
BEDFORD EAST, INDIANA 1978
BEDFORD WEST, INDIANA 1993
OOLITIC, INDIANA 1987

SCALE VERIFICATION

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

Approved

DRAWING STATUS

Status	Date	Initial

GM POWERTRAIN
BEDFORD FACILITY

GENERAL MOTORS POWERTRAIN DIVISION

WATER WELL LOCATION MAP

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: SEE ABOVE

Project Manager: JJM	Reviewed By: DLR / WKS	Date: 5/22/01	
Scale: AS SHOWN	Project Nº: 13968-00	Report Nº: 001	Drawing Nº: figure 3.1

13968-00(001)GN-CO009 JUL 19/2001

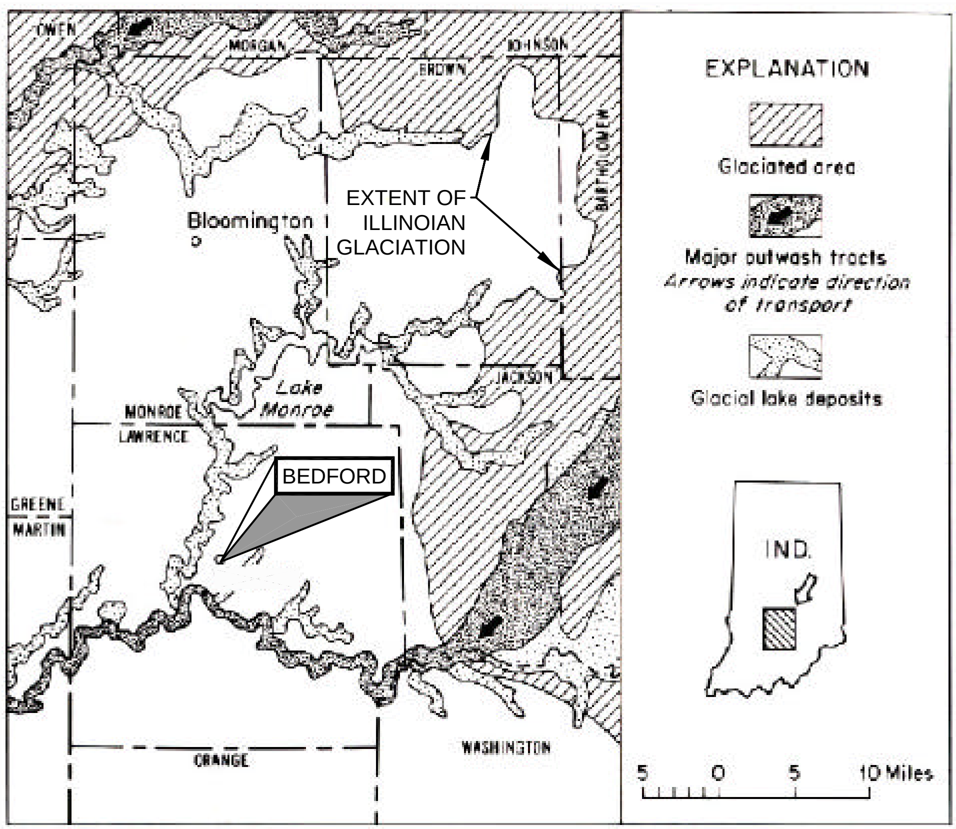


figure 3.2

GLACIAL FEATURES OF SOUTH-CENTRAL INDIANA
GM POWERTRAIN BEDFORD FACILITY
Bedford, Indiana

SOURCE: GRAY, 1974

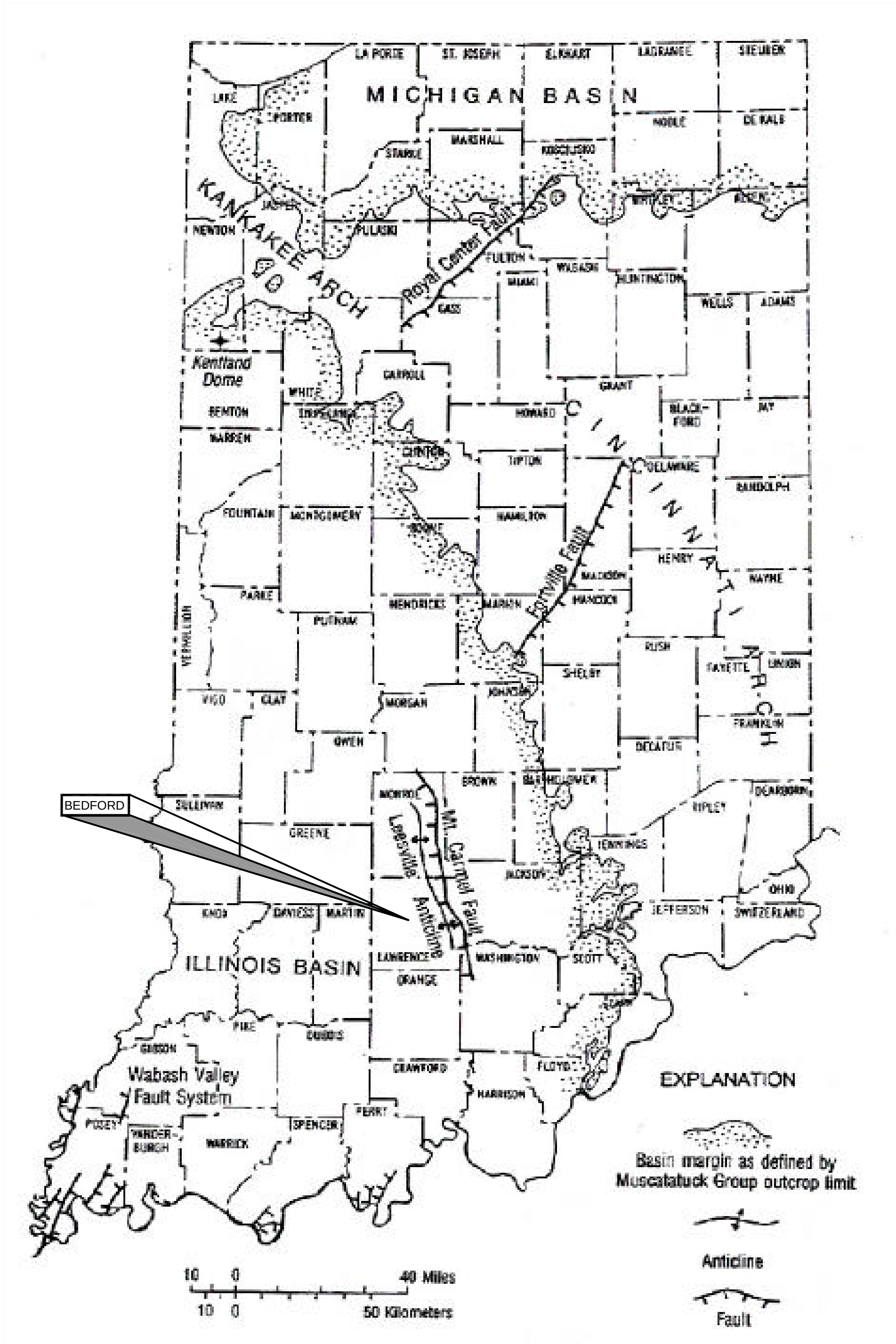


figure 3.3

BEDROCK STRUCTURAL FEATURES OF INDIANA
GM POWERTRAIN BEDFORD FACILITY
Bedford, Indiana

SOURCE: RUPP, 1991

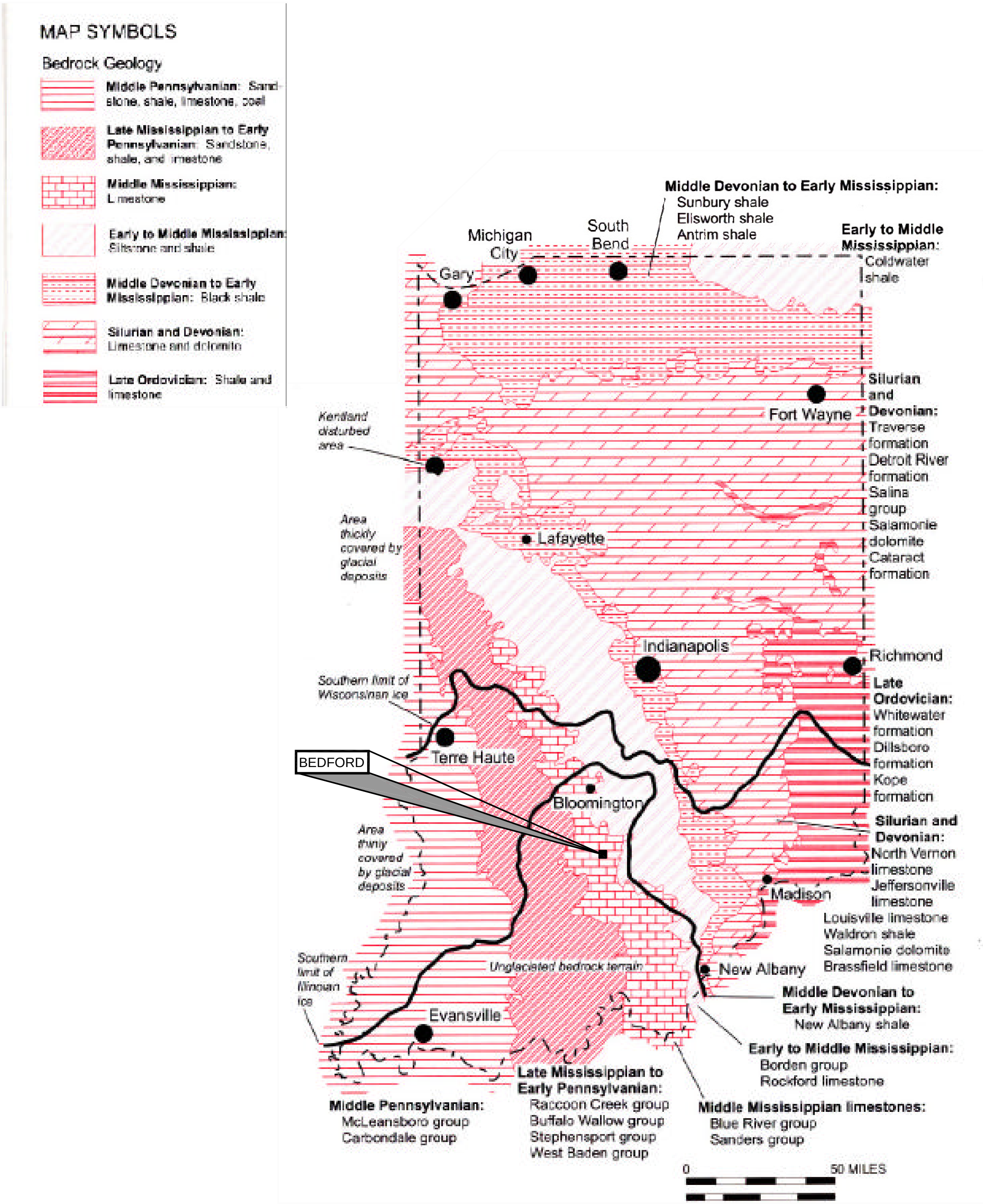


figure 3.4

BEDROCK GEOLOGY OF INDIANA
GM POWERTRAIN BEDFORD FACILITY
Bedford, Indiana

SOURCE: CAMP AND RICHARDSON, 1999

13968-00(001)GN-CO005 MAY 23/2001

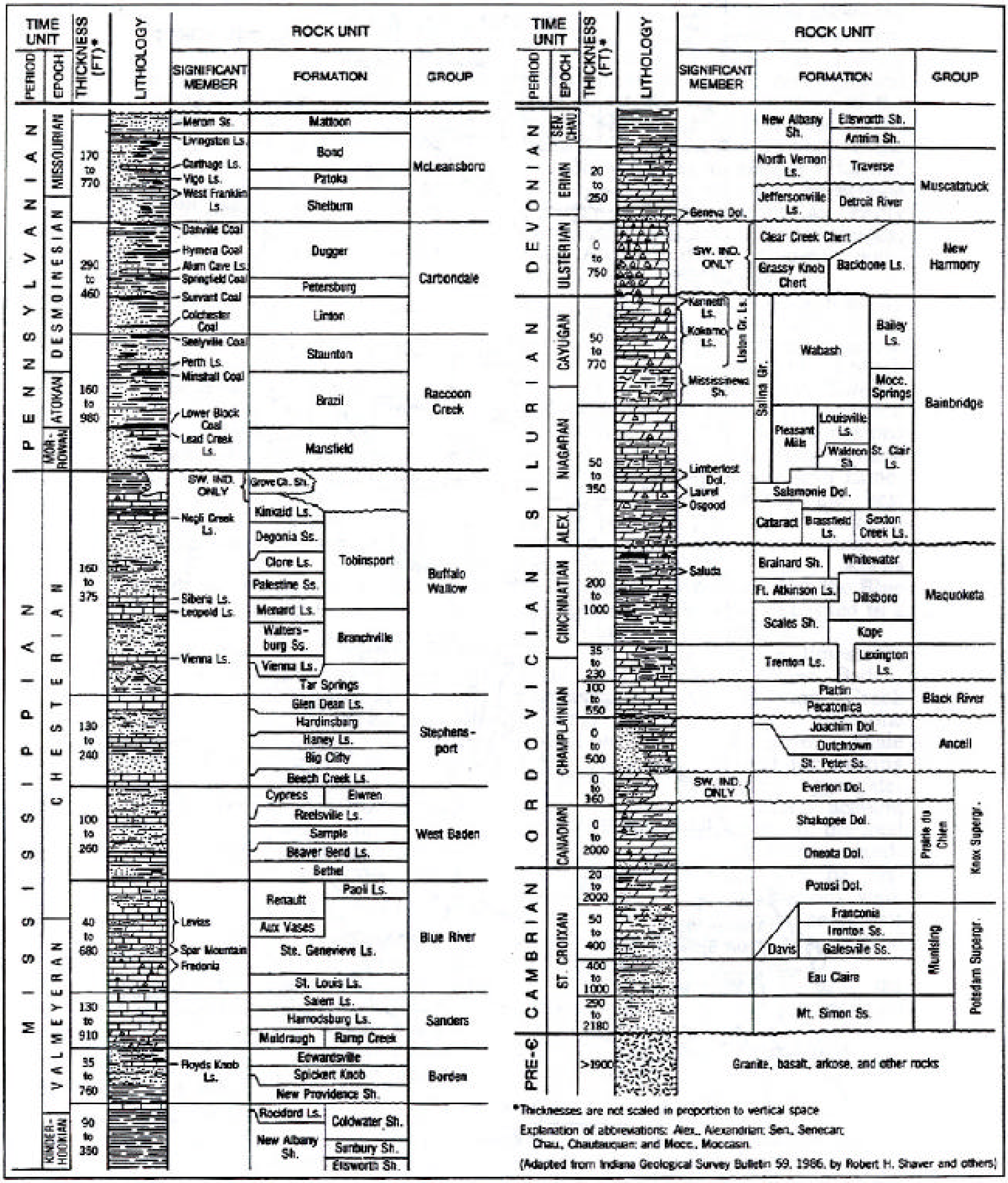
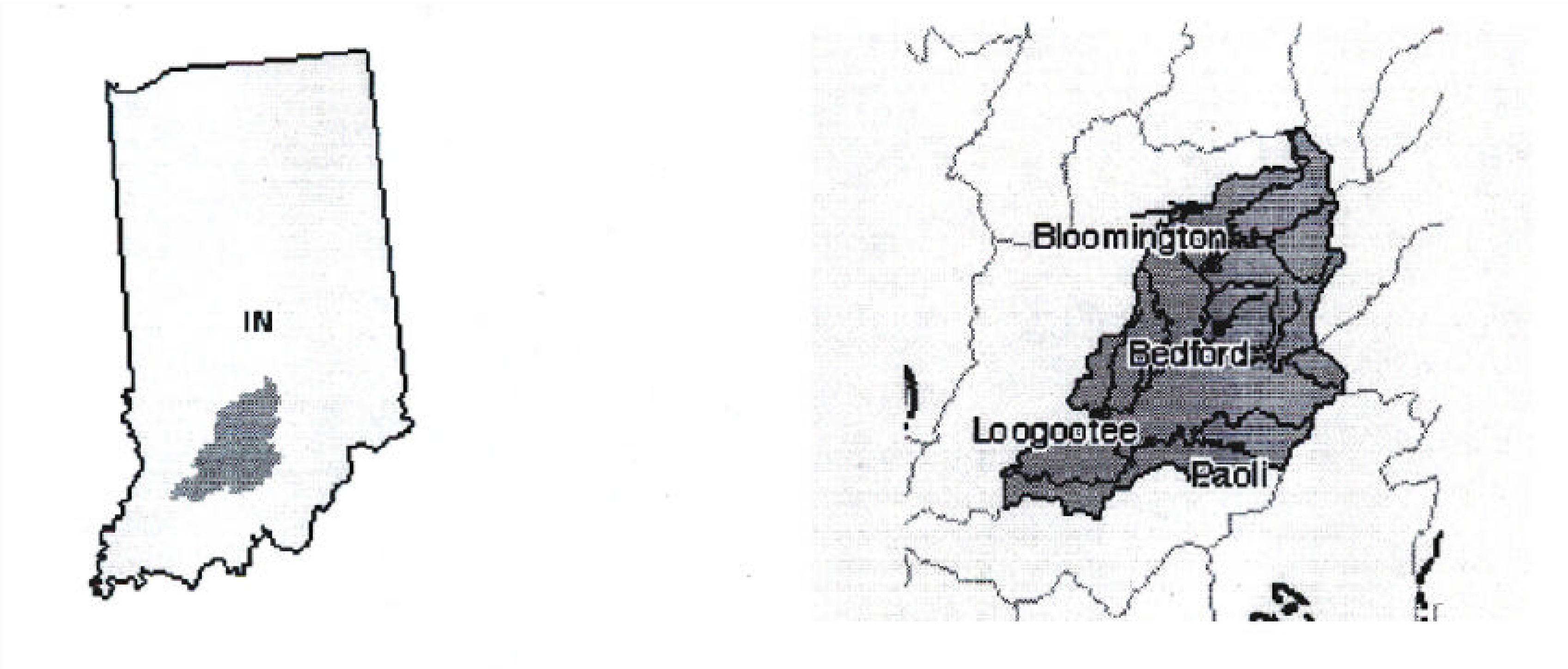


figure 3.5

GENERALIZED STRATIGRAPHIC COLUMN
FOR PALEOZOIC ROCKS IN INDIANA
GM POWERTRAIN BEDFORD FACILITY
Bedford, Indiana

SOURCE: HILL, UNDATED

13968-00(001)GN-CO007 MAY 23/2001



SOURCE: U.S. EPA, UNDATED

NOT TO SCALE

figure 3.6

LOWER EAST FORK WHITE RIVER
DRAINAGE BASIN
GM POWERTRAIN BEDFORD FACILITY
Bedford, Indiana

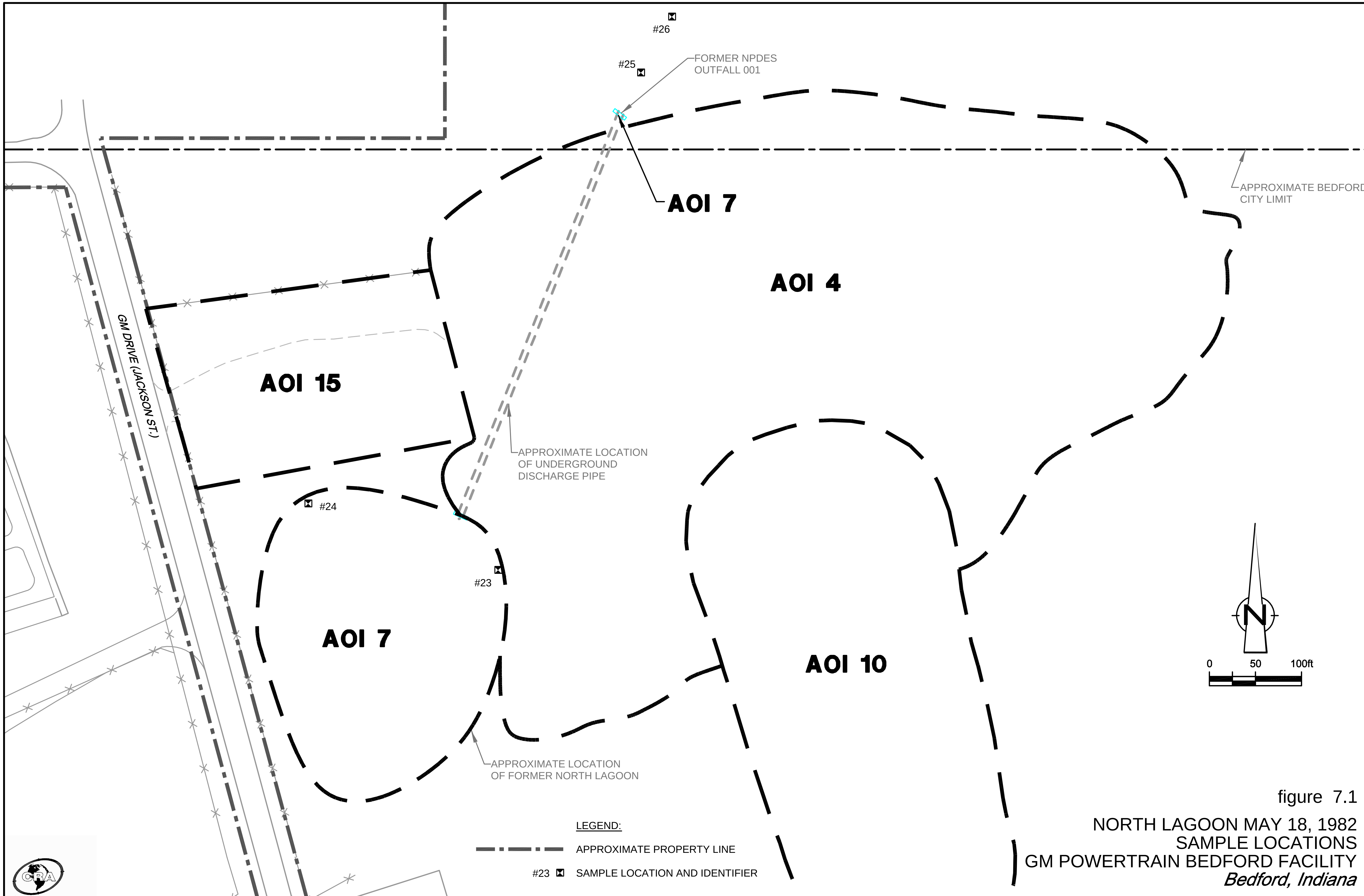
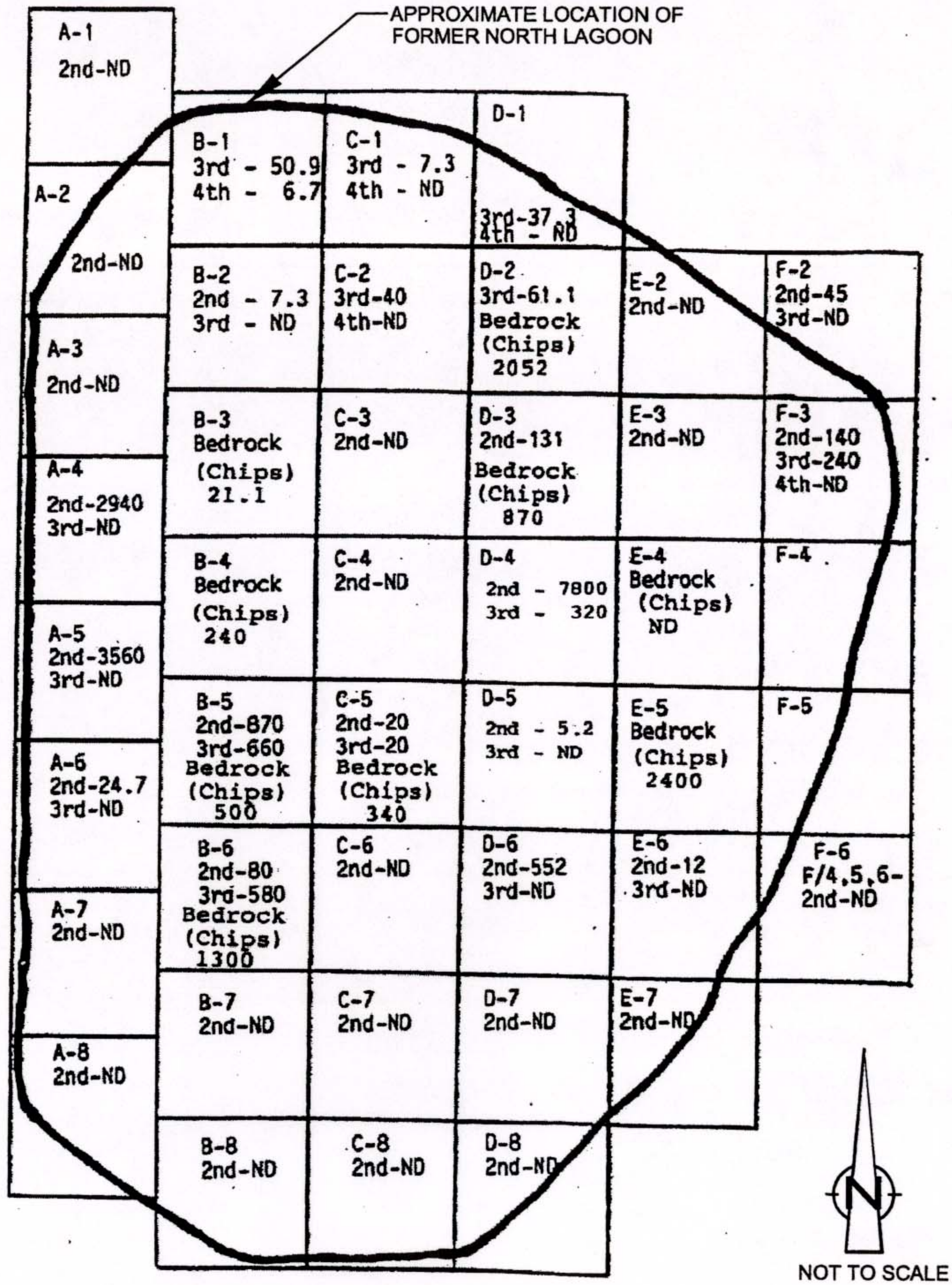


figure 7.1

NORTH LAGOON MAY 18, 1982
SAMPLE LOCATIONS
GM POWERTRAIN BEDFORD FACILITY
Bedford, Indiana

13968-00(001)GN-CO011 MAY 25/2001



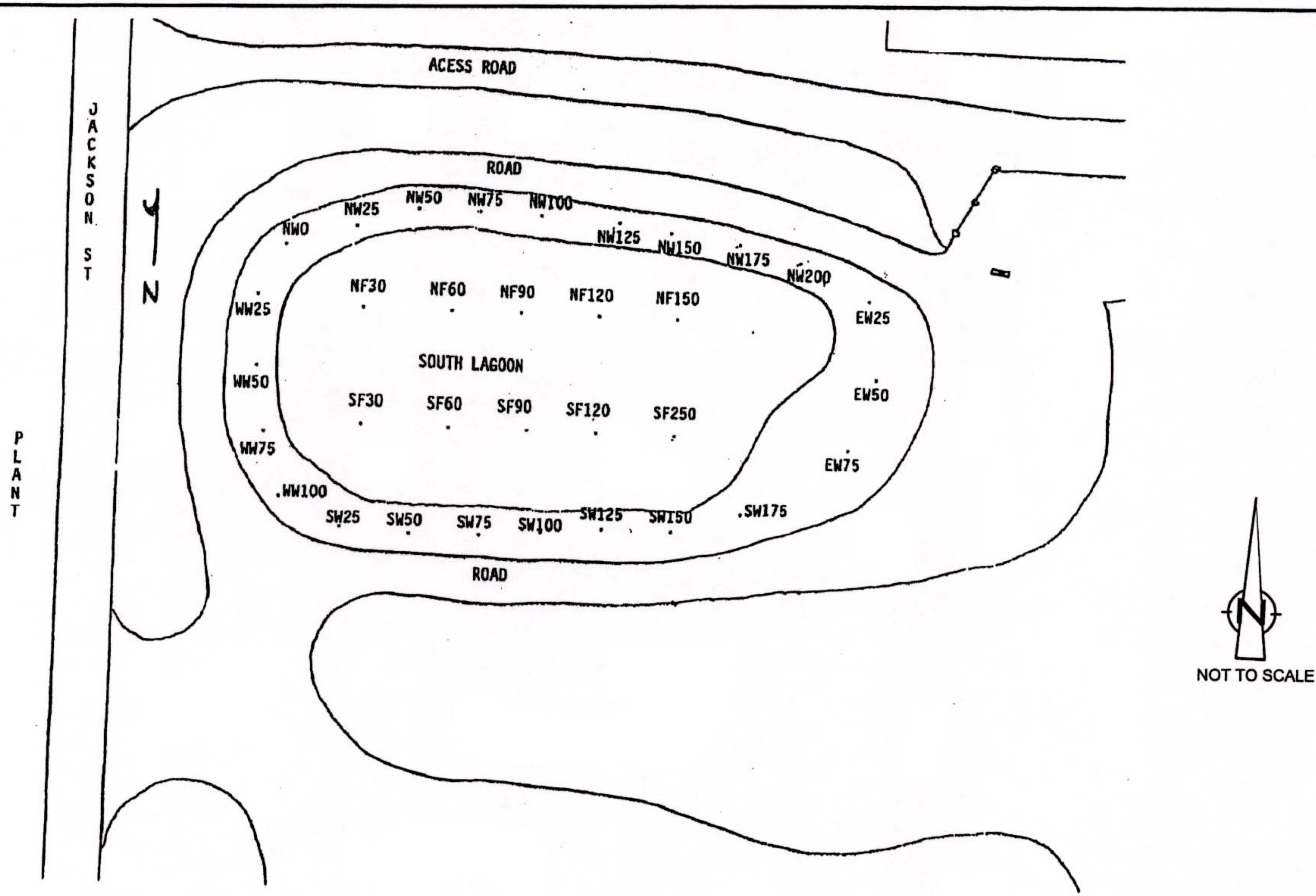
All results are in ppm.
ND=Not Detected or <3ppm

SOURCE: CWM, 1988

figure 7.2

FORMER NORTH LAGOON CLOSURE
SAMPLE LOCATIONS
TOTAL PCB RESULTS
GM POWERTRAIN BEDFORD FACILITY
Bedford, Indiana

13968-00(001)GN-CO010 MAY 23/2001



SOURCE: CECOS, 1984

figure 7.3

FORMER SOUTH LAGOON #4
CLOSURE SAMPLE LOCATIONS
GM POWERTRAIN BEDFORD FACILITY
Bedford, Indiana

13968-00(001)GN-CO008 MAY 23/2001

TABLE 1.1

SUMMARY OF AOIs
GENERAL MOTORS POWERTRAIN BEDFORD FACILITY

AOI 1	Former Railroad Operations and Minerals Processing Facility
AOI 2	Waste Storage Area
AOI 3	PCB Storage Areas
AOI 4	Former North Disposal Area
AOI 5	Former East Sand Disposal Area
AOI 6	Former Sludge Disposal and Fire Training Area
AOI 7	Former North Lagoon and Outfall 001
AOI 8	Former South Lagoons and Outfall 002
AOI 9	Service Tunnels
AOI 10	Existing Stormwater Lagoon and Outfall 003
AOI 11	Aboveground Storage Tanks
AOI 12	Area Affected by the Reclaimed Hydraulic Fluid Release
AOI 13	Underground Storage Tanks
AOI 14	McBride Cows Disposal Area
AOI 15	Former Equipment Storage Area
AOI 16	Former East Electrical Substation
AOI 17	Piston Building Oil Accumulations
AOI 18	Area Affected by the Henry System Discharge
AOI 19	Area Affected by Paint and Thinner Spill
AOI 20	Northern Portion of the Piston Building
AOI 21	Filled Ravine North of Die Cast Building
AOI 22	Tool Room Annex Dock Release
AOI 23	Area Affected by the 1996 Wastewater Treatment Filter Cake Release
AOI 24	Area Affected by the June 2000 Die Lube 5150 Release

TABLE 5.1

NORTH DISPOSAL AREA WATER SEEP ANALYTICAL SUMMARY
GENERAL MOTORS POWERTRAIN BEDFORD PLAN
BEDFORD, INDIANA

Date	*Sample #1*	*Sample #2*
Apr-83	0.003	0.003
May-83	0.001	0.001
Jun-83	<0.001	<0.001
Jul-83	<0.001	<0.001
Aug-83	0.003	0.002
Sep-83	0.001	0.001

Notes:
< indicates less than the stated laboratory detection limit.
All sample results in mg/L.
Sample locations are shown on Figure 5.1.

TABLE 7.1

SUMMARY OF AVAILABLE PCB ANALYTICAL RESULTS FROM SAMPLES COLLECTED AT THE NORTH LAGOON - 1981 GENERAL MOTORS POWERTRAIN BEDFORD FACILITY

Sample Location	*Date*	*PCBs*	*Units*
Plant Results			
Corrugated Pipe in Landfill	3/31/81	0.016	mg/L
Leachate at toe of slope	3/31/81	0.01	mg/L
Bailey Scales road ditch downstream of Outfall 001	3/31/81	0.003	mg/L
001 Outfall Discharge	3/31/81	0.182	mg/L
Sediment in N. Lagoon	4/6/81	0.06	mg/L
State Results			
Sediment in N. Lagoon*	4/6/81	230	mg/Kg
Sediment in N. Lagoon**	4/6/81	1300	mg/Kg

Notes:
* = Quantified as Aroclor 1260
** = Quantified as Aroclor 1242
mg/L = milligram per liter

TABLE 7.2

NORTH DISPOSAL AREA WATER SEEP PCB ANALYTICAL SUMMARY
GENERAL MOTORS POWERTRAIN BEDFORD FACILITY

Date	***Sample #1***	***Sample #2***
Apr-83	0.003	0.003
May-83	0.001	0.001
Jun-83	<0.001	<0.001
Jul-83	<0.001	<0.001
Aug-83	0.003	0.002
Sep-83	0.001	0.001

Notes:
< indicates less than the stated laboratory detection limit.
All sample results in milligram per liter.

TABLE 7.3

SUMMARY OF AVAILABLE PCB ANALYTICAL RESULTS
MAY 18, 1982, U.S.EPA SITE INSPECTION
GENERAL MOTORS POWERTRAIN BEDFORD FACILITY

Sample	***Matrix***	***Units***	***Plant Result***	***U.S. EPA Result***
#23	Sediment	mg/kg	2376	91,000*
#24	Sediment	mg/kg	3068	600,000*
#25	Water	mg/L	<0.001	0.006*
#26	Sediment	mg/kg	0.0072	38*

Notes:
* = Quantified as Aroclor 1242
mg/kg = milligram per kilogram
mg/L = milligram per liter
Sample locations are shown on Figure 7.1

TABLE 7.4

NORTH LAGOON CLOSURE SAMPLE RESULTS
GENERAL MOTORS POWERTRAIN BEDFORD FACILITY

				Sample Parameter (mg/kg)							
Date	***Location***	***Depth (ft bgs)***	***Sample ID***	***Aroclor 1016***	***Aroclor 1221***	***Aroclor 1232***	***Aroclor 1242***	***Aroclor 1248***	***Aroclor 1254***	***Aroclor 1260***	***Total PCBs (1)***
8/17/87	A1	2	GM001	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	ND
	A1	3	GM002	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	ND
	A2	2	GM005	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	ND
	A2	3	GM006	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	ND
	A3	2	GM009	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	ND
	A3	3	GM010	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	ND
	A4	2	GM013	< 1.0	< 1.0	< 1.0	2300.0	< 1.0	220.0	420.0	2940.0
	A4	3	GM014	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	ND
	A5	2	GM017	< 1.0	< 1.0	< 1.0	3400.0	< 1.0	< 1.0	160.0	3560.0
	A5	3	GM018	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	ND
	A6	2	GM021	< 3.0	< 3.0	< 3.0	19.0	< 3.0	5.7	< 3.0	24.7
	A6	3	GM022	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	ND
	A7	2	GM025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	ND
	A7	3	GM026	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	ND
	A8	2	GM029	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	ND
	A8	3	GM030	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	ND
8/21/87	B1	4	GM033	< 3.0	< 3.0	< 3.0	6.7	< 3.0	< 3.0	< 3.0	6.7
	B1	3	GM034	< 1.0	< 1.0	< 1.0	41.0	< 1.0	8.1	1.8	50.9
	C1	3	GM038	< 1.0	< 1.0	< 1.0	4.8	< 1.0	2.5	< 1.0	7.3
	C1	4	GM039	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	ND
	E2	2	GM041	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	ND
	E2	3	GM042	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	ND
	D1	3	GM046	< 1.0	< 1.0	< 1.0	17.0	< 1.0	15.0	5.3	37.3
	D1	4	GM047	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	ND
	F2	2	GM049	< 1.0	< 1.0	< 1.0	45.0 (combined)		< 1.0	< 1.0	45.0
	F2	3	GM050	< 1.0	< 1.0	< 1.0	1.8	< 1.0	< 1.0	< 1.0	1.8
8/24/87	B2	2	GM053	< 3.0	< 3.0	< 3.0	5.2	< 3.0	< 3.0	< 3.0	5.2
	B2	3	GM054	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	ND
	C2	3	GM057	< 1.0	< 1.0	< 1.0	29.0	< 1.0	7.7	3.6	40.3
	C2	4	GM058	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	ND
	D2	3	GM060	< 1.0	< 1.0	< 1.0	54.0	< 1.0	3.4	1.7	59.1
	D2	4	GM061	< 3.0	< 3.0	< 3.0	2000.0	< 3.0	< 3.0	52.0	2052.0
	B7	2	GM062	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	ND
	B3	1	GM065	< 3.0	< 3.0	< 3.0	18.0	< 3.0	3.1	< 3.0	21.1
	B4	1	GM068	< 5.0	< 5.0	< 5.0	240.0	< 5.0	< 5.0	< 5.0	240.0
8/26/87	C3	2	GM069	NA	NA	NA	NA	NA	NA	NA	< 0.03
	D3	2	GM072	NA	NA	NA	NA	NA	NA	NA	130.0
	D3	3	GM073	NA	NA	NA	NA	NA	NA	NA	870.0
	E3	2	GM074	NA	NA	NA	NA	NA	NA	NA	< 0.03
	F3	2	GM075	NA	NA	NA	NA	NA	NA	NA	140.0
	F3	3	GM076	NA	NA	NA	NA	NA	NA	NA	240.0
	F3	4	GM077	NA	NA	NA	NA	NA	NA	NA	< 0.03
	B7	2	GM078	NA	NA	NA	NA	NA	NA	NA	< 0.03
	C8	2	GM081	NA	NA	NA	NA	NA	NA	NA	< 0.03
	C8	2	GM081 DUP	NA	NA	NA	NA	NA	NA	NA	< 0.03
9/1/87	B6	2	GM084	NA	NA	NA	NA	NA	NA	NA	80.0
	B6	2	GM084 DUP	NA	NA	NA	NA	NA	NA	NA	130.0
	B6	3	GM085	NA	NA	NA	NA	NA	NA	NA	580.0
	B6	4	GM086	NA	NA	NA	NA	NA	NA	NA	1300.0
	B5	2	GM087	NA	NA	NA	NA	NA	NA	NA	870.0
	B5	3	GM088	NA	NA	NA	NA	NA	NA	NA	660.0
	B5	4	GM089	NA	NA	NA	NA	NA	NA	NA	500.0
	C7	2	GM090	NA	NA	NA	NA	NA	NA	NA	1.0
	C6	2	GM093	NA	NA	NA	NA	NA	NA	NA	0.2
	C5	2	GM096	NA	NA	NA	NA	NA	NA	NA	20.0
	C5	3	GM097	NA	NA	NA	NA	NA	NA	NA	20.0
	C5	4	GM098	NA	NA	NA	NA	NA	NA	NA	340.0
	C4	2	GM099	NA	NA	NA	NA	NA	NA	NA	2.0
9/16/87	D8	2	GM102	NA	NA	NA	NA	NA	NA	NA	< 0.03
	D7	2	GM105	NA	NA	NA	NA	NA	NA	NA	< 0.03
	D5	2	GM108	NA	NA	NA	NA	NA	NA	NA	5.2
	D5	3	GM109	NA	NA	NA	NA	NA	NA	NA	< 0.03
	D4	2	GM111	NA	NA	NA	NA	NA	NA	NA	7800.0
	D4	3	GM112	NA	NA	NA	NA	NA	NA	NA	320.0
	E4	2	GM114	NA	NA	NA	NA	NA	NA	NA	0.7
	E5	2	GM115	NA	NA	NA	NA	NA	NA	NA	2400.0
	not specified		GM116	NA	NA	NA	NA	NA	NA	NA	1300.0
9/18/87	D6	2	GM117	NA	NA	NA	440.0	NA	112.0	NA	552.0
	D6	3	GM118	NA	NA	NA	NA	NA	NA	NA	<3.0
	E7	2	GM120	NA	NA	NA	NA	NA	NA	NA	<3.0
	E6	2	GM123	NA	NA	NA	12.0	NA	NA	NA	12.0
	E6	3	GM124	NA	NA	NA	NA	NA	NA	NA	<3.0
	F4/5	2	GM127	NA	NA	NA	NA	NA	NA	NA	<3.0

Notes:
NA-Specific Aroclor Not Analyzed
< Indicates Less than the Stated Laboratory Method Detection Limit or Quantitation Limit
Samples Analyzed Using EPA Method SW846-8080
Sample locations are shown on Figure 7.2
(1) Revised July 20, 2001. Added Total PCBs column.

TABLE 7.5

SOUTH LAGOON #4 CLOSURE SAMPLE RESULTS
GENERAL MOTORS POWETRAIN BEDFORD FACILITY

Date	Excavated Sample ID/Location	Final Sample ID/Location	Sample Parameter (mg/Kg) Total PCBs
9/12/83		NW-0	<1
		NW-25	13.0
		NW-50	10.0
		NW-75	5.0
	NW-100		550.0
		NW-125	50.0
	NW-150		1100.0
		NW-175	2.0
	NW-200		260.0
	SW-25		400.0
	SW-50		79.0
		SW-75	6.3
		SW-100	41.0
		SW-125	10.0
	SW-150		95.0
	SW-175		360.0
	WW-25		250.0
	WW-50		370.0
		WW-75	13.0
		WW-100	36.0
		SF-30	6.0
		SF-60	5.0
		SF-90	14.0
		SF-120	9.0
	SF-150		52.0
	NF-30		67.0
		NF-60	3.0
		NF-90	1.4
		NF-120	11.0
		NF-150	<1
9/13/83		EW-25	12.0
	EW-50		3772.0
	EW-75		2447.0
9/16/83	NW-100-C		5600.0
		NW-50-C	872.0
	SW-25-C		174.0
		SW-50-2	7.0
	SW-150-C		55.0
	SW-175-C		245.0
		EW-50-C	21.0
	EW-75-C		86.0
		NF-30-2	4.0
		SF-150-2	2.0
9/23/83	NW-100-S2		85.0
		NW-150-S2	2.0
		NW-200-S2	<5
		WW-25-S2	<3
	WW-50-S2		89.0
		SW-25-S2	5.0
		SW-150-S2	15.0
	SW-175-S2		242.0
		EW-75-S2	2.0
		EW-50-S2	<4
9/27/83		NW-100-S3	40.0
		WW-50-S3	<2
		SW-175-S3	11.0

Notes:
< indicates less than the stated laboratory detection limit
Sample ID's ending with "C" indicate core samples. All other samples were surface grab samples.
Sample locations are shown on Figure 7.3

TABLE 7.6

**SUMMARY OF INDIANA STATE BOARD OF HEALTH
PCB SAMPLING FROM THE MCBRIDE'S FARM
GENERAL MOTORS POWERTRAIN BEDFORD FACILITY**

Sample Location	*Sample Date*	*Aroclor 1242 (mg/L)*
Water well in milk house	9/27/77	<0.1
Spring	9/27/77	<0.1
Unnamed creek (west side of property)	9/27/77	12
City water from outside faucet at residence	9/27/77	<0.1

Notes:
< indicates less than the stated laboratory detection limit
(1) Revised July 20, 2001. Deleted reference to Attachment showing sample locations in the Notes.