



Ford Motor Company

Area C Investigation Work Plan

Twin Cities Assembly Plant
St. Paul, Minnesota



A handwritten signature in black ink, appearing to read "Kris Hinskey".

Kris Hinskey
Associate Project Manager

A handwritten signature in black ink, appearing to read "Ryan Oesterreich".

Ryan Oesterreich
Project Engineer, PE, PG

Area C Investigation Work Plan

Twin Cities Assembly Plant
966 South Mississippi Boulevard
St. Paul, Minnesota 55166

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1. Introduction

On behalf of Ford Motor Company (Ford), ARCADIS has prepared this *Area C Investigation Work Plan* (Work Plan) for the Twin Cities Assembly Plant (TCAP; Site) in accordance with the requirements of the Minnesota Pollution Control Agency (MPCA) Voluntary Investigation and Cleanup (VIC) Program. ARCADIS requests approval of this Work Plan from the VIC Program. Area C is located adjacent to the former manufacturing parcel at the base of a bluff west of South Mississippi River Boulevard, and south of the Site's steam plant. The property location and layout are depicted on Figure 1.

Existing historical data that has been collected for Area C was summarized in the *Area C – Comprehensive Site History and Investigation Report* (ARCADIS 2014) and submitted to the MPCA in April 2014. Following MPCA review, the MPCA submitted an October 14, 2014 letter to Ford requesting additional investigation work at Area C to improve delineation and characterization of the industrial waste and to evaluate potential exposure pathways, if any.

This Work Plan describes the investigation work that will be completed to meet those objectives. The investigation work described in further detail below includes vertical borings with soil and groundwater sampling, test trenching, monitoring well installation and surficial soil sampling.

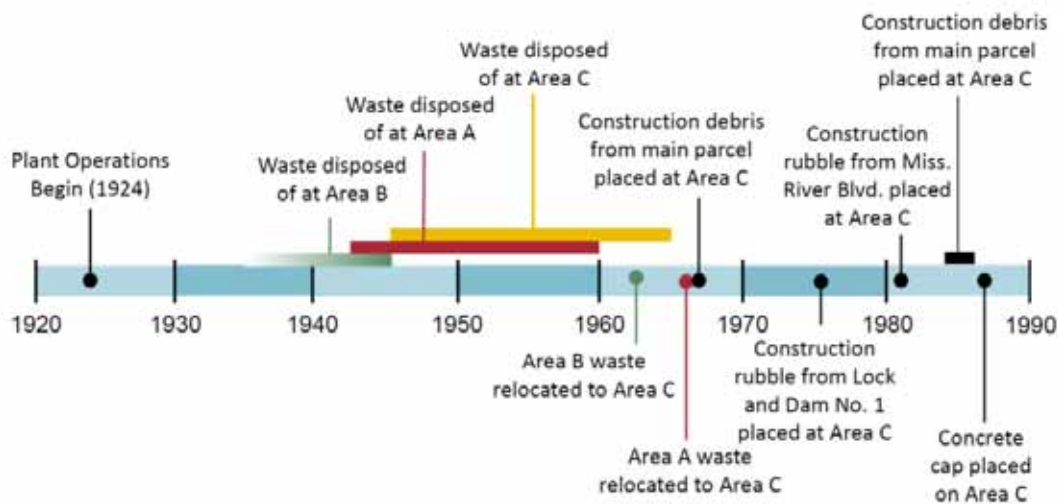
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2. Disposal History

The sections below summarize the site history and historical disposal practices that occurred in Area C and on the main parcel located east of Mississippi River Boulevard as they relate to Area C. Additional detail regarding the disposal history at Area C is included in the *Area C – Comprehensive Site History and Investigation Report* (ARCADIS 2014). A timeline of disposal activities is shown below:



A more detailed summary of the disposal practices at each area are included below:

2.1 Disposal Area Summary

Area A was used as an industrial waste disposal site from 1943 until 1960 and was located at the south end of the former test track east of the main assembly plant. The exact dates and quantities of the disposal events are not known. Based on a file and aerial photo review, a railroad track expansion project required Area A and a portion of the former test track to be excavated. The excavated materials were deposited onto Area C in 1966.

Area B was used for burning waste and burial of industrial waste during plant operations until 1945, and was located approximately 800 feet south and east of the main assembly building. Buried waste included non-combustible materials such as scrap steel, bricks, concrete block and other solid materials. The exact dates and

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quantities of these burning and burial events are not known. Excavated materials from Area B were deposited onto Area C during construction of a parking lot expansion in 1962.

From approximately 1945 to 1966 Area C was used as a disposal area for industrial waste, such as construction rubble, paint sludge, and old paints and solvents generated at the Site. Additionally, as noted above, excavated materials from Areas A and B, were deposited in Area C in 1966 and 1962, respectively. Disposal of industrial wastes at the Site was discontinued in 1966. The total thickness of this waste is anticipated to be approximately 25 feet.

After placement of the industrial waste described above the following fill activities on non-industrial waste have occurred over and around Area C: The total thickness of the non-industrial waste overlying Area C is anticipated to be 30 to 60 feet.

- 1965 to 1967 - Ford placed an unknown volume of construction debris (concrete and soil).
- 1975 - The United States Army Corps of Engineers (USACE) deposited rubble between the Site and the Mississippi River during reconstruction of Lock and Dam No. 1 near the "Ford Bridge.
- 1981 - Al Johnson Construction Company General Contractors, placed approximately 19,000 cubic yards (CY) of concrete, 10,000 CY of sandstone and approximately 18,000 CY of sand generated as part of the Ford Lock Rehabilitation project.
- 1984 to 1986 - Ford placed an unknown volume of debris and excavated soil from construction of the Paint Building on the Main Assembly Plant parcel.
- 1985 to 1987 - The site was covered with an 8-inch concrete cap.

2.2 Suspected Waste Composition

Based on the historical descriptions above, the materials in the industrial waste that were deposited at Area C includes paint waste, solidified paint sludge, scrap steel, brick, concrete block, wood chunks and contaminated soil.

The primary contaminants of concern associated with these materials include metals (e.g., lead, cobalt, cadmium, manganese, chromium) and non-chlorinated solvents (e.g., toluene, methylethyl ketone, methyl isobutyl ketone, xylene) that are historically associated with paint and painting processes. Metals and non-chlorinated solvents are consistent with compounds that have been detected historically during sampling



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activities at Areas A, B and C (ARCADIS 2014). In addition to these primary contaminants of concern the investigation detailed below will include analytical data for an extensive list of volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), metals, gasoline range organics (GRO), diesel range organics (DRO) and, as warranted, polychlorinated biphenyls (PCBs). Additional detail on the analyses that will be run on the samples collected from Area C is included below and in Appendix A.

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3. Area C Investigation Activities

The following sections describe the various components of the investigation activities that will be completed at Area C as well as the objectives of each component.

3.1 Waste Delineation Soil Borings

Vertical soil borings through the Area C fill material will be completed using a drill rig and Rotosonic drilling techniques. The objective of these borings is to verify the lateral and vertical footprint of the industrial waste placed at Area C and to collect waste characterization samples from various intervals of the fill that represent the different areas of disposal described above.

3.1.1 Scope of Work

Historical reports completed in 1982 and 1990 showed two different extents of industrial waste completed in Area C. These suspected limits of the industrial waste are shown on Figure 2. Three preliminary borings will be completed at the locations shown on Figure 2 with the objective of determining which of the disposal limits are likely the most accurate. Four supplemental soil borings are shown on Figure 2; however, the final location of these supplemental soil borings may be adjusted in the field so that they evenly cover the suspected extent of industrial waste. The distribution of borings will be limited to the paved parking area overlying Area C, which will provide a stable working area for the drill rig. MPCA staff present during the investigation will be consulted prior to moving borings from the locations shown on Figure 2.

During drilling, industrial waste will be defined as paint sludge or other non-soil materials, drums or soil with elevated PID readings or visual staining similar to what was observed during the previous test trench activities. Soil samples will be collected from various vertical intervals throughout the soil borings to characterize the vertical distribution of industrial waste and potential contaminant impacts.

3.1.2 Methodology

Rotosonic drilling will allow for continuous soil core collection. Each boring will be logged continuously by an ARCADIS field geologist and screened using a Photoionization Detector (PID) with an 11.7 electron volt (eV) lamp that has been calibrated at least twice a day. Soil boring logs will be created in the field and material encountered for each borehole will be logged using the United Soil Classification

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System (USCS). The total depth of borings will be limited to the depth of the fill material in Area C which is approximately 60 to 70 ft bgs plus up to five feet into the native soil underlying the fill. Borings will only be extended beyond that five foot limit if field observations (e.g., elevated PID readings, visual staining) suggest impacts may continue deeper. If borings are extended, they will be continued until the field observations indicate impacts are no longer present or until groundwater is encountered. Borings will not be extended into bedrock, if encountered.

3.1.3 Well Installation

As discussed in the section above, borings that pass through the industrial waste will not be extended to groundwater unless visual staining or PID screening indicates impacts extend beyond the base of the fill and into the groundwater. The intent of stopping at the base of the industrial waste is to avoid creating a preferential pathway for vertical migration of impacts into areas that are not currently impacted. If field observations indicate impacts do continue into the saturated zone and borings are extended until groundwater is encountered, a permanent groundwater well will be installed at that location. Casing will be installed to isolate the industrial waste and prevent vertical migration of impacts along the well column. Monitoring wells will be completed using 10 foot long, two-inch diameter, 0.10 slot well screens with two inch risers to the surface. The well screen will be installed such that approximately seven feet of screen will be exposed in the saturated zone and three feet of screen will be exposed in the unsaturated zone. Screened depth may be adjusted based on the current water level versus the expected range of fluctuation. The screen will be surrounded by a sand filter pack to approximately two feet above the top of screen. The remainder of the annular space will be filled with a bentonite seal up to the surface. Flush mount well vaults will be installed at the surface. The wells will be developed and permitted in accordance with Minnesota Department of Health (MDH) requirements.

3.1.4 Analytical Sampling

Soil samples will be collected at each boring location based on observations made during the soil logging. Soil samples will be focused on the intervals containing indications of industrial waste, on intervals with the highest PID readings, intervals with visual staining and intervals containing non-soil materials (i.e., metal that could be indicative of drums or other industrial waste). Additionally, if native soil is encountered at the end of a boring, a soil sample of the native soil will be collected. If impacts appear to extend into the native soil, the native soil will be sampled using the same criteria described above. At a minimum, each soil sample will be analyzed for:

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- Minnesota (MN) List VOCs and toxicity characteristic leaching procedure (TCLP) VOCs using USEPA Method 8260 and 1311,
- Target Compound List (TCL) SVOCs and TCLP SVOCs using USEPA Method 8270 and 1311,
- Target Analyte List (TAL) metals and TCLP metals using USEPA Method 6010 and 1311, and
- GRO and DRO using the WI Modified Method.

A list of the analytes included with each of the methods is included as Appendix A. The Minnesota List of VOCs includes all the non-chlorinated solvents historically associated with paint processes (e.g., toluene, xylenes, ketones) as well as many other VOCs including chlorinated solvents. The TAL metals list is the most extensive list of metals analyses available and includes all the metals that have historically been identified at Area C or on the main parcel in Area A and B. All TAL metals samples will include speciation for hexavalent and trivalent chromium. In addition to those analytical samples, each interval with indications of industrial waste will be analyzed in the field using a petroleum sheen test (in accordance with MPCA Petroleum Remediation Program Guidance 4-04) and a solvent non-aqueous phase liquid (NAPL) test kit (e.g., Oil-in-Soil test kits) to identify petroleum or solvent based NAPLs.

If there are indications of oily waste present in the boring, a sample will also be collected for polychlorinated biphenyl (PCB) analysis using USEPA Method 8082. Additionally, soil cores will be inspected for the presence of asbestos containing materials (ACM) and sampling and positive identification will be completed as needed.

It is anticipated that up to five samples will be collected per boring, but the final number of samples will be determined based on field observations. Soil samples will be collected in laboratory supplied containers and placed on ice for shipment to the laboratory following standard chain-of-custody procedures.

3.1.5 Boring Abandonment

All boreholes will be sealed in accordance with MDH Guidelines and a Borehole Sealing Record will be prepared.

3.2 Test Trenches

Test trenches will be completed on the south side of Area C to supplement the test pit work that was completed in 1988 (Figure 2). Additional details on the historical test pit

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investigation are included in the *Area C – Comprehensive Site History and Investigation Report* (ARCADIS 2014).

3.2.1 Scope of Work

During the 1988 investigation, two test pits (TP-3 and TP-8) were observed to contain gray-black stained soil and a paint-like odor (CRA 1988). Those two test pits were completed near the toe of the southern slope of Area C at approximate elevations of 708 and 720 feet above mean sea level (ft amsl) respectively. Based on the contours shown on Figure 2, the base of the Area C fill is between approximately 704 and 710 ft amsl. Five test trenches will be completed along the southern boundary of Area C where the toe of the slope is accessible to small equipment and historical drawings show industrial waste near the toe of the slope. Locations of the proposed test trenches are shown on Figure 2. Supplemental test trenches may be installed based on the results of the initial test trenches to continue the investigation or to laterally delineate the extent of industrial waste between the initial trenches. Industrial waste will be defined as paint sludge or other non-soil materials, drums or soil with elevated PID readings or visual staining similar to what was observed during the previous test trench activities. MPCA staff present during the investigation will be consulted prior to selecting locations for additional trenches.

3.2.2 Methodology

Access for small equipment to the southern portion of Area C may need to pass through Hidden Falls State Park so appropriate access agreements would be required to be in place prior to beginning any test trench work. Test trenches will be completed using a rubber-tire backhoe or mini-excavator. Brush and small trees will be cleared for accessing and digging each test trench and to provide a stable working platform for the backhoe. Trenches will be excavated perpendicular to the slope of Area C starting at approximately 720 ft amsl and moving down the slope. Trenches will be extended laterally beyond the toe of the Area C slope until native materials are encountered and vertically based on equipment limitations, access and sidewall stability (assumed minimum of 10 feet ft bgs). Excavated soil will be placed as close as possible to the test trench. If visual/olfactory indications of contamination are present or debris other than concrete and structural metal (e.g., I-beams or rebar) is encountered, the soil will be placed on sheets of polyethylene. This impacted soil will be placed into the trench at the same elevation it was encountered during backfilling and covered. Excavated soil will be observed, logged and screened by an ARCADIS geologist using the USCS classification system and a PID with an 11.7 eV lamp.

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3.2.3 Analytical Sampling

Soil samples will be collected at each test trench location where visual staining, PID readings greater than 10 parts per million (ppm), or other indication of industrial waste is observed. Samples will be collected directly from the bucket of the backhoe. At a minimum, each soil sample will be analyzed for

- MN List VOCs and TCLP VOCs using USEPA Method 8260 and 1311,
- TCL SVOCs and TCLP SVOCs using USEPA Method 8270 and 1311,
- TAL metals and TCLP metals using USEPA Method 6010 and 1311, and
- GRO and DRO using the WI Modified Method.

A list of the analytes included with each of the methods is included as Appendix A. All TAL metals samples will include speciation for hexavalent and trivalent chromium. In addition to those analytical samples, each area where industrial waste is detected will be analyzed in the field using a petroleum sheen test (in accordance with MPCA Petroleum Remediation Program Guidance 4-04) and a NAPL test kit (e.g., Oil-in-Soil test kits) to identify petroleum or solvent based NAPLS. If there are indications of oily waste present in the boring, a sample will also be collected for PCB analysis using USEPA Method 8082. Additionally, soil cores will be inspected for the presence of ACM and sampling and positive identification will be completed as needed.

It is anticipated that a single soil sample will be collected at each test trench with evidence of industrial waste; however, if the fill has variable composition additional samples will be collected.

Soil samples will be collected in laboratory supplied containers and placed on ice pending shipment to the laboratory. Following standard chain-of-custody procedures, all samples will be submitted to a designated laboratory for analysis.

3.3 Monitoring Well Installation

Five new monitoring wells will be installed at the locations shown on Figure 2. The objective of these new monitoring wells is to improve the monitoring well network around Area C to ensure that groundwater quality is adequately monitored.

3.3.1 Scope of Work

Wells will be installed around the northwest, west and southern perimeters of Area C to provide monitoring well coverage in all accessible directions. No wells can be installed

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east of Area C because, as discussed in the *Area C – Comprehensive Site History and Investigation Report* (ARCADIS 2014), the sandstone bedrock rises sharply to the east forming the bedrock bluff that is present directly adjacent to Area C and there is no saturated interval in the unconsolidated overburden. New monitoring wells will be installed in the upper most saturated zone at similar vertical intervals to AMW-19 and AMW-20. If sufficient unconsolidated saturated thickness is present (greater than 15 feet of thickness), a nested well pair will be installed at AMW-22, AMW-23 and AMW-25 to provide additional hydrogeologic information and to characterize water quality at the base of the unconsolidated aquifer (bedrock interface).

3.3.2 Methodology

Boreholes will be drilled using either a nominal 4.25-inch inner diameter hollow stem auger (HSA) or the same Rotasonic drilling methods as described above. Soil will be logged by an ARCADIS geologist using the USCS soil classification system and screened using a PID with an 11.7 eV lamp. Groundwater elevations during recent sampling events completed in the summer and fall of 2014 indicate the groundwater elevation at AMW-19 and AMW-20 varied between approximately 689 ft amsl and 698 ft amsl. Groundwater elevations at the new monitoring well locations are expected to fluctuate over a similar range. Anticipated well construction details are shown on Table 1, however, these are subject to slight variation based on observations made during installation by the field geologist.

Water table monitoring wells will be completed using 10-foot long screens. If deeper nested wells are installed at any location, those wells will be installed with 5-foot long screens. All wells will be constructed of two-inch diameter, 0.10 machine slot PVC well screens with two-inch PVC risers to the surface. The screen will be surrounded by a sand filter pack to approximately two feet above the top of screen. The remainder of the annular space will be filled with a bentonite seal up to the surface. Wells will be completed as above-ground stick-up wells similar to the construction of AMW-19 and AMW-20. The wells will be developed and permitted in accordance with MDH requirements.

3.3.3 Analytical Sampling

Following well development, all existing and newly installed monitoring wells around Area C (AMW-07 and AMW-19 through AMW-24) will be sampled. Water levels will be measured using an electronic water-level indicator. The water level indicator will be cleaned between each well using a detergent solution and rinsed with clean distilled

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water prior to deploying into the next monitoring well. The water-level data will be used to calculate purge volumes and evaluate groundwater gradients and flow directions.

If possible, wells will be sampled using a peristaltic pump and low flow sampling techniques, but if the depth to water is too great for a peristaltic pump the wells will be sampled using a down hole pump or bailer after removing three well volumes. Immediately prior to sample collection, groundwater field parameters, including specific conductivity, temperature, pH, dissolved oxygen, turbidity, and oxidation/reduction potential, will be measured at each well using a multi-parameter water-quality monitor. Groundwater samples collected for dissolved metals analyses will be field filtered.

Samples will be collected for analysis of each of the following parameters:

- MN List VOCs using USEPA Method 8260,
- TCL SVOCs using USEPA Method 8270,
- Dissolved TAL metals using USEPA Method 6010, and
- DRO using the WI Modified Method.

Those analytes are consistent with recent historical analytes for Area C monitoring wells. All TAL metals samples will include speciation for hexavalent and trivalent chromium.

A list of the analytes included with each of the methods is included as Appendix A. A second sampling event will be completed approximately three months (one quarter) following the initial sampling event to: 1) confirm reproducibility of the analytical data, and 2) maintain compliance with MPCA sample requirements. These sampling events are also expected to cover the duration of the Area C remedial investigation as requested in the October 14, 2014 investigation request letter from the MPCA. Additional sampling events and/or monitoring programs will be discussed with the MPCA following receipt of the initial set of groundwater sample analytical data. It is anticipated that a more formal long-term monitoring program will be introduced, but at this time Ford is not prepared to present that formal program.

In addition to the monitoring described above, weekly groundwater elevation gauging of the Area C monitoring well network will be initiated if water levels at the nearest downstream river gauge (STPM5) exceed flood stage (14 feet above baseline). This gauging will be completed to evaluate groundwater response to flood conditions in the Mississippi River and will be continued for one month after. Weekly groundwater

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gauging will continue for the duration of the flood event and for one month following the time when river stage recedes to below flood stage.

3.4 Surficial Soil Samples

Soil samples will be collected from the exposed soil on the slopes of Area C with the objective of evaluating the potential exposure to any potential current or future receptors. Results will be compared to applicable MPCA Soil Reference Values (SRVs).

3.4.1 Scope of Work

Samples will be collected based on transects oriented approximately parallel to the slope of Area C. A transect down the slope will be placed approximately every 200 linear feet as measured along the perimeter of the paved parking surface overlying Area C. Surficial soil samples will be collected at a minimum of one sample for every 25 vertical feet of slope along that transect. Proposed location of sampling transects and sample locations are shown on Figure 2. Actual locations may be modified as necessary in the field based on access restrictions.

3.4.2 Methodology

A hand auger or shovel will be used to collect a soil sample from the upper one foot at each sample location. The sample will be collected from a single sample location. In addition to collecting a soil sample, at each location, the field sampling personnel will take a picture of the area and make notes about any surficial debris (e.g., concrete, metal) that is present in the immediate area. All sampling equipment will be cleaned between sample locations using a combination of distilled water, Liquinox™ and ethane.

3.4.3 Analytical Sampling

Soil samples will be analyzed for the following constituents:

- MN List VOCs using USEPA Method 8260,
- TCL SVOCs using USEPA Method 8270,
- TAL metals using USEPA Method 6010, and
- GRO and DRO using the WI Modified Method.

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A list of the analytes included with each of the methods is included as Appendix A. All TAL metals samples will include speciation for hexavalent and trivalent chromium. If oily wastes, additional drums or other unexpected conditions arise during sampling, detailed notes on the condition and locations will be collected and submitted to the MPCA.

3.5 Investigation-Derived Waste

Investigation-Derived Waste (IDW) generated during the course of the investigation activities listed above will include soil cuttings, development water, personal protective equipment (PPE) and disposable sampling equipment (i.e. filters, tubing, PVC).

- Soil cuttings will be segregated in the field prior to disposal pursuant to field screening results; segregation parameters will be of 0 ppm to <100 ppm and greater than 100 ppm. One composite sample will be collected for laboratory analysis from each staging area for every five 55 gallon drum generated. Laboratory analysis will be utilized for the determination of potential site re-use or offsite disposal.
- Purge water generated during groundwater monitoring activities will be drummed for off-site disposal after review of laboratory analysis.
- PPE and disposal sampling equipment will be segregated and disposed of upon review of subsurface investigation results.

3.6 Surveying

All monitoring wells, test trenches, and boring locations will be surveyed for X, Y and Z (ground surface) coordinates referencing the National Geodetic Vertical Datum of 1929 (NGVD 29) and North American Datum of 1983 (NAD 83) at the completion of subsurface investigation activities. Surficial soil sample locations will be recorded using a GPS unit.

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4. Reporting

The results of this investigation will be summarized in report format and submitted to the MPCA. The submittal will discuss information collected during the site characterization activities and will include a technical overview of the site characterization, results, findings, and recommendations.

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5. Scheduling

Soil borings, surficial soil samples and monitoring well installation will be scheduled following receipt of MPCA approval, but is expected to be implemented within the first six months of 2015 when weather conditions will allow for access to the target areas. Test trenches will be completed at the same timeframe assuming an access agreement with Hidden Falls State Park has been executed.

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6. References

ARCADIS, 2014. Area C –Comprehensive Site History and Investigation Report, Ford Motor Company, Twin Cities Assembly Plant, St. Paul, Minnesota. April 2014.

CRA, 1994. Abandonment of Wells, Ford Motor Company, Twin Cities Assembly Plant, St. Paul, Minnesota.” January.

Tables

**Table 1
Proposed Well Construction Details**

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Twin Cities Assembly Plant, St. Paul, Minnesota**

Well ID	Approximate Surface Elevation (ft msl)	Estimated Groundwater Elevation (ft msl)	Screen Length (ft)	Screen Interval¹ (Elev. - Elev.) (ft msl)	Screen Interval¹ (Elev. - Elev.) (ft bgs)	Surface Completion Type
AMW-21	741	689 to 698	10	685-695	56-66	Stick-up
AMW-22A	704	689 to 698	10	685-695	9-19	Stick-up
AMW-22B ²	704	689 to 698	5	>695	>19	Stick-up
AMW-23A	706	689 to 698	10	685-695	11-21	Stick-up
AMW-23B ²	706	689 to 698	5	>695	>21	Stick-up
AMW-24	706	689 to 698	10	685-695	11-21	Stick-up
AMW-25A	706	689 to 698	10	685-695	11-21	Stick-up
AMW-25B ²	706	689 to 698	5	>695	>21	Stick-up

Footnotes:

¹ Exact depth of screen may be modified based on field observations.

² Deeper wells will only be installed if greater than 15 feet of saturated unconsolidated soil is noted during drilling.

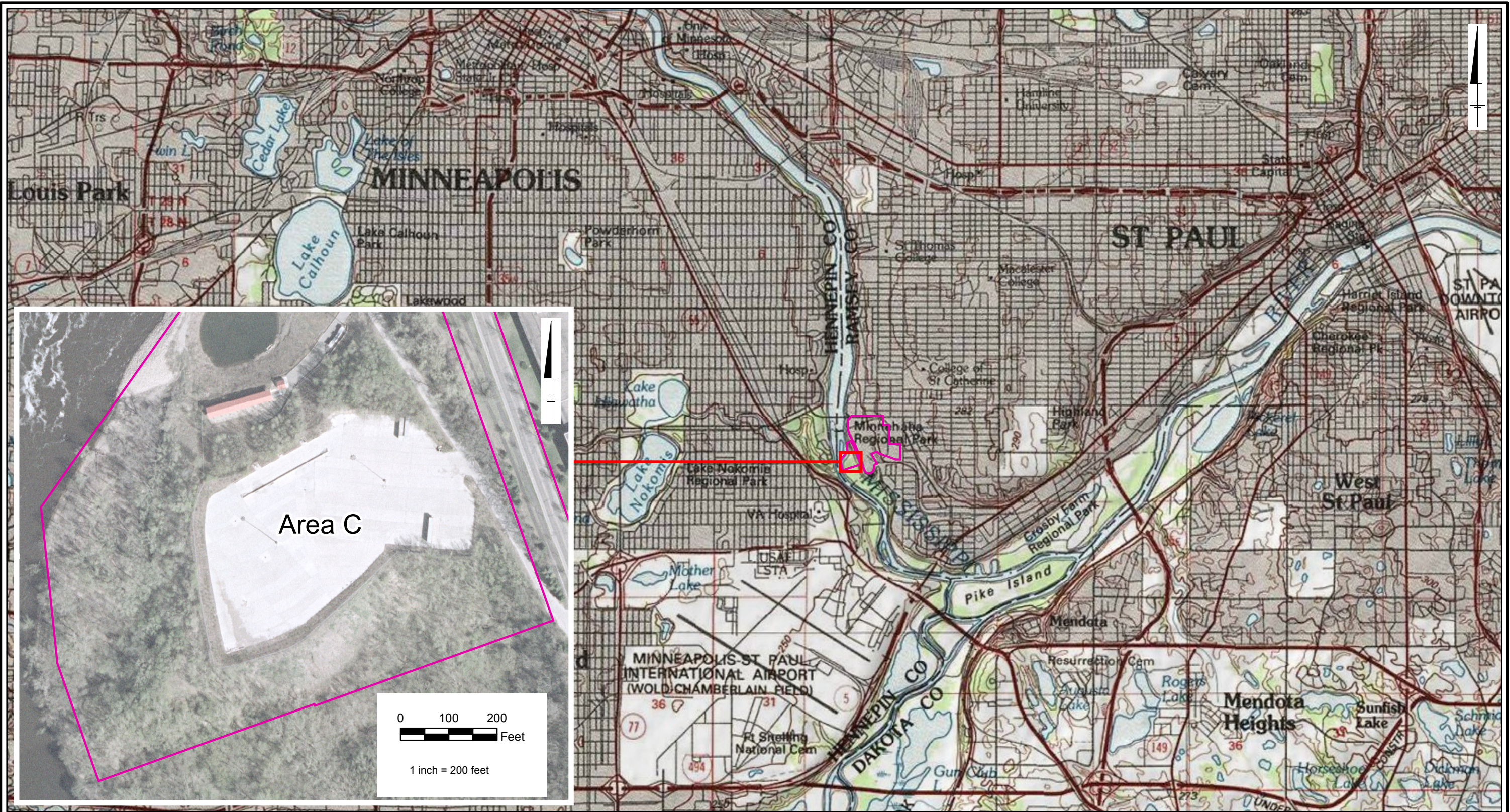
Acronyms and Abbreviations:

Elev. = elevation

ft msl = feet above mean sea level

ft bgs = feet below ground surface

Figures



CITY: MPLS DB: MG LD: TW PM: BZ
 FORD ST. PAUL
 G:\GIS\Projects\Ford Ranger\ArchMap\2012\02\Fig1_Site_Location_Area_C_20120228.mxd

LEGEND:

— Ford Property Boundary

NOTES:

Imagery Source: United States Geological Survey
 High Resolution Orthoimagery for the Minneapolis-St. Paul,
 Minnesota Urban Area

 Topographic Map Source:
 © 2007 National Geographic Society



1 inch = 1 miles

	Twin Cities Assembly Plant Ford Motor Company St. Paul, Minnesota
Area C Site Location / Property Layout	
	FIGURE 1

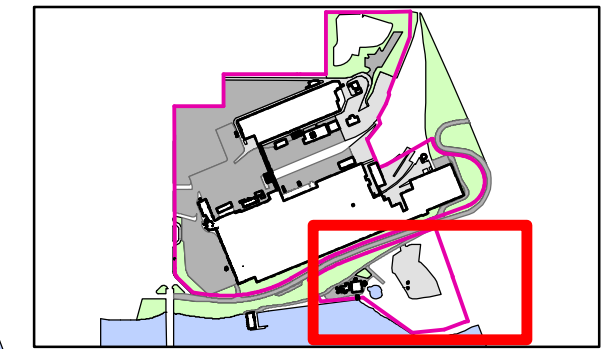


CITY: MPLS, MN DB: MG LD: RO
 FORD ST. PAUL
 Path: G:\GIS\Projects\Ford Rangen\ArcMap\2015\2015-03\Area_C_Invest\Locs_20150312.mxd

LEGEND:

- | | | | | |
|---|-------------------------------------|------------------------|--|---|
| Surficial Soil Sampling Location | Existing Monitoring Well | Ford Property Boundary | Buildings | Approximate Extent of Industrial Waste Fill Inferred from CRA Report, 1990 |
| Preliminary Boring Location for Waste Characterization | Abandoned Monitoring Well | Fence | Asphalt | Approximate Extent of Industrial Waste Fill Inferred from Ford Report, 1982 |
| Supplemental Boring Location for Waste Characterization | Soil Boring | Tunnel 1A | Concrete | |
| New Monitoring Well Location | Former Test Pit Location (1988) | | Grass | |
| Preliminary Test Pit Location for Waste Delineation | Mississippi River Sampling Location | | Mississippi River/Retention Pond | |
| | | | Elevation Contours (Feet Mean Sea Level) | |

NOTES:
 AMW ARCADIS Monitoring Well
 Topographic survey for Area C completed January 2012, Sunde Land Surveying



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Area C Investigation Locations

FIGURE
2

Appendix A

List of Analytes

Appendix A. List of Analytes

Minnesota List for VOCs	
Compound	CAS Number
1,1,1,2-Tetrachloroethane	630-20-6
1,1,1-Trichloroethane	71-55-6
1,1,2,2-Tetrachloroethane	79-34-5
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1
1,1,2-Trichloroethane	79-00-5
1,1-Dichloroethane	75-34-3
1,1-Dichloroethene	75-35-4
1,1-Dichloropropene	563-58-6
1,2,3-Trichlorobenzene	87-61-6
1,2,3-Trichloropropane	96-18-4
1,2,4-Trichlorobenzene	120-82-1
1,2,4-Trimethylbenzene	95-63-6
1,2-Dibromo-3-Chloropropane	96-12-8
1,2-Dichlorobenzene	95-50-1
1,2-Dichloroethane	107-06-2
1,2-Dichloropropane	78-87-5
1,3,5-Trimethylbenzene	108-67-8
1,3-Dichlorobenzene	541-73-1
1,3-Dichloropropane	142-28-9
1,4-Dichlorobenzene	106-46-7
3-Chloropropene	107-05-1
2,2-Dichloropropane	594-20-7
2-Chlorotoluene	95-49-8
Bromobenzene	108-86-1
Bromochloromethane	74-97-5
4-Chlorotoluene	106-43-4
p-Isopropyltoluene	99-87-6
Acetone	67-64-1
Benzene	71-43-2
Bromoform	75-25-2
Bromomethane	74-83-9
Carbon tetrachloride	56-23-5
Chlorobenzene	108-90-7
Chloroethane	75-00-3
Chloroform	67-66-3
Chloromethane	74-87-3
cis-1,2-Dichloroethene	156-59-2
cis-1,3-Dichloropropene	10061-01-5
Hexachlorobutadiene	87-68-3
Dibromomethane	74-95-3
Bromodichloromethane	75-27-4
Dichlorodifluoromethane	75-71-8
Dichlorofluoromethane	75-43-4
Ethyl ether	60-29-7
Ethylbenzene	100-41-4
1,2-Dibromoethane	106-93-4
Naphthalene	91-20-3
m-Xylene & p-Xylene	179601-23-1
n-Butylbenzene	104-51-8
Isopropylbenzene	98-82-8
N-Propylbenzene	103-65-1
2-Butanone (MEK)	78-93-3
4-Methyl-2-pentanone (MIBK)	108-10-1
sec-Butylbenzene	135-98-8
Methyl tert-butyl ether	1634-04-4
Methylene Chloride	75-09-2
o-Xylene	95-47-6
Styrene	100-42-5
tert-Butylbenzene	98-06-6
Tetrachloroethene	127-18-4
Tetrahydrofuran	109-99-9
Toluene	108-88-3
trans-1,2-Dichloroethene	156-60-5
trans-1,3-Dichloropropene	10061-02-6
Trichloroethene	79-01-6
Trichlorofluoromethane	75-69-4
Vinyl chloride	75-01-4
Dibromochloromethane	124-48-1

Target Compound List for SVOCs	
Compound	CAS Number
Acenaphthene	83-32-9
Acenaphthylene	208-96-8
Acetophenone	98-86-2
Anthracene	120-12-7
Atrazine	1912-24-9
Benzaldehyde	100-52-7
Benzo[a]anthracene	56-55-3
Benzo[b]fluoranthene	205-99-2
Benzo[k]fluoranthene	207-08-9
Benzo[g,h,i]perylene	191-24-2
Benzo[a]pyrene	50-32-8
Butyl benzyl phthalate	85-68-7
1,1'-Biphenyl	92-52-4
Bis(2-chloroethoxy)methane	111-91-1
Bis(2-chloroethyl)ether	111-44-4
Bis(2-ethylhexyl) phthalate	117-81-7
4-Bromophenyl phenyl ether	101-55-3
Caprolactam	105-60-2
Carbazole	86-74-8
4-Chloroaniline	106-47-8
4-Chloro-3-methylphenol	59-50-7
2-Chloronaphthalene	91-58-7
2-Chlorophenol	95-57-8
4-Chlorophenyl phenyl ether	7005-72-3
Chrysene	218-01-9
2-Methylnaphthalene	91-57-6
3 & 4 Methylphenol	15831-10-4
Dibenz(a,h)anthracene	53-70-3
Dibenzofuran	132-64-9
3,3'-Dichlorobenzidine	91-94-1
2,4-Dichlorophenol	120-83-2
Diethyl phthalate	84-66-2
2,4-Dimethylphenol	105-67-9
Dimethyl phthalate	131-11-3
4,6-Dinitro-2-methylphenol	534-52-1
2,4-Dinitrophenol	51-28-5
2,4-Dinitrotoluene	121-14-2
Di-n-butyl phthalate	84-74-2
Di-n-octyl phthalate	117-84-0
Fluoranthene	206-44-0
Fluorene	86-73-7
Hexachlorobenzene	118-74-1
Hexachlorobutadiene	87-68-3
Hexachlorocyclopentadiene	77-47-4
Hexachloroethane	67-72-1
Indeno[1,2,3-cd]pyrene	193-39-5
Isophorone	78-59-1
2-Methylphenol	95-48-7
Naphthalene	91-20-3
2-Nitroaniline	88-74-4
3-Nitroaniline	99-09-2
4-Nitroaniline	100-01-6
Nitrobenzene	98-95-3
2-Nitrophenol	88-75-5
4-Nitrophenol	100-02-7
N-Nitrosodiphenylamine	86-30-6
N-Nitrosodi-n-propylamine	621-64-7
2,2'-oxybis[1-chloropropane]	108-60-1
Pentachlorophenol	87-86-5
Phenanthrene	85-01-8
Phenol	108-95-2
Pyrene	129-00-0
2,4,5-Trichlorophenol	95-95-4
2,4,6-Trichlorophenol	88-06-2
2,6-Dinitrotoluene	606-20-2

Target Analyte List for Metal	
Compound	CAS Number
Aluminum	7429-90-5
Antimony	7440-36-0
Arsenic	7440-38-2
Barium	7440-39-3
Beryllium	7440-41-7
Cadmium	7440-43-9
Calcium	7440-70-2
Chromium	7440-47-3
Cobalt	7440-48-4
Copper	7440-50-8
Iron	7439-89-6
Lead	7439-92-1
Magnesium	7439-95-4
Manganese	7439-96-5
Nickel	7440-02-0
Potassium	7440-09-7
Selenium	7782-49-2
Silver	7440-22-4
Sodium	7440-23-5
Thallium	7440-28-0
Vanadium	7440-62-2
Zinc	7440-66-6

Target List for PCBs	
Compound	CAS Number
Aroclor-1016	12674-11-2
Aroclor-1221	11104-28-2
Aroclor-1232	11141-16-5
Aroclor-1242	53469-21-9
Aroclor-1248	12672-29-6
Aroclor-1254	11097-69-1
Aroclor-1260	11096-82-5