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Madison Kipp Corporation

2014 Annual Report

Madison-Kipp Corporation
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Madison, Wisconsin

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ARCADIS

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2014 Annual Report

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ARCADIS

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1. Introduction

ARCADIS was retained by Madison-Kipp Corporation (MKC) to complete investigation and remedial activities at its facility located at 201 Waubesa Street, in Madison, Wisconsin (Site). Environmental investigation and remediation activities have been ongoing since 1994. Investigation activities focused on tetrachloroethene (PCE) and were expanded to evaluate polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons and Resource Conservation and Recovery Act metals beginning in 2012.

This report presents a summary of the Site investigation and remedial activities completed between December 2013 and December 2014, a summary of the observations and analytical results, and recommendations for future activities. Activities completed prior to December 30, 2013, have been previously documented in the *Site Investigation Work Plan,* dated May 31, 2012, and the *Site Investigation and Interim Actions Report, February 2012 – January 2013*, dated March 15, 2013 (SI Report), the SI Report addenda dated May 29, 2013, and September 30, 2013, and the *2013 Annual Report* dated March 31, 2014. A Natural Resources (NR) 712.09 submittal certification is included in Appendix A.

1.1 Site Background

The Site is located at 201 Waubesa Street in Madison, Wisconsin. The Site is located in the southwest quarter of Section 5, Township 7 North, Range 10 East in Dane County. The location of the Site is illustrated on a topographic quadrangle presented as Figure 1-1.

The Site is approximately 7.5 acres in size. A 130,000-square foot building occupies much of the Site. Asphalt parking lots are located in the northeastern, southwestern, and southeastern portions of the Site. The building has a 25,000 square-foot second floor and a 25,000 square-foot basement. In addition, a 6,000-square foot building is currently being constructed on a portion of the northeast parking lot. The Site is Zoned M-1 (industrial/manufacturing). The Site is currently operated as a metal die casting facility.

The Site is located in the eastern portion of Madison, in a mixed use area of commercial, industrial and residential land use. The Site is bounded by the Capital City Bike Trail to the north, Atwood Avenue to the south and Waubesa Street to the west. Residences are located adjacent to the east and west sides of the Site, and

further west (across Waubesa Street) and east (across Marquette Street). Commercial properties are located to the south (across Atwood Street) and further east. The Goodman Community Center is located to the north across the Capital City Bike Trail.

The Site is also located at the northeast end of the Madison Isthmus, which is a narrow strip of land separating Lake Mendota and Lake Monona. The Site is approximately 1,500 feet north of Lake Monona and approximately 6,800 feet east of Lake Mendota. This is important from a hydrogeological perspective because the lakes function as hydrologic boundaries for the Site. The topography of the Site is relatively flat, with an elevation ranging from approximately 870 to 880 feet above mean sea level. The Site and surrounding area is serviced by municipal water supply and sewer systems.

Investigation and remediation activities have been ongoing at the Site since 1994. This report presents the activities completed from December 2013 through 2014. Activities completed prior to December 2013 have been previously documented in the *Site Investigation Work Plan,* dated May 31, 2012, the SI Report dated March 15, 2013, the SI Report addenda dated May 29, 2013, and September 30, 2013, and the *2013 Annual Report* dated March 31, 2014.

2. Site Investigation

The following sections present an overview of Site investigation activities completed during the reporting period. The results of the investigation are presented in a subsequent section of the report. Figure 2-1 presents a summary of sample locations for work completed through this reporting period.

2.1 Regulatory Correspondence

All investigation and remediation activities were completed with approval from the Wisconsin Department of Natural Resources (WDNR). A complete list of work plans, summary reports, correspondence, and copies of regulatory correspondence for the period of January to December 2014 is included in Appendix B.

2.2 Site Investigation Activities

Activities from December 30, 2013, through December 31, 2014, are documented in this report and include the following:

- PCB Investigation, Supplemental Building Interior – Advanced and sampled 27 soil borings within the manufacturing building to complete additional delineation of volatile organic compounds (VOCs) and PCBs beneath the building.

- Groundwater Monitoring – Collected groundwater elevations and sampled 61 sample intervals for analysis of VOCs in April, July, and October 2014. Select wells were also sampled for total and dissolved PCBs and total and dissolved Resource Conservation and Recovery Act metals.

- Soil Vapor Extraction (SVE) System – Completed routine SVE system performance monitoring of permanent SVE system.

- Center Aisle Soil Excavation – Completed excavation, disposal, and backfill of on-Site soils containing PCBs within the manufacturing building along the center aisle. Additionally, the MKC facility disposed of concrete and soils as part of routine facility maintenance activities.

- Vapor Probe Sampling – Collected soil gas vapor samples from the vapor probes located around the perimeter of the Site.

- Office Indoor Air Sampling – Collected an indoor air sample from the MKC office.

- Performed annual sub-slab depressurization systems (SSDS) inspections for five residences along South Marquette Street.

- In-Situ Chemical Oxidation (ISCO) – Performed an ISCO injection of 5% sodium permanganate solution into the shallow, unconsolidated formation.

- Groundwater Extraction Treatment System (GETS) – Performed a step test for design of the GETS. Submitted the *Basis of Design* dated April 1, 2014, secured permits, and initiated construction activities for installation of the GETS.

- Rain Garden Soil Excavation – Completed excavation, disposal, and backfill of off Site soils containing PCBs within the rain garden which is located on city of Madison property between the northern MKC property boundary and the Capital City Bike Path. Confirmation soil samples were collected at approximately every 20 feet along the side walls and base of the excavation area.

- Parking Lot Soil Excavation – Completed excavation, disposal, and backfill of off Site soils containing PCBs on city of Madison property adjacent to the rain garden and the northern MKC property boundary. Confirmation soil samples were collected from three side walls of the excavation as well as the base of the excavation.

- Collected and disposed of non-hazardous and hazardous investigative-derived waste (IDW).

2.3 Site Preparation

Prior to any intrusive work, Site utilities were cleared in accordance with the ARCADIS Utility Locate Policy, where a minimum of three lines of evidence are required. ARCADIS contacted the Wisconsin One-Call, “Digger’s Hotline,” and private utility locators. ARCADIS also consulted with MKC employees to confirm the locations of known utilities.

2.4 On Site Soil Investigation

2.4.1 Supplemental Building Interior PCB Investigation

From December 30, 2013, to February 27, 2014, 27 soil borings were advanced (six of which were conducted at previous boring locations – B-136, B-148, B-149, B-150, B-158, and B-160) within the manufacturing building on Site to complete additional delineation beneath the building. The work was completed in accordance with the WDNR- and United States Environmental Protection Agency (U.S. EPA)-approved *Supplemental Work Plan for Polychlorinated Biphenyl Building Subsurface Investigation*, dated August 1, 2013. Up to three soil samples were collected from each soil boring: one sample from a 2-foot interval located from 0 to 4 feet below land surface (ft bls), one sample from the 2-foot interval located directly above the water table or where refusal was encountered, and/or one sample from the 2-foot interval located between 4 ft bls and the sample collected above the water table or where refusal was encountered. A total of 72 soil samples were collected and submitted for laboratory analysis of PCBs and VOCs. Details of the investigation activities were submitted to the WDNR in a document titled *Supplemental Building Interior Polychlorinated Biphenyl Work Plan Subsurface Investigation Summary,* dated April 22, 2014. Figure 2-2 presents the soil boring locations beneath the building.

2.5 Groundwater Investigation

Monitoring well locations are presented on Figure 2-3. Well construction details are summarized in Table 2-1. Below is a summary of activities completed as part of the groundwater investigation.

2.5.1 Monitoring Well Groundwater Elevation Measurements

Static groundwater measurements were collected from the Site monitoring network in April, July, and October 2014. The monitoring wells were opened and allowed to equilibrate prior to measuring depth to groundwater. Measurements were collected from the north side of the casing using an electronic water level meter capable of measuring to an accuracy of plus or minus 0.01 feet. Groundwater elevations are summarized in Table 2-2. The water level meter was decontaminated between well locations using non-phosphate laboratory grade detergent water and rinsed with distilled water.

2.5.2 Monitoring Well Sample Collection and Analysis

Groundwater samples were collected and submitted for laboratory analysis of VOCs in April, July, and October 2014. Groundwater samples were also collected from select wells and submitted for analysis of total and dissolved PCBs in April and October 2014. Groundwater samples were collected from monitoring wells using low-flow sampling techniques. Field parameters were recorded using a multi-parameter meter for pH, conductivity, dissolved oxygen, redox potential, and temperature. Groundwater samples were collected from the multiport wells using the Westbay-supplied sampling equipment. All non-dedicated field equipment was decontaminated between each well location using non-phosphate laboratory grade detergent water and rinsed with distilled water.

2.6 Vapor Monitoring

Vapor monitoring was completed at the perimeter Site soil vapor probes. Monitoring details are provided below.

2.6.1 Vapor Probe Monitoring

As recommended in the *2013 Annual Report*, the last semi-annual sampling event for soil vapor probe monitoring was completed on January 29 and 30, 2014. Annual monitoring of the soil vapor probes was initiated for 2014 and performed on July 22 and 23, 2014. The network of soil vapor probes that were monitored in January and July 2014 includes: VP-1N, VP-1S, VP-2N, VP-2S, VP-3, VP-4, VP-5, VP-6, VP-102, VP-114, VP-126, VP-202, VP-210, VP-222, VP-237, and VP-261 (Figure 2-4). Soil Vapor Probes VP-3 through VP-6 were not sampled in January 2014 due to elevated groundwater levels and/or saturated soil conditions along the northern portion of the Site. Soil Vapor Probe VP-202 was compromised during construction activities and was not sampled during the July 2014 event. Soil Vapor Probe VP-249 was unable to be located during the January and July 2014 sampling events due to construction activities on Site. Additionally, it should be noted that since the July 2014 sampling event, Soil Vapor Probes VP-102, VP-114, and VP-222 have been compromised due to construction activities. Based on discussions with WDNR, only Soil Vapor Probe VP-102 will be replaced in 2015.

During the vapor monitoring events, soil vapor samples were collected from the vapor probes over an approximate 30 minute time period using 6-liter summa canisters. The vapor samples were submitted for analysis of five VOCs by U.S. EPA Method TO-15:

PCE, TCE, cis-1,2-dichloroethene, trans-1,2-dichloroethene, and vinyl chloride to Eurofins Air Toxics, Inc. laboratory in Folsom, California.

2.6.2 Office Indoor Air Monitoring

Indoor air sampling was conducted in the MKC office building in 2013. A summary of the office indoor air sampling activities was provided in the *2013 Annual Report* and the *Summary of Office Indoor Air Sampling Activities* letter dated February 24, 2014 and submitted to WDNR. Per the recommendations of these reports, one additional indoor air sample was collected in July 2014 at sample location IA-5 to confirm the air quality in this area of the office building.

Sample IA-5 was located in the northern most file storage room (northeast corner of the office building). Office indoor air re-sampling of location IA-5 was performed on July 18, 2014. An ambient air sample was also collected upwind, outside the east side of the office building. The samples were collected over an approximate 8-hour period using 6 liter summa canisters. Each sample was submitted for laboratory analysis of five VOCs by U.S. EPA Method TO-15: PCE, TCE, cis-1,2-dichloroethene, trans-1,2-dichloroethene, and vinyl chloride. The samples were submitted to Eurofins Air Toxics, Inc. laboratory using appropriate chain-of-custody procedures.

2.7 IDW

IDW was generated during the Site investigation activities including soils, soil cuttings, development water, purge water, and decontamination water. Nonhazardous soil and soil cuttings were collected in rolloffs and/or 55-gallon steel drums and transported off Site for disposal at Advanced Disposal's Glacier Ridge Landfill LLC in Horicon, Wisconsin. Hazardous soil and soil cuttings were collected in rolloffs and/or 55-gallon steel drums and transported off Site for disposal at Wayne Disposal, Inc., in Belleville, Michigan. Non-hazardous development, purge, and decontamination water was collected in a tanker and disposed of off Site at Best Waste Solutions in Mequon, Wisconsin or steel 55-gallon drums and disposed of with MKC facility wastewater. Disposal documentation is presented in Appendix C.

3. Site Geologic and Hydrogeologic Conditions

Below is a summary of the Site geologic and hydrogeologic conditions based on soil and bedrock boreholes advanced and monitoring wells installed on Site and off Site. A geologic cross section was prepared to illustrate subsurface conditions using the Site wells. The location of the geologic cross section is depicted on Figure 3-1. Geologic Cross Section A-A' is presented as Figure 3-2.

3.1 Site Geology

The Site's near-surface geology consists of two unconsolidated units consisting of fill material and glacially-derived deposits, which overlie weakly cemented sandstone bedrock. A brief description of each unit is presented below.

3.1.1 Fill Material

Fill material consisting of debris and non-native sand, is located near the ground surface. The fill material classified as debris included slag, glass, brick, aluminum and steel pieces, wire, and rubber with an average thickness of approximately 0.5 feet. The fill material classified as non-native sand was described as very fine to medium grained sand. This fill material averaged from 2- to 4-feet thick.

3.1.2 Glacially-Derived Deposits

Underlying the fill material are several glacially-derived deposits including an upper clay unit, several gravel lenses, and a lower sand unit.

The uppermost native soil at the Site is referred to as the clay unit. The clay unit consists of stiff to medium stiff clay with some to little silt and trace to some very fine to fine sand. The clay unit was encountered from the land surface to an average depth of 6 ft bls.

Several continuous gravel lenses were identified within the upper clay and lower sand units. Three distinct gravel lenses were identified and appear to be laterally continuous across the Site. The lenses were identified at average depths of approximately 6.8, 15.4, and 23.8 ft bls on Site.

The sand unit located beneath the clay unit consists of very fine to coarse grained sand (mostly very fine to fine). The sand unit was encountered from an average of 6.0 ft bls to bedrock which was encountered at an average of 30 to 34 ft bls.

3.1.3 Bedrock Formations

Underlying the unconsolidated soil, three bedrock formations were identified; Lone Rock, Wonewoc, and Eau Claire.

The Lone Rock Formation is located immediately below the unconsolidated soils and was described as a friable to moderately hard, glauconitic, very fine to fine grained quartz sandstone. The base of the Lone Rock Formation was encountered at approximately 95 ft bls and averaged approximately 65-feet thick on Site.

The Wonewoc Formation is located below the Lone Rock Formation and was subdivided into two Members including the Ironton and the Galesville Members. The Ironton Member was described as friable to moderately hard, very fine to fine grained sandstone with an average thickness of approximately 32 feet. The Galesville Member was described as alternating beds of hard very fine to fine sandstone and friable, rounded, medium grained sandstone with an average thickness of approximately 99 feet.

The Eau Claire Formation was described as hard to moderately hard, very fine to fine grained sandstone interbedded with laminated, pale green siltstone and shale. The shale in the vicinity of the Site is estimated to range from 10- to 20-feet thick, although it has been eroded in portions of the central Yahara Lakes.

3.2 Hydrogeologic Conditions

The current groundwater monitoring well network at the Site includes 61 sample intervals. Below is a summary of the Site's potentiometric surfaces, hydraulic gradient directions, and horizontal and vertical gradients using data from the current well network.

3.2.1 Potentiometric Surface, Hydraulic Gradient Direction, and Gradient

Site-wide groundwater elevations were collected quarterly in April, July, and October 2014. Groundwater elevations are summarized in Table 2-2. The quarterly data were

evaluated to determine the hydraulic gradient direction and calculate horizontal gradients. Below is a summary of the findings.

3.2.1.1 Water Table Surface Elevation

The water table surface elevation using April, July, and October 2014 data are presented on Figures 3-3 through 3-5. Wells screened across the water table are located approximately 857 to 834 feet above mean sea level (ft amsl). The hydraulic gradient direction across the water table was to the southwest to southeast. The water table is primarily influenced by the amount of precipitation and the lock and dam where the Yahara River drains from Lake Mendota south into Lake Monona. The horizontal gradient in the saturated unconsolidated soils was calculated as 0.001 foot per foot to 0.005 foot per foot.

3.2.1.2 Lower Lone Rock Formation Potentiometric Surface

The potentiometric surface in the Lower Lone Rock Formation using April, July, and October 2014 data are presented on Figures 3-6 through 3-8. Wells screened in the Lower Lone Rock Formation are located approximately 816 to 777 ft amsl. The hydraulic gradient direction in the Lower Lone Rock Formation was to the northeast, east, and southeast. The horizontal gradient in the Lower Lone Rock Formation was calculated as 0.001 to 0.002 foot per foot to the northeast and east and 0.001 to 0.003 foot per foot to the southeast.

3.2.1.3 Upper Wonewoc Formation Potentiometric Surface

The potentiometric surface in the Upper Wonewoc Formation using April, July, and October 2014 data are presented on Figures 3-9 through 3-11. Wells screened in the Lower Wonewoc Formation are located between approximately 768 and 698 ft amsl. The hydraulic gradient direction in the Upper Wonewoc Formation was to the northeast, east, and southeast. Hydraulic gradients in the Upper Wonewoc Formation do not appear to be influenced by pumping at the nearest water supply wells. The horizontal gradient in the Upper Wonewoc Formation was calculated as 0.000 to 0.002 foot per foot across the Site.

3.2.2 Vertical Gradients

Vertical gradients were calculated for well pairs using the April, July, and October 2014 groundwater elevation data. Wells are screened or have sample intervals in four

geologic units including the wells screened across the water table, Lone Rock Formation, Wonewoc Formation, and Eau Claire Formation. Vertical gradient data are summarized in Table 3-1.

The current well network includes 10 wells nests including MW-2 through MW-6, MW-9, MW-17, MW-22, MW-23, MW-25, and MW-27. There are currently four multiport wells (MP-13 through MP-16) with four to seven sample intervals at each well. Below is a summary of vertical gradients and key observations made from the monitoring wells and multiport wells.

- The average vertical gradients between the water table wells and Lone Rock Formation were calculated at 0.000 to 0.084 feet/feet (ft/ft) and the hydraulic gradient direction is down. The exception is the Monitoring Well MW-22S and MW-22D nest where the average vertical gradient is -0.025 ft/ft and the hydraulic gradient direction is up.

- The average vertical gradients between the Lone Rock Formation and the Wonewoc Formation were calculated at 0.015 to 0.079 ft/ft and the hydraulic gradient direction is down.

- Upward vertical gradients were calculated between MW-5D2 and MW-5D3 with an average of -0.001 ft/ft and MW-22S and MW-22D with an average of -0.025 ft/ft.

- The direction of the vertical gradients for the Site was nearly consistently downward and within the same order of magnitude from the unconsolidated to the bedrock, as well as within each bedrock formation and between bedrock formations. This finding is consistent with a mathematical groundwater flow model commissioned by Dane County (WGNHS, 1999).

4. Site Investigation Results

Below is a summary of the soil, groundwater and vapor analytical results from the investigation activities completed during the reporting period.

4.1 On-Site Soil Analytical Results

The following subsections describe the investigations conducted, samples collected, and the nature and distribution of soil impacts.

4.1.1 Supplemental Building Interior PCB Investigation

From December 30, 2013, to February 27, 2014, 27 soil borings were advanced within the manufacturing building on Site to complete additional delineation beneath the building. A total of 72 soil samples were collected and submitted for laboratory analysis of PCBs and VOCs. Twenty-six of the 72 samples contained PCBs above the U.S. EPA high occupancy cleanup level of 1 milligrams per kilogram (mg/kg) and 15 samples were detected above the Toxic Substance Control Act (TSCA) disposal limit of 50 mg/kg. The highest PCB concentrations were located adjacent to the historical concrete trench located in the middle of the facility, running north to south. Only one of the samples collected, B-190 from 0 to 2 ft bls, exceeded the industrial direct contact residual contaminant level (RCLs) for PCE (2,400 mg/kg) and TCE (150 mg/kg). The boring is located in the north parking lot and will be managed through maintenance of the Site paved areas as an engineered barrier. In general, the highest concentrations of total PCBs are present along the historical trench at varying depths from 0 to 2 ft bls up to approximately 18 ft bls.

As presented in Section 5.3.1, excavation, disposal, and backfill activities were performed within the MKC manufacturing building along the center aisle in June and July 2014. The excavation encompassed a 165 by 8 foot area to a total depth of approximately 3 to 4 ft bls. The excavation was backfilled with 3-inch crushed stone and ¾-inch fine stone compacted in 6 to 8-inch lifts, and finished with an 11-inch thick concrete floor. The remaining PCB-impacted soils in place are present beneath 6 to 11 inches concrete floor so there is no complete exposure pathway for direct contact. Results of the investigation activities were submitted to the WDNR in a document titled *Supplemental Building Interior Polychlorinated Biphenyl Work Plan Subsurface Investigation Summary*, dated April 22, 2014. Soil analytical results are presented in Table 4-1.

4.2 Groundwater Analytical Results

Groundwater samples were collected from monitoring wells and multiport wells. Groundwater analytical laboratory reports that have not been previously submitted are included in Appendix D. The following subsections describe the samples collected, and the nature and distribution of groundwater impacts.

4.2.1 Monitoring Well Groundwater Analytical Results

The current groundwater monitoring well network at the Site includes 61 sample intervals. The sample intervals are designed to collect samples from four geologic units including from shallowest to deepest: the water table; Lone Rock Formation; Wonewoc Formation; and the Eau Claire Formation.

Groundwater samples were collected for laboratory analysis of VOCs in April, July and October 2014 from the well network. Additionally, groundwater samples were collected for total and dissolved metals in April from Monitoring Wells MW-3S and MW-18S. Groundwater samples were also collected for total and dissolved PCBs in April and October from Monitoring Wells MW-22S and MW-22D and in October from Monitoring Wells MW-23S and MW-23D. Groundwater analytical results are presented in Table 4-4, and groundwater laboratory analytical reports are presented in Appendix D.

Groundwater PCE isoconcentration maps were prepared for the October 2014 groundwater sampling event for each of the three geologic units (Water Table, Upper Lone Rock Formation, and Upper Wonewoc Formation). Below is a summary of the VOC groundwater analytical results and estimated extent of impacts by geologic unit.

4.2.1.1 Groundwater Analytical Results for the Water Table

Monitoring wells with screens located across the water table include MW-1, MW-2S, MW-3S, MW-7, MW-8, MW-10S, MW-11S, MW-12S, MW-18S, MW-22S, MW-23S, and MW-26S. Monitoring wells MW-4S, MW-6S, and MW-24 are screened below the water table, but were used to prepare isoconcentration maps to understand the extent of impacts at and near the water table. Groundwater analytical results for the water table are presented in Table 4-4.

- VOC concentrations were reported above Enforcement Standards (ESs) for PCE and TCE at MW-1, MW-3S, MW-18S, MW-22S, and MW-23S.

- Total and dissolved PCBs were reported above the ES at MW-22S.

- Total metals were reported above ESs for iron and manganese at MW-3S and MW-18S. Dissolved iron concentrations were reported above the ES at MW-18S. Dissolved manganese concentrations were reported above the ES at MW-3S and MW-18S. The manganese concentrations are attributed to the ISCO injection completed in the unconsolidated formation.

The estimated extent of PCE in groundwater from the water table wells from April and October 2014 are presented on Figures 4-1 and 4-2, respectively. An estimated extent of PCE in groundwater from the water table wells from July was not prepared since groundwater samples were only collected from Monitoring Wells MW-25D, MW-25D2, MW-26S, MW-27D, and MW-27D2. PCE isoconcentration cross sections are presented as Figures 4-3 and 4-4. The locations of the cross sections are depicted on Figure 3-1. As shown, the highest PCE concentrations are centered near the MW-3 well nest. Groundwater PCE impacts are delineated by the water table wells to the north by Monitoring Well MW-12S and MW-26S, to the east by Monitoring Wells MW-7, MW-8, and MW-11S, to the south by MW-6S, and to the west by Monitoring Well MW-10S.

4.2.1.2 Groundwater Analytical Results for the Lone Rock Formation

Monitoring wells screened in the Lone Rock Formation include MW-2D, MW-3D, MW-3D2, MW-4S, MW-4D, MW-4D2, MW-5S, MW-5D, MW-6S, MW-6D, MW-9D, MW-9D2, MP-13 (44 to 48 ft bls; 67 to 71 ft bls; 81 to 85 ft bls), MP-14 (70 to 75 fet bls), MP-16 (80 to 84 ft bls), MW-19D, MW-20D, MW-21D, MW-22D, MW-23D, and MW-24. Monitoring well MW-25D is screened below the Lone Rock Formation, but is used to prepare isoconcentration maps to understand the extent of impacts at and near the Lone Rock Formation. Groundwater data from Monitoring Wells MW-4S, MW-6S, and MW-24 were used to illustrate the water table PCE isoconcentration maps, and are thus not used in the Lone Rock Formation isoconcentration maps. Groundwater analytical results for the Lone Rock Formation are presented in Table 4-4.

- VOC concentrations were reported above the ESs for PCE, TCE, cis-1,2-dichloroethene, vinyl chloride, methylene chloride, and/or benzene at MW-2D, MW-3D, MW-3D2, MW-5S, MW-5D, MW-6D, MW-9D2, MP-13 (44 to 48 feet, 67 to 71 feet, 81 to 85 feet), MW-19D, MW-20D, MW-21D, MW-22D, and/or MW-23D.

The estimated extent of PCE in groundwater from the Lone Rock Formation from October 2014 is presented on Figure 4-5. PCE isoconcentration cross sections are presented as Figures 4-3 and 4-4. As shown, the highest PCE concentrations are centered near Multiport Well MP-13 in the north parking lot and extends south under the building. Groundwater PCE impacts are delineated in groundwater in the Lower Lone Rock Formation to the north by Monitoring Well MW-9D, to the east by Multiport Well MP-16, to the west by Multiport Well MP-14, and to the south by Monitoring Well MW-4D, MW-4D2, and MW-6D.

4.2.1.3 Groundwater Analytical Results for the Wonewoc Formation

Monitoring wells screened in the Wonewoc Formation include Monitoring Wells MW-5D2, MP-13 (102 to 106; 121 to 125; 135 to 139; 163 to 167 ft bls), MP-14 (100 to 105; 135 to 140; 170 to 178 ft bls), MP-15 (88 to 92; 100 to 105; 120 to 125; 142 to 146; 177 to 187 ft bls), MP-16 (106 to 116; 140 to 144; 175 to 179 ft bls), MW-17, MW-19D2, MW-20D2, MW-21D2, MW-25D, MW-25D2, MW-27D, and MW-27D2. Groundwater data from Monitoring Well MW-25D were used to illustrate the Lone Rock Formation isoconcentration maps, and are thus not used in the Wonewoc Formation isoconcentration maps. Groundwater analytical results for the Wonewoc Formation are presented in Table 4-4.

- VOC concentrations were reported above the ES for PCE, TCE, cis-1,2-dichloroethene, and/or vinyl chloride at MW-5D2, MP-13 (102 to 106 feet, 121 to 125 feet, 135 to 139 feet, and 163 to 167 feet), MP-14 (135 to 140 feet, 170 to 178 feet), MP-15 (88 to 92 feet, 100 to 105 feet, 120 to 125 feet, 142 to 146 feet, 177 to 187 feet), MP-16 (106 to 116 feet, 140 to 144 feet, 175 to 179 feet), MW-17, MW-19D2, MW-20D2, MW-21D2, MW-27D, and MW-27D2.

The estimated extent of PCE in groundwater from the Wonewoc Formation from October 2014 is presented on Figure 4-6. PCE isoconcentration cross sections are presented as Figures 4-3 and 4-4. As shown, the highest PCE concentrations are centered on Multiport Well MP-13 in the north parking lot and extend south and north. Groundwater PCE impacts are delineated in the Upper Wonewoc Formation to the north by Monitoring Well MW-27D, to the east by Multiport Well MP-16, and to the south by Monitoring Well MW-25D2.

4.2.1.4 Groundwater Analytical Results for the Eau Claire Formation

Monitoring wells screened in the Eau Claire Formation include Monitoring Wells MW-3D3 and MW-5D3. Monitoring wells MW-3D3 and MW-5D3 serve as vertical delineation wells on Site. Groundwater analytical results for the Eau Claire Formation are presented in Table 4-4. The VOC analytical results for these wells were below ESs.

4.3 Vapor Analytical Results

Below is summary of on Site vapor analytical results.

4.3.1 On-Site Perimeter Vapor Analytical Results

Semi-annual sampling of the on-Site network of soil vapor probes was performed on January 29 and 30, 2014. Annual sampling of the on-Site network of soil vapor probes was performed on July 22 and 23, 2014.

The on-Site network of soil vapor probes was sampled in January and July 2014 includes: VP-1N, VP-1S, VP-2N, VP-2S, VP-3, VP-4, VP-5, VP-6, VP-102, VP-114, VP-126, VP-202, VP-210, VP-222, VP-237, and VP-261 (Figure 2-5). Soil Vapor Probes VP-3 through VP-6 were not sampled in January 2014 due to elevated groundwater levels and/or saturated soil conditions along the northern portion of the Site. Soil Vapor Probe VP-202 was compromised during construction activities and was not sampled during the July 2014 event. Soil Vapor Probe VP-249 was unable to be located during the January and July 2014 sampling events due to construction activities on Site. Additionally, it should be noted that since the July 2014 sampling event, Soil Vapor Probes VP-102, VP-114, and VP-222 have been compromised due to construction activities. Based on discussions with WDNR, only Soil Vapor Probe VP-102 will be replaced in 2015.

The vapor samples were submitted to Eurofins Air Toxics, Inc. laboratory in Folsom, California for analysis of five VOCs by U.S. EPA Method TO-15: PCE, TCE, cis-1,2-dichloroethene, trans-1,2-dichloroethene, and vinyl chloride. A summary of the vapor probe analytical data is presented in Table 4-5, and vapor laboratory analytical reports are presented in Appendix E. The analytical data were compared to the calculated screening levels for deep soil gas to indoor air. Vapor probes adjacent to residences were compared to the residential screening levels, and the bike path vapor probes (VP-3 through VP-6) were compared to the non-residential screening levels. In general, the

2014 data are consistent with previous vapor probe data. None of the soil vapor samples collected contained VOC concentrations above the applicable screening levels. Vapor Probes VP-1N, VP-1S, VP-2N, VP-2S, former VP-102, former VP-114, and VP-126 are located within the influence of the SVE system.

4.3.2 Office Indoor Air Monitoring

Indoor air sampling was conducted in the MKC office building in July 2014 at sample location IA-5 to confirm the air quality in this area of the office building. The sample was submitted for laboratory analysis of five VOCs by U.S. EPA Method TO-15: PCE, TCE, cis-1,2-dichloroethene, trans-1,2-dichloroethene, and vinyl chloride.

The analytical results of the office indoor air sample were compared to Wisconsin's non-residential indoor air action levels. Results of the indoor air sample were below the non-residential indoor air action levels for the five VOCs at Sample IA-5. No further actions are necessary.

5. Interim Remedial Actions

5.1 SVE System Operation, Maintenance, and Monitoring

The permanent SVE system installed in May 2013 utilizes SVE Wells SVE-1 through SVE-9 to provide capture and treatment of soil vapors.

Performance monitoring, outlined in the *Monitoring and Sampling Plan for the Phase I SVE System*, submitted to the WDNR on March 8, 2012, is conducted on a monthly basis and consists of monitoring the nine SVE extraction wells, the existing on Site soil vapor probes within the radius of influence of the SVE system, SVE system influent and effluent sample collection, and SVE system operations.

The SVE system was operated at a total vacuum of approximately 5 inches of mercury and at a total extraction rate of approximately 230 standard cubic feet per minute with the make-up air closed. Influent and effluent system air samples are collected and submitted for laboratory analysis of VOCs by U.S. EPA Method TO-15 on a monthly basis. The SVE effluent data are used to calculate the total mass of each VOC constituent discharged from the system per hour and per year. The calculated values are compared to the discharge limits listed in Table A of Wis. Admin. Code NR 445 (based on stack height between 25 and 40 feet) to confirm that the discharge is in compliance with the State of Wisconsin discharge requirements.

Vacuum measurements were collected at Soil Vapor Probes VP-1N, VP-2N, VP-1S, VP-2S, VP-102, VP-114, and VP-126, which are located on the Site and are within the radius of influence of the SVE system. The purpose of the monitoring is to evaluate the effectiveness of the SVE system in preventing the potential off Site migration of soil vapors within the vadose zone. Vacuum monitoring completed to date indicates the SVE system is effectively controlling sub-surface vapors within the vadose zone in the radius of influence. It should be noted that Soil Vapor Probes VP-102, VP-114, and VP-202 were compromised during construction activities. Vacuum readings at adjacent SVE wells are consistent with those taken in previous months.

Summaries of the SVE system operational data along with tables of routine monitoring data, influent and effluent vapor sample analytical data, and discharge compliance calculations are provided in the SVE Progress Reports submitted to WDNR in 2014 (refer to Appendix B). The SVE system is effectively controlling migration of sub-surface vapors within the vadose zone and treatment of extracted soil vapors.

5.2 Groundwater Extraction System

As presented in the *2013 Annual Report* and summarized in the October 15, 2013 *Groundwater Remedial Strategy* letter approved by WDNR in electronic correspondence dated October 16, 2013, MKC will incorporate groundwater extraction to minimize off-Site VOC migration, facilitate the removal of VOC mass and provide hydraulic influence. A step test was completed on Site in January 2014 to determine the necessary operational requirements of the extraction well (GWE-1) and to guide design specifications for the groundwater extraction and treatment system (GETS). The *Basis of Design for Proposed Groundwater Extraction and Treatment System*, dated April 1, 2014 was submitted to WDNR. MKC secured permits from the city of Madison and WDNR, including the Wisconsin Pollutant Discharge Elimination System (WPDES) permit for discharge of treated groundwater, and initiated construction activities for installation of the GETS in fall 2014. Startup of the GETS is anticipated for spring 2015.

5.3 On and Off-Site Excavations

5.3.1 Center Aisle Excavation

From June 27, 2014 through July 3, 2014, excavation, disposal, and backfill activities were performed within the MKC manufacturing building along the center aisle. On-Site soil excavation activities were completed in accordance with the *Interior Building Maintenance-Center Aisle* document, dated June 3, 2014 and submitted to WDNR and U.S. EPA. The WDNR approved of the center aisle excavation work in electronic correspondence dated June 10, 2014. The excavation encompassed a 165 by 8 foot area to a total depth of approximately 3 to 4 ft bls. A total of 53.9 tons of the concrete floor was disposed of at the Glacier Ridge landfill in Horicon, Wisconsin. A total of 279 tons of soil with concrete and piping debris was disposed of at Environmental Quality Wayne Disposal Landfill in Belleville, Michigan. The excavation was backfilled with 3-inch crushed stone and ¾-inch fine stone compacted in 6 to 8-inch lifts, and finished with an 11-inch thick concrete floor. A summary of the excavation and backfill activities were submitted to the WDNR in a document titled *Center Aisle Excavation Summary*, dated July 15, 2014. Waste disposal documentation is included in Appendix C.

5.3.2 Maintenance Activities

MKC performed routine maintenance activities within the manufacturing building and on Site periodically throughout 2014. MKC met with the WDNR on January 9, 2014 to discuss the maintenance activities and obtain WDNR concurrence for these activities. Maintenance activities included the removal and replacement of concrete and soils within the building and parking lot areas of the Site, and repaving of the facility parking lots. Concrete and soils that were removed were profiled and disposed of in accordance with state and federal regulations. Non-hazardous concrete and soil were disposed off Site at Advanced Disposal's Glacier Ridge Landfill in Horicon, Wisconsin. TSCA hazardous concrete and soil was disposed off Site at the Environmental Quality Wayne Disposal Landfill in Belleville, Michigan. Waste disposal documentation is included in Appendix C.

Maintenance activities were documented in letters dated February 4, 2014, April 2014, May 29, 2014 and October 22, 2014, and submitted to WDNR and U.S. EPA.

5.3.3 Rain Garden Soil Excavation

From April 7 through 9, May 6 through 9, and May 22 through 23, 2014, excavation, disposal, and backfill activities were performed within the rain garden which is located on city of Madison property between the northern MKC property boundary and the Capital City Bike Path. Off-Site soil excavation activities were completed in accordance with the WDNR-approved *Rain Garden Soil Removal Work Plan* dated December 2013. The excavation was split into three separate sections due to setback zones provided by Madison Gas and Electric around overhead utility poles and the associated guide wires that were situated directly within the planned excavation area.

Soils containing PCBs at concentrations above the WDNR's industrial direct contact RCL of 0.744 mg/kg to a depth of 4 ft bls were excavated and disposed off Site. Soils at the rain garden were removed to the extent practicable to either below the WDNR's industrial direct contact RCL, or safely excavated to Madison Gas and Electric utility buffers. A total of 362.92 tons of soil was disposed as non-hazardous material at Advanced Disposal Glacier Ridge Landfill located in Horicon, Wisconsin, and 29.39 tons of soil was disposed as TSCA hazardous material at Environmental Quality Wayne Disposal Landfill located in Belleville, Michigan.

Confirmation soil samples were collected at approximately every 20 feet along the side walls and base of each excavation area. A total of 41 side wall soil samples and five

base soil samples were collected during the three excavations and submitted for laboratory analysis of PCBs. Areas within the rain garden parcel containing confirmation soil samples with concentrations of PCBs above the WDNR's industrial direct contact RCL will be documented on the WDNR's geographic information system soil registry at case closure.

As specified by the city of Madison, the excavation areas were backfilled with sand to a depth of 1 foot bls followed by 1 foot of Purple Cow topsoil mix. Details of the excavation, sampling, and backfill activities were submitted to the WDNR in a document titled *Summary of Rain Garden Soil Removal Activities,* dated August 6, 2014. Soil analytical results are presented in Table 4-2. Waste disposal documentation is included under Appendix C.

A Request for Case Closure for the rain garden (BRRTS #02-13-562649) was submitted to the WDNR in November 2014. The status of the Request for Case Closure is currently on hold.

5.3.4 Parking Lot Soil Excavation

On August 12-13, 2014, excavation, disposal, and backfill activities were performed on city of Madison property adjacent to the rain garden and the northern MKC property boundary. The work was approved by WDNR in electronic correspondence dated August 6, 2014. The excavation encompassed a 10 by 10 foot area to a total depth of approximately 4 ft bls. A total of 27 tons of soil was excavated and disposed of at Environmental Quality Wayne Disposal Landfill located in Belleville, Michigan. The excavation was backfilled to grade with gravel and compacted in 1-foot lifts. The excavation area was subsequently paved with 6 inches of asphalt by MKC. Confirmation soil samples were collected from three side walls of the excavation as well as the base of the excavation. The northeastern sidewall of the excavation was not sampled since soils were excavated to the clean backfill of the adjacent rain garden. A total of three sidewall samples and one base sample were collected during the excavation activities and submitted for laboratory analysis of PCBs. Details of the excavation, sampling, and backfill activities were submitted to the WDNR in a document titled *Summary of Soil Removal Activities,* dated October 13, 2014. Soil analytical results are presented in Table 4-3. Waste disposal documentation is included in Appendix C.

5.3.5 Residential Excavations

MKC performed soil removal activities at adjacent residential properties along South Marquette Street and Waubesa Street during summer 2014. The soil removal activities consisted of excavating sod and/or one foot of soil from certain residential backyards and backfilling with clean, imported topsoil and sod as shown on the attached Figure 5-1. Soils were disposed off Site at Advanced Disposal's Glacier Ridge Landfill in Horicon, WI.

5.3.6 Residential Sub-Slab Depressurization Systems

MKC completed the installation of SSDSs at residential properties near the Site. SSDSs were installed in 48 homes. This work was initiated in December 2013 and completed in spring 2014. The SSDSs were installed by Acura, on behalf of MKC.

5.3.7 ISCO Activities

A focused ISCO injection event was completed in the existing shallow injection well (IW-1S) screened in the unconsolidated zone in March 2014. The intent of the ISCO injection was to promote additional treatment of VOCs within the unconsolidated zone.

Injection activities were completed from March 13 through 17, 2014. A total of approximately 2,400 gallons of 5% sodium permanganate solution was injected into the shallow injection interval, unconsolidated formation above bedrock, during the event. ISCO activities were documented in the *Discharge Monitoring Report – In-Site Chemical Oxidation Groundwater Treatment* document dated April 7, 2014 and submitted to WDNR.

6. Recommendations

Below is a summary of the recommendations based on the investigation and interim remedial action activities.

6.1 Soil

- At the request of U.S. EPA, additional soil investigation activities to document PCBs beneath the manufacturing building will be performed. The work will include the advancement and sampling of six soil borings and one monitoring well in accordance with the *Supplemental Building Interior Polychlorinated Biphenyl Investigation Work Plan* dated January 22, 2015.

- On-Site soil exceedances will be managed through maintenance of the Site building and paved areas as an engineered barrier (cap).

- MKC will confirm with WDNR the appropriate actions for case closure of the off-Site rain garden.

- No additional off -Site soil investigation or remediation activities will be completed.

6.2 Groundwater Monitoring

- At the request of U.S. EPA, additional groundwater investigation activities to document PCBs beneath the manufacturing building will be performed. The work will include installation and sampling of a monitoring well within the building in accordance with the *Supplemental Building Interior Polychlorinated Biphenyl Investigation Work Plan* dated January 22, 2015.

- The 2015 groundwater monitoring program will consist of the following:

  - Collection of semi-annual groundwater elevations in April and October from the entire well network consisting of 55 sample intervals.

  - Collection of quarterly groundwater elevations in January and July 2015 from the monitoring well network consisting of 41 monitoring well intervals.

- Collection of quarterly groundwater samples (January, April, July, and October) for VOCs from Monitoring Wells MW-25D, MW-25D2, MW-27D, and MW-27D2.

- Collection of semi-annual (April and October) groundwater samples for analysis of VOCs by Method 8260B from 23 monitoring wells and 18 multi-port well intervals.
  - Monitoring wells to be sampled semi-annually for VOCs include the following: MW-1, MW-2D, MW-3S/D/D2/D3, MW-5S/D/D2/D3, MW-6S/D, MW-9D/D2, MW-17, MW-22S/D, MW-23S/D, MW-25D/D2, and MW-27D/D2.
  - Multi-port well intervals will be sampled semi-annually for VOCs with the exception of MP-14 (70-75) and MP-16 (80-84) as groundwater VOC concentrations from these intervals have consistently been low to non-detect.
  - Groundwater samples will not be collected from Monitoring Wells MW-2S, MW-4S/D/D2, MW-7, MW-8, MW-10S, MW-11S, MW-12S, MW-18S, MW-19D/D2, MW-20D/D2, MW-21D/D2, MW-24, or MW-26S since groundwater VOC concentrations at these well intervals have either been consistently low to non-detect, have stabilized, are wells installed related to the ISCO treatment area, and/or are duplicative locations.

- Collection of semi-annual (April and October) groundwater samples for analysis of dissolved PCBs by Method 8082 from Monitoring Wells MW-22S/D, MW-23S/D, and the newly installed monitoring well within the building as part of the *Supplemental Building Interior Polychlorinated Biphenyl Investigation Work Plan.*

- Groundwater sampling will be conducted using low-flow sampling techniques.

6.3 PCB Wipe Sampling

- Surface wipe sampling activities to document PCBs within the manufacturing building will include the collection of approximately 40 wipe samples from various surfaces within the building in accordance with the *Quality Assurance Project Plan – Building Interior Polychlorinated Biphenyl Wipe Sampling* dated February 19, 2015 and approved by the WDNR and U.S. EPA.

6.4 Vapor Monitoring

The 2015 vapor monitoring program will consist of the following:

- Installation and replacement of Soil Vapor Probes VP-102 per discussions with WDNR.

- Annual monitoring of the on Site network of soil vapor probes (July 2015) over an approximate 30 minute time period using 6-liter summa canisters. The vapor samples will be submitted for analysis of five VOCs by U.S. EPA Method TO-15: PCE, TCE, cis-1,2-dichloroethene, trans-1,2-dichloroethene and vinyl chloride. Soil vapor samples will be collected from 13 Vapor Probes: VP-1N, VP-1S, VP-2N, VP-2S, VP-3, VP-4, VP-5, VP-6, VP-102, VP-126, VP-210, VP-237, and VP-261.

- Based on the results of the *Quality Assurance Project Plan – Building Interior Polychlorinated Biphenyl Wipe Sampling*, indoor air sampling for PCBs will be evaluated with WDNR and U.S. EPA.

- Annual inspection of the SSDSs at 146, 150, 154, 162, and 166 South Marquette Street.

- No off-Site residential vapor sampling will be completed.

6.5 SVE System

In 2015, SVE performance monitoring will continue to be conducted on a monthly basis while the system is operating. The SVE performance monitoring will consist of:

- Vacuum monitoring at the nine SVE Extraction Wells SVE-1 through SVE-9;

- Vacuum monitoring at the existing and replacement on Site Soil Vapor Probes VP-1N, VP-2N, VP-1S, VP-2S, VP-102, and VP-126, located on the Site and within the radius of influence of the SVE system;

- SVE system operation documentation including: instantaneous flow rate for each vapor extraction well, vacuum/pressure at various locations throughout the system, air temperature and the combined flow rate for the system; and

- Influent and effluent SVE system sample collection for analysis of VOCs using U.S. EPA Method TO-15.

The data will be used to optimize system operation, demonstrate capture of soil vapors via the extraction system, calculate the total pounds of each constituent discharged from the system per hour and per year, and evaluate the future operation of the SVE system. The calculated values will be compared to the discharge limits listed in Table A of Wis. Adm. Code NR 445 to confirm that the discharge is in compliance with the State of Wisconsin discharge requirements and to determine whether continued treatment of the soil vapor stream is required.

6.6 Groundwater Remediation

The groundwater extraction and treatment system is currently being constructed on Site with startup anticipated in spring 2015. The system is being installed in order to minimize off-Site VOC migration, facilitate the removal of VOC mass, and provide hydraulic influence. A WPDES permit was secured with WDNR for discharge monitoring of the GETS. Additionally, a performance monitoring plan for GETS implementation monitoring will be submitted to WDNR for approval.

6.7 Reporting

The following reporting will be completed and submitted to the WDNR for the Site:

- Summary of the activities related to the *Supplemental Building Interior Polychlorinated Biphenyl Investigation Work Plan* and the *Quality Assurance Project Plan – Building Interior Polychlorinated Biphenyl Wipe Sampling*

- GETS construction documentation report

- Discharge monitoring reports for the GETS in accordance with the WPDES permit

- Semi-annual reporting to document the SVE performance monitoring and any recommendations

- 2015 annual report.

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