

Ms. Karen Kromar  
Minnesota Pollution Control Agency  
520 Lafayette Road North  
St. Paul, MN 55155-4194

Subject:

Soil Investigation and Risk Assessment Work Plan – Baseball Fields – Feature 139  
Ford Twin Cities Assembly Plant, St. Paul, Minnesota

Dear Ms. Kromar:

On behalf of Ford Motor Company (Ford), ARCADIS has prepared this Work Plan for a portion of the Ford Motor Company Twin Cities Assembly Plant (TCAP) located at 966 South Mississippi River Boulevard within the City of St. Paul in Ramsey County, Minnesota (Figure 1). This Work Plan describes the further characterization of soil and performance of risk assessment activities at the baseball field area, hereafter referred to as Feature 139, which was identified in the 2007 TCAP Phase I Environmental Site Assessment (ESA) as a potential battery waste disposal area.

The Work Plan outlines the general approach, scope of work for the field investigations and scope of the risk assessment. Field activities will be conducted according to the Field Sampling Plan (FSP) (ARCADIS June 18, 2007) developed for the site that outlines the sampling procedures and quality assurance protocols. These procedures assure that the data collected during execution of the scope of work are both representative and reliable.

## **Background**

### **Property Location and Description**

The Ford TCAP is located at 966 South Mississippi River Boulevard in St. Paul, Ramsey County, Minnesota at approximate Latitude (north) 44° 54' 50.8" and Longitude (west) 93° 11' 31.9". TCAP is located in a mixed industrial, commercial and residential use area on the eastern shore of the Mississippi River, along the east side of South Mississippi River Boulevard, south of Ford Parkway and west of South Cleveland Avenue in St. Paul, Minnesota.

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ENVIRONMENTAL

Date:

September 7, 2007

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Our ref:

MN000593.0003

The area occupied by Feature 139 is approximately 6 acres in size, and presently includes three baseball fields. The area also includes a concession building with restrooms, batting cages, a practice pitching area, graveled surface and grassed areas.

A Phase I ESA was completed by ARCADIS in 2007 to identify Features and obtain information regarding environmental activities and conditions at TCAP. Following the Phase I, ARCADIS performed a Phase II exterior assessment of the site to evaluate soil and groundwater conditions of the exterior Features identified by the Phase I ESA.

### Site Geology

The general geology of TCAP has been determined based on information identified during the Phase I and Phase II ESA. At the surface of the TCAP property a thin mantle of unconsolidated sediments overlies bedrock terraces. Below the unconsolidated material are sedimentary bedrock units which were deposited during the middle of the Ordovician geologic period. The sedimentary units are, in descending order, Decorah Shale, Platteville Limestone/dolostone, Glenwood Shale and St. Peter Sandstone.

The soil mantle consists of predominately sandy clay and clayey sand. Weathered shale cobbles are common and in some areas there is two to five feet of peat. In some of the areas investigated at TCAP much of the native material has been disturbed and is mixed with fill material such as building rubble, glass, scrap metal and ash. The Platteville formation lies on top of the Glenwood Shale formation and the contact is gradational. The Glenwood Shale is composed of dark green to gray shale and sandy shale. The formation is thinly laminated and moderately fissile (cleavable) and is approximately seven feet thick in the areas investigated. The St. Peter Sandstone outcrops along the bluffs of the Mississippi River and continues below the elevation of the river bed. The sandstone is composed of medium-grained, well-sorted and well-rounded quartzite. It is white to buff in color and is medium to weakly indurated (hardened). The St. Peter formation is as much as 150 feet thick in the Twin Cities area.

Based on the Phase II Exterior work conducted, the geology of Feature 139 generally consists of approximately 1 to 4.5 feet of sand and gravel fill material. Below the fill material is unconsolidated terrace deposits. Beneath the unconsolidated material is

the Decorah Shale which is in general 4.5 to 8 feet below ground surface (bgs). The Decorah Shale is expected to be approximately 25 to 30 feet thick.

#### Results from Phase II Investigations at Feature 139

A geophysical survey was completed at Feature 139 on June 20 through June 21, 2007 by 3Dgeophysics of Chaska, Minnesota. The geophysical study was conducted using EM-31 and EM-61 frequency domain electromagnetic methods. The geophysical surveys were used to identify potential metallic anomalies (EM-61) in the subsurface and to determine changes in electrical conductivity from differences in soil types, disturbances, etc. (EM-31).

Multiple EM anomalies resulting from buried objects were identified by the metal detection survey EM61. No discernable surface metal debris, other than that related to obvious surface obstructions, was observed during the survey. The EM anomalies present in the dataset are related to unknown buried objects.

The most significant and apparently naturally occurring anomaly detected by the EM31 survey is a northwest trending area of low conductivity within the center of Feature 139. Typically, sandy and drier sediments exhibit low conductivity, while clayey and moist sediments exhibit higher conductivity.

Following the geophysical investigation, six direct push soil borings (ASB-049 to ASB-054) were completed at Feature 139 (Figure 2). The borings were advanced at select areas based on anomalies identified during the geophysical survey. The soil borings were completed using direct push methods by Matrix Environmental, LLC. of Osseo, Minnesota on July 5, 2007 based on anomalies identified from the geophysical survey.

Three surface soil samples were collected from Feature 139 on August 13, 2007. AGM-SS-01 was collected near ASB-049, AGM-SS-02 was collected near ASB-051, and AGM-SS-03 was collected near ASB-053. Surface soil samples were collected from the upper six inches of ground surface. Results from the soil samples indicated that concentrations of arsenic, copper and iron exceeded the Recreational Soil Reference Values (SRVs) but were below the Industrial SRVs at several soil sample locations at Feature 139. Based on the exceedances, it was recommended that this additional soil characterization and risk assessment be performed. Additional details regarding the soil sampling are presented below and in the report entitled "Soil

Investigation Report - Potential Battery Waste Disposal Area - Feature 139, Ford Twin Cities Assembly Plant" (ARCADIS, September 7, 2007).

### **Recommended Scope of Work**

The scope of work consists of the following tasks:

- Complete a surface soil investigation of Feature 139.
- Complete a subsurface soil investigation of Feature 139.
- Perform a risk assessment using the results from the surface soil sampling.
- Survey surface sample and boring locations.
- Characterize investigation-derived waste (IDW) for disposal.
- Submit report with the findings and recommendations.

### **Collection of Surface Soil Samples**

ARCADIS proposes to collect an estimated 36 surface soil samples to evaluate surface soil conditions at Feature 139. The proposed surface soil sample locations are presented on Figure 3. Nine samples will be collected from each of three baseball fields (for a total of 27 samples) and additional nine samples will be collected outside of the baseball fields, but within areas accessible by the public (e.g. below the bleachers). The Northwest, Northeast and South Baseball Field samples will be located in an evenly spaced grid pattern, with an individual grid established for each baseball field. One surface soil sample will be collected in each area of the grid. Actual sample locations will be based on field conditions and accessibility.

The proposed location of the nine surface soil samples which will be located outside of the baseball fields area also shown on Figure 3. Sample locations shown are an example layout. Four to five samples will be collected from areas expected to be utilized by young children present during events such as under bleachers, near the concession stand, etc. The remaining locations will be distributed around the perimeter of the area. All samples will be collected from approximately 0 to 6 inches bgs. Samples will be submitted for laboratory analysis for total arsenic, copper, lead and iron by Method 6010. Sampling will be conducted according to the FSP

developed for the site. Following the collection of the samples the surface will be restored and the sample location will be marked for surveying.

### **Completion of Soil Borings**

A total of 24 direct push soil borings will be completed in a grid pattern across Feature 139. Activities are described below.

A full utility clearance will be performed prior to initiating any subsurface work at TCAP. Gopher One Call will be notified so that all utility lines servicing the area in and around Feature 139 will be marked. In addition to notifying Gopher One Call, a private utility locator will be retained to locate private lines in the areas where subsurface work will be conducted.

ARCADIS proposes to advance approximately 24 soil borings (192 total feet) and to evaluate subsurface soil conditions at Feature 139. The proposed soil boring locations are presented on Figure 4. The borings will be located in a grid pattern (100 foot by 100 foot). One soil boring will be completed in each area of the grid. Actual boring locations will be based on field conditions and accessibility.

The boreholes will be completed using a direct push drilling rig to approximately 8 feet or until competent bedrock/refusal is encountered. Soil samples will be collected continuously from each boring to provide a profile of the subsurface materials at each boring location. Logs will be prepared for each boring and will present the United Soil Classification System classification of the materials encountered. Each soil sample will be screened in the field with a photo ionization detector (PID) or equivalent.

Up to four soil samples per boring may be collected for laboratory analysis. Soil samples will be collected from four intervals from ground surface to eight feet bgs (0-2, 2-4, 4-6 and 6-8 feet bgs). Samples will be submitted for laboratory chemical analysis as follows:

- Samples will be submitted from all four intervals for analyses of total arsenic, copper, iron and lead using method 6010.
- Two samples will be analyzed and the remaining two samples will be held by the project laboratory.
- The held samples may be analyzed if results of the first samples if deemed necessary.

In the event that perched groundwater is encountered, a temporary monitoring well will be installed and up to one groundwater grab sample will be collected and analyzed for Metals (Method 6010). The sample will be filtered prior to placement in the sample container. According to MDH well code, temporary wells must be properly abandoned within 48 hours of installation. Boring locations will be marked for surveying following the completion of the boring.

### **Risk Assessment**

Limited data were collected in Feature 139 at the Ford Twin Cities Assembly Plant property/site during the Phase II – Exterior Investigation. A total of 9 samples were analyzed, including 3 surface soil and 6 subsurface soil (Figure 2). Data were evaluated by comparison to generic screening criteria provided in Minnesota Pollution Control Agency's January 1999 "Draft Guidelines, Risk-Based Guidance for the Soil-Human Health Pathway, Volume 2 (Guidance Document)". The Feature 139 area is currently used for recreational purposes (e.g. three baseball fields located within this area), therefore levels detected were compared to Recreational SRVs (screening criteria) provided in the Minnesota Pollution Control Agency (MPCA) guidance. The maximum detected concentration of arsenic, copper, and iron exceeded the generic Tier 2 Acute and Chronic Recreational SRVs but were below the Industrial Tier 2 SRVs (Table 1). Based on this comparison, arsenic, copper and iron were identified as constituents of potential concern (COPCs).

Additional surface and subsurface soil data will be collected and data used to evaluate risks associated with continued recreational use of this area. The additional proposed surface soil data, along with the existing surface soil data, will be used to complete a Tier 3 risk assessment for the three COPCs.

The Tier 3 risk assessment will be completed in accordance with the MPCA's draft Guidance Document. The site will be evaluated based on a recreational land use scenario. Consistent with the Guidance document, receptors will be evaluated based on three age groups (<6 years old, 6 to 18 years old, and greater than 18 to 33 years old). In addition, risks and hazards associated with a maintenance worker will be evaluated.

Consistent with the MPCA guidance, short-term (acute, subchronic), and chronic exposures will be evaluated as appropriate for the receptors of interest. The assessment will also include a short-term hazard evaluation, consistent with Section 3.0 of the Guidance Document.

Site-specific activities that could result in exposures that are not consistent with the default assumptions in the guidance, such as base-running, will also be evaluated. If needed, exposure models provided in either the USEPA's Soil Screening Levels Guidance and/or American Society for Testing and Materials (ASTM) Risk-Based Corrective Action (RBCA) Standards will be used to supplement approaches used in the Guidance Document.

The Tier 3 assessment will be completed for each of the three baseball fields separately, and for the entire complex as appropriate based on the data. Exposure point concentrations for each of the COPCs will be determined following the procedures outlined in the MPCA Guidance Document. In general, default exposure assumptions provided in the generic Tier 2 equations will be used to evaluate risk, unless they are not representative of site-specific use and activities. Where appropriate, the exposure parameters (i.e., exposure frequency and exposure durations) will be adjusted to more adequately address anticipated exposures at the site. The rationale for site-specific adjustments will be provided for review.

Consistent with the Guidance Document, the provided toxicity values will be used unless there are toxicity values available on the USEPA's Integrated Risk Information System (IRIS) that are based on an updated assessment of the data. If toxicity values are not available for a chemical or an exposure scenario (i.e. acute reference doses), then values will be also be obtained from IRIS, USEPA's National Center for Environmental Assessment (NCEA), USEPA's Health Assessment Summary Tables (HEAST), the Agency for Toxic Substances and Disease Registry (ATSDR) (minimal risk levels) or other sources, as appropriate.

The Tier 3 assessment will provide an evaluation of current risks and hazards associated with recreational use of the property based on surface soil data. This may be expanded to evaluate risks and hazards associated with surface and subsurface soil when the data are available.

#### **Surveying Surface Soil and Boring Locations**

Soil borings and surface soil sample locations and ground elevations will be surveyed to the Ramsey County coordinates and 1929 USGS Vertical Datum, as well as the plant coordinate system.

**Characterization and Disposal of Investigative Derived Waste**

Soil and groundwater investigative derived waste (IDW) will be containerized and properly labeled pending characterization and disposed of at a properly permitted facility.

**Reporting**

The results of the Soil Investigation for Feature 139 will be presented in a report. The report will discuss information collected during the site characterization activities and will include a technical overview of the site characterization, execution, results and comparison of the results to MPCA's screening criteria for Recreational and Industrial Use. The report will also include a discussion of the results from the Tier 3 assessment for current risks and hazards associated with recreational use of the property and recommendations for further activities (if necessary).

**Schedule**

Site characterization activities will commence approximately one week after receiving approval of this Work Plan by the MPCA.

We appreciate a prompt review of this document by MPCA, so that the investigation and risk assessment activities can proceed in the next two weeks. If you have questions, please call Bryan Zinda.

Sincerely,

ARCADIS U.S., Inc.

Bryan Zinda, PE  
Project Manager

Andrew Fiskness, PG  
Staff Geologist

Eric Carman  
Principal In Charge, VP

Copies:

Ms. Barbara Rusinowski, Ford Motor Company, Dearborn, Michigan  
Mr. John Meyers, Ford Twin Cities Assembly Plant, St. Paul, Minnesota



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**Tables**

**Table 1. Summary of Detected Compounds in Soil, Feature 139-VIC Program  
Ford Twin Cities Assembly Plant, St. Paul, Minnesota**

Feature Number		Feature 139										
Location ID		Recreational	Industrial	AGM-SS-001	AGM-SS-002	AGM-SS-003	ASB-049	ASB-050	ASB-051	ASB-052	ASB-053	ASB-054
Depth Interval (ft)		SRV	SRV	0 - 0.5	0 - 0.5	0 - 0.5	4 - 6	4 - 6	2 - 4	2 - 4	2 - 4	4 - 6
Sample Date	Units			8/13/2007	8/13/2007	8/13/2007	7/5/2007	7/5/2007	7/5/2007	7/5/2007	7/5/2007	7/5/2007
<b>VOC</b>												
Methyl acetate	mg/kg	NS	NS	NA	NA	NA	< 0.52	< 0.58	0.1 J	< 0.55	< 0.79	< 0.56
<b>SVOCs</b>												
bis-2-Ethylhexyl phthalate	mg/kg	690	2100	NA	NA	NA	0.07 J	< 0.39	0.026 J	0.02 J	0.042 J	0.038 J
Fluoranthene	mg/kg	1290	6800	NA	NA	NA	< 0.34	< 0.39	< 0.44	< 0.36	0.024 J	< 0.37
Pyrene	mg/kg	1060	5800	NA	NA	NA	< 0.34	< 0.39	< 0.44	< 0.36	0.025 J	< 0.37
<b>Metals</b>												
Aluminum	mg/kg	40000	100000	6380	8410	7090	3120	8250	8420	5610	9020	2780
Antimony	mg/kg	16	100	1.2 J	< 7.7	< 7.5	< 6.2	< 7	< 8	< 6.5	< 9.5	< 6.7
Arsenic	mg/kg	5	20	<b>16.4</b>	5	4.8	<b>6.6</b>	1.6	<b>5.3</b>	2.1	<b>7.2</b>	3.1
Barium	mg/kg	1200	18000	111	100	87.5	35.8	70.7	164	60.2	56.8	22.5
Beryllium	mg/kg	75	230	0.17 J	0.35 J	0.29 J	0.3 J	0.49 J	0.75	0.26 J	0.5 J	0.27 J
Cadmium	mg/kg	35	200	0.54 J	0.32 J	0.33 J	< 0.52	< 0.58	< 0.67	< 0.55	< 0.79	< 0.56
Calcium	mg/kg	NS	NS	14300 J	9080	21700	72900	16400	23600	9560	22000	32200
Chromium	mg/kg	120/60000	650/100000	13.1	15.3	12.3	8.7	15.3	14.5	8.8	18.1	8.4
Cobalt	mg/kg	800	2600	4.6 J	6 J	7.4	6.2	5.7 J	17.8	10.7	10.2	7.3
Copper	mg/kg	11	9000	<b>19.4</b>	<b>14.7</b>	<b>13.8</b>	<b>18.8</b>	9.5	5.3	<b>35.3</b>	<b>13.2</b>	9.1
Iron	mg/kg	12000	75000	<b>12900</b>	<b>16200</b>	<b>13300</b>	<b>17100</b>	<b>16600</b>	<b>13600</b>	<b>20600</b>	<b>18700</b>	<b>9970</b>
Lead	mg/kg	300	700	43	22.7	44.2	3	5.3	2.6	2.6	6.8	2.2
Magnesium	mg/kg	NS	NS	4860	4060	4180	19400	8400	4150	5680	4250	12300
Manganese	mg/kg	5000	8100	495	449	545	563	230	589	279	563	309
Nickel	mg/kg	800	2500	10.8	13.3	13.9	14.9	13.6	30.8	26.3	18.6	12.7
Potassium	mg/kg	NS	NS	1370	972	2460	560	722	3700	496 J	3150	639
Sodium	mg/kg	NS	NS	< 676	< 638	< 624	< 520	< 584	< 666	116 J	< 792	< 559
Vanadium	mg/kg	40	250	17.6	28.7	15.8	20.4	18.9	6.8	<b>34.1</b>	23.6	13.3
Zinc	mg/kg	12000	75000	56.4	36.4	46.3	16.1	32.1	23.8	30.2	46.6	16
Mercury	mg/kg	1.2	1.5	0.057 J	0.029 J	0.11 J	< 0.1	0.042 J	0.025 J	0.019 J	0.037 J	< 0.11
<b>Other</b>												
pH	none	NS	NS	NA	NA	NA	8.4	8.6	8.7	8.6	7.8	9
Percent Solids	mg/kg	NS	NS	73.9	78.4	80.1	96.1	85.6	75	91.6	63.2	89.5

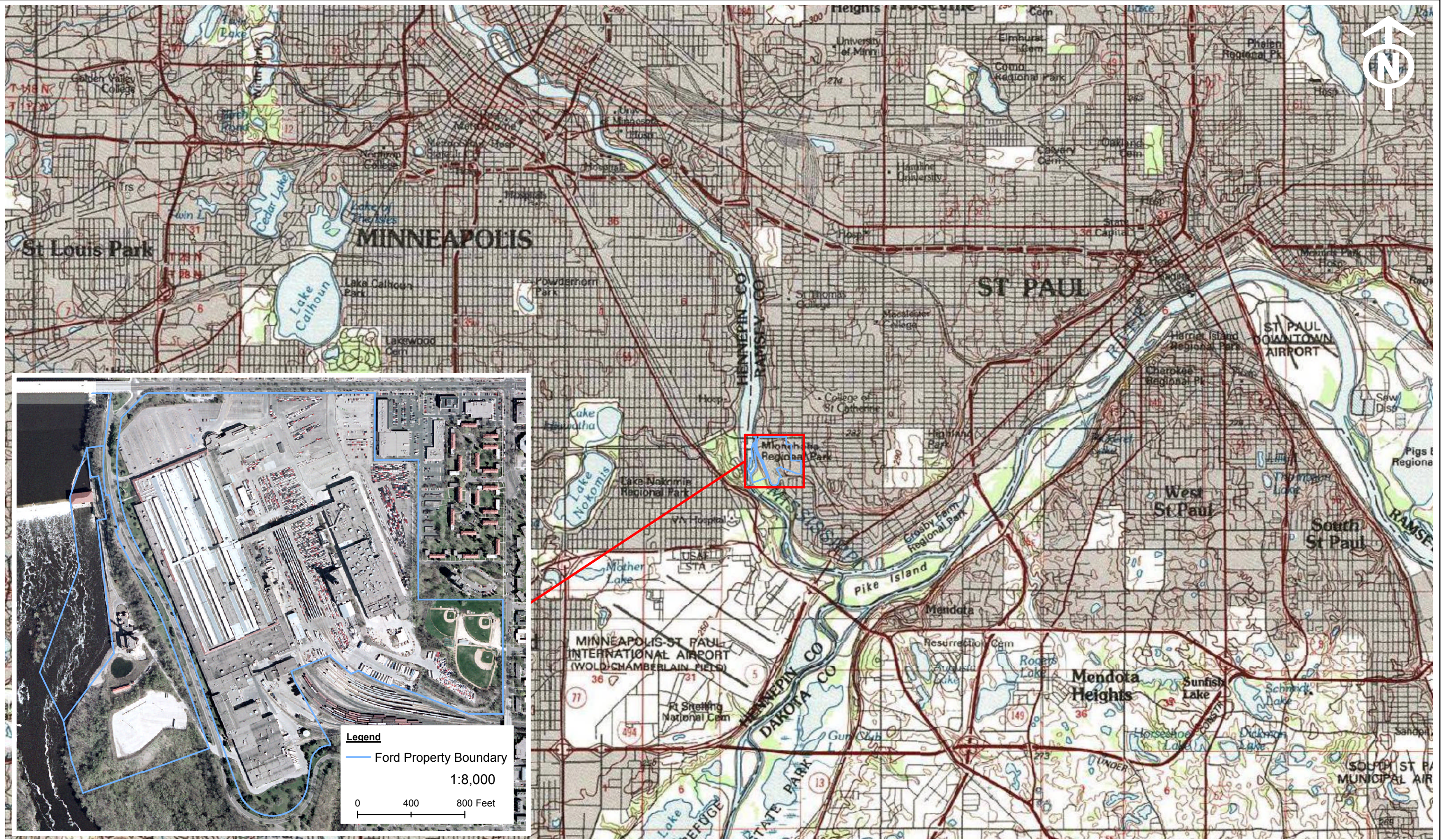
Results are reported in milligrams per kilogram (mg/kg).

**Notes:**

- Feature Number Environmental feature from Phase I Environmental Site Assessment report.
- ASB ARCADIS Soil Boring Location.
- AGM-SS ARCADIS Surface Soil Sampling Location.
- ft Feet from ground surface.
- NA Not analyzed.
- NS No standard.
- J Estimated result.
- Value is above the Tier 2 Recreational Soil Reference Value (SRV).
- Shade** Value is above the Tier 2 Industrial Soil Reference Value (SRV).
- VIC Voluntary Investigation and Cleanup.

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**Figures**

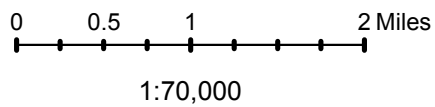


**Legend**

— Ford Property Boundary

1:8,000

0 400 800 Feet



Project Manager E. Carman	Assistant Project Manager B. Zinda
Drawn M. Gress	Checked T. Nelson-Kalmes



Imagery Source: USGS High Resolution Orthoimagery for the Minneapolis-St. Paul, Minnesota Urban Area  
 Topographic Map Source: <http://services.arcgisonline.com/v92>,  
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**Site Location / Property Layout**  
**Ford Twin Cities Assembly Plant**  
**St. Paul, Minnesota**

Project Number MN000593
Date 05-SEP-07
Figure 1

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<b>AGM-SS-003</b>	
<b>0 - 0.5 ft bgs</b>	
<b>8/13/2007</b>	
Copper	13.8
Iron	13300

<b>ASB-053</b>	
<b>2 - 4 ft bgs</b>	
<b>7/5/2007</b>	
Arsenic	7.2
Copper	13.2
Iron	18700

<b>ASB-049</b>	
<b>4 - 6 ft bgs</b>	
<b>7/5/2007</b>	
Arsenic	6.6
Copper	18.8
Iron	17100

<b>ASB-051</b>	
<b>2 - 4 ft bgs</b>	
<b>7/5/2007</b>	
Arsenic	5.3
Iron	13600

ASB-054

<b>AGM-SS-001</b>	
<b>0 - 0.5 ft bgs</b>	
<b>8/13/2007</b>	
Arsenic	16.4
Copper	19.4
Iron	12900

<b>AGM-SS-002</b>	
<b>0 - 0.5 ft bgs</b>	
<b>8/13/2007</b>	
Copper	14.7
Iron	16200

<b>ASB-052</b>	
<b>2 - 4 ft bgs</b>	
<b>7/5/2007</b>	
Copper	35.3
Iron	20600

<b>ASB-050</b>	
<b>4 - 6 ft bgs</b>	
<b>7/5/2007</b>	
Iron	16600

Results reported in milligrams per kilogram (mg/kg).

Chemical	Tier 2 Recreational Soil Reference Value
Arsenic	5
Copper	11
Iron	12000

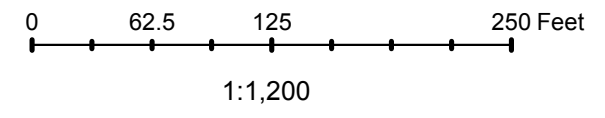
Location ID	
Boring Depth Interval (ft bgs)	
(Feet Below Ground Surface)	
Sample Date	
Chemical	Result

Legend	
	Surface Soil Sample
	Soil Boring
	Ford Property Boundary

Project Manager <b>E. Carman</b>	Assistant Project Manager <b>B. Zinda</b>
Drawn <b>M. Gress</b>	Checked <b>T. Nelson-Kalmes</b>



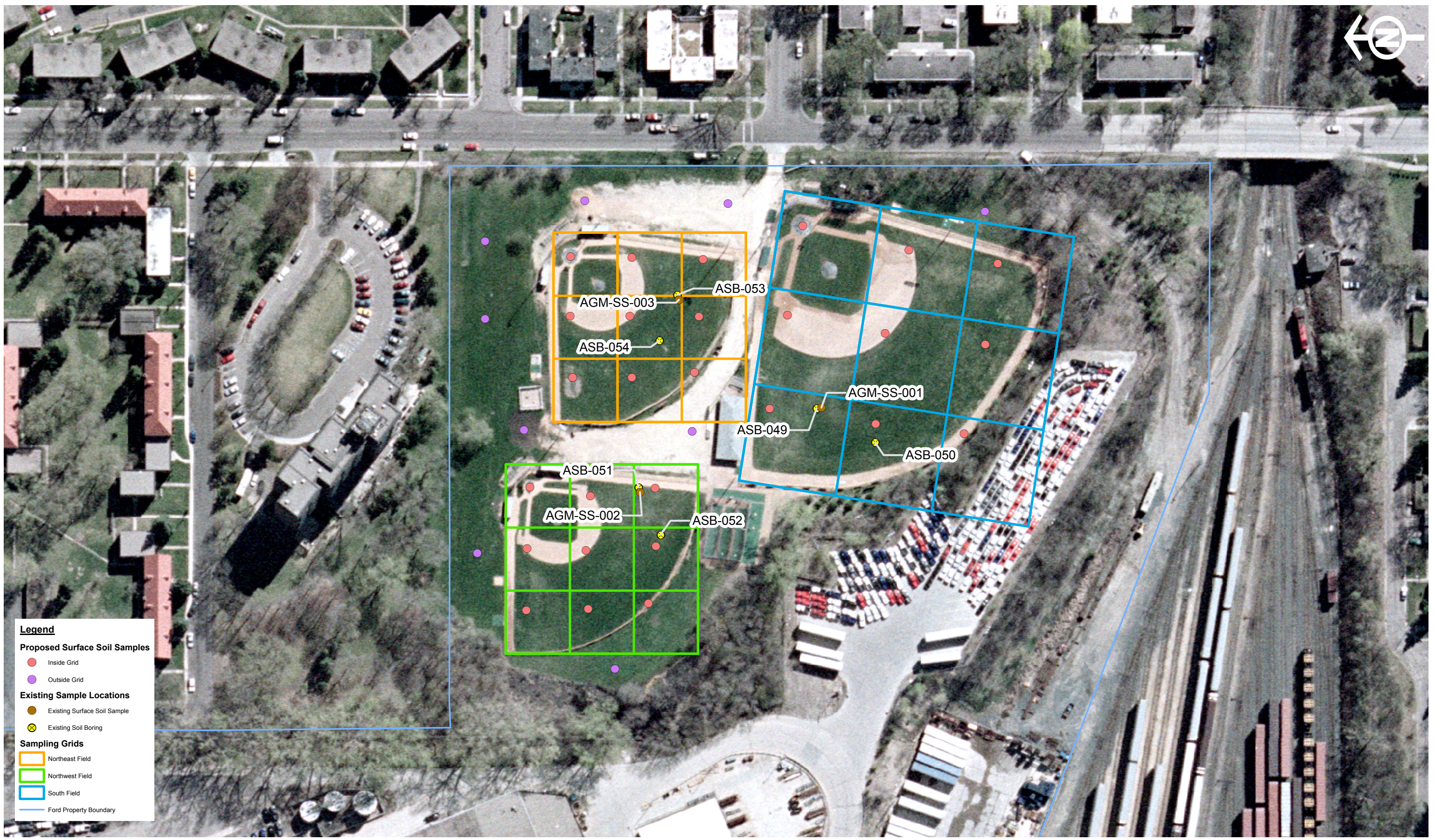
Imagery Source: USGS High Resolution Orthoimagery for the Minneapolis-St. Paul, Minnesota Urban Area



**Feature 139, Soil Sampling Locations Exceeding Tier 2 Recreational Soil Reference Values Ford Twin Cities Assembly Plant St. Paul, Minnesota**

Project Number <b>MN000593</b>
Date <b>4-SEP-07</b>
Figure <b>2</b>

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**Legend**

**Proposed Surface Soil Samples**

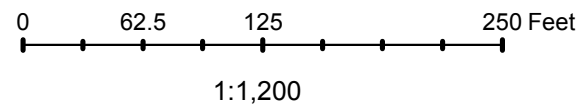
- Inside Grid
- Outside Grid

**Existing Sample Locations**

- Existing Surface Soil Sample
- Existing Soil Boring

**Sampling Grids**

- Northeast Field
- Northwest Field
- South Field
- Ford Property Boundary



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**Feature 139, Proposed Surface Soil Sampling Locations  
 Ford Twin Cities Assembly Plant  
 St. Paul, Minnesota**

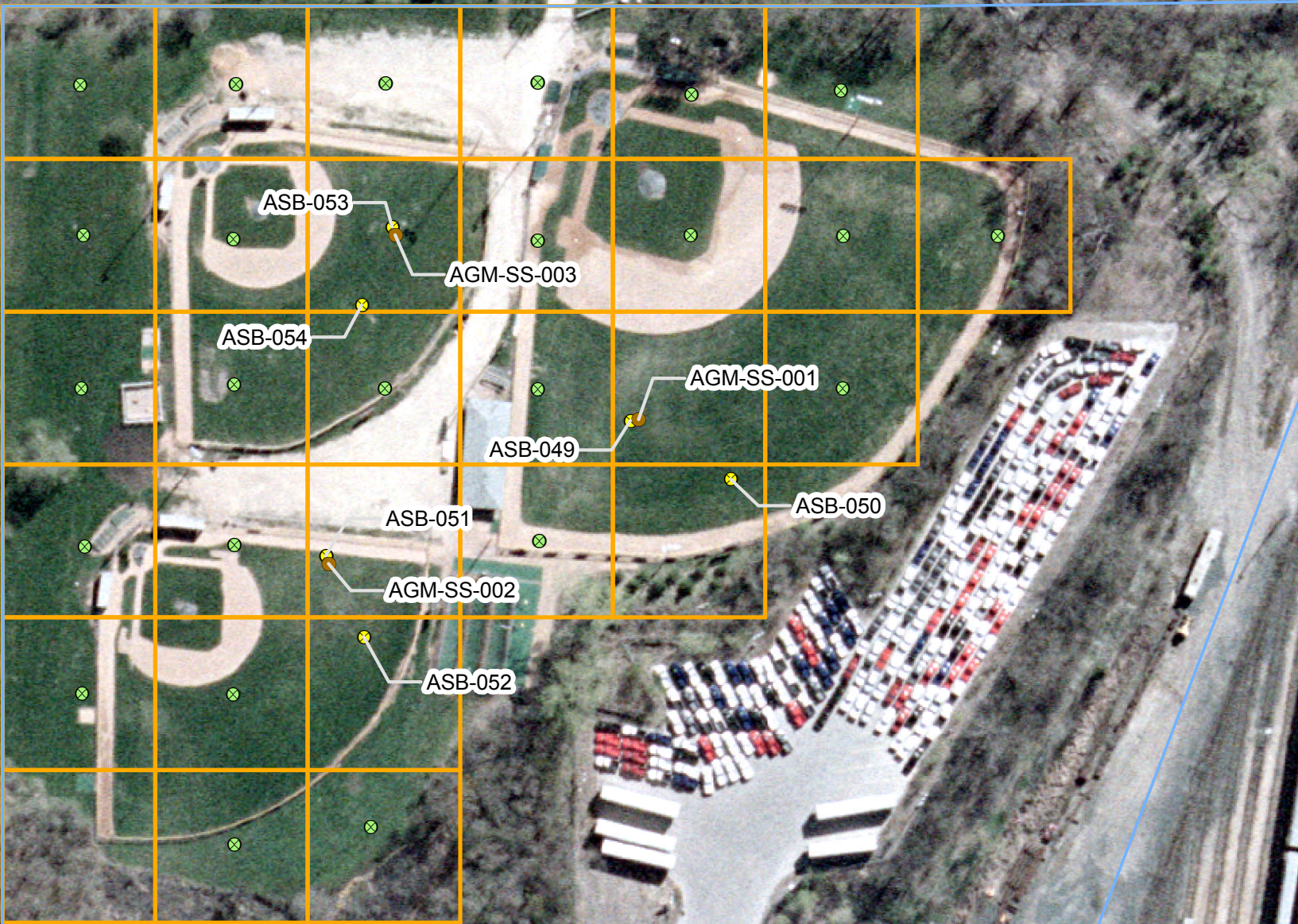
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Project Manager <b>E. Carman</b>	Assistant Project Manager <b>B. Zinda</b>
Drawn <b>M. Gress</b>	Checked <b>A. Fiskness</b>



Imagery Source: USGS High Resolution Orthoimagery for the Minneapolis-St. Paul, Minnesota Urban Area

Project Number <b>MN000593</b>
Date <b>5-SEP-07</b>
Figure <b>3</b>



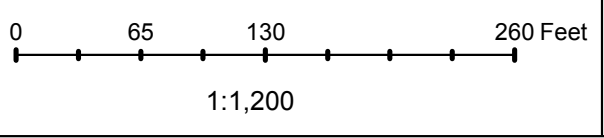
Legend	
	Existing Surface Soil Sample
	Existing Soil Boring
	Proposed Soil Boring
	Sampling Grid
	Ford Property Boundary

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Project Manager E. Carman	Assistant Project Manager B. Zinda
Drawn M. Gress	Checked T. Nelson-Kalmes



Imagery Source: USGS High Resolution Orthoimagery for the Minneapolis-St. Paul, Minnesota Urban Area



**Feature 139, Proposed Soil Boring Sampling Locations**  
**Ford Twin Cities Assembly Plant**  
**St. Paul, Minnesota**

Project Number MN000593
Date 4-SEP-07
Figure 4