RESOURCE CONSERVATION AND RECOVERY ACT FACILITY INVESTIGATION WORK PLAN

FORMER WILLOW RUN POWERTRAIN PLANT
YPSILANTI, MICHIGAN

Prepared for:

Revitalizing Auto Communities Environmental Response Trust (RACER)

FEBRUARY 2012
REF. NO. 017358 (18)

Prepared by:
Conestoga-Rovers & Associates
14496 Sheldon Road, Suite 200
Plymouth, Michigan 48170
Office: (734) 453-5123
Fax: (734) 453-5201

web: http:\\www.CRAworld.com

RESOURCE CONSERVATION AND RECOVERY ACT FACILITY INVESTIGATION WORK PLAN

FORMER WILLOW RUN POWERTRAIN PLANT
YPSILANTI, MICHIGAN

Prepared for:

Revitalizing Auto Communities Environmental Response Trust (RACER)

FEBRUARY 2012
REF. NO. 017358 (18)

Based on my knowledge of the conditions of the property described in the remedial action plan (RAP) and my inquiry of the person or persons who manage the system referenced in the operator's certification, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Grant R Trigger

Grant Trigger
Michigan Cleanup Manager
Revitalizing Auto Communities
Environmental Response Trust

2-22-12

Date:

TABLE OF CONTENTS

LIST OF FIGURES
(Following Text)

LIST OF TABLES
(Following Text)

LIST OF APPENDICES

LIST OF ACRONYMS

AOI	area of interest
bgs	below ground surface
CCR	Current Conditions Report
CRA	Conestoga-Rovers & Associates, Inc.
FMGs	field method guides
GM	General Motors Corporation
GM LLC	General Motors LLC
IRA	interim response actions
Kaiser-Frazer	Kaiser-Frazer Company
LIF	laser induced fluorescences
LNAPL	light non-aqueous phase liquid
MLC	Motors Liquidation Company
MS/MSD	matrix spike/matrix spike duplicates
PCBs	Polychlorinated Biphenyls
PID	photoionization detector
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
RACER	Revitalizing Auto Communities Environmental Response Trust
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
Site	Willow Run Powertrain Plant Property
SVOCs	Semi-Volatile Organic Compounds
TAL	Target Analyte List
VOCs	Volatile Organic Compounds
Work Plan	RFI Work Plan
WWTP	Waste Water Treatment Plan
YTO	Ypsilanti Transmission Operations

1.0 INTRODUCTION

Conestoga-Rovers & Associates, Inc. (CRA) has prepared this Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) Work Plan (Work Plan) for the Former Willow Run Powertrain Plant property (Site) in Ypsilanti, Michigan. Figure 1.1 presents the Site location and Figure 1.2 presents the Site layout as well as areas of interest (AOIs) identified in the Current Conditions Report (CCR, CRA, Draft, July 2011). This Work Plan is prepared to further investigate Site impacts and address data gaps identified in the CCR.

As a result of General Motors Corporation's (GM) bankruptcy, certain operating assets of GM were sold on July 10, 2009 to a newly formed company which is now known as General Motors LLC (GM LLC). Existing, non-conforming assets remained the property of GM, which was renamed Motors Liquidation Company (MLC). On October 20, 2010, MLC entered into a settlement agreement with federal and state governmental authorities regarding MLC's environmental obligations at its owned real property, including this Site (Settlement Agreement). On March 3, 2011, this Settlement Agreement was approved by the United States Bankruptcy Court for the Southern District of New York as part of MLC's Chapter 11 Plan of Liquidation. According to the terms of the Settlement Agreement, MLC transferred its interests in this Site to the Revitalizing Auto Communities Environmental Response Trust (RACER) on March 31, 2011, the Effective Date of MLC's Chapter 11 Plan of Liquidation. As such, the Site is now operated by RACER and this Work Plan has been prepared on RACER's behalf.

Specifically, this Work Plan presents the additional investigative activities that will be conducted to:

- Investigate soil impacts throughout the Site
- Investigate shallow and intermediate zone groundwater quality outside of the light non-aqueous phase liquid (LNAPL) plumes
- Investigate subsurface geology, in particular, the intermediate sand layer and deep sand layer(s), if present
- Investigate deep aquifer quality at perimeter of Site
- Determine the Site-specific background metals concentrations in soil and groundwater
- Investigate data gaps at several AOIs that have not historically been investigated

2.0 BACKGROUND

The Site is bordered to the north by US 12/M 17 highway, to the east and south by the Willow Run Airport, to the west by Wiard Road. The Willow Run Plant is approximately 4.6 million square feet. The northern portion of the Site was used for parking. Willow Run Creek runs through the western portion of the Site and into Tyler Pond to the south of the Site.

Prior to 1940, the current Willow Run site was agricultural land purchased by the Ford Motor Company. In 1941 the United States Defense Plant Corporation of America purchased the Willow Run facility from Ford and directed Ford to construct and operate a bomber production plant. Along with the plant, Ford constructed various support buildings, an airstrip and a wastewater treatment plant. Military aircraft were manufactured at the plant from 1942 to 1945.

The Kaiser-Frazer Company (Kaiser-Frazer) leased the bomber plant and Company Vehicle Operations property from the War Asset Administration in November 1945 and purchased the facility in December 1948. Kaiser-Frazer refurbished the plant to produce automobiles. A dam was built sometime between 1941 and 1942 at Tyler Road, creating Tyler Pond. This pond served as the discharge point for wastewater treatment operations associated with the Airport and the bomber production facility. Kaiser-Frazer owned the property until its sale to GM in December 1954.

Prior to 2001, several environmental consultants conducted limited investigations at the Site. CRA became involved in the Site and began interim response actions (IRAs) in 2001. A summary of the environmental investigations and IRAs completed to date at the Site are presented in the CCR. Table 2.1 briefly summarizes the previous environmental investigations.

The geology for the western portion of the Site is most easily described by dividing the stratigraphy into four units. The uppermost unit typically extends 8 to 10 feet below ground surface (bgs), consists of fill and native soils composed of a mixture of silty sands, clayey sands, poorly graded sands, and silty clays. The sandy upper unit is underlain by a firm dark green to gray, high plasticity clay with occasional discontinuous sand lenses. This clay unit is typically 2 to 5 feet thick. The third unit generally consists of silty sands with some interbedded silt units, and is saturated. This sandy unit is typically 4 to 6 feet thick. The fourth unit is the regionally extensive clay unit that is at least 50 feet thick. The geology of the eastern portion of the Site is generally similar though the upper sandy unit extends to approximately 15 feet bgs and the saturated unit is thicker. The third unit may pinch out to the east, though this has not been thoroughly investigated.

According to residential well logs surrounding the property, a deep aquifer is present between 80 and 100 feet bgs. This unit consists of sand and "hard pan" and is underlain by shale. No deep borings have been advanced on-Site.

The saturated zone for the western portion of the Site consists of a shallow and an intermediate unit, which correlate to the first and third unit as described above. The depth to water in the western portion of the Site is approximately 8 to 9 feet bgs in the shallow unit and 9 to 11 feet bgs in the intermediate unit. The shallow groundwater table in the eastern portion of the Site is approximately 7 feet bgs. Figures 2.1 and 2.2 present groundwater contours for the shallow and intermediate zones, respectively.

3.0 INVESTIGATION PROGRAM

This section presents the rationale for investigation throughout the Site. A detailed description of investigation methodologies is presented in Section 4.0. Figure 3.1 presents proposed locations for all soil boring, monitoring well, and soil gas probe locations associated with this Work Plan. Table 3.1 includes detailed information on soil sample depths and analysis, monitoring well screened intervals, and estimated depths of borings. Figure 3.2 presents locations of existing monitoring wells which will be sampled as part of this Work Plan. Table 3.2 includes detailed information on groundwater sampling analysis planned at both new and existing wells.

3.1 WESTERN PORTION OF PLANT

CRA completed a Limited Remedial Investigation within the western portion of the plant, also known as Ypsilanti Transmission Operations (YTO), in 2003 and a substantial number of soil and groundwater data were collected. Therefore, the investigation throughout this area focuses more on identifying the relationship between the shallow and intermediate zone and evaluating the chlorinated constituents identified in groundwater.

3.1.1 SOIL INVESTIGATION

Soil borings will be advanced at all locations. At all locations where a single shallow monitoring well is installed, the boring will be advanced through the overlying sandy unit and at least six inches into the underlying clay. Where well pairs (shallow and intermediate) are installed, the boring will be advanced through the top clay, through the intermediate sand unit, and six inches into the underlying clay. At locations where well clusters (shallow, intermediate and deep) are installed, the soil boring will be advanced 80 – 100 feet, through the deep aquifer to the shale or a maximum of 100 feet. Where a shallow soil boring is completed with no well installation, the boring will be advanced only as deep as the water table. This information will be used to more thoroughly evaluate the geologic conditions underlying the Plant and better define potential pathways.

Soil samples will be collected to verify previous results.

3.1.2 SHALLOW AND INTERMEDIATE GROUNDWATER INVESTIGATION

Several paired monitoring wells will be advanced. The shallower of the paired wells will screen the entire water column in the shallow zone. The deeper of the paired wells will screen the entire water column of the intermediate zone, if encountered. Several chlorinated constituents have been identified in the groundwater in both the shallow and intermediate zones. This approach to well screen intervals should provide the most conservative manner in which to identifying any chlorinated impacts.

The paired wells will also be used to monitor dissolved concentrations adjacent to the laser induced fluorescences (LIF) defined extent of LNAPL.

Several existing monitoring wells which have previously had detections of volatile organic compounds (VOCs) (including chlorinated VOCs), semi-volatile organic compounds (SVOCs), metals and/or polychlorinated biphenyls (PCBs) will be resampled (Figure 3.2 and Table 3.2) as part of this Work Plan.

3.1.3 FREE PHASE INVESTIGATION

Based on LIF results, soil samples will be collected at potential hot spots above the LNAPL plume (Figure 3.1). The soil samples will be analyzed for VOCs, SVOCs, metals, and PCBs. No additional wells will be set in the LNAPL plumes at this time as groundwater samples will not be collected beneath the LNAPL.

3.1.4 SOIL GAS INVESTIGATION

To investigate the potential for VOCs to volatilize from the LNAPL plume to soil gas within the unsaturated overburden, four permanent sub slab soil gas probes will be installed and sampled (Figure 3.1 and Table 3.3).

3.2 EASTERN AND CENTRAL PORTION OF PLANT

The eastern and central portions of the plant include a large network of monitoring/recovery wells within the LNAPL plumes, very limited and dated soil information, and limited constituents analyzed for in groundwater.

3.2.1 SOIL INVESTIGATION

Areas of the plant, such as the northeast corner, have not been investigated before. A grid approach will be applied in these areas with bias towards any known activities, such as the Former Degreasing Stations (AOI 33).

Soil borings will be advanced at all locations. At all locations where a single shallow monitoring well is installed, the boring will be advanced through the overlying sandy unit and at least six inches into the underlying clay. Where well pairs (shallow and intermediate) are installed, the boring will be advanced through the top clay, through the intermediate sand unit, and six inches into the underlying clay. At locations where well clusters (shallow, intermediate and deep) are installed, the soil boring will be advanced 80 – 100 feet, through the deep aquifer to the shale or a maximum of 100 feet. Where a shallow soil boring is completed with no well installation, the boring will be advanced only as deep as the water table. This information will be used to more thoroughly evaluate the geologic conditions underlying the Plant and better define potential pathways.

Soil samples will be collected and analyzed to provide lateral coverage of the Plant to identify potential impacts.

3.2.2 SHALLOW AND INTERMEDIATE GROUNDWATER INVESTIGATION

Several well pairs outside of the central plume will be advanced to investigate the potential intermediate zone in this area. The shallower of the paired wells will screen the entire water column in the shallow zone. The deeper of the paired wells will screen the entire water column of the intermediate zone, if encountered. This approach to well screen intervals should provide the most conservative manner in which to identifying any chlorinated impacts.

Areas of the plant, such as the northeast corner, have not been investigated before. A grid approach will be applied in these areas with bias towards any known activities, such as the Former Degreasing Stations (AOI 33).

Several existing monitoring wells which have previously had detected concentrations of VOCs (including chlorinated VOCs), SVOCs, metals and/or PCBs will be resampled (Figure 3.2 and Table 3.2).

Based on the 2010 and current LIF investigation results, a series of monitoring wells will be installed. The wells will be a minimum of 100 feet from the LIF defined extent of

LNAPL. The purpose of these wells will be to assess any potential dissolved phase impacts adjacent to the LNAPL plumes.

Currently, monitoring wells along the eastern property boundary screen the water table. Additional monitoring wells will be installed to monitor the lower portion of the shallow zone at the eastern property boundary to investigate potential chlorinated impacts. Depending upon results from this investigation, more lower portion monitoring wells may be set in future investigations.

3.2.3 FREE PHASE INVESTIGATION

Based on LIF results, soil samples will be collected at potential hot spots above the LNAPL plume. The soil samples will be analyzed for VOCs, SVOCs, metals, and PCBs. No additional wells will be set in the LNAPL plumes at this time as groundwater samples will not be collected beneath the LNAPL.

3.2.4 SOIL GAS INVESTIGATION

To investigate the potential for compounds to volatilize from the LNAPL plume to soil gas within the unsaturated overburden, the installation of 13 permanent sub slab soil gas probes will be installed and sampled (Figure 3.1 and Table 3.3).

3.3 SITE-SPECIFIC BACKGROUND METALS

Metals have been identified in soil and groundwater throughout the Site. Additional data will be collected to evaluate Site-specific background levels of metals in soil and groundwater. Upgradient wells will be installed in the northern and western portion of the property and sampled for target analyte list (TAL) metals as a background. A minimum of two rounds of quarterly groundwater sampling will be collected prior to calculating background values.

3.4 DEEP AQUIFER INVESTIGATION

Boring logs from several private wells near the Site indicate that a deep aquifer is present 70 to 100 feet below ground surface. Using a rotosonic drill rig, deep monitoring wells will be installed to verify the presence of a "deep aquifer", determine groundwater

flow direction in this deep aquifer, and assess whether any Site related impacts have affected the deep aquifer (Figure 3.1 and Tables 3.1 and 3.2).

3.5 EXTERIOR DATA GAPS

Several exterior AOIs have either not been investigated at all or require additional soil and/or groundwater investigation. See Tables 3.1 and 3.2 for description of the AOIs to be investigated and the planned sampling.

Three monitoring wells were previously installed in the Salvage Yard (AOI 12) but have not been included in the groundwater monitoring events at the Site. These wells will be redeveloped and resampled (Table 3.2).

3.6 NON RCRA INVESTIGATION

The current Waste Water Treatment Plant (WWTP) was identified as AOI 45 in the CCR. The land that the WWTP is on was never owned by GM or MLC, was not included in the Part A Permit, and therefore not subject to RCRA Corrective Action and AOI designation has be removed. The investigation of this area is included in this Work Plan for ease of implementation, but results will be evaluated under Part 201 of the Natural Resources and Environmental Protection Act (1994 PA 451, as amended), not part of the RCRA corrective actions.

4.0 SAMPLING METHODOLOGY

Field related activities including soil boring completion, monitoring well installation, sample collection, etc. will be conducted in accordance with Site-specific field method guidelines (FMGs). Applicable Site-specific FMGs, including sample collection methodologies for soil, soil gas, and groundwater, are provided in Appendix A. Samples will be shipped to the laboratory under chain-of-custody procedures.

4.1 INVESTIGATION METHODOLOGIES

The following section details the field investigation methods for each media to be sampled.

4.1.1 SOIL INVESTIGATION

- Soil borings with the exception of those completed for the installation of a deep and intermediate monitoring will be installed with a direct push drill rig
- Continuous soil samples will be collected from each location to record soil stratigraphy and to screen for organic vapors using a photoionization detector (PID)
- Unless otherwise specified, soil samples for laboratory analysis will be collected from 0 to 2 feet bgs, the interval 2 feet above the water table, and from a maximum of one additional interval that is deemed significantly impacted in the field (elevated PID readings, odors, staining, etc.)
- At soil boring locations where a monitoring well will not be installed, the soil boring will be advanced only to the depth of the water table
- Table 3.1 includes location specific sampling and completion details

4.1.2 SOIL GAS INVESTIGATION

- Soil probes will be installed using a rotary hammer drill (or other appropriate portable drill).
- A shallow outer hole, approximately 7/8 inches in diameter, will be created using the drill. A smaller diameter inner hole (approximately 5/16 inches in diameter) will be drilled within the outer hole through the concrete slab and approximately 3 inches into the sub-slab material.
- The sub-slab probes will be constructed from small diameter brass or stainless steel tubing and compression fittings.

- A cement grout that expands upon drying will be used to seal between the probe and the outer hole.

4.1.3 SHALLOW GROUNDWATER INVESTIGATION

- Soil borings to be completed as shallow monitoring wells will be advanced 6 inches into the underlying clay.
- Soil samples will be collected during the installation of shallow groundwater monitoring wells, as described in Section 4.1.1 and Table 3.1.
- Shallow groundwater monitoring wells will be installed using 4 ¼ inch inside diameter (ID) hollow-stem augers.
- A 2-inch diameter Schedule 40 PVC well will be installed with a Schedule 40 PVC, 0.010 inch machine slotted screen.
- Shallow monitoring wells will screen the entire saturated shallow zone plus at least 2 feet above the water table, with a maximum screen length of 10 feet. Screens will be advanced 0.5 feet into the underlying clay.
- Other than the eastern property boundary, if the saturated unit is greater than 8 feet, the screen interval will be set to screen the water table portion of the shallow zone.
- For the wells installed on the eastern property boundary, wells will be biased towards the lower portion of the shallow zone to monitor for potential chlorinated impacts since water table wells are currently present. Screens in these wells will be a maximum of 5 feet long.
- All groundwater sampling will be completed according to the FMGs provided in Appendix A. Groundwater samples will be collected from the mid-point of the saturated screen interval.
- Table 3.1 includes location specific sampling and installation details.

4.1.4 INTERMEDIATE GROUNDWATER INVESTIGATION

- Soil samples will be collected for laboratory analysis from the unsaturated zone as described in Section 4.1.1 at intermediate monitoring well locations. Soil will be continuously logged and field screened for the entire depth of the boring.
- Intermediate groundwater monitoring wells will be installed using a rotosonic drill rig.
- A 2-inch diameter Schedule 40 PVC well will be installed with a Schedule 40 PVC, 0.010 inch machine slotted screen.

- Intermediate monitoring wells will screen the entire intermediate zone and, therefore, screen length may vary with a maximum screen length of 10 feet. A minimum of a 2-foot bentonite seal is required between the intermediate and shallow units. Screen length and placement will take this into consideration.
- Table 3.1 includes location specific sampling and installation details.

4.1.5 DEEP GROUNDWATER INVESTIGATION

- Soil samples will be collected for laboratory analysis from the unsaturated zone as described in Section 4.1.1 at deep monitoring well locations. Soil will be continuously logged and field screened for the entire depth of the boring.
- The deep aquifer is expected to be encountered between 80 and 100 feet bgs.
- Deep groundwater monitoring wells will be installed with a rotosonic drill rig.
- Depending on subsurface geology, up to two 2-inch diameter monitoring wells may be installed in each deep boring location.
- A 2-inch diameter Schedule 40 PVC well will be installed with a Schedule 40 PVC, 0.010 inch machine slotted screen.
- Drilling will advance through the entire deep aquifer to the underlying shale or a maximum of 100 feet, whichever is encountered first.
- Deep monitoring wells will screen the entire deep aquifer and, therefore, screen length may vary with a maximum screen length of 10 feet. If the deep aquifer is greater than 10 feet, the well will screen the top of the unit unless impacts or areas of higher permeability are observed at deeper intervals. The well screen will be set to screen the depth interval most likely to have impacts.
- Table 3.1 includes location specific sampling and installation details.

4.2 SAMPLE NOMENCLATURE

Each sample will be labeled with a unique sample number consistent with the Site-specific sample designation system.

Series-Project Number –Date-Initials-xxx

The series is a letter or letters that designates a group of samples (GG, groundwater; S, soil; N, non-aqueous phase liquid; RB, rinse equipment blank; WSS, water storm sewer). Initials refer to the sampler's initials. The "xxx" sample identification number

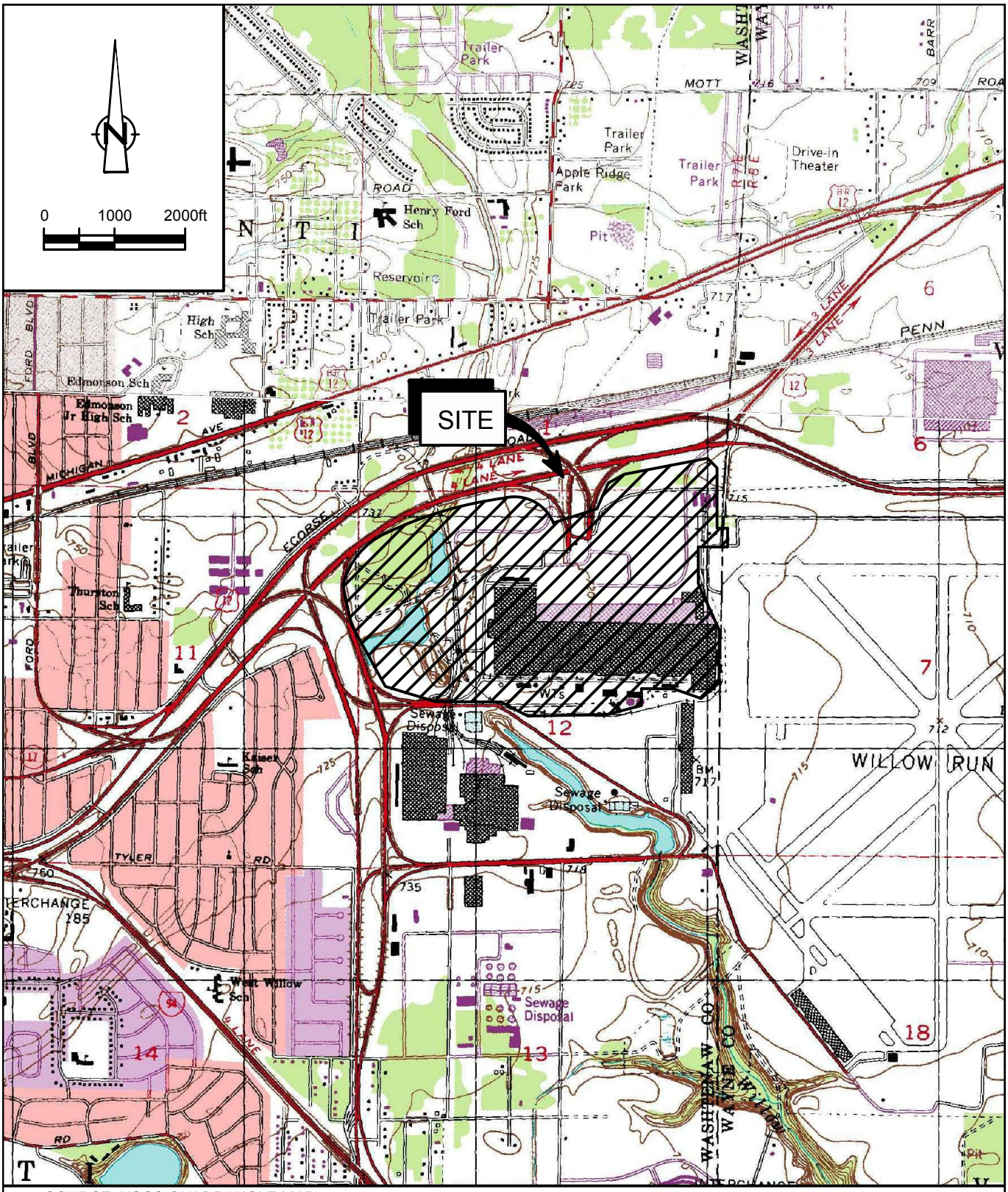
will carry forward from previously collected samples at the Site (last sample collected - 057).

Each location installed will be assigned a CRA-specific location name. Sample locations associated with this Work Plan will be the "700 & 800-series" (e.g., CRA-701, CRA-802, etc.). Following the following the "700 & 800-series" number one or two letters will be added to denote the type of boring/well, as follows:

- "M" – denotes shallow monitoring wells based on current Site nomenclature practices (e.g., CRA-701M)
- "ML" – denotes monitoring wells installed to screen the lower portion of the shallow zone (e.g., CRA-827ML)
- "I" – denotes wells installed in the intermediate unit (e.g., CRA-704I)
- "D" – denotes wells installed in the deep unit (e.g., CRA-704D)
- "SB" – denotes locations where only soil data is collected and a monitoring well is not set (e.g., CRA-707SB)
- "GP" - denotes locations where soil gas probes are installed (e.g., CRA-817GP)

4.3 QUALITY ASSURANCE/QUALITY CONTROL

Quality Assurance/Quality Control (QA/QC) field samples (duplicates and matrix spike/matrix spike duplicates [MS/MSD]) will be collected in accordance with Site specific Quality Assurance Project Plan (QAPP) provided in Appendix B. Validation of analytical data will be performed by the CRA chemistry department and will be defined the QAPP.



SOURCE: USGS QUADRANGLE MAP;
EAST YPSILANTI, MICHIGAN
DATE: 1996
EAST DENTON, MICHIGAN
DATE: 1969; REVISED: 1980

NOTE:
SITE BOUNDARY IS ESTIMATED

figure 1.1

SITE LOCATION
RFI WORK PLAN
FORMER WILLOW RUN PLANT
Ypsilanti, Michigan

Nº	Revision	Date	Initial

0 100 200ft

N

LEGEND

- PROPERTY BOUNDARY
- AOI — AREA OF INTEREST
- UNDERGROUND TRANSFORMER SUBSTATIONS (AOI 24)
- ESTIMATED SITE POWER UNDERGROUND
- STEAM TUNNELS (AOI 26)
- TRENCHES AND FLUMES (INCLUDES COOLANT TRENCHES (AOI 28))
- HISTORICAL ACID AND CYANIDE WASTE LINES (AOI 40)
- SITE SECTION DESIGNATION
- SURFACE WATER
- RAILROAD
- APPROXIMATE EXTENT OF LNAPL BASED ON LIF AND IN WELL MEASUREMENTS

NOTE: AOI 38 - HISTORICAL TANK FARMS INCLUDES AOI 18, AOI 17, AOI 27

SCALE VERIFICATION

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

Approved

DRAWING STATUS

Status	Date	Initial

SITE PLAN

RFI WORK PLAN

FORMER WILLOW RUN PLANT YPSILANTI, MICHIGAN

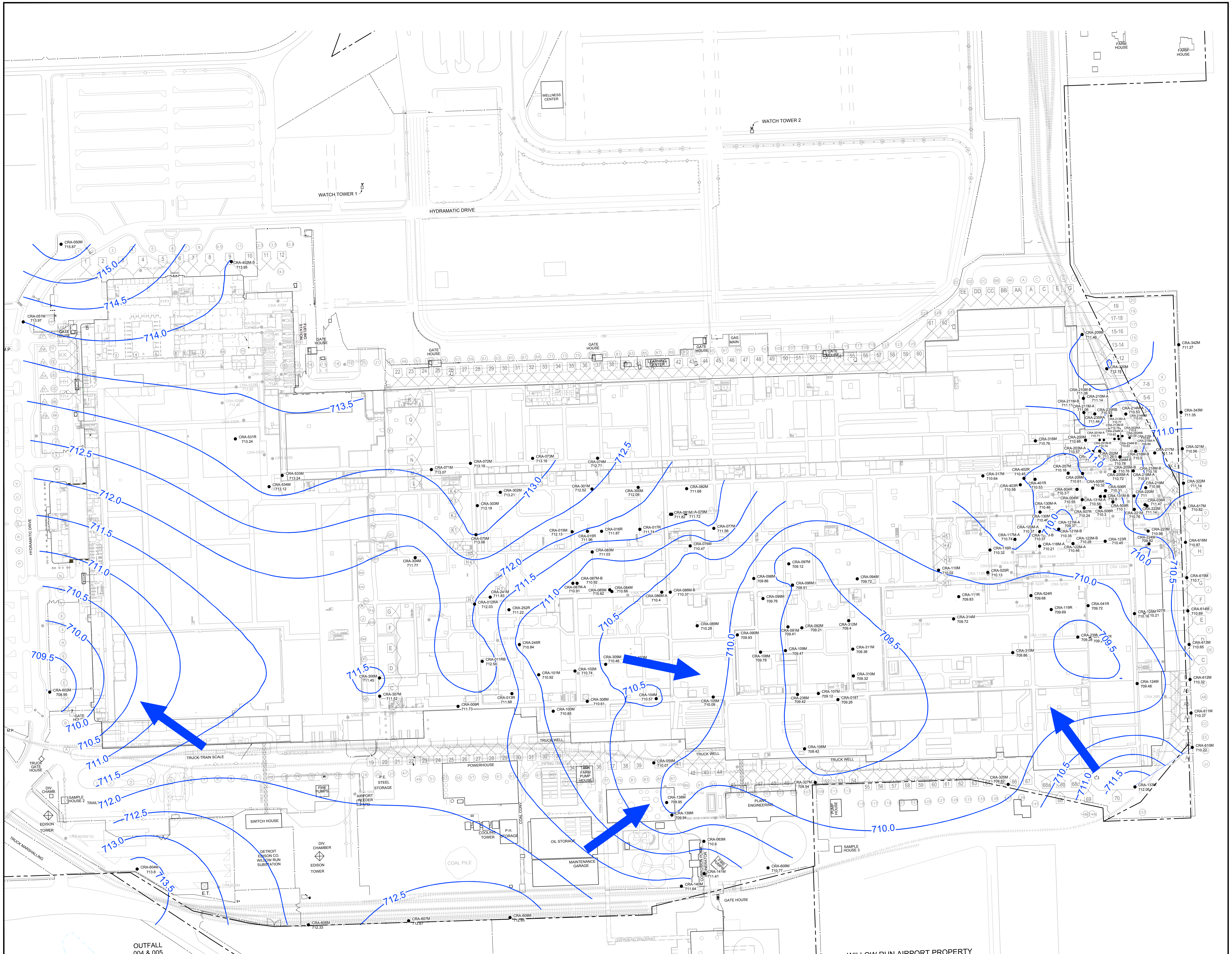
CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By:	Date:
H. H.	B. L.	NOVEMBER 2011

Scale:	Project Nº:	Report Nº:	Drawing Nº:
1:200	017358-T01	018	figure 1.2

017358-T01(018)GN-DE005 FEB 16/2012



Nº	Revision	Date	Initial

N

0 70 140ft

LEGEND

CRA-303M ●	GROUNDWATER LEVEL MEASUREMENT WELL LOCATION
CRA 3R ●	EXISTING WELL LOCATION (NOT MEASURED)
	PROPERTY BOUNDARY (NOT FIELD VERIFIED)
	SURFACE WATER
	RAILROAD
712.5	GROUNDWATER CONTOURS (ft. AMSL)
713.19	MEASURED GROUNDWATER ELEVATIONS (ft. AMSL)
	GROUNDWATER FLOW DIRECTION

NOTE: GROUNDWATER LEVEL MEASURED BETWEEN 10/24/11 AND 11/04/11

SCALE VERIFICATION

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

Approved

DRAWING STATUS

Status	Date	Initial

GROUNDWATER CONTOUR MAP SHALLOW ZONE

RFI WORK PLAN

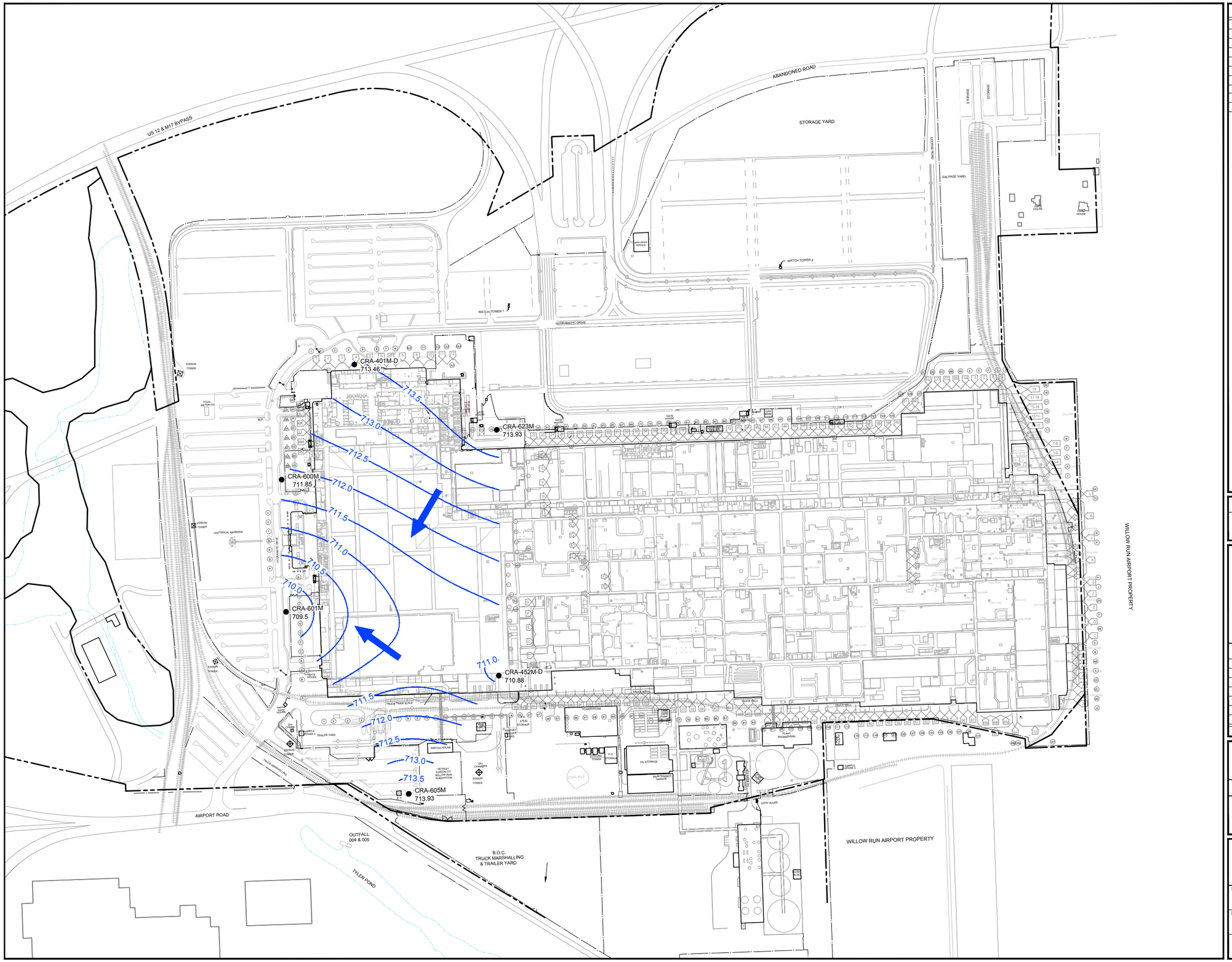
FORMER WILLOW RUN PLANT
YPSILANTI, MICHIGAN

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By:	Date:	
B. L.	H. H.	NOVEMBER 2011	
Scale: 1:140	Project Nº: 017358-T01	Report Nº: 018	Drawing Nº: figure 2.1

017358-T01(018)GN-DE007 FEB 16/2012



No	Revision	Date	Initial

0 100 200ft

LEGEND

- CRA-342M — GROUNDWATER LEVEL MEASUREMENT WELL LOCATION
- CRA 3R — EXISTING WELL LOCATION (NOT MEASURED)
- SALVAGE YARD WELLS (LOCATIONS ESTIMATED NOT SURVEYED)
- PROPERTY BOUNDARY
- SURFACE WATER
- RAILROAD
- GROUNDWATER CONTOURS (ft. AMSL)
- MEASURED GROUNDWATER ELEVATIONS (ft. AMSL)

NOTE: GROUNDWATER LEVEL MEASURED ON 10/24/11

SCALE VERIFICATION

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

Approved

DRAWING STATUS

Status	Date	Initial

GROUNDWATER CONTOUR MAP INTERMEDIATE ZONE

YPSILANTI, MICHIGAN

WILLOWRUN POWERTRAIN

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By:	Date:	
B. L.	H. H.	NOVEMBER 2011	
Scale: 1:200	Project No: 017358-T01	Report No: 018	Drawing No: figure 2.2

017358-T01(018)GN-DE008 FEB 21/2012

NO	Revision	Date	Initial

0 100 200ft

LEGEND

- PROPERTY BOUNDARY
- CRA 701M — PROPOSED SHALLOW WELL AND SOIL SAMPLE LOCATION
- CRA-785I — PROPOSED INTERMEDIATE WELL LOCATION
- CRA-785D — PROPOSED DEEP WELL LOCATION
- CRA-794SB — PROPOSED SOIL BORING LOCATION
- CRA-817GP — PROPOSED SUB-SLAB SOIL GAS PROBE LOCATION
- EXISTING MONITORING WELL LOCATION
- EXISTING RECOVERY WELL LOCATION
- APPROXIMATE EXTENT OF LNAPL BASED ON LIF AND IN WELL MEASUREMENTS
- SITE SECTION DESIGNATION
- SURFACE WATER
- RAILROAD

NOTE:
ALL LOCATIONS WILL BE FIELD SCREENED FOR UTILITIES AND LOGISTICS. LOCATIONS SUBJECT TO CHANGE.

SCALE VERIFICATION

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

Approved

DRAWING STATUS

Status	Date	Initial

PROPOSED SOIL BORING AND MONITORING WELL LOCATIONS

RFI WORK PLAN

FORMER WILLOW RUN PLANT
YPSILANTI, MICHIGAN

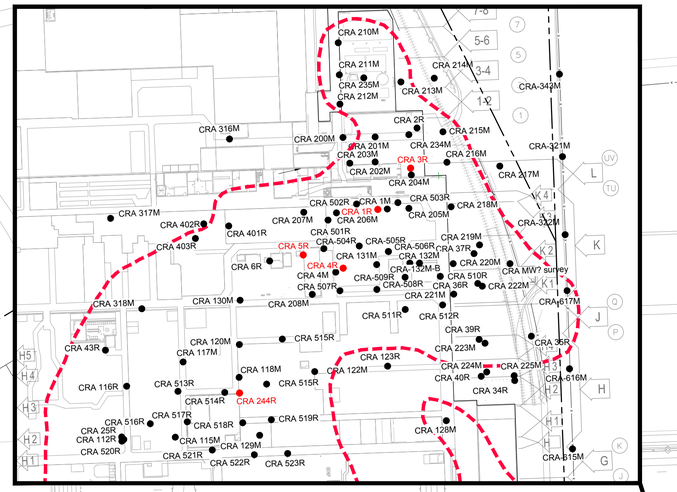
CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By:	Date:	
B.L.	H.H.	NOVEMBER 2011	
Scale: 1:200	Project N°: 017358-T01	Report N°: 018	Drawing N°: 3.1

017358-T01(018)GN-DE002 FEB 16/2012

DETAIL



NO	Revision	Date	Initial

N

0 100 200ft

LEGEND

- CRA-342M ● EXISTING MONITORING WELL LOCATIONS
- CRA 3R ● EXISTING RECOVERY WELL LOCATIONS
- PROPERTY BOUNDARY
- SURFACE WATER
- RAILROAD
- EXISTING MONITORING WELLS TO BE RE-SAMPLED
- APPROXIMATE EXTENT OF LNAPL BASED ON LIF AND IN WELL

SCALE VERIFICATION

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

Approved

DRAWING STATUS

Status	Date	Initial

EXISTING MONITORING WELL GROUNDWATER SAMPLING LOCATIONS

RFI WORK PLAN

FORMER WILLOW RUN PLANT
YPSILANTI, MICHIGAN

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By:	Date:	
B. L.	H. H.	NOVEMBER 2011	
Scale: 1"=200'	Project N°: 017358-T01	Report N°: 018	Drawing N°: figure 3.2

017358-T01(018)GN-DE006 FEB 20/2012

TABLE 2.1

INVESTIGATION AND RESPONSE ACTION TIMELINE
RFI WORK PLAN
FORMER WILLOW RUN PLANT
YPSILANTI, MICHIGAN

DATE	EFFORTS/EVENTS	COMPLETED BY
Early 1980s	•LNAPL Discovery - Identified oil accumulating under the plant during construction and maintenance activities	GM & Various Consultants
1980s & 1990s	•LNAPL Investigations - Completed various subsurface investigations to delineate LNAPL plumes, especially in central and eastern portion of Plant •Soil and Groundwater Investigations - Completed various soil and groundwater investigations where impacts were observed during re-tooling, retrofitting, tank removal, or construction efforts •Exterior Impacts - Identified soil and groundwater impacts beyond the footprint of the Plant •PAOCs - Identified initial potential areas of concern (PAOCs) •LNAPL Recovery Systems - Designed and installed various LNAPL recovery systems at several locations throughout Plant •Limited Soil Excavations - Completed several limited excavations based on investigation results (e.g., North Yard)	GM Research Division & Various Consultants
2000	•Storm Sewer Survey - Conducted in eastern portion of Plant to identify source of oil and grease in storm sewer	CRA
2001	•Site Evaluation - Inspected and evaluated Site-wide monitoring wells and LNAPL recovery systems •Data Compilation - Compiled boring logs, set naming conventions, and created comprehensive figures for the Site •Free Product Recovery Test - Conducted on 25 monitoring and recovery wells •Storm Sewer Lining - Lined approximately 1,800 feet of storm sewer in eastern portion of Plant (i.e., E-3 and E-4 lines) to prevent infiltration of groundwater and LNAPL	CRA
2002	•Source Investigation - Conducted Site survey to identify potential sources of impacts •LNAPL Investigation - Installed monitoring wells and soil borings to better delineate LNAPL plumes and gather information for response actions •Evaluation/Repair of LNAPL Recovery System - Further evaluated and repaired existing LNAPL recovery systems •Bioslurp/MPE - Completed bioslurp (i.e., multi-phase extraction [MPE]) pilot test in eastern portion of Plant	CRA
2003	•Additional PAOCs - Researched and identified additional PAOCs, including historic operations •Mass Balance Study - Calculated mass balance of hydrocarbon products coming into and leaving Plant from 2002 to 2003 to determine amount of product lost to subsurface •Limited RI of West End of Plant - Conducted remedial investigation (RI) in preparation for strip out and remodel of YTO •Steam Tunnel Survey - Conducted visual inspection of approximately 6,000 feet of steam tunnels to identify areas of LNAPL infiltration •Decommissioning LNAPL Recovery Systems - Decommissioned several non- or under-functioning LNAPL recovery wells	CRA
2004	•Perimeter Utility Corridor Investigation - Completed ground penetrating radar (GPR) survey and utility corridor test pits to investigate possible LNAPL and groundwater migration off-Site via utility bedding •Perimeter Groundwater Investigation - Installed and sampled monitoring wells to investigate potential off-Site migration •LNAPL Characterization - Completed LNAPL product analysis to identify types of product and extent of PCBs in LNAPL •Aquifer Step Tests •Groundwater Sampling Event	CRA
2005	•East End Investigations - Completed limited LNAPL and hydrogeologic investigations in eastern portion of Site •LNAPL Treatability Study - Tested LNAPL and wastewater from LNAPL recovery systems to determine if additional treatment of effluent was necessary	CRA

TABLE 2.1

INVESTIGATION AND RESPONSE ACTION TIMELINE
RFI WORK PLAN
FORMER WILLOW RUN PLANT
YPSILANTI, MICHIGAN

DATE	EFFORTS/EVENTS	COMPLETED BY
2007	•YTO LNAPL Recovery System - Designed and installed recovery system in north portion of YTO building •Repair LNAPL Recovery Systems - Repaired recovery systems in the central and eastern portion of the Plant	CRA
2008	•Groundwater Sampling Event •Eastern Perimeter Investigation - Installed several monitoring wells along eastern property boundary to evaluate potential off-Site migration	CRA
2010	•Site-Wide Investigation - Collected laser induced fluorescence (LIF), LNAPL, and groundwater data (Arcadis) •LIF Survey - Detailed survey of eastern portion of Site (CRA) •Notice of Migration - Submitted Notice of Migration to MDEQ and Willow Run Airport regarding eastern LNAPL plume •Groundwater Sampling Event	CRA & Arcadis
2002 - Present	•Groundwater and LNAPL Monitoring - Completed regular groundwater and LNAPL level monitoring at the Site	CRA
2007 - Present	•LNAPL Recovery System - Maintained and monitored 8 LNAPL recovery systems	CRA

TABLE 3.1

SOIL SAMPLING AND MONITORING WELL INSTALLATION PLAN
RFI WORK PLAN
FORMER WILLOW RUN PLANT
YPSILANTI, MICHIGAN

Boring/Well Number	Target Depth	Soil Sample Intervals (feet bgs) [3]	Soil Analysis[1]	Screen Installation Interval	Sampling Reason
CRA-701M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Evaluate conditions at northern upgradient property boundary Site-specific background metals
CRA-702I	~ 50 feet bgs	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	Call office for well screen interval determination. Set at least one well, screen length to be determined.[5]	Evaluate stratigraphy at northeast boundary of plant
CRA-703I	Through top clay, through sand unit, 0.5 feet into second clay.	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	Screen entire intermediate water bearing zone. Maximum 10' screen.[5]	Evaluate stratigraphy at northern upgradient property boundary Site-specific background metals
CRA-703M	0.5 feet into clay	-	-	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	-
CRA-704D [2]	80-100 feet, through deep aquifer to shale or maximum of 100 feet	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	Call office for well screen interval determination (expected to be upper most 10 feet of deep aquifer). Set at least one well, screen length to be determined.	Evaluate stratigraphy at northern upgradient property boundary Site-specific background metals
CRA-704I	Through top clay, through sand unit, 0.5 feet into second clay.	-	-	Screen entire intermediate water bearing zone. Maximum 10' screen.[5]	-
CRA-704M	0.5 feet into clay	-	-	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	-
CRA-705M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Evaluate conditions at northern upgradient property boundary Site-specific background metals
CRA-706M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Evaluate conditions at northern upgradient property boundary Site-specific background metals
CRA-707SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	If high PIDs or other impacts observed, call office to determine if well will be set.	Storage Yard investigation
CRA-708SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	If high PIDs or other impacts observed, call office to determine if well will be set.	Storage Yard investigation
CRA-709M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Storage Yard investigation
CRA-710M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Storage Yard investigation
CRA-711I	~ 50 feet bgs	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	Call office for well screen interval determination. Set at least one well, screen length to be determined.[5]	Evaluate stratigraphy at southeast property boundary

TABLE 3.1

SOIL SAMPLING AND MONITORING WELL INSTALLATION PLAN
RFI WORK PLAN
FORMER WILLOW RUN PLANT
YPSILANTI, MICHIGAN

Boring/Well Number	Target Depth	Soil Sample Intervals (feet bgs) [3]	Soil Analysis[1]	Screen Installation Interval	Sampling Reason
CRA-712I	~ 50 feet bgs	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	Call office for well screen interval determination. Set at least one well, screen length to be determined.[5]	Evaluate stratigraphy at southeast property boundary
CRA-713M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Evaluate conditions at northeast of YTO
CRA-714M[4]	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Delineation north of Plant building[4]
CRA-715M[4]	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Delineation north of Plant building[4]
CRA-716M[4]	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Delineation north of Plant building[4]
CRA-717M[4]	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Delineation north of Plant building[4]
CRA-718M[4]	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Delineation north of Plant building[4]
CRA-719M[4]	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Delineation north of Plant building[4]
CRA-720I	Through top clay, through sand unit, 0.5 feet into second clay.	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	Screen entire intermediate water bearing zone. Maximum 10' screen.[5]	Investigation of former LNAPL location (AOI 14)
CRA-721M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Evaluate conditions west of YTO
CRA-722M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Former Admin Building UST investigation/Evaluate conditions west of YTO
CRA-723M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Former Admin Building UST investigation/Evaluate conditions west of YTO
CRA-724I	Through top clay, through sand unit, 0.5 feet into second clay.	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	Screen entire intermediate water bearing zone. Maximum 10' screen.[5]	Evaluate stratigraphy west of YTO
CRA-725I	Through top clay, through sand unit, 0.5 feet into second clay.	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	Screen entire intermediate water bearing zone. Maximum 10' screen.[5]	Evaluate stratigraphy west of YTO

TABLE 3.1

SOIL SAMPLING AND MONITORING WELL INSTALLATION PLAN
RFI WORK PLAN
FORMER WILLOW RUN PLANT
YPSILANTI, MICHIGAN

Boring/Well Number	Target Depth	Soil Sample Intervals (feet bgs) [3]	Soil Analysis[1]	Screen Installation Interval	Sampling Reason
CRA-725M	0.5 feet into clay	-	-	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	-
CRA-726D [2]	80-100 feet, through deep aquifer to shale or maximum of 100 feet	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	Call office for well screen interval determination (expected to be upper most 10 feet of deep aquifer). Set at least one well, screen length to be determined.	Evaluate stratigraphy at west property boundary
CRA-726I	Through top clay, through sand unit, 0.5 feet into second clay.	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	Screen entire intermediate water bearing zone. Maximum 10' screen.[5]	Evaluate soils beneath former building in area.
CRA-726M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Evaluate soils beneath former building in area.
CRA-728M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Historical Acid and Cyanide Waste Lines (AOI 40)
CRA-729I	Through top clay, through sand unit, 0.5 feet into second clay.	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	Screen entire intermediate water bearing zone. Maximum 10' screen.[5]	Evaluate conditions where groundwater monitoring wells are installed for aerial coverage of Plant
CRA-729M	0.5 feet into clay	-	-	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	-
CRA-730I	Through top clay, through sand unit, 0.5 feet into second clay.	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	Hex & Tri Chrom If additional sample collected due to field observation: TCL VOCs, TCL SVOCs, TAL Metals, Total PCBs, Fractionated Lead if >75 ppm	Screen entire intermediate water bearing zone. Maximum 10' screen.[5]	Chromium speciation analysis due to total chromium concentrations detected in the area
CRA-730M	0.5 feet into clay	-	-	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	-
CRA-731I	Through top clay, through sand unit, 0.5 feet into second clay.	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	Screen entire intermediate water bearing zone. Maximum 10' screen.[5]	Evaluate conditions where groundwater monitoring wells are installed for aerial coverage of Plant
CRA-731M	0.5 feet into clay	-	-	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	-
CRA-732I	Through top clay, through sand unit, 0.5 feet into second clay.	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	Hex & Tri Chrom If additional sample collected due to field observation: TCL VOCs, TCL SVOCs, TAL Metals, Total PCBs, Fractionated Lead if >75 ppm	Screen entire intermediate water bearing zone. Maximum 10' screen.[5]	Chromium speciation analysis due to total chromium concentrations detected in the area
CRA-732M	0.5 feet into clay	-	-	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	-
CRA-733I	Through top clay, through sand unit, 0.5 feet into second clay.	• Up to one additional interval with high PID, staining, etc.	If additional sample collected due to field observation: TCL VOCs, TCL SVOCs, TAL Metals, Total PCBs, Fractionated Lead if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Evaluate conditions where groundwater monitoring wells are installed for aerial coverage of Plant

TABLE 3.1

SOIL SAMPLING AND MONITORING WELL INSTALLATION PLAN
RFI WORK PLAN
FORMER WILLOW RUN PLANT
YPSILANTI, MICHIGAN

Boring/Well Number	Target Depth	Soil Sample Intervals (feet bgs) [3]	Soil Analysis[1]	Screen Installation Interval	Sampling Reason
CRA-733M	0.5 feet into clay	-	-	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	-
CRA-734I	Through top clay, through sand unit, 0.5 feet into second clay.	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	Hex & Tri Chrom If additional sample collected due to field observation: TCL VOCs, TCL SVOCs, TAL Metals, Total PCBs, Fractionated Lead if >75 ppm	Screen entire intermediate water bearing zone. Maximum 10' screen.[5]	Chromium speciation analysis due to total chromium concentrations detected in the area
CRA-734M	0.5 feet into clay	-	-	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	-
CRA-735I	Through top clay, through sand unit, 0.5 feet into second clay.	-	-	Screen entire intermediate water bearing zone. Maximum 10' screen.[5]	-
CRA-736I	Through top clay, through sand unit, 0.5 feet into second clay.	-	-	Screen entire intermediate water bearing zone. Maximum 10' screen.[5]	-
CRA-737I	Through top clay, through sand unit, 0.5 feet into second clay.	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	Hex & Tri Chrom If additional sample collected due to field observation: TCL VOCs, TCL SVOCs, TAL Metals, Total PCBs, Fractionated Lead if >75 ppm	Screen entire intermediate water bearing zone. Maximum 10' screen.[5]	Chromium speciation analysis due to total chromium concentrations detected in the area
CRA-737M	0.5 feet into clay	-	-	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	-
CRA-738I	Through top clay, through sand unit, 0.5 feet into second clay.	• Up to one additional interval with high PID, staining, etc.	If additional sample collected due to field observation: TCL VOCs, TCL SVOCs, TAL Metals, Total PCBs, Fractionated Lead if >75 ppm	Screen entire intermediate water bearing zone. Maximum 10' screen.[5]	Evaluate stratigraphy for aerial coverage of Plant.
CRA-738M	0.5 feet into clay	-	-	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	-
CRA-739I	Through top clay, through sand unit, 0.5 feet into second clay.	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	Hex & Tri Chrom If additional sample collected due to field observation: TCL VOCs, TCL SVOCs, TAL Metals, Total PCBs, Fractionated Lead if >75 ppm	Screen entire intermediate water bearing zone. Maximum 10' screen.[5]	Chromium speciation analysis due to total chromium concentrations detected in the area
CRA-739M	0.5 feet into clay	-	-	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	-
CRA-740I	Through top clay, through sand unit, 0.5 feet into second clay.	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	Screen entire intermediate water bearing zone. Maximum 10' screen.[5]	Evaluate conditions where groundwater monitoring wells are installed for aerial coverage of Plant
CRA-740M	0.5 feet into clay	-	-	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	-
CRA-741I	Through top clay, through sand unit, 0.5 feet into second clay.	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	Screen entire intermediate water bearing zone. Maximum 10' screen.[5]	Evaluate conditions where groundwater monitoring wells are installed for aerial coverage of Plant

TABLE 3.1

SOIL SAMPLING AND MONITORING WELL INSTALLATION PLAN
RFI WORK PLAN
FORMER WILLOW RUN PLANT
YPSILANTI, MICHIGAN

Boring/Well Number	Target Depth	Soil Sample Intervals (feet bgs) [3]	Soil Analysis[1]	Screen Installation Interval	Sampling Reason
CRA-741M	0.5 feet into clay	-	-	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	-
CRA-742D [2]	80-100 feet, through deep aquifer to shale or maximum of 100 feet	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	Call office for well screen interval determination (expected to be upper most 10 feet of deep aquifer). Set at least one well, screen length to be determined.	Evaluate stratigraphy along southern property boundary.
CRA-742I	Through top clay, through sand unit, 0.5 feet into second clay.	-	-	Screen entire intermediate water bearing zone. Maximum 10' screen.[5]	-
CRA-743M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Machinery Staging Area (AOI 27)
CRA-744M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Machinery Staging Area (AOI 27)
CRA-745M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Historical Coal Storage Pile (AOI 35)
CRA-746SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	-	Historical Coal Storage Pile (AOI 35)
CRA-747SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	-	Historical Coal Storage Pile (AOI 35)
CRA-748SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	-	Historical Coal Storage Pile (AOI 35)
CRA-749M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Historical Coal Storage Pile (AOI 35)
CRA-750M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Dry Cleaning Operations (AOI 43)
CRA-751M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Dry Cleaning Operations (AOI 43)
CRA-752M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Barrel Yard (AOI 23)
CRA-753M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Barrel Yard (AOI 23)

TABLE 3.1

SOIL SAMPLING AND MONITORING WELL INSTALLATION PLAN
RFI WORK PLAN
FORMER WILLOW RUN PLANT
YPSILANTI, MICHIGAN

Boring/Well Number	Target Depth	Soil Sample Intervals (feet bgs) [3]	Soil Analysis[1]	Screen Installation Interval	Sampling Reason
CRA-754M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Evaluate conditions where groundwater monitoring wells are installed for aerial coverage of Plant
CRA-755M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Evaluate conditions where groundwater monitoring wells are installed for aerial coverage of Plant
CRA-756M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Evaluate conditions where groundwater monitoring wells are installed for aerial coverage of Plant
CRA-757M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Evaluate conditions where groundwater monitoring wells are installed for aerial coverage of Plant
CRA-758SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	-	Evaluate conditions above LNAPL for aerial coverage of Plant
CRA-759SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	-	Evaluate conditions above LNAPL for aerial coverage of Plant
CRA-760SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	-	Evaluate conditions for aerial coverage of Plant
CRA-761SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	-	Evaluate conditions for aerial coverage of Plant
CRA-762SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	-	Evaluate conditions for aerial coverage of Plant
CRA-763SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	-	Evaluate conditions for aerial coverage of Plant
CRA-764SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	-	Evaluate conditions above LNAPL for aerial coverage of Plant
CRA-765SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	-	Evaluate conditions above LNAPL for aerial coverage of Plant
CRA-766SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	-	Evaluate conditions above LNAPL for aerial coverage of Plant
CRA-767SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	-	Evaluate conditions above LNAPL for aerial coverage of Plant
CRA-768SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	-	Evaluate conditions for aerial coverage of Plant

TABLE 3.1

SOIL SAMPLING AND MONITORING WELL INSTALLATION PLAN
RFI WORK PLAN
FORMER WILLOW RUN PLANT
YPSILANTI, MICHIGAN

Boring/Well Number	Target Depth	Soil Sample Intervals (feet bgs) [3]	Soil Analysis[1]	Screen Installation Interval	Sampling Reason
CRA-769SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	-	Evaluate conditions above LNAPL for aerial coverage of Plant
CRA-770SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	-	Evaluate conditions above LNAPL for aerial coverage of Plant
CRA-771SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	-	Evaluate conditions above LNAPL for aerial coverage of Plant
CRA-772SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	-	Evaluate conditions above LNAPL for aerial coverage of Plant
CRA-773SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	-	Evaluate conditions for aerial coverage of Plant
CRA-774SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	-	Evaluate conditions for aerial coverage of Plant
CRA-775M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Evaluate conditions where groundwater monitoring wells are installed for aerial coverage of Plant
CRA-776M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Evaluate conditions where groundwater monitoring wells are installed for aerial coverage of Plant
CRA-777M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Evaluate conditions where groundwater monitoring wells are installed for aerial coverage of Plant
CRA-778M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Wastewater Treatment Plant (Not part of RCRA corrective action)
CRA-779M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Wastewater Treatment Plant (Not part of RCRA corrective action)
CRA-780M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Wastewater Treatment Plant (Not part of RCRA corrective action)
CRA-781M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Wastewater Treatment Plant (Not part of RCRA corrective action)
CRA-782M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Wastewater Treatment Plant (Not part of RCRA corrective action)

TABLE 3.1

SOIL SAMPLING AND MONITORING WELL INSTALLATION PLAN
RFI WORK PLAN
FORMER WILLOW RUN PLANT
YPSILANTI, MICHIGAN

Boring/Well Number	Target Depth	Soil Sample Intervals (feet bgs) [3]	Soil Analysis[1]	Screen Installation Interval	Sampling Reason
CRA-783M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Wastewater Treatment Plant (Not part of RCRA corrective action)
CRA-785D [2]	80-100 feet, through deep aquifer to shale or maximum of 100 feet	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	Call office for well screen interval determination (expected to be upper most 10 feet of deep aquifer). Set at least one well, screen length to be determined.	Evaluate stratigraphy at southeast property boundary
CRA-785I	Through top clay, through sand unit, 0.5 feet into second clay.	-	-	Screen entire intermediate water bearing zone. Maximum 10' screen.[5]	-
CRA-786SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	-	Evaluate conditions for aerial coverage of Plant
CRA-787I	Through top clay, through sand unit, 0.5 feet into second clay.	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	Screen entire intermediate water bearing zone. Maximum 10' screen.[5]	Evaluate conditions where groundwater monitoring wells are installed for aerial coverage of Plant
CRA-787M	0.5 feet into clay	-	-	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	-
CRA-788I	Through top clay, through sand unit, 0.5 feet into second clay.	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	Screen entire intermediate water bearing zone. Maximum 10' screen.[5]	Evaluate conditions where groundwater monitoring wells are installed for aerial coverage of Plant
CRA-788M	0.5 feet into clay	-	-	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	-
CRA-789I	Through top clay, through sand unit, 0.5 feet into second clay.	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	Screen entire intermediate water bearing zone. Maximum 10' screen.[5]	Evaluate conditions where groundwater monitoring wells are installed for aerial coverage of Plant
CRA-789M	0.5 feet into clay	-	-	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	-
CRA-790M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Evaluate conditions where groundwater monitoring wells are installed for aerial coverage of Plant
CRA-791M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Evaluate conditions where groundwater monitoring wells are installed for aerial coverage of Plant
CRA-792I	Through top clay, through sand unit, 0.5 feet into second clay.	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	Screen entire intermediate water bearing zone. Maximum 10' screen.[5]	Evaluate conditions where groundwater monitoring wells are installed for aerial coverage of Plant
CRA-792M	0.5 feet into clay	-	-	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	-
CRA-793SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm, Hex/Tri Cr	-	Evaluate conditions for aerial coverage of Plant

TABLE 3.1

SOIL SAMPLING AND MONITORING WELL INSTALLATION PLAN
RFI WORK PLAN
FORMER WILLOW RUN PLANT
YPSILANTI, MICHIGAN

Boring/Well Number	Target Depth	Soil Sample Intervals (feet bgs) [3]	Soil Analysis[1]	Screen Installation Interval	Sampling Reason
CRA-794SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	-	Evaluate conditions for aerial coverage of Plant
CRA-795M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Evaluate conditions where groundwater monitoring wells are installed for aerial coverage of Plant
CRA-796SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	-	Evaluate conditions for aerial coverage of Plant
CRA-797I	Through top clay, through sand unit, 0.5 feet into second clay.	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	Screen entire intermediate water bearing zone. Maximum 10' screen.[5]	Evaluate conditions where groundwater monitoring wells are installed for aerial coverage of Plant
CRA-797M	0.5 feet into clay	-	-	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	-
CRA-798M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Maintenance Degreasing (AOI 33)
CRA-799M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Maintenance Degreasing (AOI 33)
CRA-800M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Maintenance Degreasing (AOI 33)
CRA-801M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Maintenance Degreasing (AOI 33)
CRA-802SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	PCBs	-	Evaluate soils surronding well with LNAPL >50 ppm PCBs
CRA-803M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Evaluate conditions where groundwater monitoring wells are installed for aerial coverage of Plant
CRA-804M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Evaluate conditions where groundwater monitoring wells are installed for aerial coverage of Plant
CRA-805M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Evaluate conditions where groundwater monitoring wells are installed for aerial coverage of Plant
CRA-806M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Evaluate conditions where groundwater monitoring wells are installed for aerial coverage of Plant
CRA-807M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Evaluate conditions where groundwater monitoring wells are installed for aerial coverage of Plant

TABLE 3.1

SOIL SAMPLING AND MONITORING WELL INSTALLATION PLAN
RFI WORK PLAN
FORMER WILLOW RUN PLANT
YPSILANTI, MICHIGAN

Boring/Well Number	Target Depth	Soil Sample Intervals (feet bgs) [3]	Soil Analysis[1]	Screen Installation Interval	Sampling Reason
CRA-808M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Evaluate conditions where groundwater monitoring wells are installed for aerial coverage of Plant
CRA-809SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	-	Evaluate conditions above LNAPL for aerial coverage of Plant
CRA-810SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	-	Evaluate conditions above LNAPL for aerial coverage of Plant
CRA-811SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	-	Evaluate conditions above LNAPL for aerial coverage of Plant
CRA-812SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	-	Evaluate conditions above LNAPL for aerial coverage of Plant
CRA-813SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	-	Evaluate conditions above LNAPL for aerial coverage of Plant
CRA-814SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	-	Evaluate conditions above LNAPL for aerial coverage of Plant
CRA-815SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	-	Evaluate conditions above LNAPL for aerial coverage of Plant
CRA-816SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	-	Evaluate conditions above LNAPL for aerial coverage of Plant
CRA-817SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	-	Evaluate conditions above LNAPL for aerial coverage of Plant
CRA-818SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	-	Evaluate conditions above LNAPL for aerial coverage of Plant
CRA-819SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	-	Evaluate conditions above LNAPL for aerial coverage of Plant
CRA-820SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	-	Evaluate conditions above LNAPL for aerial coverage of Plant
CRA-821SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	-	Evaluate conditions above LNAPL for aerial coverage of Plant
CRA-822SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	-	Evaluate conditions above LNAPL for aerial coverage of Plant
CRA-823SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	-	Evaluate conditions above LNAPL for aerial coverage of Plant

TABLE 3.1

SOIL SAMPLING AND MONITORING WELL INSTALLATION PLAN
RFI WORK PLAN
FORMER WILLOW RUN PLANT
YPSILANTI, MICHIGAN

Boring/Well Number	Target Depth	Soil Sample Intervals (feet bgs) [3]	Soil Analysis[1]	Screen Installation Interval	Sampling Reason
CRA-824SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	-	Evaluate conditions above LNAPL for aerial coverage of Plant
CRA-826ML	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	Screen length to be determined in field. 5 foot screen. Intent is to screen bottom 5 feet of shallow unit. Set 0.5 feet into clay.	Evaluate stratigraphy and conditions along eastern property boundary.
CRA-827ML	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	Screen length to be determined in field. 5 foot screen. Intent is to screen bottom 5 feet of shallow unit. Set 0.5 feet into clay.	Evaluate stratigraphy and conditions along eastern property boundary.
CRA-828M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Evaluate conditions where groundwater monitoring wells are installed for aerial coverage of Plant
CRA-829M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	Evaluate conditions where groundwater monitoring wells are installed for aerial coverage of Plant
CRA-830SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	-	Evaluate soils surronding well with LNAPL >50 ppm PCBs
CRA-831SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	PCB	-	Evaluate soils surronding well with LNAPL >50 ppm PCBs
CRA-832SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	PCB	-	Evaluate soils surronding well with LNAPL >50 ppm PCBs
CRA-833M	0.5 feet into clay	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom, Fine/Coarse Pb if >75 ppm	Screen entire length shallow zone (2 feet above water table, 0.5 feet into clay). Screen length TBD in field, max 10 feet. Bias towards water table if saturated zone > 8 feet.	North Yard Investigation (AOI 12)
CRA-834SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	-	North Yard Investigation (AOI 12)
CRA-835SB	Water table	• 0-2 • 2 feet above water table • Up to one additional interval with high PID, staining, etc.	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Fine/Coarse Pb if >75 ppm	-	North Yard Investigation (AOI 12)

Notes

M - monitoring well installed to screen shallow zone
ML - monitoring well installed to screen lower portion of shallow zone
I - monitoring well installed to screen intermediate zone
D - monitoring well installed to screen deep zone
SB - soil boring
SBD - soil boring extended deeper than the shallow zone water table

[1] "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" SW846, 3rd Edition, updated November 1986

VOCs	U.S. EPA Method SW846-8260
SVOCs	U.S. EPA Method SW846-8270
PCBs	U.S. EPA Method SW846-8082
Inorganics	U.S. EPA Method SW846-6000/7000 series
Fine/Coarse Pb	If totals analysis indicates that lead is present at concentrations greater than 75 ppm, the laboratory will analyze for fine and coarse grain.

[2] Deep aquifer investigation will be completed first

[3] 0-2 feet bgs interval will be based on field conditions and will represent a 2 foot interval beneath the concrete and subslab fill

[4] Well will be installed and sampled if additional delineation is needed based on results from CRA-790M, CRA-792M, CRA-793SB, CRA-794SB, CRA-795M, CRA-796SB and CRA-799M

[5] Where an intermediate well is set, a minimum of a two foot bentonite seal is required between the intermediate and shallow units. Screen length and placement will take this into consideration.

TABLE 3.2

GROUNDWATER SAMPLING PROGRAM
RFI WORK PLAN
FORMER WILLOW RUN PLANT
YPSILANTI, MICHIGAN

Well Number	Groundwater Analysis[1]	Sampling Reason	Sampling Frequency
New Locations			
CRA-701M	TCL VOCs, TCL SVOCs, TAL Metals, PCBs, Hex & Tri Chrom	Northern upgradient property boundary Site-specific background metals	Full analysis one - time and TAL Metals one additional event, at least 3 months apart
CRA-702I	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Intermediate zone quality (if present), outiside north wall of Plant	One - time
CRA-703M	TCL VOCs, TCL SVOCs, TAL Metals, PCBs	Northern upgradient property boundary Site-specific background metals	Full analysis one - time and TAL Metals one additional event, at least 3 months apart
CRA-703I	TCL VOCs, TCL SVOCs, TAL Metals, PCBs	Intermediate zone quality Northern upgradient property boundary Site-specific background metals	Full analysis one - time and TAL Metals one additional event, at least 3 months apart
CRA-704M	TCL VOCs, TCL SVOCs, TAL Metals, PCBs	Northern upgradient property boundary Site-specific background metals	Full analysis one - time and TAL Metals one additional event, at least 3 months apart
CRA-704I	TCL VOCs, TCL SVOCs, TAL Metals, PCBs	Intermediate zone quality	Full analysis one - time and TAL Metals one additional event, at least 3 months apart
CRA-704D [3]	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Deep aquifer quality	One - time
CRA-705M	TCL VOCs, TCL SVOCs, TAL Metals, PCBs, Hex & Tri Chrom	Northern property boundary Site-specific background metals	Full analysis one - time and TAL Metals one additional event, at least 3 months apart
CRA-706M	TCL VOCs, TCL SVOCs, TAL Metals, PCBs	Northern property boundary Site-specific background metals	Full analysis one - time and TAL Metals one additional event, at least 3 months apart
CRA-709M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom	Storage Yard investigation	One - time
CRA-710M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Storage Yard investigation	One - time
CRA-711I	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Intermediate zone quality (if present) - downgradient property boundary	One - time
CRA-712I	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Intermediate zone quality (if present) - downgradient property boundary	One - time
CRA-713M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Groundwater quality north of Plant building	One - time
CRA-714M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom	Delineation north of Plant building[2]	One - time
CRA-715M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Delineation north of Plant building[2]	One - time
CRA-716M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom	Delineation north of Plant building[2]	One - time
CRA-717M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Delineation north of Plant building[2]	One - time
CRA-718M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Delineation north of Plant building[2]	One - time
CRA-719M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom	Delineation north of Plant building[2]	One - time
CRA-720I	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom	Intermediate zone quality	One - time
CRA-721M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Western shallow groundwater quality Western chlorinated plume	One - time
CRA-722M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Former Admin Building UST investigation	One - time
CRA-723M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Former Admin Building UST investigation	One - time

TABLE 3.2

GROUNDWATER SAMPLING PROGRAM
RFI WORK PLAN
FORMER WILLOW RUN PLANT
YPSILANTI, MICHIGAN

Well Number	Groundwater Analysis[1]	Sampling Reason	Sampling Frequency
CRA-724I	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom	Intermediate zone quality Western chlorinated plume	One - time
CRA-725I	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Intermediate zone quality Western chlorinated plume	One - time
CRA-725M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Western chlorinated plume	One - time
CRA-726M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom	Western property boundary shallow zone groundwater quality	One - time
CRA-726I	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Western property boundary intermediate zone groundwater quality	One - time
CRA-726D [3]	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Deep aquifer quality	One - time
CRA-728M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Amenable Cyanide, Hex & Tri Chrom	Western chlorinated plume Historical Acid and Cyanide Waste Lines (AOI 40)	One - time
CRA-729M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Western chlorinated plume	One - time
CRA-729I	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Intermediate zone quality Western chlorinated plume	One - time
CRA-730M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom	Groundwater quality outside of LNAPL plume Western chlorinated plume	One - time
CRA-730I	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Intermediate zone quality Western chlorinated plume	One - time
CRA-731M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Groundwater quality outside of LNAPL plume Western chlorinated plume	One - time
CRA-731I	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Intermediate zone quality Western chlorinated plume	One - time
CRA-732M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom	Groundwater quality outside of LNAPL plume Western chlorinated plume	One - time
CRA-732I	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Intermediate zone quality Western chlorinated plume	One - time
CRA-733M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Groundwater quality outside of LNAPL plume Western chlorinated plume	One - time
CRA-733I	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Intermediate zone quality Western chlorinated plume	One - time
CRA-734M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom	Groundwater quality outside of LNAPL plume Western chlorinated plume	One - time
CRA-734I	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Intermediate zone quality Western chlorinated plume	One - time
CRA-735I	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Intermediate zone quality Western chlorinated plume	One - time
CRA-736I	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Intermediate zone quality Western chlorinated plume	One - time
CRA-737M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom	Groundwater quality outside of LNAPL plume Western chlorinated plume	One - time
CRA-737I	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Intermediate zone quality Western chlorinated plume	One - time
CRA-738M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Groundwater quality outside of LNAPL plume Western chlorinated plume	One - time
CRA-738I	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Intermediate zone quality Western chlorinated plume	One - time
CRA-739M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom	Groundwater quality outside of LNAPL plume Western chlorinated plume	One - time
CRA-739I	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Intermediate zone quality Western chlorinated plume	One - time
CRA-740M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Western chlorinated plume	One - time

TABLE 3.2

GROUNDWATER SAMPLING PROGRAM
RFI WORK PLAN
FORMER WILLOW RUN PLANT
YPSILANTI, MICHIGAN

Well Number	Groundwater Analysis[1]	Sampling Reason	Sampling Frequency
CRA-740I	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Intermediate zone quality Western chlorinated plume	One - time
CRA-741M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Western chlorinated plume	One - time
CRA-741I	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom	Intermediate zone quality Western chlorinated plume	One - time
CRA-742D[3]	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Deep zone quality	One - time
CRA-742I	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Amenable Cyanide	Intermediate zone quality Historical Acid and Cyanide Waste Lines (AOI 40)	One - time
CRA-743M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom	Machinery Staging Area (AOI 27)	One - time
CRA-744M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Machinery Staging Area (AOI 27)	One - time
CRA-745M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Amenable Cyanide, Hex & Tri	Historical Coal Pile (AOI 35)	One - time
CRA-749M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Amenable Cyanide	Historical Coal Pile (AOI 35)	One - time
CRA-750M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Dry Cleaning Operations (AOI 43)	One - time
CRA-751M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Amenable Cyanide	Dry Cleaning Operations (AOI 43)	One - time
CRA-752M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Barrel Yard (AOI 23)	One - time
CRA-753M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Amenable Cyanide	Barrel Yard (AOI 23)	One - time
CRA-754M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Groundwater quality outside of LNAPL plume	One - time
CRA-755M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom	Groundwater quality outside of LNAPL plume	One - time
CRA-756M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Groundwater quality outside of LNAPL plume	One - time
CRA-757M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom	Groundwater quality outside of LNAPL plume	One - time
CRA-775M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Area not previously investigated	One - time
CRA-776M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Area not previously investigated	One - time
CRA-777M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom	Area not previously investigated	One - time
CRA-778M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Wastewater Treatment Plant (Not part of RCRA corrective actions)	One - time
CRA-779M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Wastewater Treatment Plant (Not part of RCRA corrective actions)	One - time
CRA-780M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom	Wastewater Treatment Plant (Not part of RCRA corrective actions)	One - time
CRA-781M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Wastewater Treatment Plant (Not part of RCRA corrective actions)	One - time
CRA-782M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Wastewater Treatment Plant (Not part of RCRA corrective actions)	One - time
CRA-783M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom	Wastewater Treatment Plant (Not part of RCRA corrective actions)	One - time
CRA-785I	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Eastern property boundary intermediate zone groundwater quality	One - time
CRA-785D[3]	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Deep aquifer quality	One - time

TABLE 3.2

GROUNDWATER SAMPLING PROGRAM
RFI WORK PLAN
FORMER WILLOW RUN PLANT
YPSILANTI, MICHIGAN

Well Number	Groundwater Analysis[1]	Sampling Reason	Sampling Frequency
CRA-787M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Western chlorinated plume	One - time
CRA-787I	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Intermediate zone quality Western chlorinated plume	One - time
CRA-788M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Western chlorinated plume	One - time
CRA-788I	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Intermediate zone quality Western chlorinated plume	One - time
CRA-789M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Groundwater quality outside of LNAPL plume	One - time
CRA-789I	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Intermediate zone quality Groundwater quality outside of LNAPL plume	One - time
CRA-790M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Groundwater quality outside of LNAPL plume	One - time
CRA-791M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Groundwater quality outside of LNAPL plume	One - time
CRA-792M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Groundwater quality outside of LNAPL plume	One - time
CRA-792I	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Intermediate zone quality Groundwater quality outside of LNAPL plume	One - time
CRA-795M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Groundwater quality outside of LNAPL plume	One - time
CRA-797M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Intermediate zone quality Groundwater quality outside of LNAPL plume	One - time
CRA-797I	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Intermediate zone quality	One - time
CRA-798M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom	Maintenance Degreasing (AOI 33)	One - time
CRA-799M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Maintenance Degreasing (AOI 33)	One - time
CRA-800M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Maintenance Degreasing (AOI 33)	One - time
CRA-801M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom	Maintenance Degreasing (AOI 33)	One - time
CRA-803M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Groundwater quality outside of LNAPL plume	One - time
CRA-804M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom	Groundwater quality outside of LNAPL plume	One - time
CRA-805M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Groundwater quality outside of LNAPL plume	One - time
CRA-806M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Groundwater quality outside of LNAPL plume	One - time
CRA-807M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Hex & Tri Chrom	Groundwater quality outside of LNAPL plume	One - time
CRA-808M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Groundwater quality outside of LNAPL plume	One - time
CRA-826ML	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Lower portion of shallow zone quality	One - time
CRA-827ML	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Lower portion of shallow zone quality	One - time
CRA-828M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Possible historical drum storage area	One - time
CRA-829M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Possible historical drum storage area	One - time
CRA-833M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	North Yard (AOI 12)	One - time

TABLE 3.2

GROUNDWATER SAMPLING PROGRAM
RFI WORK PLAN
FORMER WILLOW RUN PLANT
YPSILANTI, MICHIGAN

Well Number	Groundwater Analysis[1]	Sampling Reason	Sampling Frequency
Existing Locations			
CRA-60M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Groundwater quality outside of LNAPL plume, previously not sampled for full list, confirmation of previous results	One - time
CRA-71M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Groundwater quality outside of LNAPL plume, previously not sampled for full list, confirmation of previous results	One - time
CRA-72M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Groundwater quality outside of LNAPL plume, previously not sampled for full list, confirmation of previous results	One - time
CRA-73M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Groundwater quality outside of LNAPL plume, previously not sampled for full list, confirmation of previous results	One - time
CRA-74M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Groundwater quality outside of LNAPL plume, previously not sampled for full list, confirmation of previous results	One - time
CRA-94M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Groundwater quality outside of LNAPL plume, previously not sampled for full list, confirmation of previous results	One - time
CRA-109M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Groundwater quality outside of LNAPL plume, previously not sampled for full list, confirmation of previous results	One - time
CRA-110M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Groundwater quality outside of LNAPL plume, previously not sampled for full list, confirmation of previous results	One - time
CRA-113M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Groundwater quality outside of LNAPL plume, previously not sampled for full list, confirmation of previous results	One - time
CRA-124M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Groundwater quality outside of LNAPL plume, previously not sampled for full list, confirmation of previous results	One - time
CRA-133M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Shallow zone quality adjacent to new intermediate and deep wells Eastern property boundary shallow zone groundwater quality	One - time
CRA-137M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Groundwater quality outside of LNAPL plume, previously not sampled for full list, confirmation of previous results	One - time
CRA-209M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Evaluate groundwater on currently leased airport property.	One - time
CRA-238M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Groundwater quality outside of LNAPL plume, previously not sampled for full list, confirmation of previous results	One - time
CRA-263M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Well at Site Boundary, previously not sampled for full list, confirmation of previous results	One - time
CRA-264	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Historical well, recently found and previously not sampled for full list	One - time
CRA-265	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Historical well, recently found and previously not sampled for full list	One - time
CRA-266	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Historical well, recently found and previously not sampled for full list	One - time

TABLE 3.2

GROUNDWATER SAMPLING PROGRAM
RFI WORK PLAN
FORMER WILLOW RUN PLANT
YPSILANTI, MICHIGAN

Well Number	Groundwater Analysis[1]	Sampling Reason	Sampling Frequency
CRA-311M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Groundwater quality outside of LNAPL plume, previously not sampled for full list, confirmation of previous results	One - time
CRA-314M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Groundwater quality outside of LNAPL plume, previously not sampled for full list, confirmation of previous results	One - time
CRA-315M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Groundwater quality outside of LNAPL plume, previously not sampled for full list, confirmation of previous results	One - time
CRA-320M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Evaluate groundwater on currently leased airport property.	One - time
CRA-325M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Well at Site Boundary, previously not sampled for full list, confirmation of previous results	One - time
CRA-342M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Evaluate groundwater on currently leased airport property.	One - time
CRA-529M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Groundwater quality outside of LNAPL plume, previously not sampled for full list, confirmation of previous results	One - time
CRA-606M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs, Amenable Cyanide	Shallow zone quality adjacent to new intermediate and deep wells Western chlorinated plume Historical Acid and Cyanide Waste Lines (AOI 40)	One - time
CRA-609M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Well at Site Boundary, previously not sampled for full list, confirmation of previous results	One - time
CRA-610M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Evaluate groundwater on currently leased airport property.	One - time
CRA-618M	TCL VOCs, TCL SVOCs, Site-Specific TAL Metals, PCBs	Well at Site Boundary, previously not sampled for full list, confirmation of previous results	One - time

Notes

Due to non-standard screen length, tubing will be set at the mid-point of the screen length for sampling.

M - monitoring well installed to screen shallow zone
ML - monitoring well installed to screen lower portion of shallow zone
I - monitoring well installed to screen intermediate zone
D - monitoring well installed to screen deep zone
SB - soil boring

[1] "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" SW846, 3rd Edition, updated November 1986

VOCs	U.S. EPA Method SW846-8260
SVOCs	U.S. EPA Method SW846-8270
Site-Specific TAL Metals	U.S. EPA Method SW846-6000/7000 series
PCBs	U.S. EPA Method SW846-8082
Amenable Cyanide	U.S. EPA Method SW846-9012
Hex Chromium	U.S. EPA Method SW846-7196
Tri Chromium	By calculation

[2] Well will be installed and sampled if additional delineation is needed based on results from CRA-790M, CRA-792M, CRA-793SB, CRA-794SB, CRA-795M, CRA-796SB and CRA-799M

[3] An additional deep well may be installed if additional saturated sand unit is encountered

TABLE 3.3

SOIL GAS SAMPLING PROGRAM
RFI WORK PLAN
FORMER WILLOW RUN PLANT
YPSILANTI, MICHIGAN

Boring/Well Number	Target Depth	Environmental Parameters	
		Sample Intervals (feet bgs)	Chemical Analysis
CRA-809GP	3-inches below concrete	Sub-slab	VOCs - TO-15
CRA-810GP	3-inches below concrete	Sub-slab	VOCs - TO-15
CRA-811GP	3-inches below concrete	Sub-slab	VOCs - TO-15
CRA-812GP	3-inches below concrete	Sub-slab	VOCs - TO-15
CRA-813GP	3-inches below concrete	Sub-slab	VOCs - TO-15
CRA-814GP	3-inches below concrete	Sub-slab	VOCs - TO-15
CRA-815GP	3-inches below concrete	Sub-slab	VOCs - TO-15
CRA-816GP	3-inches below concrete	Sub-slab	VOCs - TO-15
CRA-817GP	3-inches below concrete	Sub-slab	VOCs - TO-15
CRA-818GP	3-inches below concrete	Sub-slab	VOCs - TO-15
CRA-819GP	3-inches below concrete	Sub-slab	VOCs - TO-15
CRA-820GP	3-inches below concrete	Sub-slab	VOCs - TO-15
CRA-821GP	3-inches below concrete	Sub-slab	VOCs - TO-15
CRA-822GP	3-inches below concrete	Sub-slab	VOCs - TO-15
CRA-823GP	3-inches below concrete	Sub-slab	VOCs - TO-15
CRA-824GP	3-inches below concrete	Sub-slab	VOCs - TO-15
CRA-825GP	3-inches below concrete	Sub-slab	VOCs - TO-15

Notes
- bgs - below ground surface

- QA/QC Samples will include the collection and analysis of one duplicate sample. Additionally, isopropyl alcohol (IPA) will be analyzed with all samples

APPENDIX A

APPLICABLE SITE-SPECIFIC FIELD METHOD GUIDELINES

TABLE OF CONTENTS

LIST OF FIGURES

(Following Text)

LIST OF FORMS

(Following Text)

1.0 INTRODUCTION

These guidelines are not intended to provide the basis for an investigation program, but instead assume that a scope of work has been designed, and a Site-specific Work Plan has been established.

2.0 DRILLING METHODS

The standard approach for soil boring completion and well installation at this Site is direct push and hollow-stem auger, respectively. Rotosonic drilling methods will be used for soil borings or wells that extend below the confining clay layer defining the shallow aquifer.

3.0 SOIL CLASSIFICATION

Descriptions for natural undisturbed soils are recorded on a Stratigraphy Log (Overburden) (Form SP-14). An example of a completed Stratigraphy Log (Overburden) is presented on Form 3.1.

Soil descriptions are completed in the following order:

1. Unified Soil Classification System (USCS) group symbol(s) (e.g., SM) of primary soil components or dual or borderline symbols
2. Name and adjective description of primary, secondary, and minor grain size components
3. Relative density for non-cohesive soils or consistency for cohesive soils
4. Gradation and soil structure for non-cohesive soils or structure and plasticity for cohesive soils
5. Color
6. Moisture content
7. Other physical observations including presence of staining and or odors

Note: When describing observed odors, general odor category and strength of odor will be classified as specific as possible. Odors are generally chemical, petroleum, or septic related, varying from slight to moderate to strong. Identification of specific chemical compounds (i.e., benzene, gasoline) is not necessary and is often inaccurate as detailed chemistry commonly shows an array of chemicals present.

When describing vegetative matter presence in soils, the term organic is not used. The use of the term organic often leads to confusion regarding the presence of organic chemicals (i.e., volatile organic compounds [VOCs], semi-volatile organic compounds [SVOCs]). Similarly, as noted above, more specific terms for odors than organic will be used.

The description of fill soils is similar to those used to describe native undisturbed soils. Fill soils will be identified as fill (i.e., SP/GP-Sand and Gravel [Fill]). To determine if soils are fill, evidence that the soil has been artificially placed (e.g., brick fragments, slag, glass, wood fragments) will be observed. Relative or inconsistent soil density can also assist in determining if soils are fill, along with irregular soil structure.

Soils are identified and grouped consistently to determine subsurface pattern or changes and non-conformities in the soil stratigraphy. The stratigraphy of each soil boring is compared to ensure that patterns or changes in soil stratigraphy are noted and that consistent terminology is used.

Visual examination, physical observation, and manual tests (based on ASTM D2488, Standard Practice for Description and Identification of Soils [Visual-Manual Procedure]) are used to aid in classifying and grouping soil samples in the field. These procedures are described in the following subsection. ASTM D2488 should be reviewed for detailed explanations of the procedures. Note that the related ASTM D2487 Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System) uses slightly different percentages of soil components. Visual-manual procedures used to aid in soil identification and classification include:

1. Visual determination of grain size, soil gradation, and percentage of various soil components to the nearest 5 percent (i.e., gravel, sand, silt, and clay)
2. Dry strength, dilatancy, toughness, and plasticity tests (i.e., thread or ribbon test) for identification of inorganic fine-grained soils (e.g., CL or CH [clays], and ML or MH [silts])
3. Soil compressive strength and consistency estimates based on thumb indent and or pocket penetrometer (preferred) methods

The three main soil divisions are:

1. Coarse-grained soils (e.g., sand and gravel)
2. Fine-grained soils (e.g., silts and clays)

3. Soils with high natural organic and vegetative matter content (e.g., peat, marl)

These soil divisions are presented in the table of USCS classifications below.

Major Divisions			Group Symbol	Typical Description
Coarse grained soils more than 50% retained on No. 200 sieve	Gravel more than 50% of coarse fraction retained on No. 4 sieve	clean gravel <5% fines	GW	well graded gravel, gravel-sand mixtures
			GP	poorly graded gravel, gravel-sand mixtures
		gravel with >15% fines	GM	silty gravel, gravel-sand-silt mixtures
			GC	clayey gravel, gravel-sand-clay mixtures
	Sand more than 50% of coarse fraction passes No. 4 sieve	clean sand <5% fines	SW	well graded sand, fine to coarse sand, gravelly sand
			SP	poorly graded sand
		sand with >15% fines	SM	silty sand, sand-silt mixtures
			SC	clayey sand, sand-clay mixtures
Fine grained soils more than 50% passes No. 200 sieve	Silt and Clay liquid limit <50, low plasticity	inorganic	ML	Inorganic silt
			CL	Inorganic clay
		organic	OL	organic silt, organic clay
	Silt and Clay liquid limit ≥50, high plasticity	inorganic	MH	silt of high plasticity, elastic silt
			CH	clay of high plasticity, fat clay
		organic	OL	organic clay, organic silt, low plasticity
			OH	organic clay, organic silt, high plasticity

Major Divisions	Group Symbol	Typical Description
Highly organic soils	PT	peat

4.0 SOIL SCREENING & SAMPLING

For environmental sampling, gloves are changed each time between collecting subsequent soil samples to prevent cross-contamination. All tools (e.g., samplers, spatulas) are decontaminated prior to use on each sample to prevent cross-contamination.

When soil sampling at sites with known or suspected VOC impact, it is often required to measure the soil for the presence of undifferentiated organic vapors. This field screening can be performed using a photoionization detector (PID). Immediately upon the opening of the split-spoon or discrete soil sampler, the soil is screened with a PID (HNu, Microtip, or equivalent) for the presence of undifferentiated organic vapors. This is accomplished by recording a head space measurement. This consists of placing a portion of the soil sample in bag and sealing the bag. The bag is set aside for 3 - 5 minutes. After the sample has equilibrated, the bag is punctured with the PID probe, and the air (headspace) above the soil sample is monitored. The headspace reading is recorded on the field form or in the field book.

Subsurface soil samples are usually grab samples, used to characterize the soil at a specific depth or depth interval (e.g., 2 to 4 feet). On occasion, composite samples are collected from a borehole over a greater depth interval (e.g., 5 to 15 feet). Soil samples for VOC analysis will not be homogenized. Soil samples collected for chemical analysis will be placed in a cooler with ice. Samples will be shipped using Chain of Custody procedures to the analytical laboratory.

5.0 WELL CONSTRUCTION

The standard approach for monitoring well construction at this Site includes 2-inch diameter Schedule 40 polyvinyl chloride (PVC) wells with No. 10 slot PVC screens. Screen lengths vary based on location and purpose of the well, with a maximum length of 10 feet. Typical overburden well installation details are provided on Figure A-5.1.

6.0 WELL DEVELOPMENT

Well development can be accomplished by using in-place pumps or by using portable equipment; either peristaltic, bladder, or other appropriate pumps depending on well depth. The well will be purged until the groundwater is relatively silt free; no further change is noted, the temperature, pH and specific conductivity readings have stabilized to within 10 percent.

7.0 GROUNDWATER SAMPLING

Low Flow Purging (LFP) using peristaltic pumps is the preferred groundwater sampling method at this Site.

During LFP, the pumping rate should be between 100 and 500 milliliters per minute (mL/min) to allow for measured groundwater levels to maintain a maximum 0.4 foot of drawdown. During purging, the pumping rate and groundwater level should be measured at least every 10 minutes. It is recommended that water level measurements occur at 5-minute intervals.

During LFP, stabilization of the purged groundwater is required to ensure the collection of representative groundwater samples from the formation and not from the stagnant water in the well casing. Field parameters including pH, temperature, specific conductance, oxidation-reduction potential (ORP), dissolved oxygen (DO), and turbidity should monitored during LFP. The field measurements should be measured and recorded at 5-minute intervals. Groundwater stabilization is considered achieved when three consecutive readings for each of the field parameters, taken at 5-minute intervals, are within the following limits:

pH	±0.1 pH units of the average value of the three readings
Temperature	±3 percent of the average value of the three readings
Conductivity	±0.005 milliSiemen per centimeter (mS/cm) of the average value of the three readings for conductivity <1 mS/cm and ±0.01 mS/cm of the average value of the three readings for conductivity >1 mS/cm
ORP	±10 millivolts (mV) of the average value of the three readings
DO	±10 percent of the average value of the three readings

Turbidity	±10 percent of the average value of the three readings, or a final value of less than 5 NTU

If the recharge to the well is insufficient to conduct LFP, the well should be pumped dry and allowed to recharge sufficiently for the collection of the groundwater sample volume. Wells purged dry are required to be sampled within 24 hours of being purged dry. If there is not sufficient volume of water within 24-hours the well will be deemed dry and no sample will be collected.

Variations from this procedure need to be cleared by the CRA project manager or senior hydrogeologist prior to sample collection.

8.0 SOIL GAS SAMPLING

This provides for the installation and sampling of two types of soil gas probes, subslab and a typical soil gas probe (deep soil gas probe). The deeper soil gas probes (typically greater than 5 feet bgs) will be installed using the Geoprobe dual tube sampling system (a direct push method) to advance a borehole six-inches into the clay-confining unit. The dual tube sampling system consists of first advancing a 2½-inch ID inner sampling casing followed by advancing a 3½-inch ID outer casing. The outer casing will cut away disturbed soil immediately surrounding the borehole left by the inner probe. The outer casing will create reduced soil disturbance itself due to the inner probe having already been advanced. The inner casing will be advanced until the pre-determined depth is reached or until the water table is encountered, whichever occurs first. The outer casing will then be used to cut away the disturbed soil to the desired depth (typically between 5 and 10 feet bgs, where the soil probe will be installed. It is anticipated that using the dual tube system will result in a minimum amount of soil disturbance around the borehole annulus. The soil gas probes will be constructed of ½-inch ID polyethylene tubing or ¾-inch PVC. The screened interval for each soil gas probe will be 1 foot in length and will be set between 5 and 10 feet bgs, designed to screen the most permeable unsaturated soils within this interval. A typical deep soil probe construction is presented on Figure A-8.1.

Sub-slab probes will be installed using a rotary hammer drill (or other appropriate portable drill). A shallow outer hole, approximately 7/8-inch inches diameter, will be created using the drill. A smaller diameter inner hole (approximately 5/16-inches in diameter) will be drilled within the outer hole through the concrete slab and approximately 3-inches into the sub-slab material. The sub-slab probes will be constructed from small diameter brass or stainless steel tubing and compression fittings.

A cement grout that expands upon drying will be used to seal between the probe and the outer hole. A typical sub-slab probe construction is presented on Figure 8.2.

The soil gas samples will be collected using 6-liter capacity Summa™ canisters fitted with a laboratory calibrated critical orifice flow regulation device sized to allow the collection of the soil gas sample over a 1-hour sample collection time. The 1-hour sample collection time for a 6-litre capacity Summa™ canister corresponds to a maximum soil gas sample collection flow rate of approximately 200 milliliters per minute (ml/min). Prior to sample collection, soil gas probe purging will be conducted at a maximum flow rate of 200 ml/min. Two soil gas probe volumes (calculated based on casing and sand pack volume) will be purged to remove potentially stagnant air from the internal volume of the soil gas probe and ensure that soil gas representative of the formation is drawn into the soil gas probe.

9.0 DECONTAMINATION PROCEDURE

The standard decontamination procedure employed at this Site includes an initial wash with potable water and laboratory detergent (e.g. alconox) followed by a potable water rinse.

Polychlorinated Biphenyls (PCB) Decontamination Procedure

The following cleaning procedures are recommended for decontaminating non dedicated equipment being used for environmental investigation activities in areas where significant levels of PCBs have been detected.

1. Wash equipment with potable water and laboratory detergent (Alconox or Liquinox or similar solution).
2. Rinse thoroughly with potable water.
3. Rinse thoroughly with deionized water.
4. Rinse equipment with 1/10 dilution of hexane. Use a laboratory style bottle for hexane to avoid splashing. Do not use a spray bottle.
5. Rinse equipment with 1/10 dilution of acetone. Use a laboratory style bottle for acetone to avoid splashing. Do not use a spray bottle.
6. Rinse thoroughly with deionized water and allow to air dry.

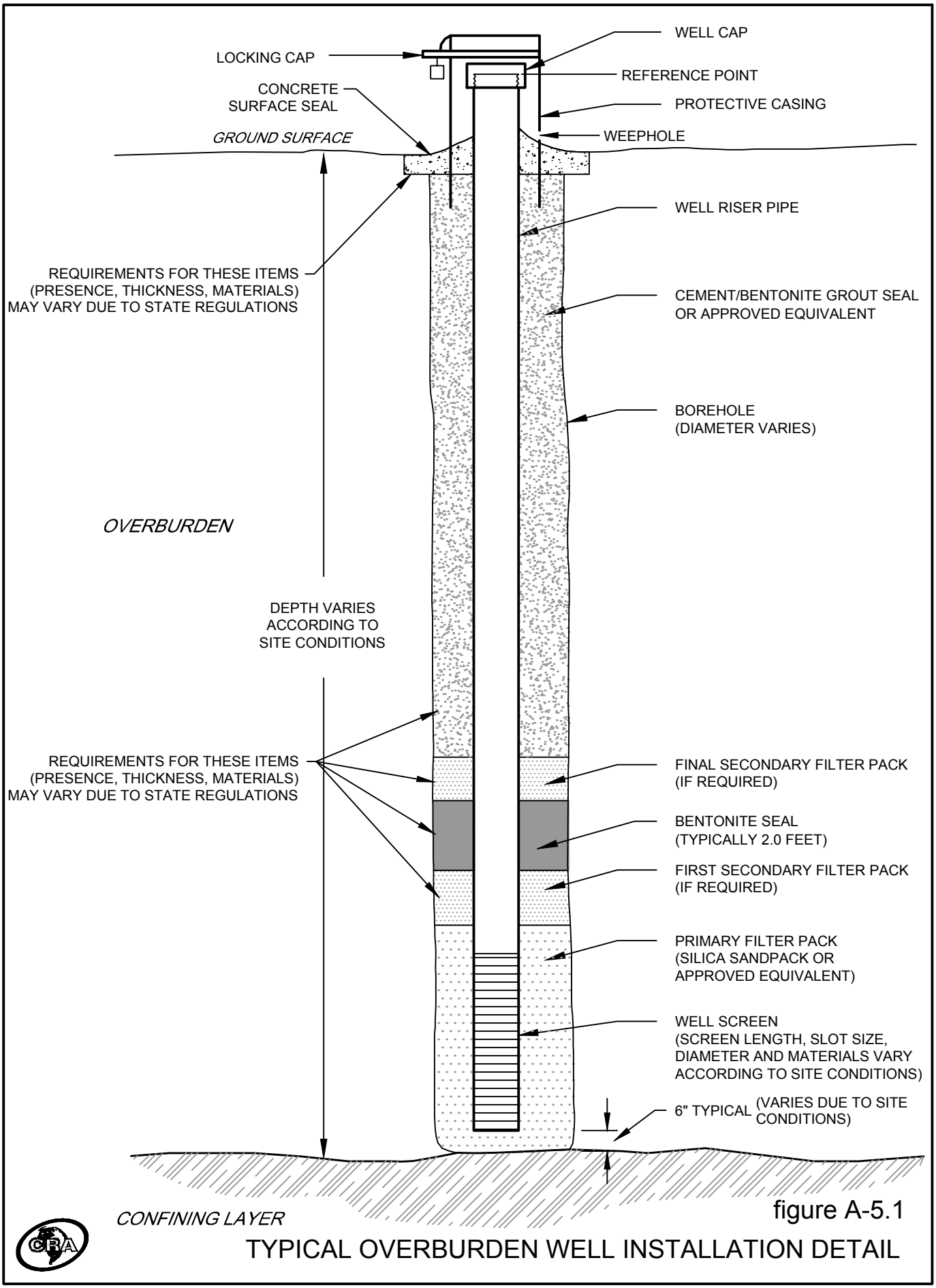
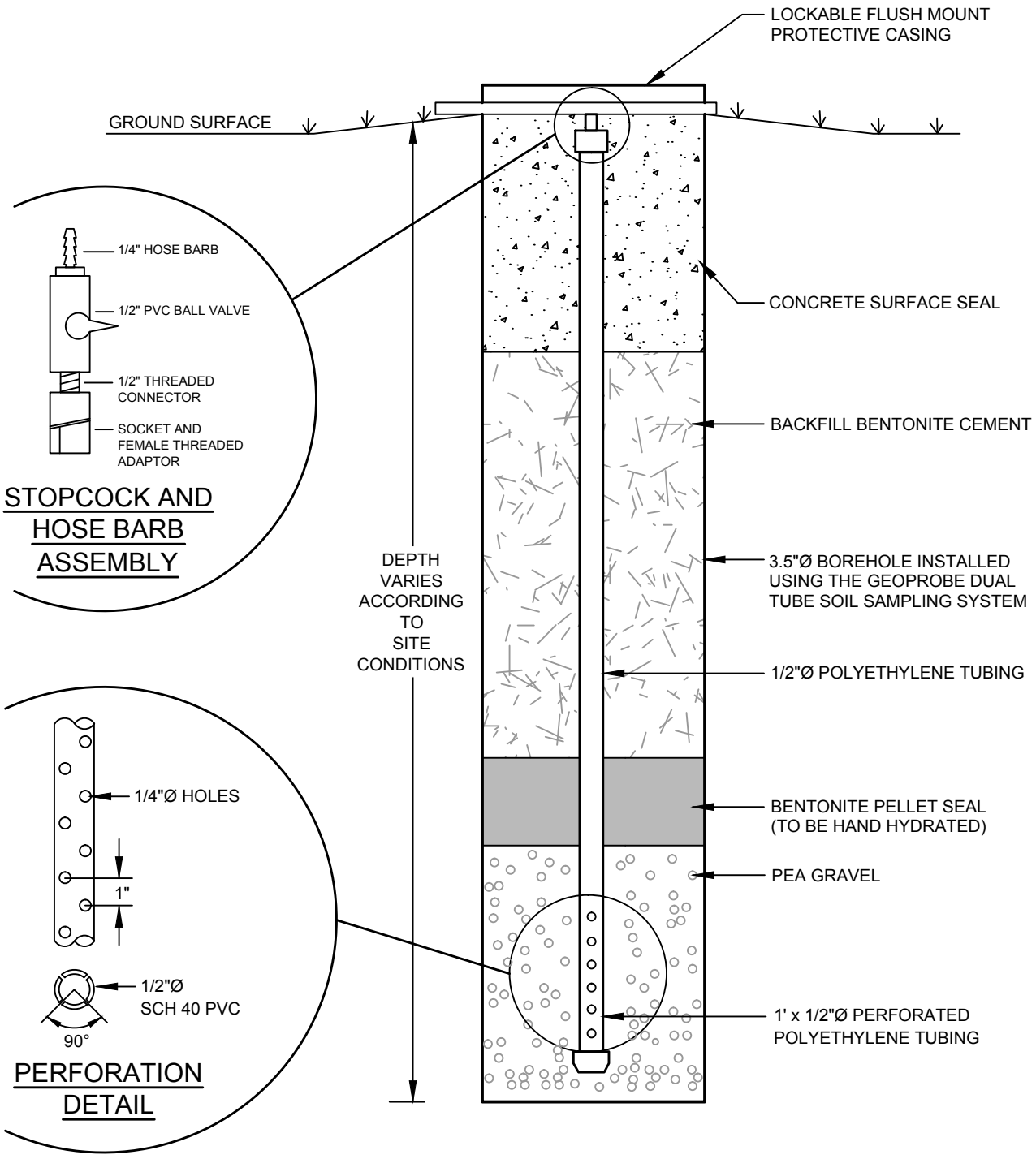


figure A-5.1

TYPICAL OVERBURDEN WELL INSTALLATION DETAIL



NOTE: CONNECTIONS AND ADAPTORS ARE NOT TO BE GLUED

figure A-8.1

TYPICAL SOIL GAS PROBE CONSTRUCTION DETAIL

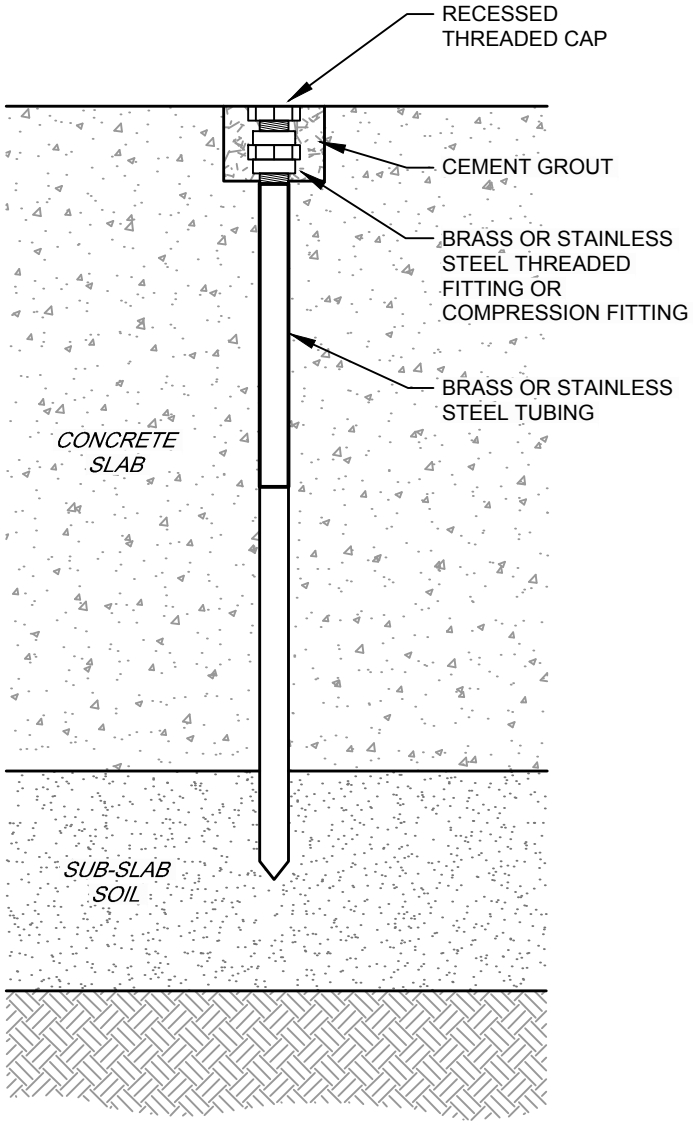


figure A-8.2

TYPICAL SUB-SLAB GAS PROBE CONSTRUCTION DETAIL

STRATIGRAPHY LOG (OVERBURDEN)

PROJECT NAME ______________________
PROJECT NUMBER ______________________
GM SITE ______________________
LOCATION ______________________

DRILLING CONTRACTOR ______________________
DRILLER ______________________
SURFACE ELEVATION ______________________
WEATHER (A.M.) ______________________
(P.M.) ______________________

HOLE DESIGNATION ______________________
DATE/TIME STARTED ______________________
DATE/TIME COMPLETED ______________________
DRILLING METHOD ______________________
SUPERVISOR ______________________

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION	SAMPLE DETAILS							PID / FID (ppm)	CHEMICAL ANALYSIS	GRAIN SIZE
FROM	AT	TO	ORDER OF DESCRIPTORS: SOIL TYPE SYMBOL(S) – MAIN COMPONENT(S), (NATURE OF DEPOSIT), SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE (FRACTURE PRESENCE/APPEARANCE),COLOR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS (FILL OR NATIVE; ROOT PRESENCE/STRUCTURE), NOTE: PLASTICITY DETERMINATION REQUIRES THE ADDITION OF MOISTURE IF THE SAMPLE IS TOO DRY TO ROLL (INDICATE IF MOISTURE WAS ADDED OR NOT).	SAMPLE #	SAMPLING METHOD	PENETRATION RECORD SPLIT SPOON BLOWS (RECORD N-VALUES & RECOVERIES) 6"	6"	6"	6"	SAMPLE INTERVAL			

REMEDIATION SECTION

DEPTH OF BOREHOLE CAVING __________ DEPTH OF FIRST GROUNDWATER ENCOUNTER __________ TOPSOIL THICKNESS __________

WATER LEVEL IN OPEN BOREHOLE ON COMPLETION __________, AFTER _____ HOURS _____

COMPLETION DETAILS: ______________________

NOTE: FOR EACH SPLIT-SPOON SAMPLE, RECORD BLOW COUNTS, N-VALUE, SAMPLE RECOVERY LENGTH, AND SAMPLE INTERVAL.

APPENDIX B

QUALITY ASSURANCE PROJECT PLAN

QUALITY ASSURANCE PROJECT PLAN (QAPP)
RCRA FACILITY INVESTIGATION WORK PLAN

WILLOW RUN POWERTRAIN PLANT
YPSILANTI, MICHIGAN

Prepared for:

RACER TRUST

FEBRUARY 2012
REF. NO. 17358 (19)

TABLE OF CONTENTS

Page

TABLE OF CONTENTS (CONTINUED)

Page

TABLE OF CONTENTS (CONTINUED)

Page

LIST OF TABLES

ATTACHMENTS

(To Be Provided Upon Request)

1.0 PROJECT DESCRIPTION

The following outlines the scope of the RCRA Facility Investigation (RFI) for the Site to be performed at the Revitalizing Auto Communities Environmental Response (RACER) Trust Willow Run Powertrain (PT) Plant located in Ypsilanti, Michigan (Site).

This Quality Assurance Project Plan (QAPP) presents the organization, objectives, planned activities, and specific quality assurance / quality control (QA/QC) procedures associated with the RFI for the Site. Protocols for sample collection, sample handling and storage, chain-of-custody procedures, and laboratory and field analyses are described or specifically referenced to related investigation documents.

This QAPP addresses the QA/QC elements in the U.S. EPA Region 5 QAPP policy presented in the "U. S. EPA RCRA QAPP Instructions" dated April 1998 and other relevant guidance documents. The QA/QC procedures described in this QAPP are consistent with U.S. EPA guidance in general.

1.1 INTRODUCTION

This QAPP has been prepared on behalf of RACER. The QAPP is a component of the RFI Work Plan.

1.1.1 PROJECT OBJECTIVES AND DECISION STATEMENT

The primary objectives for data collection activities include:

i) Define the nature and extent of releases of hazardous wastes and/or hazardous constituents in environmental media (soil, sediment, groundwater, and/or surface water) at the Site; and

ii) Collect sufficient data and information to evaluate the risk to human health and the environment, if any, associated with any releases of hazardous waste and/or hazardous constituents.

The Decision Statement for the investigation is as follows:

i) Determine whether interim remedial actions are necessary to control current unacceptable risks, if any, to human health or the environment; and

ii) Provide data for the development of a study of appropriate corrective measures (if warranted) to control current and future unacceptable risks to human health and the environment.

Associated specific objectives for field and laboratory data collection are discussed in Section 1.0 of the RFI Work Plan and Section 1.4 of this QAPP.

1.1.2 PROJECT STATUS/PHASE

The project status was presented in the Current Conditions Report, and investigation approach is presented in the RFI Work Plan. Additional Work Plans will be prepared as the investigation progresses at the Site.

1.1.3 QAPP PREPARATION GUIDELINES

As previously noted, this QAPP has been prepared to present the project specific QA/QC elements in the "U.S. EPA Region 5 QAPP Instructions" dated April 1998.

1.2 SITE DESCRIPTION

The general Site description is provided in Section 2.0 of the RFI Work Plan and is incorporated here by reference.

1.3 SITE HISTORY

The Site history is provided in Section 2.0 of the RFI Work Plan and incorporated here by reference.

1.4 PROJECT OBJECTIVES AND INTENDED DATA USE

1.4.1 TARGET PARAMETER LIST

The investigative program includes the sampling and analysis of environmental media for the presence of organic and inorganic constituents based on historical operations and previous investigations at the Site. The field and laboratory parameters are summarized below and presented in Table 1.1.

1.4.1.1 FIELD PARAMETERS

Concurrent with sample collection, several field parameters will be determined by the field sampling personnel. For soils and solid matrices, these field parameters will include visual observations, odor identification, and VOC screening using handheld monitoring equipment such as photo-ionization detector (PID). For aqueous samples (surface water and groundwater), at a minimum, the following parameters will be determined with field testing equipment: pH, specific conductivity, and temperature. The low-flow purging techniques utilized for groundwater sampling will include additional field parameters including turbidity, dissolved oxygen (DO), and oxidation/reduction potential (ORP).

1.4.1.2 LABORATORY PARAMETERS

The laboratory parameters will vary depending on the area, the reason for the investigation and prior investigation results and may include target compound list (TCL) volatile organic compounds (VOCs), TCL semi-volatile organic compounds (SVOCs), TCL polychlorinated biphenyls (PCBs), and target analyte list (TAL) metals excluding calcium, magnesium, potassium, and sodium. In addition to the TCL/TAL parameters, select samples may be analyzed for total and amenable cyanide, petroleum fingerprinting, hexavalent-chromium, fine/coarse grain lead, pH, and hardness. Non-aqueous phase liquid (NAPL) samples may also include analysis for petroleum fingerprinting, viscosity, specific gravity, and heating value. Soil gas and/or indoor air samples may be analyzed for VOCs

The estimated quantitation limits (EQL) and method detection limits (MDL) for each compound or analyte are presented in Table 1.2 – TCL/TAL and associated investigative parameters and Table 1.3 – air monitoring parameters.
The MDL studies have been performed by TestAmerica Laboratories, Inc. (TA) in accordance with the procedures established in the Federal Register, Volume 49, number 209, October 26, 1984 pp. 198-199, the MDL values are presented in Table 1.2 and Appendix D.

1.5 SAMPLING LOCATIONS

The RFI Work Plan (and subsequent Work Plans) provides a summary and rationale for the location environmental samples at the Site. It is possible, however, that depending on the nature of encountered field conditions, sampling locations may change. The person responsible for making such decisions will be the Field Quality Assurance (QA) Officer whose responsibilities are described in Section 2.0 of this QAPP. Any change of the sampling strategy will only be implemented after approval from the RACER Project Manager.

1.6 PROJECT SCHEDULE

The schedule of projected milestones is presented in the RFI Work Plan. The schedule is presented in the 2012 Annual Environmental Action Budget Authorization Request package. This will be updated in each year's request.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

The CRA Project Manager will have the primary responsibility for the implementation of the RFI Work Plan. TestAmerica will perform all of the analyses of environmental samples collected at the Site. This section defines the roles and responsibilities of the individuals who will perform the RI activities.

2.1 MANAGEMENT RESPONSIBILITIES

RACER Project Manager

The RACER Project Manager is responsible for implementing the project, and has the authority to commit the resources necessary to meet project objectives and requirements. The RACER Project Manager's primary function is to ensure that technical, financial, and scheduling objectives are achieved successfully. The RACER Project Manager will provide the major point of contact and control matters concerning the project and represent the project team at regulatory agency meetings and public hearings. The RACER Project Manager will define project objectives and develop a detailed project schedule in conjunction with the CRA Project Manager. The RACER Project Manager will establish project policy and procedures to address the specific needs of the project as a whole, as well as the objectives of each task.

CRA Project Manager

The Project Manager is responsible for managing the implementation of the RFI Work Plan and coordinating the collection of data pertaining to the investigation. The CRA Project Manager is responsible for technical quality control and project oversight. The CRA Project Manager also provides approval of the QAPP.

The CRA Project Manager will:

i) Acquire and apply technical and other resources as needed to ensure performance within budget and schedule restraints;

ii) Review work performed on each task to ensure quality, responsiveness, and timeliness;

iii) Be responsible for the preparation and quality of interim and final reports;

iv) Communicate with]RACER about the progress of the project.

CRA Project Coordinator

The CRA Project Coordinator will assist the Project Manager in day-to-day project management. The CRA Project Coordinator is responsible for coordinating all field activities and the procurement of project subcontractors. Additional responsibilities include:

i) Assisting in monitoring the RFI progress and quality;
ii) Preparing and reviewing RFI reports; and
iii) Providing technical support of project activities.

2.2 QUALITY ASSURANCE RESPONSIBILITIES

The Quality Assurance team will consist of a Quality Assurance Officer and the Project Manager. Quality Assurance responsibilities are described as follows:

CRA Project Quality Assurance (QA) Officer

The CRA QAOfficer reports directly to the CRA Project Manager and will be responsible for ensuring that all QA/QC procedures are being followed. The CRA QA Officer will be responsible for overseeing the review of all field and laboratory data. Additional responsibilities include:

i) Assuring the application and effectiveness of the QAPP by the analytical laboratory and the project staff;

ii) Conducting internal QA/QC of the investigation activities;

iii) Providing input to the CRA Project Manager and the CRA Project Coordinator/Engineer as to corrective actions required resulting from the above-mentioned evaluations;

iv) Preparation and review of data validation and audit reports; and

v) Approval of the QAPP.

The CRA QA Officer will be assisted by the data validation staff in the evaluation and validation of field and laboratory generated data. The CRA QA Officer will monitor the performance of the laboratory to ensure that the Data Quality Objectives for the project are met.

2.3 LABORATORY RESPONSIBILITIES

TA's North Canton, Ohio Laboratory (TA - North Canton) will provide laboratory services in support of the RFI Work Plan with support from their facilities in Los Angeles, California (TA - Los Angeles) and Knoxville, Tennessee (TA - Knoxville).

TA Project Manager

The Laboratory Project Manager will report directly to the CRA QA Officer and will be responsible for ensuring all resources of the laboratory are available on an as-required basis. The Laboratory Project Manager will also be responsible for the approval of the final analytical reports and approval of the laboratory's ability to adhere to the QAPP.

TA Operations Manager

The Laboratory Operations Manager will report to the Project Manager and will be responsible for coordinating laboratory analysis, supervising in-house chain-of-custody reports, scheduling sample analyses, overseeing data review, and overseeing preparation of analytical reports

TA QA Officers

The Laboratory QA Officer is responsible for coordination and oversight of the laboratories quality assurance program which includes:

i) Coordinate and oversee laboratory system audits;
ii) Overview of QA/QC documentation;
iii) Conduct detailed data review upon request;
iv) Implement and document laboratory corrective actions, if required;
v) Technical representation of laboratory QA procedures;
vi) Oversee preparation of laboratory SOPs; and
vii) Approval of the QAPP.

TA Sample Receiving Group Leaders

The Laboratory Sample Receiving Group Leader will report to the Laboratory Operations Manager and will be responsible for the following:

i) Receiving and inspecting the incoming sample containers;

ii) Recording the condition of the incoming sample containers;

iii) Signing appropriate documents;

iv) Verifying chain-of-custody and its correctness;

v) Notifying the Project Manager and Operations Manager of sample receipt and inspection;

vi) Assigning a unique identification number and customer number, and entering each into the sample receiving log;

vii) Initiating transfer of samples to lab sections; and

viii) Controlling and monitoring access/storage of samples and extracts.

Laboratory Technical Personnel

The laboratory technical staff will have the primary responsibility in the performance of sample analysis and the execution of the QA procedures developed to determine the data quality. These activities will include the proper preparation and analysis of the project samples in accordance with the contract laboratory's Quality Assurance Manual and associated Standard Operating Procedures.

Data Validation Staff

The data validation staff report to the CRA QA Officer. They will be independent of the laboratory and familiar with the analytical procedures performed. The validation will include a review of each validation criterion as prescribed by the guidelines presented in Section 9.2.2 of this document and be presented in a formal written report for submittal to the CRA Project Manager .

2.4 FIELD RESPONSIBILITIES

CRA Field QA Officer

The Field QA Officer is responsible for the overall operation of the field team and reports directly to the CRA Project Manager. The Field QA Officer works with the project Health & Safety Officer to conduct operations in compliance with the project Health & Safety Plan. The Field QA Officer will facilitate communication and coordinate efforts between the CRA Project Manager/Coordinator and the field team members. Other responsibilities include:

i) Developing and implementing field-related work plans, ensuring schedule compliance, and adhering to management-developed project requirements;

ii) Coordinating and managing field staff, including sampling and drilling;

iii) Performing field system audits;

iv) Overseeing quality control for technical data provided by the field staff;

v) Preparing, and approving of text and graphics required for field team efforts;

vi) Coordinating and overseeing technical efforts of subcontractors assisting the field team;

vii) Identifying problems in the field, resolving difficulties in consultation with the CRA QA Officer and CRA Project Manager, implementing and documenting corrective action procedures;

viii) Approving the QAPP; and

ix) Participating in preparation of the final reports.

Field Team Personnel

Field Team Personnel involved in the RFI will be responsible for:

i) Performance of field activities as detailed in the RFI Work Plan (and subsequent Work Plans) and in compliance with this QAPP; and

ii) Immediately reporting any accidents and/or unsafe conditions to the Site Health & Safety Officer and taking all reasonable precautions to prevent injury.

3.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA

The RFI Work Plan and associated QAPP are designed to produce data of the quality necessary to achieve the project objectives and meet or exceed the minimum standard requirements for field and analytical methods. The overall QA objective for measurement data is to develop and implement procedures for field sampling, chain-of-custody, lab analyses, and reporting that will provide results which are adequate for supporting the RFI objectives and legally defensible in a court of law. The QAPP program will include:

i) A mechanism for ongoing control of measurements and evaluation of data quality.

ii) A measure of data quality in terms of precision, accuracy, representativeness, completeness, and comparability.

The following section is a general discussion of the criteria used to measure the field and laboratory analytical data quality. The laboratory reference data and standard operating procedures (SOPs) provided in Attachments 2 and 3, present the performance criteria for laboratory QC objectives.

3.1 PRECISION

3.1.1 DEFINITION

Precision is defined as a quantitative measure of the degree to which two or more measurements are in agreement. Precision will be stated in terms of relative percent difference (RPD). The overall precision of measurement data is a mixture of sampling and analytical factors. Precision will be determined by collecting and analyzing field duplicate samples and by creating and analyzing laboratory duplicates from one or more of the field samples. The analytical results from the field duplicate samples will provide data on sampling precision. The results from the laboratory created duplicate samples will provide data on analytical precision.

3.1.2 FIELD PRECISION SAMPLE OBJECTIVES

Field precision will be assessed through collection and measurement of field duplicates at a rate of one (1) duplicate per 20 investigative samples with a minimum of one per sampling event..

3.1.3 LABORATORY PRECISION SAMPLE OBJECTIVES

Laboratory duplicate analyses will be performed through the use of matrix spike/matrix spike duplicates (MS/MSD) for all organic and most inorganic parameters and matrix spike/matrix duplicate (MD) analyses for certain inorganic parameters. The analytical data will be presented in summary table format. The precision criteria for laboratory MS/MSD/MD analyses are provided in the laboratory reference data provided in Attachment 3.

3.2 ACCURACY

3.2.1 DEFINITION

Accuracy relates to the bias in a measurement system. Bias is the difference between the observed and the "true" value. Sources of error are the sampling process, field contamination, preservation techniques, sample handling, sample matrix, sample preparation and analytical procedure limitations.

3.2.2 FIELD ACCURACY OBJECTIVES

Sampling bias will be assessed by evaluating the results of field equipment rinsate and trip blanks. Field equipment rinsate and trip blanks will be collected as appropriate for each sampling effort.

Field equipment rinsate blanks will be collected by passing laboratory purified water over and/or through the respective field equipment utilized during each sampling effort. One field equipment rinsate blank will be collected every 20 investigative samples. If dedicated or disposable sampling equipment is used, equipment rinsate samples may not be collected. However, at a minimum, frequency of one equipment rinsate blank sample will be collected

per sampling event. Field rinsate blanks will be analyzed for each target parameter for the respective sampling effort for which environmental media have been collected.

Trip blank samples will be prepared by the laboratory and provided with each cooler that includes aqueous volatile organic compound (VOC) analysis sample containers. Trip blank samples will be analyzed for each VOC for which environmental media have been collected for analysis.

3.2.3 LABORATORY ACCURACY SAMPLE OBJECTIVES

Analytical bias will be assessed through the use of known laboratory control samples and site specific matrix spike sample analyses. Laboratory control samples (LCS) and MS/MSD sample analysis will be performed as prescribed by the analytical method SOPs. LCS analyses will be performed with each analytical batch of project samples to determine the accuracy of the analytical system.

One (1) set of MS/MSD analyses will be performed with each batch of twenty (20) project samples to assess the accuracy of identification and quantification of analytes within the site-specific sample matrices. Additional sample volume will be collected at sample locations selected for MS/MSD analyses so that MDLs and EQLs can be met.

The results of the LCS and MS/MSD analyses will be presented in a summary table reporting format and evaluated versus the acceptance criteria presented in the laboratory analytical reports. Current acceptance criteria are presented in the laboratory reference data provided in Attachment 3.

The accuracy of organic parameter analyses is also monitored through the analysis of system monitoring or surrogate compounds. Surrogate compounds are added to each sample, standard, blank, and QC samples prior to the sample preparation and analysis. Surrogate compound percent recoveries provide information on the effect of the sample matrix on the accuracy of the analyses and are evaluated against the acceptance criteria presented in laboratory analytical reports. Current acceptance criteria are presented in the laboratory reference data provided in Attachment 3.

3.3 REPRESENTATIVENESS

3.3.1 DEFINITION

Representativeness expresses the degree to which sample data accurately and precisely represents a characteristic of a population, a parameter variation at a sampling point, or an environmental condition. Representativeness is a qualitative parameter that is dependent upon the design of the sampling program. The representativeness criterion is satisfied by proper selection of sampling locations and quantity of samples collected.

3.3.2 MEASURES TO ENSURE REPRESENTATIVENESS OF FIELD DATA

Representativeness will be addressed by describing sampling techniques and the rationale used to select sampling locations. Sampling locations may be biased (based on existing data, instrument surveys, observations, etc.) or unbiased (completely random or stratified-random approaches).

For this project, sampling will be biased; that is, sampling associated with the soil and groundwater will be based on the observed presence/absence of site specific contaminants, and/or site knowledge. Specific sampling technique descriptions, which allow consistency, repetitiveness and thus representativeness, are provided as Site-Specific Field Method Guidelines in the RFI Work Plan.

3.3.3 MEASURES TO ENSURE REPRESENTATIVENESS OF LABORATORY DATA

Representativeness in the laboratory is ensured by using proper analytical procedures, and analyzing field duplicate samples. By definition, field duplicate samples are collected to be representative of a given point in space and time. Thus, sample duplicates provide both precision and representativeness information.

3.4 COMPLETENESS

3.4.1 DEFINITION

Completeness is a measure of the amount of valid (usable) data obtained from a measuring system compared to the amount that was expected to be obtained under normal conditions. The completeness goal for all data uses is that a sufficient amount of valid data be generated so that determinations can be made related to the intended data use with a high degree of confidence.

3.4.2 FIELD COMPLETENESS OBJECTIVES

Completeness is a measure of the amount of valid measurements obtained from all measurements taken in this project. Field completeness objective for this project will be 90 percent.

3.4.3 LABORATORY COMPLETENESS OBJECTIVES

Laboratory data completeness objective is a measure of the amount of valid data obtained from all laboratory measurements. The evaluation of the data completeness will be performed at the conclusion of each sampling and analysis effort. Corrective actions such as revised sample handling procedures will be implemented if problems are noted.

The completeness of the data generated will be determined by comparing the amount of valid data, based on independent validation, with the total data set. The completeness objective will be 90 percent.

3.5 COMPARABILITY

3.5.1 DEFINITION

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another.

3.5.2 MEASURES TO ENSURE COMPARABILITY OF FIELD DATA

Sample data should be comparable with other measurement data for similar samples and sample conditions. This goal is achieved through using standard operating procedures to collect, preserve, store, and analyze representative samples and the reporting of analytical results. The Site-Specific Field Method Guidelines for the various activities to be conducted during this investigation provide guidelines to generate reproducible results.

3.5.3 MEASURES TO ENSURE COMPARABILITY OF LABORATORY DATA

Comparability of laboratory data will also be measured with the results from the analysis of reference materials traceable to standards from accredited suppliers for instrument initial and continuing calibration verification. The reported analytical data will be presented in standard units of mass of contaminant within a known volume or mass of environmental media.

i) Solid Matrices - micrograms (µg) contaminant per kilogram (kg) for organic analyses, and milligrams (mg) contaminant per kilogram (kg) for inorganic analyses of media (Dry Weight).

ii) Aqueous Matrices – micrograms (µg) contaminant per liter (L) of media for organic and metals analyses, and milligrams (mg) per liter (L) for inorganic analyses.

iii) Non-Aqueous Phase Liquids – (NAPL) – micrograms (µg) contaminant per kilogram (kg) of media for organic analyses, and milligrams (mg) per kilogram (kg) for inorganic analyses.

iv) Gaseous Matrices – micrograms (µg) contaminant per cubic meter (M^3) of media

Additional guidance on analytical data reporting is contained in the laboratory SOPs.

3.6 DECISION RULES

3.6.1 DEFINITION

The decision rule is a statement that prescribes a course of action or non-action to be taken, based on assumptions to test its logical and empirical consequences.

3.6.2 DECISION RULE OBJECTIVE

The rationale for sample locations, sample number, and analytical parameters is provided in the main text of the RFI Work Plan. The decision rule for the sampling and analysis data collected is also provided in the RFI Work Plan.

3.7 LEVEL OF QUALITY CONTROL EFFORT

Equipment rinsate, trip, and method blanks samples, field duplicate samples, laboratory control and MS/MSD samples will be prepared and analyzed to determine the data quality provided by the sampling and analysis activities conducted during the execution of the RFI program.

Equipment rinsate blanks will be prepared by field personnel and submitted for analysis of target parameters. Equipment rinsate blanks will provide the means to assess the quality of data resulting from the field program. Equipment rinsate blank samples will be analyzed to check for contamination of equipment introduced during sampling at the Site. One equipment rinsate blank will be collected for every 20 investigative samples. However, a minimum of one will be collected each day of sampling activities for each type of non-dedicated or non-disposable equipment.

Trip blanks are used to assess the potential for contamination during sample storage and shipment. The trip blank consists of laboratory purified water (water samples) or methanol (soil samples) provided with the sample containers to be used for the sampling of VOCs. Trip blanks will be preserved and handled in the same manner as the investigation samples. One trip blank will be included along with each shipment cooler containing project samples to be analyzed for VOCs.

Method blank samples will be prepared by the laboratory and analyzed concurrently with all project samples to assess potential contamination introduced during the analytical process.

Field duplicate samples are analyzed to check for sampling and analytical reproducibility. One field duplicate will be collected for every 20 or fewer investigative samples collected with a minimum of one per sampling event..

Matrix spikes will provide information to assess the precision and accuracy of the analysis of the target parameters within the environmental media collected at the Site. Matrix spikes will be performed in duplicate for all TCL/TAL parameters. One MS/MSD will be collected for every 20 or fewer investigative samples per sample matrix (i.e. soil, groundwater). Soil MS/MSD samples require a triple sample volume for VOCs only. Aqueous MS/MSD samples require triple the normal sample volume for VOCs analysis and double the volume for the remaining parameters.

4.0 SAMPLING PROCEDURES

Samples of groundwater, surface water, soil, and sediment will be obtained during the RFI program. The sampling procedures for the RFI will be consistent for the objectives of the project. The RFI Work Plan describes each of the sampling tasks and objectives.

Refer to the RFI Work Plan for the Site-Specific Field Method Guidelines.

4.1 SAMPLE CONTAINERS

Sample containers for each sampling task will be provided by the project laboratory. The containers will be cleaned by the manufacturer to meet or exceed the analyte specifications established in the U.S. EPA, "Specifications and Guidance for Obtaining Contaminant-Free Sample Containers", April 1992, OSWER Directive #9240.0-0.5A. Certificates of analysis for each lot of sample containers used during the RFI will be maintained by the laboratory and will be available upon request.

The appropriate sample containers, preservation method, maximum holding times, and shipping information for each target parameter and sampling task are provided in Table 4.1.

4.2 SAMPLE LABELING

Each sample will be labeled with a unique sample number that will facilitate tracking and cross-referencing of sample information. Field blank and field duplicate samples also will be numbered with a unique sample number to prevent analytical bias of field QC samples.

Refer to the RFI Work Plan for the sample labeling procedures.

4.3 FIELD QC SAMPLE COLLECTION

4.3.1 EQUIPMENT RINSATE BLANK SAMPLE COLLECTION

Equipment rinsate blank samples will be collected when non-dedicated or non-disposable sampling equipment is used to collect samples. Equipment rinsate blanks consist of

laboratory purified water that has been routed through decontaminated sampling equipment and collected into the appropriate containers. The containers will be filled in order of decreasing analyte volatility (i.e., VOCs first, SVOCs second, which are followed by the containers for the remaining analyses).

4.3.2 FIELD DUPLICATE SAMPLE COLLECTION

4.3.2.1 WATER SAMPLES

Field duplicate samples will be collected concurrently with the investigative sample alternating the filling of each sample container.

4.3.2.2 SOIL AND SEDIMENT SAMPLES

Soil and sediment field duplicates will be collected concurrently with the investigative sample.

4.3.3 MS/MSD SAMPLE COLLECTION

MS/MSD sample collection for aqueous samples requires triple the sample volume. The sampling procedure specified in Section 4.3.2.1 is used to collect aqueous samples. Soil MS/MSD samples require triple volume for VOC analyses. No additional volume is required for remaining soil parameters. Section 4.3.2.2 describes the sampling procedures for soil sample collection.

5.0 CUSTODY PROCEDURES

Custody is one of several factors necessary for the admissibility of environmental data as evidence in a court of law. Custody procedures help to satisfy the two major requirements for admissibility: relevance and authenticity. Sample custody is addressed in three parts: field sample collection, laboratory analysis, and final evidence files. Final evidence files, including all originals of laboratory reports, are maintained under document control in a secure area.

Custody of a sample begins when it is collected by or transferred to an individual and ends when that individual relinquishes or disposes of the sample. A sample or evidence file is under your custody if:

1. the item is in actual possession of a person;
2. the item is in the view of the person after being in actual possession of the person;
3. the item was in actual possession but is stored to prevent tampering; or
4. the item is in a designated and identified secure area.

5.1 FIELD CUSTODY PROCEDURES

Field personnel will be required to keep written records of field activities on applicable preprinted field forms or in a bound field notebook. The logbooks provide the means of recording data collecting activities. These records will be written legibly in ink and will contain pertinent field data and observations. Entry errors or changes will be crossed out with a single line, dated and initialed by the person making the correction. Field forms and

TABLE 1.1

SUMMARY OF SAMPLING AND ANALYSIS PROGRAM
RCRA FACILITY INVESTIGATION
WILLOW RUN POWERTRAIN PLANT
YPSILANTI, MICHIGAN

Description	*Sample Matrix*	*Field Parameters*	*Laboratory Parameters*	*Investigative Samples*	*Quality Control Samples (1)*			*Total*
					Field Blanks (2)	*Field Duplicates*	*MS/MSD (3)*	
Soil Investigation	Soil	PID VOC Screen	TCL VOC, TCL SVOC, TCL PCB Site-specific TAL Metals (4), Fractionated Lead, Hexavalent/Trivalent Chromium, Total Cyanide	TBD	1/20	1/20	1/20	(5)
Groundwater Investigation	Groundwater	pH/Temperature, DO, Specific Conductivity, Turbidity, ORP	TCL VOC, TCL SVOC, TCL PCB, Site-specific TAL Metals (4), Hexavalent/Trivalent Chromium, Amenable Cyanide	TBD	1/20	1/20	1/20	(5)
Background Metals	Soil	PID VOC Screen	TAL Metals	TBD	1/20	1/20	1/20	(5)
	Groundwater	pH/Temperature, DO, Specific Conductivity, Turbidity, ORP	TAL Metals	TBD	1/20	1/20	1/20	(5)
NAPL Characterization	NAPL	n/a	TCL VOC, TCL SVOC, TCL PCB, Site-specific TAL Metals (4) Specific gravity, viscosity, Heating Value Flashpoint, Fingerprinting	TBD	--	--	--	TBD
Soil Gas Sampling	Air	None	Site-specific VOC	TBD	0	1/20	1/20	(5)
Ambient Air Sampling	Air	None	Site-specific VOC	TBD	0	1/20	1/20	(5)

TABLE 1.1

SUMMARY OF SAMPLING AND ANALYSIS PROGRAM
RCRA FACILITY INVESTIGATION
WILLOW RUN POWERTRAIN PLANT
YPSILANTI, MICHIGAN

Notes:

(1) - A laboratory trip blank will be submitted with each shipment of aqueous samples for TCL VOC analysis.
(2) - Field equipment blank samples (field blanks) will not be required if dedicated or disposable sampling equipment is used, although a minimum of one field blank will be collected per sampling event.
(3) - Matrix Spike/Matrix Spike duplicate (MS/MSD) analyses are required for samples submitted for organic and inorganic analyses are to be analyzed at a frequency of one per group of twenty (20) or fewer investigative samples.
(4) - Site-specific TAL Metals includes TAL Metals excluding Calcium, Magnesium, Potassium and Sodium.
(5) - The total quantity will vary depending on the number of field blanks collected.

TCL = Target Compound List
TAL = Target Analyte List
VOC = Volatile Organic Compounds
SVOC = Semi-volatile Organic Compounds
PCB = Polychlorinated Biphenyls
DO = Dissolved Oxygen
ORP = Oxidation-Reduction Potential
TBD = To Be Determined

TABLE 1.2

RFI TARGET COMPOUND AND TARGET ANALYTE PARAMETER LIST
RCRA FACILITY INVESTIGATION
WILLOW RUN POWERTRAIN PLANT
YPSILANTI, MICHIGAN

	Estimated Quantitation Limits (EQL) [1]			*Method Detection Limits (MDL)* [2]		
Compound	*Water (µg/L)*	*Soil (µg/kg)*	*NAPL (µg/kg)*	*Water (µg/L)*	*Soil (µg/kg)*	*NAPL (µg/kg)*
Target Compound List (TCL) Volatile Organic Compounds (VOC) [3]						
Acetone	10	600	4,000	1.1	170	170
Benzene	1	40	1,000	0.13	12	12
Bromodichloromethane	1	80	1,000	0.15	9.9	10
Bromoform	1	80	1,000	0.64	19	19
Bromomethane	1	200	2,000	0.41	29	29
2-Butanone	10	600	4,000	0.57	43	43
Carbon disulfide	5	200	1,000	0.13	12	12
Carbon tetrachloride	1	40	1,000	0.13	6.4	6.4
Chlorobenzene	1	40	1,000	0.15	6.4	6.4
Chloroethane	1	200	2,000	0.29	61	61
Chloroform	1	40	1,000	0.16	8.8	8.8
Chloromethane	1	200	2,000	0.3	14	14
Cyclohexane	1	960	2,000	0.12	40	40
Dibromochloromethane	1	40	1,000	0.18	12	12
1,2-Dibromo-3-chloropropane	1	200	1,000	0.67	50	50
1,2-Dibromoethane	1	200	1,000	0.24	10	10
1,2-Dichlorobenzene	1	80	1,000	0.13	8.6	8.6
1,3-Dichlorobenzene	1	80	1,000	0.14	4.8	4.8
1,4-Dichlorobenzene	1	80	1,000	0.13	8	8.0
Dichlorodifluoromethane	1	80	2,000	0.31	16	16
1,1-Dichloroethane	1	40	1,000	0.15	17	17
1,2-Dichloroethane	1	40	1,000	0.22	10	10
1,1-Dichloroethene	1	40	1,000	0.19	18	18
cis-1,2-Dichloroethene	1	40	1,000	0.17	6.9	6.9
trans-1,2-Dichloroethene	1	40	1,000	0.19	9.2	9.2
1,2-Dichloropropane	1	40	1,000	0.18	8.2	8.2
cis-1,3-Dichloropropene	1	40	1,000	0.14	7.9	7.9
trans-1,3-Dichloropropene	1	40	1,000	0.19	20	20
Ethylbenzene	1	40	1,000	0.17	5.4	5.4
2-Hexanone	10	2000	4,000	0.41	20	20
Isopropylbenzene	1	200	1,000	0.13	6.5	6.5
Methyl acetate	10	960	2,000	0.38	25	25
Methylene chloride	5	200	1,000	0.33	77	77
Methylcyclohexane	1	960	1,000	0.13	12	12.0
4-Methyl-2-pentanone	10	2000	4,000	0.32	48	48
Methyl tert-butyl ether	5	200	4,000	0.17	7.1	7.1
Styrene	1	40	1,000	0.11	5.6	5.6
1,1,2,2-Tetrachloroethane	1	40	1,000	0.18	8.9	8.9
Tetrachloroethene	1	40	1,000	0.29	12	12.0

TABLE 1.2

RFI TARGET COMPOUND AND TARGET ANALYTE PARAMETER LIST
RCRA FACILITY INVESTIGATION
WILLOW RUN POWERTRAIN PLANT
YPSILANTI, MICHIGAN

	Estimated Quantitation Limits (EQL) [1]			*Method Detection Limits (MDL)* [2]		
Compound	*Water (µg/L)*	*Soil (µg/kg)*	*NAPL (µg/kg)*	*Water (µg/L)*	*Soil (µg/kg)*	*NAPL (µg/kg)*
TCL VOC (Continued)						
Toluene	1	80	1,000	0.13	17	17
1,2,4-Trichlorobenzene	1	200	1,000	0.15	7.3	7.3
1,1,1-Trichloroethane	1	40	1,000	0.22	21	21
1,1,2-Trichloroethane	1	40	1,000	0.27	12	12
Trichloroethene	1	40	1,000	0.17	9.7	9.7
Trichlorofluoromethane	1	80	2,000	0.21	16	16
1,1,2-Trichloro-1,2,2-trifluoroethane	1	200	2,000	0.28	39	39
Vinyl chloride	1	32	2,000	0.22	18	18
Xylenes (total)	2	120	2,000	0.28	8.1	8.1
TCL Semi-Volatile Organic Compounds (SVOC)						
Acenaphthene	5	264	20,000	0.1	3.3	55
Acenaphthylene	5	264	20,000	0.1	3.3	84
Acetophenone	5	264	20,000	0.34	9.2	330
Anthracene	5	264	20,000	0.1	3.3	138
Atrazine	3	40	20,000	0.34	9.1	660
Benzaldehyde	5	264	20,000	0.39	12	414
Benzo(a)anthracene	1	264	20,000	0.1	3.3	84
Benzo(a)pyrene	1	264	20,000	0.1	3.3	138
Benzo(b)fluoranthene	1	264	20,000	0.1	3.3	138
Benzo(g,h,i)perylene	1	264	20,000	0.1	3.3	108
Benzo(k)fluoranthene	1	264	20,000	0.1	3.3	138
1,1'-Biphenyl	5	264	20,000	0.8	27	432
4-Bromophenylphenyl ether	5	264	20,000	0.8	13	282
Butylbenzylphthalate	5	264	20,000	0.8	10	222
di-n-Butyphthalate	5	264	20,000	0.67	15	300
Caprolactam	10	264	20,000	0.8	37	468
Carbazole	10	264	20,000	0.28	27	558
4-Chloroaniline	5	264	20,000	0.8	17	312
bis(2-Chloroethoxy)methane	5	264	20,000	0.32	22	960
bis(2-Chloroethyl)ether	1	80	20,000	0.1	2	246
2,2'-oxibis(1-Chloropropane)	5	264	20,000	0.4	9.5	312
4-Chloro-3-methylphenol	5	264	20,000	0.8	21	3,060
2-Chloronaphthalene	5	264	20,000	0.1	3.3	378
2-Chlorophenol	5	264	20,000	0.29	27	216
4-Chlorophenyl phenyl ether	10	264	20,000	0.8	13	216
Chrysene	1	264	20,000	0.1	1.1	59
Dibenz(a,h)anthracene	2	264	20,000	0.1	3.3	90

TABLE 1.2

RFI TARGET COMPOUND AND TARGET ANALYTE PARAMETER LIST
RCRA FACILITY INVESTIGATION
WILLOW RUN POWERTRAIN PLANT
YPSILANTI, MICHIGAN

Compound	Estimated Quantitation Limits (EQL) [1] Water (µg/L)	Soil (µg/kg)	NAPL (µg/kg)	Method Detection Limits (MDL) [2] Water (µg/L)	Soil (µg/kg)	NAPL (µg/kg)
TCL Semi-Volatile Organic Compounds (cont'd)						
Dibenzofuran	4	264	20,000	0.1	3.3	50
3,3'-Dichlorobenzidine	1	1,600	96,000	0.37	18	294
2,4-Dichorophenol	10	264	20,000	0.8	20	318
Diethylphthalate	5	264	20,000	0.6	16	372
2,4-Dimethylphenol	5	264	20,000	0.8	20	408
Dimethylphthalate	5	264	20,000	0.29	17	384
4,6-Dinitro-2-methylphenol	20	150	96,000	2.4	80	2,820
2,4-Dinitrophenol	20	150	96,000	2.4	80	2,460
2,4-Dinitrotoluene	5	264	20,000	0.27	27	342
2,6-Dinitrotoluene	5	264	20,000	0.8	21	348
bis(2-Ethylhexyl)phthalate	5	264	20,000	0.8	19	960
Fluoranthene	1	264	20,000	0.1	3.3	56
Fluorene	5	264	20,000	0.1	3.3	78
Hexachlorobenzene	0.2	264	20,000	0.1	2.1	84
Hexachlorobutadiene	1	40	20,000	0.27	27	150
Hexachlorocyclopentadiene	5	264	96,000	0.8	27	174
Hexachloroethane	5	264	20,000	0.8	9	294
Indeno(1,2,3-cd)pyrene	2	264	20,000	0.1	3.3	120
Isophorone	5	264	20,000	0.27	13	210
2-Methylnaphthalene	5	264	20,000	0.1	3.3	59
2-Methylphenol	5	264	20,000	0.8	80	402
4-Methylphenol	5	264	20,000	0.3	20	348
Naphthalene	5	264	20,000	0.1	3.3	53
2-Nitroaniline	20	200	96,000	0.8	9.1	306
3-Nitroaniline	20	200	96,000	0.28	18	192
4-Nitroaniline	20	200	96,000	0.8	26	216
Nitrobenzene	3	264	20,000	0.04	2.2	384
2-Nitrophenol	5	264	20,000	0.28	27	204
4-Nitrophenol	20	330	96,000	2.4	80	4,860
N-Nitroso-di-n-propylamine	5	264	20,000	0.8	27	456
N-Nitrosodiphenylamine	5	264	20,000	0.31	21	246
di-n-Octylphthalate	5	264	20,000	0.8	27	660
Pentachlorophenol	5	150	20,000	2.4	80	2,700
Phenanthrene	2	264	20,000	0.1	3.3	66
Phenol	5	264	20,000	0.6	27	342
Pyrene	5	264	20,000	0.1	3.3	60
2,4,5-Trichlorophenol	5	264	20,000	0.3	25	294
2,4,6-Trichlorophenol	4	264	20,000	0.8	80	408

TABLE 1.2

RFI TARGET COMPOUND AND TARGET ANALYTE PARAMETER LIST
RCRA FACILITY INVESTIGATION
WILLOW RUN POWERTRAIN PLANT
YPSILANTI, MICHIGAN

Compound	Estimated Quantitation Limits (EQL) [1]			Method Detection Limits (MDL) [2]		
	Water (µg/L)	Soil (µg/kg)	NAPL (µg/kg)	Water (µg/L)	Soil (µg/kg)	NAPL (µg/kg)
TCL Polychlorinated Biphenyls (PCB)						
Aroclor 1016	0.1	264	1,000	0.044	21	190
Aroclor 1221	0.1	264	1,000	0.045	16	220
Aroclor 1232	0.1	264	1,000	0.073	14	170
Aroclor 1242	0.1	264	1,000	0.06	13	290
Aroclor 1248	0.1	264	1,000	0.061	17	200
Aroclor 1254	0.1	264	1,000	0.032	17	120
Aroclor 1260	0.1	264	1,000	0.038	17	130

Compound	Estimated Quantitation Limits (EQL) [1]			Method Detection Limits (MDL) [2]		
	Water (µg/L)	Soil (mg/kg)	NAPL (mg/kg)	Water (µg/L)	Soil (mg/kg)	NAPL (mg/kg)
Site-specific TAL Metals						
Aluminum	50	16	20	19	9.6	9.6
Antimony	2	0.16	1	0.13	0.024	0.39
Arsenic	5	0.08	1	0.4	0.062	0.30
Barium	100	0.8	20	0.19	0.071	0.07
Beryllium	1	0.16	0.5	0.2	0.043	0.043
Cadmium	1	0.08	0.2	0.13	0.036	0.036
Chromium	10	0.8	0.5	0.71	0.2	0.20
Cobalt	20	0.4	5	0.058	0.16	0.16
Copper	4	0.8	2.5	0.29	0.74	0.74
Iron	200	8.0	10	26	4.9	4.9
Lead						
Lead, total by determination	3	0.24	0.3	0.18	0.19	0.19
Lead, total by fraction calculation	NA	0.24	NA	NA	0.19	NA
Lead, fine grain fraction	NA	0.24	NA	NA	0.19	NA
Lead, course grain fraction	NA	0.24	NA	NA	0.19	NA
Manganese	50	0.8	1.5	0.83	0.074	0.074
Mercury	0.2	0.04	0.1	0.2	0.015	0.015
Nickel	20	0.8	4	0.12	0.27	0.27
Selenium	5	0.16	0.5	0.57	0.09	0.45
Silver	0.2	0.08	0.5	0.08	0.016	0.10
Thallium	2	0.08	1	0.14	0.013	0.55
Vanadium	4	0.8	5	0.44	0.12	0.12
Zinc	50	0.8	2	2.3	0.2	1.00

TABLE 1.2

RFI TARGET COMPOUND AND TARGET ANALYTE PARAMETER LIST
RCRA FACILITY INVESTIGATION
WILLOW RUN POWERTRAIN PLANT
YPSILANTI, MICHIGAN

	Estimated Quantitation Limits (EQL) [1]			*Method Detection Limits (MDL)* [2]		
Compound	*Water (µg/L)*	*Soil (mg/kg)*	*NAPL (mg/kg)*	*Water (µg/L)*	*Soil (mg/kg)*	*NAPL (mg/kg)*
Additional TAL Metals						
Calcium	1,000	400	NA	22	16	NA
Magnesium	1,000	80	NA	17	5.1	NA
Potassium	1,000	400	NA	8.3	6.2	NA
Sodium	1,000	80.0	NA	6.9	66	NA
Additional Parameters						
Cyanide (amenable)	10	NA	NA	5	NA	NA
Cyanide (total)	NA	0.5	0.5	NA	0.1	0.1
Hexavalent chromium	20	0.8	NA	5	0.2	0.2
pH	NA	NA	NA	NA	NA	NA
Hardness	5,000	NA	NA	2800	NA	NA
Specific Gravity	NA	NA	0.01 g/cm^3	NA	NA	NA
Viscosity	NA	NA	0.20 cSt	NA	NA	NA
Heating Value	NA	NA	360 BTU/lb	NA	NA	NA
Petroleum Fingerprinting	NA	NA	NA	NA	NA	NA

Notes:

[1] - Please note that these are estimated quantitation limits and are presented for guidance only. Actual quantitation limits are highly matrix dependent and may be elevated due to matrix effects, QA/QC problems and high concentrations of target and non-target analytes.

[2] - Method Detection Limits (MDL) are also presented for guidance only. Actual MDLs will vary depending on sample specific preparation factors. The MDLs are also highly matrix dependant and may be elevated due to matrix effects, QA/QC problems and high concentrations of target and non-target analytes. Laboratory MDLs are updated on a periodic basis and the MDLs in effect when the samples are analyzed will be used for reporting purposes.

[3] - U.S. EPA Contract Laboratory Program, "Statement of Work for Organic Analysis, Multi-Media, Multi-Concentration", OLM4.2, May 1999 Target Compound List.

NA - Not Applicable

TABLE 1.3

AIR MONITORING PARAMETER LIST
RCRA FACILITY INVESTIGATION
WILLOW RUN POWERTRAIN PLANT
YPSILANTI, MICHIGAN

Compound	*Estimated Quantitation Limits (EQL)* [1]		*Method Detection Limits (MDL)* [2]	
	Low Level ($\mu g/M^3$)	*Medium Level* ($\mu g/M^3$)	*Low Level* ($\mu g/M^3$)	*Medium Level* ($\mu g/M^3$)
Site-Specific Volatile Organic Compounds (VOC)				
Acetone	1.90	23.8	0.71	9.50
Benzene	0.96	12.8	0.48	6.39
Bromodichloromethane	2.01	26.8	1.01	13.4
Bromoform	4.13	41.3	2.07	20.7
Bromomethane	3.11	15.5	0.78	7.77
2-Butanone (MEK)	2.36	29.5	1.18	11.8
Carbon disulfide	2.49	31.1	0.62	6.23
Carbon tetrachloride	5.03	62.9	1.57	25.2
Chlorobenzene	1.38	18.4	0.46	9.21
Dibromochloromethane	3.41	34.1	0.85	17.0
Chloroethane	2.11	10.6	0.53	5.28
Chloroform	1.46	19.5	0.49	9.77
Chloromethane	1.65	8.3	0.41	4.13
1,2-Dibromoethane (EDB)	6.15	30.7	1.54	15.4
1,2-Dichlorobenzene	2.40	24.0	0.90	12.0
1,3-Dichlorobenzene	2.40	24.0	0.90	12.0
1,4-Dichlorobenzene	2.40	24.0	0.90	12.0
Dichlorodifluoromethane	1.98	19.8	0.74	9.89
1,1-Dichloroethane	1.21	16.2	0.61	8.09
1,2-Dichloroethane	3.24	16.2	1.21	8.09
cis-1,2-Dichloroethene	1.59	15.9	0.79	7.93
trans-1,2-Dichloroethene	1.59	15.9	0.79	7.93
1,1-Dichloroethene	3.17	15.9	0.79	7.93
1,2-Dichloropropane	1.85	23.1	0.92	9.24
cis-1,3-Dichloropropene	1.82	22.7	0.91	9.08
trans-1,3-Dichloropropene	1.82	45.4	0.91	18.2
Ethylbenzene	1.74	17.4	0.65	8.68
2-Hexanone	1.64	41.0	1.02	8.19
Methylene chloride	1.39	13.9	0.69	6.95
4-Methyl-2-pentanone (MIBK)	1.64	41.0	0.82	8.19
Styrene	1.70	17.0	0.85	8.52
Tetrachloroethene	2.71	27.1	1.36	13.6
Toluene	1.51	15.1	0.75	7.54
1,2,4-Trichlorobenzene	18.6	37.1	7.42	18.6
1,1,1-Trichloroethane	1.64	21.8	0.82	10.9
1,1,2-Trichloroethane	2.18	21.8	1.09	10.9
Trichloroethene	2.15	21.5	1.07	10.7
Trichlorofluoromethane	2.25	22.5	0.84	11.2

TABLE 1.3

AIR MONITORING PARAMETER LIST
RCRA FACILITY INVESTIGATION
WILLOW RUN POWERTRAIN PLANT
YPSILANTI, MICHIGAN

Compound	*Estimated Quantitation Limits (EQL)* [1]		*Method Detection Limits (MDL)* [2]	
	Low Level ($\mu g/M^3$)	*Medium Level* ($\mu g/M^3$)	*Low Level* ($\mu g/M^3$)	*Medium Level* ($\mu g/M^3$)
Site-Specific VOC (Continued)				
1,1,2-Trichloro-1,2,2-trifluoroethane	3.07	30.7	1.53	15.3
Vinyl chloride	0.51	10.2	0.26	5.11
Xylenes (total)	5.21	34.7	1.84	17.4

Notes:

[1] - Please note that these are estimated quantitation limits and are presented for guidance only. Actual quantitation limits are highly matrix dependent and may be elevated due to matrix effects, QA/QC problems and high concentrations of target and non-target analytes.

[2] - Method Detection Limits (MDL) are also presented for guidance only. Actual MDLs will vary depending on sample specific preparation factors. The MDLs are also highly matrix dependant and may be elevated due to matrix effects, QA/QC problems and high concentrations of target and non-target analytes. Laboratory MDLs are updated on a periodic basis and the MDLs in effect when the samples are analyzed will be used for reporting purposes.

TABLE 4.1

CONTAINER, PRESERVATION, SHIPPING AND PACKAGING REQUIREMENTS
RCRA FACILITY INVESTIGATION
WILLOW RUN POWERTRAIN PLANT
YPSILANTI, MICHIGAN

Analyses	*Sample Containers* [1]	*Preservation*	*Maximum Holding Time from Sample Collection* [2]	*Volume of Sample*	*Shipping*	*Normal Packaging*
WATER (Groundwater)						
VOC	Three 40 mL teflon-lined septum vials per analysis	HCl to pH < 2 Iced, 4 ± 2° C	14 days for analysis	Fill completely, no air bubbles	Overnight or Hand Deliver	Foam Liner or Bubble-wrap
SVOC, PCB	Two 1 liter amber glass bottles per analysis	Iced, 4 ± 2° C	7 days for extraction 40 days after extraction for analysis	Fill to neck of bottle	Overnight or Hand Deliver	Foam Liner or Bubble-wrap
Metals	One 1 liter plastic bottle	HNO_3 to pH < 2 Iced, 4 ± 2° C	180 days (mercury-28 days) for analysis	Fill to neck of bottle	Overnight or Hand Deliver	Foam Liner or Bubble-wrap
Cyanide (amenable)	One 500 ml plastic bottle	NaOH to pH>12 Iced, 4 ± 2° C	14 days for analysis	Fill to neck of bottle	Overnight or Hand Deliver	Foam Liner or Bubble-wrap
Hexavalent Chromium, pH	One 250 ml plastic bottle	Iced, 4 ± 2° C	24 hours for analysis	Fill to neck of bottle	Overnight or Hand Deliver	Foam Liner or Bubble-wrap
SOLID (Soil/Sediment)						
VOC	One 40 ml Teflon-lined septum vial[3]	10 ml methanol, Iced, 4 ± 2° C	14 days for analysis	10 g soil	Overnight or Hand Deliver	Foam Liner or Bubble-wrap
SVOC, PCB	One 4-ounce glass jar per analysis	Iced, 4 ± 2° C	14 days for extraction 40 days after extraction for analysis	Fill to shoulder of jar	Overnight or Hand Deliver	Foam Liner or Bubble-wrap

TABLE 4.1

CONTAINER, PRESERVATION, SHIPPING AND PACKAGING REQUIREMENTS
RCRA FACILITY INVESTIGATION
WILLOW RUN POWERTRAIN PLANT
YPSILANTI, MICHIGAN

Analyses	*Sample Containers* [1]	*Preservation*	*Maximum Holding Time from Sample Collection* [2]	*Volume of Sample*	*Shipping*	*Normal Packaging*
SOLID (Soil/Sediment) (Cont'd)						
Metals	One 4-ounce glass jar	Iced, 4 ± 2° C	180 days (mercury 28 days) for analysis	Fill to shoulder of jar	Overnight or Hand Deliver	Foam Liner or Bubble-wrap
Hexavalent Chromium	One 4-ounce glass jar	Iced, 4 ± 2° C	30 days for extraction 24 hours for analysis	Fill to shoulder of jar	Overnight or Hand Deliver	Foam Liner or Bubble-wrap
Cyanide (total)	One 4-ounce glass jar	Iced, 4 ± 2° C	14 days for analysis	Fill to shoulder of jar	Overnight or Hand Deliver	Foam Liner or Bubble-wrap
LIQUID (LNAPL/DNAPL)						
VOC	One 4-ounce glass jar	Iced, 4 ± 2° C	14 days for analysis	10 g soil 5 g soil each	Overnight or Hand Deliver	Foam Liner or Bubble-wrap
SVOC, PCB	One 4-ounce glass jar	Iced, 4 ± 2° C	14 days for extraction 40 days after extraction for analysis	Fill to shoulder of jar	Overnight or Hand Deliver	Foam Liner or Bubble-wrap
Metals	One 4-ounce glass jar	Iced, 4 ± 2° C	180 days (mercury 28 days) for analysis	Fill to shoulder of jar	Overnight or Hand Deliver	Foam Liner or Bubble-wrap
Hydrocarbon Fuel Scan	One 4-ounce glass jar	Iced, 4 ± 2° C	14 days for extraction 40 days after extraction for analysis	Fill to shoulder of jar	Overnight or Hand Deliver	Foam Liner or Bubble-wrap

TABLE 4.1

CONTAINER, PRESERVATION, SHIPPING AND PACKAGING REQUIREMENTS
RCRA FACILITY INVESTIGATION
WILLOW RUN POWERTRAIN PLANT
YPSILANTI, MICHIGAN

Analyses	*Sample Containers* [1]	*Preservation*	*Maximum Holding Time from Sample Collection* [2]	*Volume of Sample*	*Shipping*	*Normal Packaging*
LIQUID (LNAPL/DNAPL) (Cont'd)						
Specific gravity	One 4-ounce glass jar	Iced, 4 ± 2° C	28 days for analysis	Fill to shoulder of jar	Overnight or Hand Deliver	Foam Liner or Bubble-wrap
Viscosity	One 4-ounce glass jar	Iced, 4 ± 2° C	28 days for analysis	Fill to shoulder of jar	Overnight or Hand Deliver	Foam Liner or Bubble-wrap
Heating Value, BTU	One 4-ounce glass jar	Iced, 4 ± 2° C	28 days for analysis	Fill to shoulder of jar	Overnight or Hand Deliver	Foam Liner or Bubble-wrap
AIR (Soil Gas, Ambient Air)						
VOC (medium level)	One 1-L Tedlar Bag	None	72 hours for analysis	Fill Tedlar Bag 75 - 85% full	Overnight or Hand Deliver	Double Bag
VOC (low level)	One 6-L Summa Canister	None	14 days for analysis	Fill canister maintaining slight negative pressure	Overnight or Hand Deliver	Cardboard Shipper

Notes:

[1] - Multiple parameters on a single sample may be combined into one single 16 ounce glass jar.

[2] - These are technical holding times, i.e., are based on time elapsed from time of sample collection.

[3] - Soil VOC samples will require in addition to the EnCore an additional container of sample for dry weight determination if no other analyses are required. Sediment samples if non-cohesive, may require standard bulk sampling techniques using a 4 ounce glass jar with no head space.

TABLE 7.1

SUMMARY OF ANALYTICAL METHODS
RCRA FACILITY INVESTIGATION
WILLOW RUN POWERTRAIN PLANT
YPSILANTI, MICHIGAN

Parameter[1]	*Preparation Method*[2]	*Laboratory Preparation SOP*	*Analytical Method*[2]	*Laboratory Analytical SOP*
Groundwater and Surface Water Samples				
VOC	SW-846 5030B	NC-MS-019	SW-846 8260B	NC-MS-019
SVOC	SW-846 3520C	NC-OP-038	SW-846 8270C	NC-MS-018
PCB	SW-846 3500C	NC-OP-038	SW-846 8082	NC-GC-038
Metals[3]				
ICP/MS Metals	SW-846 3010A/3020A	NC-IP-011	SW-846 6020	NC-MT-0002
Mercury	SW-846 7470A	NC-MT-014	SW-846 7470A	NC-MT-014
Cyanide (Amenable)	SW-846 9012A	NC-WC-0032	SW-846 9012A	NC-WC-0031
Hexavalent Chromium	SW-846 7196A	NC-WC-0024	SW-846 7196A	NC-WC-0024
Trivalent Chromium	Calculation	NC-WC-0024	SW-846 7196A	NC-WC-0024
Soil, Sediment and Sludge Samples				
VOC	SW-846 5035[4]	NC-MS-019	SW-846 8260B	NC-MS-019
SVOC	SW-846 3550B	NC-OP-039	SW-846 8270C	NC-MS-018
PCB	SW-846 3550B	NC-OP-039	SW-846 8082	NC-GC-038
Metals[3]				
ICP Metals	SW-846 3050B	NC-IP-010	SW-846 6010B	NC-MT-012
ICP/MS Metals	SW-846 3050B	NC-IP-010	SW-846 6020	NC-MT-0002
Mercury	SW-846 7471A	NC-MT-001	SW-846 7471A	NC-MT-001
Coarse/Fine Lead	MDEQ SOP	MDEQ SOP	SW-846 6010B	NC-MT-012
Cyanide (Total)	SW-846 9012A	NC-WC-0032	SW-846 9012A	NC-WC-0031
Hexavalent Chromium	SW-846 3060	NC-WC-0086	SW-846 7196A	NC-WC-0024
Trivalent Chromium	Calculation	NC-WC-0024	SW-846 7196A	NC-WC-0024
NAPL Characterization				
VOC	SW-846 5030B-H	NC-MS-019	SW-846 8260B	NC-MS-019
SVOC	SW-846 3580A	NC-OP-039	SW-846 8270C	NC-MS-018
PCB	SW-846 3580A	NC-OP-039	SW-846 8082	NC-GC-038
Metals[3]				
ICP Metals	SW-846 3050B	NC-IP-010	SW-846 6010B	NC-MT-012
Mercury	SW-846 7471A	NC-MT-014	SW-846 7471A	NC-MT-014
Cyanide (Total)	SW-846 9012A	NC-WC-0032	SW-846 9012A	NC-WC-0031
Petroleum Fingerprinting		NC-OP-024	SW-846 8015	NC-GC-038
Specific gravity (TA Knoxville))		NA	ASTM D1475	KNOX-WC-0015
Viscosity (TA Knoxville)		NA	ASTM D445	KNOX-WC-0011
Heating Value (BTU), (TA Knoxville)		NA	ASTM D240	KNOX-WC-0010

TABLE 7.1

SUMMARY OF ANALYTICAL METHODS
RCRA FACILITY INVESTIGATION
WILLOW RUN POWERTRAIN PLANT
YPSILANTI, MICHIGAN

Parameter[1]	*Preparation Method*[2]	*Laboratory Preparation SOP*	*Analytical Method*[2]	*Laboratory Analytical SOP*
Air Samples - Medium Level				
VOC (TA-Los Angeles)	EPA-AA TO-14/TO-15	LA-MSA-014	EPA-AA TO-14/TO-15	LA-MSA-014
Air Samples - Low Level				
VOC (TA-Los Angeles)	EPA-AA TO-15	LA-MSA-015	EPA-AA TO-15	LA-MSA-015

Notes:

1 Refer to Tables 1.2 for the compounds/elements of each parameter group.

2 Preperation and Analytical Method References:
- SW-846 - "Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods ", SW-846, 3rd Edition, and Promulgated Updates, November 1986.
- EPA-WW - "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, March 1983.
- SM - "Standard Methods for the Examination of Water and Wastewater", APHA, AWWA, & WEF, 19the Edition, 1995.
- EPA-AA - "
- EPA SOP RSK 175 -

3 Metals by Method

Water:	All by ICP/MS (except Mercury)
Soil ICP:	Barium, Beryllium, Cadmium, Chromium, Cobalt, Lead, Manganese, Nickel, Selenium, Vanadium.
Soil ICP/MS:	Arsenic, Antimony, Selenium, Silver, Thallium, and Zinc.
Waste/NAPL:	All by ICP (except Mercury)

4 Sediment and sludge samples may be collected as bulk samples which will be prepared in accordance with SW-846 Method 5030B.

VOC = Volatile Organic Compounds
SVOC = Semi-Volatile Organic Compounds
PCB = Polychlorinated Biphenyls
NAPL = Non-aqueous Phase Liquid
NA - Not Applicable