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Initial Phase II - Exterior Investigation Report

Twin Cities Assembly Plant (TCAP)
St. Paul, Minnesota

ARCADIS

Initial Phase II – Exterior Investigation Report

Twin Cities Assembly Plant
(TCAP)
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St. Paul, Minnesota 55166

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Executive Summary

The Initial Phase II – Exterior Investigation was conducted by ARCADIS at the Features (i.e., Recognized Environmental Concerns [RECs], Historical RECs [H. RECs], and Areas of Interest [AOIs]) located on the exterior portion of the Twin Cities Assembly Plant (TCAP), which is located at 966 South Mississippi River Boulevard in St. Paul, Minnesota. These exterior Features were identified in the June 2007 Phase I Environmental Site Assessment (ESA). The Site has a total of 32 exterior Features; 30 Features were investigated, one Feature was evaluated and one Feature was not investigated due to utility interferences. Features that were in close proximity to one another were grouped so that borings could be co-located. The co-located borings were placed in locations such that they could assess multiple Features.

The Initial Phase II – Exterior Investigation was conducted in June and July 2007. A total of 54 soil borings, 16 hand auger borings, 12 permanent groundwater monitoring wells and nine temporary wells were installed and sampled to evaluate soil and groundwater conditions at the site. In addition, three existing monitoring wells already located on site were sampled as part of this investigation. A geophysical survey was also conducted at one of the Features to identify potential buried material and/or disturbed soil.

On July 17, 2007, Ford Motor Company submitted applications to enter into the Minnesota *Voluntary Investigation and Cleanup (VIC)* program *and the Voluntary Petroleum Investigation and Cleanup (VPIC)* program. The *VIC* program was created to promote the development on properties with known or suspected environmental concerns. Under the Land Recycling Act of 1992, persons who are not responsible for environmental issues on a property are eligible for future liability protection when a voluntary investigation occurs. The *VPIC* program is similar to the *VIC* program, but only applies to petroleum contaminants on a property/site. The exterior site Feature results presented in this report were grouped based on the applicable state regulatory program.

Twenty-two Features were investigated/evaluated under the *VIC* program, seven Features were investigated under the *VPIC* program and two features, which could potentially fall into either program, were investigated under both programs.

This report presents details regarding the scope of work, a summary of analytical results, along with findings and recommendations with respect to the Initial Phase II –

Exterior Investigation. The Initial Phase II – Exterior Investigation is not yet complete and further evaluation will be conducted.

Below is a summary of data collected and findings obtained during the Initial Phase II – Exterior Investigation:

- Unconsolidated soils at TCAP are approximately 1 to 18 feet in thickness and consist largely of fill material or soil that has been reworked as part of construction at the facility. Bedrock on the main portion of the facility consists of Decorah Shale (approximately 35 feet in thickness), underlain by a 30 foot thick unit of the Platteville Limestone. Located beneath the Platteville unit is the Glenwood Shale which is roughly 2 to 10 feet thick. The underlying bedrock unit is the St. Peter Sandstone. In the portion of the TCAP within the floodplain, adjacent to the Mississippi River, the St. Peter Sandstone was the only rock unit encountered.

- Perched groundwater is present in the unconsolidated formation, at depths ranging from 2 to 8 feet below ground surface (ft bgs). The direction of groundwater flow in this unit was not determined since the temporary wells were not surveyed. Also, the perched water, as observed during this initial investigation, is not likely present as a continuous aquifer beneath the property, and groundwater flow is expected to be highly influenced by local features such as foundations or topographic relief.

- Groundwater is present in the Platteville Limestone at depths ranging from 18.71 to 78.82 ft bgs at elevations from 779.31 to 793.09 ft mean sea level (MSL) and in the St. Peter Sandstone at depths ranging from 32.83 to 100.82 ft bgs at elevations from 690.27 to 710.90 feet. Generally, the direction of groundwater flow in both units is west, with some southwesterly components of flow towards the nearby Mississippi River. Groundwater mounding was noted in the Platteville Limestone, possibly due to variability in infiltration caused by the overlying structures.

- *VIC Program*

Soil samples collected from six of the 21 Features investigated under the *VIC* Program (Former Hazardous Waste Storage Area - Feature 10, Wastewater Collection ASTs - Feature 44, Wastewater Treatment Area- Feature 134, Potential Battery Waste Disposal Area (Baseball Fields) - Feature 139, Former Waste Disposal Area - Feature 140, and Collapsed Area With Buried Drums - Feature 150) contained one or more constituent at a concentration exceeding the Tier 2 Industrial Soil Reference Values (SRVs) (Tier 2 Recreational SRV for Potential Battery Waste

Disposal Area (Baseball Fields) - Feature 139). Additional soil evaluation of these Features is anticipated.

Perched groundwater samples were collected from three of the Features assessed under the VIC program. Two of these Features (Former Railroad Spurs - Feature 12 and Former Coal Operations - Feature 47) contained one or more constituent at a concentration exceeding the Minnesota Health Risk Limits (HRLs). Additional groundwater evaluation of these Features is anticipated. In addition, a perched groundwater sample will be collected in the future near the Former Hazardous Waste Storage Area - Feature 10 for metals.

Based on the data collected to date, no further soil or groundwater evaluation is anticipated for Features with no soil exceedances of the Tier 2 Industrial SRVs or groundwater exceedances of the HRLs.

- *VPIC Program*

Soil samples collected from two of the seven Features investigated under the *VPIC* soil program (Former Gasoline, Sunoco Spirits and Pryoxlin Thinner USTs - Feature 16 and Former Fuel Oil UST - Feature 152) contained one or more constituent at concentrations exceeding the Tier 2 Industrial SRVs. Additional soil evaluation of these Features is anticipated.

Perched groundwater samples were collected from four of the Features assessed under the VPIC program. All four of the features where perched groundwater samples were collected (Former Location of Gasoline and Diesel Fuel Underground Piping - Feature 5, Former Gasoline, Sunoco Spirits and Pryoxlin Thinner USTs - Feature 16, Former Oil Fill Area - Feature 20 and Former Fuel Oil UST - Feature 152) contained one or more constituent at a concentration exceeding the HRLs. Additional groundwater evaluation of these Features is anticipated.

Based on the data collected to date, no further soil or groundwater evaluation is anticipated for Features with no soil exceedances of the Tier 2 Industrial SRVs or groundwater exceedances of the HRLs.

- *VIC and VPIC Programs*

No soil samples collected from the Features assessed under both the *VIC* and *VPIC* soil programs contained constituent concentrations exceeding the Tier 2 Industrial SRVs. No temporary wells were set due to no water observed or lack of water accumulating in the borings in either of the Features. No further soil or groundwater evaluation is anticipated.

- Permanent Groundwater Monitoring Wells

Perched Groundwater - Existing Wells (MW-4, 5 and 6)

Several Resource Conservation and Recovery Act (RCRA) metals were detected in each of the three groundwater well samples at concentrations below the HRL. Two RCRA metals were detected above the HRL (chromium at MW-5 and lead at MW-6). No other constituents were detected above the HRLs. A total of three additional quarterly monitoring events are anticipated.

Platteville Limestone Wells (AMW-01, 02, 03A, 04, 06, 08, 09 and 10)

Arsenic was detected in groundwater samples at AMW-06, AMW-08, and AMW-09 above the HRL. In AMW-09, cadmium was detected above the HRL. Chromium was detected in AMW-08 and AMW-09 above the HRL. Lead was detected above the HRL in AMW-06, AMW-08, and AMW-09. No other constituents were detected above the HRLs in Platteville Limestone wells. A total of three additional quarterly monitoring events are anticipated.

St. Peter Sandstone Wells (AMW-03B, 05, 05B and 07)

No sample was collected from AMW-05 as the well was dry at the time of sampling. Lead was detected above the HRL in the groundwater sample collected from AMW-05B. Benzo(a)pyrene was detected in AMW-07 above the HRL. No other constituents were detected above the HRLs in St. Peter Sandstone wells. A total of three additional quarterly monitoring events are anticipated.

VIC guidance requires a minimum of two sampling events to confirm groundwater sampling results. To date, one sampling event has been completed. The results presented in this report provide an overview of the groundwater analytical results from

this first round of sampling. Conclusions regarding groundwater quality will be developed after further sampling events.

Based on the results of the Initial Phase II – Exterior Investigation, limited soil impacts exist in the vicinity of eight out of 30 Features investigated. ARCADIS recommends the following activities be conducted to meet the *VIC* and *VPIC* Program requirements for a Phase II Investigation:

- Define and delineate the extent of impacts where the Tier 2 Industrial SRVs or HRLs were exceeded at each exterior Feature.
- Conduct three quarterly rounds of groundwater samples from the monitoring well network.
- Initiate the receptor survey activities (groundwater survey and vapor survey).
- Develop a scope of work for the Initial Phase II – Interior Investigation.

For the additional activities described above, work plans will be prepared and submitted to the *VIC* and/or *VPIC* Programs for approval(s).

1. Introduction

On behalf of Ford Motor Company (Ford), ARCADIS has prepared this Initial Phase II – Exterior Investigation Report for the Twin Cities Assembly Plant (TCAP) located at 966 South Mississippi River Boulevard within the City of St. Paul in Ramsey County, Minnesota (Site).

The current operations at TCAP consist of the assembly and painting of light duty trucks (Ford Ranger) using parts that are manufactured elsewhere. Processes include welding, assembly, metal cleaning, painting and curing, windshield and trim installation and preparation of the vehicles for final delivery. In addition, a wastewater treatment plant and steam plant are also in operation at TCAP and are associated with the current assembly operations which were all investigated during the Phase I Environmental Site Assessment (ESA).

ARCADIS completed a Phase I ESA for TCAP in early 2007 (ARACADIS, 2007). During the Phase I assessment, several Recognized Environmental Conditions (RECs), Historical RECs (H. RECs), and Areas of Interest (AOI) were identified both inside and outside the buildings. The Initial Phase II – Exterior Investigation was implemented to evaluate the exterior Features identified as RECs and AOIs. The RECs and AOIs are referred to as Features in this report, and will here on out be referred as Features. The scope of services performed by ARCADIS during the Initial Phase II – Exterior is described below.

- Utility clearance was conducted prior to initiating any subsurface work.

- A Perimeter Groundwater Investigation was conducted to characterize groundwater quality and groundwater flow direction near the property boundaries by installing eight bedrock wells in the Platteville Limestone/Dolostone and four bedrock wells in the St. Peter Sandstone.

- Feature investigations were completed to evaluate the potential presence of soil and/or groundwater impacts associated with the exterior Features identified at the Site by installing 54 soil borings, 16 hand augers and nine temporary wells. The Features were grouped based on which potential lead program in the Minnesota Pollution Control Agency (MPCA) would be evaluating the results.

- A geophysical study was conducted at the Potential Battery Disposal Area (Baseball Fields) – Feature 139 to evaluate subsurface conditions in the area that may have been used for disposal of batteries.

- All monitoring well and boring locations were surveyed.

- Soils, drilling water, and monitoring well water were analyzed and characterized as investigative-derived waste (IDW) for disposal.

This report presents details regarding the property history and the historical investigation activities completed at TCAP, a summary of findings from the 2007 Phase I ESA, and a description of the activities completed in executing the scope of work. A detailed discussion of the analytical results from the Initial Phase II – Exterior is presented, along with a summary of findings and recommendations regarding future investigative work.

2. Site Background

This section provides a description of the Site, a summary of the Site history, and a description of the Site geology and hydrogeology.

2.1 Property Location and Description

The 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". The Site 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. The Site is accessed from the west via two entrances on South Mississippi River Boulevard and from the north via three entrances on Ford Parkway.

The Site property is improved with production buildings and several outbuildings, which comprise an approximate total of 2,144,932 square feet of building area. The primary production buildings consist of the main assembly building, which also includes a warehouse portion, and a paint building. A steam plant and wastewater treatment plant are also associated with the current operations. Three baseball fields are located in the southeast portion of the property, which were included in this assessment.

Several railroad spurs are present in the southern and central portions of the Site, which allow transport of parts and materials utilized in the assembly operations to the plant and transfer of completed vehicles from the plant. Vehicle parking areas are located in the northern, eastern and central portions of the Site. An additional irregularly shaped parking area is located south of the steam plant.

The current operations at the TCAP consist of the assembly and painting of light duty trucks using parts that are manufactured elsewhere. Processes include welding, assembly, metal cleaning, painting and curing, and preparation of the vehicles for final delivery. In addition, a wastewater treatment plant and steam plant are also in operation and are associated with the current assembly operations.

The property layout is depicted on Figure 1. The exterior Features are depicted on Figure 2 and are summarized in Table 1.

2.2 Site History

According to historical sources reviewed, the property on which the TCAP now resides was vacant undeveloped land prior to the development of the assembly plant. Construction of the original portion of the main assembly building began in 1923 and several additions to the main assembly building have occurred throughout the years, mainly between 1960 and 1978, which added an additional 300,000 square feet to the original building. An addition to the warehouse portion of the main assembly building was constructed in 1989 to 1990, which included a computerized stock storage and retrieval system.

The paint building is located to the east of the assembly plant and consists of approximately 275,000 square feet of operating space. The paint building was constructed in 1985 and is connected to the main assembly building via a 625-foot bridge that supports delivery conveyors to transport bare metal truck bodies from the main assembly building to the paint building and painted truck bodies to the trim area in the main assembly building.

The steam plant was constructed in 1923 and consists of approximately 10,400 square feet. A historical structure was associated with the steam plant, located near the southeastern portion of the current steam plant. The historical structure was apparently constructed prior to 1937 and was demolished prior to 1974. The historical use of the structure is unknown. The wastewater treatment plant was constructed in 1984 and consists of approximately 10,124 square feet, according to assessment records.

2.3 Site Geology and Hydrogeology

The general geology and hydrogeology of the Site, based on information identified during the Phase I ESA, is outlined in the following sections. Subsequent sections in the report provide additional details regarding hydrogeologic conditions, based on the Initial Phase II – Exterior work.

2.3.1 Geology

At the surface of the Site property, a thin mantle of unconsolidated sediments exists over bedrock terraces. Underlying 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 the Site 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.

2.3.2 Hydrogeology

To define the groundwater flow system at the Site, ARCADIS identified the stratigraphic units which were grouped into hydrostratigraphic units according to their water bearing properties. Units having a significant capacity to transmit water were termed aquifers, units with low permeability which have a low capacity to transmit water were termed aquitards and units which are essentially impermeable to groundwater flow were termed aquicludes. Three hydrostratigraphic units exist at the Site. The first consists of the unconsolidated sediment, which is a heterogeneous unit and may have properties of an aquitard or an aquifer, depending on the location of the monitoring wells installed in the areas investigated. However, taken as a whole, the formation would be considered to be an aquitard. The second unit is the Decorah/Platteville/Glenwood Formation which is an aquitard/aquiclude. The third unit, the St. Peter Formation is a high-yielding aquifer. The groundwater in both the unconsolidated sediment and the Decorah/Platteville/Glenwood Formation is perched. Based on previous subsurface investigations completed, the groundwater flow direction within the St. Peter Formation was determined to be southwest towards the Mississippi River.

Near the Mississippi River, in the floodplain, The Decorah/Platteville/Glenwood Formation is absent; the uppermost unit in this area is the St. Peter Sandstone Formation.

2.4 Previous Investigations

During the Phase I ESA, ARCADIS was provided with previous investigation reports relevant to the TCAP. The information provided in the previous reports is summarized in the following sections. The data from the previous investigations was used to evaluate the Features and to develop the scope of work for the Phase II activities.

2.4.1 Summary of Activities Completed for the Three Former Disposal Areas (Former Disposal Area A - Feature 9, Former Disposal Area B - Feature 11 and Former Disposal Area C - Feature 13) and the Former Bulk Storage and Waste Solvent UST Area (Waste Solvent USTs - Feature 35, Former Bulk Solvent and Waste Solvent USTs - Feature 36, Solvent UST Underground Piping - Feature 37 and Sump within Solvent UST Basin - Feature 46)

Conestoga-Rovers & Associates Limited (CRA) prepared a Revised Draft Remedial Investigation/Alternatives Analysis (RI/AA) Report for the TCAP in May 1992 (CRA, 1992). The RI/AA was conducted as part of a Remedial Investigation/Feasibly Study (RI/FS) in accordance with a Request for Response Action (RFRA) issued by the MPCA on June 26, 1990. The RFRA was issued by the MPCA due to the historical waste handling and disposal practices at the Site. Three historical waste disposal sites were identified at the property as well as impact caused by a release of solvent-related compounds from used paint solvent (non-halogenated) underground storage tanks (USTs) in place at the Site. The four areas of concern are referenced as Former Disposal Areas A, B, C and the former bulk storage and waste solvent UST area.

Area A is located in the south-central portion of the Site, southwest of the paint building; Area B is located just southeast of the main assembly building; Area C is located south of the steam plant along the Mississippi River; and the former bulk storage and waste solvent UST area is located west of the current hazardous waste storage building. Present and historic aboveground storage tanks (ASTs) and USTs are depicted on Figure 3 and presented in Table 2.

A risk assessment was also completed with regards to Former Disposal Areas A and B and the UST area to estimate the potential risk to human health, which was included in CRA's May 1992 RI/AA. The assessment included analytical testing of soil and water samples obtained from the areas and modeling using risk exposure equations. Based on the assessment it was determined that the only exposure to chemicals of concern present in the former bulk storage and wastes solvent UST area would occur during excavation and construction-related activities, which would be controlled by a health

and safety plan. It was determined that the only potential exposure pathways for former disposal Areas A and B would be wading in the Hidden Falls Creek via dermal contact and accidental oral ingestion of water, since the creek is too shallow to support fishing or swimming. In addition, potential future exposure to subsurface soils could occur should construction activities be performed in the areas of A and B, which would also need to be managed by a health and safety plan. Although the identified impacts posed limited risk, remediation activities were completed as descried below to address Former Disposal Areas A and B and the former bulk storage and waste solvent UST area.

Former Disposal Area A - Feature 9 and Former Disposal Area B - Feature 11

- Areas A and B were utilized as historical disposal sites for wastes generated at the Site. Paint sludge and wastes were disposed of in Area A from 1943 until 1960. Burning and burial of plant waste occurred at Area B during early plant operations until 1945. Waste paint sludge was burned at Area B and burial of non-combustible wastes such as scrap steel, bricks, concrete block and other solid materials occurred at Area B. Documentation reviewed at the MPCA indicated that waste solvents generated during 1950 through 1976 contained aromatic and aliphatic hydrocarbons, ketones, esters, alcohol, xylene and toluene.

- Excavated materials from these two areas were deposited into Area C, due to a railroad car expansion project and construction of additional parking (1962 and 1966).

- No previous field work was conducted at Areas A and B prior to the issuance of the RFRA, with the exception of five soil borings and three monitoring wells being completed in the vicinity of Area B in 1989 and 1990.

- The locations of the soil borings completed in the two areas to investigate the subsurface conditions as part of the RI/FS were selected based on a review of past investigative work and historical aerial photographs which depicted areas of disturbance. Three monitoring wells were installed in the bedrock at Area B to ascertain if impacted groundwater previously detected within Area B has migrated vertically into the bedrock. Surface water samples were also collected from Hidden Falls Creek and the Mississippi River, upstream and downstream of the Areas A and B.

- The remedial investigation activities conducted at Areas A and B resulted in an Interim Response Action to remove soils with inorganic and organic concentrations that exceeded the response action goals as outlined by the MPCA. The compounds of concern were lead, ethylbenzene, toluene and xylenes. Soils were excavated from six "hot spots" from November 1992 through January 1993. Approximately 352 tons of impacted soil was removed from the areas and disposed of at the Madison Prairie Landfill in Dane County, Wisconsin. The soil was shipped as non-hazardous special waste. The Response Action Final Completion Report for Areas A and B was accepted by the MPCA on April 20, 1993. On July 8, 1993, the TCAP was de-listed from the Permanent List of Priorities (PLP). Therefore, Former Disposal Areas A and B are considered H. RECs.

Former Disposal Area C - Feature 13

- Area C is located west of South Mississippi River Boulevard and south of the steam plant. Area C was utilized as a historical waste disposal site for paint sludge and wastes generated at TCAP prior to 1970. Filling activities with paint sludge and waste ceased in 1965; however, substantial filling with demolition rubble and excavated soil occurred after 1965, including soils and waste materials that were excavated from Areas A and B. A volume of approximately 30,000 cubic yards of waste material is believed to be located within Area C. The paint sludge and waste materials were buried beneath approximately 30 feet of rubble including large blocks of reinforced concrete. Drums containing waste materials were also indicated as being buried in this disposal area. An existing 8-inch concrete pavement covers most of the waste fill and limits infiltration through the waste material. The total fill thickness throughout Area C was determined to be approximately 60 feet, which, if removed, would require the removal of a concrete parking lot and excavation of approximately 50,000 cubic yards of fill material.

- A groundwater and chemical data evaluation for Area C concluded that: a) Area C appeared to have had no impact on the Mississippi River; b) concentrations of dissolved metals were either below method detection levels (MDLs) or were low and typically acceptable for levels naturally occurring in groundwater; c) barium was the only analyte found above MDLs in river samples taken in 1990 and was found at equal concentrations upstream and downstream from Area C; and d) review of all 1990 sampling data indicated no analyte concentration at or near any then-applicable standards used for comparison of water quality and purity (maximum contaminant levels [MCLs] and remedial action levels [RALs]) and all

results for the supplemental 1990 monitoring were found well below the current Minnesota Department of Health (MDH) Health Risk Limits (HRLs) and MCLs.

- Ford Motor Company proposed no further action for Area C in the February 15, 1991 "RI/FS Work Plan." The MPCA approved the Work Plan in a letter dated January 16, 1991 and Area C was de-listed from the Minnesota PLP along with Areas A and B on July 8, 1993. Therefore, former disposal Area C is considered a H. REC.

Former Bulk Storage and Waste Solvent UST Area (Waste Solvent USTs - Feature 35, Former Bulk Solvent and Waste Solvent USTs - Feature 36, Solvent UST Underground Piping - Feature 37 and Sump within Solvent UST Basin - Feature 46)

During the fall of 1984 the former bulk storage and waste solvent UST area was constructed and four USTs were installed to store paints, resin and new solvents delivered to the TCAP in tanker trucks. The USTs were double-walled steel tanks with corrosion protection and were anchored on buried 24-inch thick concrete pads. Apparently, only two of the four USTs were utilized, one of which was placed into use in 1987 and the other was put into use in 1988 (other documentation reviewed indicates that all four USTs may have been utilized to store materials during different periods of time). Based on an analysis of the waste materials stored within the two USTs that were operated, the waste solvent in the tanks consisted of 45 percent xylene; 13.5 percent methyl isobutyl ketone (MIBK) and 12.5 percent toluene with a waste density of 0.882. Present and historic ASTs/USTs are depicted on Figure 3 and presented in Table 2.

- Site investigation activities were completed in this area in 1992. This investigation was initiated due to a release of solvent-related compounds into the surrounding subsurface. It was determined that the impacted area was confined to the UST basin and that the Decorah Shale, which is located approximately 20 feet below the basin, is essentially impermeable to groundwater flow and would prevent vertical migration of contaminants. Based on the UST investigation results, an interim response action (IRA) for tank removal and remediation was implemented in 1992. The IRA consisted of removal of the four USTs, removal of 790 cubic yards of soil, replacement of the drain tile and sump system associated with the UST system, on-site thermal treatment of soils and backfill of the excavation with imported clean soil and treated soils. Currently, two waste solvent USTs are present within this area, which were installed following removal and remedial activities associated with the four former USTs in 1992.

- In addition to the IRA, the final remedy for the UST site, as stated in MPCA's March 22, 1993, Record of Decision (ROD) Document, included continued pumping of the UST sump to the wastewater treatment plant, periodic monitoring of the UST sump discharge, and periodic monitoring of the three monitoring wells present near the UST site. The UST site was de-listed from the PLP on July 8, 1993; however, the monitoring of the three UST site monitoring wells continued until 2003. At that time, the MPCA approved discontinuation of the well monitoring. Based on a 2007 Annual Monitoring Report completed by CRA, ethylbenzene, MIBK, and total xylenes were detected above the applicable criteria in the sump and the next monitoring event is scheduled for the summer of 2008.

Additional Information Pertaining to Former Disposal Area A - Feature 9, Former Disposal Area B - Feature 11 and Former Disposal Area - Feature 13 Obtained Through Review of Files Maintained by Ford

Additional information pertaining to the former waste disposal sites was obtained from documentation maintained at the TCAP and/or Ford, which included several items of correspondence between Ford and the MPCA. A letter dated October 23, 1992 described the site conditions at the time. The letter indicated that the TCAP was on the state superfund list of contaminated areas. Soils in various areas of the property were contaminated with solvents, oils and paint sludge. The TCAP received a score of 8, with 100 being the highest level of concern. Contaminated soils were excavated from the UST area in the summer of 1992 and were treated at an area near the steam plant (Area C) along the river below the bluff. The treatment method was called "soil roasting." Under an MPCA-approved plan, the contaminated soils were stockpiled at a burner on an impermeably lined pad. The pile was covered and diked to prevent possible runoff from the stockpile. The soils were fed into a portable asphalt-type burner, where the contaminants were volatilized and destroyed by combustion. Approximately 500 cubic yards of impacted soil was treated on-site at the time of the letter submittal.

Also contained in the TCAP documentation reviewed was a letter from Al Johnson Construction Company General Contractors, dated October 26, 1979 to Ford, indicating that approximately 19,000 cubic yards of concrete, 10,000 cubic yards of sandstone and 18,000 cubic yards of sand was proposed to be transported to Area C for disposal. The solid waste material was generated as a result of rehabilitation activities of the Ford Lock site (near the hydroelectric plant). The fill material was to be added to bring the height of the fill area to grade with the existing roadway to the steam plant. Once the property (Area C) was brought to grade a concrete parking lot

was proposed to be constructed over the area for truck parking. The filling activities were apparently approved in August 1981. The parking lot area was observed during ARCADIS' Phase I ESA site Feature reconnaissance activities in March 2007.

2.4.2 Former Fuel Oil UST - Feature 41

Subsurface Investigation Completed by Peer Environmental & Engineering Resources, Inc. (PEER) (January 1992),

PEER was retained by Howard Needles Tammen & Bergendoff (HNTB) to perform a remedial investigation at the steam plant (PEER, 1992). The investigation was conducted in response to a petroleum release from a UST. The purpose of the investigation was to define the horizontal and vertical extent of the release and to assess the potential impacts to public health and environment. The work was performed between November 1991 and January 1992. The UST release was from a 26,500 gallon UST containing fuel oil #6. The UST was of steel construction and was installed south of the steam plant in 1950.

Prior to UST closure activities, a preliminary subsurface investigation was performed by Nova Environmental Services, Inc. (Nova) on September 18, 1990 to determine if any releases had occurred from the UST. Based on the results of the preliminary investigation, a release was reported to the MPCA on September 20, 1990 (leak 3262).

Soil borings and monitoring wells were subsequently installed by PEER to assess the impact caused by the release. Sandy clay fill to depths of approximately 9 to 15 feet below ground surface (ft bgs) were encountered during soil boring completion. The fill was underlain by alluvial deposits consisting of silty sand and sand with gravel. Groundwater was encountered in the alluvial deposits at depths of approximately 23 to 30.5 feet. The groundwater flow was determined to be southwest, towards the Mississippi River. Soil and groundwater samples were collected and analyzed from the area of the fuel oil UST. Fuel-oil impacted soils were encountered at an elevation several feet beneath the base of the UST and just below the water table. Impacted soils were identified at a depth of 28 to 35 ft bgs in B-1 and B-2 (located southeast and north of the UST, respectively). In boring ST-2 (directly southeast of UST), the impacted soil extended from a depth of 29 to at least 37 ft bgs. No free product was detected during investigation activities. Based on the analytical results, traces of gasoline contamination were detected in the area of the fuel oil UST, which appeared to be unrelated to the UST. The UST was closed in place in October 1990 after it was determined that the removal of the UST was not feasible. UST removal was not

feasible because the UST is buried at a depth of 22 ft bgs and is located in proximity to numerous utilities associated with the steam plant and aboveground water tank.

PEER concluded that groundwater impacts associated with the petroleum release were limited, based on analytical data; there was a low potential for vapor impacts to on-site utilities and basement structures due to the depth of contamination and the low mobility and volatility of fuel oil #6 constituents. Based on the results of the investigation performed, it did not appear that soil or groundwater corrective actions were warranted. PEER recommended that additional water level measurements and a second round of groundwater samples be obtained in March 1992. The release received an MPCA approved closure in 1994.

2.4.3 Former Area of Impacted Soil Leak # 10700 - Feature 4

American Engineering Testing, Inc. (AET) Phase II Environmental Site Assessment – Proposed Ford Motor Company/UAW/State of Minnesota Training Facility, St. Paul, Minnesota, Dated June 18, 1997

AET was retained by the Minnesota Department of Administration to conduct a Phase II ESA at a proposed state training facility to be constructed along the northeast corner of the main assembly building. The purpose of the Phase II ESA was to determine if the subsurface in the area of the proposed training center had been impacted by a nearby Leaking Underground Storage Tank (LUST) site located near the southeast portion of the proposed training center. Below is a brief summary of the Phase II ESA activities and findings.

- Five soil borings (SB-1 through SB-5) were advanced in the area of the proposed training center on April 24 and 25, 1997 and an additional soil boring (SB-5A) was advanced adjacent to SB-5 on June 11, 1997. The soil borings were extended to depths ranging between 11.5 and 17 ft bgs and were situated at locations around the perimeter of the proposed training facility. In addition, groundwater samples from each boring were collected from a depth of approximately 6 to 8 feet.

- Based on field screening with a photoionization detector (PID) unit, elevated levels of organic vapors up to 180 parts per million (ppm) were identified in SB-5 (completed near the western portion of the current training center) and 650 ppm was identified in SB-5A. Petroleum odors were also identified in conjunction with the PID readings. No elevated PID readings from SB-1 through SB-4 were recorded.

- The soil analytical results revealed Volatile Organic Compounds (VOCs) indicative of a gasoline release present in SB-5. The VOCs were below the reporting limits in the remaining samples. Diesel Range Organics (DRO) were detected in SB-5A at 45 ppm and in SB-1 at 31 ppm. DROs in the remaining samples were below reporting limits. The Gasoline Range Organics (GRO) were reported to be 46 ppm in SB-5 and 570 ppm in SB-5A. The analysis for the eight RCRA metals found the metals concentrations to be within naturally occurring ranges in all samples.

- Analytical results of the groundwater samples collected revealed that DRO were below reportable limits; low levels of VOCs (below established limits for drinking water) were reported for methylene chloride and chloroform; and metal concentrations were below detectible limits in SB-5A.

- The Phase II ESA Report concluded that abandoned fuel lines, which historically carried both gasoline and diesel fuel, were present in the area of the investigation and that the contamination was most likely a result of leakage from the gasoline line. AET recommended that the fuel lines be excavated and that the soils encountered should be screened with a PID. In addition, any soils excavated from the area were recommended to be screened with a PID for proper disposal in accordance with MPCA regulations. Furthermore, AET recommended that the property owners (Ford) be notified of the contamination found as well as an application/request for assistance form sent to the MPCA's *VPIC* program.

CRA Development Response Action Plan Training Center Construction, Ford Motor Company Twin Cities Assembly Plant, St. Paul, Minnesota, Dated February 1998

This report outlined the Development Response Action Plan (Development RAP) related to the management of the petroleum-impacted soils at the training center location for which the MPCA had assigned leak Number 10700 (CRA, 1998). The report provided a background of investigative activities that were completed at the facility and the proposed soil and groundwater management plans for the area. A brief summary of the report is provided below.

- In October 1997, in response to the June 1997 AET report, CRA conducted a limited soil and groundwater investigation in the area of the proposed training center. During soil boring completion Decorah Shale was encountered generally between 9 and 11 ft bgs. Perched groundwater was encountered at 5 ft bgs at all boring locations. CRA reported to the MPCA that a small amount of free product was discovered at soil boring location S-4, located along the western portion of the

proposed training center. The MPCA requested that a monitoring well be installed in the area of S-4 to evaluate the thickness and potential volume of the free product encountered in the area. After additional planning and discussion with the MPCA, Ford submitted an application to enter into the MPCA's *VPIC* program on December 10, 1997 which was approved by the MPCA on December 16, 1997.

- Additional investigative work was completed in January 1998 to define the extent of the petroleum impact beneath and adjacent to the proposed training center. Nine soil borings and one monitoring well (in the location of S-4) were completed to the top of bedrock or to a maximum depth of 12 ft bgs. Measurements of the monitoring well identified approximately 0.01 foot of free product.

- In February 1998, ten soil borings were completed in the area to characterize the soils that were to be excavated from the proposed training center area for disposal or reuse purposes. It was estimated that approximately 16,000 cubic yards of soil would be excavated from the area and that approximately 5,500 cubic yards of soil would be impacted and would need soil characterization for disposal. In addition, it was anticipated that dewatering would be required during excavation activities; therefore, groundwater sampling was completed to provide the necessary data to apply for a discharge permit to the city sanitary sewer. On February 24, 1998, the Metropolitan Council of Environmental Services (MCES) granted temporary approval for the discharge of contaminated groundwater generated from the excavation activities into the city sanitary sewer system.

- The excavated soils from the area of the training center would be directly loaded onto trucks for off-site transportation as site conditions did not allow for the temporary storage of soil prior to off-site transportation. The monitoring well previously installed in the area would be removed during excavation activities. A soil and groundwater management plan was outlined in the report and proposed to be implemented during the activities.

CRA Implementation Report Development RAP Training Center Construction, Ford Motor Company Twin Cities Assembly Plant, St. Paul, Minnesota, Dated May 15, 1998

CRA submitted a letter to the MPCA to serve as the implementation plan for the Development RAP at TCAP. The Development RAP was approved by the MPCA on February 27, 1998.

Construction activities of the training facility began on March 2, 1998. During the excavation activities CRA collected soil samples and evaluated them immediately in the field for potential impact by visual and PID unit methods. The purpose of the screening was to identify excavated soil that was petroleum-impacted and would be sent off-site for disposal versus reuse as off-site general fill material. A total of approximately 3,078 cubic yards of soil was sent to a disposal site for biological treatment. Dewatering activities were conducted during the excavation activities and groundwater was pretreated prior to discharge into the sanitary sewer system. The treatment system contained an oil/water separator and an air stripper. A total of 50,693 gallons of water from dewatering activities was discharged during the project.

2.5 Summary of 2007 Phase I ESA

A Phase I ESA was completed by ARCADIS in 2007 to identify Features and obtain information regarding environmental activities and conditions at the Site. Based on the file reviews and site visits, the Phase I indicated that Site property is improved with production buildings and several out buildings, which comprise an approximate total of 2,144,932 square feet of building area. The primary production buildings identified consist of the main assembly building, which also includes a warehouse portion and a paint building. A steam plant and wastewater treatment plant are also associated with the current operations. A 40,000 square foot technical training center was added to the northeastern portion of the main assembly building in 1999. Three baseball fields are located in the southeast portion of the TCAP property. Several subsurface tunnels are also located below TCAP, which include traffic tunnels, gas tunnels, cable tunnels, mined sand tunnels and a utility tunnel.

According to historical sources reviewed, the property on which TCAP now resides was vacant undeveloped land prior to the development of the assembly plant. Construction of the original portion of the main assembly building began in 1923 and several additions to the main assembly building have occurred throughout the years. In addition, glass manufacturing and nickel plating operations historically occurred at the Site within the main assembly building. The glass was manufactured from silica sand mined from tunnels existing approximately 60 feet beneath the Site.

The current operations occurring at the Site include the complete assembly of light duty trucks. All parts for the assembly process are shipped to the plant via truck or rail. In general, the assembly process includes assembly of the cab and box, cleaning and painting of the bodies, installation of the windshields utilizing a sealer compound, installation of the interior and other trim features and quality assurance and quality

control of each completed vehicle. The completed vehicles are then prepared for delivery via truck or rail. The steam plant is used to provide heat for various assembly and painting operations within the plant and the wastewater treatment plant treats the industrial wastewater generated from the assembly process.

The Phase I assessment at the Site was based primarily on conditions observed at during site inspections conducted on March 14 through 16, 2007 and May 2 through 7, 2007, information obtained from publicly available databases, review of documentation and site plans provided by Ford, information obtained through research conducted through state, county and local agencies, and interviews with individuals having relevant information pertaining to historical and current Site conditions. The Phase I assessment identified several Features associated with the Site to be investigated during Phase II investigation activities. Table 1 presents the summary of the Features investigated during Initial Phase II - Exterior Investigation activities.

A visual inspection was completed of the subsurface tunnels located below the Site during the Phase I ESA. Accessible areas within the traffic tunnels, gas tunnels, cable tunnels, mined sand tunnels and utility tunnels were inspected. The traffic tunnels run west-southwest and east-northeast under the central portion of the main assembly plant and were historically utilized to transfer finished vehicles from the main assembly building to barges on the Mississippi River for shipment. The gas tunnel entrance is located adjacent to the steam plant and is made of concrete block, while the remainder of the tunnel consists of sandstone. Another accessible entrance is located within the main assembly plant in bay M33. The gas tunnel is not currently in use. Historically, a gasification plant was located near the steam plant where coal was used to generate gas. The gas was then pumped to the main assembly plant through this tunnel. At the east end of the gas tunnel, water was observed to be leaking in from the main assembly building above. The cable tunnels are accessible from the north traffic tunnel, a utility building located approximately 300 feet north of the north traffic tunnel entrance, a third entrance through a door from inside the hydroelectric plant building and a fourth entrance through a manhole near the hydroelectric plant. The main cable tunnel runs north-northwest and south-southeast, with a central junction that runs east-northeast and west-southwest. Mined sand tunnels are connected to the traffic tunnels and cable tunnels. The sand tunnels are accessible only through one of the junctures in the traffic and cable tunnels. The majority of the mined sand tunnels are located underneath of the Paint Building, with the exception of tunnel 1A which runs underneath the general central portion of TCAP. The utility tunnel is located underneath the main assembly building floor and begins in the former oil house. The utility tunnel runs west-southwest and east-northeast and terminates near bay G18.

Only the one exit/entrance exists for the utility tunnel, which is located inside the former oil house beneath a floor hatch.

3. Overview of Initial Phase II – Exterior Investigation

ARCADIS conducted an Initial Phase II - Exterior Investigation of the site to evaluate soil and groundwater conditions of the exterior Features identified in the Phase I ESA. Features were grouped based on the anticipated state agency program, and investigative methods were developed based on state agency program requirements. Investigation methods at each Feature were based on the knowledge of the geology and hydrogeology of the site, previous investigation results, potential environmental concerns and agency requirements.

A separate investigation will be conducted to evaluate Features located within the plant buildings.

3.1 Scope and Rationale

The scope of work is described in detail in the Initial Phase II – Exterior Scope Matrix presented in Table 1. In general, the following scope of work was completed for the Initial Phase II - Exterior Investigation:

- Conducted utility clearance prior to initiating any subsurface work.
- Completed a Perimeter Groundwater Investigation to characterize groundwater quality and aquifer flow direction near the property boundaries in the St. Peter Sandstone and Platteville Limestone.
- Completed Feature Investigations to evaluate the potential presence of soil and groundwater environmental impacts associated with the exterior Features identified at the Site.
- Conducted a geophysical study to evaluate subsurface conditions in the Potential Battery Disposal Area (Baseball Fields) - Feature 139.
- Completed soil borings and collected soil samples at several areas that were identified during the geophysical survey.
- Surveyed all monitoring well and boring locations.
- Characterized IDW for disposal.

3.2 Field Investigation Methods

3.2.1 Utility Clearance

A full utility clearance was performed prior to initiating any subsurface work at the Site. Gopher One Call was notified so that all utility lines servicing the Site were marked. In addition, a private utility locator, Hance Utility Service, Inc. of Buffalo, Minnesota, was retained to locate private lines in the areas where subsurface work was conducted. Ford Plant personnel assisted the private utility locator for the duration of the work.

When selecting potential drilling locations, ARCADIS conducted a visual inspection for marked subsurface utility locations, manholes and other evidence of subsurface utilities, and referred to client-provided site and utility maps.

3.2.2 Permanent Groundwater Monitoring Wells

ARCADIS advanced 12 soil borings for the purpose of installing groundwater monitoring wells to evaluate groundwater quality in the vicinity of the property boundaries. Well locations are presented in Figure 2 and well depths are presented in Table 3.

Bedrock is present in areas of the site as shallow as 2 ft bgs. As a result, all of the monitoring wells were advanced into the bedrock. Two water bearing units are present at the site. Based on existing geologic information the groundwater table on top of the bluff near the plant is located in the Platteville Formation, which consists of limestone and dolomitized limestone. At the portion of the Site within the floodplain, adjacent to the Mississippi River, the groundwater table is located in the St. Peter Sandstone. In some areas of the Site, perched groundwater is encountered above or at the interface of the unconsolidated sediments and the bedrock. Since this shallow perched groundwater was observed to be discontinuous during field investigation it is not likely to yield sufficient water to provide a viable water supply.

To characterize groundwater in the Platteville Formation at the site, eight monitoring wells (AMW-01, 02, 03A, 04, 06, 08, 09 and 10) were advanced to a depth of approximately 40 to 90 ft bgs. Three monitoring wells (AMW-05, 05B and 07) were advanced into the St. Peter Sandstone near the Mississippi River, at a depth of approximately 30 to 55 ft bgs. The remaining monitoring well (AMW-03B) was nested with AMW-03A, which was constructed in the Platteville Limestone. AMW-03B was advanced through the Platteville Limestone and installed in the underlying St. Peter

Sandstone to a depth of approximately 151 ft bgs. The screened interval for AMW-05 appeared to be saturated during well installation, but upon returning for development activities the well was dry so AMW-05B was installed. The well nest was constructed in the southeastern portion of the property in the lower semi-truck bullpen to evaluate groundwater quality near the main plant building and to provide information for determining groundwater flow direction. The borings did not extend beyond the St. Peter Sandstone.

Boreholes were drilled using sonic drilling methods by Boart Longyear of Little Falls, Minnesota. A dual casing methodology was employed, where the inner casing is drilled past the outer casing, minimizing the potential for vertical migration of constituents.

Soil samples and rock coring samples were collected continuously from nine borings (AMW-01, AMW-02, AMW-03B, AMW-04, AMW-05, AMW-06, AMW-07, AMW-08, and AMW-09) to provide a profile of the subsurface materials at each boring location. Well construction and soil boring logs were prepared for each boring in accordance with MPCA and MDH requirements and present the United Soil Classification System (USCS) classification of the materials encountered. Each soil sample was screened in the field with a PID. A summary of field headspace readings are presented in Table 4. Well construction and soil boring logs are presented in Appendix A and MDH Well Records are presented in Appendix B.

One soil sample was collected from each boring for laboratory analysis. Soil sampling techniques were conducted in accordance with State requirements and guidelines. All soil samples were analyzed for VOCs using Environmental Protection Agency (EPA) Method 8260, Semi-Volatile Organic Compounds (SVOCs) using EPA Method 8270, GRO using the Wisconsin Modified Method, DRO using the Wisconsin Modified Method, RCRA metals using EPA Method 6010, and Polychlorinated Biphenyls (PCBs) using EPA Method 8082.

A 2-inch diameter monitoring well was installed in each borehole. The wells were developed (bailing and surging techniques or air lifting), and permitted in accordance with MDH requirements and in accordance with the standard operating procedures (SOPs) outlined in the field sampling plan (FSP) (ARCADIS June 18, 2007). A total of 12 wells were completed according to MDH wells codes. Six monitoring wells were completed as a flush mount well and six as an above ground stick-up well with protective posts. The well location, ground surface and top of casing elevation was surveyed to the Ramsey County coordinates and 1929 United States Geological

Survey (USGS) Vertical Datum by Sunde Land Surveying of Bloomington, Minnesota. The elevation data was used to evaluate groundwater flow direction and gradients within the Platteville Formation and the St. Peter Sandstone. Monitoring well construction details are presented in Table 3 and groundwater elevations are presented in Table 5.

In addition to the 12 recently installed monitoring wells, there are three existing monitoring wells located at the Site which were observed during Phase I activities. The three existing monitoring wells (MW-4, MW-5 and MW-6) are located east, west and southwest of the hazardous waste storage building, respectively. These wells were installed to monitor groundwater present in the vicinity of the two used solvent USTs situated west of the hazardous waste storage building. Present and historic ASTs/USTs are depicted on Figure 3 and presented in Table 2.

Static water levels were measured from the surveyed top of casing using an electronic water level meter. After collecting static water level data, the newly installed perimeter wells along with the previously existing wells were sampled. All of the monitoring wells were sampled in accordance with the FSP. Wells were sampled with a disposable bailer (AMW-03B was sample via submersible pump) and collected into clean, laboratory-supplied sample containers, and placed in a cooler filled with ice. Field parameters were collected using a multi-parameter probe, and results are presented on Table 6. The samples were submitted to the laboratory for the analysis of VOCs, SVOCs, RCRA metals, and PCBs. The samples were submitted to the laboratory using appropriate "chain-of-custody" procedures as outlined in the FSP. Following sample collection, field parameter values were collected and recorded. Groundwater sampling logs are presented in Appendix C.

This report only includes data from one sampling event. Per the MPCA *VIC* guidance, a minimum of two sampling events separated by a minimum of two weeks is required to confirm sampling results and to obtain enough data on which to base decisions regarding groundwater quality. Therefore, three additional sampling events will be completed during subsequent phases of work at the site to satisfy this requirement.

3.2.3 Feature Investigations

ARCADIS advanced 54 soil borings (550 total feet; as ASB-001 through ASB-0054) and 16 hand augers (12.5 feet; as HA-055 through HA-070) to evaluate subsurface soil conditions at 30 Features. The majority of the Features represent former or current

ASTs/USTs, former disposal areas, areas of staining, or railroad spurs. The Features are presented as exterior Features on Figures 2 and 4. Present and historic ASTs/USTs are depicted on Figure 3 and presented in Table 2.

The total number of borings to be advanced, the depth of exploration, and analytical sampling requirements were developed based on the use of each Feature. Analytical sampling requirements for each Feature were also based on the type of known or potential chemical usage, and the applicable MPCA guidance based on the Feature type. Detailed sampling and analysis information is presented in Table 1. Where Features overlapped, borings were co-located and samples were submitted for all of the analytical parameters identified within the overlapping Features.

The exterior boreholes (ASB-001 to ASB-048) were drilled by Bergerson-Caswell Inc., of Maple Plain, Minnesota using nominal 4.25-inch inner diameter hollow stem auger (HSA) drilling methods until the depth requirements for the Feature had been reached or competent bedrock was encountered. Soil borings were completed from June 19, 2007 to July 6, 2007. Soil samples were collected, logged, and screened with a PID by an ARCADIS geologist in the same manner described above for the monitoring wells.

Boreholes completed within the sand, utility, and gas tunnels (Figure 4) were completed with hand augers on July 10 and July 11, 2007. Where the tunnel floor was composed of concrete in the utility tunnel, a hand drill with core was utilized to penetrate through the concrete prior to completing the hand auger.

At each boring location, one soil sample was collected for laboratory analysis. Intervals which exhibited the following characteristics were containerized for chemical analysis:

- The interval with the highest field indication of organic vapors and/or visual and/or incidental olfactory evidence of impacts,
- If possible impacts are identified the interval below the impacts were containerized to delineate the extent of soil impacts,
- If organic vapor and/or visual and/or incidental olfactory evidence of impacts are observed at multiple depth intervals that could provide useful assessment or delineation data, those intervals were containerized, or

- If no organic vapor, visual, or incidental olfactory evidence of impacts are observed, the two foot interval above the saturated zone or the lowermost interval of the soil boring (if the saturated zone is not encountered) was containerized.

Soil sampling techniques were consistent with State requirements or guidelines. See the site specific FSP for further details. Soil samples collected for laboratory analysis were placed in a cooler with wet ice and transported to the lab via the laboratory courier following standard chain-of-custody procedures. Soil samples were submitted for one or more of the following analytes: VOCs, SVOCs, polycyclic aromatic hydrocarbons (PAHs) using EPA Method 8270c, Metals, PCBs, GRO, DRO, pH using EPA Method 150.1, and Ethylene Glycol using EPA Method 8015B. Specific analyte information is summarized in Tables 7, 8, and 9. Lab reports are included in Appendix D.

In the event that potential impacts appeared to extend to the water table (based on visual observations, odors or PID readings), a minimum of one temporary monitoring well was installed and a groundwater grab sample was collected and analyzed for the same suite of sample parameters analyzed for in soil per Feature. Groundwater samples were collected from nine of the borings. The groundwater samples were collected by inserting 1-inch polyvinyl chloride (PVC) well screen and casing into the soil boring and withdrawing groundwater using plastic tubing and a check valve. In the event that insufficient groundwater was recovered for analysis of all parameters, the groundwater grab samples were collected in the following order; VOCs, SVOCs, Metals, PCBs, GRO, and DRO, omitting parameters that are not required for a given Feature. In accordance with MDH well code, temporary wells were properly abandoned within 48 hours of installation.

All analytical data collected during the Initial Phase II – Exterior Investigation has been verified and/or validated. Verification consists of reviewing the laboratory report and electronic data deliverable (including the case narrative), sample analytical data, quality control documentation, and chain-of-custody. Verification is a process completed to ensure that all quality control procedures have been followed and that they meet the minimum requirements of the analytical methodology and contract. Specifically, it includes a review of holding times, blank contaminants, laboratory control samples and quality control limits. Full (Level IV) validation was completed on approximately 10% of all field sample data. Validation is a detailed process that extends the review beyond the verification step to determine the specific quality of a set of data. Full validation consisted of a comprehensive review of the raw data, transcriptions, and calculations. The data review process included interaction with the laboratory to correct data

deficiencies and obtain additional information, as appropriate. Data verification and validation was completed by Enovis, Inc. of Detroit, Michigan. The verification and validation reports are included with the laboratory reports in Appendix D.

3.2.4 Geophysical Investigation

A geophysical survey was completed at the Potential Battery Waste Disposal Area (Baseball Fields) - 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 any metallic anomalies (EM-61) in the subsurface and to determine changes in electrical conductivity from differences in soil types, disturbances, etc. (EM-31). A copy of the geophysical investigation report is presented in Appendix E.

Multiple EM anomalies resulting from buried objects were identified by the metal detection survey EM-61. No discernable surface metal debris, not related to 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 EM-31 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 within Feature 139 at select areas to confirm findings from the geophysical investigation. 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 additional 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 top six inches of ground surface.

4. Initial Phase II – Exterior Investigation Results

Soil sample analytical results were compared to Tier 2 Industrial SRVs, with the exception of the Potential Battery Waste Disposal Area (Baseball Fields) - Feature 139, in which soil samples were additionally compared to Tier 2 Recreational SRVs. Groundwater sample analytical results were compared to HRLs. The soil analytical results are summarized in Tables 7, 8, and 9. The groundwater analytical results are summarized in Tables 10 and 11.

4.1 Results of Geologic and Hydrogeologic Investigation

The depth to groundwater in the unconsolidated perched aquifer ranges from 2 to approximately 8 ft bgs. The unconsolidated unit varies across the site from 1 to 18 feet thick, and appears to have been reworked several times near the building. Shallow perched groundwater flow was not determined during this investigation since temporary wells were installed but only sampled for groundwater, and were not surveyed. Due to variability of the thickness of the unconsolidated material and the presence of fill material throughout the property, it is unlikely that a continuous groundwater unit exists in the unconsolidated material. Flow in this unit, if any occurs, is also likely influenced by localized conditions such as structures, foundations, topography, fill materials, etc.

Cross sections were constructed for the Site to aid in interpreting the subsurface conditions. The cross section locations map and cross sections, A-A' and B-B' are presented in Figures 5, 6, and 7. Cross sections indicate that the Decorah Shale may be nonexistent near the main plant building. Near the north end of the Site, the Decorah shale is up to 35 feet in thickness. The Platteville Limestone underlies the Decorah Shale. In general, the Platteville Limestone is 30 feet thick across the Site, and tends to be dolomitic towards the top of the formation with vugs and fossil beds. The Glenwood Shale, which underlies the Platteville Limestone, is two to 10 feet thick across the Site, and has thinly bedded sand lenses at the bottom of the unit near the St. Peter contact. The St. Peter Sandstone is a quartz rich sand unit, and was encountered at 68 ft bgs near the south central portion of the property. For the portion of the Site adjacent to the Mississippi River, the St. Peter Sandstone was the only bedrock unit encountered.

Depth to groundwater in the Platteville Limestone ranged from 18.71 to 78.82 ft bgs in monitoring wells screened within that unit. Groundwater elevations in the Platteville Limestone ranged from 779.31 to 793.09 ft msl. In the St. Peter Sandstone the depth to

groundwater ranges from 32.83 to 100.82 ft bgs at the Site. Groundwater elevations measured in the St. Peter Sandstone ranged from 690.27 to 710.90 ft msl. Individual groundwater elevations for each well are presented in Table 5. Groundwater flow in the Platteville appears to be affected by mounding. This is likely caused by the variability in infiltration rates across the site due to the extensive pavement and building structures on the Site.

At the Site, groundwater in the Platteville Limestone and St. Peter Sandstone generally flows to the west with some southwesterly components (Figures 8 and 9), in the direction of the Mississippi River, which is located 100 feet west towards the north end of the property.

4.2 Results of Soil Quality Investigation

4.2.1 Perimeter Monitoring Wells

None of the soil samples from monitoring wells AMW-01 to AMW-09 exhibited PID readings above background levels. One soil sample per well was collected and submitted for laboratory analysis of VOCs, SVOCs, PCBs, GRO, DRO, and RCRA metals analysis. A low concentration of GRO was detected in AMW-03B, and DRO was detected in AMW-03B and AMW-08, but no Tier 2 SRV exists for these analytes. No constituents were detected above Tier 2 Industrial SRVs, but several constituents were detected in each sample (Table 7). Lab reports are included in Appendix D. PID readings were not measured at AMW-05B and AMW-10 since the upper 30 feet of the borings were blind drilled.

4.2.2 Sheen Test Investigation

Petroleum sheen tests were completed at 30 soil borings at the Site to determine petroleum impacts of the surface soil per MPCA guidance (Fact Sheet 3-01, 4-01). A small quantity of soil was taken from the borings, and placed into a new clean two-ounce soil jar. Distilled water was added and the mixture was agitated. Sheen test results are shown on Table 12.

Sheen was detected on the surface of the distilled water added to the soil samples collected at ASB-008 (1996 Glycol Release From Underground Piping - Feature 21). See Section 4.2.3.1.7 for Feature 21 soil analytical data. The remaining 29 borings did not exhibit sheen.

4.2.3 Feature Investigations

The Features fall into one of two potential state agency programs: either the *VIC* or *VPIC* program. The Features have been grouped by agency program and Feature locations can be found on Figure 2.

4.2.3.1 VIC Program

4.2.3.1.1 Former Test Track - Feature 1

Background

Based on a review of aerial photographs, the former test track was historically used to test vehicles from prior to 1953 until prior to 1974. The test track was sprayed with oil for dust control, based on information provided through interviews with TCAP personnel.

Investigation

Two hollow stem auger borings (ASB-033 and ASB-046) were advanced to depths of 10 feet bgs and 4 feet bgs, respectively. The soil samples did not exhibit elevated PID readings.

One soil sample was collected from each boring, and submitted for VOCs, SVOCs, DRO, PCBs, and RCRA metals analysis. DRO was detected in both soil samples (ASB-033: 97 mg/kg, ASB-046: 330 mg/kg); however there is no Tier 2 SRV for this constituent. No analytical constituents were detected about the Tier 2 Industrial SRVs.

4.2.3.1.2 Railroad Spurs - Feature 7

Background

Railroad spurs are utilized for the delivery and loading of parts and other items to and from the assembly plant via rail cars. In addition, railcars are used to transfer final products to their retail destinations. Some areas of staining were observed within the vicinity of the railroad spurs.

Investigation

Five hollow stem auger borings (Borings ASB-017, ASB-021, ASB-022, ASB-031, and ASB-043) were advanced to depths between six to 12 feet bgs in the proximity to the stained areas when possible. The soil samples did not exhibit elevated PID readings.

One soil sample was collected from each boring, and submitted for VOCs, SVOCs, DRO, PCBs, and RCRA metals analysis. DRO was detected in ASB-017 (38 mg/kg), ASB-022 (2.4 J mg/kg), and ASB-031 (2.8 J mg/kg) boring; however there is no Tier 2 SRV for this constituent. No analytical constituents were detected above the Tier 2 SRVs.

4.2.3.1.3 Former Hazardous Waste Storage Area - Feature 8

Background

Based on historical documentation reviewed, a former hazardous waste storage area was identified in the area. The documentation did not include any reported spills from this area; however, based on the general usage of the area to store hazardous waste materials this area was investigated.

Investigation

Two hollow stem auger borings (ASB-034 and ASB-044) were advanced to depths of 4 feet bgs. The soil samples did not exhibit elevated PID readings.

One soil sample was collected from each boring, and submitted for VOCs, SVOCs, GRO, DRO, PCBs, and RCRA metals analysis. No analytical constituents were detected above the Tier 2 SRVs.

4.2.3.1.4 Former Hazardous Waste Storage Area - Feature 10

Background

Based on historical documentation reviewed, a former hazardous waste storage area was identified in the area. The documentation did not include any reported spills from this area; however based on the general usage of the area to store hazardous waste materials this area was investigated.

Investigation

Two hollow stem auger borings (ASB-013 and ASB-014) were advanced to a depth of 10 feet bgs. The soil samples did not exhibit elevated PID readings.

One soil sample was collected from each boring and submitted for VOCs, SVOCs, PCBs, and RCRA metals analysis. Arsenic was detected in ASB-014 at 156 mg/kg, which exceeds the Tier 2 Industrial SRV. No other constituents were detected in either boring above the Tier 2 Industrial SRVs (Figure 10 and Table 7).

4.2.3.1.5 Former Railroad Spurs - Feature 12

Background

Railroad spurs were utilized for the delivery and loading of parts and other items to and from the assembly plant via rail cars. Based on their historic use the former railroad spurs were investigated.

Investigation

Three hollow stem auger borings (ASB-005, ASB-37, and ASB-040) were advanced to depths of 10 to 18 feet bgs. The soil samples did not exhibit elevated PID readings.

Two soil samples were collected from ASB-037, and one soil sample was collected from each of the other two borings. Soil sampled were submitted and analyzed for VOCs, SVOCs, DRO, PCBs, and RCRA metals. DRO was detected in ASB-005 (44 mg/kg) and ASB-037 (81 mg/kg at 6-8 ft bgs and 1,100 mg/kg at 12 -14 ft bgs); however, there is no Tier 2 SRV for this constituent. No constituents were detected in any samples above the Tier 2 Industrial SRVs.

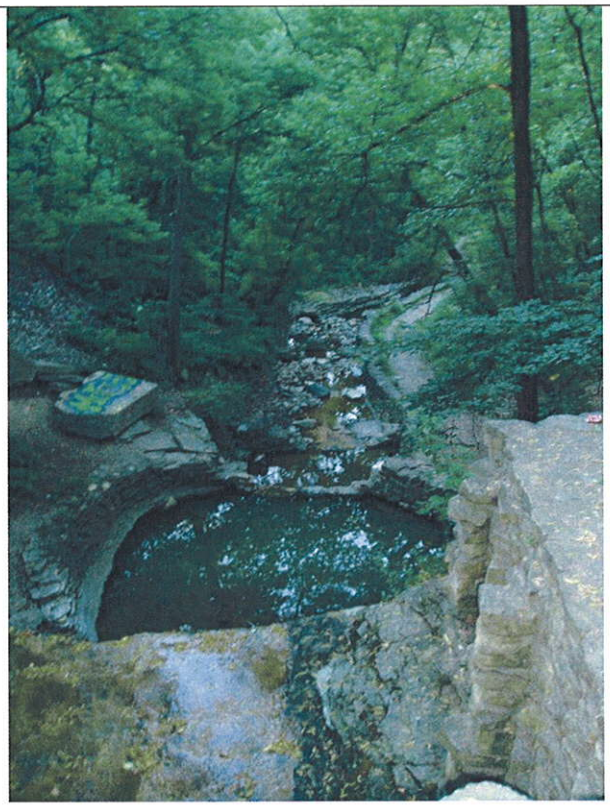
4.2.3.1.6 Outfall 001- Feature 15

Background

Outfall 001 is regulated under the Site's NPDES permit and discharges into Hidden Falls Regional Park. According to documentation maintained at the MPCA, three separate spill events occurred at the Hidden Falls storm drain Outfall 001 in July, August and September of 1989. Samples were taken from the outfall area by MPCA representatives, which indicated the presence of MIBK and other solvents. During a meeting with MPCA representatives, Ford indicated that the suspected source of the spill was most likely a catch basin around four USTs containing solvents. Ford agreed to complete the requirements to define the extent of contamination surrounding the waste solvent tanks and proposed remediation addressed in the RFRA issued by the MPCA in June 1990. However, documentation pertaining to additional closure sampling at Outfall 001, following the identification of the presence of MIBK, was not found at files maintained at the TCAP or the MPCA.

Investigation

No hand auger was completed at Outfall 001. The outfall (storm drain) is a man-made structure, which drains into a man-made channelized stream that drains into the Mississippi River. The channelization consists of a poured concrete stream bottom, with limestone cemented walls. Outfall 001 consists of a cemented limestone retaining wall, at the bottom of the wall is a man-made pond (constructed of a concrete bottom, and limestone walls). See the picture below.

	SITE NAME: Twin Cities Assembly Plant (TCAP)
	SITE LOCATION: St. Paul, Minnesota
DATE: 7/6/2007	
DIRECTION: South **COMMENT:** Photograph depicts Outfall 001 in Hidden Falls Regional Park.	

4.2.3.1.7 1996 Glycol Release From Underground Piping - Feature 21

Background

In 1996 a leak occurred from underground piping used to transfer glycol along the eastern portion of the main assembly building. Based on available documentation reviewed, remediation activities were completed in the area of the release; however there was no documentation indicating that the release had been adequately remediated per the MPCA. Therefore, the glycol release represents a Feature.

Investigation

Two hollow stem auger borings were completed to investigate Feature 21 (ASB-008 and ASB-009). Borings ASB-008 and ASB-009 were advanced to depths of 10 feet bgs. The soil samples did not exhibit elevated PID readings.

Two soil samples were collected from ASB-008 and one sample from ASB-009 and analyzed for ethylene glycol. No constituents were detected in any soil samples above the Tier 2 Industrial SRVs.

4.2.3.1.8 Former Brake Fluid AST - Feature 23

Background

A former 6,000-gallon brake fluid UST was used in fluid fill operations at TCAP. The UST was installed in 1968 and removed in 1990. The UST was of steel construction. A review of available documentation indicated that there were no reported releases from this UST; however, no documentation pertaining to removal activities or closure sampling was found in files maintained at TCAP or the MPCA.

Investigation

No borings were completed due to utility interference. The investigation will be completed at a later date.

4.2.3.1.9 Waste Solvent USTs - Feature 35, Former Bulk Solvent and Waste Solvent USTs - Feature 36, Solvent UST Underground Piping - Feature 37 and Sump within Solvent UST Basin - Feature 46

Background

Waste Solvent USTs - Feature 35: Two 10,000 gallon USTs store used purge solvent and cleaning solvent generated from the painting process at TCAP. The USTs are of

steel construction with cathodic protection. These USTs were installed in an area previously impacted by a release of solvents from historical USTs located in the area (Feature 36). Once these USTs are no longer in use the area will be addressed in accordance with applicable regulations.

Former Bulk Solvent and Waste Solvent USTs - Feature 36: During the fall of 1984 the UST area was constructed and four USTs were installed to store paints, resin and new solvents delivered to TCAP in tanker trucks. The USTs were double-walled steel tanks with corrosion protection and were anchored on buried 24-inch thick concrete pads. A release was reported from the USTs in 1989 and remedial activities were completed in the area as part of the PRP investigation completed at TCAP. Three monitoring wells were installed in the area and were sampled annually until 2003, when the MPCA deemed additional sampling unnecessary. The sump located in the vicinity of the current USTs is described under Feature 46 below.

Solvent UST Underground Piping - Feature 37: Piping is utilized to collect solvent waste generated during the painting process that is then transferred to the used solvent USTs located south of the paint building. Additional piping is utilized to transfer the used solvents from the USTs to unloading ports near the southwestern portion of the paint building for removal. The portion of the underground piping located between the building and USTs consists of double-walled steel piping. The piping is located within a concrete utility trench, with the exception of a section of the piping extending from the top of the USTs down to the trench.

Sump within Solvent UST Basin - Feature 46: In this area, collection of groundwater from the solvent UST basin gets pumped to paint sludge pits. The sump is sampled annually (and last occurred in September of 2007) due to a former release which occurred from the former solvent USTs that were removed from the area in 1992. Based on the latest monitoring results ethylbenzene, MIBK, and total xylenes were detected above the applicable criteria in the sump and the next monitoring event is scheduled for the summer of 2008. Present and historic ASTs/USTs are depicted on Figure 3.

Investigation

Three hollow stem auger borings (ASB-018, ASB-019, and ASB-020) were advanced to depths of 4 to 6 feet bgs. None of the soil samples exhibited elevated PID reading with the exception of soil samples from near the bottom of ASB-019, which exhibited PID readings slightly above background levels. See Table 4 for a complete field screening headspace summary.

One soil sample was collected from each of the above borings, and submitted for VOCs, SVOCs, PCBs, and RCRA metals analysis. No constituents were detected in the above samples above the Tier 2 Industrial SRVs.

4.2.3.1.10 Wastewater Collection ASTs - Feature 44, Wastewater Treatment Area - Feature 134 and Former Waste Disposal Area - Feature 140

Background

Wastewater Collection ASTs - Feature 44: Three approximate 139,000-gallon wastewater treatment tanks are utilized to store and treat process wastewater generated by the assembly and painting processes at TCAP. The phosphate process generates the majority of the wastewater at TCAP. Since the ASTs contain and hold process industrial wastewater prior to and during treatment, this area was investigated.

Wastewater Treatment Area - Features 134: The wastewater treatment area houses operations including transferring, containing, storing, and treating process wastewater generated from the assembly process. Based on current and historic use this area was investigated.

Former Waste Disposal Area – Feature 140: In what appears to be an isolated disposal incident in 1966, paint waste solvent and sludge was disposed of north of the Steam Plant. Visibly contaminated soils in the area were excavated and sent to a hazardous waste landfill. The reviewed documentation stated that the waste materials excavated were deemed non-hazardous; however, no analytical data of the material disposed of or description of materials excavated and disposed were included.

Investigation

Four hollow stem auger borings were completed and co-located to evaluate Features 44, 134 and 140. ASB-023, ASB-024, ASB-025, and ASB-027 were advanced to depths of 12 to 16 feet bgs. None of the soil samples exhibited elevated PID readings.

One soil sample was collected from each boring, and submitted for VOCs, SVOCs, PCBs and target analyte list (TAL) metals analysis. Lead was the only constituent detected above the Tier 2 Industrial SRV, in boring ASB-027 at 1070 mg/kg (Figure 10 and Table 7).

4.2.3.1.11 Former Coal Operations - Feature 47

Background

The coal hopper building was utilized to store coal for use at the Steam Plant. Coal was delivered via rail and was transferred into the coal hopper building for storage. A tunnel connecting the coal hopper building and the steam plant runs beneath the main assembly plant, which was utilized to transfer the coal from the hopper to the steam plant.

Investigation

Two hollow stem auger borings (ASB-035 and ASB-036) were advanced to depths of 14 to 16 feet bgs. The soil samples did not exhibit elevated PID readings.

One soil sample was collected from each boring, and submitted for VOCs, SVOCs, DRO, and TAL metals analysis. No constituents were detected in any samples above the Tier 2 Industrial SRVs.

4.2.3.1.12 Sludge Pits - Feature 121

Background

Two waste paint sludge pits are used to store paint sludge generated from the painting process. The pits are of concrete construction. Overspray from the painting process is captured by sheeting action of water in trenches underneath the paint booths, which is transferred into the paint sludge pits for separation. The northern paint sludge pit was observed to be in good condition; however, the southern paint sludge pit was currently full of water and could not be inspected. Since the sourthern pit could not be inspected, the Feature was investigated.

Investigation

Three hollow stem auger borings (ASB-015, ASB-016, and ASB-032) were advanced to depths of 6 to 8 feet bgs. The soil samples did not exhibit elevated PID readings.

One soil sample was collected from each boring, and submitted for VOCs, SVOCs, PCBs, and TAL metals analysis. No constituents were detected in any samples above the Tier 2 SRVs.

4.2.3.1.13 Potential Battery Waste Disposal Area (Baseball Fields) - Feature 139

Background

Based on documentation reviewed the area was potentially used for disposal of battery waste. The MPCA requested a geophysical study in the area; however, no documentation pertaining to additional investigations into Feature 139 was found.

Investigation

A geophysical survey of the area was conducted. Six direct push borings were advanced within anomalies identified within this Feature. Direct push borings ASB-049, ASB-050, ASB-51, ASB-052, ASB-053, and ASB-054 were advanced to a depth of 8 feet bgs. The soil samples did not exhibit elevated PID readings. In addition, three surface soil samples were also collected in this Feature: AGM-SS-01, AGM-SS-02, and AGM-SS-03. 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.

One soil sample was collected from each boring, and submitted for VOCs, SVOCs, and TAL metals analysis. Arsenic was detected in ASB-049 (6.6 mg/kg), ASB-051 (5.3 mg/kg), ASB-053 (7.2 mg/kg), and AGM-SS-01 (16.4 mg/kg) above the Tier 2 Recreational SRV. Copper was detected in ASB-049 (18.8 mg/kg), ASB-052 (35.3 mg/kg), ASB-053 (13.2 mg/kg), and all three surface soil samples AGM-SS-001 (19.4 mg/kg), AGM-SS-002 (14.7 mg/kg), and AGM-SS-003 (13.8 mg/kg) above the Tier 2 Recreational SRV. Iron was detected above the Tier 2 Recreational SRV in all borings ASB-049 (17,100 mg/kg), ASB-050 (16,600 mg/kg), ASB-051 (13,600 mg/kg), ASB-052 (20,600 mg/kg), ASB-053 (18,700 mg/kg), AGM-SS-001 (12,900 mg/kg), AGM-SS-002 (16,200 mg/kg), and AGM-SS-003 (13,300 mg/kg) with the exception of ASB-054. No constituents were detected in any samples above the Tier 2 Industrial SRVs (Figure 11 and Table 8).

4.2.3.1.14 Drums - Feature 143

Background

A total of three drums were observed in the sand tunnels. The floor and walls of the sand tunnels consist of sandstone. Two of three drums were empty (The drum with contents was sampled for waste characterization, see Section 4.4 for further details), all drums were rusted and in poor condition with no lids. Staining was not observed in or near the drums observed in these areas. It appeared that the drums may have been historically utilized to mix concrete or mortar. However, due to the presence of the corroded drums of which the former contents is unknown, the area was investigated.

Investigation

Two hand auger borings (HA-055 and HA-056) were advanced to depths of 1 and 0.5 feet bgs, respectively. The soil samples did not exhibit elevated PID readings.

One soil sample was collected from each boring, and submitted for VOCs, SVOCs, PCBs and RCRA metals analysis. No constituents were detected in any samples above the Tier 2 Industrial SRVs.

4.2.3.1.15 Utility Tunnel Staining - Feature 144

Background

Staining was identified on the concrete floor surface within the utility tunnel. The utility tunnel may have been associated with historical Fluid Fill AST tank farm (UST/AST Feature 52) located in or near the former fuel house which contains product piping. Refer to Table 2 for additional tank information on Feature 52 and Figure 3 for tank locations.

Investigation

A drill core was used to core through the initial 18 to 24 inches of concrete flooring in order to reach unconsolidated sediments underneath the tunnel floor. Two hand auger borings were advanced in this Feature. HA-069 and HA-070 were advanced to depths of 1 foot bgs. The soil samples did not exhibit elevated PID readings.

One soil sample was collected from each boring and was submitted for VOCs, SVOCs, GRO, DRO, PCBs, ethylene glycol, and RCRA metals analysis. DRO was detected in the sample at HA-070 (230 mg/kg); however, there is no Tier 2 SRV for this constituent. GRO was also detected in the sample at HA-070 (22 mg/kg); however, there is no Tier 2 SRV for this constituent. No analytical constituents were detected above the Tier 2 SRVs.

4.2.3.1.16 Flow Stone - Feature 149

Background

At the east end of the gas tunnel, water was observed to be leaking in from the main assembly building above. The floor and walls of the gas tunnel consist of sandstone. Flow stone was observed on the walls within the gas tunnel.

Investigation

One hand auger boring (HA-068) was advanced to a depth of 1 foot bgs. The soil samples did not exhibit elevated PID readings.

One soil sample was collected from the boring, and submitted for VOCs, SVOCs, PCBs and RCRA metals analysis. No constituents were detected in the sample above the Tier 2 SRVs.

4.2.3.1.17 Collapsed Area with Buried Drums - Feature 150

Background

Sand tunnel 1A south was an exit at one point in time, with concrete and rebar-formed walls and ceiling. Currently, there is no exit point, and a collapse is apparent at the end of the tunnel. Buried drums were observed to be present among the collapse debris and black, rust and turquoise staining was observed on the floor and ceiling. The stained area had a paint odor. The black, rust, and turquoise staining was also present in open 55-gallon drums partially filled with solids with a paint odor. The extent of the drum storage could not be determined due to a collapse at the assumed exit point of the tunnel.

Investigation

Four hand auger borings (HA-064, HA-065, HA-066, and HA-067) were advanced to depths up to 1 foot bgs. Field screening showed PID readings above background levels in all four hand augers. See Table 4 for a complete field screening headspace summary.

One soil sample was collected from each boring and submitted for VOCs, SVOCs, PCBs and RCRA metals analysis. Boring HA-064 detected several constituents above Tier 2 Industrial SRVs including naphthalene(1,400 mg/kg), 1,2,4-trimethylbenzene (87 mg/kg), 2-methylnaphthalene (370 J mg/kg), arsenic (36.7 mg/kg), cadmium, (307 mg/kg) and lead (6,650 mg/kg). Boring HA-065 detected several constituents above Tier 2 Industrial SRVs including butylbenzene (130 mg/kg), naphthalene (2,100 mg/kg), 2-methylnaphthalene (460 J mg/kg), 1,3,5-trimethlybenzene (350 mg/kg), 1,2,4-trimethylbenzene (1,100 mg/kg), xylene-o (360 mg/kg) and m&p (670 mg/kg), arsenic (42.6 mg/kg), cadmium (832 mg/kg) and lead (8,410 mg/kg). Boring HA-066 detected several constituents above Tier 2 Industrial SRVs including butylbenzene (160 mg/kg), ethylbenzene (350 mg/kg), naphthalene (1,300 mg/kg), 1,3,5-trimethlybenzene (480

mg/kg), 1,2,4-trimethylbenzene (1,500 mg/kg), xylene-o (610 mg/kg) and m&p (1,200 mg/kg), arsenic (87.5 mg/kg), cadmium (1,420 mg/kg), and lead (17,900 mg/kg).

Note that Naphthalene was run on both the VOC and SVOC list. The results for naphthalene were significantly different between the two analyses. The SVOC results are believed to be more representative since the retention time for naphthalene falls more squarely within the analytical window for the SVOC analysis (Figure 12 and Table 7).

4.2.3.1.18 Potential Film/Staining - Feature 151

Background

Several of the mined sand tunnels contain railroad ties (with a limited number having rails still attached) which were used to transport the mined sand from the tunnels for use in the glass manufacturing operations in the main assembly building. A number of these tunnels have had or currently had standing water in them, and a film/staining on the standing water was observed in these areas. The staining may have been related to wood preservation. The film/staining was observed to be dark brown to black in color.

Investigation

Seven hand auger borings (HA-057, HA-058, HA-059, HA-060, HA-061, HA-062, and HA-063) were advanced to depths of 0.5 to 1 foot bgs. Field screening showed PID readings at HA-062 and HA-063 slightly above background levels. See Table 4 for a complete field screening headspace summary.

One soil sample was collected from each boring, and submitted for VOCs, SVOCs, PCBs and RCRA metals analysis. No constituents were detected in the samples above the Tier 2 Industrial SRVs.

4.2.3.2 VPIC Program

4.2.3.2.1 Former Location of Gasoline and Diesel Fuel Underground Piping - Feature 5

Background

Underground steel piping was formerly utilized in conjunction with former gasoline and diesel fuel USTs in the area, which were removed in 1993. The piping had been in place since approximately 1977. Some piping may still be in place below the ground

surface. A release occurred from the piping which impacted subsurface soils. Remedial activities were completed in the area of the piping, which included extensive soil removal. However, in 2004-2005 during a water main repair in the area of the piping, a subsequent release was reported. The releases have been closed per the MPCA; however, based on the recurrent releases identified, impacted soil may still be present in the area of the underground piping.

Investigation

Five hollow stem auger borings (ASB-029, ASB-030, ASB-045, ASB-047, and ASB-048) were advanced to depths of 8 to 12 feet bgs. PID readings were not elevated in the above mentioned borings, with the exception of ASB-47, which had PID readings slightly above background levels at the bottom of the borehole.

One soil sample was collected from each boring (ASB-029, ASB-030, ASB-047, and ASB-048), and submitted for VOCs, PAHs, GRO and DRO analysis. ASB-045 was submitted for VOCs, SVOCs, PCBs, GRO, DRO, and TAL metals analysis. ASB-30 was the only boring with a GRO detection of 2.4 J mg/kg. DRO were detected at low levels in all borings (ASB-029: 7.3 J mg/kg, ASB-030: 14 mg/kg, ASB-045: 280 mg/kg, ASB-047: 41 mg/kg, ASB-048: 21 mg/kg). There is no Tier 2 SRV for GRO or DRO. No constituents were detected in any samples above the Tier 2 Industrial SRVs.

4.2.3.2.2 Former Gasoline, Sunoco Spirits and Pryoxlin Thinner USTs - Feature 16

Background

Two former 20,000 gallon gasoline USTs were located east of the former oil house and eight 6,000 gallon gasoline, Sunoco spirits and pryoxlin thinner USTs were located north of the former oil house, which were utilized in conjunction with the former paint operations that occurred within the main assembly building. Documentation pertaining to the removal and subsequent closure of the USTs was not found in files maintained at TCAP or the MPCA.

Investigation

Two hollow stem auger borings (ASB-001 and ASB-002) were advanced to depths of 12 to 14 feet bgs. PID readings were slightly above background levels in ASB-002. See Table 4 for a complete field screening headspace summary.

Two soil samples were collected from ASB-001 and one soil sample was collected from ASB-002, and submitted for VOCs, PAHs, GRO, DRO, and RCRA metals

analyses. Xylene-o (38 mg/kg) and m&p (140 mg/kg) were detected in ASB-001 above Tier 2 Industrial SRVs. 1,2,4-trimethlybenzene (57 mg/kg) and 1,3,5-trimethlybenzene (18 mg/kg) were detected in ASB-002 above their respective Tier 2 Industrial SRVs. DRO were detected at low levels in both borings and all samples (ASB-001:250 mg/kg (6-8 ft bgs and 3.2 J (8-10 ft bgs)) and ASB-002: 200 mg/kg), GRO was detected at ASB-001 (6-8 ft bgs) and ASB-2 at concentrations of 740 and 1400 mg/kg, respectively. There is no Tier 2 SRV for GRO or DRO. No other constituents were detected in the samples above the Tier 2 Industrial SRVs (Figure 13 and Table 9).

4.2.3.2.3 Former Oil Fill Area - Feature 20

Background

A review of historical drawings indicated the presence of a former oil fill location. Based on the former use of the area the oil fill location was investigated.

Investigation

Two hollow stem auger borings (ASB-006 and ASB-007) were advanced to depths of 12 to 14 feet bgs. The soil samples did not exhibit elevated PID readings.

One soil sample was collected from the boring and submitted for analysis of VOCs, SVOCs, GRO, DRO, RCRA metals, and PCBs. DRO was detected in ASB-007 (7.8 J mg/kg); however, there is no Tier 2 SRV for DRO. No constituents were detected in the above boring above the Tier 2 Industrial SRVs.

4.2.3.2.4 Unleaded Gasoline USTs - Feature 24

Background

Two 20,000-gallon unleaded gasoline USTs are utilized in conjunction with the fluid fill operations on the assembly line. The USTs are of STI-P3 construction with cathodic protection. A review of available documentation indicated that there were no reported releases from the USTs. Once these USTs are no longer in use the area will be addressed in accordance with applicable regulations.

Investigation

One hollow stem auger boring (ASB-028) was advanced to a depth of 8 feet bgs. The soil samples did not exhibit elevated PID readings.

One soil sample was collected from the boring, and submitted for VOCs and GRO. No constituents were detected in the sample above the Tier 2 Industrial SRVs.

4.2.3.2.5 Former Fuel Oil ASTs - Feature 42

Background

Former fuel oil ASTs were located south of the Steam Plant. The ASTs were removed from service in 2000 and corrective actions were completed between August 1, 2000 and October 16, 2000. The corrective actions included removal of the remaining fuel oil from the in service AST, cleaning of the AST and associated piping and dismantling of the two ASTs for recycling.

Investigation

One hollow stem auger boring was advanced in this Feature. ASB-026 was advanced to a depth of 18 feet bgs. The soil samples did not exhibit elevated PID readings. One soil sample was collected from ASB-026, and submitted for VOCs, SVOCs, PCBs, and TAL metals analysis. No constituents were detected in the sample were above the Tier 2 Industrial SRVs.

4.2.3.2.6 Former 20,000 Gallon Gasoline AST - Feature 138

Background

A former 20,000-gallon gasoline AST was removed from south of the former oil house as identified during interviews with TCAP personnel. Based on the interviewee, when the AST was removed stained soil and odors were identified. However, actions for remediation of the soil were apparently not completed in the area. It is unknown if the UST stored leaded or unleaded gasoline.

Investigation

Two hollow stem auger borings (ASB-041 and ASB-042) were advanced to depths of 12 to 14 feet bgs. The soil samples did not exhibit elevated PID readings.

One soil sample was collected from each boring, and submitted for VOCs, lead and GRO analysis. GRO was detected at low levels in ASB-041 (200 mg/kg); however there is no Tier 2 SRV for this constituent. No VOCs were detected in the sample were above the Tier 2 Industrial SRVs.

4.2.3.2.7 Former Fuel Oil UST - Feature 152

Background

The 27,000-gallon UST may have been utilized to provide fuel as a heating source in the main assembly building. The UST was installed at an unknown date and no documentation pertaining to its removal was found through research activities; therefore, the UST may still be in place at TCAP.

Investigation

Two hollow stem auger borings (ASB-003 and ASB-004) were advanced to depths of 8 to 10 feet bgs. None of the soil samples exhibited elevated PID readings.

One soil sample was collected from ASB-004, and two soil samples were collected from ASB-003. The samples were submitted for VOCs, PAHs, GRO, DRO, and RCRA metals analysis. GRO were detected in ASB-003 (6-8 ft bgs: 1,000 mg/kg, 10-12 ft bgs: 1,800 mg/kg). DRO were detected in ASB-003 (6-8 ft bgs: 290 mg/kg, 10-12 ft bgs: 40 mg/kg) and ASB-004 (9.7 J mg/kg). There are no Tier 2 SRVs for GRO or DRO. 1,2,4-Trimethylbezene (31 mg/kg) was detected in ASB-003 from 6 to 8 feet above the Tier 2 Industrial SRV. No other constituents were detected in the samples above the Tier 2 Industrial SRVs (Figure 13 and Table 9).

4.2.3.3 VIC and VPIC Program

4.2.3.3.1 Oil/Water Separator and Trench - Feature 27

Background

An approximate 3,000-gallon oil/water separator collects an oil/water mixture from a 100-foot long collection trench. Since this subsurface structure collects oil and water mixture and the integrity of the structure could not be inspected it is considered a Feature. Once the oil/water separator has been emptied and cleaned, the integrity of the structure will be evaluated.

Investigation

Three hollow stem auger borings (ASB-010, ASB-011, and ASB-012) were advanced to a depth of 8 to 10 feet bgs. The soil samples did not exhibit elevated PID readings.

One soil sample was collected from borings ASB-010, ASB-011, and ASB-012, and submitted for VOCs, SVOCs, DRO, PCBs, and RCRA metals analysis. DRO was

detected in ASB-011(30 mg/kg) and ASB-012(640 mg/kg). No Tier 2 SRV exists for DRO. No constituents were detected in the above samples above the Tier 2 Industrial SRVs.

4.2.3.3.2 Former Hazardous Waste Storage Area - Feature 49

Background

Based on historical documentation reviewed, a former hazardous waste storage area was identified to have been located east of the main assembly building. Based on the general usage of the area to store hazardous waste materials, the former hazardous storage area was investigated.

Investigation

Two hollow stem auger borings were (ASB-038 and ASB-039) were advanced to depths of two to 18 feet bgs. The soil samples did not exhibit elevated PID readings. One soil sample was collected from each boring, and submitted for VOCs, SVOCs, PCBs, and TAL metals analysis. In addition, the sample from ASB-038 was analyzed for GRO and DRO. The sample from ASB-038 contained DRO (510 mg/kg). GRO and DRO do not have Tier 2 SRVs. No constituents were detected in the above boring were above the Tier 2 Industrial SRVs.

4.3 Results of Groundwater Investigation

All monitoring wells were sampled July 16 through July 25, 2007. As indicated in Section 3.2.2, *VIC* guidance requires a minimum of two sampling events to confirm sampling results. To date, one sampling event has been completed. The following sections present an overview of the groundwater analytical results from this first round of samples. Conclusions regarding groundwater quality will be further developed after further sampling events. Note that unfiltered metals samples were collected. Laboratory analysis of unfiltered samples can release metals loosely bound to suspended solids in water, thus metal concentrations can be overestimated.

4.3.1 Perched Groundwater - Existing Wells (MW-4, 5 and 6)

The previously installed wells MW-4, MW-5, and MW-6 are completed into the perched groundwater within the unconsolidated formation. MW-4 and MW-5 were sampled and analyzed for VOCs and RCRA metals. Due to insufficient water volume in wells MW-4 and MW-5, SVOCs were not collected. MW-6 was sampled and analyzed for VOCs, SVOCs, and RCRA metals. Several RCRA metals were detected in each groundwater

sample below the HRL. Two RCRA metals were detected above the HRL. Chromium was detected in MW-5 at 907 ug/L, and lead was detected in MW-6 at 15.9 ug/L. No other constituents were detected above the HRLs (Figure 14 and Table 10).

4.3.2 Perimeter Wells

All perimeter groundwater samples were analyzed for VOCs, SVOCs, and RCRA metals. One or more constituents were detected in all of the perimeter wells, at low concentrations. No VOCs were detected above the HRLs in the perimeter monitoring wells (Figure 14 and Table 10).

4.3.2.1 Platteville Limestone Wells (AMW-01, 02, 03A, 04, 06, 08, 09 and 10)

Arsenic was detected in AMW-06 (10.7 ug/L), AMW-08 (20.7 ug/L), and AMW-09 (171 ug/L) above the HRL. In AMW-09, cadmium was detected at 13 ug/L, which is above the HRL. Chromium was detected in AMW-08 (252 ug/L) and AMW-09 (802 ug/L) above the HRL. Lead was detected above the HRL in AMW-06 (16 ug/L), AMW-08 (27.5 ug/L), and AMW-09 (733 ug/L). No other constituents were detected above the HRLs in Platteville Limestone wells (Figure 14 and Table 10).

4.3.2.2 St. Peter Sandstone Wells (AMW-03B, 05, 05B and 07)

No sample was collected from AMW-05 as the well was dry at the time of sampling. Lead was detected above the HRL in AMW-05B at 77.6 ug/L. Benzo(a)pyrene was detected in AMW-07 (0.79 J ug/L) above the HRL. No other constituents were detected above the HRLs in St. Peter Sandstone wells (Figure 14 and Table 10).

4.3.3 Feature Investigations – Temporary Wells (Perched Groundwater)

4.3.3.1 VIC Program

4.3.3.1.1 Former Test Track - Feature 1

No temporary wells were set due to no water observed or lack of water accumulating in the borings.

4.3.3.1.2 Railroad Spurs - Feature 7

No temporary wells were set due to no water observed or lack of water accumulating in the borings.

4.3.3.1.3 Former Hazardous Waste Storage Area - Feature 8

No temporary wells were set due to no water observed or lack of water accumulating in the borings.

4.3.3.1.4 Former Hazardous Waste Storage Area - Feature 10

Perched groundwater samples were collected from temporary well ASB-013, and submitted for laboratory analysis of VOCs and SVOCs. Due to insufficient water volume no samples were collected for metals analysis. Groundwater samples were cloudy during collection. None of the constituents were detected above the HRLs.

4.3.3.1.5 Former Railroad Spurs - Feature 12

Perched groundwater samples were collected from temporary wells ASB-005 and ASB-037, and submitted for laboratory analysis of VOCs, SVOCs, and RCRA metals. Groundwater samples were cloudy during collection. Arsenic (45.5 ug/L), cadmium (6.4 ug/L), chromium (348 ug/L), and lead (202 ug/L) were all detected above the HRLs in ASB-005. The same constituents (arsenic [482 ug/L], cadmium [45.8 J ug/L], chromium [1,540 ug/L], and lead [1,830 ug/L]) were detected in ASB-037, along with beryllium (7,210 ug/L) and mercury (5.5 ug/L) above their respective HRLs (Figure 14 and Table 10). DRO were detected at both locations (ASB-005:1.9 mg/l and ASB-037:64 mg/l). There is no established HRL for DRO.

4.3.3.1.6 Outfall 001 - Feature 15

No borings were installed at the Outfall. The outfall (storm drain) is a man-made structure, which drains into a man-made channelized stream that drains into the Mississippi River. The channelization consists of a poured concrete stream bottom, with limestone cemented walls. The Outfall consists of a cemented limestone retaining wall, at the bottom of the wall is a man-made pond (constructed of a concrete bottom, and limestone walls).

4.3.3.1.7 1996 Glycol Release From underground Piping - Feature 21

No temporary wells were set due to no water observed or lack of water accumulating in the borings.

4.3.3.1.8 Former Brake Fluid AST - Feature 23

No borings were completed due to utility interference, but will be completed at a later date.

4.3.3.1.9 Wastewater Collection ASTs - Feature 44 and Wastewater Treatment Area - Feature 134

No temporary wells were set due to no water observed or to lack of water accumulating in the boring.

4.3.3.1.10 Former Coal Operations - Feature 47

A perched groundwater sample was collected from temporary well ASB-036, and submitted for laboratory analysis of VOCs, SVOCs, and TAL metals. Arsenic (25.1 ug/L), beryllium (8.4 ug/L), chromium (257 ug/L), lead (80.7 ug/L), manganese (9780 ug/L), nickel (361 ug/L), and vanadium (367 ug/L) were all detected above their respective HRLs. Other VOCs, SVOCs, and TAL metals were detected in the sample; however all were at concentrations below the HRLs (Figure 14 and Table 10).

4.3.3.1.11 Sludge Pits - Feature 121

No temporary wells were set due to no water observed or lack of water accumulating in the borings.

4.3.3.1.12 Potential Battery Waste Disposal Area - Feature 139

No temporary wells were set due to no water observed or lack of water accumulating in the borings.

4.3.3.1.13 Former Waste Disposal Area - Feature 140

No temporary wells were set due to no water observed or lack of water accumulating in the borings.

4.3.3.1.14 Drums - Feature 143

No temporary wells were set due to no water observed or lack of water accumulating in the boring due to shallow boring depth.

4.3.3.1.15 Utility Tunnel Staining - Feature 144

No temporary wells were set due to no water observed or lack of water accumulating in the boring due to shallow boring depth.

4.3.3.1.16 Flow Stone - Feature 149

No temporary wells were set due to no water observed or lack of water accumulating in the boring due to shallow boring depth.

4.3.3.1.17 Collapsed Area with Buried Drums - Feature 150

No temporary wells were set due to no water observed or lack of water accumulating in the boring due to shallow boring depth.

4.3.3.1.18 Potential Film/Staining - Feature 151

No temporary wells were set due to no water observed or lack of water accumulating in the boring due to shallow boring depth.

4.3.3.2 VPIC Program

4.3.3.2.1 Former Location of Gasoline and Diesel Fuel Underground Piping-Feature 5

Perched groundwater samples were collected from temporary wells ASB-030 and ASB-047, and submitted for laboratory analysis of VOCs, SVOCs, GRO, DRO, and lead. Groundwater samples were cloudy during collection. DRO (ASB-030: 0.62 ug/L, ASB-047: 0.87 J ug/L) and GRO (ASB-030: 1,900 ug/L, ASB-047: 680 ug/L) were detected in both samples; however there is no HRL for these constituents. Benzene (80 ug/L) and lead (231 ug/L) were detected in ASB-030 above the HRLs. Benzene (84

ug/L), benzo(a)pyrene (15.5J ug/L), and lead (534 ug/L) were detected above the HRLs in ASB-047 (Figure 15 and Table 11).

4.3.3.2.2 Former Gasoline, Sunoco Spirits and Pryoxlin Thinner USTs - Feature 16

A perched groundwater sample was collected from temporary well ASB-001, and submitted for laboratory analysis of VOCs, SVOCs, GRO, DRO, and RCRA metals. Groundwater samples were cloudy during collection. DRO (52 ug/L) and GRO (66,000 ug/L) were detected in the sample; however there is no HRL for these constituents. Ethylbenzene (11,000 ug/L), isopropylbenzene (320 J ug/L), naphthalene (2,120 ug/L), xylene-o (11,000 ug/L), and xylene-m&p (35,000 ug/L) were detected in the groundwater sample above their respective HRLs. The following were also detected above the HRLs: arsenic (247 ug/L), barium (6,610 ug/L), cadmium (15.4 J ug/L), chromium (473 ug/L), and lead (935 ug/L). Note that Naphthalene was run on both the VOC and SVOC list. The results for naphthalene were significantly different between the two analyses. The SVOC results are believed to be more representative since the retention time for naphthalene falls more squarely within the analytical window for the SVOC analysis (Figure 15 and Table 11).

4.3.3.2.3 Former Oil Fill Area - Feature 20

A perched groundwater sample was collected from temporary wells ASB-006, and submitted for laboratory analysis of VOCs, SVOCs, GRO, DRO, and RCRA metals. Groundwater samples were cloudy during collection. DRO (0.31 ug/L) was detected in the sample; however there is no HRL for these constituents. Arsenic (254 ug/L), barium (8,840 ug/L), cadmium (36.5 ug/L), chromium (990 ug/L), lead (552 ug/L), and mercury (3.4 ug/L) were detected in the groundwater sample above their respective HRLs (Figure 15 and Table 11).

4.3.3.2.4 Unleaded Gasoline USTs - Feature 24

No temporary wells were set due to no water observed or lack of water accumulating in the boring.

4.3.3.2.5 Waste Solvent USTs - Feature 35, Former Bulk Solvent and Waste Solvent USTs - Feature 36, Solvent UST Underground Piping - Feature 37 and Sump within Solvent UST Basin - Feature 46

No temporary wells were set in this Feature due to lack of water accumulating in the borings.

4.3.3.2.6 Former Fuel Oil ASTs - Feature 42

No temporary wells were set due to no water observed or lack of water accumulating in the boring.

4.3.3.2.7 Former 20,000 Gallon Gasoline AST - Feature 138

No temporary wells were set due to no water observed or lack of water accumulating in the borings.

4.3.3.2.8 Former Fuel Oil UST - Feature 152

A perched groundwater sample was collected from temporary well ASB-003, and submitted for laboratory analysis of VOCs, PAHs, GRO, DRO, and RCRA metals. Groundwater samples were cloudy during collection. Benzene (99 J ug/L), ethylbenzene (6,300 J ug/L), isopropylene (540 J ug/L), xylene-o (2,000 J ug/L), and xylene-m&p (15,000 ug/L) were detected in the groundwater sample above their respective HRLs. The following were also detected above the HRLs: Benzo(a)pyrene (2.62 ug/L), naphthalene (1,400 ug/L), arsenic (207 ug/L), barium (5,030 ug/L), cadmium (16.8 J ug/L), chromium (668 ug/L), and lead (657 ug/L). DRO (30 ug/L) and GRO (33,000 ug/L) were also detected in the sample; however there is no HRL for these constituents. Naphthalene was run on both the VOC and SVOC list, but results were an order of magnitude different for all samples. The SVOC result tends to be more accurate since it falls in the SVOC analysis window better (Figure 15 and Table 11).

4.3.3.3 VIC and VPIC Program

4.3.3.3.1 Oil/Water Separator and Trench - Feature 27

No temporary wells were set due to no water observed or lack of water accumulating in the borings.

4.3.3.3.2 Former Hazardous Waste Storage Area - Feature 49

No temporary wells were set due to no water observed or lack of water accumulating in the borings.

4.4 Waste Characterization Samples of Drums - Feature 143 and Collapsed Area With Buried Drums - Feature 150

On May 7, 2007, five waste characterization samples were collected from Feature 143 and Feature 150 prior to the Initial Phase II - Exterior Investigation. Samples were collected consistent with the site developed FSP for waste characterization sampling. The samples were analyzed for VOC Toxicity characteristic leaching procedure (TCLP), SVOC TCLP, Metals TCLP, Pesticides TCLP, Herbicides TCLP, PCBs, flashpoint, paint filter, pH, percent solids, cyanide, and acid soluble sulfide.

Results of the TCLP show several exceedances for waste characterization for Feature 150. No exceedances were present for Feature 143. The results of the sampling are summarized in Table 12.

5. Risk Evaluation

Risk evaluation will be performed for the site following the collection of the entire site data.

6. Summary of Findings

Although the Phase II – Exterior Investigation is ongoing, ARCADIS has completed Initial Phase II – Exterior Investigation activities at the Features (i.e., RECs,and AOIs) that were identified in the June 2007 Phase I ESA on the exterior portion of the Site. The Site has a total of 32 exterior Features; 30 Features were investigated, one Feature was evaluated and one Feature was not investigated due to utility interferences

The Initial Phase II – Exterior Investigation activities were conducted in June and July 2007. A total of 54 soil borings, 16 hand auger borings, 12 groundwater monitoring wells and nine temporary wells were installed and sampled to evaluate soil and groundwater condition at the site. In addition, three existing monitoring wells already located on site were sampled as part of this investigation. A geophysical survey was conducted at one of the Features to identify potential buried material and/or disturbed soil.

The following is a summary of findings from the Initial Phase II – Exterior Investigation:

6.1 VIC Program

6.1.1 Former Test Track - Feature 1

Two hollow stem auger borings (ASB-033 and ASB-046) were advanced and DRO was detected in both soil samples (ASB-033: 97 mg/kg, ASB-046 330 mg/kg); however there is no Tier 2 SRV for this constituent. No analytical constituents were detected above the Tier 2 Industrial SRVs. Based on the data collected to date; no additional soil evaluation is anticipated within this Feature.

6.1.2 Railroad Spurs - Feature 7

Five hollow stem auger borings (Borings ASB-017, ASB-021, ASB-022, ASB-031, and ASB-043) were advanced and DRO was detected in the soil samples at ASB-017 (38 mg/kg), ASB-022 (2.4 J mg/kg), and ASB-031 (2.8 J mg/kg) boring; however there is no Tier 2 SRV for this constituent. No analytical constituents were detected above the Tier 2 SRVs. Based on the data collected to date; no additional soil evaluation is anticipated within this Feature.

6.1.3 Former Hazardous Waste Storage Area - Feature 8

Two hollow stem auger borings (ASB-034 and ASB-044) were advanced and no analytical constituents were detected in the soil samples above the Tier 2 SRVs. Based on the data collected to date; no additional soil evaluation is anticipated within this Feature.

6.1.4 Former Hazardous Waste Storage Area - Feature 10

Two hollow stem auger borings (ASB-013 and ASB-014) were advanced and arsenic was detected in soil at ASB-014 at concentration of 156 mg/kg, which exceeds the Tier 2 Industrial SRV. No other constituents were detected in either boring above the Tier 2 Industrial SRVs. Perched groundwater samples were collected from temporary well ASB-013 and none of the constituents were detected above the HRLs. Due to insufficient water volume, a sample for metals was unable to be collected. Based on the data collected to date; additional soil evaluation is anticipated within this Feature along with collection of metals from a temporary monitoring well within the perched groundwater.

6.1.5 Former Railroad Spurs - Feature 12

Three hollow stem auger borings (ASB-005, ASB-37, and ASB-040) were advanced and no constituents were detected in any soil samples above the Tier 2 Industrial SRVs. Perched groundwater samples were collected from temporary wells ASB-005 and ASB-037. Arsenic (45.5 ug/L), cadmium (6.4 ug/L), chromium (348 ug/L), and lead (202 ug/L) were all detected above the HRLs in ASB-005. The same constituents (arsenic [482 ug/L], cadmium [45.8 J ug/L], chromium [1,540 ug/L], and lead [1,830 ug/L]) were detected in ASB-037, along with beryllium (7,210 ug/L) and mercury (5.5 ug/L) above their respective HRLs (Figure 14 and Table 10). Based on the data collected to date; further groundwater evaluation is anticipated within this Feature.

6.1.6 Outfall 001 - Feature 15

No soil sample was collected at this Feature. The outfall (storm drain) is a man-made structure, which drains into a man-made channelized stream that drains into the Mississippi River. The channelization consists of a poured concrete stream bottom, with limestone cemented walls. The Outfall consists of a cemented limestone retaining wall, at the bottom of the wall is a man-made pond (constructed of a concrete bottom, and limestone walls). Based on the observations above; no additional evaluation is anticipated within this Feature.

6.1.7 1996 Glycol Release From underground Piping - Feature 21

Two hollow stem auger borings were completed to investigate Feature 21 (ASB-008 and ASB-009). Borings ASB-008 and ASB-009 were advanced and no constituents were detected in any soil samples above the Tier 2 Industrial SRVs. Based on the data collected to date; no additional soil evaluation is anticipated within this Feature.

6.1.8 Former Brake Fluid AST - Feature 23

No borings were completed due to utility interference, and will be completed at a later date.

6.1.9 Former Bulk Solvent and Waste Solvent USTs - Feature 35, Former Bulk Storage Area - Feature 36, Solvent UST Underground Piping-Feature -37 and Sump within Solvent UST Basin - Feature 46

Three hollow stem auger borings (ASB-018, ASB-019, and ASB-020) were advanced and no constituents were detected in the soil samples above the Tier 2 Industrial SRVs. Based on the data collected to date; no additional soil evaluation is anticipated within this Feature.

6.1.10 Wastewater Collection ASTs - Feature 44, Wastewater Treatment Area - Feature 134 and Former Waste Disposal Area - Feature 140

Four hollow stem auger borings were completed and co-located to evaluate Features 44, 134 and 140. ASB-023, ASB-024, ASB-025, and ASB-027 were advanced. Lead was above the Tier 2 Industrial SRV in the soil sample collected at boring ASB-027 (1070 mg/kg). Based on the data collected to date; additional soil evaluation is anticipated within this Feature.

6.1.11 Former Coal Operations - Feature 47

Two hollow stem auger borings (ASB-035 and ASB-036) were advanced and no constituents were detected in any soil samples above the Tier 2 Industrial SRVs. Perched groundwater samples were collected from temporary well ASB-036. Arsenic (25.1 ug/L), beryllium (8.4 ug/L), chromium (257 ug/L), lead (80.7 ug/L), manganese (9780 ug/L), nickel (361 ug/L), and vanadium (367 ug/L) were all detected above their respective HRLs. Based on the data collected to date; further groundwater evaluation is anticipated for this Feature.

6.1.12 Sludge Pits - Feature 121

Three hollow stem auger borings (ASB-015, ASB-016, and ASB-032) were advanced and no constituents were detected in any soil samples above the Tier 2 SRVs. Based on the data collected to date; no additional soil evaluation is anticipated at this Feature.

6.1.13 Potential Battery Waste Disposal Area (Baseball Fields) - Feature 139

A geophysical survey of the area was conducted. Six direct push borings were advanced within anomalies identified within this Feature. Direct push borings ASB-049, ASB-050, ASB-51, ASB-052, ASB-053, and ASB-054 were advanced. In addition, three surface soil samples were also collected in this Feature: AGM-SS-01, AGM-SS-02, and AGM-SS-03. 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.

Arsenic was detected in soils at ASB-049 (6.6 mg/kg), ASB-051 (5.3 mg/kg), ASB-053 (7.2 mg/kg), and AGM-SS-01 (16.4 mg/kg) above the Tier 2 Recreational SRV. Copper was detected in ASB-049 (18.8 mg/kg), ASB-052 (35.3 mg/kg), ASB-053 (13.2 mg/kg), and all three surface soil samples (AGM-SS-001: 19.4 mg/kg, AGM-SS-002: 14.7 mg/kg, AGM-SS-003: 13.8 mg/kg) above the Tier 2 Recreational SRV. Iron was detected above the Tier 2 Recreational SRV in all borings (ASB-049: 17,100 mg/kg, ASB-050: 16,600 mg/kg, ASB-051: 13,600 mg/kg, ASB-052: 20,600 mg/kg, ASB-053: 18,700 mg/kg, AGM-SS-001: 12,900 mg/kg, AGM-SS-002: 16,200 mg/kg, and AGM-SS-003: 13,300 mg/kg) with the exception of ASB-054. Additional investigation activities have already begun prior to the submittal of this report.

6.1.14 Drums-Feature 143

Two hand auger borings (HA-055 and HA-056) were advanced and no constituents were detected in any soil samples above the Tier 2 Industrial SRVs. Based on the data collected to date; no additional soil evaluation is anticipated within this Feature.

6.1.15 Utility Tunnel Staining - Feature 144

Two hand auger borings were advanced (HA-069 and HA-070). No analytical constituents were detected above the Tier 2 SRVs. Based on the data, no additional soil evaluation is anticipated within this Feature.

6.1.16 Flow Stone-Feature 149

One hand auger borings (HA-068) was advanced and no constituents were detected in the soil sample above the Tier 2 SRVs. Based on the data collected to date; no additional soil evaluation is anticipated within this Feature.

6.1.17 Collapsed Area with Buried Drums - Feature 150

Four hand auger borings (HA-064, HA-065, HA-066, and HA-067) were advanced. Boring HA-064 detected several constituents above Tier 2 Industrial SRVs including naphthalene(1,400 mg/kg), 1,2,4-trimethylbenzene (87 mg/kg), 2-methylnaphthalene (370 J mg/kg), arsenic (36.7 mg/kg), cadmium, (307 mg/kg) and lead (6,650 mg/kg). Boring HA-065 detected several constituents above Tier 2 Industrial SRVs including butylbenzene (130 mg/kg), naphthalene (2,100 mg/kg), 2-methylnaphthalene (460 J mg/kg), 1,3,5-trimethlybenzene (350 mg/kg), 1,2,4-trimethylbenzene (1,100 mg/kg), xylene-o (360 mg/kg) and m&p (670 mg/kg), arsenic (42.6 mg/kg), cadmium (832 mg/kg) and lead (8,410 mg/kg). Boring HA-066 detected several constituents above Tier 2 Industrial SRVs including butylbenzene (160 mg/kg), ethylbenzene (350 mg/kg), naphthalene (1,300 mg/kg), 1,3,5-trimethlybenzene (480 mg/kg), 1,2,4-trimethylbenzene (1,500 mg/kg), xylene-o (610 mg/kg) and m&p (1,200 mg/kg), arsenic (87.5 mg/kg), cadmium (1,420 mg/kg), and lead (17,900 mg/kg). Based on the data collected to date; additional evaluation is anticipated within this Feature.

6.1.18 Potential Film/Staining - Feature 151

Seven hand auger borings (HA-057, HA-058, HA-059, HA-060, HA-061, HA-062, and HA-063) were advanced and no constituents were detected in the soil samples above the Tier 2 Industrial SRVs. Based on the data collected to date; no additional soil evaluation is anticipated within this Feature.

6.1.19 VIC Program Summary

In general, the detected constituents in soil correspond to historical chemical usage of the Features. Two exceptions were noted. The only constituent detected above the Tier 2 Industrial SRVs at the Former Hazardous Waste Storage Area - Feature 10 was arsenic. The presence of this constituent at this Feature is more likely associated with fill material or naturally occurring conditions than a release from the Feature given the lack of other hazardous waste constituents. The second noted exception was the detection of metals at Potential Battery Waste Disposal Area (Baseball Fields) -

Feature 139. Although the batteries contain metals, it is noted that the detected metals concentrations all fall within very narrow ranges. For example, copper was detected at concentrations ranging from 13.2 to 35.3 mg/kg. The presence of a constituent in a narrow range of concentrations may be an indicator of background conditions. In addition, no lead concentrations were detected above Tier 2 SRVs (Industrial or Recreational) within the area of Feature 139 investigated.

Impacts at each of the six Features with Tier 2 Industrial SRV exceedances appear confined to the vicinity of each Feature. However, the extent of impacts cannot be confirmed at this time due to the limited number of borings installed within each Feature area.

Perched groundwater exceedances generally consisted of metals. The presence of these constituents is consistent with site historical chemical usage of these areas. However, it is noted that the soil samples collected from both of Features with exceedances did not contain constituents at concentrations that exceeded the Tier 2 Industrial SRVs.

6.2 VPIC Program

6.2.1 Former Location of Gasoline and Diesel Fuel Underground Piping - Feature 5

Five hollow stem auger borings (ASB-029, ASB-030, ASB-045, ASB-047, and ASB-048) were advanced. No constituents were detected in any soil samples above the Tier 2 Industrial SRVs. Perched groundwater samples were collected from temporary wells ASB-030 and ASB-047. Benzene (80 ug/L) and lead (231 ug/L) were detected in ASB-030 above the HRLs. Benzene (84 ug/L), benzo(a)pyrene (15.5 J ug/L), and lead (534 ug/L) were detected above the HRLs in ASB-047. Based on the data collected to date; further groundwater evaluation is anticipated within this Feature.

6.2.2 Former Gasoline, Sunoco Spirits, and Pryoxlin Thinner USTs - Feature 16

Two hollow stem auger borings (ASB-001 and ASB-002) were advanced. Xylene-o (38 mg/kg) and m&p (140 mg/kg) were detected in soil at ASB-001 above Tier 2 Industrial SRVs. 1,2,4-trimethlybenzene (57 mg/kg) and 1,3,5-trimethlybenzene (18 mg/kg) were detected in soil at ASB-002, which are above respective Tier 2 Industrial SRVs for these constituents. No other constituents were detected in the soil samples above the Tier 2 Industrial SRVs. A perched groundwater sample was collected from temporary

well ASB-001. Ethylbenzene (11,000 ug/L), isopropylbenzene (320 J ug/L), naphthalene (2120 ug/L), xylene-o (11,000 ug/L), and xylene-m&p (35,000 ug/L) were detected in the perched groundwater sample above their respective HRLs. The following were also detected above the HRLs: arsenic (247 ug/L), barium (6610 ug/L), cadmium (15.4 J ug/L), chromium (473 ug/L), and lead (935 ug/L). Based on the data collected to date; additional soil and groundwater evaluation is anticipated within this Feature.

6.2.3 Former Oil Fill Area - Feature 20

Two hollow stem auger borings (ASB-006 and ASB-007) were advanced. No constituents were detected in the above boring above the Tier 2 Industrial SRVs. A perched groundwater sample was collected from temporary wells ASB-006. Arsenic (254 ug/L), barium (8,840 ug/L), cadmium (36.5 ug/L), chromium (990 ug/L), lead (552 ug/L), and mercury (3.4 ug/L) were detected in the perched groundwater sample above their respective HRLs. Based on the data collected to date; further groundwater evaluation is anticipated within this area.

6.2.4 Unleaded Gasoline USTs - Feature 24

One hollow stem auger boring (ASB-028) was advanced and no constituents were detected in the soil sample above the Tier 2 Industrial SRVs. Based on the data collected to date; no additional soil evaluation is anticipated within this Feature.

6.2.5 Former Fuel Oil ASTs - Feature 42

One hollow stem auger boring (ASB-026) was advanced and no constituents were detected in the soil sample above the Tier 2 Industrial SRVs. Based on the data collected to date; no additional soil evaluation is anticipated within this Feature.

6.2.6 Former 20,000 Gallon Gasoline AST - Feature 138

Two hollow stem auger borings (ASB-041 and ASB-042) were advanced. No VOCs were detected in the soil sample were above the Tier 2 Industrial SRVs. Based on the data collected to date; no additional soil evaluation is anticipated within this Feature.

6.2.7 Former Fuel Oil UST - Feature 152

Two hollow stem auger borings (ASB-003 and ASB-004) were advanced. 1,2,4-Trimethylbezene (31 mg/kg) was detected in soil at ASB-003 from 6 to 8 feet above the Tier 2 Industrial SRV. No other constituents were detected in the samples above the Tier 2 Industrial SRVs. A perched groundwater sample was collected from temporary well ASB-003. Benzene (99 J ug/L), ethylbenzene (6,300 J ug/L), isopropylene (540 J ug/L), xylene-o (2,000 J ug/L), and xylene-m&p (15,000 J ug/L) were detected in the perched groundwater sample above their respective HRLs. The following were also detected above the HRLs: Benzo(a)pyrene (2.62 ug/L), naphthalene (1,400 ug/L), arsenic (207 ug/L), barium (5,030 ug/L), cadmium (16.8 J ug/L), chromium (668 ug/L), and lead (657 ug/L) were also detected in the perched groundwater sample; however there is no HRL for these constituents. Based on the data collected to date; additional soil and groundwater evaluation is anticipated within this Feature.

6.2.8 VPIC Program Summary

The VOCs detected in the soils correspond with the historical chemical usage at the Feature (Former Fuel Oil UST - Feature 152). Impacts at the two Features with Tier 2 Industrial SRV exceedances appear confined to the vicinity of each Feature. However, the extent of impacts cannot be confirmed at this time due to the limited number of borings installed in each Feature.

Several of the constituents VOCs, SVOCs, and Metals detected in perched groundwater from Former Gasoline, Sunoco Spirits, and Pryoxlin Thinner USTs - Feature 16 and Former Fuel Oil UST - Feature 152 were also detected in soil samples from these areas at concentrations exceeding the Tier 2 Industrial SRVs.

The soil sample collected from Former Location of Gasoline and Diesel Fuel Underground Piping - Feature 5 did not contain constituents at concentrations exceeding the Tier 2 Industrial SRVs; however, the constituents detected in the groundwater sample from Feature 5 are consistent with historic chemical usage of this area.

The soil sample collected from Former Oil Fill Area - Feature 20 did not contain constituents at concentrations exceeding the Tier 2 Industrial SRVs. The constituents detected in the groundwater sample (metals) are not consistent with land usage at this Feature.

6.3 VIC and VPIC Programs

6.3.1 Oil/Water Separator and Trench - Feature 27

Three hollow stem auger borings (ASB-010, ASB-011, and ASB-012) were advanced. No constituents were detected in the above soil samples above the Tier 2 Industrial SRVs. Based on the data collected to date; no additional soil evaluation is anticipated at this Feature.

6.3.2 Former Hazardous Waste Storage Area - Feature 49

Two hollow stem auger borings were (ASB-038 and ASB-039) were advanced. No constituents were detected in the soil samples were above the Tier 2 Industrial SRVs. Based on the data collected to date; no additional soil evaluation is anticipated at this Feature.

6.4 Permanent Groundwater Monitoring Wells

6.4.1 Perched Groundwater - Existing Wells (MW-4, 5 and 6)

The previously installed wells MW-4, MW-5, and MW-6 are completed into the perched groundwater within the unconsolidated formation. MW-4 and MW-5 were sampled and analyzed for VOCs and RCRA metals. Due to insufficient water volume in wells MW-4 and MW-5, SVOCs were not collected. MW-6 was sampled and analyzed for VOCs, SVOCs, and RCRA metals. Several RCRA metals were detected in each groundwater well sample below the HRL. Two RCRA metals were detected above the HRL. Chromium was detected in MW-5 at 907 ug/L, and lead was detected in MW-6 at 15.9 ug/L. No other constituents were detected above the HRLs.

6.4.2 Platteville Limestone Wells (AMW-01, 02, 03A, 04, 06, 08, 09 and 10)

Arsenic was detected in groundwater samples at AMW-06 (10.7 ug/L), AMW-08 (20.7 ug/L), and AMW-09 (171 ug/L) above the HRL. In AMW-09, cadmium was detected at 13 ug/L, which is above the HRL. Chromium was detected in AMW-08 (252 ug/L) and AMW-09 (802 ug/L) above the HRL. Lead was detected above the HRL in AMW-06 (16 ug/L), AMW-08 (27.5 ug/L), and AMW-09 (733 ug/L). No other constituents were detected above the HRLs in Platteville Limestone wells. A total of three additional quarterly monitoring events are anticipated.

6.4.3 St. Peter Sandstone Wells (AMW-03B, 05, 05B and 07)

No sample was collected from AMW-05 as the well was dry at the time of sampling. Lead was detected above the HRL in the groundwater sample at AMW-05B at 77.6 ug/L. Benzo(a)pyrene was detected in AMW-07 (0.79 J ug/L) above the HRL. No other constituents were detected above the HRLs in St. Peter Sandstone wells. A total of three additional quarterly monitoring events are anticipated.

ARCADIS recommends that three quarterly rounds of groundwater samples be collected from the monitoring well network. In addition, the remaining elements required by the MPCA for a Phase II investigation will be conducted. These elements include:

- Risk Evaluation (Groundwater and Surface water)
- Receptor Survey
- Vapor Survey
- Soil Gas Investigation

7. Recommendations

Based on the results of the Initial Phase II – Exterior Investigation and to meet the *VIC* and *VPIC* Program requirements for a Phase II Investigation, ARCADIS recommends the following activities be preformed at the site:

- Define and delineate the extent of impacts where the Tier 2 SRVs or HRLs were exceeded at each exterior Feature.
- Conduct three quarterly rounds of groundwater samples from the monitoring well network.
- Initiate the receptor survey activities (groundwater survey and vapor survey).
- Develop a scope of work for the Initial Phase II – Interior Investigation.

For the additional activities described above, work plans will be prepared and submitted to the *VIC* and/or *VPIC* Programs for approval(s).

8. References

ARCADIS. "Phase I Environmental Site Assessment, Ford Motor Company, Twin Cities Assembly Plant, St. Paul, Minnesota." June 2007.

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PEER. "Remedial Investigation Report." 1992.

CRA. "Remedial Investigation/Alternatives Analysis (RI/AA) Report (Draft), Ford Motor Company, Twin Cities Assembly Plant, St. Paul, Minnesota." May 1992.