CONESTOGA-ROVERS & ASSOCIATES

SUMMARY OF HISTORICAL CONFIDENTIAL DOCUMENTS

FORMER GM-SAGINAW DIVISION BUFFALO PLANT
BUFFALO, NEW YORK

General Motors Corporation
Worldwide Facilities Group
Environmental Services Group - Remediation

Reference No. 12635-03-103081-Misc-HistDoc

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INTRODUCTION

In the letter response dated August 17, 2005, from Maura Desmond, Senior Attorney, New York State Department of Environmental Conservation (NYSDEC) to Barry Kogut of Bond, Schoeneck, and King, PLLC, Counsel for General Motors (GM), the NYSDEC disagreed with GM's assertion of privilege with reference to the three (3) historical site assessment reports and one (1) work plan (Confidential Reports) cited in the Draft Records Search Report submitted as part of Mr. Kogut's letter of July 7, 2005, to Attorney Desmond. In addition to its claim of privilege, it is GM's position that only the factual information contained within the Confidential Documents that relates to the area within the American Axle & Manufacturing, Inc. Plant (AAM) Buffalo Facility that has been defined as either the "Site" under NYSDEC Consent Order Index #B9-0681-04-12 (the "Consent Order") or were discussed in the March 29, 2001 letter report to Mr. S. Calandra of Region 9, NYSDEC ("Report") is relevant and required to be provided.

On November 9, 1994, a meeting was held at the NYSDEC Region 9 Office to discuss issues relating to the AAM Buffalo Facility including GM's submission of investigation reports being generated in connection with the investigation and remediation of the NYSDEC spill incidents (NYSDEC Spill #9104671 and #9400483) that are now the subject of the Consent Order. In correspondence dated December 2, 1994, Mr. Mark Napolitan of GM conveyed to Mr. Salvatore Calandra of NYSDEC Region 9, GM's understanding of the approach agreed upon at that meeting with respect to the focused submissions to be made by GM to NYSDEC from environmental assessments conducted in connection with the sales to AAM. At that time, GM agreed to provide NYSDEC with those parts of the reports prepared or to be prepared that relate to the remedial program for the site contamination at issue.

Conestoga-Rovers & Associates (CRA) reviewed the NYSDEC files at the Region 9 Office and found the following correspondence regarding investigation activities relative to the referenced NYSDEC spill numbers:

i) August 29, 1994: Results of subsurface investigations in areas where free oil was discovered in soil and/or groundwater;

ii) March 6, 1995: Quarterly Progress Report;

iii) March 31, 1995: Phase II Boring and Monitoring Well Location Maps. Maps indicate areas which contained oil;

iv) January 11, 1996: Update on investigation activities relating to petroleum releases;

v) March 27, 1997: Status of the investigations in the areas previously reported to the NYSDEC;

vi) March 29, 2001: Letter report regarding Spill File No. 9400483;

vii) May 19, 2003: Additional Field Investigation Report, Spill File No. 9400483;

viii) August 13, 2003: Proposed Additional Investigation Activities; and

ix) March 24, 2004: Conestoga-Rovers & Associates (CRA) Project Status Report.

CRA APPROACH

This document serves to present information relative to those areas within the AAM Buffalo Facility that have been defined as either the "Site" for the purposes of the Consent Order or are contained in the "Report". Factual information considered to be confidential or not relevant to the contamination at issue at these areas has been redacted from the attached versions of the following Confidential Documents. These Documents were initially prepared at the request and direction of GM legal staff to serve as a basis for legal advice to GM Management on issues arising in connection with the sale of GM's Saginaw Division Buffalo Plant to AAM on February 28, 1994:

i) Phase I Environmental Site Assessment (ESA), Saginaw Division - Buffalo Plant, Buffalo, New York, prepared by H&A of New York (H&A) of Rochester, New York, December 1993 (Appendix A);

ii) Phase II Environmental Site Investigation (ESI), Saginaw Division - Buffalo Plant, Buffalo, New York, prepared by H&A of Rochester, New York, December 1994 (Appendix B);

iii) Supplemental Phase II ESI and Phase III Extent of Contamination (EOC) Work Plan, AAM, Inc. (Formerly GM Saginaw Division), Buffalo Plant, Buffalo, New York, prepared by H&A of Rochester, New York, November 1995 (Appendix C); and

iv) Blasland, Bouck and Lee, Inc., Final Phase II Environmental Site Investigation and Phase III Extent of Contamination Study, Buffalo Plant, Buffalo, New York, August 2000 (BBL Report) (Appendix D).

An attempt has been made to rewrite as little as possible of the original relevant text in an effort to avoid altering the original intent / viewpoint of the author. The existing language of the Reports appear in plain text and CRA's additional language that was inserted to provide transition and continuity to the discussion appears in *italics*.

Attached as Appendix E is a copy of the letter report dated March 29, 2001 (without attachments) that GM forwarded to Mr. Salvatore Calandra of NYSDEC Region 9 Office. (The complete Report can be found in the NYSDEC Region 9 files as noted in the Document list at ¶ vi under Introduction.)

The letter report to Mr. Calandra essentially built upon the data referenced in the BBL Report and updated the technical discussion to include, among other things, the use of NYSDEC screening criteria (that is, those found in Spill Technology and Remediation Series [STARS] Memo #1 and Technical and Administrative Guidance Memoranda [TAGM] #4046) rather than the Michigan and Massachusetts criteria used in the BBL Report, and an exposure assessment that was prepared in accordance with NYSDEC guidance.

APPENDIX A

PHASE I ENVIRONMENTAL SITE ASSESSMENT
SAGINAW DIVISION - BUFFALO PLANT
BUFFALO, NEW YORK

Prepared by
H&A of Rochester, New York
December 1993

PHASE I ENVIRONMENTAL SITE ASSESSMENT (ESA)
SAGINAW DIVISION - BUFFALO PLANT
BUFFALO, NEW YORK

PREPARED BY H&A OF ROCHESTER, NEW YORK
AT THE REQUEST OF GENERAL MOTORS COUNSEL
DECEMBER 1993

PURPOSE

H&A of New York (H&A) performed a Phase I Environmental Site Assessment (ESA) of the General Motors Corporation (GM) Saginaw Division Buffalo Plant (Buffalo Plant) located at 1001 East Delavan Avenue in Buffalo, New York. The study was performed by H&A at the request of GM Legal Counsel.

The purpose of this study was to identify potential areas of environmental concern (PAOC). PAOCs are areas where there may have been a release of contaminants into the environment at levels that could adversely impact human health or the environment. Identification of PAOCs is based on the following objective criteria:

i) written records regarding a release; or

ii) knowledge of a release reported by GM personnel; or

iii) currently visible evidence of release associated with a route into the environment.

SCOPE

The scope of H&A's work included:

i) visual Site inspections;

ii) review of available information concerning past and present use, storage, handling, disposal, and release of oil and hazardous materials at the Site and in the surrounding area; and

iii) interviews of employees.

Plant visits were conducted by H&A personnel on five occasions between October 18 and October 25, 1993. Discussions were held with key individuals of the Buffalo Plant Engineering Department. Reconnaissance of interior and exterior areas of the facility was performed.

Sources of information reviewed for this project included:

i) environmental files, records, and architectural/engineering drawings which are maintained at the Buffalo Plant;

ii) discussion with officials of the Buffalo Sewer Authority (BSA);

iii) records of the Buffalo Fire Department concerning fuel and storage tanks located at the Buffalo Plant;

iv) records of the Erie County Real Property Taxation office and the Erie County Clerk's office concerning past and present property ownership in the area;

v) industrial records and aerial photographs maintained at the Erie County Department of Environment and Planning (ECDEP);

vi) aerial photographs maintained at the Erie County Office of the U.S. Department of Agriculture's Soil Conservation Service;

vii) an Environmental Risk Information and Imaging Services (ERIIS) report containing information on the Site and the surrounding 1-mile radius. This information was compiled from State and Federal hazardous materials databases and Sanborn Fire Insurance Maps; and

viii) *New York State Department of Environmental Conservation (NYSDEC) files concerning this Site.*

PHYSICAL SETTING

Refer to the Remedial Investigation (RI) Report for a detailed discussion of Site conditions. Sections contained in the H&A Report have been deleted since they are redundant and not as complete in scope as the RI Report.

REPORT ORGANIZATION

The following sections of this report present information obtained during performance of the *work scope described above for those PAOCs which existed within the area currently identified as the "Site" in the NYSDEC Consent Order Index #B9-0681-04012 or were discussed in the March 29, 2001 letter report to Mr. S. Calandra at Region 9, NYSDEC ("Report").*

SPILL CLEANUPS IN THE AREA DESIGNATED AS THE "SITE"

Track No. 1 Replacement Project

Track No. 1, located at the east side of Plant 81, is used for placement of oily scrap metal chips into railcars. The track foundation and track well floor was replaced in two phases beginning in 1988. According to plant personnel, oily soil was encountered along the length of the track well during both phases of construction. Plant personnel reported

that oily soils encountered were excavated and disposed of off-Site; evidence of oily sheen or free floating product was reportedly not observed on groundwater during the project.

Records reviewed indicate that subsurface oil contamination encountered in December 1989 (during the second phase of construction, in the Marshalling Building section of the track well) was reported to NYSDEC and was designated as Spill No. 8909294. Sixteen (16) truckloads of oil-contaminated soil and construction debris were disposed of in May 1990 as non-hazardous waste at the Orleans County Landfill. Volatile organic compound (VOC) analysis for waste profiling purposes of four grab samples from the excavated soil pile did not detect the presence of VOCs. Analysis of one sample by EP Toxicity (EP TOX) methods did not detect hazardous levels of metals or pesticides. *The NYSDEC's spill file was closed on February 28, 1990.*

Underground Tank Closures

Twelve underground oil storage tanks were permanently closed-in-place by the Buffalo Plant during 1990 and 1992. The tank closure process involved:

i) the removal and use or transfer to new tanks of tank contents;

ii) the cleaning of tank interiors and associated fill and discharge lines; and

iii) the installation of test borings adjacent to each tank scheduled for closure.

Subsurface soil contamination was noted in test borings and/or excavations at *tank locations 5 and 11 which were located in the area designated as the "Site" in the 2006 Consent Order.* NYSDEC was notified by GM in each case. Site visits were made by a NYSDEC representative who inspected closure activities at each of the *locations.*

Test boring samples *from tank locations 5 and 11* were submitted for laboratory analysis to determine whether petroleum compounds were present at levels which would warrant remedial action.

Toxicity Characteristic Leaching Procedure (TCLP) analysis for semi-volatile organic compounds (SVOCs) was performed on composites of oily or stained samples from the Tank No. 5 and Tank No. 11 borings. These two tanks had contained hydraulic and quench oils, respectively. SVOCs were not detected in the composite sample from either location.

Plant records indicate that after inspection of conditions at each tank, NYSDEC personnel gave verbal approval for the in-place closure *of tanks 5 and 11.* The analytical results *for tank locations 5 and 11* was reported to NYSDEC. *The NYSDEC spill files for Tanks 5 and 11 (9012457 and 9010810, respectively) were closed.*

Tanks were closed by filling first with clean sand and then with a concrete slurry pumped in to fill voids. Plant and Buffalo Fire Department records reviewed indicate that the permanent closure of each tank was performed in accordance with applicable industry and regulatory standards.

B-26 Oil Recovery System

A metal-machining-coolant recovery system located in a sub-grade, concrete-lined vault in the B-26 bay in Plant 81, was decommissioned and removed in July 1991. After cleaning of the vault was completed, an influx of oil and water was observed by Plant personnel at a crack in the joint between the pit floor and the east wall. NYSDEC was notified and designated the occurrence as Spill No. 9104671.

The coolant system pit was subsequently converted to use as a passive oil recovery system. An 8-inch diameter slotted pipe was laid diagonally across the pit floor; the pipe was installed to collect and discharge oil and water to the existing pit sump in which a sump pump was installed. A stand pipe was installed above the sump and the pit was backfilled with a base layer of coarse concrete debris, an intermediate crusher-run-gravel layer, and a new concrete floor slab at grade. Operation of the oil/water sump pump was initiated in May 1992. Pump effluent is discharged to the Buffalo Plant's industrial waste system.

Two overburden test borings were installed in the area by Wehran in April 1992. The top of rock was encountered at depths of 16.5 to 17.4 feet. This is the approximate depth of the floor of the coolant system pit.

Buffalo Plant records indicate that a composite sample of oily test boring soil samples was analyzed for total polychlorinated biphenyls (PCB) compounds and for hazardous VOC, SVOC, pesticides, herbicides, and metal compounds by TCLP methods. No organic compounds were detected and metals detected were at concentrations below hazardous waste limits.

Monitoring wells were installed by Wehran in each test boring in May 1992. Well number B-1 is located just north of the northwest corner of the former coolant pit. B-2 is

located just south of the southwest pit corner. Periodic monitoring of oil and water levels in the two wells and in the pit sump has been performed since June 1992.

Plant personnel indicated that possible sources of the subsurface oil include past and present metal machining operations in the area, which have used non-soluble mineral oils and soluble-oil solutions for lubricating and cooling purposes and non-soluble hydraulic oil for machinery operation. PCB analysis of samples of water and oil collected from the pit did not detect PCB compounds.

ENVIRONMENTAL CONDITIONS

This section of the report describes processes or areas of the Buffalo Plant site from which oil or hazardous substances could have been released to the environment. For the purpose of the Phase I study, if the information reviewed indicated that a process or area had a release of or had a potential pathway for release of oil or hazardous substances into the environment at levels which may adversely impact human health or the environment, it is deemed a PAOC. Where the available information was not sufficient to determine what level of contamination had resulted from a release which is known to have occurred, the area of the release is considered to be a PAOC.

Coolant Pit

H&A personnel inspected the coolant pit at Bay G-29 (Buhr Pit). Evidence of leaks or cracks was not apparent although the presence of oil on the floor and in the sump did not permit a thorough inspection for small cracks.

Because there was no visible evidence, written documentation, or knowledge by Plant personnel interviewed of releases of oil or hazardous substances into the environment at levels above those protective of human health and the environment, H&A did not consider the in-service coolant pit *at G-29* to be a PAOC.

Underground Storage Tank (UST) No. 5

This 20,000-gallon capacity tank located in Bay AA-26 was used for hydraulic oil storage. Records indicate Tank 5 tested tight in 1987. It was closed-in-place in 1990.

Two test borings were installed adjacent to the tank in 1990. Top of bedrock was encountered at 20 feet, which is the depth of the base of the tank. Oil-saturated soil was observed at depths of approximately 9 feet in each boring. Field screening of soil samples indicated the presence of VOCs. The apparent contamination was reported to the State (Spill No. 9012457). TCLP analysis for SVOCs was performed on a composite of oily test boring soil samples; no SVOCs were detected.

The test boring results indicate that a release of oil has occurred in the area of Tank No. 5. The analytical results may indicate that contamination of groundwater by semi-volatile compounds is unlikely to occur from the level of contamination present in the soil samples analyzed, since semi-VOCs were not detected in the TCLP leachate. However, oil saturation was noted in the samples collected, and plant personnel indicated that Tank No. 5 is suspected of being a possible source of the subsurface oil contamination in the area of the B-26 coolant pit. Additional investigation should be necessary to determine whether free-floating oil is present on the water table at the Tank No. 5 location. Therefore, H&A considers the Tank No. 5 location to be a PAOC.

G-25 Tank Vault

A basement area located at Bay G-25 contains four 6,000-gallon tanks which are presently used on an intermediate basis for temporary holding of soluble-oil coolant. The tanks are numbered 12, 14, 15, and 16. These tanks were installed in 1923; records indicate that they were originally used for storage of enamel.

An adjacent basement vault, which may have been constructed in the 1940s, contains Tanks No. 8 and 9. These were formerly used for storage of hydraulic and gear oil, respectively, and have been out of service since 1992.

Plant personnel indicated that they suspected the integrity of the concrete floor in these basement areas was insufficient for complete containment of spills. No drains or sumps are known to be present for capturing oils or other liquids spilled to the floor. No permanent system for pumping spilled liquids from the vaults to the waste treatment plant (WTP) is present. Plant personnel indicated that passive drainage to the BSA sewers would not be possible, since the basement floor was below the invert elevation of the BSA system in this area of the Plant. At the time of the Site visit, a considerable amount of oil was observed by H&A personnel on the floor of both basement areas. As a consequence, it was not possible to assess the presence of cracks or other release pathways that may be present.

Because of the integrity of the spill containment in both areas is suspected by Plant personnel to be poor, H&A believes there is a potential for releases to have occurred. Therefore, H&A considers the area of the G-25 tank vault to be a PAOC.

Other Pits and Sumps

Plant engineering drawings indicate that in the past, various other pits and sumps have been present at the "Site" as defined in the 2006 Consent Order. Enamel tank pits were constructed in 1923 at locations in Bay E-18 and E-22; these existed until at least 1942.

Former Oil Drains

Plant personnel reported that in the 1960s there were three areas of Plant 81 in which holes had been drilled through the floor slab to remove oil from floor areas. The holes were reportedly drilled into underlying soils, and no containment was installed. Plant personnel reported that the floor drains were plugged in each area in approximately 1970.

The locations of the floor drains were areas of heavy oil use in machining operations, and the holes were reportedly drilled to provide a means of draining routine accumulations of oil from the floor. The three areas were: the axle shaft drilling area in bay N-15/16, the old knuckle job area in bays N-10 to N-12, and the Gleason machine area.

H&A considers the location of each of the former floor drains to be a PAOC.

Gleason Machine Area

The Gleason Machine Area where pinion and ring gears are machined from raw forgings, appears from observations made by H&A during the Site visit to continue to have considerable oil accumulations on the floor. Plant personnel indicated that a system of shallow trenches, which was formerly used to drain oil from machinery and from spills to the floor, is now less than fully functional. Plant personnel indicated that oil may be migrating through joints or cracks in the floor or along the seams between the slab and the steel-lined trench drains. The Gleason Machine Area is suspected by Plant personnel of being a possible source for the oil contamination present in the subsurface at the B-26 coolant pit.

H&A considers the Gleason Machine Area to be a PAOC.

B-26 Coolant Pit

The B-26 Coolant Pit is located at the north end of the Gleason Machine Area. Because of the documented presence of a layer of oil on the water table in this area, H&A considers it to be a PAOC.

Isuzu Axle Paint System

An automated system for painting rear axle assemblies is located between the Gleason Machine Area and Track No. 1. Paints used are reportedly water-based and do not contain high levels of VOCs. The system is new, and equipment installations are at or above floor grade. Because there was no visible evidence, written documentation, or knowledge by Plant personnel interviewed, of releases of oil or hazardous substances into the environment at levels above those protective of human health and the environment, H&A does not consider the Isuzu axle paint system area to be PAOC.

Maintenance Garage

Fork-truck, fleet-vehicle, test-car, and tractor-trailer maintenance activities are performed in a garage area located near the northwest corner of Plant 81. A small parking garage is attached to the north side of the maintenance shop.

A small-parts Safety-Kleen degreaser unit, which uses a mineral-spirits-based solvent, is located in the shop. Oil and other liquid bulk storage is performed in three or four drums located on a rack at the southwest corner of the garage. A small oil-stained area was observed on the floor beneath the storage rack. A paint and steam-cleaning booth equipped with a floor drain which is used as an industrial waste dump station is located in the area. A central floor drain is reported connected to the industrial waste system. Plant personnel reported that the shop formerly had a fork-truck-battery charging area.

In general, garage area floors were clean and appeared free of obvious pathways for release of oil or other liquids into the environment. However, plant personnel reported that in the past hydraulic lifts present in the shop have had unrecovered losses of

hydraulic fluid to the subsurface on several occasions. Accordingly, H&A considers the hydraulic lift locations to be a PAOC.

Former Pumphouse

Records reviewed indicate that the original fill station for underground tanks located inside the facility was at the old powerhouse; later (1940s to 1966), it was located at the pumphouse building. Plant personnel interviewed reported that minor spills of naptha and paint were a common occurrence during tanker-truck unloading operations performed at the pumphouse in the 1960s. Releases to the subsurface may have occurred, according to Plant personnel. H&A, therefore, considers the former pumphouse area to be a PAOC.

Tanks No. 6 and 11

Tanks 6 and 11 (11,000- and 12,000-gallon capacity, respectively), were closed in 1991. They had been used for storage of paint and naptha prior to 1966; after construction of the heat treat addition, they were used for quench oil storage. Records reviewed indicate Tank 11 tested tight in 1987. No written record of tightness testing of Tank No. 6 was found.

Oil-saturated soil was encountered at a depth of 10 feet at the apparent base of fill material, in three test borings installed adjacent to Tank 11 in 1991. No contamination was encountered in borings at Tank 6, located immediately adjacent to the east end of Tank 11. The oil occurrence at Tank 11 was reported by the Plant to NYSDEC (Spill 9010810). A sample of the oily soil was analyzed by TCLP methods for SVOCs (8270 analysis); no SVOCs were detected.

The test boring results indicate that a release of oil has occurred in the area of Tank 11. The analytical results may indicate that contamination of groundwater by semi-VOCs is unlikely to result from the level of oil contamination present in the Tank 11 soil sample analyzed, since semi-VOCs were not detected in the TCLP leachate. The absence of visible contamination at Tank 6 may indicate that the oil contamination is not widespread.

Additional investigation would be necessary to determine whether a free-product layer is present in the subsurface and to determine whether the documented release of oil has

resulted in contamination at levels above those protective of human health and the environment. H&A therefore considers the Tank 11 area to be a PAOC.

Alkaline Soap Storage

Two aboveground soap storage tanks are present in southeast corner of the Heat Treat addition. A considerable amount of soap solids were present on the floor in this area at the time of the Site visits performed by H&A. However, the floor appeared to be in good condition, and no evidence of potential release pathways was observed. Because there was no visible evidence, written documentation, or knowledge by Plant personnel interviewed of releases of oil or hazardous substances into the environment at levels above those protective of human health and the environment, H&A does not consider the alkaline soap storage tanks to be a PAOC.

Industrial Waste Tank Vault

The main wastewater collection tank for Plant 81 is located in Bay F-37 at the southwest corner of the Heat Treat addition. It is installed in a subgrade concrete vault. Wastes are discharged into a tank from overhead piping and from a floor drain used to dump floor-scrubber wastes. A conveyor system is used to remove sludge and solids into a sludge hopper. The vault lining appeared from a cursory visual inspection to be in good condition.

Because there was no visible evidence, written documentation, or knowledge by Plant personnel interviewed of releases of oil or hazardous substances into the environment at levels above those protective of human health and the environment, H&A does not consider the industrial waste tank vault to be a PAOC.

Former Scrap Pits

Prior to 1967, four large subgrade concrete-lined pits were located in the area of Bays C/H-39 to -41. Plant personnel reported that the former scrap pits were completely removed for construction of the Marshalling Building. Plant personnel could not recall whether underlying soil appeared to be contaminated. However, it was known by Plant personnel that the fill material encountered in the Marshalling Building footprint contained considerable foundry sand which, because of its looseness, was an unsuitable bearing material that was removed and replaced with clean fill.

Because there was no visible evidence, written documentation, or knowledge by Plant personnel interviewed of releases of oil or hazardous substances into the environment at levels above those protective of human health and the environment, H&A does not consider the former scrap pits to be a PAOC.

Track No. 1

Oily-soil removal was performed during replacement of the Track No. 1 foundation in the Marshalling Building in 1990. Plant personnel reported that the likely source of the oil contamination encountered was drainage from passing railcars loaded with oily scrap metal chips.

Visibly contaminated soils in the track well were reportedly removed in 1990. There does not appear to be a potential source for subsequent releases in the present operations conducted in the Marshalling Building. The bed of the railspur has been paved and drains have been installed to collect drainage from passing railcars. The drains were reportedly connected to the Buffalo Plant's industrial waste system.

Because there was no visible evidence, written documentation, or knowledge by Plant personnel interviewed of releases of oil or hazardous substances into the environment at levels above those protective of human health and the environment, H&A does not consider the Marshalling Building section of Track No. 1 to be a PAOC.

Battery Charge Area

The fork-truck battery charge station for the Plant is located in the northeast corner of the 1975 addition. The floor slab appeared to be in good condition, and no spills were evident during visual inspection of the area. No record or knowledge of releases was found. H&A does not consider the charge station to be a PAOC.

Bulk Storage Area

Drums and luggers for soaps, surfactants, soluble oils, and greases are stored in an area at Bay H-38. Curbed containment areas are present but not sufficiently large for storage of all the containers. The floor appeared generally clean although small areas of oil staining were observed. No degradation or significant cracks in the concrete were

visible. Plant personnel were not aware of any uncontained spills in the area, nor was any record found of past releases. Because there was no visible evidence, written documentation, or knowledge by Plant personnel interviewed of releases of oil or hazardous substances into the environment at levels above those protective of human health and the environment, H&A does not consider the area to be a PAOC.

Fire Loop Repair Excavation

Plant personnel reported that oily soils were encountered at a depth of approximately 3 feet in an excavation recently performed to repair a fire-loop post-indicator-valve located between MW-2 and Plant 81. Investigation of the level or extent of possible contamination was reportedly not performed, although oily soils encountered were reportedly removed. H&A considers the area to be a PAOC.

Former Fill Station

Prior to 1990 completion of the new tank farm, the fill station for oil storage tanks located inside Plant 81 was located at the southwest corner of the Heat Treat Addition building. Visual inspection of the location by H&A indicated that the pavement in the immediate area is cracked and somewhat degraded, and oil staining of the pavement was evident. H&A therefore considers the former fill station to be a PAOC.

CONCLUSIONS

The work performed for the Phase I ESA in the area designated as the "Site" in the 2006 Consent Order or discussed in the "Report" of March 29, 2001, led H&A to the following conclusions:

- A limited number of releases to the environment of oily liquids have been documented at the Facility, and, although some cleanup has been performed, residues are apparent at some locations and may be present at levels above those protective of human health and the environment.
- Our assessment is based on our understanding of GM's requirements for the project. The work performed has not involved sampling and analysis of environmental media for the purpose of comparison to applicable health and environmental guidance values. Pursuant to the GM environmental assessment process, H&A concludes an additional Phase II Site Investigation is necessary to determine whether oil or hazardous substances releases occurred in some areas at levels above those protective of human health and the environment. *The following list comprises those*

areas either within the "Site" as defined in the 2006 Consent Order or discussed in the March 29, 2001 "Report" designated as PAOCs.

- Tank No. 5 Area
- G-25 Tank Vault
- Former Oil Drain in Area of Bays N-15/16
- Former Oil Drain in Areas of Bay N-10/12
- Former Oil Drain in Gleason Machine Area
- Gleason Machine Area
- B-26 Coolant Pit
- Former Pumphouse
- Tank No. 11 Area
- Area of Fire Loop Repair Excavation
- Former Fill Station

Facility Regulatory Status Summary

The Buffalo Plant is currently not listed on the Federal NPL list. However, an area of the site has been listed on the New York Registry of State-regulated inactive hazardous waste sites. Ongoing investigations of the area of the plant site is being conducted by the Buffalo Plant oversight by NYSDEC. Documents reviewed indicate that the facility is a large quantity generator of hazardous waste (EPA I.D. No. NYD002127165).

APPENDIX B

PHASE II ENVIRONMENTAL SITE INVESTIGATION
SAGINAW DIVISION - BUFFALO PLANT
BUFFALO, NEW YORK

Prepared by:
H&A of Rochester, New York
December 1994

PHASE II ENVIRONMENTAL SITE INVESTIGATION (ESI)

SAGINAW DIVISION - BUFFALO PLANT

BUFFALO, NEW YORK

PREPARED BY H&A OF ROCHESTER, NEW YORK
AT THE REQUEST OF GENERAL MOTORS COUNSEL
DECEMBER 1994

PURPOSE

H&A of New York (H&A) performed a Phase II Environmental Site Investigation (ESI) of the Buffalo Plant located at 1001 East Delavan Avenue in Buffalo, New York. The plant was formerly owned by the General Motors (GM) Saginaw Division. The study was performed by H&A at the request of GM Legal Counsel. H&A understands that GM requested the study to obtain information in connection with the February 28, 1994 sale of the property to AAM.

The purposes of this investigation were:

i) to confirm the presence or absence of oil or hazardous substances in the surface and subsurface environment at potential areas of environmental concern (PAOCs); and

ii) to determine the magnitude of concentrations of oil or hazardous substances detected in the subsurface and compare them to human health and environmental risk based criteria for screening soil and groundwater quality.

The PAOCs investigated as part of this study had been identified in H&A's Phase I ESA report dated December 14, 1993. *Pursuant to the agreement between GM and AAM*, evaluation of soils and/or groundwater may be provided using human health and environmental risk-based factors which include the following:

i) likely exposure pathways consistent with industrial use of the property;

ii) typical simulated exposure distribution consistent with such exposures;

iii) fate and transport characteristics;

iv) local geology and hydrogeology; and

v) toxicity of materials.

SCOPE

The Phase II work described herein consisted of investigation of PAOCs either identified by H&A within the "Site" as defined in the 2006 Consent Order or were discussed in the March 29, 2001 letter report to Mr. S. Calandra, Region (NYSDEC ("Report").

The Phase II exploration program included drilling of soil test borings and installation of groundwater monitoring wells, soil and groundwater sampling, laboratory analysis of

site soil and water samples, hydrogeologic testing, and a survey of boring and well locations. Implementation of the Phase II program began on April 7, 1994. Field work was completed on May 26, 1994.

INVESTIGATION AREAS

H&A's Phase I ESA report identified 12 PAOCs within either the "Site" as defined in the 2006 Consent Order or in the "Report". The following PAOCs were evaluated during the Phase II ESI to determine whether there had been releases of oil or hazardous substances above the risk-based criteria:

i) *Tank No. 5 area;*

ii) *G-25 tank vault;*

iii) *former oil drain in Gleason Machine Area;*

iv) *Gleason Machine Area;*

v) *B-26 Coolant Pit Area;*

vi) *former pumphouse;*

vii) *Tank No. 11 Area;*

viii) *Former oil drain in area of Bays N-15/16;*

ix) *former oil drain in area of Bays N-10/12;*

x) *Maintenance Garage;*

xi) *area of Fire Loop Repair; and*

xii) *former Fill Station.*

INVESTIGATION OVERVIEW

The Phase II field program performed included the installation of test borings and monitoring wells and the collection and analysis of test boring soil samples, near-surface soil samples, groundwater samples, and equipment-, trip-, or laboratory-blank samples.

SCREENING STANDARDS OF COMPARISON

H&A utilized human health and environmental risk-based criteria to evaluate the impact of potential releases at either the "Site" as defined in the 2006 Consent Order or locations described

in the "Report". H&A screened the areas investigated by comparing investigation analytical results to the risk-based criteria described in the following documents:

- Michigan Department of National Resources (MDNR) "Operational Memorandum #14 (Revision 1), Generic Remedial Action Plans Using Industrial Site Risk Assessment Cleanup Criteria; Other Requirements for Type C Remedial Action Plans, June 21, 1994" (Type C Criteria).
- Massachusetts Department of Environmental Protection (MADEP) Bureau of Waste Site Cleanup and Office of Research and Standards "Background Documentation for the Development of MCP Numerical Standards", dated April 1994. Massachusetts Contingency Plan (MCP) standards were only used to evaluate total petroleum hydrocarbons (TPH) analytical results.

The MDNR Type C Criteria establish a conservative risk-based industrial exposure scenario to determine chemical cleanup criteria for soils and groundwater; the criteria represent concentrations above which there could be an adverse impact on human health or the environment. As provided by the Asset Purchase Agreement (APA) H&A utilized the Type C Criteria during the Phase II investigation as screening levels to determine whether a release above levels protective of human health and the environment has occurred at an area which was designated a PAOC during the Phase I ESA.

The Type C Criteria used in this investigation were as follows:

Medium	***MDNR Type C Criterion***
▪ Soil	Direct Contact Value (DCV)
▪ Groundwater	Health-Based Drinking Water Value (DWV)

The Type C Criteria do not establish health-based levels for TPH in soil or groundwater. Therefore, in its evaluation of the areas investigated, H&A used soil and groundwater cleanup standards established under the MCP to evaluate TPH analysis results for samples not also analyzed for semi-volatile organic compounds (SVOCs) by United States Environmental Protection Agency (USEPA) Method 8270 (Michigan Type C Standards are available for SVOC compounds).

The MCP standards were developed from risk-based algorithms for human health and environmental exposures. The MCP standards also address leaching potential of

petroleum contamination in soil using default attenuation / dilution factors derived from the SESOIL model using a set of eight petroleum compounds.

The MCP allows for determining a TPH standard for Site soils and groundwater on the basis of human exposure potential. H&A identified the soils at the Buffalo Plant as being accessible to, potentially accessible to, or isolated from adults-only, low-frequency, low-intensity contact. *Based on these assumptions, the following screening criteria were selected by H&A for evaluating Phase II investigation TPH data:*

Medium	***TPH Evaluation Criterion (ppm)***
▪ Soil	5,000
▪ Groundwater	50

For the remainder of this report the screening levels described above will be referenced as the risk-based screening criteria (RBSC) for soil or groundwater. The RBSC used to evaluate Phase II investigation results are summarized in Table *1*.

The RBSC were used as follows by H&A in determining whether an area had a release of contaminants at levels above those protective of human health and the environment and would require additional study:

	Condition	***Result***
1.	Concentration of analyte in soil is less than the MDNR Type C DCV and TPH concentration in soil is less than 5,000 parts per million (ppm).	Area is not a PAOC with respect to soil.
2.	Concentration of analyte in groundwater is less than the MDNR Type C DWV and TPH concentration in groundwater is less than 50 ppm.	Area is not a PAOC with respect to groundwater.
3.	Concentration of TPH in soil is greater than 5,000 ppm but other analytes tested for in soil, including SVOCs, are below MDNR Type C DCV.	Area is not a PAOC with respect to soil.
4.	Concentration of TPH is greater than 5,000 ppm in soil samples or 50 ppm in groundwater samples for which no Method 8270 SVOC analysis was performed.	Additional analyses will be performed in the area as part of the pre-Phase III activities.

SUMMARY OF LABORATORY ANALYSIS RESULTS

Laboratory analysis results for each PAOC within the "Site" as defined in the 2006 Consent Order are presented in separate tables which are included.

INVESTIGATION FINDINGS

TANK NO. 5 AREA

H&A's Phase II investigation activities included installation of monitoring well MW-101 near the south end of the abandoned tank according to the methods and general locations specified in the S&AP.

Soil

Continuous split spoon sampling was performed to refusal at 6.4 feet below floor grade. Two soil samples were analyzed for TPH by USEPA Method 418.1, purgeable aromatic volatile organic compounds (VOCs), naphthalene, and methyl tertiary butyl ether (MTBE) by modified USEPA Method 8020 (8021), and SVOCs by USEPA Method 8270. Selection of the soil samples for laboratory analysis was based on results of field screening for VOCs and observations of petroleum odors as specified in the S&AP. *Results of the analyses are presented in Table B-1.*

The compounds detected in MW-101 soil samples by Method 8021 (with maximum concentration in ppm shown in parentheses) included: toluene (0.096); ethylbenzene (0.360); xylene (0.880); isopropylbenzene (0.160); n-propylbenzene (0.210); 1,3,5-trimethylbenzene (0.190); 1,2,4-trimethylbenzene (0.250); p-isopropyltoluene (0.210); and naphthalene (0.170). GM (Michigan Type C) screening criteria are available only for toluene, ethylbenzene, xylene, and naphthalene. These compounds were not detected above the RBSC. The concentrations of the volatile aromatic compounds of isopropylbenzene, n-propylbenzene, trimethylbenzene, and p-isopropyltoluene (for which there are no risk-based Michigan Type C Criteria) were detected in the MW-101 sample from 6.0 to 6.4 feet.

Because benzo(a)pyrene, an SVOC, was detected in the MW-101 soil sample from 6.0 to 6.4 feet at a concentration above the RBSC, the area is considered a PAOC relative to soil.

Groundwater

Groundwater was not encountered in MW-101. Approximately 1.4 feet of an unidentified oil was present in the well on April 29, 1994. A sample of the oil was collected and analyzed for purgeable aromatic VOCs with MTBE (Method 8021), and SVOCs. *Results are presented in Table B-1.*

On the basis of the presence of oil in monitoring well MW-101 the Tank No. 5 Area is considered a PAOC relative to groundwater.

G-25 TANK VAULT

Phase II investigation activities included the installation of test boring SB-101 at the south end of the tank vault as specified in the S&AP. Because of limited overhead and lateral clearances in the area, the boring was installed using a tripod-mounted drilling rig. Continuous split-spoon sampling was performed to a depth of 10 feet; the boring could not be advanced to the top of bedrock as specified in the S&AP because of the soil conditions encountered and the limitations of the tripod rig.

Two soil samples were analyzed for VOCs by USEPA Method 8240 and TPH by Method 8015. The sample intervals analyzed correspond to those intervals in the boring which were at or below the floor level of the tank vault. *Analytical results are presented in Table B-2.*

Neither VOCs nor TPH were detected at concentrations above RBSC. Based on the analytical results, the G-25 Tank Vault Area is not considered a PAOC relative to soil.

FORMER OIL DRAINS IN THE AREA OF BAYS N-10 TO N-16

Soil

Investigative activities included the installation of test boring SB-102 in the axle-shaft drilling area and test boring SB-103 in the old knuckle-job area. The borings were installed according to the methods and general locations specified in the S&AP. Continuous split-spoon sampling was performed to 17 feet at both locations. Oil was noted coating the SB-103 sample collected from 6 to 8 feet.

Two soil samples were collected from each boring and analyzed for TPH by Method 8015 (SB-102), 418.1 (SB-103, 6 to 8 feet), or both (SB-103, 4 to 6 feet). The two samples from each boring were also analyzed for SVOCs. Selection of the soil samples for laboratory analysis was based on field screening data and visual observations as discussed in the S&AP. The TPH data is summarized as follows:

Sample Depth and Location	***TPH (ppm)***	
	By 8015	***By 418.1***
SB-102, 6 to 8 feet	1,2000	NA
SB-102, 12 to 14 feet	4,700	NA
SB-103, 4 to 6 feet	2,500	25,000
SB-103, 6 to 8 feet	NA	17,000

The TPH results for SB-103 samples analyzed by Method 418.1 were above the RBSC. However, reanalysis by Method 8015 of one of the samples indicated the TPH level to be below the RBSC. Furthermore, SVOCs were not detected above the RBSC. Based on the concentrations of SVOCs detected, H&A does not consider either the old knuckle job area or the axle-shaft drilling area to be a PAOC relative to soil.

Groundwater

The presence of oil on the sample from 6 to 8 feet in SB-103 indicates that an accumulation of oil may be present at the water table at this location. The base of fill, which according to plant personnel is often the horizon at which the water table is encountered in excavations within the plant interior, was noted at a depth of 5 feet in SB-103. The 4 to 6 feet and 6 to 8 feet samples from SB-103 did not appear to be oil-saturated, which may be an indication that a small amount of oil is present.

Installation of a monitoring well at this location would be necessary to determine whether recoverable product is present in the old knuckle job area. Based on the apparent potential presence of free-oil, the old knuckle job area is considered a PAOC and warrants supplemental Phase II investigation.

GLEASON MACHINE AREA

Phase II activities included the installation of test borings SB-104, SB-105, and SB-106 in the approximate center and at the southeast and southwest corners of the Gleason Machine Area, respectively according to the methods and general locations specified in

the S&AP. Continuous split-spoon sampling was performed to 9 feet below floor grade. Free oil was noted coating the sample from 8 to 9 feet at SB-104, and the 4- to 6-feet interval from SB-105 had an oily appearance. Two soil samples were selected from each boring in accordance with the S&AP and analyzed for TPH and SVOCs. *Results are presented in Table B-3.*

TPH concentrations detected were above the RBSC in each sample. The SVOC benzo(a)pyrene was detected at a concentration above the RBSC in the following samples: SB-105, 2 to 4 and 4 to 6 feet; and SB-106, 8 to 9 feet. The Gleason Machine Area is considered a PAOC because of exceedance of RBSC in soil and the potential presence of free oil on the water table.

B-26 COOLANT PIT AREA

The S&AP specified sampling of the groundwater from existing piezometer B-2 located at the southwest corner of the pit. Groundwater was not encountered in B-2 or in piezometer B-1, located at the northeast corner of the pit, during the groundwater sampling event performed by H&A. A few inches of oil were present in the bottom of B-2. An oil sample was collected as specified in the S&AP and analyzed for VOCs by Method 8240. Sufficient sample was not available for the SVOC analysis as specified in the S&AP. No VOCs were detected other than methylene chloride at a concentration of 0.002 ppm; this concentration is likely the result of laboratory contamination.

Based on the apparent presence of free oil in the subsurface, the B-26 Coolant Pit Area is considered a PAOC. *Analytical data is presented in Table B-4.*

HYDRAULIC LIFTS IN MAINTENANCE GARAGE

Phase II activities included the installation of test boring SB-107 at the former location of one of the hydraulic lifts. Continuous split-spoon sampling was performed to 10 feet below floor grade in accordance with the S&AP. A petroleum odor and free oil were noted at the base of the fill sequence in the sample intervals from 6 to 9.8 feet.

Soil samples from this interval were submitted for TPH and SVOC analysis; however, the sample jars were broken in transit to the laboratory and only TPH analysis was possible. Excess sample material from the interval from 6 to 8 feet which had been retained at the site was resubmitted within an acceptable holding time for TPH and SVOC analysis.

Results of the analyses indicated the presence of 62,000 ppm TPH in the initial sample from the 6- to 8-foot interval. Analyses of the second sample from this interval indicated the presence of 32,000 ppm TPH; SVOCs were not detected above a quantitation limit of 2.0 ppm in the second sample. The sample from the 8- to 9.8-foot interval contained 27,000 ppm TPH.

Additional sampling and analysis for SVOCs by Method 8270 would be necessary to determine whether the 62,000 ppm TPH concentration detected in the initial SB-107 sample from 6 to 8 feet represents the presence of hazardous substances at levels above the RBSC. The former hydraulic lift location is considered a PAOC warranting supplemental Phase II investigation because of the potential presence of SVOCs in soil in the 6- to 8-foot interval and the potential presence of free oil on the water table.

FORMER PUMPHOUSE AND TANK NO. 11 AREA

H&A's Phase II investigative activities included the installation of one test boring (SB-108) in the vicinity of the former pumphouse and one temporary monitoring well (MW-103) at the south side of Tank No. 11 according to the methods and general locations specified in the S&AP.

Soil

Continuous split-spoon sampling was performed at 11.0 feet in SB-108 and to the top of the bedrock at 11.3 feet in MW-103. Two soil samples from each location were analyzed for TPH and VOCs (by Method 8240); the MW-103 samples were also analyzed for SVOCs and polychlorinated biphenyls (PCBs). *Results are presented in Table B-5.*

PCBs were not detected in the MW-103 samples. Concentrations of VOCs and SVOCs detected in the samples from borings were not above the RBSC. The TPH concentrations detected in SB-108 samples were not above the RBSC.

Based on the analytical results, the Former Pumphouse Area and the Tank No. 11 Area are not considered to be PAOCs relative to soil.

Groundwater

MW-103 groundwater was sampled on April 29, 1994 and analyzed for TPH, VOCs, and SVOCs. The PCB analysis specified in the S&AP was inadvertently omitted from the

analyses requested by H&A. H&A resampled MW-103 on July 26, 1994 to obtain a groundwater sample for PCB analysis. A layer 1.9 feet thick of a light-colored liquid which appeared to be oil was present in the bottom of the well. As specified in the S&AP in the event that oil was encountered in MW-103, a sample of the oily material was collected for VOC, SVOC, and PCB analysis. When received by the laboratory, the sample had separated into two phases which included water and a few beads of floating oil. The sample was shaken to mix the two phases and a representative portion was used to perform the requested analyses. *Groundwater sample analysis results are presented in Table B-5.*

TPH was detected in the April groundwater sample at a concentration of 74 ppm, which is above the RBSC of 50 ppm. VOCs were not detected above the RBSC. Bis(2-ethylhexyl)phthalate (an SVOC) was detected above the RBSC. Although the detection was not flagged by the laboratory, the detection of bis(2-ethylhexyl)phthalate is likely to have resulted from laboratory contamination. No compounds were detected above the RBSC in the July sample of oily water. Based on the analytical results, the MW-103 Area is not considered a PAOC.

The phase separation which occurred in the July 26 sample from MW-103 indicates that the oily material encountered may have been an emulsion of non-soluble oil and groundwater, a soluble-oil solution, or a mixture of oil and groundwater produced during the sampling event by immersion of the measuring and sampling tools through a thin layer of floating, non-soluble oil. While the sample conditions at the time of receipt by the laboratory indicate that the amount of oil present in the sample was relatively minor, the area of Tank No. 11 is considered a PAOC warranting supplemental Phase II investigations to determine whether a recoverable oil layer is present.

AREA OF FIRE LOOP REPAIR EXCAVATION

Phase II activities included the installation of test boring SB-116 adjacent to the west edge of the excavation in accordance with the methods specified in the S&AP. Free oil was noted coating the sample from the 2- to 4-foot interval. This depth interval corresponds to the approximate depth of the water table measured in previously existing monitoring well MW-2, which is located 190 feet northwest of SB-116.

The 2- to 4-foot sample interval and the interval above it (1 to 2 feet) were selected for analysis in accordance with the S&AP. Analyses performed included TPH and purgeable aromatic VOCs for both samples and SVOCs for the oily sample as specified

in the S&AP. At the request of AAM and with the approval of GM, PCB analysis of the oily sample was also performed.

PCB compounds were not detected in the SB-116 sample. TPH, VOC, and SVOCs were not detected at levels above the RBSC.

Based on the analytical results, the area of the Fire-Loop-Repair Excavation is not considered a PAOC relative to soil. Based on the apparent presence of free oil in the interval from 2 to 4 feet and the apparent potential for the presence of free oil on the water table, the area of the Fire-Loop-Repair Excavation is considered a PAOC warranting supplemental Phase II investigations to determine whether free oil is present on the water table.

FORMER FILL STATION IN WEST YARD

Investigative activities included the installation of test boring SB-117 in an area of oil-stained pavement 20 feet west of the former fill station. Continuous split-spoon sampling was performed to a depth of 10 feet in accordance with the S&AP. Oil staining was noted on samples of fill material from just beneath the pavement (1 to 2 feet) and on lacustrine sediments from 4 to 6 feet. Free oil was noted coating the sample from 6 to 8 feet.

The sample intervals from 1 to 2 feet and 6 to 8 feet were selected for TPH and SVOC analysis in accordance with the S&AP. The sample jar for the 6- to 8-foot interval was broken in transit to the laboratory; the sample material submitted was not usable for analysis, and no additional sample material was available for resubmittal.

SVOCs and TPH were not detected above the RBSC.

Based on the potential presence of free oil, TPH, and SVOCs indicated by visual observations of field conditions, the Former Fill Station Area is considered a PAOC warranting supplemental Phase II investigations because of the potential presence of free oil on the water table and the potential for exceedance of RBSC for SVOCs.

BACKGROUND SAMPLING LOCATIONS

Investigative activities included the collection of two background soil samples. BSS-101 was collected by hand from the lawn area at the front of the Buffalo Plant and was

comprised of soil just beneath the root zone. BCS-101 was collected at the southeast corner of the plant and was comprised of composited fill material collected during continuous split-spoon sampling to the top of natural lacustrine soil deposits.

Background samples were analyzed for metals. No metals were detected at levels above RBSC. *Analytical results are presented in Table B-6.*

PREVIOUSLY EXISTING MONITORING WELLS

Groundwater samples from previously existing perimeter wells MW-1, MW-2, MW-3, MW-4 were analyzed for VOCs, TPH, and total (unfiltered) metals. The MW-4 sample was also analyzed for SVOCs. *Results of these analyses are presented in Table B-7.*

Acetone, a likely lab contaminant, was detected at a concentration of 0.005 ppm in the MW-1 sample. The concentration detected was well below the RBSC. No other VOCs, SVOCs, or TPH were detected in samples from the perimeter wells.

Lead was detected at concentrations from 0.03 to 0.26 ppm in each well. These concentrations are above the RBSC of 0.004 ppm.

Arsenic was detected at concentrations from 0.010 to 0.019 ppm, above the RBSC of 0.0002 ppm, in samples from MW-2 and MW-3. Arsenic was not detected above the quantitation limit of 0.003 ppm in samples from MW-1 and MW-4.

Manganese was detected at a level above the screening criterion of 0.500 ppm in the MW-3 sample (0.616 ppm) and in one of two split samples from MW-2 (0.548 ppm). The concentrations detected in the other split of MW-2 (0.309) and in samples from MW-1 (0.304) and MW-4 (0.411) were below the screening criterion.

Previously existing perimeter monitoring wells MW-1, MW-2, MW-3, and MW-4 are located on the eastern, western, southwestern, and southern sides of the property. Phase II water level monitoring results indicate that some or all of these wells are located hydraulically upgradient of the Buffalo Plant manufacturing buildings, and groundwater conditions at these locations therefore are likely to be representative of background conditions at the site. The relatively consistent metals analysis results for samples from perimeter wells MW-1 through MW-4 indicate that background concentrations of total (unfiltered) lead, arsenic, and manganese in groundwater in the area of the site may be above the RBSC for these metals.

CONCLUSIONS

Based on the results of the Phase II ESI, oil or hazardous substances were detected in soil and/or groundwater at levels above RBSC in some of the areas investigated during the Phase II investigation. The presence or potential presence of free oil in the subsurface was encountered in some of these and also in other areas.

Supplemental Phase II investigations are warranted in some of the areas which remain potential areas of environmental concern to determine whether hazardous substances are present above risk-based screening levels or above Site background levels or to determine whether recoverable free oil is present in the water table. For other areas which also remain PAOCs, an assessment of the nature and extent of potential subsurface contamination should be performed.

Based on the results of the Phase II investigation, the affected areas include the following:

PAOCs Warranting Supplemental Phase II Investigation

- Former Knuckle-Job Floor Drain: No contaminants detected above the RBSC; however, free oil detected in soil sample from SB-103. Installation of a monitoring well would be necessary to determine whether recoverable oil is present at the water table.
- Maintenance Garage Area: TPH detected above the RBSC and free oil detected in soil samples from SB-107. A monitoring well installation with resampling of soil for SVOC analysis would be necessary to determine whether free oil is present at the water table or SVOC levels exceed RBSC in soil.
- Tank No. 11 Area: No contaminants detected above RBSC; however, possible presence of oil detected in monitoring well MW-103. Continued monitoring and resampling of MW-103 or installation of a new monitoring well would be necessary to determine whether recoverable oil is present.
- Area of Fire-Loop Repair: No contaminants detected above the RBSC; however, free oil detected in soil sample from SB-116. Installation of a monitoring well would be necessary to determine whether recoverable free oil is present at the water table.
- Area of Former Fill Station: No contaminants detected above RBSC in sample of soil from beneath pavement (1 to 2 feet) in SB-117. However, apparent free oil was observed by H&A personnel in the soil sample from 6 to 8 feet. A monitoring well installation with resampling of soil from 6 to 8 feet would be necessary to determine

whether RBSC exceedances are present in soil at this depth and whether recoverable oil is present at the water table.

PAOCs Warranting Assessment of Nature and Extent of Contamination

- Tank No. 5 Area: Benzo(a)pyrene detected in soil above RBSC; free oil present in monitoring well MW-101.
- Gleason Machine Area: Benzo(a)pyrene detected in soil from SB-105 and SB-106 above risk-based screening criteria; free oil observed in soil from SB-104 indicating potential presence of recoverable oil layer at water table.
- B-26 Coolant Pit Area: Free oil present in previously existing well B-2. The potential presence of SVOCs in soil at levels above RBC also warrants supplemental investigation.

Phase II results indicated that total and/or dissolved arsenic, lead, and manganese are present in site groundwater at levels above the RBSC. The consistency in the concentrations of these metals detected in samples from both perimeter wells and wells at PAOCs indicates that the concentrations detected are representative of site background conditions rather than of release of these metals at the site. These detections are not considered PAOCs.

TABLE 1
COMPARISON STANDARDS FOR COMPOUNDS
PHASE II ENVIRONMENTAL SITE INVESTIGATION
FORMER SAGINAW DIVISION - BUFFALO PLANT
BUFFALO, NEW YORK

SOIL STANDARDS
(CONCENTRATIONS IN PARTS PER MILLION [ppm])

Parameter	Michigan Type C Criterion (1)
Volatiles	
Methylene Chloride	15
Acetone	15,000
Carbon Disulfide	16,000
Chloroform	410
2-Butanone (MEK)	6,800
Trichloroethene (TCE)	150
Tetrachloroethane (PCE)	49
Benzene	85
Toluene	33,000
Ethylbenzene	14,000
Xylene	270,000
Styrene	83
Isopropylbenzene	NAV
n-Propylbenzene	NAV
1,3,5-Trimethylbenzene	ID
1,2,4-Trimethylbenzene	NAV
sec-Butylbenzene	NAV
p-Isopropyltoluene	NAV
n-Butylbenzene	NAV

TABLE 1
COMPARISON STANDARDS FOR COMPOUNDS
PHASE II ENVIRONMENTAL SITE INVESTIGATION
FORMER SAGINAW DIVISION - BUFFALO PLANT
BUFFALO, NEW YORK

SOIL STANDARDS
(CONCENTRATIONS IN PARTS PER MILLION [ppm])

Parameter	Michigan Type C Criterion (1)
Semi-Volatiles	
Phenol	89,000
3-Methylphenol	45,000
4-Methylphenol	4,500
2,4-Dimethylphenol	45,000
Benzoic Acid	650,000
Naphthalene	32,000
2-Methylnaphthalene	ID
2,4,6-Trichlorophenol	1,400
2-Nitroaniline	NAV
Acenaphthylene	3,200
Acenaphthene	160,000
Dibenzofuran	NAV
Diethylphthalate	670,000
Fluorene	110,000
4-Chlorophenylphenylether	NAV
Phenanthrene	3,200
Anthracene	900,000
Di-N-butyl phthalate	110,000
Fluoranthene	110,000
Pyrene	67,000
Benzo(a)Anthracene	21
Bis(2-ethylhexyl)phthalate	ID
Chrysene	2,100
Benzo(b)Fluoranthene	21
Benzo(k)Fluoranthene	210
Benzo(a)Pyrene	2.1
Indeno(1,2,3-cd)Pyrene	21
Dibenzo(a,h)Anthracene	2.1
Benzo(g,h,i)perylene	3,200

TABLE 1
COMPARISON STANDARDS FOR COMPOUNDS
PHASE II ENVIRONMENTAL SITE INVESTIGATION
FORMER SAGINAW DIVISION - BUFFALO PLANT
BUFFALO, NEW YORK

SOIL STANDARDS
(CONCENTRATIONS IN PARTS PER MILLION [ppm])

Parameter	Michigan Type C Criterion (1)	Mass. DEP MCP Standard (2)
PCBs	7.5	
Total Petroleum Hydrocarbons (TPH)	NAV	5,000

Metals	Michigan Type C Criterion (1)	NYSDEC Background (3)	Eastern U.S. Background (4)		Site Background Maximum (5)
			Range	Est. Mean	
Arsenic	8.6	3-12	<.1-73	7.4	7.36
Barium	63,000	15-600	10-1,500	420	140
Cadmium	450	0.1-1	NAV	NAV	1.09
Chromium	4,300*	1.5-40	1-1,000	52	54.6
Iron	ID	2,000-550,000	100-100,000	25,000	20,100
Lead	400	200-500	<10-300	17	285
Magnesium	NAV	100-5,000	50-50,000	4,600	15,800
Manganese	4,300	50-5,000	<2-7,000	640	644
Mercury	270	0.001-0.2	0.01-3.4	0.12	0.23
Nickel	68,000	0.5-25	<5-700	18	21.1
Selenium	4,500	0.1-3.9	<0.1-3.9	.45	0.78
Silver	4,200	NAV	NAV	NAV	0.29
Tin	NAV	NAV	<0.1-10	1.5	39.0

TABLE 1
COMPARISON STANDARDS FOR COMPOUNDS
PHASE II ENVIRONMENTAL SITE INVESTIGATION
FORMER SAGINAW DIVISION - BUFFALO PLANT
BUFFALO, NEW YORK

SOIL STANDARDS
(CONCENTRATIONS IN PARTS PER MILLION [ppm])

Parameter	Michigan Type C Criterion (1)	Mass. DEP MCP Std. (2)
Volatiles		
Acetone	2.1	
Toluene	1.0 u	
Xylene	1.0 u	
Semi-Volatiles		
Benzoic Acid	92	
Bis (2-ethylhexyl) phthalate	0.006 u	
PCBs	0.00017	
Petroleum Hydrocarbons (TPH)	NAV	50
Metals		
Arsenic	0.0002	
Barium	2.0 u	
Cadmium	0.006 u	
Chromium	0.1 u	
Iron	ID	
Lead	0.004	
Magnesium	NAV	
Manganese	0.5	
Mercury	0.002 u	
Nickel	0.1 u	
Selenium	0.05 u	
Silver	0.098	
Tin	NAV	

TABLE 1
COMPARISON STANDARDS FOR COMPOUNDS
PHASE II ENVIRONMENTAL SITE INVESTIGATION
FORMER SAGINAW DIVISION - BUFFALO PLANT
BUFFALO, NEW YORK

SOIL STANDARDS
(CONCENTRATIONS IN PARTS PER MILLION [ppm])

Notes:

1. Type C criteria taken from "Type C Generic Industrial Cleanup Criteria for Groundwater and Soil," Operational Memorandum #14 (Rev. 1), Michigan Dept. of Natural Resources (MDNR), 21 June 1994. Soil criterion reported is the Direct Contact Value (DCV). Groundwater criterion reported is the Health-Based Drinking Water Value (DWV).

   * Chromium criteria reported for soil are for hexavalent chromium only. Type C criteria for trivalent (III) chromium in soil is 1,000,000 ppm in soil. Memorandum #14 states that volume-specific chromium data (Cr III and Cr VI) must be compared to the same volume-specific cleanup-criteria. If analytical data are provided for "total" chromium only (as in the case of this investigation), then values for chromium VI must be applied. Chromium III cleanup criteria can only be used at sites where groundwater is prevented from being used as a public water supply, currently and in the future. Type C criteria for chromium III and VI in groundwater are the same (0.1 ppm, u).

2. Massachusetts Department of Environmental Protection (DEP) Massachusetts Contingency Plan (MCP) cleanup standards for TPH in soil and groundwater taken from Derivation Document for the Development of the MCP Numerical Standards, DEP Bureau of Waste Site Cleanup and Office of Research and Standards, April 1994.

3. NYSDEC background metals concentrations taken from "Division Technical and Administrative Guidance Memorandum (TAGM): Determination of Soil Cleanup Objectives and Cleanup Levels," M.J. O'Toole, Director, Division of Hazardous Waste Remediation, TAGM HWR-92-4046 (Revised), 24 January 1994, Albany, New York.

4. Eastern U.S. background metals concentrations taken from Element Concentrations in Soils and Other Specified Materials of the Conterminous United States, U.S. Geological Survey Professional Paper 1270, H.T. Shacklette and J.G. Boerngen, U.S. Gov't. Printing Office, Washington, D.C., 1984.

5. Site background maximum = maximum concentration detected in background samples BSS-101 and BSS-102 collected at the site.

6. NAV - Reference standard on background value not currently available. SB - Site Background.
   u - Maxium contaminant level (MCL) used by MDNR as the default where the Type C health-based drinking water value is greater.

TABLE B-1
SUMMARY OF ANALYTICAL RESULTS,
TANK NO. 5 AREA
PHASE II ENVIRONMENTAL SITE INVESTIGATION
FORMER SAGINAW DIVISON - BUFFALO PLANT
BUFFALO, NEW YORK

	SOIL (ppm)			OIL (ppm)
EXPLORATION NUMBER		MW101	MW101	MW101
SAMPLE DEPTH (soil only)	RBSC	4'-6'	6'-6.4'	4/28/94
VOC's (Method 8021)				
Toluene	33,000	0.013	0.096	ND
Ethylbenzene	14,000	0.016	0.360	26
Xylenes	270,000	0.028	0.880	29
Isopropylbenzene	NAV	0.0056	0.160	ND
n-Propylbenzene	NAV	0.0069	0.210	7.9
1,3,5-Trimethylbenzene	ID	0.0059	0.190	5.7
1,2,4-Trimethylbenzene	NAV	0.010	0.250	9.7
p-Isopropyltoluene	NAV	ND	0.110	5.5J
Naphthalene	32,000	0.0035	0.170	4.4J
SVOC's (Method 8270)				
Naphthalene	32,000	ND	0.490J	15J
2 - Methylnaphthalene	ID	0.250J	1.600J	29J
Acenaphthene	160,000	0.650J	3.200	64J
Dibenzofuran	ID	0.420J	2.000	35J
Fluorene		ND	3.100	58J
Phenanthrene	32,000	3.100	15.000	230
Anthracene	900,000	0.850J	2.800	51J
Flouranthene	110,000	ND	6.000	180
Pyrene	67,000	ND	6.000	92J
Benzo (a) anthracene	21	ND	3.600	62J
Chrysene	2,100	ND	4.200	87J
Benzo (b) fluoranthene	21	ND	3.800	ND
Benzo (k) fluoranthene	210	ND	2.600	ND
Benzo (a) pyrene	2.1	ND	2.400	ND
PCB's		NA	NA	NA
TPH				NA
as TPH (Method 418.1)	5,000	34,000	55,000	
as Motor oil (Method 8015)		NA	NA	
METALS		NA	NA	NA

Notes:

1.) RBSC = risk-based screening criterion.
ID = inadequate data to develop criterion.
NA = Not analyzed.
NAV = Not available.
ND = Not detected.
J = Estimated value outside the calibrated concentration range.

2.) Shading indicates concentrations which are above the applicable RBSC.

3.) Refer to text for additional information.

TABLE B-2
SUMMARY OF ANALYTICAL RESULTS,
G-25 TANK VAULT AREA
PHASE II ENVIRONMENTAL SITE INVESTIGATION
FORMER SAGINAW DIVISION - BUFFALO PLANT
BUFFALO, NEW YORK

SOIL (ppm)

EXPLORATION NUMBER		SB101	SB101
SAMPLE DEPTH	RBSC	6'-8'	8'-10'
VOC's (Method 8240)			
Methylene Chloride	15	0.011	0.010
Acetone	15,000	0.046	ND
2-Butanone (MEK)	68,000	0.007J	ND
Trichloroethene (TCE)	150	ND	0.001J
Toluene	33,000	0.001J	0.001J
Styrene	83	0.001J	0.001J
SVOC's		NA	NA
PCB's		NA	NA
TPH (Method 8015)			
as Motor oil	5,000	2,400	4,300
METALS		NA	NA

Notes:

1.) RBSC = Risk-based screening criterion.
NA = Not analyzed.
NAV = Not available.
ND = Not detected.
J = Estimated value outside the calibrated concentration range.

2.) Methylene chloride (0.003J ppm), acetone (0.014), chloroform (0.002J), 1,2-dichloroethane (0.002J), and MIBK (0.011) were detected in the VOC trip blank sample which accompanied the SB101 samples.

3.) Refer to text for additional information.

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TABLE B-3
SUMMARY OF ANALYTICAL RESULTS,
GLEASON MACHINE AREA
PHASE II ENVIRONMENTAL SITE INVESTIGATION
FORMER SAGINAW DIVISION - BUFFALO PLANT
BUFFALO, NEW YORK

SOIL (ppm)

EXPLORATION NUMBER		SB104	SB104 field dup.	SB104	SB105	SB105	SB106	SB106
SAMPLE DEPTH	RBSC	1'-2'	1'-2'	8'-9'	2'-4'	4'-6'	4'-6'	8'-9'
VOC's		NA	NA	NA	NA	NA	NA	NA
SVOC's (Method 8270)								
Phenol	89,000	2.300J	8.500	ND	0.540J	0.570J	ND	0.390J
3+4 Methylphenol	4,500	ND	1.300J	ND	ND	ND	ND	ND
Benzoic acid	650,000	0.860J	0.650J	ND	ND	ND	0.360JB	1.200B
Naphthalene	32,000	1.300J	3.400J	ND	0.600J	2.100J	0.170J	0.720
2 - Methylnaphthalene	ID	1.200J	3.400J	0.630J	0.690J	2.400J	0.230J	0.760
2,4,6-Trichlorophenol	1,400	ND	0.400J	ND	ND	ND	ND	ND
Acenaphthylene	3,200	3.100J	ND	ND	ND	ND	0.095J	0.130J
Acenaphthene	160,000	ND	7.900	1.700J	1.500J	3.500J	ND	2.400
Dibenzofuran	ID	2.500J	6.900	1.200J	ND	ND	0.340J	1.700
Fluorene	110,000	3.500J	6.800	1.900J	1.600J	3.800J	0.530	2.800
Phenanthrene	32,000	16.000	34.000	6.600	6.600	16.000	2.500	18.000
Anthracene	900,000	ND	ND	1.400J	1.900J	5.000	ND	4.700
Flouranthene	110,000	ND	ND	3.200	7.000	13.000	1.200	18.000
Pyrene	67,000	3.000J	ND	4.300	4.000	9.700	0.980	10.000
Benzo (a) anthracene	21	2.700J	ND	ND	2.400	5.600	0.690	6.400
Bis (2-Ethylhexyl) phthalate	ID	ND	ND	1.000JB	3.900B	ND	3.600	6.700
Chrysene	2,100	3.000J	ND	0.980J	3.800	7.000	0.630	6.200
Benzo (b) fluoranthene	21	ND	2.900J	0.890J	12.000	6.000	0.540	4.800
Benzo (k) fluoranthene	210	ND	3.000J	1.000J	5.600	5.000	ND	4.500
Benzo (a) pyrene	2.1	1.500J	2.100J	0.610J	5.700	4.500	0.210J	5.600
Indeno (1,2,3-cd) pyrene	21	0.650J	1.300J	ND	4.200	1.900J	0.280J	3.200
Dibenzo(a,h)anthracene	2.1	ND	ND	ND	1.700	ND	ND	1.100
Benzo (g,h,i) perylene	3,200	0.600J	1.400J	ND	4.000	1.500J	0.280J	3.200
PCB's		NA	NA	NA	NA	NA	NA	NA
TPH								
as Motor oil (Method 8015)	5,000	84,000	76,000	36,000	NA	NA	5,400	16,000
as TPH (Method 418.1)	5,000	NA	NA	NA	36,000	180,000	NA	NA
METALS		NA	NA	NA	NA	NA	NA	NA

Notes:

1.) RBSC = Risk-based screening criterion.
ID = inadequate data to develop criterion.
NA = Not analyzed.
NAV = Not available.
ND = Not detected.
J = Estimated value outside the calibrated concentration range.
B = Also detected in an associated laboratory blank sample.

2.) Shading indicates concentrations which are above the applicable RBSC.

3.) Refer to text for additional information.

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TABLE B-4
SUMMARY OF ANALYTICAL RESULTS,
B-26 COOLANT PIT AREA
PHASE II ENVIRONMENTAL SITE INVESTIGATION
FORMER SAGINAW DIVISION - BUFFALO PLANT
BUFFALO, NEW YORK

	OIL (ppm)
EXPLORATION NUMBER	B-2
VOC's (Method 8240)	
Methylene chloride	0.002J
SVOC's	NA
PCB's	NA
TPH	NA
METALS	NA

Notes:

1.) NA = Not analyzed.
J = Estimated value outside the calibrated concentration range.

2.) Refer to text for additional information.

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TABLE B-5
SUMMARY OF ANALYTICAL RESULTS,
FORMER PUMPHOUSE AND TANK NO. 11 AREA
PHASE II ENVIRONMENTAL SITE INVESTIGATION
FORMER SAGINAW DIVISION, BUFFALO PLANT
BUFFALO, NEW YORK

	SOIL (ppm)							GROUNDWATER (ppm)			OIL/WATER SAMPLE (ppm)
EXPLORATION NUMBER		SB108	SB108	SB108 lab. dup.	MW103	MW103 field dup.	MW103		MW103	MW103	MW103
SAMPLE DEPTH (soil only)	RBSC	2'-4'	6'-8'	6'-8'	2'-4'	2'-4'	6'-8'	RBSC	4/29/94	4/29 dup.	7/26/94
VOC's (Method 8240)											
Methylene chloride	15	0.009	ND	0.061	0.016	0.105	0.013	0.005	0.006B	0.005JB	ND
Acetone	15,000	0.055B	ND	0.098B	0.086B	0.013B	0.033B	2.1	0.006J	0.005J	0.004J
Carbon disulfide	16,000	0.005	ND	0.002J	ND	0.0007J	ND	2.3	ND	ND	ND
Chloroform	NAV	ND	ND	ND	0.0009J	ND	ND	0.057	ND	ND	ND
1,2-Dichloroethane		ND	ND	ND	ND	ND	ND	0.0038	ND	0.0006JB	ND
2-Butanone	6,800	0.016	ND	0.019	0.020	0.004J	0.007	0.96	ND	ND	ND
Benzene	85	0.002J	ND	ND	0.001J	ND	ND	0.005	ND	ND	ND
Tetrachloroethene	NAV	0.003J	ND	ND	0.001J	ND	0.007	0.005	ND	ND	ND
Toluene	33,000	0.006	0.001J	0.002J	0.004J	0.004J	0.003J	1	0.0007JB	0.0007JB	ND
Ethyl benzene	14,000	ND	ND	ND	0.002J	ND	ND	0.7	ND	ND	ND
Styrene	270,000	ND	ND	ND	0.001J	0.001J	0.002J	0.012	ND	ND	ND
Xylenes	270,000	0.013	0.001J	0.002J	0.007	0.003J	0.002J	10	0.0008JB	0.0006JB	ND
SVOC's (Method 8270)		NA	NA	NA						NA	
Benzoic acid	NAV				0.110JB	0.130JB	0.025JB	92	ND (<0.25)		0.005J
Naphthalene	32,000				0.018J	0.019J	ND	0.75	ND (<0.05)		ND
2 - Methylnaphthalene	ID				0.063J	0.042J	ND	ID	ND (<0.05)		ND
2-Nitroaniline	NAV				ND	0.001J	ND	NAV	ND (<0.05)		ND
Acenaphthylene	3,200				ND	0.008J	ND	0.075	ND (<0.05)		ND
Acenaphthene	160,000				ND	0.010J	ND	3.7	ND (<0.05)		ND
Fluorene	110,000				ND	ND	0.010J	2.5	ND (<0.05)		ND
4-Chlorophenyl phenyl ether	NAV				0.020J	ND	ND	NAV	ND (<0.05)		ND
Phenanthrene	32,000				0.073J	ND	ND	0.075	ND (<0.05)		ND
Anthracene	900,000				0.014J	ND	ND	21	ND (<0.05)		ND
Di-n-butylphthalate	110,000				ND	0.050JB	0.047JB	2.5	ND (<0.05)		0.004J
Flouranthene	110,000				ND	ND	ND	2.5	ND (<0.05)		ND
Benzo (a) anthracene	21				ND	ND	ND	0.0005	ND (<0.05)		ND
bis(2-Ethylhexyl)phthalate	ID				ND	0.620	0.310J	0.006	0.077		0.004J
PCB's (Method 8080)		NA	NA	NA	ND	ND	ND		NA	NA	ND
TPH (Method 8015)				NA						NA	NA
as Motor oil	5,000	2,100	2,700		4,400	7,600	9,400	50	74		
METALS		NA	NA	NA	NA	NA	NA		NA	NA	NA

Notes:

1.) RBSC = Risk-based screening criterion.
ID = Inadequate data to develop criterion.
NA = Not analyzed.
NAV = Not available.
ND = Not detected.
J = Estimated value outside the calibrated concentration range.
B = Also detected in an associated laboratory blank sample.

2.) Methylene chloride (0.024B ppm), acetone (0.010), chloroform (0.0004JB), and toluene (0.0005JB) were also detected in the groundwater equipment blank sample collected for VOC analysis at MW-103.

3.) Shading indicates concentrations which are above the applicable RBSC.

4.) Refer to text for additional information.

TABLE B-6
SUMMARY OF ANALYTICAL RESULTS,
BACKGROUND METALS SAMPLING
PHASE II ENVIRONMENTAL SITE INVESTIGATION
FORMER SAGINAW DIVISION - BUFFALO PLANT
BUFFALO, NEW YORK

SOIL (ppm)

EXPLORATION NUMBER		BCS101	BSS101	BSS101 field dup.
SAMPLE DEPTH	RBSC	1'-4'	0'-2'	0'-2'
METALS (Methods 6000/7000)				
Arsenic	8.6	7.36	6.36	6.07
Barium	63,000	60.0	140	122
Cadmium	450	0.118	1.09	1.07
Chromium	4,300	25.5	51.5	54.6
Iron	ID	17,100	20,100	18,200
Lead	400	28.0	285	259
Magnesium	NAV	15,800	4,080	3,730
Manganese	4,300	289	644	347
Mercury	270	ND	0.23	0.19
Nickel	68,000	19.5	21.1	20.3
Selenium	4,500	ND	ND	0.78
Silver	4,200	0.16	0.27	0.29
Tin	NAV	ND	38.6	39.0

Notes:

1.) RBSC = Risk-based screening criterion.
ID = inadequate data to develop criterion.
NAV = Not available.
ND = Not detected.

2.) Refer to text for additional information.

TABLE B-7
SUMMARY OF ANALYTICAL RESULTS,
PREVIOUSLY-EXISTING MONITORING WELLS
PHASE II ENVIRONMENTAL SITE INVESTIGATION
FORMER SAGINAW DIVISION - BUFFALO PLANT
BUFFALO, NEW YORK

GROUNDWATER (ppm)

EXPLORATION NUMBER		MW1	MW2	MW2 dup.	MW3	MW4	MW4 dup.	MW5	MW5	MW5
		4/29/94	4/29/94	4/29/94	4/29/94	4/29/94	4/29/94	4/29/94	9/7/94	9/7/94
DATE SAMPLED	RBSC	Unfiltered	Unfiltered	Unfiltered	Unfiltered	Unfiltered	Unfiltered	Unfiltered	Unfiltered	Filtered
VOC's (Method at right)		8240	8020	NA	8021	8240	NA	8240	NA	NA
Methylene chloride	330	0.008B	NA		NA	0.007B		0.006B		
Acetone	15,000	0.005J	NA		NA	ND		ND		
Other VOCs		ND	ND (<0.002)		ND (<0.002)	ND		ND		
SVOC's (Method 8270)		NA	NA	NA	NA	ND (<0.010)	ND (<0.010)	ND (<0.010)	NA	NA
PCB's (Method 8080)		NA	NA	NA	NA	NA	NA	ND (<0.0005)	NA	NA
TPH (Method 8015)	50	ND (<0.3)	ND (<0.3)	NA	ND (<0.3)	ND (<0.3)	ND (<0.3)	ND (<0.3)	NA	NA
METALS (Methods 6000/7000)							NA			
Arsenic	0.0002	ND	0.0101	0.0189	0.0138	ND		0.0032	0.0093	0.0084
Barium	2	0.307	0.170	0.300	0.131	0.105		0.445	NA	NA
Cadmium	0.005	0.003	ND	0.0005	0.0069	0.002		0.0003	NA	NA
Chromium	0.1	ND	ND	ND	0.0013	ND		0.0086	NA	NA
Iron	ID	11.2	0.72	2.85	4.95	2.74		17.8	NA	NA
Lead	0.004	0.257	0.0272	0.0036	0.151	0.0600		1.07	1.3	ND (<0.005)
Magnesium	NAV	13.9	25.4	70.1	22.5	28.0		32.1	NA	NA
Manganese	0.5	0.304	0.309	0.548	0.616	0.411		1.07	3.05	0.79
Mercury	0.002	ND	ND	ND	ND	ND		ND	NA	NA
Nickel	0.1	ND	ND	ND	0.024	ND		ND	NA	NA
Selenium	0.05	ND	ND	ND	0.055	ND		ND	NA	NA
Silver	0.098	ND	ND	ND	ND	ND		ND	NA	NA
Tin	NAV	ND	ND	ND	ND	ND		ND	NA	NA

Notes:

1.) RBSC = Risk-based screening criterion.
   ID = Inadequate data to develop criterion.
   NA = Not analyzed.
   ND = Not detected.
   J = Estimated value outside the calibrated concentration range.
   B = Also detected in an associated laboratory blank sample.
2.) Refer to text for additional information.
3.) Shading indicates concentrations which are above the applicable RBSC.

APPENDIX C

SUPPLEMENTAL PHASE II ENVIRONMENTAL SITE INVESTIGATION AND PHASE III EXTENT OF CONTAMINATION STUDY WORK PLAN AMERICAN AXLE & MANUFACTURING, INC. (FORMERLY GENERAL MOTORS SAGINAW DIVISION) BUFFALO PLANT BUFFALO, NEW YORK

Prepared by H&A of Rochester, New York
November 1995

SUPPLEMENTAL PHASE II ENVIRONMENTAL SITE INVESTIGATION AND PHASE III EXTENT OF CONTAMINATION STUDY WORK PLAN AMERICAN AXLE & MANUFACTURING, INC. (FORMERLY GENERAL MOTORS SAGINAW DIVISION) BUFFALO PLANT BUFFALO, NEW YORK

PREPARED BY H&A OF ROCHESTER, NEW YORK
AT THE REQUEST OF GENERAL MOTORS COUNSEL
NOVEMBER 1995

EXECUTIVE SUMMARY

General Motors (GM) is undertaking Supplemental Phase II Environmental Site Investigation (ESI) activities and a Phase III Extent of Contamination (EOC) Study at the former Saginaw Division Buffalo Plant located at 1001 East Delavan Avenue, Buffalo, Erie County, New York. The location of the site is shown on Figure 1. The Supplemental Phase II ESI will provide for further investigation in specific locations to determine if further investigation in the form of a Phase II EOC is required at each area based on criteria used during the Phase II ESI. The Phase III investigations will involve characterization of the nature and extent of soil and groundwater contamination at potential areas of concern (PAOCs) identified in the conclusions of the Phase II ESI report dated November 30, 1994, as amended by the Addendum to the Phase II ESI report dated October 24, 1995, and any subsequent areas determine to require additional Phase III activities based on results of the Supplemental Phase II ESI activities. The Phase II ESI was performed at the site at the request of GM Legal Counsel. Phase II ESI activities identified the presence of oil or hazardous substances at levels above risk-based screening criteria (RBSC) at eight PAOCs.

PURPOSE

The purpose of the Supplemental Phase II Expanded Site Investigation (ESI) is to determine if areas investigated during the Phase II ESI require additional investigation in the form of a Phase III Extent of Contamination (EOC) Study. The purpose of the Phase III EOC study shall be to define the nature and extent of surface and subsurface contamination at each of the potential areas of environmental concern (PAOCs) identified in Phase II ESI as having oil or hazardous substances in soil and/or groundwater at levels above risk-based screening criteria (RBSC). The RBSC used to determine if a Supplemental Phase II area requires a Phase III EOC Study will be the same RBSC used in the Phase II ESI. The RBSC to be used for this EOC study are the generic industrial cleanup criteria for remedial action plans as stated in Michigan Department of Natural Resources (MDNR) Environmental Response Division Operational Memorandum #14 (Revision 2, dated June 6, 1995). A variety of surface and subsurface exploration procedures shall be employed to collect samples for chemical field screening and laboratory analysis and to determine certain physical characteristics of the subsurface contamination and hydrogeology. Field screening will be utilized to direct field investigations. Chemical analysis results from the Phase III study shall be evaluated to determine extent of contamination above RBSC at each PAOC. Preliminary conclusions shall be made concerning the need for remedial activities and potentially applicable remedial methods.

BACKGROUND

Phase I and Phase II studies have been performed. The plant was formerly owned by the Saginaw Division of General Motors (GM). The investigations were performed at the request of GM legal counsel in connection with the sale February 28 of the property to American Axle & Manufacturing, Inc. Plant (AAM).

The Phase I activities identified PAOCs for surface and subsurface investigation during Phase II activities. PAOCs were identified according to criteria adopted in the terms of the Asset Purchase Agreement (APA) between AAM and GM. *The Phase I PAOCs identified either within the "Site" as defined in the 2006 Consent Order or contained in the "Report" included the following:*

i) *Tank No. 5 Area;*

ii) *G-25 Tank Vault;*

iii) *Former Oil Drain in Gleason Machine Area;*

iv) *Gleason Machine Area;*

v) *B-26 Coolant Pit Area;*

vi) *Former Pumphouse;*

vii) *Tank No. 11 Area;*

viii) *Former Oil Drain in Area of Bays N-15/16;*

ix) *Former Oil Drain in Area of Bays N-10/12;*

x) *Maintenance Garage;*

xi) *Area of Fire Loop Repair; and*

xii) *Former Fill Station*.

The Phase II ESI included soil sampling and analysis at the above PAOCs, installation of overburden groundwater monitoring wells at select locations, groundwater sampling and analysis, limited hydrogeologic testing, and quality assurance/quality control (QA/QC) sampling and analysis.

Soil sampling was performed using hollow-stem auger test borings advanced to depths of 6 to 17 feet with continuous split-spoon sampling according to American Society for Testing and Materials (ASTM) methodologies. Test boring samples were visually examined and screened in the field for presence of volatile organic compounds (VOCs) to assess the presence of contaminants. Selected samples from each boring were submitted to a laboratory for chemical analysis of one or more of the following: United States Environmental Protection Agency (USEPA) Target Compound List (TCL) VOCs, purgeable aromatic VOCs including benzene, toluene, ethylbenzene, and xylene (BTEX), total purgeable aromatic VOCs including BTEX, total purgeable aromatic VOCs plus methyl tert butyl ether, USEPA TCL semi-volatile organic compounds (SVOCs), total petroleum hydrocarbons (TPH), polychlorinated biphenyls (PCBs), and various metals.

Monitoring wells were installed at selected locations using hollow-stem auger (HSA) test borings advanced to the top of bedrock which was encountered at depths of from 8.5 to 15.3 feet. Monitoring wells were constructed of polyvinyl chloride (PVC) well screen and riser pipe and 10-foot lengths of well screen were placed to screen across the apparent water table. Limited hydrogeologic testing, including water level monitoring and rising-head permeability testing (slug tests), was performed after completion of the monitoring well installations. Groundwater sampling for laboratory analysis of one or more of the parameter groups listed above was then performed.

Supplemental Phase II activities as described in Sections 2 and 3 will be performed in the following areas:

- PAOC #1 Former Knuckle - Job Area
- PAOC #2 Maintenance Garage Area
- PAOC #3 Tank No. 11 Area
- PAOC #5 Area of Fire Loop Repair
- PAOC #6 Area of Former Fill Station

Phase II activities at the Buffalo Plant indicated the presence of contaminants above RBSC in three areas requiring Phase III EOC activities. These areas are listed as follows:

- PAOC #7 Tank No. 5 Area
- PAOC #8 Gleason Machine Area
- PAOC #9 B-26 Coolant Pit Area

This plan presents the work activities to be performed at each of the Supplemental Phase II and Phase III program sampling locations.

SCOPE OF WORK

PAOC #1 - FORMER KNUCKLE-JOB AREA

A monitoring well shall be installed adjacent to the Phase II test boring SB-103 in the Former Knuckle-Job Area. No RSBC exceedances were indicated by analysis of SB-103 soil samples; however, free-oil was noted on the SB-103 soil sample from 6 to 8 feet. A 10-foot length of PVC well screen shall be installed in a HSA test boring advanced without soil sampling to 15 feet below grade.

After its installation the well will be monitored monthly during the period of on-site Supplemental Phase II and Phase III activities (or at a minimum of three occasions with intervals of one month or more between events) for the presence of free-oil. If free-oil is encountered then Phase III activities shall be performed as necessary.

PAOC #2 - MAINTENANCE GARAGE AREA

A monitoring well shall be installed adjacent to Phase II test boring SB-107 in the Maintenance Garage Area. A petroleum odor and free-oil were noted in soil samples from 6 to 9.8 feet, and TPH concentrations exceeded the RBSC for both sample intervals (6 to 8 and 8 to 9.8 feet), although SVOC exceedances were not indicated in the one sample analyzed for SVOCs. A 10-foot length of PVC well screen shall be installed in a HSA test boring advanced without soil sampling to 6 feet below grade, with continuous sampling from 6 to 10 feet, and without soil sampling to 15 feet. Soil samples from 6 to 8 feet and 8 to 10 feet shall be submitted for laboratory analysis of SVOCs using USEPA Method 8270.

After its installation the well will be monitored monthly during the period of on-site Supplemental Phase II and Phase III activities (or at a minimum on three occasions with intervals of one month or more between event, if possible) for the presence of free-oil. If free-oil is encountered in the monitoring well and/or SVOCs are detected above RBSC in the soil samples analyzed, Phase III activities shall be performed as necessary.

PAOC #3 - TANK NO. 11 AREA

Monitoring well MW-103 shall be monitored for the presence or absence of a layer of free oil. An apparent oil layer was noted in the well on one of two occasions when the well was sampled during the Phase II ESI; however, a sample of the oil layer collected from the well separated in transit to the laboratory into water with a few floating drops of oil.

MW-103 shall be monitored on three occasions with at least one month between events. The presence or absence of oil shall be determined using an oil-water interface probe. If an oil layer is detected, its presence shall be confirmed by bailing oil from the well until the thickness of the oil layer is reduced to less than one inch, followed by additional monitoring as necessary to determine the length of time required for recovery to a static level of the oil layer. If free-oil is confirmed, then Phase III activities shall be performed as necessary.

PAOC #5 - FIRE-LOOP-REPAIR AREA

A monitoring well shall be installed adjacent to Phase II test boring SB-116 in the area of the Fire-Loop-Repair excavation. No RBSC exceedances were indicated by analysis of

SB-116 samples; however, free-oil was noted coating the sample from 2 to 4 feet. A 10-foot length of PVC well screen shall be installed in a HSA test boring advanced without soil sampling to 12 feet below grade.

After its installation the well will be monitored monthly during the period of on-site Supplemental Phase II and Phase III activities (or at a minimum of three occasions with intervals of one month or more between events) for the presence of free-oil. If free-oil is encountered then Phase III activities shall be performed as necessary.

PAOC #6 - FORMER FILL STATION AREA

A monitoring well shall be installed adjacent to the Phase II test boring SB-117 in the area of the Former Fill Station. Free-oil was noted coating SB-117 soil sample from 6 to 8 feet; this sample was not analyzed because the sample container was broken in transit to the laboratory. A 10-foot length of PVC well screen shall be installed in a HSA test boring advanced without soil sampling to 6 feet, with continuous soil sampling from 6 to 8 feet, and with standard soil sampling for visual observation and manual description only to 15 feet below grade or the top of bedrock. The 6 to 8-foot sample shall be submitted for laboratory analysis of SVOCs by USEPA Method 8270.

After its installation the well will be monitored monthly during the period of on-site Supplemental Phase II and Phase III activities (or at a minimum on three occasions with intervals of one month or more between events) for the presence of free-oil. If free-oil is encountered and/or SVOCs are detected above RBSC in the soil sample analyzed, Phase III activities shall be performed as necessary.

GROUNDWATER LEVEL MONITORING

Groundwater and oil-layer level measurements shall be performed on one day at each of the existing and Supplemental Phase II monitoring wells and piezometers present at the site. Results will be used to reassess the direction of shallow groundwater flow at the site and to assess the water-table level relative to the top of bedrock in the central portion of the site.

PHASE III ACTIVITIES

PAOC 7, 8, AND 9 - TANK NO. 5/GLEASON MACHINE/B-26 COOLANT PIT AREA

A monitoring well (MW-101) was installed at the south end of Tank No. 5 (PAOC #7), which is abandoned and is located at the northeast corner of the Gleason Machine Area. The well was installed to a depth of 6.4 feet, at which depth a subsurface obstruction was encountered. No RBSC exceedances were indicated by analysis of soil samples from the MW-101 boring. Oil was noted in the bottom of the well on one occasion. On other occasions the well was dry.

Three soil borings (SB-104, -105, and -106) were drilled in the Gleason Machine Area (PAOC #8), where oily machining operations are located and where a floor drain was reportedly present in the past for draining oil from the surrounding floor. No RBSC exceedances were indicated by analysis of SB-104, -105, and -106 soil samples. Free oil was noted on soil samples from 4 to 6 feet at boring SB-105 and from 8 to 9 feet at SB-104.

At the B-26 Coolant Pit (PAOC #9), located in the north end of the Gleason Machine Area, free-oil is present in the subsurface. The former coolant system pit, now backfilled, is equipped with a product recovery pump which collects oil seeping into the pit through cracks near its base. Piezometers for monitoring the presence of oil in surrounding soils are located at the northeast and southwest corners of the former pit.

To characterize the extent of free-oil contamination in this area, the following steps will be taken:

i) Geoprobe microwells shall be installed at the six locations and, if necessary, at regular distances upgradient or downgradient of the location shown to determine the apparent upgradient and downgradient limits of a free oil layer. At least three permanent monitoring wells shall then be installed at locations upgradient, within, and downgradient of the areas of free-oil extent; and

ii) the monitoring wells installed in the area shall be developed, hydrogeologically tested, and sampled for laboratory analysis by Method 8270 of polynuclear aromatic hydrocarbons (PAHs) in groundwater.

ASSESSMENT OF POTENTIAL IMPACTS OF SOIL CONTAMINATION ON SITE GROUNDWATER QUALITY

As described below, Phase III investigation chemical analysis results will be evaluated by comparison to the generic Industrial & Commercial Cleanup Criteria (RBSC) specified in the MDNR Operational Memorandum #14, Revision 2 (OM #14). OM #14 states, in accordance with common risk assessment practices, that there is no need to determine soil values protective of groundwater if groundwater contamination is confined to the site and the groundwater at the site is not used as a source of drinking water. Based on our current knowledge of site conditions at the Buffalo Plant site, there are no drinking water wells in the vicinity and all local users of water are supplied with water by municipal water-authority pipelines. Supplemental Phase II and Phase III oil and groundwater level data shall be assessed to determine whether an evaluation of potential impacts to off-site groundwater is needed.

EXTENT OF CONTAMINATION REPORT

The results of the Phase III investigation shall be summarized in a report. The report shall at a minimum include:

i) Introduction with purpose, background, and scope;

ii) Investigation Summary with overview, field activity description, methodologies, sampling, and analysis summary associated with each individual PAOC;

iii) Summary of Finding and Results on the nature and extent of contamination relating to each individual PAOC including evaluation of investigation chemical analysis results according to the procedures and RBSC described in the MDNR OM #14 Revision 2, and a statistical evaluation of the correlation between chemical field screening and laboratory analysis results; and

iv) Summary of Conclusions.

A report Table of Contents is provided below.

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1.2.2 Site History
1.2.3 Previous Investigations

1.3 Scope of Work

2.0 STUDY AREA INVESTIGATION PLAN AND PROTOCOLS

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2.2.1 Surface Features (topographic mapping, etc.)
2.2.2 Contaminant Source Investigations
2.2.3 Surface Water and Sediment Investigations (if applicable)
2.2.4 Geological Investigations
2.2.5 Soil and Vadose Zone Investigation
2.2.6 Groundwater Investigations
2.2.7 Underground Utilities

2.3 If technical memoranda documenting field activities were prepared, they may be included in an appendix and summarized in this report chapter.

3.0 SUMMARY AND FINDINGS OF RESULTS

3.1 Includes results of activities to determine chemical and physical nature, extent and magnitude of contamination relating to PAOC's. Contaminant fate and transport should be discussed, where appropriate. Results and findings should be grouped by individual PAOC's. These may include the following:

3.1.1 Surface Features
3.1.2 Surface Water and Sediments
3.1.3 Geology
3.1.4 Soils
3.1.5 Hydrogeology

4.0 EVALUATION OF RESULTS WITH RESPECT TO MDNR GENERIC INDUSTRIAL CLEANUP CRITERIA

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- EOC Maps
  - Soil
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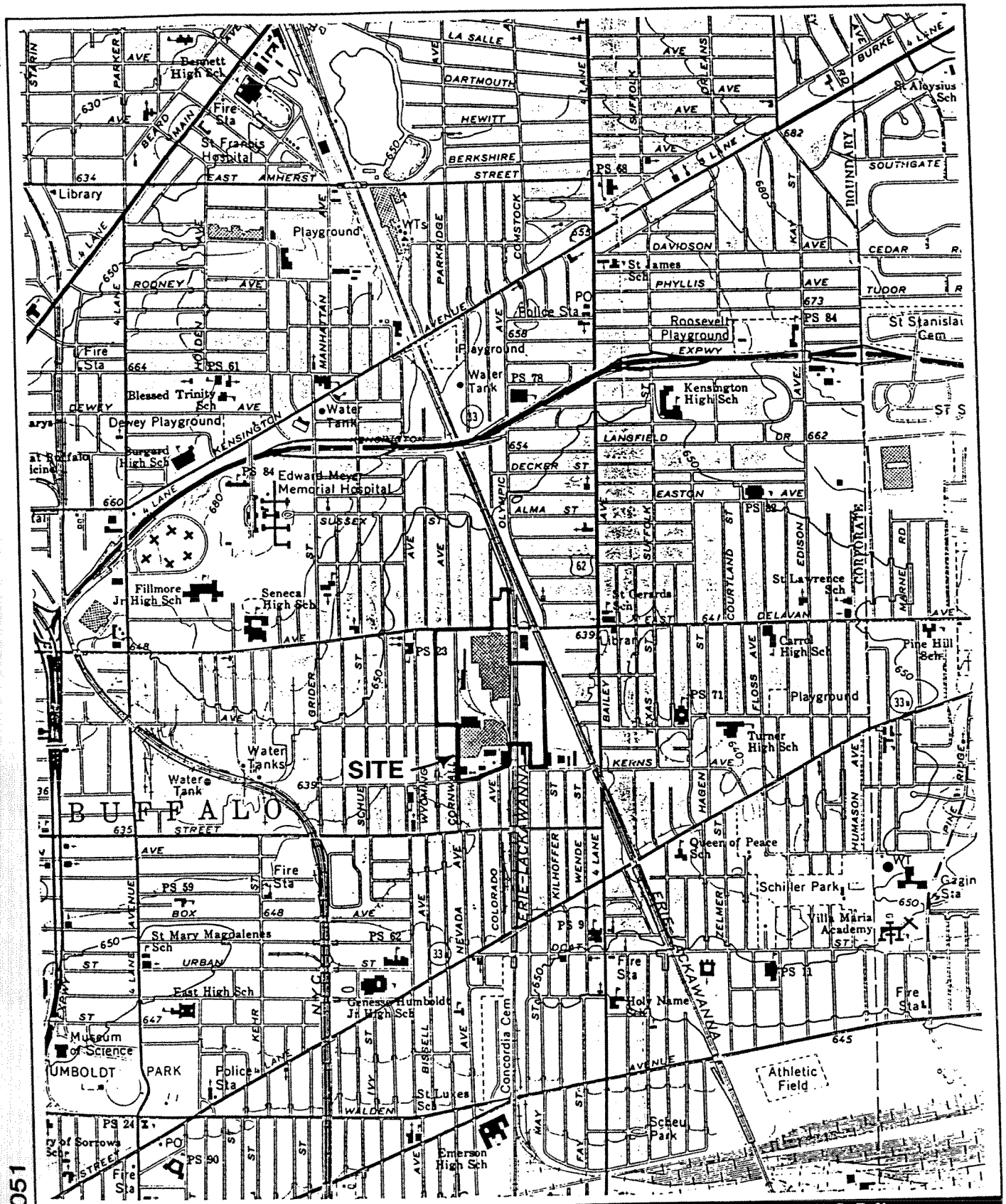
- Appendix A - Analytical Data and QA / QC Evaluation Results
- Appendix B - Hydrogeologic Testing Calculations

Appropriate figures, tables, and appendices shall support and accompany the report text. The final report shall be transmitted to GM in WordPerfect 5.1 or Microsoft Word compatible format. Tables shall be submitted in Lotus 1,2,3, Excel, or Access compatible format. All figures shall be submitted in AutoCad 12 or compatible format.

SCHEDULE AND ACCESS

The schedule for completion of the Phase III EOC study begins with the contract award date. Marking of proposed test boring locations in each PAOC at the Buffalo Plant shall be performed within 2 weeks of contract award date to permit AAM personnel time to clear underground and overhead utilities and resolve any scheduling or operational issues. Field work shall begin 3 weeks after marking of Phase III locations is performed.



LATITUDE: 42° 55' 12"N LONGITUDE: 78° 49' 09"W

USGS QUADRANGLE: BUFFALO NE, N.Y.

H&A OF NEW YORK

Geotechnical Engineers & Environmental Consultants

GENERAL MOTORS CORPORATION
BUFFALO, NEW YORK

PROJECT LOCUS

SCALE: 1 IN. = 2000 FT.

NOVEMBER 1995

FIGURE 1

FILE NO. 70464-051

169669

APPENDIX D

FINAL
PHASE II ENVIRONMENTAL SITE INVESTIGATION
AND PHASE III EXTENT OF CONTAMINATION STUDY
AMERICAN AXLE & MANUFACTURING, INC.
(FORMERLY GENERAL MOTORS SAGINAW DIVISION)
BUFFALO PLANT
BUFFALO, NEW YORK

Prepared by:
Blasland, Bouck & Lee
August 2000

FINAL

PHASE II ENVIRONMENTAL SITE INVESTIGATION (ESI) AND PHASE III EXTENT OF CONTAMINATION STUDY AMERICAN AXLE & MANUFACTURING, INC. (FORMERLY GENERAL MOTORS SAGINAW DIVISION) BUFFALO PLANT BUFFALO, NEW YORK

PREPARED BY BLASLAND, BOUCK & LEE, INC.
AT THE REQUEST OF GENERAL MOTORS COUNSEL
AUGUST 2000

INTRODUCTION

Blasland, Bouck & Lee, Inc. (BBL) performed a Supplemental Phase II Environmental Site Investigation (ESI) and Phase III Extent of Contamination (EOC) Study to address potential areas of environmental concern (PAOCs) at the General Motors Corporation's (GM) former Buffalo Plant. A PAOC is defined as an area with a documented release of hazardous substances or petroleum products that could pose an unacceptable risk to human health or the environment. The Supplemental Phase II ESI and the Phase III EOC Study were performed in four field mobilizations: July 1996; October 1997; May 1998; and June 1998. The Buffalo Plant is located at 1001 East Delavan Avenue, Buffalo, New York, and is currently owned by American Axle & Manufacturing, Inc. Plant (AAM). Figure 1 shows the site location.

BACKGROUND

Potential areas of environmental concern (PAOCs) were initially identified at the Buffalo Plant during a Phase I Environmental Site Assessment (ESA) conducted by Haley and Aldrich, Inc. (H&A) in 1993 (H&A 1993). A Phase I ESA is a non-intrusive investigation that identifies PAOCs based on a review of Federal, State, and facility files, drawings, photographs, documents, and interviews with plant personnel. The Phase I ESA was conducted at the request of GM Legal Counsel in connection with a February 28, 1994 sales of the property to AAM. Based on the Phase I ESA conclusions, a Phase II ESI was conducted at selected PAOCs. A Phase II ESI is an intrusive investigation performed to confirm or deny the presence of contaminants in soil or groundwater at levels of concern to the public health or the environment.

Based on the findings of the Phase II ESI, H&A identified PAOCs that required additional assessment. Therefore, H&A prepared a Work Plan (H&A 1995) for a Supplemental Phase II ESI with a contingency for a Phase III Extent of Contamination (EOC) Study if impacts above risk-based criteria (RBC) were confirmed. A Supplemental Phase II ESI is an intrusive investigation conducted to complete a previously inconclusive Phase II ESI. A Phase III EOC Study is an investigation conducted to determine the horizontal and vertical extent of previously identified contamination. The scope of work in the H&A Work Plan was the basis for the BBL investigation documented in this report.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC) SPILL NO. 9400483

GM reported oily soils observed in PAOCs 1, 2, 3, 5, 6, and 8, and light non-aqueous phase liquid (LNAPL) in PAOC 9 to the NYSDEC as Spill No. 9400483. In addition, three areas of oily soil were discovered by AAM during construction activities. The three oily soil areas were added to the existing Spill Report (Spill No. 9400483). BBL also investigated these areas as part of the Phase II ESI and Phase III EOC Study.

OBJECTIVES

The objectives of the Supplemental Phase II ESI were to:

i) determine whether LNAPL is present in the subsurface at the Former Knuckle-Job Area (PAOC 1), the Maintenance Garage Area (PAOC 2), the Fire Loop Repair Area (PAOC 5), the Former Underground Storage Tank (UST) Fill Station Area (PAOC 6), the Tank No. 5 Area (PAOC 7), and the Gleason Machine Area (PAOC 8);

ii) determine whether LNAPL is present in the subsurface in the three additional areas of oily soil reported as NYSDEC Spill No. 9400483. These areas include the fire loop sprinkler repair excavation, the railroad gondola car scale area, and the truck scale pit area; and

iii) characterize concentrations of semi-volatile organic compounds (SVOCs) in the soil at PAOC 2 *and PAOC 6*.

The objectives of the Phase III EOC Study performed by BBL were:

i) define the extent of LNAPL at the Tank No. 11 Area (PAOC 3), PAOC 7, PAOC 8, and the B-26 Coolant Pit (PAOC 9); and

ii) determine potential risks associated with constituents detected in soil or groundwater.

In accordance with the Asset Purchase Agreement (APA) between AAM and GM, the analytical data generated during the investigation were compared to the risk-based screening criteria (RBSC). BBL developed the RBSC using human health and environmental factors including the following:

i) likely exposure pathways consistent with industrial use at the property;

ii) typical simulated exposure distribution consistent with such exposures;

iii) fate and transport characteristics;

iv) local geology and hydrogeology; and

v) toxicity of materials.

SCOPE

The scope of the Phase II ESI and Phase III EOC Study included the following:

i) installation of 18 soil borings;

ii) collection of four soil samples for laboratory analysis for SVOC content;

iii) collection of 74 soil samples for field screening for LNAPL;

iv) installation of 25 monitoring wells; and

v) collection of six groundwater samples for laboratory analysis for SVOC content.

REPORT ORGANIZATION

This report is organized into six sections. This section, Section 1, provides an introduction, discusses the background and objectives of the Phase II ESI and Phase III EOC Studies, and outlines the scope. Section 2 provides a description of the environmental setting and summarizes the lithology and hydrogeology of the property. Section 3 describes the technical approach for the Supplemental Phase II ESI and Phase III EOC Study, including a summary of the sampling and analysis methodology employed. Section 3 includes a discussion of the development of the RBSC used to evaluate the data. Section 4 is organized by investigation area. A description of the work performed in each area, the reason the work was necessary, and the results of the investigation are included in this section. Section 5 presents the conclusions of the Phase III EOC Study and recommendations for further action. Section 6 is a list of the references cited.

PHYSICAL SETTING

Refer to the Remedial Investigation (RI) Report for a detailed discussion of Site conditions. Sections contained in the BBL report have been deleted since they are redundant and not as

complete in scope as the RI Report. Geologic and hydrogeologic data developed by BBL for this report were utilized in the preparation of the RI Report.

TECHNICAL APPROACH

Soil Investigation all PAOCs

During the first phase of the field investigation (July 1996), soil borings were installed with a hydraulic probe equipped with stainless steel tubes and disposable acetate liners. In October 1997 and subsequent investigations, the standard penetration test (SPT) was employed to obtain soil samples. Field work was conducted according to the following protocol:

i) mobilize to Site and coordinate Site access and control;

ii) determine soil boring locations and coordinate concrete coring operations;

iii) calibrate TVA-1000 Organic Vapor Analyzer (OVA) and mini-ram;

iv) conduct health and safety meetings;

v) perform soil borings to specified depths using a hydraulic probe or split-spoon sampler;

vi) collect soil samples for field screening;

vii) collect soil samples for laboratory analysis;

viii) describe soils according to Burmister and using the Unified Soil Classification System (USCS);

ix) decontaminate equipment prior to, during, and after boring and sampling tasks at each boring / sampling point; and

x) properly abandon borings with bentonite and grout.

Soil boring logs are included in the RI Report.

Field Screening for Oil

Soil samples collected in October 1997 were screened for the presence of LNAPL both visually and with a hydrophobic dye. The dye, Sudan IV, turns red in the presence of petroleum hydrocarbons. This test will detect hydrocarbons that are present in quantities too small to be observed visually. To perform the test, soil samples were

placed in a clear plastic bag with approximately 2 milligrams (mg) of the dye and a small amount of water and agitated.

Definition of LNAPL in the Subsurface, PAOCs 1, 3, 7, 8, and 9

Wehran, *in a previous investigation*, calculated the conductivity of the clay for oil as 3×10^{-6} centimeters per second (cm/sec) based on slug test measurements in Coolant Pit monitoring well B-1. This means that the clay is relatively impermeable to oil. Therefore, oil in the subsurface at the Site would be expected to rest on top of the clay. In fact, oily soil beneath the plant in PAOCs 1, 2, 5, 6, 7, and 8 occurs at the base of the fill unit or in fractures in the upper portion of the clay (H&A). Oil was not observed in soil samples collected from the lower portion of the clay, which is not fractured. However, groundwater is not always encountered in the surficial sediments under the footprint of the building. So, oil could be present resting on top of the clay, but groundwater might not be. The purpose of monitoring wells installed in these PAOCs was to determine whether recoverable LNAPL would accumulate. Therefore, it was pointless to look for the water table to determine the appropriate screen interval. Monitoring wells installed within the building were set no more than 2 feet into the clay regardless of whether the water table was encountered.

PAOCs 7-8-9 Area Free-Oil Investigation

Borehole logs for monitoring wells B-1 and B-2 in the Coolant Pit, describe oil in fractures in the upper portion of the clay (Wehran 1992). The Coolant Pit occupies the northern end of the Gleason Machine Area (Figure 2). Oil was not observed in the lower portion of the clay. However, oil was observed in the till unit underlying the clay. Due to the clay's extremely low permeability to oil, the oil could not have migrated through the clay to get to the till. Therefore, these observations suggest two distinct oil plumes. The oil in the upper, fractured portion of the clay, is described as having a foul odor, while the oil in the till was described as "clean" (Wehran 1992). This could indicate that oil in the upper fractured portion of the clay has a different source from the oil in the till. Oil in the upper, fractured portion of the clay, is likely used oil from the Gleason Machine Area (PAOC 8). Oil in the till unit underlying the clay may be from Former Tank No. 5 (PAOC 7), which contained virgin oil. The Tank No. 5 Area is approximately 60 feet east of the Coolant Pit. Fill surrounding the tank likely created a conduit for the oil to migrate into the till.

PAOCs 7, 8, and 9 were assessed as a unit because of their proximity and their apparent interrelationship. The location of each PAOC is shown on Figure 2. A detail of the

vicinity of PAOCs 7, 8, and 9 is shown on Figure 6. LNAPL definition in PAOCs 7, 8, and 9 was carried out at two levels. "Shallow" monitoring wells were screened to intercept the clay/fill boundary (typically 2 to 5 feet below land surface [BLS]). "Deep" monitoring wells were drilled to bedrock and screened in the lowest 5 feet of the borehole (approximately 15 to 20 feet BLS) to intercept the till, if present. Deep and shallow wells were installed in pairs. The deep well was drilled first. Screening with Sudan IV and lithologic descriptions were performed on soil samples from the first boring only. If oily soils were encountered at the base of the fill or top of the clay (as occurred during the installation of MW-309), the well was completed as a shallow well. To avoid creating a conduit for shallow impacts deeper into the subsurface, a deep well was not installed in that area and a step-out location was selected.

Bail-Down Test, PAOC 3

One bail-down test was performed in monitoring well MW-103 to determine LNAPL thickness in the subsurface at PAOC 3. The following procedure was used:

i) bailed well until there was no measurable product thickness; and

ii) recorded increasing product thickness and rising water levels as product and water began to return to the well. Eventually, water levels start to decline again due to weight of product. The point at which water levels start to decline is called the point of inflection. Product thickness as the point of inflection is considered to be representative product thickness in the groundwater (Gruszezenski 1987).

Risk-Based Screening Approach Used for Data Evaluation

In accordance with the APA between AAM and GM, RBSC were developed to evaluate soil and groundwater data. The RBSC were calculated based on the assumptions and algorithms used by the Michigan Department of Environmental Quality (MDEQ) in Operational Memorandum (OM) #14 Revision 2 (MDEQ 1995) and various technical support documents (MDEQ 1997). The RBSC were established by evaluating exposure pathways for soil and groundwater, including:

i) direct soil contact;

ii) particulate soil inhalation;

iii) volatile soil inhalation;

iv) migration from soil to groundwater (for groundwater contact only); and

v) groundwater contact.

The calculated values for each exposure pathway for soil were compared, and the lowest was accepted as the RBSC. For the Phase II ESI, H&A used a RBC for total petroleum hydrocarbons (TPH) of 5,000 milligrams per kilogram (mg/Kg) as a screening criterion to evaluate soil for additional investigation. This criterion was developed by the Massachusetts Department of Environmental Protection (MADEP) for isolated subsurface soils with low frequency/low intensity exposure potential for adult receptors. If TPH was detected above 5,000 mg/kg, additional soil sampling and analysis for SVOC was indicated.

H&A also used a groundwater screening criterion of 50 milligrams per liter (mg/L) for TPH in water that was based on the MADEP model. However, because there is no way to evaluate human health risks using TPH data, the TPH criteria are no longer used to evaluate the Site. Acceptable background ranges of soil concentrations for New York State (NYS) are appropriate screening criteria.

Summaries of the RBSC and pathways calculated are included as Table 3.1 (soil) and Table 3.2 (groundwater). A discussion of the relevant exposure pathways for soil and groundwater is provided below.

Relevant Exposure Pathways for Soil

Exposure pathways to be considered for soil include direct contact (dermal and ingestion), inhalation of fugitive dust, surface runoff, erosion, and migration to groundwater for contact to groundwater.

Exposure of property workers to soil impacts by dermal contact is a potentially complete pathway. The soil dermal contact pathway can be eliminated or minimized by limiting excavations in areas where direct contact to soil is frequent. As part of the sale agreement for the Property, the land use is to remain industrial. An industrial deed restriction has been recorded as part of the sale.

The exposure pathway by soil inhalation consists of the inhalation pathway through both volatile emissions from the soil and through particulates in fugitive dust resulting from wind erosion and vehicular traffic. As an initial evaluation, exposure by inhalation of particulates is considered for the entire soil column. Inhalation of fugitive dust particulates should be evaluated for the upper 6 inches of soil for limited use categories

when excavation of subsurface soils is reliably restricted. Further, if emission of particulate contaminants to the ambient air is determined to be prevented by an engineering barrier (e.g., concrete floor), then the exposure pathway by inhalation would be considered an incomplete pathway.

In areas where groundwater has not been directly evaluated, the potential for mobilization of soil contamination to groundwater must be considered. Soil concentrations protective of contaminant mobilization to groundwater at concentrations above RBSC have been calculated. Because dermal exposure by direct contact is the only potentially complete exposure pathway for groundwater at the Buffalo Plant, soil data were compared to soil criteria protective of groundwater contact.

Relevant Exposure Pathways for Groundwater

Because the surficial waterbearing unit is not a potable water source and the nearest surface water body is 3,000 feet away, the only relevant exposure pathway is groundwater contact, which consists of dermal contact with groundwater contaminants. Therefore, the RBSC developed for constituents of concern in groundwater are based on dermal contact with groundwater.

REGULATORY REQUIREMENTS

NYSDEC

GM reported LNAPL occurrences to NYSDEC in Spill No. 9400483 in 1994. This spill report is a consolidation of all LNAPL issues on-site, including the release at the former B-26 Coolant Pit, which was originally reported as Spill No. 9104671. The spill file will be closed when LNAPL recovery activities are completed.

SUMMARY OF RESULTS

This section provides for each area a brief summary of the results of H&A's investigation, the results of BBL's investigation, and the evaluation of the data generated with respect to the RBSC.

PAOC 1 - Former Knuckle-Job Area

H&A performed a soil boring (SB-103) near a former oil drain in this area. They reported oil coating soil retrieved from the top of the clay in a soil boring performed in this area. SVOC concentrations were detected in two soil samples from SB-103 submitted for analysis but were below RBSC.

To determine whether recoverable oil was present, BBL attempted to install a monitoring well in this area in July 1996. However, the attempt was not successful because concrete encountered at a depth of 2.5 feet BLS could not be penetrated. In October 1997, BBL installed monitoring well MW-304 to a depth of 7.5 feet BLS using a drilling rig with a roller bit. Oil was not observed visually in the soil samples collected for screening during well installation, but was indicated by the hydrophobic dye in soil collected from 5 feet BLS. A measurable quantity of oil had not accumulated in the monitoring well by December 22, 1997. Therefore, this area is no longer considered a PAOC for LNAPL.

PAOC 2 - Maintenance Garage Area

H&A reported LNAPL and a TPH concentration of 62,000 mg/Kg in a soil sample collected from the base of the fill unit in a soil boring (SB-107) located near a hydraulic lift. Therefore, BBL performed a soil boring (SB-2-1) to a depth of 12 feet BLS using a hydraulic probe. Soil samples were collected from the 6-8 and 8-10 feet BLS intervals and analyzed for SVOC using United States Environmental Protection Agency (USEPA) Method 8270.

Di-n-butyl phthalate was detected at a concentration of 1,800 mg/Kg in the soil sample collected from the 8-10 feet BLS interval from soil boring SB-2-1. This concentration is below relevant RBSC. Concentrations of other SVOC constituents were below detection limits (BDL) in the two soil samples collected in this PAOC. Therefore, this area is no longer considered a PAOC for soil. Soil analytical data are summarized in Table 4-1.

Monitoring well MW-205 was installed to a depth of 11 feet in the location of soil borings SB-2-1 to determine whether LNAPL was present in the subsurface. No obvious odors or sheen were observed during well installation or development. LNAPL was not observed in the well. Therefore, this area is no longer considered a PAOC for LNAPL.

PAOC 3 - Tank No. 11 Area

H&A collected soil samples during the installation of monitoring well MW-103 in this area. Soil samples were analyzed for volatile organic compounds (VOCs), SVOCs, polychlorinated biphenyls (PCBs), and TPH. Concentrations of TPH exceeded RBSC in the sample collected from 6 to 8 feet BLS. However, concentrations of VOC and SVOC were below RBSC. PCBs were not detected. Therefore, this area is not considered a PAOC for soil.

A groundwater sample collected from MW-103 was analyzed for TPH, VOC, and SVOC. Bis(2-ethylhexyl)phthalate (a laboratory contaminant) was detected at 77 micrograms per liter (µg/L), slightly above the RBSC of 46 µg/L. TPH was detected at 74 mg/L.

H&A observed LNAPL in monitoring well MW-103 f our months after it was installed. BBL personnel observed 2.14 feet of oil in MW-103 in July 1996. Therefore, in October 1997, BBL installed monitoring wells MW-300, MW-301, MW-302, and MW-303 to define the extent of LNAPL. Soil samples were collected at 2-foot intervals from soil boring locations SB-3-1 (in the location of MW-300), SB-3-2 (MW-301), SB-3-3 (MW-302), and SB-3-4 (MW-303) and screened for LNAPL using Sudan IV hydrophobic dye. Because oil, if present, cannot penetrate the clay and groundwater is not always encountered in the surficial soils underneath the building, wells were installed to 2 feet into the clay regardless of whether groundwater was encountered.

During installation of monitoring well MW-302 north of MW-103, oily soil was observed at a depth of 6 feet BLS, which is the base of the fill unit. During installation of monitoring well MW-300 west of MW-103, hydrocarbons were detected with the Sudan IV dye in soil from 4 feet BLS, also near the base of the fill unit. Oily soils were not observed, and the presence of hydrocarbons was not detected by the Sudan IV dye during installation of monitoring wells MW-301 and MW-303.

A bail-down test was performed in monitoring well MW-103 to determine the thickness of LNAPL in the groundwater. Results of bail-down testing indicate that 0.59 feet (approximately 7 inches) of LNAPL is present on the groundwater.

Groundwater accumulated in three of the four newly-installed wells after several days. However, LNAPL was never observed in these wells.

This indicates that only a limited quantity of LNAPL is present in PAOC 3 and that the extent of LNAPL has been defined.

PAOC 5 - Fire Loop Repair Area (West)

H&A performed a soil boring (SB-116) adjacent to the west edge of the excavation in this area. Two soil samples, from 1-2 and 2-5 feet BLS, were collected for analysis for TPH, VOC (both samples), and SVOC (2-4 foot sample only). Concentrations of these compounds were below RBSC. Therefore, this area was not considered a PAOC for soil. However, H&A reported oil coating the soil in the sample collected from 2-4 feet BLS, which is the base of the fill unit in this area.

To determine whether recoverable oil would accumulate, BBL installed monitoring well MW-200 to a depth of 11 feet (Figure 2). No obvious odors or sheen were observed during well installation or development. LNAPL was not observed in the well. Therefore, this area is no longer considered a PAOC for LNAPL.

PAOC 6 - Former UST Fill Station Area

H&A performed a soil boring (SB-117) in an area of oil-stained pavement 20 feet west of the former fill station. Concentrations of TPH and SVOC in a soil sample collected from 1-2 feet BLS were below RBSC.

H&A reported LNAPL in soil collected from the top portion of the clay in this area. Therefore, BBL performed soil boring SB-6-1 to a depth of 11 feet BLS using a hydraulic probe. A soil sample was collected from the 6-8 foot BLS interval and analyzed for SVOC using USEPA Method 8270. Concentrations of SVOC constituents were BDL. Therefore, this area is no longer considered a PAOC. Soil analytical data are summarized in Table 4-1.

Monitoring well MW-204 was installed to a depth of 11 feet in the location of soil boring SB-6-1 to determine whether LNAPL was present in the subsurface. No obvious odors or sheen were observed during well installation or development. LNAPL was not observed in the well. Therefore, this area is no longer considered a PAOC for LNAPL.

PAOCs 7-8-9 - Tank No. 5, Gleason Machine, and B-26 Coolant Areas

Because of their proximity to each other, these PAOCs 7, 8, and 9 were assessed as a unit. The Tank No. 5 Area (PAOC 7) is approximately 60 feet east of the Coolant Pit (PAOC 9) and may be the source of the oil observed in the Coolant Pit. The Coolant Pit

occupies the northern end of the Gleason Machine Area (PAOC 8). The location of each PAOC is shown on Figure 2. A detail of PAOCs 7, 8, and 9 is shown on Figure 6.

PAOC 7- 8-9 History

PAOC 7 - Tank No. 5 Area: Tank No. 5, a UST formerly containing virgin oil, was emptied, cleaned, and closed in place in 1990. H&A reported that oil-saturated soil was observed at approximately 9 feet BLS in soil borings installed adjacent to the tank in 1990 (H&A 1993). TPH concentrations exceeded RBSC in two soil samples collected for analysis during the installation of monitoring well MW-101 in this area. However, concentrations of SVOC were below RBSC. Because SVOCs have toxicological data that can be applied, TPH exceedances are no longer used as RBSC because there is no way to evaluate risk to human health. In April 1994, H&A observed oil in monitoring well MW-101.

PAOC 8 - Gleason Machine Area: Historically holes had been drilled in the floor in this area to drain accumulated lubricating oils. H&A reported oily soils at the base of the fill unit in soil borings installed in the Gleason Machine Area. TPH concentrations exceeded RBSC in six soil samples collected from three soil borings (SB-105, SB-105, and SB-106) performed in this area. However, concentrations of SVOC were below RBSC.

PAOC 9 - Coolant Pit: The B-26 Coolant Pit is a sub-grade vault with a base at the level of the till unit below the clay. When the coolant pit was cleaned after being decommissioned in 1991, oil was observed seeping in at the joint between the floor and the east wall. This location is hydraulically downgradient from the former location of Tank No. 5. An oil recovery system was subsequently installed in the Coolant Pit in 1992 (Figure 6) and monitoring wells were installed at the northeast (B-1) and southwest corners of the Pit (B-2). However, the horizontal extent of oil had not been defined to address the spill report and the thickness of the oil layer in B-2 still needed to be evaluated.

PAOC 7-8-9 - LNAPL Definition

H&A's Work Plan (H&A 1995) called for installing six temporary wells with direct push technology to define the extent of LNAPL in this area. BBL attempted this approach in July 1996. However, no groundwater or oil was retrieved in three direct push sampling locations with screens open from 6 to 10 feet BLS (BH-1 and BH-3) or 8 to 10 feet BLS (BH-2). Direct push sampling locations are shown on Figure 6. In an attempt to locate the water table, a solid stem auger was used to drill to limestone bedrock in the location of BH-3. A petroleum odor was observed in cuttings retrieved from 10 feet BLS, which

was the base of the fill. Oily soils were not observed at this level. However, this location is apparently near the eastern limit of the shallow plume. Oil was observed on the end of a measuring tape dropped in the borehole when the top of the limestone was reached at 16 feet BLS. This oil is part of the "deep" plume present in the till. No groundwater was encountered at any point in the borehole.

These observations support the presence of impacts at two levels in the PAOC 7-8-9 area. Therefore, definition of the extent of LNAPL is completed by installing paired wells, one screened at the base of the fill / top of the clay and one screened in the till.

Soil samples were collected at 2-foot intervals from soil boring locations SB-7-1, SB-8-1, SB-8-2, SB-9-1, SB-9-2, SB-9-3, SB-9-4, SB-9-5, SB-9-6, SP-9-7, and SB-9-8 and screened for petroleum hydrocarbons using Sudan IV hydrophobic dye. Screening data are presented in Table 4.2.

In October 1997, five monitoring wells were installed in this area (Figure 6). Monitoring wells MW-305, MW-307, and MW-308 were installed to bedrock to define LNAPL in the till unit. Monitoring wells MW-306 and MW-309 were completed 2 feet into the top of the clay to determine whether LNAPL was also present on the top of the clay. MW-309 was initially planned as a deep (bedrock) well. However, because oil-saturated soils were observed at the base of the fill unit, the well was completed as a shallow well. After installation, oil was present in all five wells. A cross-section through the PAOC 7-8-9 Area (Figure 7) was prepared to illustrate the subsurface conditions.

In May 1998, ten additional monitoring wells were installed in PAOC 7-8-9 Area (Figure 8). The wells were installed in two-well clusters consisting of a shallow well screened in the fill unit and deep well screened above the bedrock. The well clusters were installed to the north (MW-402 and MW-403), south (MW-400 and MW-401), east (MW-408 and MW-409), and west (MW-406 and MW-407) of the PAOC 7-8-9 Area and were placed as close to PAOC 7-8-9 as was practically feasible. Monitoring wells MW-404 and MW-405 were installed downgradient from PAOC 7-8-9 and adjacent to the Buffalo Sewer Authority (BSA) sewer tunnel. These locations were selected because the water table elevation maps suggest that water beneath the plant migrates toward the tunnel, then moves south along the side of it. Monitoring wells MW-400, MW-402, MW-404, MW-406, and MW-408 were installed to bedrock and monitoring wells MW-401, MW-403, MW-406, MW-407, and MW-409 were completed in the fill unit. After installation, oil was present in monitoring wells MW-400, MW-401, and MW-406. Only a small amount of oily water was present in MW-404. This well is likely at the southern extent of oil that has migrated along the sewer tunnel. Additional wells were

necessary to define the western extent of the deep plume and the southern extent of both the shallow and deep plumes.

In June 1998, deep monitoring well MW-500 (Figure 8) was installed west of MW-406 to define the bedrock plume in that direction. No oil was observed in this well, which defines the western extent of the deep plume. Monitoring well MW-104 (installed by H&A) is screened just above the bedrock and serves to define the southern extent of the bedrock plume. No oil or water was observed in MW-104. Shallow monitoring well MW-502 (Figure 8) was installed adjacent to MW-104 to define the extent of the shallow plume to the south. Attempts to install this well closer to the building were not successful due to numerous utility lines in the area. The extent of the shallow and deep oil plumes are shown on Figures 8 and 9.

Groundwater Sampling and Analysis

After the extent of LNAPL was defined, groundwater samples were collected from six monitoring wells at the plume edges and analyzed for SVOC using USEPA Method 8270.

In May 1998, groundwater samples were collected from MW-404, MW-405, MW-408, and MW-409 for analysis of polynuclear aromatic hydrocarbon (PAH) content. Groundwater samples could not be obtained from MW-402, MW-403, or MW-407 because they were either dry initially or did not recharge after purging. Monitoring wells MW-500 and MW-502 were sampled in June 1998. Concentrations of all PAH constituents were BDL in all samples except the samples from MW-404. Benzo(a)pyrene and indeno(1,2,3-c,d)pyrene were detected at 33 and 14 µg/L, respectively, above RBSC of 1.1 µg/L for groundwater contact. However, the sample collected from MW-404 was oily, and concentrations detected are most likely representative of the oil and not dissolved constituents. This is supported by the fact that these concentrations are orders of magnitude above the theoretical water solubility of these chemicals. Therefore, the Gleason Machine Area, the Coolant Pit, and the Former Tank No. 5 Area are not considered PAOCs for groundwater. Table 4.3 is a summary of groundwater analytical data.

Combined Sewer Water Sampling and Analysis PAOCs 7-8-9

To determine whether LNAPL, present in the subsurface in the PAOC 7-8-9 Area, was impacting water in the combined sewer system, in September 1998, a water sample was collected from a manhole in the south portion of the property (Figure 2). The sample was analyzed for SVOC using USEPA Method 8270. Concentrations of semi-volatile

constituents were BDL, with the exception of bis(2-ethylhexyl)phthalate. An estimated concentration of 4 µg/L, which is below the method reporting limit (MRL), was quantified in the sample. However, bis(2-ethylhexyl)phthalate was also detected in the method blank, a laboratory quality assurance/quality control (QA/QC) sample. Therefore, the bis(2-ethylhexyl)phthalate appears to be the result of laboratory contamination and not a measure of dissolved concentrations in the storm sewer water.

In September 1999, AAM personnel performed routine semi-annual sampling of the combined sewer effluent required by their BSA wastewater discharge permit. Concentrations of total extractable hydrocarbons (THE) were detected at 102 and 110 parts per million (ppm), which are slightly over the BSA permitted discharge criterion of 100 ppm. Additional sampling and analysis in October 1999, April 2000, and May 2000 confirmed the exceedances. AAM has attempted to identify the source of the impacts, through the following activities:

i) videotaping a sanitary sewer that discharges to the BSA sewer tunnel. (The location of the BSA sewer tunnel with respect to the PAOC 7-8-9 is shown on Figure 7.) This sewer line passes through the B-26 Coolant Pit Area at a depth of approximately 3 feet below grade. AAM has not been able to identify the source of the oil from the videos, although an oil coating was observed on the camera;

ii) visual inspection - AAM personnel physically inspected the sewer. Some staining was observed on the sewer walls;

iii) sampling pipes emptying into the sewer - A value of 24,000 ppm oil and grease was detected in a sample from a pipe that is close to the B-26 Coolant Pit Area;

iv) fingerprinting the oil - Samples were collected from the pipe with the high detection, the B-26 Area, and the downstream location where the sewer sample was collected. The data indicated that the oils are similar. However, similar oils are used elsewhere in the facility and the B-26 Coolant Pit could not be positively identified as the source; and

v) ensuring that the oil recovery system at the B-26 Coolant Pit cannot be disabled - AAM personnel observed in January that the B-26 system had been turned off. The system was restarted but was later found to be turned off again. A security guard now regularly checks it to ensure that it is operating.

At this time, the source of the BSA permit exceedance has not been positively identified.

Truck Scale Pit, Railroad Gondola Car Scale Area, and Fire Loop Repair Excavation (East)

The truck scale pit, the railroad gondola car scale area, and the fire loop repair excavation on the east side of the plant are the three areas of oily soil included in NYSDEC Spill No. 9400483. AAM encountered oily soils during construction activities in these areas. AAM removed and properly disposed of the oily soils, and replaced them with clean fill.

The fire loop repair excavation is outside the plant east of PAOC 7-8-9 and the railroad gondola car scale area is outside the plant south of PAOC 7-8-9. Monitoring wells were installed in these areas during definition of the extent of oil from PAOC 7-8-9. The source of the oil in the soils excavated from these areas may be PAOC 7-8-9. Monitoring wells MW-408 and MW-409, which define the eastern extent of LNAPL in the PAOC 7-8-9, also serve as monitoring points for the fire loop repair excavation area.

Monitoring well MW-502, which defines the southern extent of LNAPL in the PAOC 7-8-9, provides the needed information for the railroad gondola car scale area. Monitoring well MW-502 is screened across the base of the fill / top of the clay, which is where AAM observed the oil soils. Therefore, only the truck scale pit area west of the plant needed additional investigation.

Subsequently, monitoring well MW-501 was installed in the former truck scale pit excavation. No oil was observed in MW-501 or in the monitoring wells installed in the fire loop repair excavation and the railroad gondola car scale area.

Groundwater samples *were* collected from monitoring wells MW-408, MW-409, and MW-502 for SVOC analysis. SVOC concentrations were BDL in all three wells.

Bail-Down Testing, PAOC 3

Results of bail-down testing in monitoring well MW-103 in PAOC 3 indicate that 0.59 feet (approximately 7 inches) of LNAPL is present on the groundwater. The horizontal extent of LNAPL is apparently limited to the area of thick fill where Tank No. 11 was formerly located.

CONCLUSIONS AND RECOMMENDATIONS

In July 1996 and October 1997, BBL performed a Supplemental Phase II ESI at AAM's Buffalo Plant to:

i) determine whether LNAPL is present in the subsurface at the Former Knuckle-Job Area (PAOC 1), the Maintenance Garage Area (PAOC 2), the Fire Loop Repair Area (PAOC 5), the Former UST Fill Station Area (PAOC 6), and the Gleason Machine Area (PAOC 8);

ii) characterize concentrations of SVOC in the soil at PAOC 2 *and PAOC 6*; and

iii) determine whether oil would accumulate in three areas formerly containing oily soil identified by AAM and added to NYSDEC Spill No. 9400483.

Based on the findings of the Phase II ESI and Supplemental Phase II ESI, a Phase III EOC Study was performed to:

i) define the extent of LNAPL at the Tank No. 11 Area (PAOC 3), the Tank No. 5 Area (PAOC 7), Gleason Machine Area (PAOC 8), and the Coolant Pit (PAOC 9).

BBL also reviewed the results of H&A's investigation. The following conclusions and recommendations reflect that data as well as the data from the current investigation.

Conclusions and Recommendations

Based on both BBL's field investigation and H&A's 1994 investigation, the following conclusions and recommendations are provided for each PAOC.

PAOC 1 - Former Knuckle-Job Area: The presence of oil was indicated in soil at PAOC 1 by the hydrophobic dye. However, oil was not observed visually and oil did not accumulate in monitoring well MW-304. Also, SVOC concentrations in two soil samples collected at this PAOC were below RBSC. Therefore, the Knuckle-Job Area is no longer considered a PAOC. To address the spill file with NYSDEC, a groundwater sample may be required.

PAOC 2 - Maintenance Garage Area: Concentrations of SVOC above relevant criteria were not detected in soil samples collected at PAOC 2 in July 1996. LNAPL did not accumulate in monitoring well MW-205 installed in this area. Therefore, the

Maintenance Garage Area is no longer considered a PAOC. To address the spill file with NYSDEC, a groundwater sample may be required.

PAOC 3 - Former Tank No. 11 Area: The extent of LNAPL observed in shallow portion of the subsurface in the Former Tank No. 11 Area has been defined. However, LNAPL observed in deep monitoring well MW-406 may be associated with the LNAPL observed in MW-103.

PAOC 5 - Fire Loop Repair Area (West): LNAPL did not accumulate in monitoring well MW-200 installed in PAOC 5. Therefore, the Former UST Filling Station Area is no longer considered a PAOC. To address the spill file with NYSDEC, a groundwater sample may be required.

PAOC 6 - Former UST Fill Station: Concentrations of SVOC above RBSC were not detected in a soil sample collected PAOC 6 in July 1996 (Table 4-1). Also, LNAPL did not accumulate in monitoring well MW-204 installed in this area. Therefore, the Maintenance Garage Area is no longer considered a PAOC.

PAOC 7-8-9 - Tank No. 5 Area, Gleason Machine Area, and B-26 Coolant Pit: SVOC concentrations in groundwater samples collected from monitoring wells installed at the limits of the shallow and deep plumes content were BDL, except for a sample of oily water from MW-404. Therefore, these areas are no longer considered PAOCs for dissolved SVOC in groundwater. Shallow and deep LNAPL plumes are present in this area. The relationship between the shallow and deep plumes, the B-26 Coolant Pit, and the BSA sewer tunnel is illustrated on Figure 7.

Deep Oil Plume: Although over 2 feet of LNAPL is present in the deep plume at MW-305, the current Coolant Pit recovery system which is downgradient from MW-305, appears to intercept most of the LNAPL in this area. Monitoring wells MW-307 and MW-400, which are downgradient from the Coolant Pit recovery system, only contain a thin layer of product, less than 1-inch thick. This further supports the premise that the Coolant Pit recovery system is collecting most of the oil in this area.

A trace of LNAPL was noted in MW-404, the most downgradient well in this PAOC. Since any well further downgradient would be off-Site, GM / AAM may want to consider monitoring or employing passive recovery at MW-404. The purpose of periodic monitoring and / or passive recovery at MW-404 would be to confirm the containment of LNAPL on-Site. AAM will continue operation and maintenance of the B-26 Oil Recovery System and submit the required annual report to NYSDEC.

Shallow Oil Plume: The LNAPL at the top of the clay/base of the fill in PAOC 7-8-9 is not a human health risk for the following reasons:

i) the Site is an industrial facility;

ii) the plume is contained beneath the building;

iii) the only potentially complete exposure pathway is through direct contact by construction workers;

iv) groundwater has not been impacted;

v) there are no soil impacts above RBSC;

vi) the plume is not moving; and

vii) the oils involved do not pose a flammable risk.

Truck Scale Pit: LNAPL was not present in a monitoring well installed in the area where oily soils were encountered during AAM construction activities. To address the spill file with NYSDEC, a groundwater sample and possibly soil samples may be required.

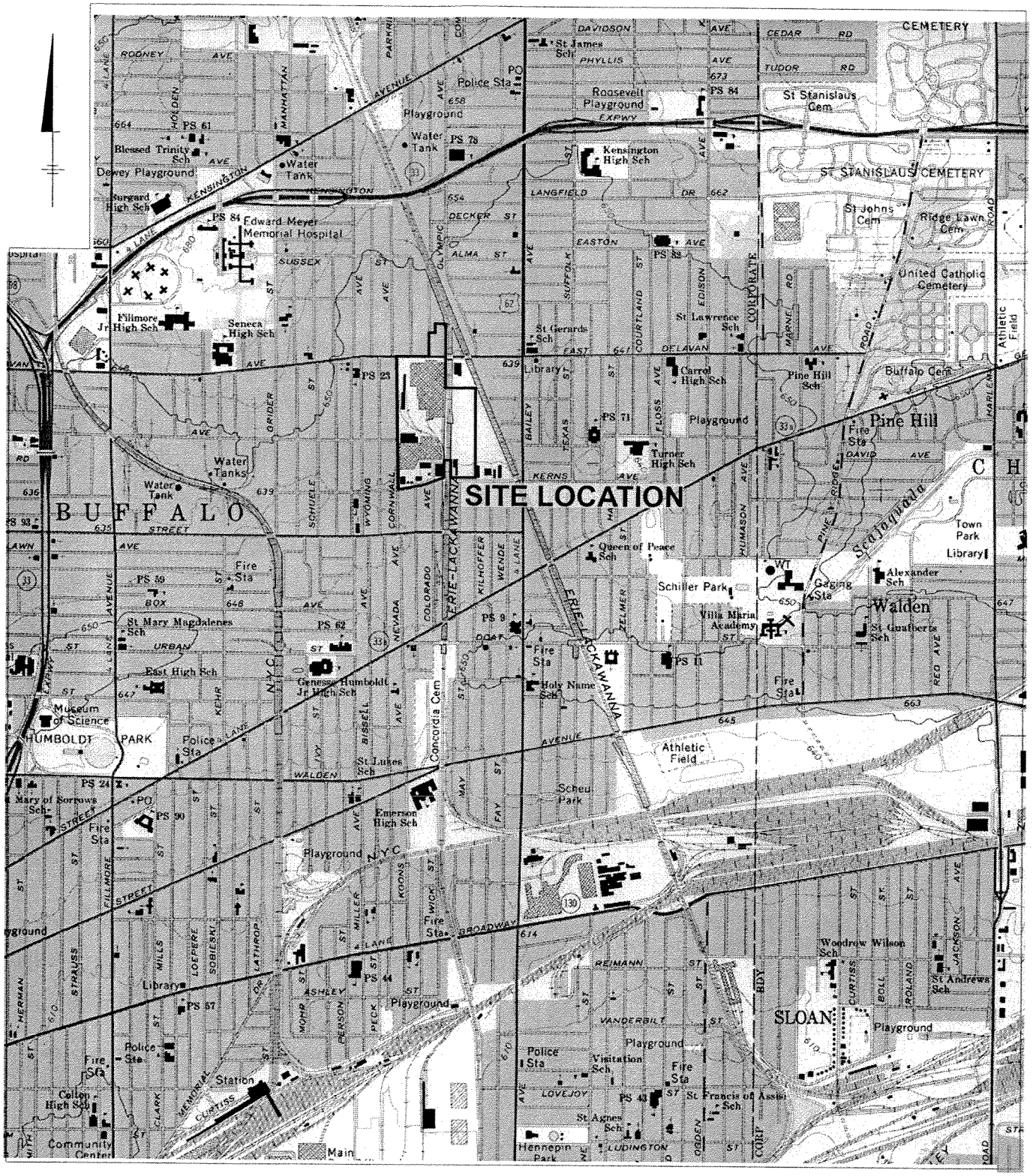
Fire Loop Repair Excavation (East): The oil soils encountered by AAM in this area may represent the eastern extent of the shallow oil plume originating in PAOC 8, the Gleason Machine Area. However, LNAPL was not present in monitoring wells MW-408 and MW-409 installed in this area as part of the investigation of the LNAPL in PAOCs 7, 8, and 9. SVOC concentrations were BDL in groundwater samples collected from these wells in 1998. Therefore, no further action is required.

Railroad Gondola Car Scale Area: The oil soils encountered by AAM in this area may represent the southern extent of the shallow oil plume originating in PAOC 8, the Gleason Machine Area. However, LNAPL was not present in monitoring wells MW-104 and MW-502. MW-502 is screened across the base of the fill unit/top of the clay, where oily soils were observed by AAM. SVOC concentrations were BDL in a groundwater sample collected from MW-502 in 1998. Therefore, no further action is required.

AAM Buffalo Sewer Authority Notice of Violation (NOV): Pursuant to the BSA NOV issued to AAM on December 29, 1999, AAM will sample the combined sanitary/storm water effluent in the fall of 2000. If exceedances of the 100 ppm THE criterion are noted, AAM will continue to attempt to identify the source. These efforts will be coordinated and addressed by AAM to the BSA.

REFERENCES

- Haley and Aldrich, Inc. 1993. "Phase I Environmental Site Assessment, Former Saginaw Division - Buffalo Plant, Buffalo, New York", File Number 70451-40, Cleveland, Ohio.
- Haley and Aldrich, Inc. 1994. "Phase II Environmental Site Investigation, Former Saginaw Division - Buffalo Plant, Buffalo, New York", File Number 70451-042, Cleveland Ohio.
- Haley and Aldrich, Inc. 1995. "Supplemental Phase II Environmental Site Investigation and Phase III Extent of Contamination Study Work Plan, Buffalo Plant, American Axle and Manufacturing, Inc. (Formerly General Motors Saginaw Division) Buffalo, New York", File Number 70465-051, Cleveland, Ohio.
- MDNR, 1995a, Environmental Response Division Operational Memorandum No. 14, Revision 2: Remedial Action Plans Using Generic Industrial or Generic Commercial Cleanup Criteria and Other Requirements. June 6, 1995.
- MDNR, 1995b, Environmental Response Division Operational Memorandum No. 6, Revision 4: "Analytical Detection Level Guidance for Environmental Contamination Response Activities Under Part 201 of the Natural Resources and Environmental Protection Act, 1994 Public Act (PA) 451," as amended. September 13, 1995.
- Wehran Engineering, P.C. (Wehran). 1986. "Proposed Groundwater Monitoring Program for Saginaw Division, General Motors Corporation, Buffalo, New York", Grand Island, September.
- Wehran, 1992. "Monitoring Well Installation Report" WE Project No. 02407.WI (letter report to Mr. Anthony Glieco, General Motors Saginaw Division, Buffalo, New York, September 1, 1992).



MAP SOURCE: UNITED STATES GEOLOGIC SURVEY
TOPOGRAPHIC QUADRANGLE, 7.5 MIN.
SERIES,Buffalo NE, New York
photo-revised 1984.

2000 0 2000

APPROXIMATE SCALE IN FEET

12/12/97 BOC-54 APD/JAR
48077030\48077015.CDR

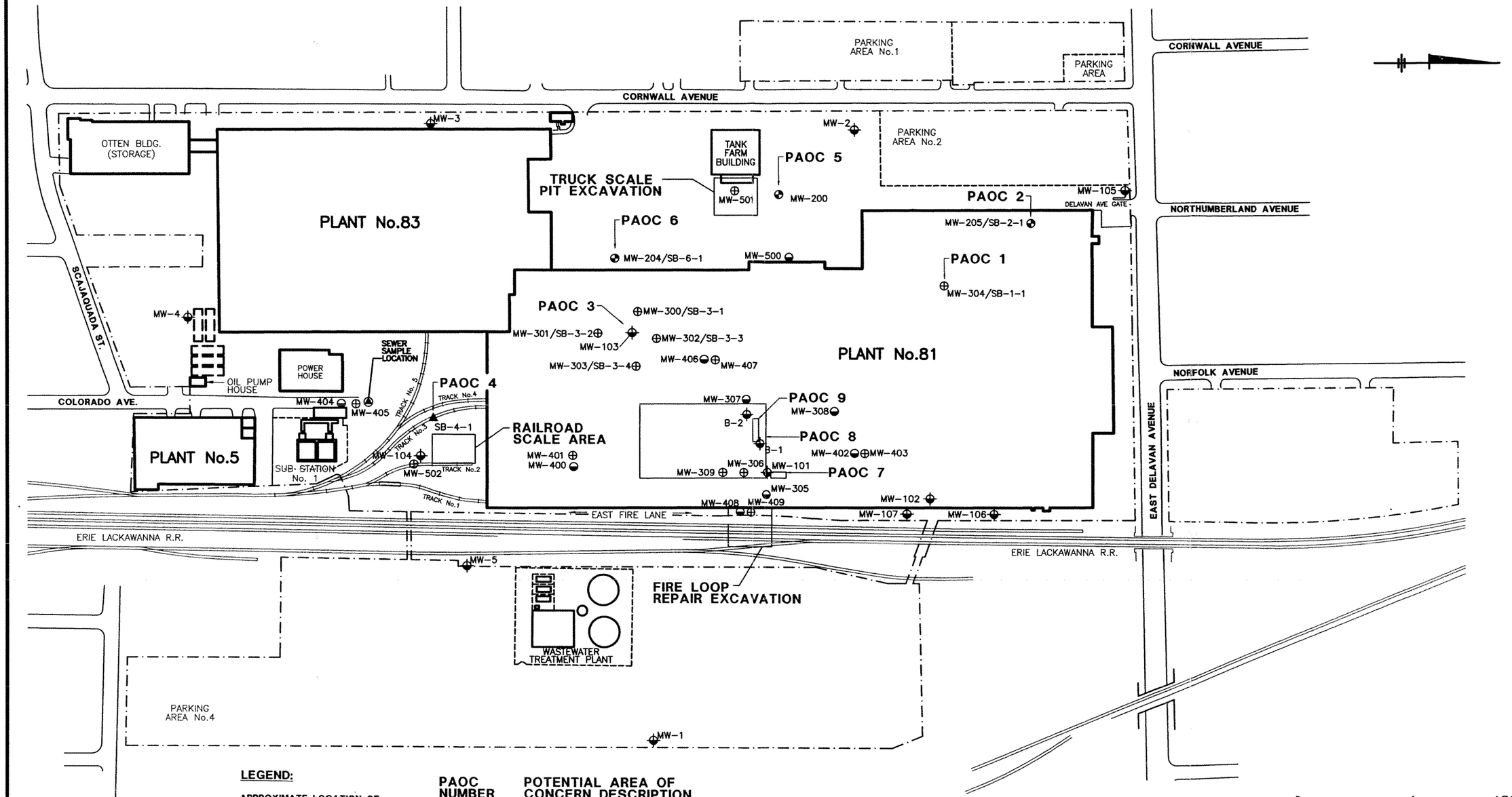
GENERAL MOTORS CORPORATION
AMERICAN AXLE & MANUFACTURING, INC. BUFFALO PLANT

SUPPLEMENTAL PHASE II ENVIRONMENTAL SITE INVESTIGATION AND PHASE III EXTENT OF CONTAMINATION REPORT

SITE LOCATION MAP

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

FIGURE 1



LEGEND:

MW-204/SB-6-1	APPROXIMATE LOCATION OF SOIL BORING/MONITORING WELL INSTALLED BY BBL
MW-300	APPROXIMATE LOCATION OF SHALLOW MONITORING WELL INSTALLED BY BBL
MW-500	APPROXIMATE LOCATION OF SOIL BORING/DEEP MONITORING WELL INSTALLED BY BBL
MW-1	APPROXIMATE LOCATION OF MONITORING WELL INSTALLED BY OTHERS
SB-4-1	SOIL BORING LOCATION

PAOC NUMBER	POTENTIAL AREA OF CONCERN DESCRIPTION
PAOC 1	FORMER KNUCKLE-JOB AREA
PAOC 2	MAINTENANCE GARAGE AREA
PAOC 3	TANK NUMBER 11 AREA
PAOC 4	TRACK NUMBER 3 AREA
PAOC 5	FIRE LOOP-REPAIR AREA
PAOC 6	FORMER UST FILLING STATION AREA
PAOC 7	TANK NUMBER 5 AREA
PAOC 8	GLEASON MACHINE AREA
PAOC 9	COOLANT PIT AREA

SOIL BORING SB-7-1 IS IN LOCATION OF MW-305
SOIL BORING SB-8-1 IS IN LOCATION OF MW-306
SOIL BORING SB-8-2 IS IN LOCATION OF MW-309
SOIL BORING SB-9-1 IS IN LOCATION OF MW-307
SOIL BORING SB-9-2 IS IN LOCATION OF MW-308
SOIL BORING SB-9-3 IS IN LOCATION OF MW-400
SOIL BORING SB-9-4 IS IN LOCATION OF MW-402
SOIL BORING SB-9-5 IS IN LOCATION OF MW-404
SOIL BORING SB-9-6 IS IN LOCATION OF MW-406
SOIL BORING SB-9-7 IS IN LOCATION OF MW-408
SOIL BORING SB-9-8 IS IN LOCATION OF MW-500

0 200' 400'

APPROXIMATE SCALE: 1"=200'

NOTES:

1. ALL LOCATIONS ARE APPROXIMATE.
2. REFERENCE: HALEY & ALDRICH DRAWING BUFFEXPL.DWG, FILE NO. 70464-051. APPROXIMATE LOCATIONS OF SITE FEATURES WERE ADDED BASED ON OBSERVATIONS MADE BY HALEY & ALDRICH, INC.

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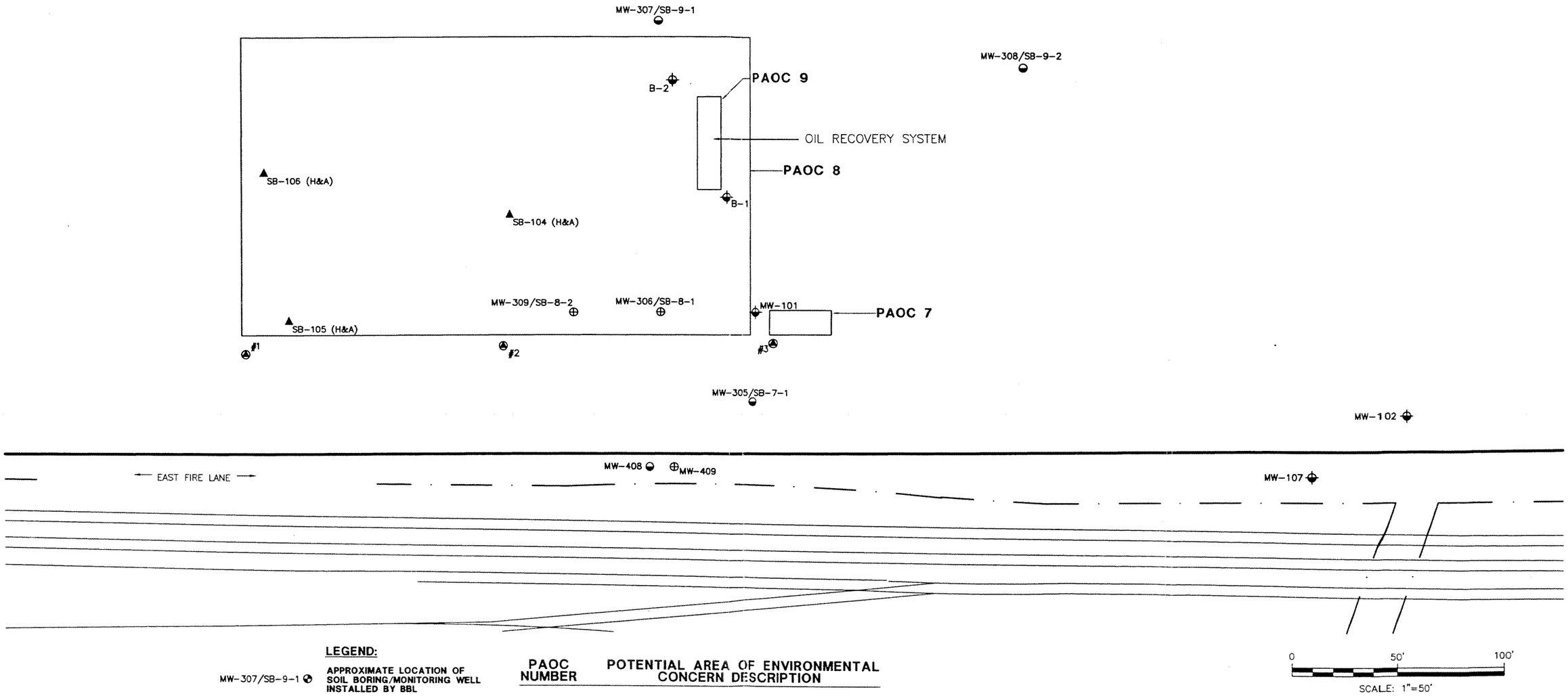
AMERICAN AXLE & MANUFACTURING, INC. BUFFALO PLANT
SUPPLEMENTAL PHASE II ENVIRONMENTAL SITE INVESTIGATION AND PHASE III EXTENT OF CONTAMINATION STUDY

SITE PLAN

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

FIGURE 2

9/20/99 BOC-54 MJS
48077040\PHASE2-3\48077099.DWG



LEGEND:

MW-307/SB-9-1	APPROXIMATE LOCATION OF SOIL BORING/MONITORING WELL INSTALLED BY BBL
MW-300	APPROXIMATE LOCATION OF SHALLOW MONITORING WELL INSTALLED BY BBL
MW-500	APPROXIMATE LOCATION OF DEEP MONITORING WELL INSTALLED BY BBL
MW-1	APPROXIMATE LOCATION OF MONITORING WELL INSTALLED BY OTHERS
SB-4-1	SOIL BORING LOCATION (H&A,1994)
#1	MICROWELL LOCATION
H&A	HALEY AND ALDRICH

PAOC NUMBER	POTENTIAL AREA OF ENVIRONMENTAL CONCERN DESCRIPTION
PAOC 7	TANK NUMBER 5 AREA
PAOC 8	GLEASON MACHINE AREA
PAOC 9	COOLANT PIT AREA

NOTES:

1. ALL LOCATIONS ARE APPROXIMATE.
2. REFERENCE: HALEY & ALDRICH DRAWING BUFFEXPL.DWG, FILE NO. 73464-051. APPROXIMATE LOCATIONS OF SITE FEATURES WERE ADDED BASED ON OBSERVATIONS MADE BY HALEY & ALDRICH, INC.

9/20/99 BOC-S4 MJS
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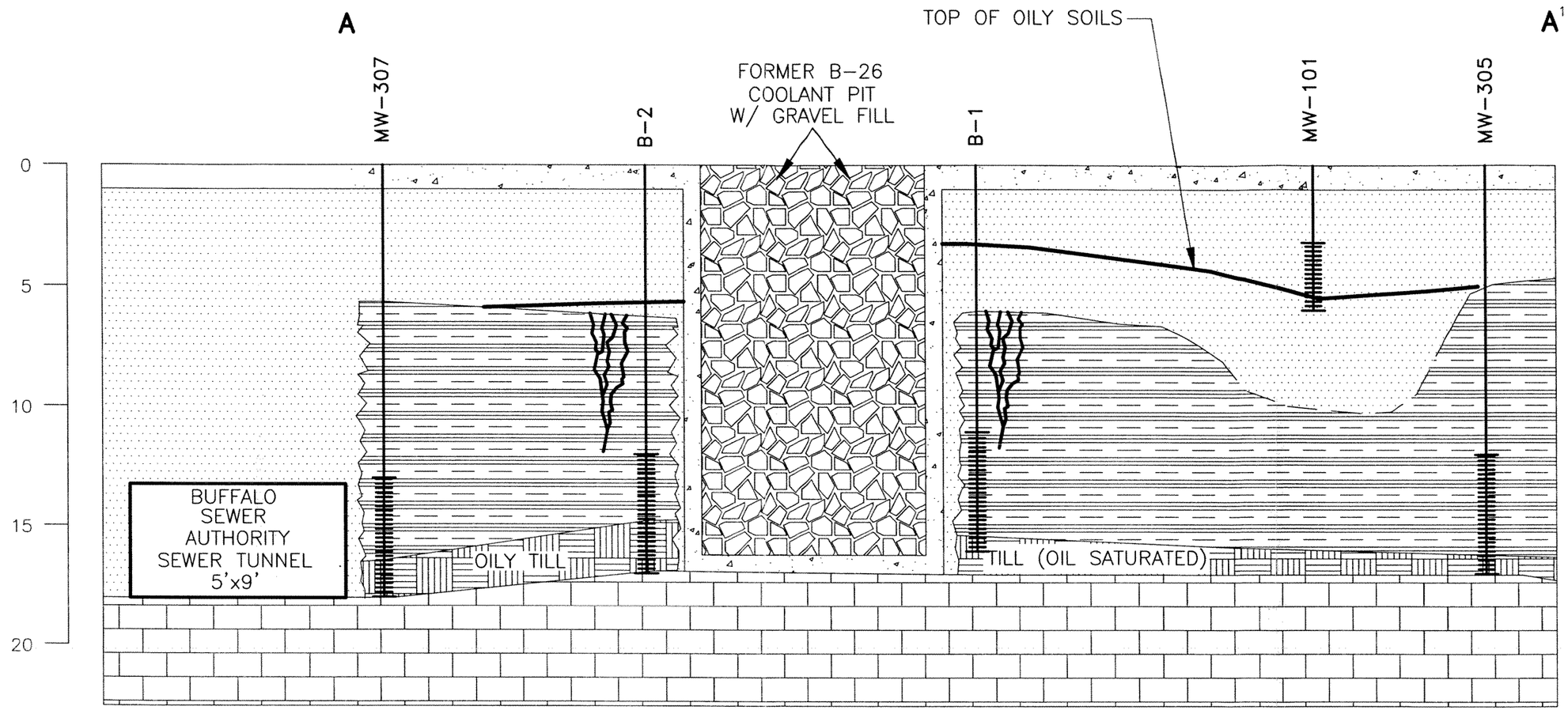
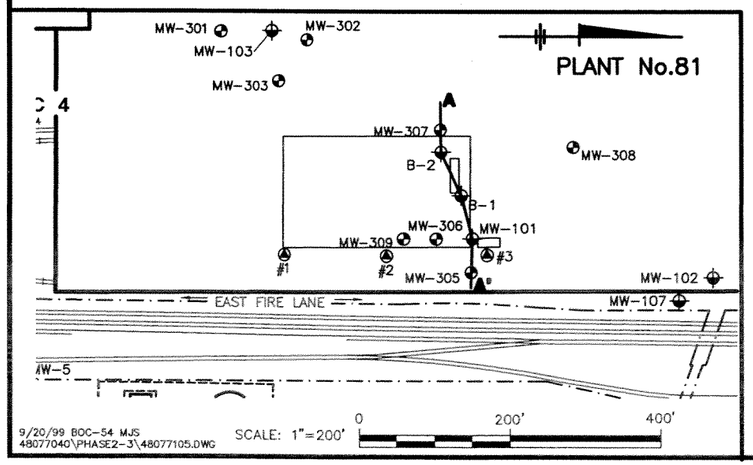
SUPPLEMENTAL PHASE II ENVIRONMENTAL SITE INVESTIGATION AND PHASE III EXTENT OF CONTAMINATION STUDY

PAOC 7, 8, AND 9 AREA DETAIL MAP

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

FIGURE 6





LEGEND

- CONCRETE
- CLAY
- TILL
- LIMESTONE
- GRAVEL
- FILL
- OIL-FILLED FRACTURES IN CLAY
- SCREENED INTERVAL

MW-307 – 0.03 FEET OF LNAPL (12/22/97)
MW-B-2 – 0.05 FEET OF LNAPL (6/28/98)

LNAPL LIGHT NON-AQUEOUS PHASE LIQUID

0 50' 100'
SCALE: 1"=50'

NOTES:

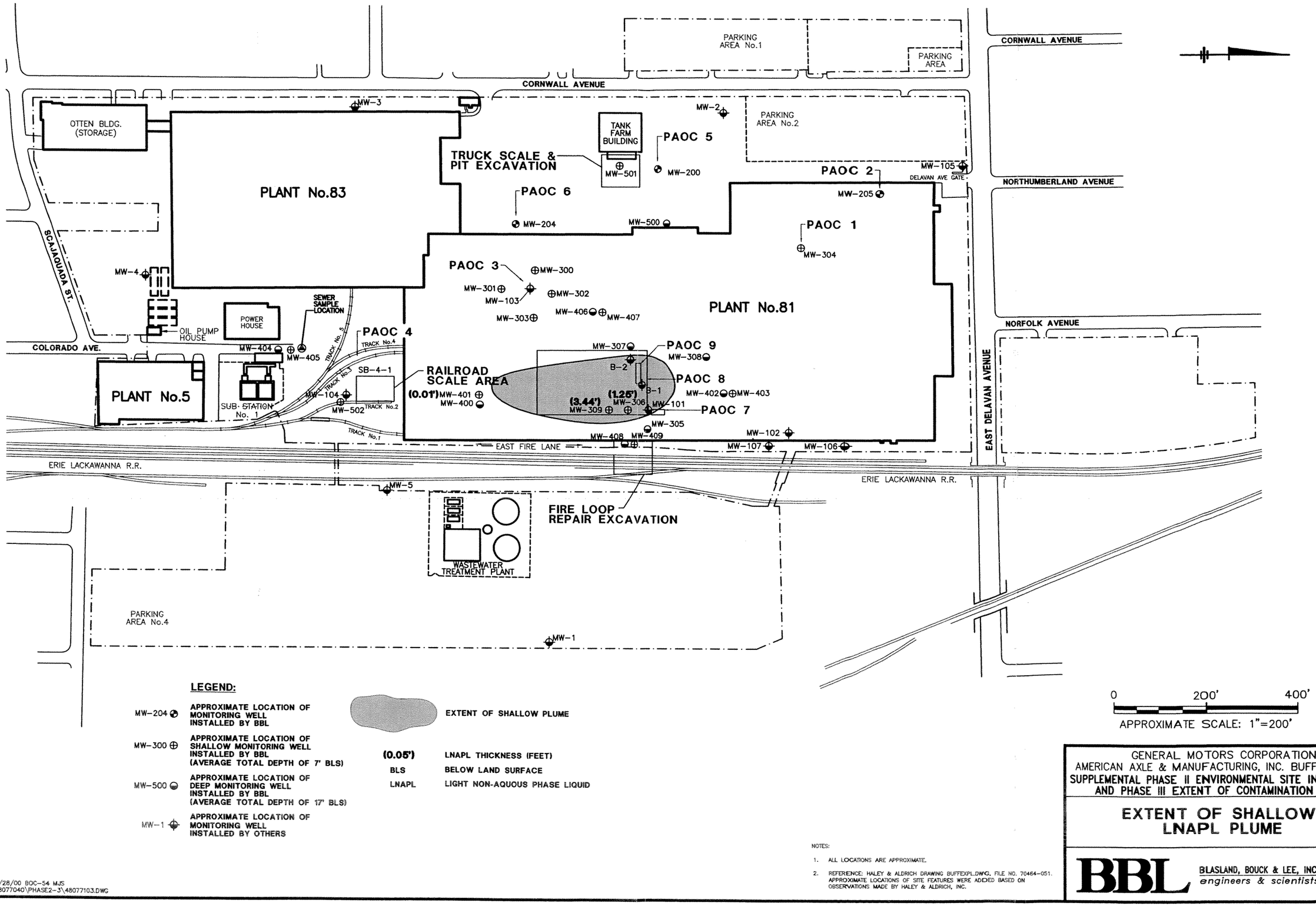
1. ALL LOCATIONS ARE APPROXIMATE.
2. REFERENCE: HALEY & ALDRICH DRAWING BUFFEXPL.DWG, FILE NO. 70464-051. APPROXIMATE LOCATIONS OF SITE FEATURES WERE ADDED BASED ON OBSERVATIONS MADE BY HALEY & ALDRICH, INC.

GENERAL MOTORS CORPORATION
AMERICAN AXLE & MANUFACTURING, INC. BUFFALO PLANT
SUPPLEMENTAL PHASE II ENVIRONMENTAL SITE INVESTIGATION AND PHASE III EXTENT OF CONTAMINATION STUDY

PAOC 7, 8, AND 9 CROSS-SECTION

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

FIGURE 7



LEGEND:

MW-204	APPROXIMATE LOCATION OF MONITORING WELL INSTALLED BY BBL
MW-300	APPROXIMATE LOCATION OF SHALLOW MONITORING WELL INSTALLED BY BBL (AVERAGE TOTAL DEPTH OF 7' BLS)
MW-500	APPROXIMATE LOCATION OF DEEP MONITORING WELL INSTALLED BY BBL (AVERAGE TOTAL DEPTH OF 17' BLS)
MW-1	APPROXIMATE LOCATION OF MONITORING WELL INSTALLED BY OTHERS
	EXTENT OF SHALLOW PLUME
(0.05')	LNAPL THICKNESS (FEET)
BLS	BELOW LAND SURFACE
LNAPL	LIGHT NON-AQUOUS PHASE LIQUID

NOTES:

1. ALL LOCATIONS ARE APPROXIMATE.
2. REFERENCE: HALEY & ALDRICH DRAWING BUFFEXPL.DWG, FILE NO. 70464-051. APPROXIMATE LOCATIONS OF SITE FEATURES WERE ADDED BASED ON OBSERVATIONS MADE BY HALEY & ALDRICH, INC.

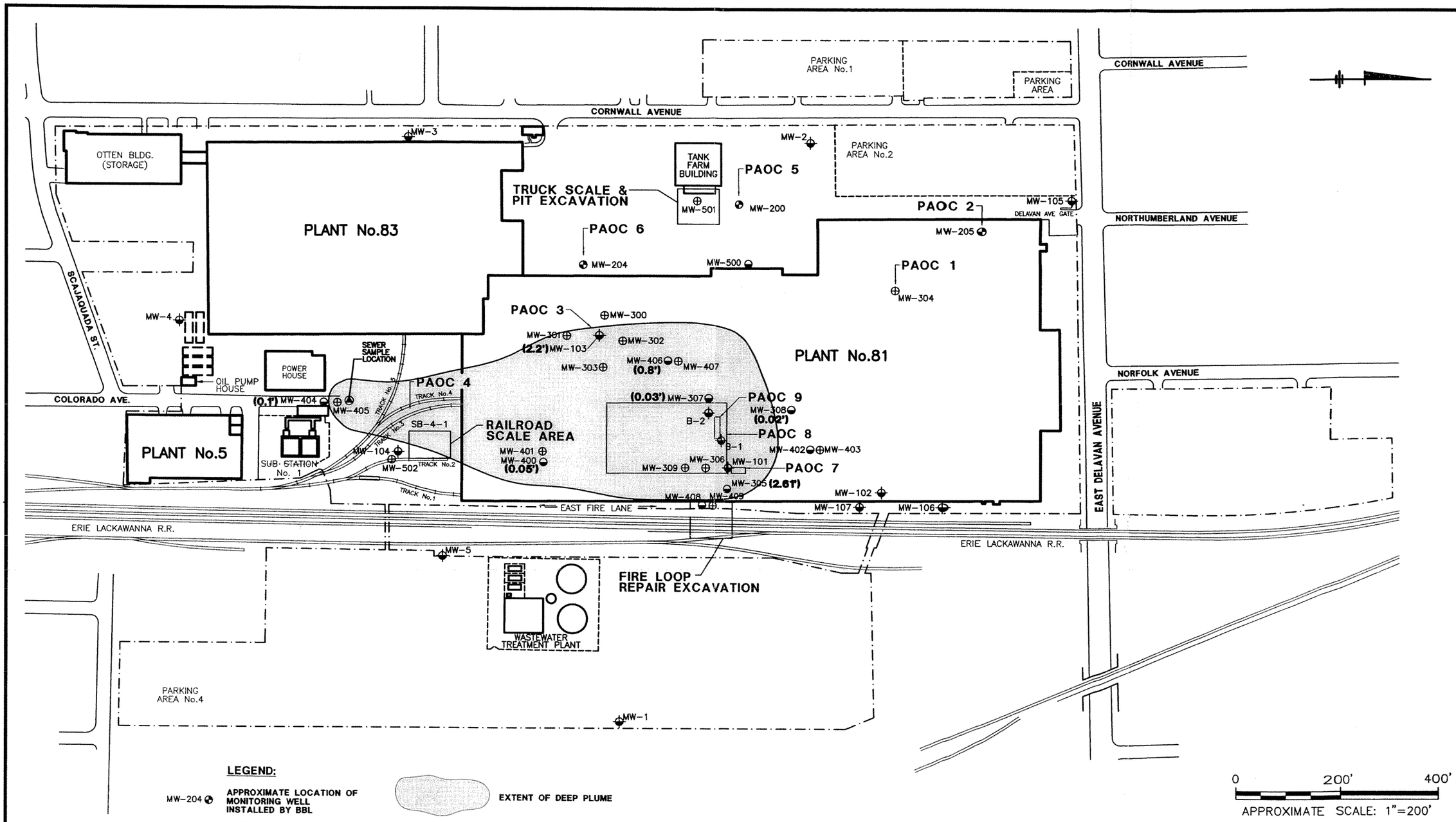
GENERAL MOTORS CORPORATION
AMERICAN AXLE & MANUFACTURING, INC. BUFFALO PLANT
SUPPLEMENTAL PHASE II ENVIRONMENTAL SITE INVESTIGATION AND PHASE III EXTENT OF CONTAMINATION STUDY

EXTENT OF SHALLOW LNAPL PLUME

BLASLAND, BOUCK & LEE, INC. engineers & scientists

FIGURE 8

8/28/00 BOC-54 MJS
48077040\PHASE2-3\48077103.DWG



LEGEND:

MW-204	APPROXIMATE LOCATION OF MONITORING WELL INSTALLED BY BBL		EXTENT OF DEEP PLUME
MW-300	APPROXIMATE LOCATION OF SHALLOW MONITORING WELL INSTALLED BY BBL (AVERAGE TOTAL DEPTH OF 7' BLS)	(0.05')	LNAPL THICKNESS (FEET)
		BLS	BELOW LAND SURFACE
MW-500	APPROXIMATE LOCATION OF DEEP MONITORING WELL INSTALLED BY BBL (AVERAGE TOTAL DEPTH OF 17' BLS)	LNAPL	LIGHT NON-AQUEOUS PHASE LIQUID
MW-1	APPROXIMATE LOCATION OF MONITORING WELL INSTALLED BY OTHERS		

0 200' 400'

APPROXIMATE SCALE: 1"=200'

NOTES:

1. ALL LOCATIONS ARE APPROXIMATE.
2. REFERENCE: HALEY & ALDRICH DRAWING BUFFEXPL.DWG, FILE NO. 70464-051. APPROXIMATE LOCATIONS OF SITE FEATURES WERE ADDED BASED ON OBSERVATIONS MADE BY HALEY & ALDRICH, INC.

GENERAL MOTORS CORPORATION
AMERICAN AXLE & MANUFACTURING, INC. BUFFALO PLANT
SUPPLEMENTAL PHASE II ENVIRONMENTAL SITE INVESTIGATION AND PHASE III EXTENT OF CONTAMINATION STUDY

EXTENT OF DEEP LNAPL PLUME

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

FIGURE 9

8/28/00 BOC-54 MJS
48077040\PHASE2-3\48077106.DWG

Tables

Table 3-1
Summary of Risk-Based Screening Criteria for Soil

Supplemental Phase II Environmental Site Investigation
and
Phase III Extent of Contamination Study
American Axle & Manufacturing, Inc.Buffalo Plant
Buffalo, New York

Chemical	Units	Relevant Exposure Pathway				Risk-Based Screening Criteria
		Direct Contact	Particulate Inhalation	Volatile Inhalation	Soil/Groundwater Contact	
Anthracene	ug/kg	1.0E+09	3.5E+10	2.3E+09	4.1E+04	4.1E+04
Benzo(a)anthracene	ug/kg	2.1E+05	ID	ID	NL	2.1E+05
Benzo(a)pyrene	ug/kg	21,000	1,100,000	1,200,000	NL	2.1E+04
Benzo(b)fluoranthene	ug/kg	2.1E+05	ID	ID	NL	2.1E+05
Benzo(g,h,i)perylene	ug/kg	1.6E+07	4.1E+08	ID	NL	1.6E+07
Benzo(k)fluoranthene	ug/kg	2.1E+06	ID	ID	NL	2.1E+06
Chrysene	ug/kg	2.1E+07	ID	ID	NL	2.1E+07
Di-n-butylphthalate	ug/kg	5.4E+08	1.7E+09	1.2E+09	1.2E+07	1.2E+07
Fluoranthene	ug/kg	5.4E+08	4.8E+09	1.3E+09	7.1E+05	7.1E+05
Fluorene	ug/kg	5.4E+08	4.8E+09	2.1E+08	8.8E+05	8.8E+05
Indeno (1,2,3-cd)pyrene	ug/kg	2.1E+05	ID	ID	NL	2.1E+05
1-Methylnaphthalene	ug/kg	NE	NE	NE	NE	NE
2-Methylnaphthalene	ug/kg	1.6E+08	4.8E+09	2.3E+07	1.6E+06	1.6E+06
Naphthalene	ug/kg	1.6E+08	4.8E+09	2.3E+07	2.0E+06	2.0E+06
Phenanthrene	ug/kg	1.6E+07	6.9E+07	ID	4.5E+05	4.5E+05
Pyrene	ug/kg	3.4E+08	3.5E+09	1.1E+09	4.5E+05	4.5E+05

Notes:
ug/kg - micrograms per kilogram
ID - Inadequate data to develop criterion
NE - Not established
NL - Not expected to leach

Table 3-2
Summary of Risk-Based Screening Criteria for Groundwater

Supplemental Phase II Environmental Site Investigation
and
Phase III Extent of Contamination Study
American Axle & Manufacturing, Inc.Buffalo Plant
Buffalo, New York

Chemical	Units	Relevant Exposure Pathway		Risk-Based Screening Criteria
		Groundwater Contact	Solubility	
Acenaphthene	ug/L	>Solubility	4,240	4,240
Benzo (a) pyrene	ug/L	0.24	2.00	0.24
Bis (2-ethylhexyl) phthalate	ug/L	46	340	46
Fluoranthene	ug/L	>Solubility	206	206
Fluorene	ug/L	>Solubility	1,980	1,980
Indeno (1,2,3-cd) Pyrene	ug/L	1.1	NA	1.1
Phenanthrene	ug/L	>Solubility	1,000	1,000
Pyrene	ug/L	>Solubility	135	135

ug/L - micrograms per liter
GCC - Groundwater contact criteria
NA - Not applicable

Table 4-1
Summary of Semi-Volatile Organic Compounds in Soil

Positive Detections Only

Supplemental Phase II Environmental Site Investigation
and
Phase III Extent of Contamination Study
American Axle & Manufacturing, Inc. Buffalo Plant
Buffalo, New York

Parameter Detected	Units	Sample Identification*				Risk-Based Screening Criteria
		SB-2-1 (6-8')	SB-2-1 (8-10')	SB-4-1 (2 - 4')	SB-6-1 (6-8')	
Fluoranthene	ug/kg	<330	<330	540	<330	7.1E+05
Pyrene	ug/kg	<330	<330	670	<330	4.5E+05
Di-n-butylphthalate	ug/kg	<330	1800	1400	<330	1.2E+07

Notes:
ug/kg - micrograms per kilogram
Samples were collected on July 17, 1996.
*Key to sample identification on laboratory reports:

PAOC2-B1 = SB-2-1
PAOC4-B1 = SB-4-1
PAOC6-B1 = SB-6-1

Table 4-2
Summary of Sudan IV Soil Screening

Supplemental Phase II Environmental Site Investigation
and
Phase III Extent of Contamination Study
American Axle & Manufacturing, Inc.Buffalo Plant
Buffalo, New York

Monitoring Well	Sample Identification	Visual Examination	Sudan IV Results
MW-304	SB-1-1 (0-1')	Concrete	Test not performed
	SB-1-1 (1-2')	No oil observed	No reaction
	SB-1-1 (2-4')	No oil observed	No reaction
	SB-1-1 (4-6')	Slightly oily	Oil show at 5 feet
	SB-1-1 (6-7.5')	No oil observed	No reaction
MW-300	SB-3-1 (0-1')	Concrete	Test not performed
	SB-3-1 (1-2')	No oil observed	No reaction
	SB-3-1 (2-4')	No oil observed	No reaction
	SB-3-1 (4-6')	Slight odor	Slight dye reaction
	SB-3-1 (6-8')	No oil observed	No reaction
MW-301	SB-3-2 (0-1')	Concrete	Test not performed
	SB-3-2 (1-2')	No oil observed	No reaction
	SB-3-2 (2-4')	No oil observed	No reaction
	SB-3-2 (4-6')	No oil observed	No reaction
	SB-3-2 (6-8')	No oil observed	No reaction
MW-302	SB-3-3 (0-1')	Concrete	Test not performed
	SB-3-3 (1-2')	No oil observed	No reaction
	SB-3-3 (2-4')	No oil observed	No reaction
	SB-3-3 (4-6')	No oil observed	No reaction
	SB-3-3 (6-8')	Oil at 6 feet	Test not necessary
MW-303	SB-3-4 (0-1')	Concrete	Test not performed
	SB-3-4 (1-2')	No oil observed	No reaction
	SB-3-4 (2-4')	No oil observed	No reaction
	SB-3-4 (4-6')	No oil observed	No reaction
	SB-3-4 (6-8')	No oil observed	No reaction
MW-305	SB-7-1 (0-1')	Concrete	Test not performed
	SB-7-1 (1-2')	No oil observed	No reaction
	SB-7-1 (2-4')	No oil observed	No reaction
	SB-7-1 (4-6')	Odor in soil	Dye reaction at 5 feet
	SB-7-1 (6-8')	No oil observed	No reaction
	SB-7-1 (8-10')	No oil observed	No reaction
	SB-7-1 (10-12')	No oil observed	Dye reaction at 10.5 feet in sand stringer
	SB-7-1 (12-14')	No oil observed	No reaction
	SB-7-1 (14-16')	No oil observed	No reaction
	SB-7-1 (16-17.1')	No oil observed	No reaction
MW-306 (completed as a shallow well)	SB-8-1 (0-2')	No oil observed	No reaction
	SB-8-1 (2-4')	No oil observed	Dye reaction at 3.5 feet
	SB-8-1 (4-6')	No oil observed	No reaction
	SB-8-1 (6-8')	No oil observed	No reaction
	SB-8-1 (10-12')	No oil observed	No reaction
	SB-8-1 (12-12.5')	Oil visible on spoon, not in soi	Test not performed
MW-309	SB-8-2 (0-2')	No oil observed	No reaction
	SB-8-2 (2-4')	No oil observed	No reaction
	SB-8-2 (4-6')	No oil observed	No reaction
	SB-8-2 (6-8')	Oily soils	Test not performed

Table 4-2 (Cont'd)
Summary of Sudan IV Soil Screening

Supplemental Phase II Environmental Site Investigation
and
Phase III Extent of Contamination Study
American Axle & Manufacturing, Inc.Buffalo Plant
Buffalo, New York

MW-307	SB-9-1 (0-1')	Concrete	Test not performed
	SB-9-1 (1-2')	No oil observed	No reaction
	SB-9-1 (2-4')	No oil observed	No reaction
	SB-9-1 (4-6')	No oil observed	No reaction
	SB-9-1 (6-9')	No oil observed	No reaction
	SB-9-1 (8-10')	No oil observed	No reaction
	SB-9-1 (10-12')	No oil observed	No reaction
	SB-9-1 (12-14')	No oil observed	No reaction
	SB-9-1 (14-16')	No oil observed	No reaction
	SB-9-1 (16-18.5')	No oil observed	Dye reaction at 17 feet
MW-308	SB-9-2 (0-3.8')	Concrete	Test not performed
	SB-9-2 (3.8-5.8')	No oil observed	No reaction
	SB-9-2 (5.8-7.8')	No oil observed	No reaction
	SB-9-2 (7.8-9.8')	No oil observed	No reaction
	SB-9-2 (9.8-11.8')	No oil observed	No reaction
	SB-9-2 (11.8-13.8')	No oil observed	No reaction
	SB-9-2 (13.8-17.5')	No oil observed	No reaction
MW-400	SB-9-3 (0-1')	Concrete	Test not performed
	SB-9-3 (1-3')	No oil observed	No reaction
	SB-9-3 (2.7-4.5')	No oil observed	No reaction
	SB-9-3 (4.5-6.5')	No oil observed	No reaction
	SB-9-3 (6.5-8.5')	Odor in soil, staining	Dye reaction
	SB-9-3 (8.5-10.5')	No oil observed	Dye reaction
	SB-9-3 (10.5-12.5')	No oil observed	Dye reaction
	SB-9-3 (12.5-14.5')	No oil observed	No reaction
	SB-9-3 (14.5-16.5')	No oil observed	No reaction
	SB-9-3 (16.5-18.5')	No oil observed	Dye reaction
MW-402	SB-9-4 (0-1')	Concrete	Test not performed
	SB-9-4 (1-2.2')	No oil observed	No reaction
	SB-9-4 (2.2-4')	Concrete	No reaction
	SB-9-4 (4-6')	No oil observed	No reaction
	SB-9-4 (6-8')	No oil observed	Dye reaction
	SB-9-4 (8-10')	No oil observed	No reaction
	SB-9-4 (10-12')	No oil observed	No reaction
	SB-9-4 (12-14')	No oil observed	No reaction
	SB-9-4 (14-14.5')	No oil observed	Dye reaction
MW-404	SB-9-5 (0-1')	Concrete	Test not performed
	SB-9-5 (1-2')	No oil observed	No reaction
	SB-9-5 (2-4')	No oil observed	No reaction
	SB-9-5 (4-6')	No oil observed	No reaction
	SB-9-5 (6-8')	No oil observed	No reaction
	SB-9-5 (8-10')	No oil observed	No reaction
	SB-9-5 (10-12')	No oil observed	No reaction
	SB-9-5 (12-14')	No oil observed	No reaction
	SB-9-5 (14-16')	No oil observed	No reaction
	SB-9-5 (16-16.3')	Odor in soil	Dye reaction

Table 4-2 (Cont'd)
Summary of Sudan IV Soil Screening

Supplemental Phase II Environmental Site Investigation
and
Phase III Extent of Contamination Study
American Axle & Manufacturing, Inc.Buffalo Plant
Buffalo, New York

MW-406	SB-9-6 (0-1')	Concrete	Test not performed
	SB-9-6 (1-2')	No oil observed	No reaction
	SB-9-6 (2-3.5')	Concrete	Test not performed
	SB-9-6 (3.5-5.5')	No oil observed	No reaction
	SB-9-6 (5.5-7.5')	No oil observed	No reaction
	SB-9-6 (9.5-11.5')	No oil observed	No reaction
	SB-9-6 (11.5-13.5')	No oil observed	No reaction
	SB-9-6 (13.5-15.5')	No oil observed	No reaction
	SB-9-6 (15.5-17.5')	No oil observed	No reaction
	SB-9-6 (17.5-17.6')	No oil observed	No reaction
MW-408	SB-9-7 (0-1')	Concrete	Test not performed
	SB-9-7 (1-3')	No oil observed	No reaction
	SB-9-7 (3-5')	No oil observed	No reaction
	SB-9-7 (5-7')	No oil observed	No reaction
	SB-9-7 (7-9')	No oil observed	No reaction
	SB-9-7 (9-11')	No oil observed	No reaction
	SB-9-7 (11-12.1')	No oil observed	No reaction
MW-500	SB-9-8 (0-2')	Concrete	Test not performed
	SB-9-8 (2-4')	No oil observed	No reaction
	SB-9-8 (4-6')	No oil observed	No reaction
	SB-9-8 (6-8')	No oil observed	No reaction
	SB-9-8 (8-10')	No oil observed	No reaction
	SB-9-8 (10-12')	No oil observed	No reaction
	SB-9-8 (12-14')	No oil observed	No reaction
	SB-9-8 (14-16')	No oil observed	No reaction
	SB-9-8 (16-18')	No oil observed	No reaction
	SB-9-8 (18-18.5')	No oil observed	No reaction

Table 4-3
Summary of Semi-Volatile Organic Compounds in Groundwater

Supplemental Phase II Environmental Site Investigation
and
Phase III Extent of Contamination Study
American Axle & Manufacturing, Inc. Buffalo Plant
Buffalo, New York

Parameter Detected	Units	Sample Identification						Risk-Based Screening Criteria
		MW-404	MW-405	MW-408	MW-409	MW-500*	MW-502*	
Acenaphthene	ug/L	49	<5	<5	<5	<5	<5	4,240
Benzo (a) pyrene	ug/L	**33**	<5	<5	<5	<5	<5	0.24
Fluoranthene	ug/L	93	<5	<5	<5	<5	<5	206
Fluorene	ug/L	58	<5	<5	<5	<5	<5	1,980
Indeno (1,2,3-cd) Pyrene	ug/L	**14**	<5	<5	<5	<5	<5	1.1
Phenanthrene	ug/L	34	<5	<5	<5	<5	<5	1,000
Pyrene	ug/L	110	<5	<5	<5	<5	<5	135

Notes:
ug/L - micrograms per liter

Samples were collected on May 18, 1998.

*Samples were collected on June 17, 1998.

APPENDIX E

LETTER REPORT TO NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (MR. S. CALANDRA)

Prepared by:
Blasland, Bouck & Lee
March 29, 2001

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

Transmitted Via Federal Express

March 29, 2001

Mr. Salvatore Calandra
NYSDEC
270 Michigan Avenue
Buffalo, New York 14203-2999

Re: Spill File No. 9400483
BBL Project #: 869.77

Dear Mr. Calandra:

Blasland, Bouck & Lee, Inc. (BBL) prepared this report on behalf of General Motors Corporation (GM) to document the investigations performed to address oily soils and light non-aqueous-phase liquid (LNAPL) observed at the former GM Buffalo Plant, located at 1001 East Delavan Avenue, Buffalo, New York. These observations were reported to the New York State Department of Environmental Conservation (NYSDEC) who assigned it as Spill No. 9400483. Four field mobilizations (July 1996, October 1997, May 1998, and June 1998) were required to complete the investigation. The Buffalo Plant is currently owned by American Axle & Manufacturing, Inc. (AAM). Figure 1 shows the site plan.

Background

During an investigation conducted in 1994, Haley and Aldrich, Inc. (H&A) initially identified oily soils in five locations (the Former Knuckle-Job Area, the Gleason Machine Area, the Maintenance Garage Area, the Fire Loop Repair Area (West), and the Former Underground Storage Tank (UST) Fill Station Area) and observed light non-aqueous phase liquid (LNAPL) in two monitoring wells (MW-101 and B-2) at the Buffalo Plant. GM submitted analytical data from the oil and oily soil samples to NYSDEC in August 1994. Subsequently, LNAPL was observed in a third monitoring well (MW-103), and AAM encountered oily soils in three areas (the Sprinkler System Fire Loop Repair Area (East), the Truck Scale Excavation Pit, and the Railroad Gondola Car Scale Area) while excavation was undertaken as part of construction activities at the site. These areas were added to Spill File 9400483 in 1995. Table 1 summarizes the areas where LNAPL and/or oily soils were observed.

TABLE 1

Summary of Oily Soil and LNAPL Detections

Description of Discovery Method	Reported By	Manufacturing Location
SB-103 (soil boring/monitoring well)	GM	Former Knuckle-Job Area
SB-104 & SB-105 (soil boring/ monitoring well)	GM	Gleason Machine Area
SB-107 (soil boring/monitoring well)	GM	Maintenance Garage Area
SB-116 (soil boring/monitoring well)	GM	Fire Loop Repair Area (West)
SB-117 (soil boring/monitoring well)	GM	Former UST Fill Station Area
MW-101 (soil boring/monitoring well)	GM	Tank No. 5 Area
B-2 (soil boring/monitoring well)	GM	B- 26 Coolant Pit (previously reported as Spill 9104671)
MW-103 (soil boring/monitoring well)	GM	Tank No. 11 Area
Excavation	AAM	Sprinkler System Fire Loop Repair Area (East)
Excavation	AAM	Truck Scale Excavation Pit
Excavation	AAM	Railroad Gondola Car Scale Area

Objectives

There were three principal objectives of the investigations. First, to determine whether LNAPL is present in the subsurface in the areas with oily soil identified in Table 1. The second objective of the investigations was to determine the horizontal extent of LNAPL where present. The third objective of the investigations was to evaluate risk associated with concentrations of semi-volatile organic compounds (SVOC) detected in soil through an Exposure Assessment.

To attain these objectives, the following scope of work was performed:

- Two additional soil samples were collected for laboratory analysis of SVOC content using EPA Method 8270;
- Seventy four soil samples were collected for field screening for LNAPL during monitoring well installation;
- Twenty six monitoring wells were installed to determine whether LNAPL would accumulate; and
- Six groundwater samples were collected for laboratory analysis for SVOC content using EPA Method 8270.

TECHNICAL APPROACH

Soil

During the first phase of the field investigations (July 1996), three soil borings were installed with a hydraulic probe equipped with stainless steel tubes and disposable acetate liners. In October 1997 and subsequent investigations, the standard penetration test (SPT) was employed to obtain soil samples.

Soil samples collected in October 1997 were screened for the presence of LNAPL both visually and with a hydrophobic dye. The dye, Sudan IV, turns red in the presence of petroleum hydrocarbons. This test will detect hydrocarbons that are present in quantities too small to be observed visually.

Soil samples collected for laboratory analysis were composited over the 2-foot interval from which they were collected. Soil samples were analyzed for SVOC using EPA Method 8270.

LNAPL Definition

The Tank No. 5 Area, the Gleason Machine Area, and the Coolant Pit were assessed as a unit because of their proximity and their apparent interrelationship. The location of each area of investigation is shown on Figure 1.

LNAPL was observed at two levels. A shallow plume is present beneath the plant perched on top of a silty clay that occurs just below the construction fill. The fill layer is approximately seven feet thick, except in areas where excavations were performed to accommodate subsurface structures. In areas where subsurface structures are present, the fill extends to the top of the limestone bedrock. The surface of the limestone bedrock slopes from approximately 10 feet below land surface (BLS) at the northern end of the plant to approximately 20 feet BLS at the southern end of the plant. In the eastern portion of the Plant, these areas of thicker fill have provided a conduit for LNAPL to migrate a second, deeper plume that occurs below the clay and above the limestone bedrock. Therefore, LNAPL definition in this area was carried out at two levels. "Shallow" monitoring wells were screened to intercept the clay/fill boundary (typically 2 to 5 feet BLS). "Deep" monitoring wells were drilled to bedrock and screened in the lowest five feet of the borehole (approximately 15 to 20 feet BLS) to intercept the till, if present. Deep and shallow wells were installed in pairs. Boring logs can be provided upon request.

The monitoring wells were constructed of 2-inch-diameter Schedule 40 polyvinyl chloride (PVC). The monitoring wells consist of a 10-foot (1996 wells) or 5-foot (1997 and 1998 wells) 0.010-inch slotted PVC well screen and varying amounts of solid PVC riser.

Groundwater

Prior to collection of groundwater samples, the wells were purged. Generally, the wells purged dry before three well volumes could be removed. Groundwater samples were analyzed for SVOC using EPA Method 8270.

QA/QC

Quality Assurance (QA) practices were developed and implemented to ensure that appropriate data collection and analysis procedures were implemented, resulting in data of a known accuracy and precision. The QA practices were used to identify data quality objectives (DQO) appropriate for the data use, and field and laboratory data collection and analysis procedures required to generate data meeting the site-specific DQO.

Data Evaluation

Site analytical data were initially compared to STARS Memo #1 TCLP values and NYSDEC TAGM #4046 Soil Cleanup Values. Concentrations of SVOCs in some soil samples exceeded the TAGM #4046 Soil Cleanup Values. Therefore, an Exposure Assessment was performed in accordance with the NYSDEC guidance document "Guidelines for Petroleum Spill Site Inactivation" issued February 23, 1998 to evaluate the risk associated with SVOC concentrations in soil.

Volatile organic compounds (VOC) and SVOC concentrations were not detected above the STARS TCLP values in groundwater samples that did not contain LNAPL. SVOC concentrations in an oily groundwater sample from one monitoring well were well above the saturation values for the detected compounds. These concentrations were considered to be the result of the oil, and not of dissolved concentrations in the groundwater. Therefore, an Exposure Assessment was not performed for groundwater pathways.

Because many of the areas with impacted soil are located beneath the plant, which is still an active operation, an exposure assessment was performed for SVOCs following guidance published by NYSDEC in 1998. Since VOC and PCB concentrations did not exceed TAGM 4046 criteria, exposure assessment values were not calculated. Values were calculated for three exposure pathways for soil:

- Pathway 2, protection of groundwater;
- Pathway 3, inhalation of vapors and particulates, dermal contact, and ingestion of chemicals in subsurface soils for a construction worker receptor; and
- Pathway 4, volatilization to indoor air for a commercial/industrial worker.

NYSDEC default values were used for all parameters. Values for all three pathways for the SVOCs evaluated exceeded the value for pure product saturation in soil provided in the Exposure Assessment guidance. Therefore, the pure product saturation value was used for comparison with site analytical data. The results of the Exposure Assessment calculations are summarized in Table 3. Worksheets summarizing the input data and calculations can be provided upon request.

INVESTIGATION SUMMARY

Former Knuckle-Job Area
H&A reported oil-coated soil retrieved from the top of the clay in a soil boring (SB-103) performed near a former oil drain in this area. SVOC concentrations were detected in two soil samples collected from SB-103 and were submitted for analysis. These data, which were reported to NYSDEC in 1994, are summarized in Tables 3 (SVOC) and 4 (total petroleum hydrocarbons [TPH]). Concentrations of some SVOC compounds were above TAGM #4046 Soil Cleanup values. However, soil concentrations are below the Exposure Assessment Value.

To determine whether recoverable LNAPL was present, BBL attempted to install a monitoring well in this area in July 1996. However, the attempt was not successful because concrete encountered at a depth of 2.5 feet BLS could not be penetrated. In October 1997, BBL installed monitoring well MW-304 to a depth of 7.5 feet BLS using a drilling rig with a roller bit. Oil was not observed visually in the soil samples collected for screening during well installation, but was indicated by the hydrophobic dye in soil collected from 5 feet BLS. A measurable quantity of LNAPL had not accumulated in the monitoring well by December 22, 1997.

The site is an industrial area, access is restricted, and the area in question is beneath a concrete floor. Therefore, dermal contact with soil, particle ingestion, and inhalation of particles and vapors by a construction worker receptor is the only potentially complete exposure pathway. On the other hand, results of the Exposure Assessment indicate that soil concentrations are below the calculated risk-based values for this pathway. Therefore, no further action is required in this area.

Maintenance Garage Area
H&A reported oil and a TPH concentration of 62,000 mg/kg in a soil sample collected from the base of the fill unit in a soil boring (SB-107) located near a hydraulic lift (Table 4). Therefore, BBL performed a soil boring (SB-2-1) to a depth of 12 feet BLS. Soil samples were collected from the 6 to 8 and 8 to 10 feet BLS intervals and analyzed for SVOC.

Di-n-butyl phthalate was detected at a concentration of 1.8 milligrams per kilogram (mg/kg) in the soil sample collected from the 8 to 10 feet BLS interval from soil boring SB-2-1. This concentration is below the TAGM #4046 Soil Cleanup Value of 7.1 mg/kg. Concentrations of other SVOC constituents were below detection limits (BDL) in the two soil samples collected in this area. Soil analytical data are summarized on Tables 3 and 4.

Monitoring well MW-205 was installed to a depth of 11 feet in the location of soil boring SB-2-1 to determine whether LNAPL was present in the subsurface. No obvious odors or sheen were observed during well installation or development. LNAPL was not observed in the well.

The site is an industrial area, access is restricted, and the area in question is beneath a concrete floor. Therefore, dermal contact with soil, particle ingestion, and inhalation of particles and vapors by a construction worker receptor is the only potentially complete exposure pathway. On the other hand, results of the Exposure Assessment indicate that soil concentrations are below the calculated risk-based values for this pathway. Therefore, no further action is required in this area.

Fire Loop Repair Area (West)
H&A performed a soil boring (SB-116) adjacent to the west edge of the excavation in this area. Two soil samples, from 1-2 and 2-4 feet BLS, were collected for analysis for TPH, VOC (both samples) and SVOC (2- to 4- foot sample only). H&A reported oil coating the soil in the sample collected from 2-4 feet BLS, which is the base of the fill unit in this area. Concentrations of SVOCs and VOCs were below TAGM #4046 Soil Cleanup Values (Tables 3 and 4).

To determine whether recoverable LNAPL would accumulate, BBL installed monitoring well MW-200 to a depth of 11 feet (Figure 2). No obvious odors or sheen were observed during well installation or development. LNAPL was not observed in the well.

The site is an industrial area, access is restricted, and the surficial soil is not impacted. Therefore, dermal contact with soil, particle ingestion, and inhalation of particles and vapors by a construction worker receptor is the only potentially complete exposure pathway. Results of the investigations indicate that soil concentrations are below TAGM 4046 values. Therefore, no further action is required in this area.

Former UST Fill Station Area
H&A performed a soil boring (SB-117) in an area of oil-stained pavement 20 feet west of the former fill station. A soil sample collected from 1-2 feet BLS was analyzed for VOCs, SVOCs, polychlorinated biphenyls (PCBs), and TPH as motor oil. Concentrations of PCBs were BDL, and TPH as motor oil was detected at 226 mg/kg. Concentrations of VOCs and SVOCs were below TAGM #4046 Soil Cleanup Values.

H&A reported oil in soil collected from the top portion of the clay in this area. Therefore, BBL performed soil boring SB-6-1 to a depth of 11 feet BLS. A soil sample was collected from the 6- to 8-foot BLS interval and analyzed for SVOC. Concentrations of SVOC constituents were BDL. Soil analytical data are summarized in Tables 3 and 4.

Monitoring well MW-204 was installed to a depth of 11 feet in the location of soil boring SB-6-1 to determine whether LNAPL was present in the subsurface. No obvious odors or sheen were observed during well installation or development. LNAPL was not observed in the well.

The site is an industrial area, access is restricted, and the surficial soil was not impacted. Therefore, dermal contact with soil, particle ingestion, and inhalation of particles and vapors by a construction worker receptor is the only potentially complete exposure pathway. Results of the investigations indicate that soil concentrations are below TAGM 4046 values. Therefore, no further action is required in this area.

Fire Loop Repair Excavation (East), Railroad Gondola Car Scale Area, and Truck Scale Pit
The truck scale pit, the railroad gondola car scale area, and the fire loop repair excavation on the east side of the plant are the three areas of oily soil added to NYSDEC Spill No. 9400483 by AAM. AAM encountered oily soils during construction activities in these areas (Figure 1). AAM removed and disposed of the oily soils, and replaced them with clean fill.

Fire Loop Repair Excavation (East)

The fire loop repair excavation is outside the plant east of Tank No. 5 Area, the Gleason Machine Area, and the Coolant Pit area. Monitoring wells were installed in this area during definition of the extent of oil from that area. The source of the oil in the soils excavated from these areas may be Tank No. 5 or the

Gleason Machine Area. Monitoring wells MW-408 and MW-409, which define the eastern extent of LNAPL in the Tank No. 5 Area, the Gleason Machine Area, and the Coolant Pit area, also serve as monitoring points for the fire loop repair excavation area. No LNAPL accumulated in these wells. Groundwater samples were collected from monitoring wells MW-408 and MW-409 for SVOC analysis. SVOC concentrations were BDL in both wells. Because the excavated soil was replaced with clean fill, soil samples were not collected. Therefore, there is no human health exposure pathway. No further action is required in this area.

Railroad Gondola Car Scale Area

The railroad gondola car scale area is outside the plant south of the Gleason Machine Area. Monitoring well MW-502 provides a monitoring location for groundwater in the Railroad Gondola Car Scale area. Monitoring well MW-502 is screened across the base of the fill/top of the clay, which is where AAM observed the oily soils. No LNAPL accumulated in the well. Because the oily soils were excavated and replaced with clean fill, soil samples were not collected. Groundwater samples were collected from monitoring well MW-502 for SVOC analysis. SVOC concentrations were BDL. Because the excavated soil was replaced with clean fill, soil samples were not collected. Therefore, there is no human health exposure pathway. No further action is required in this area.

Truck Scale Pit

Monitoring well MW-501 was installed in the former truck scale pit excavation. No LNAPL was observed in MW-501. Because the excavated soil was replaced with clean fill, soil samples were not collected. Therefore, there is no human health exposure pathway. No further action is required in this area.

Tank No. 5, Gleason Machine, and B-26 Coolant Pit Areas

Because of their proximity to each other, these three areas were assessed as a unit. The Tank No. 5 area is approximately 60 feet east of the Coolant Pit, and may be the source of the LNAPL observed in the Coolant Pit. The Coolant Pit occupies the northern end of the Gleason Machine Area. The location of each area of concern is shown on Figure 1.

History

Tank No. 5 Area - Tank No. 5, a UST formerly containing virgin oil, was emptied, cleaned, and closed in place in 1990. H&A reported that oil-saturated soil was observed at approximately 9 feet BLS in soil borings installed adjacent to the tank in 1990 (H&A, 1993). TPH was detected at concentrations of 34,000 and 55,000 mg/kg in two soil samples collected for analysis during the installation of monitoring well MW-101 in this area. Concentrations of VOC in the sample collected from 6 to 6.4 feet BLS were below TAGM #4046 Soil Cleanup Values (Tables 3 and 4). Concentrations of some SVOC compounds exceeded the TAGM #4046 Soil Cleanup Values. Concentrations of benzo (a) pyrene and chrysene also exceeded the Exposure Assessment Value, which is the value for pure product saturation. LNAPL is present in this area and these concentrations reflect the oil content in the soil.

Gleason Machine Area - Historically, holes had been drilled in the floor in this area to drain accumulated lubricating oils. H&A reported oily soils at the base of the fill unit in two soil borings (SB-104 and SB-105) performed in the Gleason Machine Area. Concentrations of SVOC in five soil samples collected from SB-104 and SB-105 exceeded TAGM #4046 Soil Cleanup Values. Concentrations of benzo (a) pyrene and/or chrysene in three of the samples also exceeded the Exposure Assessment Value, which is the value for pure product saturation. LNAPL is present in this area and these concentrations reflect the oil content in the soil.

Coolant Pit - The B-26 Coolant Pit is a sub-grade vault with a base at the level of the till unit below the clay. When the coolant pit was cleaned after being decommissioned in 1991, LNAPL was observed seeping in at the joint between the floor and the east wall. This location is hydraulically downgradient from the former location of Tank No. 5. An LNAPL recovery system was subsequently installed in the Coolant Pit in 1992 and monitoring wells were installed at the northeast (B-1) and southwest corners of the Pit (B-2). This LNAPL discovery was reported as Spill No. 9104671. AAM currently reports to NYSDEC annually on the status of the system and provides monitoring well gauging data. However, the horizontal extent of LNAPL had not been defined.

Concentrations of some VOC and SVOC compounds were above TAGM #4046 Soil Cleanup Values. Concentrations in four samples were also above the Exposure Assessment Value. However, the site is an industrial area, access is restricted, and the area in question is beneath a concrete floor. Therefore, dermal contact with soil, particle ingestion, and inhalation of particles and vapors by a construction worker receptor is the only potentially complete exposure pathway.

Tank No. 5 Area, Gleason Machine Area, and Coolant Pit Area LNAPL Definition

H&A's work plan (H&A, 1995) called for installing six temporary wells with direct push technology to define the extent of LNAPL in this area. BBL attempted this approach in July 1996. However, no groundwater or LNAPL was retrieved in three direct push sampling locations with screens open from 6 to 10 (BH #1 and BH #3) or 8 to 10 feet BLS (BH #2). In an attempt to locate the water table, a solid-stem auger was used to drill to limestone bedrock in the location of BH # 3. A petroleum odor was observed in cuttings retrieved from 10 feet BLS, which was the base of the fill. Oily soils were not observed at this level. However, this location is apparently near the eastern limit of the shallow plume. Oil was observed on the end of a measuring tape dropped in the borehole when the top of the limestone was reached at 16 feet BLS. This LNAPL is part of the "deep" plume present in the till. No groundwater was encountered at any point in the borehole.

These observations support the presence of impacts at two levels in this area. Therefore, definition of the extent of LNAPL was completed by installing paired wells, one screened at the base of the fill/top of the clay and one screened in the till.

Soil samples were collected at 2-foot intervals from soil boring locations SB-7-1, SB-8-1, SB-8-2, SB-9-1, SB-9-2, SB-9-3, SB-9-4, SB-9-5, SB-9-6, SB-9-7, and SB-9-8 and screened for petroleum hydrocarbons using Sudan IV hydrophobic dye. The Sudan IV screening data are summarized in Table 5.

In October 1997, five monitoring wells were installed in the Tank No. 5 Area, the Gleason Machine Area, and the Coolant Pit area (Figure 1). Monitoring wells MW-305, MW-307, and MW-308 were installed to bedrock to define LNAPL in the till unit. Monitoring wells MW-306 and MW-309 were completed 2 feet into the top of the clay to determine whether LNAPL was also present on top of the clay. MW-309 was initially planned as a deep (bedrock) well. However, because oil-saturated soils were observed at the base of the fill unit, the well was completed as a shallow well. After installation, LNAPL was present in all five wells.

In May 1998, ten additional monitoring wells were installed in the Gleason Machine Area (Figure 1). The wells were installed in two-well clusters consisting of a shallow well screened in the fill unit and a deep well screened above the bedrock. The well clusters were installed to the north (MW-402 and MW-403), south (MW-400 and MW-401), east (MW-408 and MW 409), and west (MW-406 and MW-407) of

the Tank No. 5 Area, the Gleason Machine Area, and the Coolant Pit area and were placed as close to the Tank No. 5 Area and the Gleason Machine Area as was practically feasible. Monitoring wells MW-404 and MW-405 were installed downgradient of Plant No. 81 and adjacent to the BSA sewer tunnel. These locations were selected because the water-table elevation maps suggest that water beneath the plant migrates towards the tunnel, and consequently along the exterior sidewalls of the tunnel. Monitoring wells MW-400, MW-402, MW-404, MW-406, and MW-408 were installed to bedrock, and monitoring wells MW-401, MW-403, MW-405, MW-407, and MW-409 were completed in the fill unit. After installation, LNAPL was present in monitoring wells MW-400, MW-401, and MW-406. Only a few drops of oil were present in the groundwater in MW-404. This oil may represent LNAPL that has migrated along the sewer tunnel. Further investigation is necessary to confirm this assumption.

In June 1998, deep monitoring well MW-500 (Figure 1) was installed west of MW-406. No LNAPL was observed in this well. Monitoring well MW-104 (installed by H&A) is screened just above the bedrock. Although this well was originally installed to evaluate the Railroad Scale Area, continued observations indicate that LNAPL is not present (no till described in the soil boring log) in this area. Shallow monitoring well MW-502 (Figure 1) was installed adjacent to MW-104 to determine if LNAPL was present above the clay in this area. Attempts to install this well closer to the building were not successful due to numerous utility lines in the area. The locations of shallow and deep LNAPL are shown on Figures 2 and 3, respectively.

Tank No. 5 Area, Gleason Machine Area, and Coolant Pit Area Groundwater Sampling and Analysis

In May 1998, groundwater samples were collected from MW-404, MW-405, MW-408, and MW-409 for analysis of SVOC content. Groundwater samples could not be obtained from MW-402, MW-403, or MW-407 because they were either dry initially, or did not recharge after purging. Monitoring wells MW-500 and MW-502 were sampled in June 1998. Concentrations of all SVOC constituents were BDL in all samples except the sample from MW-404. Benzo (a) pyrene and indeno (1,2,3-cd) pyrene were detected at 33 and 14 micrograms per liter (ug/L), respectively. However, the sample collected from MW-404 was oily, and concentrations detected are most likely representative of the LNAPL and not dissolved constituents. This is supported by the fact that these concentrations are orders of magnitude above the theoretical water solubility of these chemicals. Therefore, there is no exposure pathway for groundwater. Table 6 is a summary of groundwater analytical data.

Tank No. 5 Area, Gleason Machine Area, and Coolant Pit Area Combined Sewer Water Sampling and Analysis

To determine whether LNAPL present in the subsurface in the Tank No. 5 Area, the Gleason Machine Area, and the Coolant Pit area was impacting water in the combined sewer system, a water sample was collected from a manhole in the south portion of the property (Figure 1) in September 1998. The sample was analyzed for SVOC using EPA Method 8270. Concentrations of semi-volatile constituents were BDL, with the exception of bis (2-ethylhexyl) phthalate. An estimated concentration of 4 ug/L of bis (2-ethylhexyl) phthalate, which is below the Method Reporting Limit (MRL), was quantified in the sample. However, bis (2-ethylhexyl) phthalate was also detected in the method blank, a laboratory QA/QC sample. Therefore, the bis (2-ethylhexyl) phthalate appears to be the result of laboratory contamination and not a measure of dissolved concentrations in the storm sewer water.

In September 1999, AAM personnel performed routine semi-annual sampling of the combined sewer effluent required by their BSA wastewater discharge permit. Concentrations of Total Extractable Hydrocarbons (TEH) were detected at 102 and 110 parts per million (ppm), which are slightly over the BSA-permitted discharge criterion of 100 ppm. Additional sampling and analysis in October 1999, April, 2000, and May 2000 confirmed the exceedances. AAM attempted to identify the source of the impacts through the following activities:

1. Videotaping a sanitary sewer lateral that discharges to the BSA sewer tunnel - This lateral passes through the B-26 Coolant Pit area at a depth of approximately 3 feet below grade. AAM has not been able to identify the source of the LNAPL from the videos, although an LNAPL coating was observed on the camera.
2. Visual inspection - AAM retained a contractor to physically inspect the BSA Sewer Tunnel. Some staining was observed on the sewer walls.
3. Sampling pipes emptying into the sewer - A value of 24,000 ppm oil and grease was detected in a sample from a pipe that is close to the B-26 Coolant Pit area.
4. Fingerprinting the oil - Samples were collected from the pipe with the high detection, the B-26 area, and the downstream location where the sewer sample was collected. The data indicated that the oils are similar. However, similar oils are used elsewhere in the facility, and the B-26 Coolant Pit could not be positively identified as the source.
5. Ensuring that the oil recovery system at B-26 cannot be disabled. AAM personnel observed in January that the B-26 system had been turned off. The system was restarted, but was later found to be turned off again. A security guard now regularly checks it to ensure that it is operating.

Following AAM assurance that the B-26 oil recovery system is operating properly, TEH levels in the October 2000 sampling event were below permitted levels. Therefore, AAM concluded that oil impacts in the vicinity of the B-26 Coolant Pit are the source of the sewer sample TEH exceedances, but that proper operation of the oil recovery system should prevent further problems.

Tank No. 11 Area

LNAPL detections in this area have not previously been reported to NYSDEC. H&A observed LNAPL in monitoring well MW-103 four months after it was installed. During installation of monitoring well MW-103, H&A collected two samples for analysis for VOC, SVOC, PCBs, and TPH. All detected concentrations were below TAGM #4046 Soil Cleanup Values (Tables 3 and 4). Furthermore, VOC and SVOC concentrations in a groundwater sample collected from monitoring well MW-103 were BDL (SVOCs) or below STARS TCLP extraction values (VOCs).

BBL personnel observed 2.14 feet of LNAPL in MW-103 in July 1996. Therefore, in October 1997, BBL installed monitoring wells MW-300, MW-301, MW-302, and MW-303 to define the extent of LNAPL. Soil samples were collected at 2-foot intervals from soil boring locations SB-3-1 (in the location of MW-300), SB-3-2 (MW-301), SB-3-3 (MW-302), and SB-3-4 (MW-303) and screened for LNAPL using Sudan IV hydrophobic dye. Because LNAPL, if present, cannot penetrate the clay, and groundwater is not always encountered in the surficial soils beneath the building, wells were installed to 2 feet into the clay, regardless of whether groundwater was encountered.

During installation of monitoring well MW-302 north of MW-103, oily soil was observed at a depth of 6 feet BLS, which is the base of the fill unit. During installation of monitoring well MW-300 west of MW-103, hydrocarbons were detected with the Sudan IV dye in soil from 4 feet BLS, also near the base of the fill unit. Oily soils were not observed, and the presence of hydrocarbons was not detected by the Sudan

IV dye during installation of monitoring wells MW-301 and MW-303. The Sudan IV screening data are summarized in Table 5. Groundwater accumulated in three of the four newly-installed wells after several days. However, LNAPL was never observed in these wells.

CONCLUSIONS AND RECOMMENDATIONS

Based on both BBL's field investigations and H&A's 1994 investigation, the following conclusions and recommendations are provided for each area of concern.

Former Knuckle Job Area
The presence of LNAPL was indicated in soil at the Former Knuckle Job Area by the hydrophobic dye. However, LNAPL was not observed visually, and LNAPL did not accumulate in monitoring well MW-304. Also, SVOC concentrations in two soil samples collected at this area of concern were below the Exposure Assessment Value. Therefore, the Knuckle Job Area is no longer considered an area of concern.

Maintenance Garage Area
Concentrations of SVOC were not detected above the Exposure Assessment Value in soil samples collected from the Maintenance Garage Area in July 1996. LNAPL did not accumulate in monitoring well MW-205 installed in this area. Therefore, the Maintenance Garage Area is no longer considered a Area of concern.

Fire Loop Repair Area (West)
LNAPL did not accumulate in monitoring well MW-200 installed in this area. Therefore, the Fire Loop Repair Area (West) is no longer considered an area of concern.

Former UST Fill Station
Concentrations of SVOC were not detected above the Exposure Assessment Value in a soil sample collected from the Fill Station Area in July 1996 (Table 3). Also, LNAPL did not accumulate in monitoring well MW-204 installed in this area. Therefore, the Former UST Fill Station is no longer considered an area of concern.

Fire Loop Repair Excavation (East)
This area was investigated due to oily soils encountered by AAM. However, LNAPL was not present in monitoring wells MW-408 and MW-409 installed in this area. SVOC concentrations were BDL in groundwater samples collected from these wells in 1998. Therefore, no further action is required.

Railroad Gondola Car Scale Area
This area was investigated due to oily soils encountered by AAM. However, LNAPL was not present in monitoring wells MW-104 and MW-502. MW-502 is screened across the base of the fill unit/top of the clay, where oily soils were observed by AAM. SVOC concentrations were BDL in a groundwater sample collected from MW-502 in 1998. Therefore, no further action is required.

Truck Scale Pit
LNAPL was not present in monitoring well MW-501 installed in the area where oily soils were encountered during AAM construction activities.

Former Tank No. 11 Area
The extent of LNAPL observed in the shallow portion of the subsurface in the Former Tank No. 11 Area has been defined.

BSA Sewer Tunnel
Minute quantities of oil were present in the groundwater in MW-404 adjacent to the BSA Sewer Tunnel. This oil may represent LNAPL that has migrated along the sewer tunnel. Further investigation is warranted to confirm this assumption.

Tank No. 5 Area, Gleason Machine Area, and B-26 Coolant Pit
SVOC concentrations in soil were above the Exposure Assessment Value in three soil samples in this area. Inhalation of vapors from the soils is unlikely due to the low volatility of SVOCs. However, because some SVOCs are dermal carcinogens, a Health and Safety Plan should be developed to ensure that construction workers utilize the appropriate personal protection if construction activities occur in the affected area.

Shallow and deep LNAPL plumes are present in this area:

Deep Oil Plume
Although over 2 feet of LNAPL is present at MW-305, the current Coolant Pit recovery system, which is downgradient from MW-305, appears to intercept most of the LNAPL in this area. Monitoring wells MW-307 and MW-400, which are downgradient from the Coolant Pit recovery system, contain only a thin layer of product, less than one inch thick. This further supports the premise that the Coolant Pit recovery system is collecting most of the LNAPL in this area.

AAM will continue operation and maintenance of the B-26 Oil Recovery System and submit the required annual report for Spill No. 9104671 to NYSDEC.

Shallow Oil Plume
The LNAPL at the top of the clay/base of the fill in the Gleason Machine Area is not a human health risk for the following reasons:

- The site is an industrial facility;
- The plume is contained beneath the building;
- The only potentially complete exposure pathway is through direct contact by construction workers;
- Groundwater has not been impacted;
- The plume is not moving; and
- The oils involved do not pose a flammable risk.

Dermal contact, particle ingestion, and inhalation of particles and vapors from SVOC-impacted soil by a construction worker receptor is the only potentially complete exposure pathway at this site. Engineering controls to limit exposure during construction activities should be implemented.

Therefore, BBL recommends:

- A Due Care Plan should be prepared and implemented to protect construction workers from exposure in areas with impacted soil;
- Continue operation of the B-26 Recovery system under Spill 9104671;
- Monitor MW-404 for LNAPL under Spill 9104671;
- Investigate potential releases to stormwater in the BSA sewer tunnel;
- Evaluate the extent of LNAPL observed in monitoring well MW-406; and
- Inactivate Spill 9400483 once these activities are complete.

Sincerely,

BLASLAND, BOUCK & LEE, INC.

Barbara A. Sullivan

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Figure 1 Site Plan
Figure 2 Extent of Shallow LNAPL Plume
Figure 3 Extent of Deep LNAPL Plume

Table 2 Summary of Soil Criteria from Exposure Assessment
Table 3 Summary of Semi-Volatile Organic Compounds in Soil
Table 4 Summary of Volatile Organic Compounds, Total Petroleum Hydrocarbons, and PCBs in Soil
Table 5 Summary of Sudan IV Soil Screening
Table 6 Summary of Semi-Volatile Organic Compounds in Groundwater

Table 2
Summary of Soil Criteria from Exposure Assessment

NYSDEC Spill No. 9400483

American Axle & Manufacturing, Inc. Buffalo Plant
Buffalo, New York

Chemical	Relevant Exposure Pathway				
		Pathway 3 [1]			Pure Product
	Groundwater Protection	Carcinogenic Effects	Non-Carcinogenic Effects	Indoor Volatilization [2]	Saturation
Acenaphthene	5.74E+06	NA	8.03E+06	4.11E+06	7.89E+04
Anthracene	4.39E+07	NA	2.37E+08	6.13E+06	3.18E+03
Benzo(a)anthracene	1.72E+05	4.40E+05	2.30E+08	4.63E+10	4.62E+04
Benzo(a)pyrene	4.81E+04	4.28E+04	2.32E+08	9.54E+10	2.33E+03
Benzo(b)fluoranthene	6.80E+04	4.40E+05	2.07E+08	2.35E+09	3.85E+04
Benzo(g,h,i)perylene	4.91E+08	NA	2.35E+08	3.19E+11	5.55E+03
Benzo(k)fluoranthene	6.80E+04	4.40E+06	1.89E+08	7.42E+08	1.18E+06
Chrysene	2.50E+04	4.40E+07	2.20E+08	7.79E+09	1.80E+03
Dibenzo(a,h)anthracene	1.30E+10	4.40E+04	2.36E+08	6.57E+11	8.25E+03
Fluoranthene	NV	NV	NV	NV	NV
Fluorene	2.26E+07	NA	6.95E+07	5.23E+06	6.13E+04
Indeno(1,2,3-cd)pyrene	1.99E+05	4.40E+05	2.35E+08	3.67E+11	4.20E+03
Naphthalene	8.06E+05	NA	1.38E+06	1.56E+05	7.07E+04
Phenanthrene	4.39E+07	NA	5.21E+07	3.92E+06	7.07E+04
Pyrene	1.18E+08	NA	1.73E+08	3.51E+08	2.51E+04

Notes:
All values are in micrograms per kilogram
NA - Not applicable.
NV - No values provided by NYSDEC to perform Exposure Assessment
[1] Inhalation of vapors and particulates, dermal contact, and ingestion of chemicals
Construction worker receptor used
[2] Commercial worker receptor

Table 3
Summary of Semi-Volatile Organic Compounds in Soil

NYSDEC Spill No. 9400483

American Axle & Manufacturing, Inc. Buffalo Plant
Buffalo, New York

Exploration Number	Soil	Exposure	Knuckle Job Area		Maintenance Garage			Tank No. 11 Area			Fire Loop Repair	
			SB-103		SB-107	SB-2-1[2]		MW-103			SB-116	
Sample Depth	Cleanup[1]	Assessment	4'-6'	6'-8'	6'-8'	6'-8'	8'-10'	2'-4'	2'-4'D	6'-8'	2'-4'	2'-4-D
Acenaphthene	50.0	78.9	1.500J	1.300J	ND	ND	ND	ND	0.010J	ND	ND	ND
Acenaphthylene	41	49.4	ND	ND	ND	ND	ND	ND	0.008J	ND	ND	ND
Anthracene	50	3.18	2.000J	2.200J	ND	ND	ND	0.014J	ND	ND	ND	ND
Benzo(a)anthracene	0.224/MDL	46.2	**1.300J**	**1.100J**	ND	ND	ND	ND	ND	ND	0.042J	ND
Benzo(a)pyrene	0.061/MDL	2.33	**0.540J**	**0.440J**	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(b)fluoranthene	1.100	38.5	0.810J	0.600J	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene	50	5.55	0.420J	0.300J	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(k)fluoranthene	1.100	1,180	0.660J	0.500J	ND	ND	ND	ND	ND	ND	ND	ND
Benzoic acid	2.7	NS	ND	ND	ND	ND	ND	0.110JB	0.130JB	0.025JB	ND	ND
Bis(2-Ethylhexyl)phthalate	50.0	NS	1.400JB	0.600JB	ND	ND	ND	ND	0.62	0.310J	0.330J	0.260J
Chrysene	0.4	1.8	**1.400J**	**1.1**	ND	ND	ND	ND	ND	ND	0.082J	ND
Di-n-butylphthalate	8.1	NS	ND	ND	ND	ND	1.8	ND	0.050JB	0.047JB	0.160J	ND
Dibenzofuran	6.2	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Diethylphthalate	7.1	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluoranthene	50	NC	ND	3.4	ND	ND	ND	ND	ND	ND	0.068J	ND
Fluorene	50	61.3	1.600J	1.300J	ND	ND	ND	ND	ND	0.010J	ND	ND
Indeno(1,2,3-cd)pyrene	3.2	4.2	0.500J	0.400J	ND	ND	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene	36.4	NS	0.310J	0.700J	ND	ND	ND	0.063J	0.042J	ND	0.056J	ND
3+4 Methylphenol	0.9[3]	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	13.0	70.7	0.430J	1.3	ND	ND	ND	0.0108J	0.019J	ND	ND	ND
Phenanthrene	50	70.7	6.5	7	ND	ND	ND	0.073J	ND	ND	0.140J	0.073J
Phenol	0.03	NS	ND	ND	ND	ND	ND	ND	ND	ND	**0.130J**	0.030J
Pyrene	50	25.1	2.000J	ND	ND	ND	ND	ND	ND	ND	0.080J	ND
2,4,6-Trichlorophenol	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total SVOC	500	NS	19.97	21.64	ND	ND	1.8	0.1608	0.699	0.32	1.088	0.363

Notes:
All values are in millograms per kilogram
B - Also detected in an associated laboratory blank sample.
J - Estimated value outside the calibrated concentration range.
TAGM - Technical and Administrative Guidance Memorandum
D - Indicates duplicate sample
NA - Not analyzed
NC - Not calculated (no default values provided by NYSDEC)
TCLP - Toxicity Characteristic Leaching Procedure
ND - Not detected
NS - No standard
Bold values exceed TAGM #4046 values.
[1] - From TAGM #4046, New York Department of Environmental Conservation, January 24, 1994.
[2] Key to sample identification on laboratory reports: PAOC2-B1 = SB-2-1; PAOC6-B1 = SB-6-1
[3] - Value is for 4-methylphenol

Table 3
Summary of Semi-Volatile Organic Compounds in Soil

NYSDEC Spill No. 9400483

American Axle & Manufacturing, Inc. Buffalo Plant
Buffalo, New York

Exploration Number	Soil	Exposure	Fill Station		Tank No. 5		Gleason Machine Area				
			SB-117	SB-6-1[2]	MW-101		SB-104			SB-105	
Sample Depth	Cleanup[1]	Assessment	0'-2'	6'-8'	4'-6'	6'-6.4'	1'-2'	1'-2'D	8'-9'	2'-4'	4'-6'
Acenaphthene	50.0	78.9	0.053J	ND	0.650J	3.2	ND	7.9	1.700J	1.500J	3.500J
Acenaphthylene	41	49.4	ND	ND	ND	ND	3.100J	ND	ND	ND	ND
Anthracene	50	3.18	0.230J	ND	0.850J	2.8	ND	ND	1.400J	1.900J	5
Benzo(a)anthracene	0.224/MDL	46.2	0.730	ND	ND	**3.6**	**2.700J**	ND	ND	**2.4**	**5.6**
Benzo(a)pyrene	0.061/MDL	2.33	0.800	ND	ND	**2.4**	**1.500J**	**2.100J**	**0.610J**	**5.7**	**4.5**
Benzo(b)fluoranthene	1.100	38.5	0.780	ND	ND	**3.8**	ND	**2.900J**	0.890J	**12**	NS
Benzo(g,h,i)perylene	50	5.55	0.061J	ND	ND	ND	0.600J	1.400J	ND	4	1.500J
Benzo(k)fluoranthene	1.100	1,180	0.670	ND	ND	**2.6**	ND	**3.000J**	1.000J	**5.6**	NS
Benzoic acid	2.7	NS	0.083J	ND	ND	ND	0.860J	0.650J	ND	ND	ND
Bis(2-Ethylhexyl)phthalate	50.0	NS	0.210	ND	ND	ND	ND	ND	1.000JB	3.900B	ND
Chrysene	0.4	1.8	0.790	ND	ND	**4.2**	**3.000J**	ND	0.980J	**3.8**	NS
Di-n-butylphthalate	8.1	NS	0.033JB	ND	ND	ND	ND	ND	ND	ND	ND
Dibenzo(a)anthracene	0.014/MDL	8.25	ND	ND	ND	ND	ND	ND	ND	**1.7**	ND
Dibenzofuran	6.2	NS	ND	ND	0.420J	2	2.500J	**6.9**	1.200J	ND	ND
Diethylphthalate	7.1	NS	0.019JB	ND	ND	ND	ND	ND	ND	ND	ND
Fluoranthene	50	NR	1.600	ND	ND	6	ND	ND	3.2	7	13
Fluorene	50	61.3	0.077J	ND	ND	3.1	3.500J	6.8	1.900J	1.600J	3.800J
Indeno(1,2,3-cd)pyrene	3.2	4.2	0.320J	ND	ND	ND	0.650J	1.300J	ND	**4.2**	1.900J
2-Methylnaphthalene	36.4	NS	0.043J	ND	0.250J	1.600J	1.200J	3.400J	0.630J	0.690J	2.400J
3+4 Methylphenol	0.9[3]	NS	ND	ND	ND	ND	ND	**1.300J**	ND	ND	ND
Naphthalene	13.0	70.7	0.036J	ND	ND	0.490J	1.300J	3.400J	ND	0.600J	2.100J
Phenanthrene	50	70.7	0.860	ND	3.1	15	16	34	6.6	6.6	16
Phenol	0.03	NS	ND	ND	ND	ND	**2.300J**	**8.5**	ND	**0.540J**	**0.570J**
Pyrene	50	25.1	0.970	ND	ND	6	3.000J	ND	4.3	4	9.7
2,4,6-Trichlorophenol	NS	NS	ND	ND	ND	ND	ND	0.400J	ND	ND	ND
Total SVOC	500	NS	8.313	ND	5.27	56.79	42.21	83.95	24.41	63.83	69.57

Notes:
All values are in millograms per kilogram
B - Also detected in an associated laboratory blank sample.
J - Estimated value outside the calibrated concentration range.
TAGM - Technical and Administrative Guidance Memorandum
D - Indicates duplicate sample
NA - Not analyzed
NC - Not calculated (no default values provided by NYSDEC)
TCLP - Toxicity Characteristic Leaching Procedure
ND - Not detected
NS - No standard
Bold values exceed TAGM #4046 values.
[1] - From TAGM #4046, New York Department of Environmental Conservation, January 24, 1994.
[2] Key to sample identification on laboratory reports: PAOC2-B1 = SB-2-1; PAOC6-B1 = SB-6-1
[3] - Value is for 4-methylphenol

Table 4
Summary of Volatile Organic Compounds, Total Petroleum Hydrocarbons, and PCBs in Soil

NYSDEC Spill No. 9400483

American Axle & Manufacturing, Inc. Buffalo Plant
Buffalo, New York

Exploration Number	Soil	Knuckle Job Area		Maintenance Garage			Tank No. 11 Area		
		SB-103		SB-107			MW-103		
Sample Depth	Cleanup[1]	4'-6'	6'-8'	6'-8'	6'-8'	8'-10'	2'-4'	2'-4'D	6'-8'
Volatile Organic Compounds									
2-Butanone	0.3	NA	NA	NA	NA	NA	0.02	0.004J	0.007
Acetone	0.2	NA	NA	NA	NA	NA	0.086B	0.013B	0.033B
Benzene	0.06	NA	NA	NA	NA	NA	0.001J	ND	ND
Carbon disulfide	2.7	NA	NA	NA	NA	NA	ND	0.0007J	ND
Chloroform	0.3	NA	NA	NA	NA	NA	0.0009J	ND	ND
Ethylbenzene	5.5	NA	NA	NA	NA	NA	0.002J	ND	ND
Methylene Chloride	0.1	NA	NA	NA	NA	NA	0.016	0.105	0.013
Tetrachloroethene	1.4	NA	NA	NA	NA	NA	0.001J	ND	0.007
Toluene	1.5	NA	NA	NA	NA	NA	0.004J	0.004J	0.003J
Xylenes	1.2	NA	NA	NA	NA	NA	0.007	0.003J	0.002J
Styrene	NS	NA	NA	NA	NA	NA	0.001J	0.001J	0.002J
Polychlorinated Biphenyls									
	1.0	NA	NA	NA	NA	NA	ND	ND	ND
Total Petroleum Hydrocarbons									
Method 418.1	NS	25,000	17,000	NA	NA	NA	NA	NA	NA
as Motor Oil (Method 8015)	NS	ND	NA	62,000	32,000	27,000	4,400	7,600	9,400
as Diesel/No.2 Fuel Oil (Method 8015)	NS	2500	NA	NA	NA	NA	NA	NA	NA

Notes:
All values are in milligrams per kilogram
B - Also detected in an associated laboratory blank sample.
J - Estimated value outside the calibrated concentration range.
TAGM - Technical and Administrative Guidance Memorandum
Bold values exceed STARS TCLP Extraction Values.
[1] - From TAGM #4046, New York Department of Environmental Conservation, January 24, 1994.

D - Indicates duplicate sample
NA - Not analyzed
NC - Not calculated (no default values provided by NYSDEC)
ND - Not detected

Table 4
Summary of Volatile Organic Compounds, Total Petroleum Hydrocarbons, and PCBs in Soil

NYSDEC Spill No. 9400483

American Axle & Manufacturing, Inc. Buffalo Plant
Buffalo, New York

Exploration Number	Soil	Fire Loop Repair		Fill Station	Tank No. 5		Gleason Machine Area	
		SB-116		SB-117	MW-101		SB-105	
Sample Depth	Cleanup[1]	2'-4'	2'-4'D	0'-2'	4'-6'	6'-6.4'	2'-4'	4'-6'
Volatile Organic Compounds				8020				
Benzene	0.06	0.0004J	0.0004J	NA	ND	ND	NA	NA
Ethylbenzene	5.5	ND	ND	NA	0.016	0.36	NA	NA
Isopropylbenzene	5	ND	ND	NA	0.0056	0.16	NA	NA
p-Isopropyltoluene	11	ND	ND	NA	ND	0.11	NA	NA
Naphthalene	13	ND	ND	NA	0.0035	0.17	NA	NA
n-propylbenzene	14	ND	ND	NA	0.0069	0.21	NA	NA
1,2,4-Trimethylbenzene	11	ND	ND	NA	0.01	0.25	NA	NA
1,3,5-Trimethylbenzene	3.3	ND	ND	NA	0.0059	0.19	NA	NA
Toluene	1.5	0.0005JB	0.0006JB	NA	0.013	0.096	NA	NA
Xylenes	1.2	ND	ND	NA	0.028	0.88	NA	NA
Polychlorinated Biphenyls								
	NS	ND	ND	ND	NA	NA	NA	NA
Total Petroleum Hydrocarbons								
Method 418.1	NS	NA	NA	NA	34,000	55,000	36,000	180,000
as Motor Oil (Method 8015)	NS	118	NA	226	NA	NA	NA	NA
as Diesel/No.2 Fuel Oil (Method 8015)	NS	NA	NA	NA	NA	NA	NA	NA

Notes:
All values are in milligrams per kilogram
B - Also detected in an associated laboratory blank sample.
J - Estimated value outside the calibrated concentration range.
TAGM - Technical and Administrative Guidance Memorandum
D - Indicates duplicate sample
NA - Not analyzed
NC - Not calculated (no default values provided by NYSDEC)
ND - Not detected
Bold values exceed STARS TCLP Extraction Values.
[1] - From TAGM #4046, New York Department of Environmental Conservation, January 24, 1994.

Table 5
Summary of Sudan IV Soil Screening

NYSDEC Spill No. 9400483

American Axle & Manufacturing, Inc. Buffalo Plant
Buffalo, New York

Monitoring Well	Sample Identification	Visual Examination	Sudan IV Results
MW-304	SB-1-1 (0-1')	Concrete	Test not performed
	SB-1-1 (1-2')	No oil observed	No reaction
	SB-1-1 (2-4')	No oil observed	No reaction
	SB-1-1 (4-6')	Slightly oily	Oil show at 5 feet
	SB-1-1 (6-7.5')	No oil observed	No reaction
MW-300	SB-3-1 (0-1')	Concrete	Test not performed
	SB-3-1 (1-2')	No oil observed	No reaction
	SB-3-1 (2-4')	No oil observed	No reaction
	SB-3-1 (4-6')	Slight odor	Slight dye reaction
	SB-3-1 (6-8')	No oil observed	No reaction
MW-301	SB-3-2 (0-1')	Concrete	Test not performed
	SB-3-2 (1-2')	No oil observed	No reaction
	SB-3-2 (2-4')	No oil observed	No reaction
	SB-3-2 (4-6')	No oil observed	No reaction
	SB-3-2 (6-8')	No oil observed	No reaction
MW-302	SB-3-3 (0-1')	Concrete	Test not performed
	SB-3-3 (1-2')	No oil observed	No reaction
	SB-3-3 (2-4')	No oil observed	No reaction
	SB-3-3 (4-6')	No oil observed	No reaction
	SB-3-3 (6-8')	Oil at 6 feet	Test not necessary
MW-303	SB-3-4 (0-1')	Concrete	Test not performed
	SB-3-4 (1-2')	No oil observed	No reaction
	SB-3-4 (2-4')	No oil observed	No reaction
	SB-3-4 (4-6')	No oil observed	No reaction
	SB-3-4 (6-8')	No oil observed	No reaction
MW-305	SB-7-1 (0-1')	Concrete	Test not performed
	SB-7-1 (1-2')	No oil observed	No reaction
	SB-7-1 (2-4')	No oil observed	No reaction
	SB-7-1 (4-6')	Odor in soil	Dye reaction at 5 feet
	SB-7-1 (6-8')	No oil observed	No reaction
	SB-7-1 (8-10')	No oil observed	No reaction
	SB-7-1 (10-12')	No oil observed	Dye reaction at 10.5 feet in sand stringer
	SB-7-1 (12-14')	No oil observed	No reaction
	SB-7-1 (14-16')	No oil observed	No reaction
	SB-7-1 (16-17.1')	No oil observed	No reaction
MW-306 (completed as a shallow well)	SB-8-1 (0-2')	No oil observed	No reaction
	SB-8-1 (2-4')	No oil observed	Dye reaction at 3.5 feet
	SB-8-1 (4-6')	No oil observed	No reaction
	SB-8-1 (6-8')	No oil observed	No reaction
	SB-8-1 (10-12')	No oil observed	No reaction
	SB-8-1 (12-12.5')	Oil visible on spoon, not in soil	Test not performed

Table 5
Summary of Sudan IV Soil Screening

NYSDEC Spill No. 9400483

American Axle & Manufacturing, Inc.Buffalo Plant
Buffalo, New York

Monitoring Well	Sample Identification	Visual Examination	Sudan IV Results
MW-309	SB-8-2 (0-2')	No oil observed	No reaction
	SB-8-2 (2-4')	No oil observed	No reaction
	SB-8-2 (4-6')	No oil observed	No reaction
	SB-8-2 (6-8')	Oily soils	Test not performed
MW-307	SB-9-1 (0-1')	Concrete	Test not performed
	SB-9-1 (1-2')	No oil observed	No reaction
	SB-9-1 (2-4')	No oil observed	No reaction
	SB-9-1 (4-6')	No oil observed	No reaction
	SB-9-1 (6-9')	No oil observed	No reaction
	SB-9-1 (8-10')	No oil observed	No reaction
	SB-9-1 (10-12')	No oil observed	No reaction
	SB-9-1 (12-14')	No oil observed	No reaction
	SB-9-1 (14-16')	No oil observed	No reaction
	SB-9-1 (16-18.5')	No oil observed	Dye reaction at 17 feet
MW-308	SB-9-2 (0-3.8')	Concrete	Test not performed
	SB-9-2 (3.8-5.8')	No oil observed	No reaction
	SB-9-2 (5.8-7.8')	No oil observed	No reaction
	SB-9-2 (7.8-9.8')	No oil observed	No reaction
	SB-9-2 (9.8-11.8')	No oil observed	No reaction
	SB-9-2 (11.8-13.8')	No oil observed	No reaction
	SB-9-2 (13.8-17.5')	No oil observed	No reaction
MW-400	SB-9-3 (0-1')	Concrete	Test not performed
	SB-9-3 (1-3')	No oil observed	No reaction
	SB-9-3 (2.7-4.5')	No oil observed	No reaction
	SB-9-3 (4.5-6.5')	No oil observed	No reaction
	SB-9-3 (6.5-8.5')	Odor in soil, staining	Dye reaction
	SB-9-3 (8.5-10.5')	No oil observed	Dye reaction
	SB-9-3 (10.5-12.5')	No oil observed	Dye reaction
	SB-9-3 (12.5-14.5')	No oil observed	No reaction
	SB-9-3 (14.5-16.5')	No oil observed	No reaction
	SB-9-3 (16.5-18.5')	No oil observed	Dye reaction
MW-402	SB-9-4 (0-1')	Concrete	Test not performed
	SB-9-4 (1-2.2')	No oil observed	No reaction
	SB-9-4 (2.2-4')	Concrete	No reaction
	SB-9-4 (4-6')	No oil observed	No reaction
	SB-9-4 (6-8')	No oil observed	Dye reaction
	SB-9-4 (8-10')	No oil observed	No reaction
	SB-9-4 (10-12')	No oil observed	No reaction
	SB-9-4 (12-14')	No oil observed	No reaction
	SB-9-4 (14-14.5')	No oil observed	Dye reaction

Table 5
Summary of Sudan IV Soil Screening

NYSDEC Spill No. 9400483

American Axle & Manufacturing, Inc.Buffalo Plant
Buffalo, New York

Monitoring Well	Sample Identification	Visual Examination	Sudan IV Results
MW-404	SB-9-5 (0-1')	Concrete	Test not performed
	SB-9-5 (1-2')	No oil observed	No reaction
	SB-9-5 (2-4')	No oil observed	No reaction
	SB-9-5 (4-6')	No oil observed	No reaction
	SB-9-5 (6-8')	No oil observed	No reaction
	SB-9-5 (8-10')	No oil observed	No reaction
	SB-9-5 (10-12')	No oil observed	No reaction
	SB-9-5 (12-14')	No oil observed	No reaction
	SB-9-5 (14-16')	No oil observed	No reaction
	SB-9-5 (16-16.3')	Odor in soil	Dye reaction
MW-406	SB-9-6 (0-1')	Concrete	Test not performed
	SB-9-6 (1-2')	No oil observed	No reaction
	SB-9-6 (2-3.5')	Concrete	Test not performed
	SB-9-6 (3.5-5.5')	No oil observed	No reaction
	SB-9-6 (5.5-7.5')	No oil observed	No reaction
	SB-9-6 (9.5-11.5')	No oil observed	No reaction
	SB-9-6 (11.5-13.5')	No oil observed	No reaction
	SB-9-6 (13.5-15.5')	No oil observed	No reaction
	SB-9-6 (15.5-17.5')	No oil observed	No reaction
	SB-9-6 (17.5-17.6')	No oil observed	No reaction
MW-408	SB-9-7 (0-1')	Concrete	Test not performed
	SB-9-7 (1-3')	No oil observed	No reaction
	SB-9-7 (3-5')	No oil observed	No reaction
	SB-9-7 (5-7')	No oil observed	No reaction
	SB-9-7 (7-9')	No oil observed	No reaction
	SB-9-7 (9-11')	No oil observed	No reaction
	SB-9-7 (11-12.1')	No oil observed	No reaction
MW-500	SB-9-8 (0-2')	Concrete	Test not performed
	SB-9-8 (2-4')	No oil observed	No reaction
	SB-9-8 (4-6')	No oil observed	No reaction
	SB-9-8 (6-8')	No oil observed	No reaction
	SB-9-8 (8-10')	No oil observed	No reaction
	SB-9-8 (10-12')	No oil observed	No reaction
	SB-9-8 (12-14')	No oil observed	No reaction
	SB-9-8 (14-16')	No oil observed	No reaction
	SB-9-8 (16-18')	No oil observed	No reaction
	SB-9-8 (18-18.5')	No oil observed	No reaction

Table 6
Summary of Semi-Volatile Organic Compounds in Groundwater

NYSDEC Spill No. 9400483

American Axle & Manufacturing, Inc. Buffalo Plant
Buffalo, New York

Parameter Detected	Sample Identification							STARS TCLP Extraction Value
	MW-103[1]	MW-404[2]	MW-405[2]	MW-408[2]	MW-409[2]	MW-500[3]	MW-502[3]	
Volatile Organic Compounds								
Toluene	0.7JB	NA	NA	NA	NA	NA	NA	5
Xylenes	0.8JB	NA	NA	NA	NA	NA	NA	5
Methylene Chloride	6B	NA	NA	NA	NA	NA	NA	NS
Acetone	6J	NA	NA	NA	NA	NA	NA	NS
Semi-Volatile Organic Compounds								
Acenaphthene	<50	**49**	<5	<5	<5	<5	<5	20
Benzo (a) pyrene	<50	**33**	<5	<5	<5	<5	<5	0.002
Fluoranthene	<50	**93**	<5	<5	<5	<5	<5	50
Fluorene	<50	**58**	<5	<5	<5	<5	<5	50
Indeno (1,2,3-cd) Pyrene	<50	**14**	<5	<5	<5	<5	<5	0.002
Phenanthrene	<50	34	<5	<5	<5	<5	<5	50
Pyrene	<50	**110**	<5	<5	<5	<5	<5	50

Notes:
All concentrations are in micrograms per liter
NA = Not analyzed.
NS = No standard
J = Estimated value outside the calibrated concentration range.
B = Also detected in an associated laboratory blank sample.
STARS - Spill Remediation and Technology Series
TCLP - Toxicity Characteristic Leachate Procedure
STARS TCLP values from STARTS Memo #1, Petroleum Contaminated Soil Guidance Policy, New York State Department of Environmental Conservation, August 1992

[1] Samples were collected on April 29, 1994
[2] Samples were collected on May 18, 1998.
[3] Samples were collected on June 17, 1998.