2008 BULK UNLOAD AREA INVESTIGATION WORK PLAN

GENERAL MOTORS CORPORATION
GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

AUGUST 2008
REF. NO. 017360 (18)

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LIST OF ACRONYMS

bgs	Below Ground Surface
COC	Chain of Custody
CRA	Conestoga-Rovers & Associates
DCC	Direct Contact Criteria
DWPC	Drinking Water Protection Criteria
DOT	Department of Transportation
GM	General Motors Corporation
GSIC	Groundwater-Surface Water Interface Protection Criteria
HSA	Hollow-stem Auger
MDEQ	Michigan Department of Environmental Quality
PCBs	Polychlorinated Biphenyls
PID	Photoionization Detector
PNAs	Polynuclear Aromatic Hydrocarbons
PSIC	Particulate Soil Inhalation Criteria
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
RCI	Reactivity, Corrosivity, and Ignitabilty
RCRA	Resource Conservation and Recovery Act
RRD	Remediation and Redevelopment Division
SDBL	State Default Background Levels
SOW	Scope of Work
STL	Severn Trent Laboratories
SVOCs	Semi-Volatile Organic Compounds
TAL	Target Analyte List
TAT	Turnaround Time
TCLP	Toxicity Characteristic Leaching Procedure
TCL	Target Compound List
USCS	United Soil Classification System
U.S. EPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds
Work Plan	Bulk Unload Area Investigation Work Plan
WWTP	Wastewater Treatment Plant

1.0 INTRODUCTION

The purpose of this Bulk Unload Area Investigation Work Plan (Work Plan) is to present the protocol to be used for the implementation of the installation of soil borings, and the collection and analysis of soil samples near the bulk unload area at the General Motors Corporation (GM) Grand Rapids Metal Plant located at 300 36th Street in Wyoming, Michigan (Site). Figure 1.1 presents the Site location. A Site plan is presented on Figure 1.2.

1.1 BACKGROUND

The Grand Rapids Metal Plant is a metal fabrication and assembly plant for GM consisting of approximately 45 acres of production activities on approximately 88 acres of land.

Current operations conducted at the Site include the manufacture of quarter panels, floor pans, roof panels, deck lids, doors, and center pillars for assembly plant use. In addition, the Site constructs the dies, fixtures, mechanical devices, and manufacturing aids used internally to produce the aforementioned parts. The Site consists of a main manufacturing building, with several outbuildings including a baler house, wastewater treatment plant (WWTP), powerhouse, and other ancillary structures. The remainder of Site areas consist of asphalt/concrete paved areas and landscaped areas. The Site is relatively flat, with little or no significant topographic relief.

In November 2004, Site personnel installed a trench drain in the bulk unload area. The location of the bulk unload area is presented on Figure 1.2. The trench drain is approximately 70 feet long by one-foot wide and drains to a sump located adjacent to the bulk unload area. From there, liquids are discharged to a sump within the plant inside an adjacent truck dock, which discharges to the on-Site wastewater treatment plant via aboveground piping lines.

Prior to disposal, Site personnel sampled excavated soils from the area for waste characterization. Analysis conducted for the waste characterization of the excavated soils included Toxicity Characteristic Leaching Procedure (TCLP) metals, oil and grease, and total petroleum hydrocarbons (TPH) as gasoline, diesel, and "other." TCLP analysis of the waste soil sample had detections of barium, cadmium, copper, lead, and zinc. Totals analysis was also preformed on lead, TPH diesel, and TPH "other" for which there were detections. The soils were disposed of as a hazardous waste due to the concentration of lead identified.

Based on these finding at the Site, an investigation in the bulk unload area was initiated. Seven soil borings, SB19-05 through SB25-05 (SB19 through SB25), were advanced at the Site on December 12, 2005 and a total of 33 soil samples were collected to define current soil conditions in the vicinity of the trench drain. Soil borings SB19 through SB24 were advanced around the perimeter of the trench drain, and SB25 was advanced in the northwest corner inside the trench drain area.

Soil borings were advanced utilizing a 4 ¼-inch hollow stem auger (HSA) drill rig with continuous split-spoon sampling. Soil samples were collected starting at the top of the ground surface and continuing at two-foot intervals until a terminal depth of ten feet bgs, excluding SB23 and SB24, where samples were collected at 0 to 2 feet bgs, 4 to 6 feet bgs, and 8 to 10 feet bgs intervals, respectively. A total of 33 soil samples were collected for analysis for polynuclear aromatic hydrocarbons (PNAs) and Target Analyte List (TAL) metals.

Laboratory analytical results were compared to Michigan Public Act 451, Part 201 Generic Residential and Commercial I Cleanup Criteria (Part 201 Residential), as well as the Michigan Public Act 451, Part 201 Generic Industrial and Commercial II, III, and IV Criteria (Part 201 Industrial). Arsenic, barium, cadmium, total chromium, lead, mercury, selenium and silver were detected at concentrations above the Part 201 Residential and/or Industrial Drinking Water Protection Criteria (DWPC), Direct Contact Criteria (DCC), Particulate Soil Inhalation Criteria (PSIC), Groundwater Surface Water Interface Protection Criteria (GSIC), and/or State Default Background Level (SDBL) in the soil samples collected during the investigation. Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, fluoranthene, naphthalene, and phenanthrene were detected above the Part 201 Residential and/or Industrial DCC and/or GSIC in the soil samples collected during the investigation. The previous investigation conducted in 2005 was summarized under separate cover in a memorandum dated September 8, 2006, which was submitted to the Michigan Department of Environmental Quality (MDEQ).

Based on the findings of the 2005 investigation activities, additional investigation activities were conducted on July 10, 2007 to further delineate metal impacts to soil above the Michigan Act 451, Part 201 Residential Cleanup Criteria in the vicinity of the bulk unload area.

Eight soil borings, SB26-07 through SB32-07 (SB26 through SB32), were advanced at the Site on July 10, 2007. Soil borings SB26 through SB32 were advanced to the northwest, north, and east of the trench drain, stepping out from previous soil borings advanced in 2005. Soil borings were advanced utilizing direct push Geoprobe™ technology with

continuous macrocore sampling. Soil samples were collected starting at the top of the ground surface and continuing at two-foot intervals until a terminal depth of ten feet bgs. A total of 44 soil samples were collected for analysis for PNAs and TAL metals.

Laboratory analytical results were compared to Part 201 Residential Criteria, as well as the Part 201 Industrial Criteria. Antimony, arsenic, barium, cadmium, total chromium, cobalt, copper, lead, manganese, nickel, selenium, silver, and vanadium were detected at concentrations above the Part 201 Residential and/or Industrial DWPC, DCC, PSIC, GSIC, and/or SDBL in the soil samples collected during the investigation. Benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd) pyrene), and fluoranthene were detected above the Part 201 Residential and/or Industrial DCC and/or GSIC in the soil samples collected during the investigation. The previous investigation conducted in 2007 was summarized under separate cover in a memorandum dated October 26, 2007, which was submitted to the MDEQ.

1.2 PURPOSE OF BULK UNLOAD AREA INVESTIGATION WORK PLAN

The purpose of this Work Plan is to outline the activities proposed to further evaluate and delineate impacts to soil above the Michigan Act 451, Part 201 Residential and Industrial Cleanup Criteria in the vicinity of the bulk unload area.

2.0 CURRENT CONDITIONS

2.1 NATURE AND EXTENT OF CONTAMINATION

The nature and extent of contamination is presented in memorandums to GM dated September 8, 2006 and October 26, 2007, which were submitted to the MDEQ.

Antimony, arsenic, barium, cadmium, total chromium, cobalt, copper, lead, manganese, mercury, nickel, selenium, silver, and vanadium were detected at concentrations above the Part 201 Residential and/or Industrial DWPC, DCC, PSIC, GSIC, and/or SDBL in the soil samples collected during the investigations.

Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, fluoranthene, indeno(1,2,3-cd) pyrene), naphthalene, and phenanthrene were detected above the Part 201 Residential and/or Industrial DCC and/or GSIC in the soil samples collected during the investigations.

2.2 SITE GEOLOGY AND HYDROGEOLOGY

Information regarding the geologic conditions at the Site was collected during previous environmental investigations. Numerous soil borings have been installed at the Site between 1981 and 2007.

Regional overburden in the vicinity of the Site consists of glacial outwash sand and gravel, and postglacial alluvium from the Paleozoic Upper Mississippian Meramecian Series. Based on the review of stratigraphic boring logs generated during previous investigations at the Site, the glacial outwash, consisting of sands and gravels, has been observed at varying depths between 40 and 90 feet below ground surface (bgs). The outwash is underlain by a clay layer that has been observed to generally slope to the west-northwest at a gradient of approximately 1-foot in 15 feet. Bedrock was not encountered during previous investigations conducted at the Site. Based on a regional knowledge of geology, bedrock in the area of the Site is present at approximately 100 feet bgs. The upper bedrock is part of the Michigan formation, which is underlain by Marshall sandstone. The Michigan formation is approximately 100 feet thick, and consists of interbedded layers of shale, gypsum, and limestone.

Groundwater was encountered during the historical environmental investigations at approximately 20 feet bgs. Groundwater level measurements were recorded during the environmental investigations and during subsequent quarterly monitoring events.

Historical groundwater elevation data indicates the approximate groundwater flow direction is to the north-northwest, towards Cole Drain.

Geologic information in the vicinity of the bulk unload area was obtained during the previous investigations on December 12, 2005 and July 10, 2007. Based on observations during the investigation, soils in the bulk unload area consist of sands with trace silt to approximately 10 feet bgs (deepest boring installed in this area).

3.0 SCOPE OF WORK

The scope of work (SOW) for this Work Plan includes the advancement of six soil borings and the collection and analysis of approximately 45 soil samples, including QA/QC samples. The investigation fieldwork will adhere to the methods and procedures specified in this Work Plan and applicable Quality Assurance Project Plan. The QAPP is presented in Appendix A of the 2008 Groundwater Investigation Work Plan dated August 2008, which was submitted to the MDEQ. Additionally, the soil samples will be collected consistent with the requirements set forth in the MDEQ Remediation and Redevelopment Division (RRD) Operational Memorandum No. 2 (October 22, 2004).

3.1 SOIL BORING INSTALLATION

Seven soil borings, SB34-08 through SB40-08, will be advanced at the Site in the bulk unload area to further define the PNA and metal impacts to soil and to assess potential PCB impacts to soil. Soil borings SB34-08 through SB39-08 will be installed to the north, east, and west of soil borings SB26-07 through SB33-07, respectively, to vertically and horizontally delineate the concentrations of PNAs and metals compounds in soil samples collected from those locations and to evaluate the potential presence of PCBs in soil in this area. The soil boring to the east of the bulk unload area will be advanced inside the Site building in the oil-storage room. Additionally, one soil boring, SB40-08, will be installed adjacent to the location of SB20-05, in order to evaluate the potential presence of PCBs in soil in this area. Proposed soil boring location area presented on Figure 3.1.

Soil borings will be advanced utilizing Geoprobe™ direct push technology with continuous macrocore sampling. Soil samples will be collected starting at the top of the ground surface and continuing at two-foot intervals until a terminal depth of 10 feet bgs, with the exception of SB39-08, which will be advanced to a depth of 15 feet bgs, to account for the difference in elevation between the interior and exterior of the building. A five-foot long, two-inch outside diameter macrocore sampler will be driven into the undisturbed material. Soil samples will be described and classified according to the Unified Soil Classification System (USCS) by a CRA Geologist. Soil samples will be field screened for visual/olfactory evidence of impact and with an 11.7 eV photoionization detector (PID).

Concrete coring of approximately 10 to 12-inch thick concrete will be performed, as necessary. PID readings will be collected upon removal of concrete. Concrete will be patched after completion of drilling activities.

Soil cuttings will be screened with an 11.7 eV bulb PID and examined for visual/olfactory indication of contamination. All soil cuttings will be containerized in DOT approved 55-gallon drums and labeled as to where they were generated and the initial accumulation date.

Upon completion of soil sample collection, each borehole will be abandoned. All soil borings will be abandoned using the tremie-method to backfill the borehole annulus with a high solids bentonite grout to ground surface.

3.2 SURVEYING

A survey of the Site will be completed for all new soil borings and for the previously installed soil borings in the bulk unload area. Soil boring locations and elevations will be surveyed, with elevations to the nearest 0.01-foot. These elevations will be referenced to a designated above mean sea level benchmark.

3.3 DECONTAMINATION

Upon mobilization to the Site and prior to drilling commencement, the drill rig and all associated equipment will be thoroughly cleaned using a high-pressure, low-volume steam wash and inspected. Before initiating drilling at each subsequent location, drill rods, macrocore sampler, and other associated equipment will be decontaminated to prevent cross-contamination. Decontamination of sampling equipment is presented in Section 4.2.

All generated decontamination water will be visually examined and screened with a PID. All decontamination water will be containerized in DOT-approved 55-gallon drums for future waste characterization and disposal.

4.0 SAMPLING PROCEDURES

Proposed sample locations are presented on Figure 4.1. All sampling will be performed in accordance with the procedures outlined below.

4.1 SOIL SAMPLE COLLECTION

Soil samples shall be collected at two-foot intervals using Geoprobe™ direct push technology with a five-foot long stainless steel macrocore sampler as described in Section 3.1. Samples shall be collected consistent with the protocols set forth in MDEQ RRD Operation Memorandum No. 2 (October 22, 2004).

One soil sample will be collected for chemical analysis from each two-foot interval, in addition to quality assurance/quality control (QA/QC) samples. Approximately 45 soil samples will be collected for analysis for PNAs, Site-specific TAL metals less earth metals (aluminum, calcium, iron, magnesium, potassium, and sodium), and PCBs. The Sampling and Analysis Plan is presented in Table 4.1. Collected samples shall be placed in pre-cleaned laboratory-provided containers, properly labeled, placed on ice, and shipped under chain-of-custody (COC) protocol via overnight courier to TestAmerica Laboratories (TestAmerica) in North Canton, Ohio to be analyzed on a two-week turnaround time (TAT).

4.2 DECONTAMINATION

All non-disposable sampling equipment will be decontaminated prior to each use by using an Alconox wash, potable water rinse, followed by a deionized water rinse and allowed to air dry. This includes split-spoon samplers, hand sampling tools, etc.

All generated decontamination water will be visually examined and screened with a PID. All decontamination water will be containerized in DOT-approved 55-gallon drums for future waste characterization and disposal.

4.3 WASTE CHARACTERIZATION

All generated soil cuttings and decontamination water will be visually examined and screened with a PID. All generated soil cuttings and decontamination/development

water will be containerized in DOT-approved 55-gallon drums for future waste characterization and disposal.

Drum contents will be segregated as necessary, based on evidence of impact observed during field screening activities. Two soil waste characterization samples and one water waste characterization sample will be collected from the drums and analyzed for TCLP metals, TCLP volatile organic compounds (VOCs), TCLP semi-volatile organic compounds (SVOCs), corrosivity, and ignitability on a two-week TAT for off-Site disposal. Table 4.1 presents the Sampling and Analysis Plan.

Based on the analytical results, the decontamination water will be discharged to the on-Site WWTP or properly disposed of off-Site. Soil cuttings will be disposed off-Site at an approved disposal facility.

5.0 ANALYTICAL PROTOCOLS

Soil samples will be analyzed for PNAs, Site-specific TAL metals less earth metals (aluminum, calcium, iron, magnesium, potassium, and sodium), and PCBs, as presented in the SOW and on Table 4.1. All samples will be analyzed using the United States Environmental Protection Agency approved methods set forth in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", SW-846, 3rd Edition and Promulgated Update, November 1986, "Standards Methods for the Examination of Water and Wastewater", APHA, 19th Edition, 1995, and "Methods for Chemical Analysis of Water and Waste", EPA-600/4-79-020, revised March 1983. Quality Control/Quality Assurance samples will be collected for data and sample quality assessment in accordance with the QAPP. The QAPP is presented in Appendix A of the 2008 Groundwater Investigation Work Plan dated August 2008, which was submitted to the MDEQ. Following receipt of final analytical data, a data quality assessment and validation will be prepared by a CRA chemist, in accordance with the QAPP.

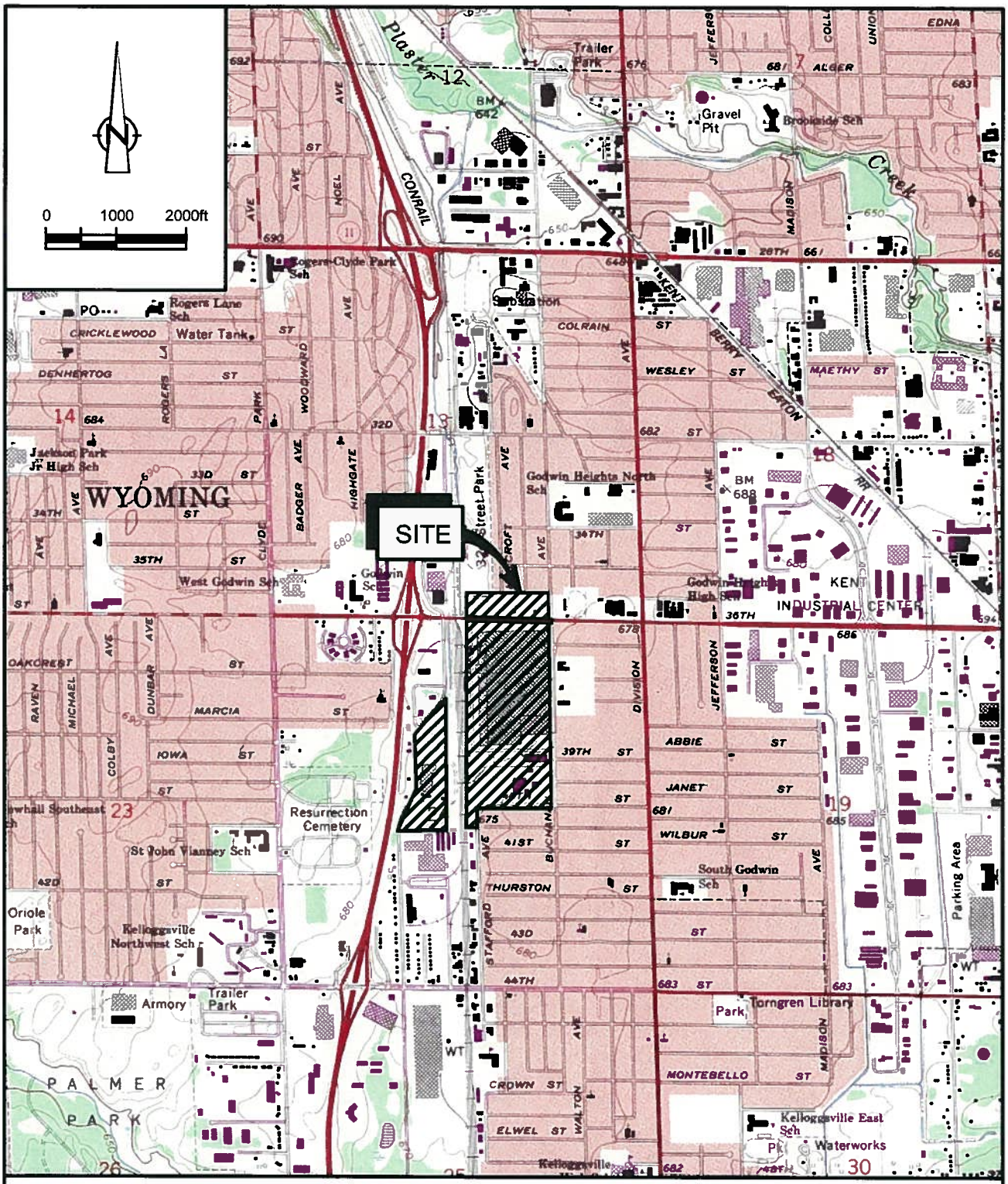
6.0 REPORTING

Upon completion of the field activities, receipt of final analytical results, and data quality assessment and validation, a report summarizing the results will be generated.

7.0 SCHEDULE

A generalized proposed schedule for the implementation of the field activities and reporting is presented below. A more detailed schedule will be provided upon verification of start date.

- Completion of Field Activities – Approximately 1 to 2 days from mobilization to completion.
- Submittal of Data Report – Approximately 6 to 10 weeks from completion of field activities.



SOURCE: USGS QUADRANGLE MAP;
GRAND RAPIDS WEST, MICHIGAN

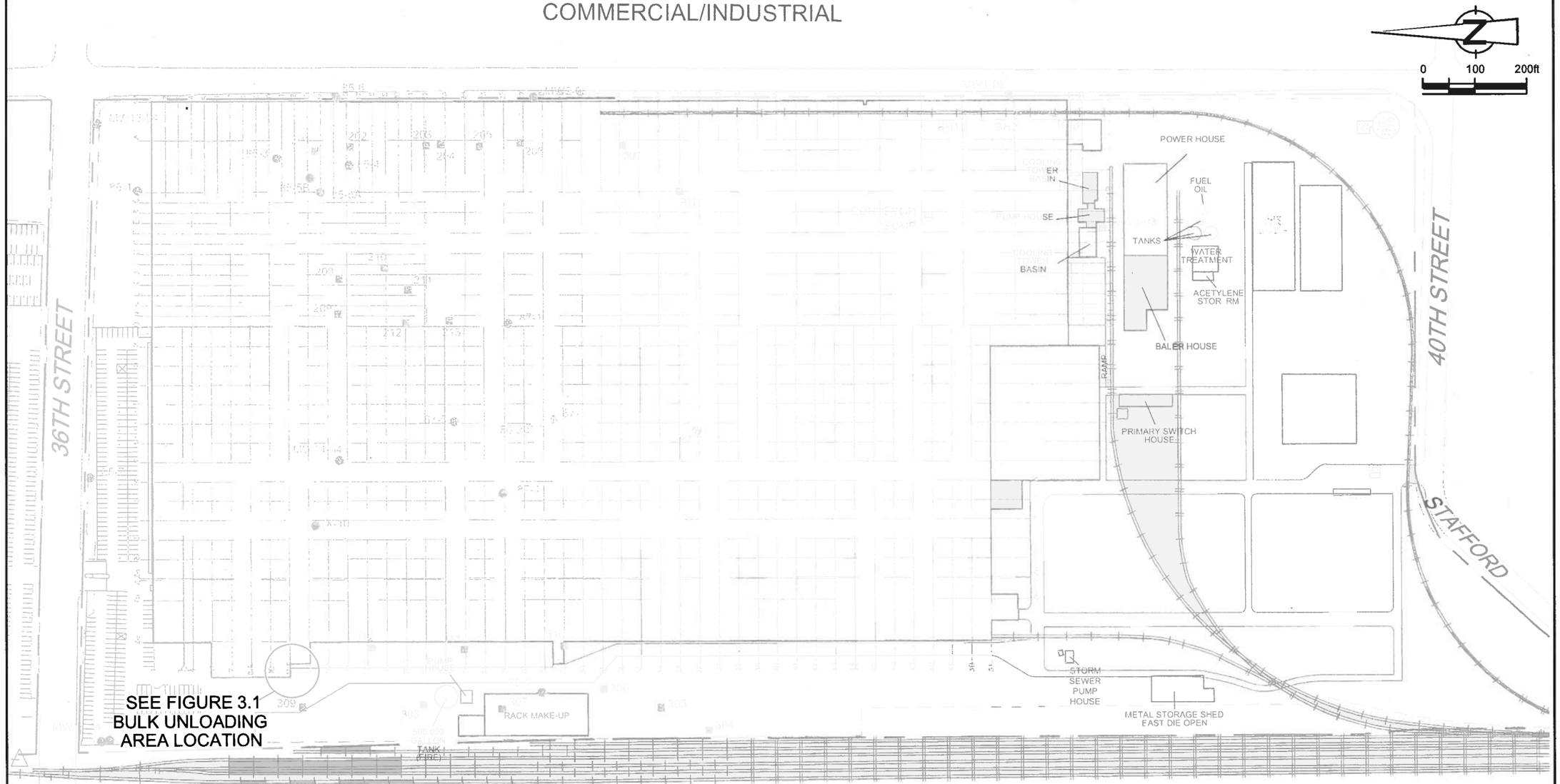
GRAND RAPIDS

figure 1.1

SITE LOCATION
GRAND RAPIDS METAL PLANT
Wyoming, Michigan

017360-10(018)GN-DE001 JAN 30/2008

COMMERCIAL/INDUSTRIAL



LEGEND

- MONITORING WELL LOCATION
- PURGE WELL LOCATION
- SOIL BORING LOCATION
- DESTROYED/REMOVED MONITORING WELL LOCATION
- CULVERT LOCATION
- ABANDONED AIR PURGE WELL
- APPROXIMATE LOCATION OF DEWATERING WELLS
- APPROXIMATE SITE BOUNDARY
- FENCE
- RAILROAD
- COLE DRAIN

SOURCE: EDI ENGINEERING & SCIENCE, JUNE 1987 AND JUNE 1988 AND EARTH TECH, SEPTEMBER 2001.

figure 1.2

APPROXIMATE BULK UNLOAD AREA
GRAND RAPIDS METAL PLANT
Wyoming, Michigan

017360-10(018)GN-DE002 JAN 30/2008

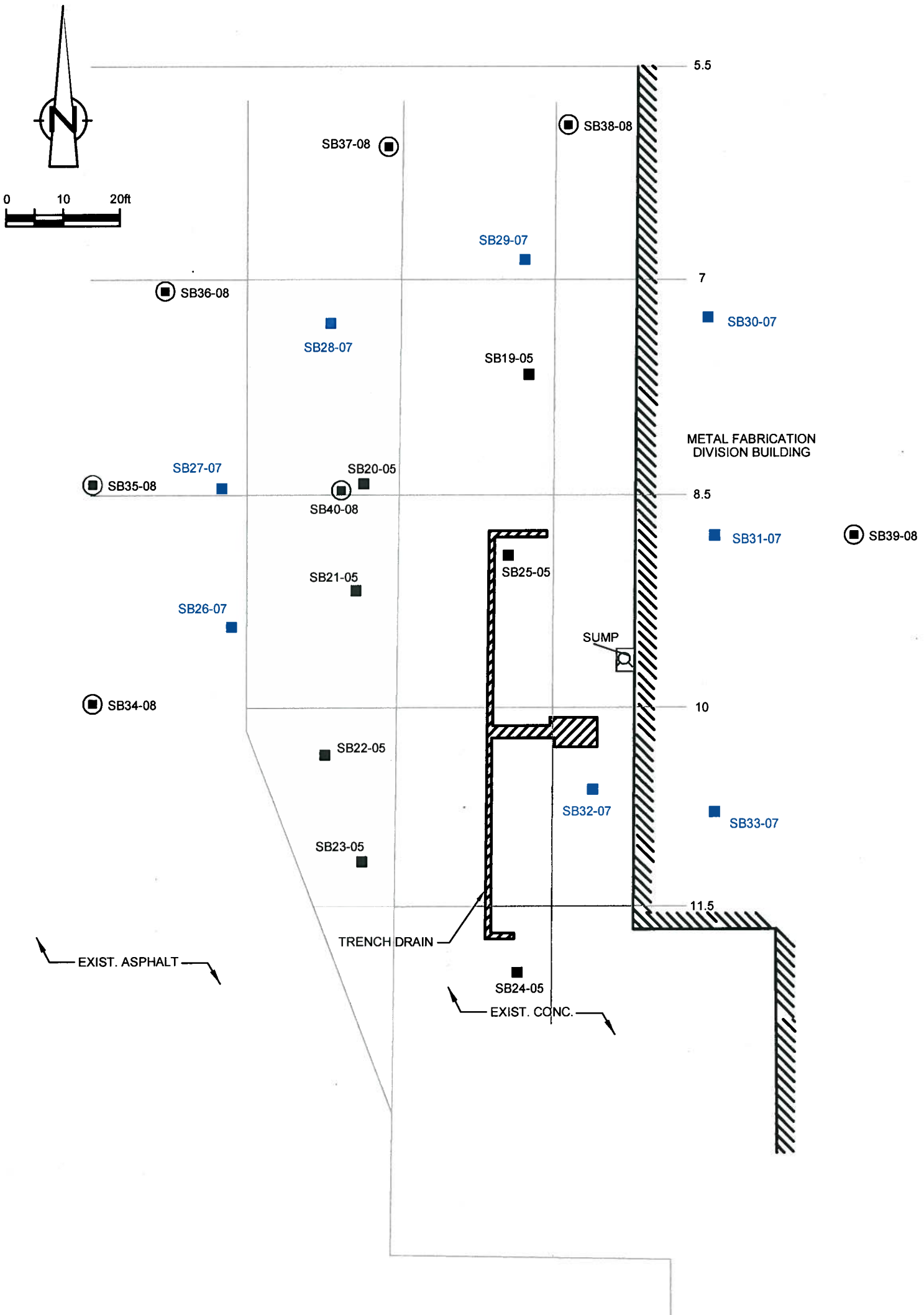


figure 3.1

PROPOSED SOIL BORING LOCATIONS
GRAND RAPIDS METAL PLANT
Wyoming, Michigan

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TABLE 4.1

SAMPLING AND ANALYSIS PLAN
2008 BULK UNLOAD AREA INVESTIGATION WORK PLAN
GENERAL MOTORS CORPORATION
GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

Proposed Investigation Activity	*Reason for Activity*	*Quantity of Sample Locations*	*Quantity of Samples*	*Sample Matrix*	*Sample Interval*	*Analysis*
Collection of Soil Samples	Vertical/horizontal delineation	7	45[1]	soil	vertical intervals of 2 feet	Site-specific TAL Metals, PNAs, and/or PCBs
Collection of waste characterization samples	Disposal	2 [2]	2 [2]	soil	–	TCLP metals, TCLP VOCs, TCLP SVOCs, CI
		1 [2]	1 [2]	water	–	TCLP metals, TCLP VOCs, TCLP SVOCs, CI

Notes:

[1] Number of samples includes Quality Assurance/Quality Control samples.
[2] Number of samples to be determined in the field.
TAL - Target Analyte List
PNAs - Polynuclear Aromatic Hydrocarbons
TCLP - Toxicity Characteristic Leaching Procedure
SVOCs - Semi-volatile Organic Compounds
CI - Corrosivity and Ignitability
VOCs -Volatile Organic Compounds
PCBs - Polychlorinated Biphenyls
Site-specific TAL metals - TAL metals less earth metals (aluminum, calcium, iron, magnesium, potassium, and sodium)