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Acronyms and Abbreviations

µg/kg	micrograms per kilogram
µg/L	micrograms per liter
amsl	above mean sea level
cis-1,2-DCE	cis-1,2-dichloroethylene
City	City of Kalamazoo
CSM	conceptual site model
EPA	U.S. Environmental Protection Agency
FS	feasibility study
FTC&H	Fishbeck, Thompson, Carr, and Huber
GSI	groundwater to surface water interface
HHRA	human health risk assessment
LTM	long-term monitoring
MDEQ	Michigan Department of Environmental Quality
mg/L	milligrams per liter
NTU	nephelometric turbidity units
OU1	Operable Unit 1
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
PCP	pentachlorophenol
RI	remedial investigation
RPD	relative percent difference
site	Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund site
SL	screening level
SMCL	secondary maximum contaminant limit
SVOC	semivolatile organic compound
TCE	trichloroethene
VOC	volatile organic compound

SECTION 1

Introduction

In 2014, the U.S. Environmental Protection Agency (EPA) performed a groundwater investigation at Allied Landfill, Operable Unit 1 (OU1) of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund site (site) in Kalamazoo, Michigan. The groundwater investigation was performed in cooperation with the Michigan Department of Environmental Quality (MDEQ) and the City of Kalamazoo (City). The results of the 2014 groundwater investigation may be used to establish a long-term groundwater monitoring plan, which would be necessary if EPA selects a remedy for OU1 that includes a waste in-place component. This report documents the 2014 field activities and evaluates the resultant physical and chemical data.

1.1 Project Background

OU1 is geographically defined as two areas between Cork Street and Alcott Street where contamination from former paper manufacturing operations is located (Figure 1-1). Cork Street is located near the southern boundary, and Alcott Street runs along the northern boundary of OU1. Portage Creek runs through OU1, separating the operational areas on either side of the creek. Residential development exists along a portion of the eastern side (across Portage Creek), and a railroad corridor forms a portion of the western boundary of OU1.

Detailed operational history for OU1 is described in the *Final Remedial Investigation Report* (MDEQ 2008). Paper mill operations were performed at OU1 between 1875 and 1969. Between 1957 and 1971, polychlorinated biphenyl (PCB) constituents were introduced to OU1 through the recycling of carbonless copy paper that contained PCBs as a carrier for the ink (EPA 1977). PCBs remained in the recycle stream of the manufacturing process after that period while the carbonless copy paper supply was depleted. PCB-containing materials have been the focus of environmental investigations conducted at OU1 (MDEQ 2008).

Remedial investigation (RI) activities and data collected from 1993 to 2003 were described in the RI report (MDEQ 2008). A feasibility study (FS) report was subsequently issued in 2013 and included the development and evaluation of remedial alternatives to address OU1-specific risks to human health and the environment (CH2M HILL 2013).

1.2 Purpose

EPA's objective for the 2014 field effort was to supplement existing groundwater data to support potential development of a long-term monitoring (LTM) network if EPA selects a remedy that includes a waste in-place component. Data from a future LTM network would be used to monitor groundwater quality at the perimeter of OU1 to confirm groundwater contamination is not going offsite after completion of the remedy.

The 2014 data was also used to confirm the conceptual site model (CSM) associated with OU1 and the local area. New soil borings and monitoring wells were completed to deeper elevations than had been previously drilled at OU1 and sampled with a target elevation of approximately 630 feet above mean sea level (amsl). The deeper 2014 soil boring and groundwater data were used to support and refine the existing CSM as described in the RI report (MDEQ 2008).

1.3 Report Scope and Organization

This report presents the data collected during the 2014 groundwater investigation and evaluates the results of that data, including impacts to the previously stated CSM understanding. Section 2 discusses the onsite activities and refers to technical memorandums that describe data collection methods (Appendixes A and B). Section 3 describes the results of physical and chemical analysis, compares groundwater results to relevant

screening levels (SLs), and discusses the relevance of any SLs that were exceeded. Section 4 updates the CSM. Section 5 presents conclusions relevant to the 2014 data and the updated CSM, and Section 6 lists the references cited throughout the text.

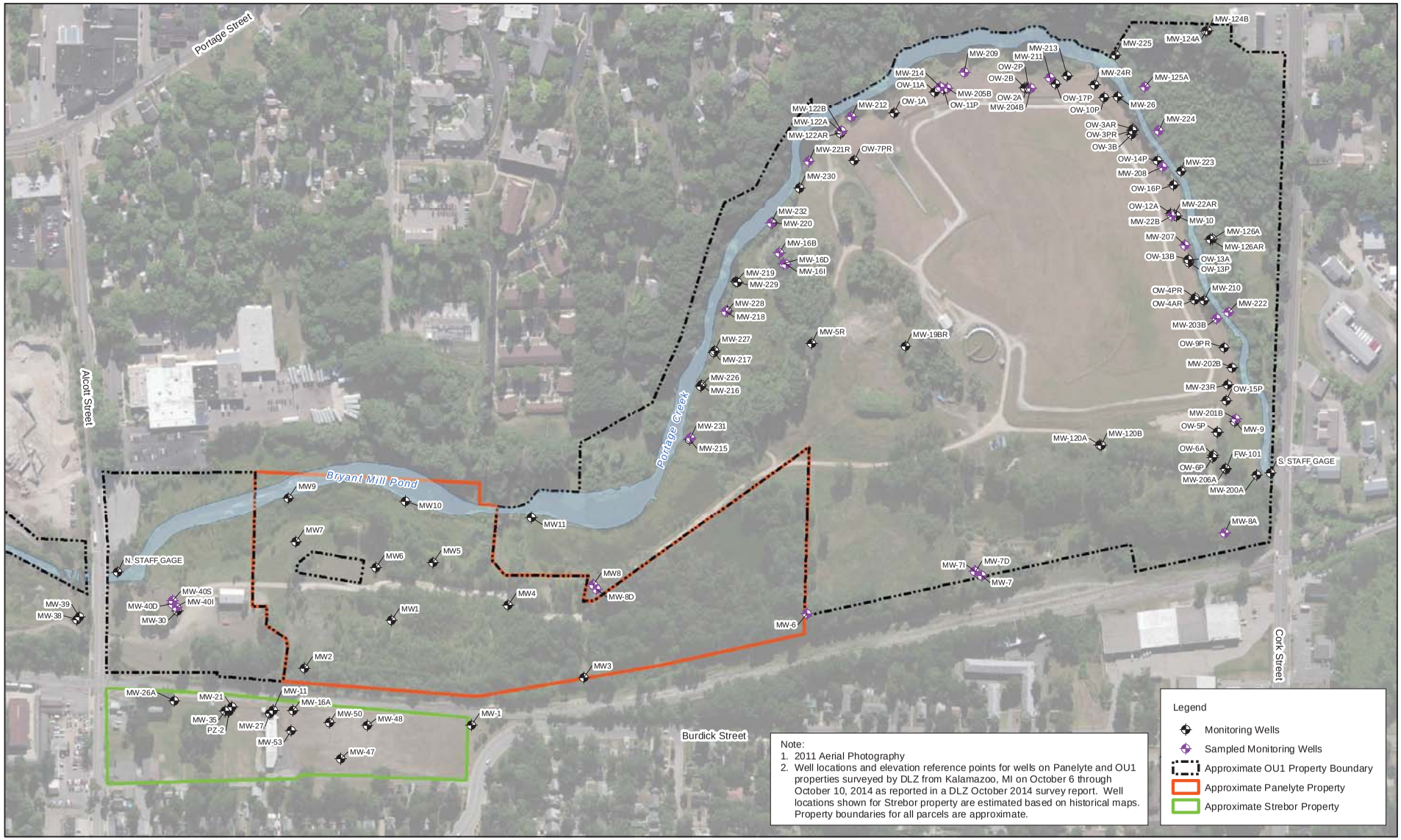

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Figure 1-1
2014 Site Location and Field Sampled Locations
2014 Groundwater Report
Allied Landfill
Kalamazoo, Michigan

CH2MHILL

MKE \\LAKEFRONT\PROJ\EPA\ALLIEDPAPER_KALAMAZOOM\MAPFILES\GWREPORT2014\FIGURE 01-01 - 2014 SITE LOCATION AND FIELD SAMPLED LOCATIONS.MXD JHANSEN1 1/30/2015 1:47:45 PM

SECTION 2

Summary of Onsite Activities

CH2M HILL performed field activities in 2014 on the dates indicated in Table 2-1. A description of the activities performed is included in Appendixes A and B. City representatives were onsite on September 25, 2014, to observe field activities and on October 14 and 15, 2014, to collect split groundwater samples at some of the monitoring wells.

TABLE 2-1
2014 Fieldwork Activities at the Allied Paper, Inc./Portage Creek/Kalamazoo River OU1 Site
Allied Landfill Groundwater Investigation, Kalamazoo, Michigan

Date	Activity
June 17–June 19, 2014	Site reconnaissance activities (locate and identify existing monitoring wells, measure depth to water and well bottom, record geographical information system coordinates, note general well conditions, photograph, and determine suitability of future drilling/well installation locations).
September 15–October 1, 2014	Soil boring, soil sample description, and monitoring well installation.
September 17, 2014	City of Kalamazoo's representative (NTH Consultants, Ltd.) onsite to observe drilling activities.
September 22–October 2, 2014	Monitoring well development (new wells) and redevelopment (existing wells).
October 6–October 10, 2014	Well and staff gage surveying.
October 13–14, 2014	Water level measurement from OU1 and Panelyte property monitoring wells, and from staff gages in Portage Creek.
October 13–17, 2014	Low-flow groundwater sampling from pre-established list of OU1 monitoring wells.
October 14–15, 2014	Water level measurement from monitoring wells at the Strebor property, performed by Strebor's contractor, Bay West.
October 14–15, 2014	City of Kalamazoo's representative (NTH) onsite to collect split samples from 11 OU1 monitoring wells.
October 17, 2014	Investigation-derived waste characterization sampling of soil (drill cuttings) and purged groundwater—samples were submitted for analysis of PCBs.
November 25, 2014	Filtering and transfer of stored development and purge water into the onsite groundwater treatment system. Settled solids removed from frac tank and sent offsite for disposal.
January 20, 2015	Offsite transport and disposal of six drums of soil cuttings and one rolloff container of soil cuttings.
January 28, 2015	Offsite transport and disposal of one drum of decontamination water.

SECTION 3

Investigation Results

During the 2014 groundwater investigation, data were collected to evaluate the physical properties of subsurface soil, groundwater flow potential on and offsite, and compounds present in groundwater. The data can be used to evaluate the current groundwater quality at the OU1 boundary and the vertical and horizontal groundwater flow present onsite.

3.1 Physical Results

3.1.1 Soil Borings and Cross Sections

Soil types identified during completion of deep soil borings were recorded on a soil boring log form for each 2014 deep boring to document subsurface soil conditions. Soil boring logs are included in Appendix B. Geological cross sections were prepared at the locations shown on Figure 3-1 using the 2014 soil boring information. The cross sections (Figures 3-2 and 3-3) use two, simplified soil categories:

- Soil types that easily transmit water or are relatively "permeable" (sand, silty sand, gravel)
- Soil types that do not easily transmit water or are relatively "less-permeable" (silt, clay, peat)

The generalized soil descriptions were used in the cross sections because of the variation, or heterogeneity, in the soil types in a boring and across OU1. Figures 3-2 and 3-3 illustrate that less-permeable layers are not present consistently across the area of investigation. Soil types with relatively lower permeabilities are present at varying depths and thicknesses between the different boring locations. The site-specific conditions presented on these two figures are incorporated into the context of more regional geologic information in Section 4 (CSM) originally prepared as a part of the *Supplemental Groundwater Investigation* (Arcadis 2009).

3.1.2 Geotechnical Laboratory Results

Segments of two soil boring "cores" were submitted to a geotechnical testing laboratory for determination of coefficient of permeability (the ability to transmit water). While describing the deep soil borings, soil was visually classified, and lower-permeability layers were identified for geotechnical sample collection. Undisturbed samples were then collected by pushing a Shelby tube through the target depth interval. The results are shown in Table 3-1. The positions of the samples collected are noted on Figures 3-2 and 3-3. The permeability results show that the clay and silt material tested have relatively low coefficients of permeability, indicating conditions within the sampled units are relatively less permeable than those established in the RI report for the "upper sand unit" (1.7×10^{-2} to 4.9×10^{-5} centimeters per second [MDEQ 2008]).

TABLE 3-1
Coefficient of Laboratory Permeability Results
Allied Landfill Groundwater Investigation, Kalamazoo, Michigan

Boring ID and Sample Depth	Coefficient of Permeability
MW-7D: 36.8 to 37.55 feet	8.1×10^{-8} centimeters per second
MW-16I: 47.67 to 48.5 feet	5.7×10^{-7} centimeters per second

3.1.3 Groundwater Contour Maps

Water elevations from October 2014 were used to prepare groundwater elevation maps for three zones within the subsurface beneath OU1. Groundwater elevation values for all wells are included on data tables

in Appendix B. The following subsections describe the relative vertical position of monitoring well screens and the associated data used for each map.

3.1.3.1 Water Table Map

October 2014 groundwater elevations were used to identify monitoring wells with screens that straddle the measured water table elevation. October 2014 groundwater elevations for the wells were used to develop the water table contours shown on Figure 3-4. A high density of monitoring points is in the shallow zone, and nested or other closely spaced wells may have different screened intervals. To reduce the influence of vertical gradients on the water table contours, well screens that were submerged below the measured water table were not used for the map. Portage Creek elevations from two staff gages (a north staff gage just south of the Alcott Street Bridge and a south staff gage just north of Cork Street) also were used on Figure 3-4.

As shown on Figure 3-4, not many water table wells are located “inland” from Portage Creek (for example, water elevations from MW-7 and MW-6, on the western boundary of OU1, were not used). The “inland” wells, although relatively “shallow” as to screen depth, do not have screens that cross the water table and therefore were excluded from the water table map. The configuration of the water table surface, as shown on Figure 3-4, confirms the previous studies (RI report [MDEQ 2008] and *Supplemental Groundwater Investigation* [Arcadis 2009]) that indicate shallow groundwater flow discharges into Portage Creek. Pumping from the shallow zone at the neighboring Strebor property results in minimal changes to the water table surface.

3.1.3.2 “Intermediate” Zone Groundwater Map

Groundwater elevations for the intermediate zone map (Figure 3-5) were used from monitoring wells with screens located between 693 and 747 feet amsl. The configuration of the potentiometric groundwater elevation lines for the intermediate zone map indicate north-northeast groundwater flow directions based on six data points.

3.1.3.3 “Deep” Zone Groundwater Map

Groundwater elevations for the deep zone map (Figure 3-6) were used from monitoring wells with screens located between approximately 630 and 693 amsl. The potentiometric groundwater elevations lines for the deep zone map show flow to the north-northeast based on four data points.

3.1.4 Vertical Groundwater Flow Components

Equipotential lines for groundwater elevations also are depicted in the vertical dimension on the geologic cross sections (Figures 3-2 and 3-3). Depiction of the lines are approximate because of the following factors:

- Vertical exaggeration of the drawing (15 times)
- Change in permeability between adjacent soil types and units
- Asymmetrical shapes of the various soil types and geological deposits
- Relatively high percentage of the represented figure that does not have an assigned soil type (the white space representing unknown conditions between boring locations)

Despite the data limitations, the groundwater elevation lines shown on the figures can be used to surmise general information about groundwater flow direction and magnitude. Localized groundwater recharge from the ground surface appears to be possible at MW-7 (Figure 3-2), which is at a higher topographic land surface elevation than the surrounding locations. This is suggested by an apparent downward gradient from the shallow to intermediate screen interval. An upward gradient is still present at MW-7 from the deep to intermediate zone. All other well nests monitored in 2014 onsite and at neighboring properties had potential vertical flow directions that appear to be upward, as measured between deep well screens and more shallow well screens at the same map locations. The vertical gradient appear to be increasing to the north, with the largest upward gradients present at the MW-30 and MW-40 well nest and the Strebor property MW-38 and MW-39 well nest.

Groundwater in shallow, intermediate, and deep zones appears to be flowing onto the OU1 southern parcel from the neighboring properties on the west-southwest (Figures 3-2 and 3-3).

3.2 Chemical Results

3.2.1 U.S. Environmental Protection Agency Groundwater Analytical Results

The groundwater results for the October 2014 groundwater sampling effort are summarized in Table 3-2. Detected concentrations were compared to the Michigan, Part 201 of the Natural Resources and Environmental Protection Act, Environmental Remediation, SL Criteria. Residential drinking water and groundwater to surface water interface (GSI) SLs are included in left-hand columns in Table 3-2. An overall summary of detections and exceedances of SLs is included in the following subsections for each relevant constituent, as listed in Table 3-3.

3.2.1.1 Polychlorinated Biphenyls

There was one detection of PCBs in groundwater in samples collected from the monitoring wells sampled (Figure 1-1, Table 3-2). The PCB detection was of Aroclor-1242 at a concentration of 0.17 J microgram per liter (µg/L) in MW-8A. This is below the GSI SL of 0.2 µg/L. The MW-8A boring log indicates the well screen is located beneath materials that contain residuals. MW-8A has had previous detections and exceedances of both GSI and drinking water SLs during the RI.

PCB samples were analyzed in October 2014, and the resulting instrument detection limits ranged from 0.021 to 0.35 µg/L with a reporting limit of 1 µg/L. PCBs were not detected in any of the samples analyzed with these reporting limits. These reporting limits exceeded the GSI SL of 0.2 µg/L, so the sample were reanalyzed in March 2015 to achieve method detection limits of 0.05 µg/L for all Aroclors. Although the EPA Contract Laboratory Program Method SOM01.2 gives a recommended holding time of 7 days until extraction and 40 days until analysis, there is technical basis from other EPA methods showing that PCBs may be held up to 1 year after extraction. Because of the stability of PCBs, it is not likely that there was significant degradation to PCB concentrations between October 2014 and March 2015. Therefore, the results of the reanalysis achieving lower detection limits have been provided in Table 3-2 with the detection qualified as “J” (estimated value). Results below the detection limit are provided in Table 3-2 as “UJ”.

Rates of PCB detections and exceedances were evaluated and presented in Table 3-2 for samples collected in 2014 and during the RI from 1993 to 2003. Higher exceedance and detection frequencies were observed with RI sample data than the 2014 data. This may be due in part to targeting double-cased wells (deeper well screens installed using an isolation-surface casing) wherever possible in 2014. Additionally, in 2014, all wells were redeveloped just before sampling, and low-flow sampling procedures were used to maintain a final sample turbidity of less than 10 nephelometric turbidity units (NTU). The 2014 sampling methods may have resulted in fewer suspended solids in the groundwater samples contributing to fewer PCB detections and no SL exceedances.

3.2.1.2 Metals

Groundwater sample concentrations with an exceedance of one or more metals SLs are included on Figure 3-7. The metal compounds with exceedances of SLs were aluminum, arsenic, chromium, iron, lead, and manganese (Table 3-2). Iron and manganese exceedances are not illustrated on Figure 3-7 because exceedances can be naturally occurring and have a widespread distribution, including in upgradient wells.

The occurrence of metal exceedances in groundwater across OU1 is generally comparable as shown in Table 3-3 when evaluating the 2014 metals data against the RI data (1993 to 2003), as summarized in the 2013 FS report (CH2M HILL 2013). For analytes in Table 3-3 where the exceedances were not limited to a small subset of wells, the relative percent difference (RPD) is less than 10 percent between the 2014 and RI data, indicating a good overall correlation. For analytes shown in Table 3-3 where RI exceedances were limited to a small subset of wells, the 2014 data generally shows a decrease in the exceedance rate. As

discussed for PCBs above, metals can be associated with suspended solids. Reductions in the detection or exceedance rates may be associated with the reduction in turbidity in 2014 samples.

If a 2014 groundwater concentration exceeded its respective SL, the concentration was also checked against 2014 upgradient range concentrations. MW-6 and MW-7 (located on the western property boundary) were considered as upgradient locations for shallow wells. MW-7I and MW-7D were used as the upgradient locations for the intermediate and deep zone wells, respectively. SL exceedances for each analyte were noted as follows in 2014:

- Aluminum was detected above the SLs at upgradient well MW-7D at concentrations ranging from 61.1 to 101 µg/L. Only one well, MW-40D, with a concentration of 136 µg/L, had an aluminum groundwater concentration greater than that detected in MW-7D. MW-40D is downgradient of the Panelyte property. Aluminum has been detected in groundwater at concentrations exceeding the SLs during previous investigations at the Panelyte property (Fishbeck, Thompson, Carr, and Huber [FTC&H] 2010). This suggests aluminum exceedances in groundwater are not attributed to OU1. The 2014 exceedance rate was 9 percent as compared to the RI exceedance rate of 7 percent, showing a good correlation between the data sets (Table 3-3).
- SL exceedances of arsenic in groundwater concentrations only occurred in shallow zone wells (no arsenic exceedances resulted from intermediate or deep well screen samples). The 2014 and RI exceedance frequencies for arsenic (Table 3-3) correlated well at about 31 percent, with an RPD of 2 percent. The State of Michigan indicates that background arsenic concentrations in groundwater in Kalamazoo County range from 20 to 50 µg/L (MDEQ 2014). The wells with arsenic concentrations that exceeded 50 µg/L were MW-122B (60 feet deep), MW-212 (17 feet deep), and MW-232 (12 feet deep). The three wells are on the eastern side of the main portion of OU1 (Figure 1-1), just west of Portage Creek, and consistently exceed 50 µg/L of arsenic, as indicated in historical data (MDEQ 2008). MW-122B exceeded 50 µg/L in 1993 and 2002, MW-212 exceeded it in 2002, and MW-232 exceeded it in 2003.
- There were no exceedances of chromium in groundwater samples collected from shallow wells. The one groundwater concentration of chromium that exceeded its SL in the intermediate zone (20.9 µg/L at MW-205B) also exceeded its upgradient concentration of 3.5 µg/L at MW-7I. Making a direct comparison more difficult, MW-7I is somewhat crossgradient to MW-205B because of the more northerly flow direction indicated in the intermediate zone. The one groundwater concentration of chromium that exceeded its SL in the deep zone (31 µg/L at MW-16D) exceeded its upgradient concentration range of 0.83 to 1.3 µg/L (estimated) at MW-7D (there is a range of upgradient concentration in the deep zone because sample results were available for a duplicate sample at MW-7D). The exceedance frequencies for chromium using 2014 data versus RI/FS summary data (Table 3-3) were relatively comparable: 6 percent for 2014 data and 1 percent for FS data.
- Iron and manganese exceedance concentrations in groundwater samples both typically exceeded their respective upgradient concentrations across all three groundwater zones (shallow, intermediate, and deep). The exceedance frequencies (frequency of wells with an SL exceedance) for the RI and 2014 data sets for iron and manganese correlated well at more than 88 percent for both compounds and events. Iron and manganese are considered by EPA as secondary maximum contaminant levels (SMCLs). They are established only as guidelines to assist public water systems in managing their drinking water for aesthetic considerations, such as taste, color, and odor. EPA does not enforce SMCLs (EPA 2014). Iron concentrations in groundwater in Kalamazoo County are only considered to be of concern at concentrations greater than 300 milligrams per liter (mg/L) (Kalamazoo County 2014). Higher manganese concentrations may be from the same natural conditions that cause naturally high iron concentrations in this area.

- The only exceedance of a lead SL was at MW-16B, and the concentration detected (7.5 µg/L) was within the same concentration range as the upgradient shallow wells (17.4 and 2.4 µg/L, respectively).

3.2.1.3 Semivolatile Organic Compounds

The only exceedance of a semivolatile organic compound (SVOC) SL occurred in groundwater sampled at MW-40I located hydraulically downgradient from the neighboring Panelyte and/or Strebor properties. The exceedance was for pentachlorophenol (PCP) at 1.7 µg/L (qualified as an estimated value) versus a residential drinking water SL of 1 µg/L. No other SVOCs were detected at MW-40I. MW-40I (identified as MW-40 in previous investigations) is a former Strebor well that was removed from its monitoring program with approval from MDEQ. Ownership of the well transferred to the Lyondell Trust to become part of the OU1 monitoring well network. PCP is a contaminant associated with the Strebor property and was previously detected in MW-40 when monitored by Strebor. PCP is not considered an OU1-related contaminant, but is instead associated with historical activities at the Strebor property (Bay West Inc. 1993).

3.2.1.4 Volatile Organic Compounds

The only exceedance of a volatile organic compound (VOC) SL occurred in groundwater sampled at Panelyte well MW-8, where tetrachloroethene (PCE) (8.0 µg/L) exceeded the residential drinking water SL of 5 µg/L. Trichloroethene (TCE) (0.43 µg/L [estimated]) and cis-1,2-dichloroethelyene (cis-1,2-DCE) (1.7 µg/L) also were detected below SLs at MW-8, a well installed by Panelyte just across its eastern property boundary onto OU1 property. PCE is known to break down to TCE and cis-1,2-DCE naturally via biological activity and reductive dechlorination processes (EPA 1998).

The detection of these chlorinated VOCs are not considered to be associated with former OU1 activities because of the proximity of MW-8 to the former Panelyte property, where varnish and solvents were historically located, stored, and/or used (FTC&H 2010). The PCE concentration is within the range of historical concentrations at the Panelyte property.

3.2.2 City of Kalamazoo Groundwater Analytical Results

The analytical results reported to EPA for the City's split sample analyses are included in Table 3-4. Fluoride, hexametaphosphate, and dioxane analyses were chosen and performed by the City and are not addressed herein. These are not site-related contaminants, but were performed by the City to evaluate the effectiveness of the well development. The City's trihalomethane analytes were only detected in 2 of the 11 wells that were sampled (MW-7I and MW-8) and were consistent with the results obtained by EPA.

Table 3-5 was organized to show only the City's detected compounds/wells, along with EPA values for the compounds. There is a good correlation between the two data sets in regard to compounds detected and concentration values of those detections.

3.2.3 Investigation-Derived Waste Sample Results and Disposal Summary

Solid and liquid waste characterization samples were collected at the end of the 2014 field investigation activities and submitted for laboratory analysis. Soil cuttings from the MW-16 well nest (MW-16I and MW-16D) were segregated into 55-gallon drums because of historically higher PCB concentrations near this location. The soil cuttings from the remainder of the borings were containerized in a rolloff container. The results of laboratory analysis completed to characterize soil cuttings are shown in Table 3-6. Barium was detected in the toxicity characteristic leaching procedure leachate in samples submitted from the rolloff container and drums. The barium concentrations, however, do not exceed the concentrations requiring the material to be managed as a hazardous waste per 40 Code of Federal Regulations 261.24. Aroclor-1242 was also detected in the MW-16 drums soil sample at a concentration of 419 micrograms per kilogram (µg/kg).

Well development and purge water were containerized during the 2014 groundwater investigation in an 8,400-gallon mini-frac tank and analyzed for PCBs. The purge water sample results are shown in Table 3-7. No detections of PCBs were in the water samples. Water was disposed onsite by filtering it for solids and

transferring it into the onsite water treatment system on November 25, 2014. Filtered solids were transferred to the rolloff container and disposed of with the soil cuttings. Settled solids from the bottom of the frac tank were removed and disposed of offsite.

Table 3-8 summarizes the offsite disposal of wastes associated with the 2014 groundwater investigation. Wastes were managed as nonhazardous Toxic Substances Control Act-regulated materials.

TABLE 3-8
Investigation-Derived Waste Disposal Summary
Allied Landfill Groundwater Investigation, Kalamazoo, Michigan

Waste Type	Container	Disposal Facility	Manifest	Disposal Date
Settled solids from frac tank	Vacuum truck	Ottawa County Farms Landfill 15550 68th Avenue Coopersville, MI 49404 MID985582097	013301909	November 25, 2014
Soil cuttings from MW-16 well nest	6 drums	Westside RDF 14094 M-60 West Three River, MI 49093 MID75000017	T356954	January 20, 2015
Soil cuttings from MW-7, MW-8, and MW-40 well nests	1 rolloff container	Westside RDF 14094 M-60 West Three River, MI 49093 MID75000017	T356955	January 20, 2015
Decontamination water	1 drum	Autumn Hills RDF 700-56th Avenue Zeeland, MI 49464 MID985665025	012232070	January 29, 2015

TABLE 3-2
Groundwater Analytical Results
Allied Landfill Groundwater Investigation, Kalamazoo, Michigan

Chemical Name	Units	CAS	Michigan Cleanup Criteria Requirements for Response Activity* Residential Drinking Water	GSI	MW-6 10/15/2014 E53R1	MW-6-FD 10/15/2014 E53R2	MW-7 10/14/2014 E53Q2	MW-7-I 10/14/2014 E53P9	MW-7D 10/14/2014 E53Q0	MW-7D-FD 10/14/2014 E53Q1	MW-8 10/14/2014 E53P8	MW-8-D 10/15/2014 E53R0	MW-8-D-FD 10/15/2014 ME53R0	MW-8-A 10/15/2014 E53R3	MW-16-B 10/14/2014 E53Q4	MW-16I 10/13/2014 E53Q3
PCBs																
Aroclor-1016	µg/L	12674112	0.5 (A)	0.2 (M); 2.6E-5	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ		0.05 UJ	0.05 UJ	0.05 UJ
Aroclor-1221	µg/L	11104282			0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ		0.05 UJ	0.05 UJ	0.05 UJ
Aroclor-1232	µg/L	11141165			0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ		0.05 UJ	0.05 UJ	0.05 UJ
Aroclor-1242	µg/L	53469219			0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ		**0.17 J**	0.05 UJ	0.05 UJ
Aroclor-1248	µg/L	12672296			0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ		0.05 UJ	0.05 UJ	0.05 UJ
Aroclor-1254	µg/L	11097691			0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ		0.05 UJ	0.05 UJ	0.05 UJ
Aroclor-1260	µg/L	11096825			0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ		0.05 UJ	0.05 UJ	0.05 UJ
Aroclor-1262	µg/L	37324235			0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ		0.05 UJ	0.05 UJ	0.05 UJ
Aroclor-1268	µg/L	11100144			0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ		0.05 UJ	0.05 UJ	0.05 UJ
Metals																
Aluminum	µg/L	7429905	50 (V)	NA	**31.2 J+**	20.0 U	**31.2 J+**	20.0 U	**101**	**61.1**	20.0 U	**28.4 J+**	**34.8**	20.0 U	20.0 U	**30.8 J+**
Antimony	µg/L	7440360	6.0 (A)	130 (X)	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Arsenic	µg/L	7440382	10 (A)	10	1.0 U	1.0 U	1.0 U	**0.25 J**	**0.75 J**	**0.84 J**	**0.25 J**	1.0 U	1.0 U	**1.0**	**3.7**	**1.1**
Barium	µg/L	7440393	2,000 (A)	(G)	**105**	**101**	**91.5**	**86.6**	**199**	**204**	**124**	**99.6**	**97.5**	**185**	**132**	**198**
Beryllium	µg/L	7440417	4.0 (A)	(G)	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Cadmium	µg/L	7440439	5.0 (A)	(G,X)	**0.19 J**	**0.15 J**	**0.22 J**	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	**1.5**	1.0 U
Calcium	µg/L	7440702			**101000**	**97200**	**101000**	**77000**	**95600**	**99100**	**99600**	**59100**	**58000**	**100000**	**85600**	**94100**
Chromium	µg/L	7440473	100 (A)	11	2.0 U	2.0 U	**10.1**	**3.5**	**0.83 J**	**1.3 J**	2.0 U	**1.2 J**	**1.1 J**	2.0 U	2.0 U	**0.73 J**
Cobalt	µg/L	7440484	40	100	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Copper	µg/L	7440508	1,000 (E)	(G)	**1.0 J**	**0.89 J**	**0.76 J**	**0.50 J**	2.0 U	2.0 U	**1.9 J**	**0.45 J**	**0.45 J**	**0.52 J**	2.0 U	2.0 U
Cyanide	µg/L	57125	200 (A)	5.2	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Iron	µg/L	7439896	300 (E)	NA	**473 J+**	**351 J+**	**337**	**390**	**2070**	**2080**	**375**	**3320 J**	**3300**	**4150**	**1290**	**3030**
Lead	µg/L	7439921	4.0 (L)	(G,X)	**17.4**	**9.6**	**2.4**	1.0 U	1.0 U	1.0 U	**0.53 J**	1.0 U	1.0 U	1.0 U	**7.5**	1.0 U
Magnesium	µg/L	7439954	400000	NA	**27700**	**26700**	**30800**	**29700**	**29400**	**30200**	**26600**	**26300 J**	**25700**	**32700**	**30200**	**29900**
Manganese	µg/L	7439965	50 (E)	(G,X)	**3.7**	**2.9**	**3.0 J-**	**146**	**84.2**	**83.9**	**89.1**	**35.1**	**33.7**	**976**	**50.8**	**97.1**
Mercury	µg/L	7439976	2.0 (A)	0.0013	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Nickel	µg/L	7440020	100 (A)	(G)	1.0 U	1.0 U	**2.8**	**1.3**	1.0 U	**1.3**	1.0 U	1.0 U	1.0 U	**2.0**	1.0 U	1.0 U
Potassium	µg/L	7440097			**2450**	**2350**	**2220**	**8540**	**1010**	**1030**	**2680**	**3390**	**3320**	**3350**	**1180**	**1500**
Selenium	µg/L	7782492	50 (A)	5	**0.84 J**	**0.76 J**	5.0 U	5.0 U	5.0 U	5.0 U	**0.43 J-**	**0.34 J**	**0.38 J**	**0.15 J**	5.0 U	5.0 U
Silver	µg/L	7440224	34	0.2 (M); 0.06	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Sodium	µg/L	7440235			**71700**	**69200**	**71800**	**37000**	**15700**	**16000**	**88500**	**34200**	**33400**	**62500**	**21500**	**24600**
Thallium	µg/L	7440280	2.0 (A)	3.7 (X)	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vanadium	µg/L	7440622	4.5	27	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Zinc	µg/L	7440666	2400	(G)	**874**	**604**	**1960**	**1.1 J-**	**0.53 J-**	**1.2 J-**	**1.9 J-**	**0.73 J-**	**0.55 J**	**0.26 J-**	**2340**	**0.77 J-**

TABLE 3-2
Groundwater Analytical Results
Allied Landfill Groundwater Investigation, Kalamazoo, Michigan

Chemical Name	Units	CAS	Michigan Cleanup Criteria Requirements for Response Activity* Residential Drinking Water	GSI	MW-6 10/15/2014 E53R1	MW-6-FD 10/15/2014 E53R2	MW-7 10/14/2014 E53Q2	MW-7-I 10/14/2014 E53P9	MW-7D 10/14/2014 E53Q0	MW-7D-FD 10/14/2014 E53Q1	MW-8 10/14/2014 E53P8	MW-8-D 10/15/2014 E53R0	MW-8-D-FD 10/15/2014 ME53R0	MW-8-A 10/15/2014 E53R3	MW-16-B 10/14/2014 E53Q4	MW-16I 10/13/2014 E53Q3
Semi-Volatile Organic Compounds (SVOCs)																
1,1'-Biphenyl	µg/L	92524			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
1,2,4,5-Tetrachlorobenzene	µg/L	95943	1,300 (S)	2.9 (X)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
2,2'-Oxybis(1-chloropropane)	µg/L	108601			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
2,3,4,6-Tetrachlorophenol	µg/L	58902			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
2,4,5-Trichlorophenol	µg/L	95954	730	NA	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
2,4,6-Trichlorophenol	µg/L	88062	120	5	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
2,4-Dichlorophenol	µg/L	120832	73	11	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
2,4-Dimethylphenol	µg/L	105679	370	380	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
2,4-Dinitrophenol	µg/L	51285			10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U		10 U	10 U	10 U
2,4-Dinitrotoluene	µg/L	121142	7.7	NA	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
2,6-Dinitrotoluene	µg/L	606202			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
2-Chloronaphthalene	µg/L	91587	1800	NA	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
2-Chlorophenol	µg/L	95578	45	18	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
2-Methylnaphthalene	µg/L	91576	260	19	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
2-Methylphenol	µg/L	95487	370 (J)	30 (J)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
2-Nitroaniline	µg/L	88744			10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U		10 U	10 U	10 U
2-Nitrophenol	µg/L	88755	20	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
3,3'-Dichlorobenzidine	µg/L	91941	1.1	0.3 (M); 0.2	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
3-Nitroaniline	µg/L	99092			10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U		10 U	10 U	10 U
4,6-Dinitro-2-methylphenol	µg/L	534521	20 (M); 2.6	NA	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U		10 U	10 U	10 U
4-Bromophenyl-phenylether	µg/L	101553			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
4-Chloro-3-methylphenol	µg/L	59507	150	7.4	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
4-Chloroaniline	µg/L	106478			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
4-Chlorophenyl-phenylether	µg/L	7005723			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
4-Methylphenol	µg/L	106445	370 (J)	30 (J)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
4-Nitroaniline	µg/L	100016			10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U		10 U	10 U	10 U
4-Nitrophenol	µg/L	100027			10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U		10 U	10 U	10 U
Acenaphthene	µg/L	83329	1300	38	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
Acenaphthylene	µg/L	208968	52	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
Acetophenone	µg/L	98862	1500	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
Anthracene	µg/L	120127	43 (S)	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
Atrazine	µg/L	1912249	3.0 (A)	7.3	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
Benzaldehyde	µg/L	100527			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
Benzo(a)anthracene	µg/L	56553	2.1	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
Benzo(a)pyrene	µg/L	50328	5.0 (A)	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 UJ	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
Benzo(b)fluoranthene	µg/L	205992	1.5 (S,AA)	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 UJ	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
Benzo(g,h,i)perylene	µg/L	191242	1.0 (M); 0.26 (S)	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 UJ	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
Benzo(k)fluoranthene	µg/L	207089	1.0 (M); 0.8 (S)	NA	5.0 U	5.0 U	5.0 U	5.0 U	5.0 UJ	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
Bis(2-chloroethoxy)methane	µg/L	111911			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
Bis(2-chloroethyl)ether	µg/L	111444	2	1.0 (M); 0.79	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
Bis(2-ethylhexyl)phthalate	µg/L	117817	6.0 (A)	25	5.0 U	5.0 U	5.0 U	**3.1 J**	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
Butylbenzylphthalate	µg/L	85687	1200	67 (X)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
Caprolactam	µg/L	105602	5800	NA	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
Carbazole	µg/L	86748	85	10 (M); 4.0	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
Chrysene	µg/L	218019	1.6 (S)	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
Dibenzo(a,h)anthracene	µg/L	53703	2.0 (M); 0.21	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 UJ	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
Dibenzofuran	µg/L	132649	ID	4	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
Diethylphthalate	µg/L	84662	5500	110	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
Dimethylphthalate	µg/L	131113	73000	NA	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
Di-n-butylphthalate	µg/L	84742	880	9.7	5.0 U	**1.8 J**	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		**2.1 J**	5.0 U	5.0 U
Di-n-octylphthalate	µg/L	117840	130	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
Fluoranthene	µg/L	206440	210 (S)	1.6	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
Fluorene	µg/L	86737	880	12	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
Hexachlorobenzene	ug/L	118741	1.0 (A)	0.2 (M); 0.0003	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
Hexachlorobutadiene	µg/L	87683	15	0.053	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
Hexachlorocyclopentadiene	µg/L	77474	50 (A)	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
Hexachloroethane	µg/L	67721	7.3	6.7 (X)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
Indeno(1,2,3-cd)pyrene	µg/L	193395	2.0 (M); 0.022 (S)	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 UJ	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
Isophorone	µg/L	78591	770	1,300 (X)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
Naphthalene	µg/L	91203	520	11	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
Nitrobenzene	µg/L	98953	3.4	180 (X)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
N-Nitroso-di-n-propylamine	µg/L	621647	5.0 (M); 0.19	NA	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
N-Nitrosodiphenylamine	µg/L	86306	270	NA	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
Pentachlorophenol	µg/L	87865	1.0 (A)	(G,X)	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U		10 U	10 U	10 U
Phenanthrene	µg/L	85018	52	2.0 (M); 1.4	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
Phenol	µg/L	108952	4400	450	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
Pyrene	µg/L	129000	140 (S)	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U

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Chemical Name	Units	CAS	Michigan Cleanup Criteria Requirements for Response Activity* Residential Drinking Water	GSI	MW-6 10/15/2014 E53R1	MW-6-FD 10/15/2014 E53R2	MW-7 10/14/2014 E53Q2	MW-7-I 10/14/2014 E53P9	MW-7D 10/14/2014 E53Q0	MW-7D-FD 10/14/2014 E53Q1	MW-8 10/14/2014 E53P8	MW-8-D 10/15/2014 E53R0	MW-8-D-FD 10/15/2014 ME53R0	MW-8-A 10/15/2014 E53R3	MW-16-B 10/14/2014 E53Q4	MW-16I 10/13/2014 E53Q3
Volatile Organic Compounds (VOCs)																
1,1,1-Trichloroethane	µg/L	71556	200 (A)	89	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U	0.50 U	0.50 U
1,1,2,2-Tetrachloroethane	µg/L	79345	8.5	78 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U	0.50 U	0.50 U
1,1,2-Trichloro-1,2,2-trifluoroethane	µg/L	76131	1.7E+5 (S)	32	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U	0.50 U	0.50 U
1,1,2-Trichloroethane	µg/L	79005	5.0 (A)	330 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U	0.50 U	0.50 U
1,1-Dichloroethane	µg/L	75343	880	740	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U	0.50 U	0.50 U
1,1-Dichloroethene	µg/L	75354	7.0 (A)	130	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U	0.50 U	0.50 U
1,2,3-Trichlorobenzene	µg/L	87616			0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U	0.50 U	0.50 U
1,2,4-Trichlorobenzene	µg/L	120821	70 (A)	99 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U	0.50 U	0.50 U
1,2-Dibromo-3-chloropropane	µg/L	96128	0.2 (A)	ID	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U	0.50 U	0.50 U
1,2-Dibromoethane	µg/L	106934	0.05 (A)	5.7 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U	0.50 U	0.50 U
1,2-Dichlorobenzene	µg/L	95501	600 (A)	13	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U	0.50 U	0.50 U
1,2-Dichloroethane	µg/L	107062	5.0 (A)	360 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U	0.50 U	0.50 U
1,2-Dichloropropane	µg/L	78875	5.0 (A)	230 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 UJ		0.50 U	0.50 U	0.50 U
1,3-Dichlorobenzene	µg/L	541731	6.6	28	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U	0.50 U	0.50 U
1,4-Dichlorobenzene	µg/L	106467	75 (A)	17	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U	0.50 U	0.50 U
2-Butanone	µg/L	78933	13000	2200	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
2-Hexanone	µg/L	591786	1000	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
4-Methyl-2-pentanone	µg/L	108101	1800	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U
Acetone	µg/L	67641	730	1700	5.0 U	5.0 U	5.0 U	**2.4 J**	5.0 U	5.0 U	5.0 U	5.0 U		10 U	5.0 U	5.0 U
Benzene	µg/L	71432	5.0 (A)	200 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U	0.50 U	0.50 U
Bromochloromethane	µg/L	74975			0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U	0.50 U	0.50 U
Bromodichloromethane	µg/L	75274	80 (A,W)	ID	0.50 U	0.50 U	0.50 U	**0.77**	0.50 U	0.50 U	0.50 U	0.50 UJ		0.50 U	0.50 U	0.50 U
Bromoform	µg/L	75252	80 (A,W)	ID	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U	0.50 U	0.50 U
Bromomethane	µg/L	74839	10	35	0.50 UJ	0.50 UJ	0.50 UJ	0.50 UJ	0.50 UJ	0.50 UJ	0.50 UJ	0.50 UJ		0.50 UJ	0.50 UJ	0.50 UJ
Carbon disulfide	µg/L	75150	800	ID	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U	0.50 U	0.50 U
Carbon tetrachloride	µg/L	56235	5.0 (A)	45 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U	0.50 U	0.50 U
Chlorobenzene	µg/L	108907	100 (A)	25	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U	0.50 U	0.50 U
Chloroethane	µg/L	75003	430	1,100 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U	0.50 U	0.50 U
Chloroform	µg/L	67663	80 (A,W)	350	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U	0.50 U	0.50 U
Chloromethane	µg/L	74873	260	ID	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U	0.50 U	0.50 U
cis-1,2-Dichloroethene	µg/L	156592	70 (A)	620	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**1.7**	0.50 U		0.50 U	0.50 U	0.50 U
cis-1,3-Dichloropropene	µg/L	10061015			0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U	0.50 U	0.50 U
Cyclohexane	µg/L	110827			0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 UJ		0.50 U	0.50 U	0.50 U
Dibromochloromethane	µg/L	124481	80 (A,W)	ID	0.50 U	0.50 U	0.50 U	**1.4**	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U	0.50 U	0.50 U
Dichlorodifluoromethane	µg/L	75718	1700	ID	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U	0.50 U	0.50 U
Ethylbenzene	µg/L	100414	74 (E)	18	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U	0.50 U	0.50 U
Isopropylbenzene	µg/L	98828	800	28	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U	0.50 U	0.50 U
m,p-Xylene	µg/L	179601231	280 (E)	41	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U	0.50 U	0.50 U
Methyl Acetate	µg/L	79209			0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U	0.50 U	0.50 U
Methyl tert-butyl ether	µg/L	1634044	40 (E)	7,100 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U	0.50 U	0.50 U
Methylcyclohexane	µg/L	108872			0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 UJ		0.50 U	0.50 U	0.50 U
Methylene chloride	µg/L	75092	5.0 (A)	1,500 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U	0.50 U	0.50 U
o-Xylene	µg/L	95476	280 (E)	41	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U	0.50 U	0.50 U
Styrene	µg/L	100425	100 (A)	80 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U	0.50 U	0.50 U
Tetrachloroethene	µg/L	127184	5.0 (A)	60 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**8.0**	0.50 U		0.50 U	0.50 U	0.50 U
Toluene	µg/L	108883	790 (E)	270	0.50 U	0.50 U	0.50 U	**0.27 J**	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U	0.50 U	0.50 U
trans-1,2-Dichloroethene	µg/L	156605	100 (A)	1,500 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U	0.50 U	0.50 U
trans-1,3-Dichloropropene	µg/L	10061026			0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U	0.50 U	0.50 U
Trichloroethene	µg/L	79016	5.0 (A)	200 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**0.43 J**	0.50 U		0.50 U	0.50 U	0.50 U
Trichlorofluoromethane	µg/L	75694	2600	NA	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U	0.50 U	0.50 U
Vinyl chloride	µg/L	75014	2.0 (A)	13 (X)	0.50 U	0.50 UJ	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 UJ		0.50 U	0.50 U	0.50 U

TABLE 3-2
Groundwater Analytical Results
Allied Landfill Groundwater Investigation, Kalamazoo, Michigan

Chemical Name	Units	CAS	Michigan Cleanup Criteria Requirements for Response Activity* Residential Drinking Water	Michigan Cleanup Criteria Requirements for Response Activity* GSI	MW-6 10/15/2014 E53R1	MW-6-FD 10/15/2014 E53R2	MW-7 10/14/2014 E53Q2	MW-7-I 10/14/2014 E53P9	MW-7D 10/14/2014 E53Q0	MW-7D-FD 10/14/2014 E53Q1	MW-8 10/14/2014 E53P8	MW-8-D 10/15/2014 E53R0	MW-8-D-FD 10/15/2014 ME53R0	MW-8-A 10/15/2014 E53R3	MW-16-B 10/14/2014 E53Q4	MW-16I 10/13/2014 E53Q3

Notes:
* Formerly known as the Part 201 Generic Cleanup Criteria and Screening Levels, now found at Sections 299.1 to 299.50, which became effective on December 30, 2013.
Footnotes associated with the criteria are included at:
http://www.michigan.gov/deq/0,1607,7-135-3311_4109_9846_30022-251790--,00.html
Bold value indicates a detection
Highlighted value indicates an exceedance of Michigan Residential Drinking Water Criteria
Highlighted value indicates an exceedance of Michigan Groundwater Surface Water Interface Criteria
GSI = groundwater surface water interface criteria
J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample
J+ = The result is an estimated quantity, but the result may be biased high
J- = The result is an estimated quantity, but the result may be biased low.
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit
UJ = The analyte was analyzed for, but not detected. The reported quantitation limit is approximate concentration of the analyte in the sample
µg/L = micrograms per liter

TABLE 3-2
Groundwater Analytical Results
Allied Landfill Groundwater Investigation, Kalamazoo, Michigan

Chemical Name	Units	CAS	Michigan Cleanup Criteria Requirements for Response Activity* Residential Drinking Water	GSI	MW-16-D 10/15/2014 E53Q9	MW-22-B 10/16/2014 E53S8	MW-22-B 10/16/2014 E53S9	MW-40-S 10/14/2014 E53P6	MW-40-I 10/14/2014 E53P7	MW-40-D 10/15/2014 E53Q8	MW-122B 10/17/2014 E53W2	MW-125A 10/13/2014 E53P3	MW-201-B 10/15/2014 E53R4	MW-203-B 10/16/2014 E53S0	MW-203-B-FD 10/16/2014 ME53S0	MW-204B 10/16/2014 E53T2
PCBs																
Aroclor-1016	µg/L	12674112	0.5 (A)	0.2 (M); 2.6E-5	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ		0.05 UJ
Aroclor-1221	µg/L	11104282			0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ		0.05 UJ
Aroclor-1232	µg/L	11141165			0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ		0.05 UJ
Aroclor-1242	µg/L	53469219			0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ		0.05 UJ
Aroclor-1248	µg/L	12672296			0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ		0.05 UJ
Aroclor-1254	µg/L	11097691			0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ		0.05 UJ
Aroclor-1260	µg/L	11096825			0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ		0.05 UJ
Aroclor-1262	µg/L	37324235			0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ		0.05 UJ
Aroclor-1268	µg/L	11100144			0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ		0.05 UJ
Metals																
Aluminum	µg/L	7429905	50 (V)	NA	**29.9 J+**	20.0 U	20.0 U	20.0 U	20.0 U	**136**	**30.8 J+**	20.0 U	**29.8 J+**	20.0 U	20.0 U	**56.5 J+**
Antimony	µg/L	7440360	6.0 (A)	130 (X)	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Arsenic	µg/L	7440382	10 (A)	10	**0.57 J**	**0.62 J**	**0.64 J**	**13.2**	1.0 U	**0.49 J**	**233**	1.0 U	**13.2**	**0.43 J**	1.0 U	**0.32 J**
Barium	µg/L	7440393	2,000 (A)	(G)	**115**	**106**	**106**	**124**	**36.7**	**146**	**373**	**467**	**431**	**148**	**143**	**103**
Beryllium	µg/L	7440417	4.0 (A)	(G)	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Cadmium	µg/L	7440439	5.0 (A)	(G,X)	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Calcium	µg/L	7440702			**45200**	**129000**	**129000**	**115000**	**75800**	**69700**	**132000**	**188000**	**197000**	**124000**	**119000**	**117000**
Chromium	µg/L	7440473	100 (A)	11	**31.0**	2.0 U	2.0 U	**8.9**	**1.1 J**	**1.5 J**	2.0 U	2.0 U	**0.85 J**	2.0 U	**0.70 J**	**7.9 J+**
Cobalt	µg/L	7440484	40	100	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	**1.6 J+**	1.0 U	**1.1**	1.0 U	1.0 U	1.0 U
Copper	µg/L	7440508	1,000 (E)	(G)	**1.2 J**	2.0 U	2.0 U	**0.40 J**	**0.32 J**	**0.49 J**	2.0 U	**0.54 J**	**0.69 J**	2.0 U	2.0 U	2.0 U
Cyanide	µg/L	57125	200 (A)	5.2	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Iron	µg/L	7439896	300 (E)	NA	**1150**	**2510**	**2540**	**1840**	**226**	**2500**	**15100**	**1950**	**51800**	**2680**	**2630**	**1990**
Lead	µg/L	7439921	4.0 (L)	(G,X)	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	**0.30 J**	1.0 U	1.0 U	**0.29 J**	1.0 U	1.0 U	1.0 U
Magnesium	µg/L	7439954	400000	NA	**25400**	**35000**	**35200**	**29600**	**26100**	**27900**	**44600**	**40000**	**26100**	**35200**	**34200**	**27900**
Manganese	µg/L	7439965	50 (E)	(G,X)	**55.3**	**336**	**333**	**503**	**176**	**110**	**81.8 J+**	**556**	**467**	**158**	**163**	**145**
Mercury	µg/L	7439976	2.0 (A)	0.0013	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Nickel	µg/L	7440020	100 (A)	(G)	**18.2**	**1.1 J+**	**1.5 J+**	**2.7**	1.0 U	**1.4**	**3.8 J+**	**1.3**	**2.0**	**1.1 J+**	**1.1**	**6.7 J+**
Potassium	µg/L	7440097			**8550**	**1950**	**1960**	**2650**	**1690**	**2700**	**2600**	**4100**	**3220**	**1810**	**1740**	**2350**
Selenium	µg/L	7782492	50 (A)	5	**0.28 J**	**0.25 J-**	**0.17 J-**	5.0 U	5.0 U	5.0 U	**0.15 J-**	5.0 U	**0.21 J**	**0.27 J-**	**0.31 J**	5.0 U
Silver	µg/L	7440224	34	0.2 (M); 0.06	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Sodium	µg/L	7440235			**32300**	**17000**	**17100**	**58800**	**20100**	**27600**	**38000**	**92400**	**11700**	**28100**	**27000**	**33100**
Thallium	µg/L	7440280	2.0 (A)	3.7 (X)	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vanadium	µg/L	7440622	4.5	27	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Zinc	µg/L	7440666	2400	(G)	2.0 U	2.0 U	2.0 U	**108**	**1.1 J-**	**1.5 J-**	**5.5 J+**	2.0 U	**2.4 J-**	2.0 U	2.0 U	2.0 U

TABLE 3-2
Groundwater Analytical Results
Allied Landfill Groundwater Investigation, Kalamazoo, Michigan

Chemical Name	Units	CAS	Michigan Cleanup Criteria Requirements for Response Activity* Residential Drinking Water	GSI	MW-16-D 10/15/2014 E53Q9	MW-22-B 10/16/2014 E53S8	MW-22-B 10/16/2014 E53S9	MW-40-S 10/14/2014 E53P6	MW-40-I 10/14/2014 E53P7	MW-40-D 10/15/2014 E53Q8	MW-122B 10/17/2014 E53W2	MW-125A 10/13/2014 E53P3	MW-201-B 10/15/2014 E53R4	MW-203-B 10/16/2014 E53S0	MW-203-B-FD 10/16/2014 ME53S0	MW-204B 10/16/2014 E53T2
Semi-Volatile Organic Compounds (SVOCs)																
1,1'-Biphenyl	µg/L	92524			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
1,2,4,5-Tetrachlorobenzene	µg/L	95943	1,300 (S)	2.9 (X)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
2,2'-Oxybis(1-chloropropane)	µg/L	108601			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
2,3,4,6-Tetrachlorophenol	µg/L	58902			5.0 U	5.0 U	5.0 U	5.0 U	**1.1 J**	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
2,4,5-Trichlorophenol	µg/L	95954	730	NA	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
2,4,6-Trichlorophenol	µg/L	88062	120	5	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
2,4-Dichlorophenol	µg/L	120832	73	11	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
2,4-Dimethylphenol	µg/L	105679	370	380	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
2,4-Dinitrophenol	µg/L	51285			10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U		10 U
2,4-Dinitrotoluene	µg/L	121142	7.7	NA	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
2,6-Dinitrotoluene	µg/L	606202			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
2-Chloronaphthalene	µg/L	91587	1800	NA	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
2-Chlorophenol	µg/L	95578	45	18	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
2-Methylnaphthalene	µg/L	91576	260	19	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
2-Methylphenol	µg/L	95487	370 (J)	30 (J)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
2-Nitroaniline	µg/L	88744			10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U		10 U
2-Nitrophenol	µg/L	88755	20	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
3,3'-Dichlorobenzidine	µg/L	91941	1.1	0.3 (M); 0.2	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
3-Nitroaniline	µg/L	99092			10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U		10 U
4,6-Dinitro-2-methylphenol	µg/L	534521	20 (M); 2.6	NA	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U		10 U
4-Bromophenyl-phenylether	µg/L	101553			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
4-Chloro-3-methylphenol	µg/L	59507	150	7.4	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
4-Chloroaniline	µg/L	106478			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
4-Chlorophenyl-phenylether	µg/L	7005723			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
4-Methylphenol	µg/L	106445	370 (J)	30 (J)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
4-Nitroaniline	µg/L	100016			10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U		10 U
4-Nitrophenol	µg/L	100027			10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U		10 U
Acenaphthene	µg/L	83329	1300	38	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	**0.85 J**	5.0 U		5.0 U
Acenaphthylene	µg/L	208968	52	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
Acetophenone	µg/L	98862	1500	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
Anthracene	µg/L	120127	43 (S)	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
Atrazine	µg/L	1912249	3.0 (A)	7.3	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
Benzaldehyde	µg/L	100527			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
Benzo(a)anthracene	µg/L	56553	2.1	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
Benzo(a)pyrene	µg/L	50328	5.0 (A)	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
Benzo(b)fluoranthene	µg/L	205992	1.5 (S,AA)	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
Benzo(g,h,i)perylene	µg/L	191242	1.0 (M); 0.26 (S)	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
Benzo(k)fluoranthene	µg/L	207089	1.0 (M); 0.8 (S)	NA	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
Bis(2-chloroethoxy)methane	µg/L	111911			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
Bis(2-chloroethyl)ether	µg/L	111444	2	1.0 (M); 0.79	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
Bis(2-ethylhexyl)phthalate	µg/L	117817	6.0 (A)	25	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
Butylbenzylphthalate	µg/L	85687	1200	67 (X)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
Caprolactam	µg/L	105602	5800	NA	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
Carbazole	µg/L	86748	85	10 (M); 4.0	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
Chrysene	µg/L	218019	1.6 (S)	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
Dibenzo(a,h)anthracene	µg/L	53703	2.0 (M); 0.21	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
Dibenzofuran	µg/L	132649	ID	4	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
Diethylphthalate	µg/L	84662	5500	110	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
Dimethylphthalate	µg/L	131113	73000	NA	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
Di-n-butylphthalate	µg/L	84742	880	9.7	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	**1.5 J**	5.0 U		**1.6 J**
Di-n-octylphthalate	µg/L	117840	130	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
Fluoranthene	µg/L	206440	210 (S)	1.6	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
Fluorene	µg/L	86737	880	12	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
Hexachlorobenzene	ug/L	118741	1.0 (A)	0.2 (M); 0.0003	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
Hexachlorobutadiene	µg/L	87683	15	0.053	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
Hexachlorocyclopentadiene	µg/L	77474	50 (A)	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
Hexachloroethane	µg/L	67721	7.3	6.7 (X)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
Indeno(1,2,3-cd)pyrene	µg/L	193395	2.0 (M); 0.022 (S)	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
Isophorone	µg/L	78591	770	1,300 (X)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
Naphthalene	µg/L	91203	520	11	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
Nitrobenzene	µg/L	98953	3.4	180 (X)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
N-Nitroso-di-n-propylamine	µg/L	621647	5.0 (M); 0.19	NA	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
N-Nitrosodiphenylamine	µg/L	86306	270	NA	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
Pentachlorophenol	µg/L	87865	1.0 (A)	(G,X)	10 U	10 U	10 U	10 U	**1.7 J**	10 U	10 U	10 U	10 U	10 U		10 U
Phenanthrene	µg/L	85018	52	2.0 (M); 1.4	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
Phenol	µg/L	108952	4400	450	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
Pyrene	µg/L	129000	140 (S)	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U

TABLE 3-2
Groundwater Analytical Results
Allied Landfill Groundwater Investigation, Kalamazoo, Michigan

Chemical Name	Units	CAS	Michigan Cleanup Criteria Requirements for Response Activity* Residential Drinking Water	GSI	MW-16-D 10/15/2014 E53Q9	MW-22-B 10/16/2014 E53S8	MW-22-B 10/16/2014 E53S9	MW-40-S 10/14/2014 E53P6	MW-40-I 10/14/2014 E53P7	MW-40-D 10/15/2014 E53Q8	MW-122B 10/17/2014 E53W2	MW-125A 10/13/2014 E53P3	MW-201-B 10/15/2014 E53R4	MW-203-B 10/16/2014 E53S0	MW-203-B-FD 10/16/2014 ME53S0	MW-204B 10/16/2014 E53T2
Volatile Organic Compounds (VOCs)																
1,1,1-Trichloroethane	µg/L	71556	200 (A)	89	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U
1,1,2,2-Tetrachloroethane	µg/L	79345	8.5	78 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U
1,1,2-Trichloro-1,2,2-trifluoroethane	µg/L	76131	1.7E+5 (S)	32	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U
1,1,2-Trichloroethane	µg/L	79005	5.0 (A)	330 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U
1,1-Dichloroethane	µg/L	75343	880	740	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U
1,1-Dichloroethene	µg/L	75354	7.0 (A)	130	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U
1,2,3-Trichlorobenzene	µg/L	87616			0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U
1,2,4-Trichlorobenzene	µg/L	120821	70 (A)	99 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U
1,2-Dibromo-3-chloropropane	µg/L	96128	0.2 (A)	ID	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U
1,2-Dibromoethane	µg/L	106934	0.05 (A)	5.7 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U
1,2-Dichlorobenzene	µg/L	95501	600 (A)	13	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U
1,2-Dichloroethane	µg/L	107062	5.0 (A)	360 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U
1,2-Dichloropropane	µg/L	78875	5.0 (A)	230 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U
1,3-Dichlorobenzene	µg/L	541731	6.6	28	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U
1,4-Dichlorobenzene	µg/L	106467	75 (A)	17	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U
2-Butanone	µg/L	78933	13000	2200	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
2-Hexanone	µg/L	591786	1000	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
4-Methyl-2-pentanone	µg/L	108101	1800	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U
Acetone	µg/L	67641	730	1700	5.0 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	5.0 U	5.0 U	5.0 U		5.0 U
Benzene	µg/L	71432	5.0 (A)	200 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U
Bromochloromethane	µg/L	74975			0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U
Bromodichloromethane	µg/L	75274	80 (A,W)	ID	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U
Bromoform	µg/L	75252	80 (A,W)	ID	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U
Bromomethane	µg/L	74839	10	35	0.50 UJ	0.50 U	0.50 U	0.50 UJ	0.50 UJ	0.50 UJ	0.50 U	0.50 U	0.50 UJ	0.50 U		0.50 U
Carbon disulfide	µg/L	75150	800	ID	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U
Carbon tetrachloride	µg/L	56235	5.0 (A)	45 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U
Chlorobenzene	µg/L	108907	100 (A)	25	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U
Chloroethane	µg/L	75003	430	1,100 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U
Chloroform	µg/L	67663	80 (A,W)	350	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U
Chloromethane	µg/L	74873	260	ID	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U
cis-1,2-Dichloroethene	µg/L	156592	70 (A)	620	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U
cis-1,3-Dichloropropene	µg/L	10061015			0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U
Cyclohexane	µg/L	110827			0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U
Dibromochloromethane	µg/L	124481	80 (A,W)	ID	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U
Dichlorodifluoromethane	µg/L	75718	1700	ID	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U
Ethylbenzene	µg/L	100414	74 (E)	18	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U
Isopropylbenzene	µg/L	98828	800	28	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U
m,p-Xylene	µg/L	179601231	280 (E)	41	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U
Methyl Acetate	µg/L	79209			0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U
Methyl tert-butyl ether	µg/L	1634044	40 (E)	7,100 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U
Methylcyclohexane	µg/L	108872			0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U
Methylene chloride	µg/L	75092	5.0 (A)	1,500 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U
o-Xylene	µg/L	95476	280 (E)	41	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U
Styrene	µg/L	100425	100 (A)	80 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U
Tetrachloroethene	µg/L	127184	5.0 (A)	60 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U
Toluene	µg/L	108883	790 (E)	270	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U
trans-1,2-Dichloroethene	µg/L	156605	100 (A)	1,500 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U
trans-1,3-Dichloropropene	µg/L	10061026			0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U
Trichloroethene	µg/L	79016	5.0 (A)	200 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**0.38 J**	0.50 U	0.50 U		0.50 U
Trichlorofluoromethane	µg/L	75694	2600	NA	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U
Vinyl chloride	µg/L	75014	2.0 (A)	13 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U

TABLE 3-2
Groundwater Analytical Results
Allied Landfill Groundwater Investigation, Kalamazoo, Michigan

Chemical Name	Units	CAS	Michigan Cleanup Criteria Requirements for Response Activity*		MW-16-D	MW-22-B	MW-22-B	MW-40-S	MW-40-I	MW-40-D	MW-122B	MW-125A	MW-201-B	MW-203-B	MW-203-B-FD	MW-204B
			Residential Drinking Water	GSI	10/15/2014	10/16/2014	10/16/2014	10/14/2014	10/14/2014	10/15/2014	10/17/2014	10/13/2014	10/15/2014	10/16/2014	10/16/2014	10/16/2014
					E53Q9	E53S8	E53S9	E53P6	E53P7	E53Q8	E53W2	E53P3	E53R4	E53S0	ME53S0	E53T2

Notes:
* Formerly known as the Part 201 Generic Cleanup Criteria and Screening Levels, now found at Sections 299.1 to 299.50, which became effective on December 30, 2013.
Footnotes associated with the criteria are included at:
http://www.michigan.gov/deq/0,1607,7-135-3311_4109_9846_30022-251790--,00.html
Bold value indicates a detection
Highlighted value indicates an exceedance of Michigan Residential Drinking Water Criteria
Highlighted value indicates an exceedance of Michigan Groundwater Surface Water Interface Criteria
GSI = groundwater surface water interface criteria
J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample
J+ = The result is an estimated quantity, but the result may be biased high
J- = The result is an estimated quantity, but the result may be biased low.
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit
UJ = The analyte was analyzed for, but not detected. The reported quantitation limit is approximate concentration of the analyte in the sample
µg/L = micrograms per liter

TABLE 3-2
Groundwater Analytical Results
Allied Landfill Groundwater Investigation, Kalamazoo, Michigan

Chemical Name	Units	CAS	Michigan Cleanup Criteria Requirements for Response Activity* Residential Drinking Water	Michigan Cleanup Criteria Requirements for Response Activity* GSI	MW-205B 10/17/2014 E53W4	MW-207 10/16/2014 E53S3	MW-208 10/16/2014 E53T0	MW-209 10/16/2014 E53S1	MW-211 10/16/2014 E53R8	MW-211 10/16/2014 E53R9	MW-212 10/16/2014 E53S2	MW-214 10/17/2014 E53W3	MW-218 10/17/2014 E53T9	MW-221R 10/17/2014 E53W1	MW-222 10/13/2014 E53P4	MW-224 10/13/2014 E53P2
PCBs																
Aroclor-1016	µg/L	12674112	0.5 (A)	0.2 (M); 2.6E-5	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ
Aroclor-1221	µg/L	11104282			0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ
Aroclor-1232	µg/L	11141165			0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ
Aroclor-1242	µg/L	53469219			0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ
Aroclor-1248	µg/L	12672296			0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ
Aroclor-1254	µg/L	11097691			0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ
Aroclor-1260	µg/L	11096825			0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ
Aroclor-1262	µg/L	37324235			0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ
Aroclor-1268	µg/L	11100144			0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ
Metals																
Aluminum	µg/L	7429905	50 (V)	NA	**33.4 J+**	**45.4 J+**	20.0 U	20.0 U	20.0 U	20.0 U	**22.8 J+**	20.0 U	20.0 U	20.0 U	20.0 U	20.0 U
Antimony	µg/L	7440360	6.0 (A)	130 (X)	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Arsenic	µg/L	7440382	10 (A)	10	**0.65 J**	**0.63 J**	**19.1**	**0.24 J**	**0.77 J**	**0.64 J**	**68.2**	**36.2**	**61.4**	**23.9**	**3.2**	**40.0**
Barium	µg/L	7440393	2,000 (A)	(G)	**13.3**	**132**	**520**	**187**	**271**	**261**	**406**	**318**	**401**	**275**	**80.4**	**773**
Beryllium	µg/L	7440417	4.0 (A)	(G)	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Cadmium	µg/L	7440439	5.0 (A)	(G,X)	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Calcium	µg/L	7440702			**8530**	**130000**	**160000**	**112000**	**118000**	**113000**	**197000**	**174000**	**107000**	**125000**	**125000**	**222000**
Chromium	µg/L	7440473	100 (A)	11	**20.9**	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	**6.4**	**0.90 J**
Cobalt	µg/L	7440484	40	100	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	**1.1 J+**	1.0 U	1.0 U	1.0 U	1.0 U	**1.1**
Copper	µg/L	7440508	1,000 (E)	(G)	**3.8**	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	**0.40 J**
Cyanide	µg/L	57125	200 (A)	5.2	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Iron	µg/L	7439896	300 (E)	NA	**351**	**2350**	**9850**	**2360**	**2260**	**2170**	**38400**	**15100**	**4870**	**23800**	**2340**	**51900**
Lead	µg/L	7439921	4.0 (L)	(G,X)	1.0 U	1.0 U	**1.4**	1.0 U	**0.24 J**	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Magnesium	µg/L	7439954	400000	NA	**31200**	**34100**	**34600**	**33900**	**31300**	**30200**	**40500**	**52600**	**25400**	**44400**	**36400**	**31200**
Manganese	µg/L	7439965	50 (E)	(G,X)	**20.9 J+**	**376**	**391**	**134**	**74.1**	**73.5 J+**	**109 J+**	**82.5 J+**	**203**	**481**	**189**	**837**
Mercury	µg/L	7439976	2.0 (A)	0.0013	**0.072 J**	0.20 U	0.20 U	0.20 U	**0.031 J**	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Nickel	µg/L	7440020	100 (A)	(G)	**59.2**	**2.0 J+**	**1.9 J+**	1.0 U	1.0 U	1.0 U	**4.3 J+**	**2.2 J+**	1.0 U	**1.6 J+**	**2.0**	**8.0**
Potassium	µg/L	7440097			**11500**	**2060**	**2970**	**1210**	**1330**	**1250**	**5150**	**2900**	**1920**	**2890**	**1660**	**1730**
Selenium	µg/L	7782492	50 (A)	5	5.0 U	**0.35 J-**	**0.15 J-**	5.0 U	5.0 U	5.0 U	**0.27 J-**	**0.34 J-**	5.0 U	**0.27 J-**	5.0 U	5.0 U
Silver	µg/L	7440224	34	0.2 (M); 0.06	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Sodium	µg/L	7440235			**24800**	**23800**	**132000**	**12000**	**5450**	**5190**	**40400**	**42200**	**55100**	**34700**	**16700**	**6420**
Thallium	µg/L	7440280	2.0 (A)	3.7 (X)	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vanadium	µg/L	7440622	4.5	27	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Zinc	µg/L	7440666	2400	(G)	**5.3 J+**	2.0 U	**2.5 J**	2.0 U	**1.1 J-**	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	**63.9**	**4.2**

TABLE 3-2
Groundwater Analytical Results
Allied Landfill Groundwater Investigation, Kalamazoo, Michigan

Chemical Name	Units	CAS	Michigan Cleanup Criteria Requirements for Response Activity* Residential Drinking Water	GSI	MW-205B 10/17/2014 E53W4	MW-207 10/16/2014 E53S3	MW-208 10/16/2014 E53T0	MW-209 10/16/2014 E53S1	MW-211 10/16/2014 E53R8	MW-211 10/16/2014 E53R9	MW-212 10/16/2014 E53S2	MW-214 10/17/2014 E53W3	MW-218 10/17/2014 E53T9	MW-221R 10/17/2014 E53W1	MW-222 10/13/2014 E53P4	MW-224 10/13/2014 E53P2
Semi-Volatile Organic Compounds (SVOCs)																
1,1'-Biphenyl	µg/L	92524			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2,4,5-Tetrachlorobenzene	µg/L	95943	1,300 (S)	2.9 (X)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2,2'-Oxybis(1-chloropropane)	µg/L	108601			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2,3,4,6-Tetrachlorophenol	µg/L	58902			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2,4,5-Trichlorophenol	µg/L	95954	730	NA	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2,4,6-Trichlorophenol	µg/L	88062	120	5	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2,4-Dichlorophenol	µg/L	120832	73	11	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2,4-Dimethylphenol	µg/L	105679	370	380	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2,4-Dinitrophenol	µg/L	51285			10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dinitrotoluene	µg/L	121142	7.7	NA	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2,6-Dinitrotoluene	µg/L	606202			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2-Chloronaphthalene	µg/L	91587	1800	NA	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2-Chlorophenol	µg/L	95578	45	18	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2-Methylnaphthalene	µg/L	91576	260	19	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2-Methylphenol	µg/L	95487	370 (J)	30 (J)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2-Nitroaniline	µg/L	88744			10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Nitrophenol	µg/L	88755	20	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
3,3'-Dichlorobenzidine	µg/L	91941	1.1	0.3 (M); 0.2	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
3-Nitroaniline	µg/L	99092			10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4,6-Dinitro-2-methylphenol	µg/L	534521	20 (M); 2.6	NA	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Bromophenyl-phenylether	µg/L	101553			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
4-Chloro-3-methylphenol	µg/L	59507	150	7.4	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
4-Chloroaniline	µg/L	106478			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
4-Chlorophenyl-phenylether	µg/L	7005723			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
4-Methylphenol	µg/L	106445	370 (J)	30 (J)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
4-Nitroaniline	µg/L	100016			10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Nitrophenol	µg/L	100027			10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Acenaphthene	µg/L	83329	1300	38	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Acenaphthylene	µg/L	208968	52	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Acetophenone	µg/L	98862	1500	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Anthracene	µg/L	120127	43 (S)	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Atrazine	µg/L	1912249	3.0 (A)	7.3	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Benzaldehyde	µg/L	100527			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Benzo(a)anthracene	µg/L	56553	2.1	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Benzo(a)pyrene	µg/L	50328	5.0 (A)	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Benzo(b)fluoranthene	µg/L	205992	1.5 (S,AA)	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Benzo(g,h,i)perylene	µg/L	191242	1.0 (M); 0.26 (S)	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Benzo(k)fluoranthene	µg/L	207089	1.0 (M); 0.8 (S)	NA	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bis(2-chloroethoxy)methane	µg/L	111911			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bis(2-chloroethyl)ether	µg/L	111444	2	1.0 (M); 0.79	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bis(2-ethylhexyl)phthalate	µg/L	117817	6.0 (A)	25	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Butylbenzylphthalate	µg/L	85687	1200	67 (X)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Caprolactam	µg/L	105602	5800	NA	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	**0.71 J**
Carbazole	µg/L	86748	85	10 (M); 4.0	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chrysene	µg/L	218019	1.6 (S)	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Dibenzo(a,h)anthracene	µg/L	53703	2.0 (M); 0.21	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Dibenzofuran	µg/L	132649	ID	4	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Diethylphthalate	µg/L	84662	5500	110	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Dimethylphthalate	µg/L	131113	73000	NA	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Di-n-butylphthalate	µg/L	84742	880	9.7	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Di-n-octylphthalate	µg/L	117840	130	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Fluoranthene	µg/L	206440	210 (S)	1.6	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Fluorene	µg/L	86737	880	12	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Hexachlorobenzene	ug/L	118741	1.0 (A)	0.2 (M); 0.0003	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Hexachlorobutadiene	µg/L	87683	15	0.053	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Hexachlorocyclopentadiene	µg/L	77474	50 (A)	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Hexachloroethane	µg/L	67721	7.3	6.7 (X)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Indeno(1,2,3-cd)pyrene	µg/L	193395	2.0 (M); 0.022 (S)	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Isophorone	µg/L	78591	770	1,300 (X)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Naphthalene	µg/L	91203	520	11	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Nitrobenzene	µg/L	98953	3.4	180 (X)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
N-Nitroso-di-n-propylamine	µg/L	621647	5.0 (M); 0.19	NA	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
N-Nitrosodiphenylamine	µg/L	86306	270	NA	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Pentachlorophenol	µg/L	87865	1.0 (A)	(G,X)	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Phenanthrene	µg/L	85018	52	2.0 (M); 1.4	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Phenol	µg/L	108952	4400	450	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Pyrene	µg/L	129000	140 (S)	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U

TABLE 3-2
Groundwater Analytical Results
Allied Landfill Groundwater Investigation, Kalamazoo, Michigan

Chemical Name	Units	CAS	Michigan Cleanup Criteria Requirements for Response Activity* Residential Drinking Water	GSI	MW-205B 10/17/2014 E53W4	MW-207 10/16/2014 E53S3	MW-208 10/16/2014 E53T0	MW-209 10/16/2014 E53S1	MW-211 10/16/2014 E53R8	MW-211 10/16/2014 E53R9	MW-212 10/16/2014 E53S2	MW-214 10/17/2014 E53W3	MW-218 10/17/2014 E53T9	MW-221R 10/17/2014 E53W1	MW-222 10/13/2014 E53P4	MW-224 10/13/2014 E53P2
Volatile Organic Compounds (VOCs)																
1,1,1-Trichloroethane	µg/L	71556	200 (A)	89	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,1,2,2-Tetrachloroethane	µg/L	79345	8.5	78 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,1,2-Trichloro-1,2,2-trifluoroethane	µg/L	76131	1.7E+5 (S)	32	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,1,2-Trichloroethane	µg/L	79005	5.0 (A)	330 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,1-Dichloroethane	µg/L	75343	880	740	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,1-Dichloroethene	µg/L	75354	7.0 (A)	130	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,2,3-Trichlorobenzene	µg/L	87616			0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,2,4-Trichlorobenzene	µg/L	120821	70 (A)	99 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dibromo-3-chloropropane	µg/L	96128	0.2 (A)	ID	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dibromoethane	µg/L	106934	0.05 (A)	5.7 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dichlorobenzene	µg/L	95501	600 (A)	13	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dichloroethane	µg/L	107062	5.0 (A)	360 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dichloropropane	µg/L	78875	5.0 (A)	230 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,3-Dichlorobenzene	µg/L	541731	6.6	28	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,4-Dichlorobenzene	µg/L	106467	75 (A)	17	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
2-Butanone	µg/L	78933	13000	2200	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2-Hexanone	µg/L	591786	1000	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
4-Methyl-2-pentanone	µg/L	108101	1800	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Acetone	µg/L	67641	730	1700	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	10 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Benzene	µg/L	71432	5.0 (A)	200 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Bromochloromethane	µg/L	74975			0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Bromodichloromethane	µg/L	75274	80 (A,W)	ID	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Bromoform	µg/L	75252	80 (A,W)	ID	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Bromomethane	µg/L	74839	10	35	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Carbon disulfide	µg/L	75150	800	ID	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Carbon tetrachloride	µg/L	56235	5.0 (A)	45 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Chlorobenzene	µg/L	108907	100 (A)	25	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Chloroethane	µg/L	75003	430	1,100 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Chloroform	µg/L	67663	80 (A,W)	350	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Chloromethane	µg/L	74873	260	ID	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
cis-1,2-Dichloroethene	µg/L	156592	70 (A)	620	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
cis-1,3-Dichloropropene	µg/L	10061015			0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Cyclohexane	µg/L	110827			0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**0.28 J**	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Dibromochloromethane	µg/L	124481	80 (A,W)	ID	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Dichlorodifluoromethane	µg/L	75718	1700	ID	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Ethylbenzene	µg/L	100414	74 (E)	18	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Isopropylbenzene	µg/L	98828	800	28	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**0.097 J**	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
m,p-Xylene	µg/L	179601231	280 (E)	41	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Methyl Acetate	µg/L	79209			0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Methyl tert-butyl ether	µg/L	1634044	40 (E)	7,100 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Methylcyclohexane	µg/L	108872			0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Methylene chloride	µg/L	75092	5.0 (A)	1,500 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
o-Xylene	µg/L	95476	280 (E)	41	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Styrene	µg/L	100425	100 (A)	80 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Tetrachloroethene	µg/L	127184	5.0 (A)	60 (X)	0.50 U	0.50 U	**0.71**	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Toluene	µg/L	108883	790 (E)	270	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
trans-1,2-Dichloroethene	µg/L	156605	100 (A)	1,500 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
trans-1,3-Dichloropropene	µg/L	10061026			0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Trichloroethene	µg/L	79016	5.0 (A)	200 (X)	0.50 U	0.50 U	**1.1**	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Trichlorofluoromethane	µg/L	75694	2600	NA	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Vinyl chloride	µg/L	75014	2.0 (A)	13 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U

TABLE 3-2
Groundwater Analytical Results
Allied Landfill Groundwater Investigation, Kalamazoo, Michigan

Chemical Name	Units	CAS	Michigan Cleanup Criteria Requirements for Response Activity* Residential Drinking Water	Michigan Cleanup Criteria Requirements for Response Activity* GSI	MW-205B 10/17/2014 E53W4	MW-207 10/16/2014 E53S3	MW-208 10/16/2014 E53T0	MW-209 10/16/2014 E53S1	MW-211 10/16/2014 E53R8	MW-211 10/16/2014 E53R9	MW-212 10/16/2014 E53S2	MW-214 10/17/2014 E53W3	MW-218 10/17/2014 E53T9	MW-221R 10/17/2014 E53W1	MW-222 10/13/2014 E53P4	MW-224 10/13/2014 E53P2

Notes:
* Formerly known as the Part 201 Generic Cleanup Criteria and Screening Levels, now found at Sections 299.1 to 299.50, which became effective on December 30, 2013.
Footnotes associated with the criteria are included at:
http://www.michigan.gov/deq/0,1607,7-135-3311_4109_9846_30022-251790--,00.html
Bold value indicates a detection
Highlighted value indicates an exceedance of Michigan Residential Drinking Water Criteria
Highlighted value indicates an exceedance of Michigan Groundwater Surface Water Interface Criteria
GSI = groundwater surface water interface criteria
J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample
J+ = The result is an estimated quantity, but the result may be biased high
J- = The result is an estimated quantity, but the result may be biased low.
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit
UJ = The analyte was analyzed for, but not detected. The reported quantitation limit is approximate concentration of the analyte in the sample
µg/L = micrograms per liter

TABLE 3-2
Groundwater Analytical Results
Allied Landfill Groundwater Investigation, Kalamazoo, Michigan

Chemical Name	Units	CAS	Michigan Cleanup Criteria Requirements for Response Activity* Residential Drinking Water	GSI	MW-231 10/16/2014 E53T1	MW-232 10/17/2014 E53W0	FB-01-101714 10/17/2014 E53S4	FB-02-101714 10/17/2014 E53S5	EB-01-101714 10/17/2014 E53S6	EB-02-101714 10/17/2014 E53S7	Trip Blank 10/13/2014 E53P5	Trip Blank 10/14/2014 E53Q5	Trip Blank 10/14/2014 E53Q6	Trip Blank 10/14/2014 E53Q7	Trip Blank 10/15/2014 E53R5	Trip Blank 10/15/2014 E53R6
PCBs																
Aroclor-1016	µg/L	12674112	0.5 (A)	0.2 (M); 2.6E-5	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ						
Aroclor-1221	µg/L	11104282			0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ						
Aroclor-1232	µg/L	11141165			0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ						
Aroclor-1242	µg/L	53469219			0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ						
Aroclor-1248	µg/L	12672296			0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ						
Aroclor-1254	µg/L	11097691			0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ						
Aroclor-1260	µg/L	11096825			0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ						
Aroclor-1262	µg/L	37324235			0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ						
Aroclor-1268	µg/L	11100144			0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ	0.05 UJ						
Metals																
Aluminum	µg/L	7429905	50 (V)	NA	20.0 U	**36.9 J+**	20.0 U	20.0 U	20.0 U	20.0 U						
Antimony	µg/L	7440360	6.0 (A)	130 (X)	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U						
Arsenic	µg/L	7440382	10 (A)	10	**4.9**	**102**	1.0 U	1.0 U	1.0 U	1.0 U						
Barium	µg/L	7440393	2,000 (A)	(G)	**518**	**375**	10.0 U	10.0 U	10.0 U	10.0 U						
Beryllium	µg/L	7440417	4.0 (A)	(G)	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U						
Cadmium	µg/L	7440439	5.0 (A)	(G,X)	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U						
Calcium	µg/L	7440702			**122000**	**133000**	500 U	500 U	500 U	500 U						
Chromium	µg/L	7440473	100 (A)	11	2.0 U	2.0 U	2.0 U	2.0 U	**0.95 J**	**2.5**						
Cobalt	µg/L	7440484	40	100	**1.9 J+**	**1.2 J+**	1.0 U	1.0 U	1.0 U	1.0 U						
Copper	µg/L	7440508	1,000 (E)	(G)	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U						
Cyanide	µg/L	57125	200 (A)	5.2	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U						
Iron	µg/L	7439896	300 (E)	NA	**5660**	**20900**	200 U	200 U	200 U	200 U						
Lead	µg/L	7439921	4.0 (L)	(G,X)	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U						
Magnesium	µg/L	7439954	400000	NA	**27600**	**33200**	500 U	500 U	500 U	500 U						
Manganese	µg/L	7439965	50 (E)	(G,X)	**1320**	**166**	1.0 U	1.0 U	**4.0**	**26.2**						
Mercury	µg/L	7439976	2.0 (A)	0.0013	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U						
Nickel	µg/L	7440020	100 (A)	(G)	**3.8 J+**	**2.4 J+**	1.0 U	1.0 U	**1.7 J+**	**3.8**						
Potassium	µg/L	7440097			**2990**	**4360**	500 U	500 U	500 U	500 U						
Selenium	µg/L	7782492	50 (A)	5	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
Silver	µg/L	7440224	34	0.2 (M); 0.06	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U						
Sodium	µg/L	7440235			**70300**	**20200**	500 U	500 U	500 U	500 U						
Thallium	µg/L	7440280	2.0 (A)	3.7 (X)	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U						
Vanadium	µg/L	7440622	4.5	27	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
Zinc	µg/L	7440666	2400	(G)	2.0 U	**2.5 J**	2.0 U	2.0 U	**10.9**	**0.34 J-**						

TABLE 3-2
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Semi-Volatile Organic Compounds (SVOCs)																
1,1'-Biphenyl	µg/L	92524			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
1,2,4,5-Tetrachlorobenzene	µg/L	95943	1,300 (S)	2.9 (X)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
2,2'-Oxybis(1-chloropropane)	µg/L	108601			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
2,3,4,6-Tetrachlorophenol	µg/L	58902			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
2,4,5-Trichlorophenol	µg/L	95954	730	NA	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
2,4,6-Trichlorophenol	µg/L	88062	120	5	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
2,4-Dichlorophenol	µg/L	120832	73	11	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
2,4-Dimethylphenol	µg/L	105679	370	380	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
2,4-Dinitrophenol	µg/L	51285			10 U	10 U	10 U	10 U	10 U	10 U						
2,4-Dinitrotoluene	µg/L	121142	7.7	NA	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
2,6-Dinitrotoluene	µg/L	606202			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
2-Chloronaphthalene	µg/L	91587	1800	NA	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
2-Chlorophenol	µg/L	95578	45	18	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
2-Methylnaphthalene	µg/L	91576	260	19	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
2-Methylphenol	µg/L	95487	370 (J)	30 (J)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
2-Nitroaniline	µg/L	88744			10 U	10 U	10 U	10 U	10 U	10 U						
2-Nitrophenol	µg/L	88755	20	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
3,3'-Dichlorobenzidine	µg/L	91941	1.1	0.3 (M); 0.2	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
3-Nitroaniline	µg/L	99092			10 U	10 U	10 U	10 U	10 U	10 U						
4,6-Dinitro-2-methylphenol	µg/L	534521	20 (M); 2.6	NA	10 U	10 U	10 U	10 U	10 U	10 U						
4-Bromophenyl-phenylether	µg/L	101553			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
4-Chloro-3-methylphenol	µg/L	59507	150	7.4	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
4-Chloroaniline	µg/L	106478			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
4-Chlorophenyl-phenylether	µg/L	7005723			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
4-Methylphenol	µg/L	106445	370 (J)	30 (J)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
4-Nitroaniline	µg/L	100016			10 U	10 U	10 U	10 U	10 U	10 U						
4-Nitrophenol	µg/L	100027			10 U	10 U	10 U	10 U	10 U	10 U						
Acenaphthene	µg/L	83329	1300	38	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
Acenaphthylene	µg/L	208968	52	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
Acetophenone	µg/L	98862	1500	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
Anthracene	µg/L	120127	43 (S)	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
Atrazine	µg/L	1912249	3.0 (A)	7.3	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
Benzaldehyde	µg/L	100527			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
Benzo(a)anthracene	µg/L	56553	2.1	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
Benzo(a)pyrene	µg/L	50328	5.0 (A)	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
Benzo(b)fluoranthene	µg/L	205992	1.5 (S,AA)	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
Benzo(g,h,i)perylene	µg/L	191242	1.0 (M); 0.26 (S)	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
Benzo(k)fluoranthene	µg/L	207089	1.0 (M); 0.8 (S)	NA	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
Bis(2-chloroethoxy)methane	µg/L	111911			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
Bis(2-chloroethyl)ether	µg/L	111444	2	1.0 (M); 0.79	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
Bis(2-ethylhexyl)phthalate	µg/L	117817	6.0 (A)	25	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
Butylbenzylphthalate	µg/L	85687	1200	67 (X)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
Caprolactam	µg/L	105602	5800	NA	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
Carbazole	µg/L	86748	85	10 (M); 4.0	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
Chrysene	µg/L	218019	1.6 (S)	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
Dibenzo(a,h)anthracene	µg/L	53703	2.0 (M); 0.21	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
Dibenzofuran	µg/L	132649	ID	4	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
Diethylphthalate	µg/L	84662	5500	110	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
Dimethylphthalate	µg/L	131113	73000	NA	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
Di-n-butylphthalate	µg/L	84742	880	9.7	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
Di-n-octylphthalate	µg/L	117840	130	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
Fluoranthene	µg/L	206440	210 (S)	1.6	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
Fluorene	µg/L	86737	880	12	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
Hexachlorobenzene	ug/L	118741	1.0 (A)	0.2 (M); 0.0003	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
Hexachlorobutadiene	µg/L	87683	15	0.053	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
Hexachlorocyclopentadiene	µg/L	77474	50 (A)	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
Hexachloroethane	µg/L	67721	7.3	6.7 (X)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
Indeno(1,2,3-cd)pyrene	µg/L	193395	2.0 (M); 0.022 (S)	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
Isophorone	µg/L	78591	770	1,300 (X)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
Naphthalene	µg/L	91203	520	11	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
Nitrobenzene	µg/L	98953	3.4	180 (X)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
N-Nitroso-di-n-propylamine	µg/L	621647	5.0 (M); 0.19	NA	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
N-Nitrosodiphenylamine	µg/L	86306	270	NA	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
Pentachlorophenol	µg/L	87865	1.0 (A)	(G,X)	10 U	10 U	10 U	10 U	10 U	10 U						
Phenanthrene	µg/L	85018	52	2.0 (M); 1.4	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
Phenol	µg/L	108952	4400	450	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						
Pyrene	µg/L	129000	140 (S)	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U						

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Volatile Organic Compounds (VOCs)																
1,1,1-Trichloroethane	µg/L	71556	200 (A)	89	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,1,2,2-Tetrachloroethane	µg/L	79345	8.5	78 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,1,2-Trichloro-1,2,2-trifluoroethane	µg/L	76131	1.7E+5 (S)	32	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,1,2-Trichloroethane	µg/L	79005	5.0 (A)	330 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,1-Dichloroethane	µg/L	75343	880	740	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,1-Dichloroethene	µg/L	75354	7.0 (A)	130	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,2,3-Trichlorobenzene	µg/L	87616			0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,2,4-Trichlorobenzene	µg/L	120821	70 (A)	99 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dibromo-3-chloropropane	µg/L	96128	0.2 (A)	ID	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dibromoethane	µg/L	106934	0.05 (A)	5.7 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dichlorobenzene	µg/L	95501	600 (A)	13	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dichloroethane	µg/L	107062	5.0 (A)	360 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dichloropropane	µg/L	78875	5.0 (A)	230 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,3-Dichlorobenzene	µg/L	541731	6.6	28	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,4-Dichlorobenzene	µg/L	106467	75 (A)	17	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
2-Butanone	µg/L	78933	13000	2200	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2-Hexanone	µg/L	591786	1000	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
4-Methyl-2-pentanone	µg/L	108101	1800	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Acetone	µg/L	67641	730	1700	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	10 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Benzene	µg/L	71432	5.0 (A)	200 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Bromochloromethane	µg/L	74975			0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Bromodichloromethane	µg/L	75274	80 (A,W)	ID	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Bromoform	µg/L	75252	80 (A,W)	ID	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Bromomethane	µg/L	74839	10	35	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 UJ	0.50 UJ	0.50 UJ	0.50 UJ	0.50 UJ
Carbon disulfide	µg/L	75150	800	ID	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Carbon tetrachloride	µg/L	56235	5.0 (A)	45 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Chlorobenzene	µg/L	108907	100 (A)	25	0.50 U	**0.68**	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Chloroethane	µg/L	75003	430	1,100 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Chloroform	µg/L	67663	80 (A,W)	350	0.50 U	0.50 U	**3.8**	**4.1**	4.5 U	3.8 U	**4.7**	**5.1 J**	**5.0**	**4.9**	**5.0**	**4.9**
Chloromethane	µg/L	74873	260	ID	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
cis-1,2-Dichloroethene	µg/L	156592	70 (A)	620	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
cis-1,3-Dichloropropene	µg/L	10061015			0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Cyclohexane	µg/L	110827			0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Dibromochloromethane	µg/L	124481	80 (A,W)	ID	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Dichlorodifluoromethane	µg/L	75718	1700	ID	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Ethylbenzene	µg/L	100414	74 (E)	18	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Isopropylbenzene	µg/L	98828	800	28	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
m,p-Xylene	µg/L	179601231	280 (E)	41	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Methyl Acetate	µg/L	79209			0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Methyl tert-butyl ether	µg/L	1634044	40 (E)	7,100 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Methylcyclohexane	µg/L	108872			0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Methylene chloride	µg/L	75092	5.0 (A)	1,500 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**0.46 J**	**0.76**	**0.52**	**0.40 J**	1.0 U	1.0 U
o-Xylene	µg/L	95476	280 (E)	41	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Styrene	µg/L	100425	100 (A)	80 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Tetrachloroethene	µg/L	127184	5.0 (A)	60 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Toluene	µg/L	108883	790 (E)	270	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
trans-1,2-Dichloroethene	µg/L	156605	100 (A)	1,500 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
trans-1,3-Dichloropropene	µg/L	10061026			0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Trichloroethene	µg/L	79016	5.0 (A)	200 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Trichlorofluoromethane	µg/L	75694	2600	NA	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Vinyl chloride	µg/L	75014	2.0 (A)	13 (X)	0.50 U	0.50 U	0.50 UJ	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U

TABLE 3-2
Groundwater Analytical Results
Allied Landfill Groundwater Investigation, Kalamazoo, Michigan

Chemical Name	Units	CAS	Michigan Cleanup Criteria Requirements for Response Activity* Residential Drinking Water	Michigan Cleanup Criteria Requirements for Response Activity* GSI	MW-231 10/16/2014 E53T1	MW-232 10/17/2014 E53W0	FB-01-101714 10/17/2014 E53S4	FB-02-101714 10/17/2014 E53S5	EB-01-101714 10/17/2014 E53S6	EB-02-101714 10/17/2014 E53S7	Trip Blank 10/13/2014 E53P5	Trip Blank 10/14/2014 E53Q5	Trip Blank 10/14/2014 E53Q6	Trip Blank 10/14/2014 E53Q7	Trip Blank 10/15/2014 E53R5	Trip Blank 10/15/2014 E53R6

Notes:
* Formerly known as the Part 201 Generic Cleanup Criteria and Screening Levels, now found at Sections 299.1 to 299.50, which became effective on December 30, 2013.
Footnotes associated with the criteria are included at:
http://www.michigan.gov/deq/0,1607,7-135-3311_4109_9846_30022-251790--,00.html
Bold value indicates a detection
Highlighted value indicates an exceedance of Michigan Residential Drinking Water Criteria
Highlighted value indicates an exceedance of Michigan Groundwater Surface Water Interface Criteria
GSI = groundwater surface water interface criteria
J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample
J+ = The result is an estimated quantity, but the result may be biased high
J- = The result is an estimated quantity, but the result may be biased low.
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit
UJ = The analyte was analyzed for, but not detected. The reported quantitation limit is approximate concentration of the analyte in the sample
µg/L = micrograms per liter

TABLE 3-2
Groundwater Analytical Results
Allied Landfill Groundwater Investigation, Kalamazoo, Michigan

Chemical Name	Units	CAS	Michigan Cleanup Criteria Requirements for Response Activity* Residential Drinking Water	Michigan Cleanup Criteria Requirements for Response Activity* GSI	Trip Blank 10/15/2014 E53R7	Trip Blank 10/16/2014 E53T3	Trip Blank 10/16/2014 E53T4	Trip Blank 10/16/2014 E53T5	Trip Blank 10/16/2014 E53T6	Trip Blank 10/16/2014 E53T7	Trip Blank 10/16/2014 E53T8
PCBs											
Aroclor-1016	µg/L	12674112	0.5 (A)	0.2 (M); 2.6E-5							
Aroclor-1221	µg/L	11104282									
Aroclor-1232	µg/L	11141165									
Aroclor-1242	µg/L	53469219									
Aroclor-1248	µg/L	12672296									
Aroclor-1254	µg/L	11097691									
Aroclor-1260	µg/L	11096825									
Aroclor-1262	µg/L	37324235									
Aroclor-1268	µg/L	11100144									
Metals											
Aluminum	µg/L	7429905	50 (V)	NA							
Antimony	µg/L	7440360	6.0 (A)	130 (X)							
Arsenic	µg/L	7440382	10 (A)	10							
Barium	µg/L	7440393	2,000 (A)	(G)							
Beryllium	µg/L	7440417	4.0 (A)	(G)							
Cadmium	µg/L	7440439	5.0 (A)	(G,X)							
Calcium	µg/L	7440702									
Chromium	µg/L	7440473	100 (A)	11							
Cobalt	µg/L	7440484	40	100							
Copper	µg/L	7440508	1,000 (E)	(G)							
Cyanide	µg/L	57125	200 (A)	5.2							
Iron	µg/L	7439896	300 (E)	NA							
Lead	µg/L	7439921	4.0 (L)	(G,X)							
Magnesium	µg/L	7439954	400000	NA							
Manganese	µg/L	7439965	50 (E)	(G,X)							
Mercury	µg/L	7439976	2.0 (A)	0.0013							
Nickel	µg/L	7440020	100 (A)	(G)							
Potassium	µg/L	7440097									
Selenium	µg/L	7782492	50 (A)	5							
Silver	µg/L	7440224	34	0.2 (M); 0.06							
Sodium	µg/L	7440235									
Thallium	µg/L	7440280	2.0 (A)	3.7 (X)							
Vanadium	µg/L	7440622	4.5	27							
Zinc	µg/L	7440666	2400	(G)							

TABLE 3-2
Groundwater Analytical Results
Allied Landfill Groundwater Investigation, Kalamazoo, Michigan

Chemical Name	Units	CAS	Michigan Cleanup Criteria Requirements for Response Activity* Residential Drinking Water	Michigan Cleanup Criteria Requirements for Response Activity* GSI	Trip Blank 10/15/2014 E53R7	Trip Blank 10/16/2014 E53T3	Trip Blank 10/16/2014 E53T4	Trip Blank 10/16/2014 E53T5	Trip Blank 10/16/2014 E53T6	Trip Blank 10/16/2014 E53T7	Trip Blank 10/16/2014 E53T8
Semi-Volatile Organic Compounds (SVOCs)											
1,1'-Biphenyl	µg/L	92524									
1,2,4,5-Tetrachlorobenzene	µg/L	95943	1,300 (S)	2.9 (X)							
2,2'-Oxybis(1-chloropropane)	µg/L	108601									
2,3,4,6-Tetrachlorophenol	µg/L	58902									
2,4,5-Trichlorophenol	µg/L	95954	730	NA							
2,4,6-Trichlorophenol	µg/L	88062	120	5							
2,4-Dichlorophenol	µg/L	120832	73	11							
2,4-Dimethylphenol	µg/L	105679	370	380							
2,4-Dinitrophenol	µg/L	51285									
2,4-Dinitrotoluene	µg/L	121142	7.7	NA							
2,6-Dinitrotoluene	µg/L	606202									
2-Chloronaphthalene	µg/L	91587	1800	NA							
2-Chlorophenol	µg/L	95578	45	18							
2-Methylnaphthalene	µg/L	91576	260	19							
2-Methylphenol	µg/L	95487	370 (J)	30 (J)							
2-Nitroaniline	µg/L	88744									
2-Nitrophenol	µg/L	88755	20	ID							
3,3'-Dichlorobenzidine	µg/L	91941	1.1	0.3 (M); 0.2							
3-Nitroaniline	µg/L	99092									
4,6-Dinitro-2-methylphenol	µg/L	534521	20 (M); 2.6	NA							
4-Bromophenyl-phenylether	µg/L	101553									
4-Chloro-3-methylphenol	µg/L	59507	150	7.4							
4-Chloroaniline	µg/L	106478									
4-Chlorophenyl-phenylether	µg/L	7005723									
4-Methylphenol	µg/L	106445	370 (J)	30 (J)							
4-Nitroaniline	µg/L	100016									
4-Nitrophenol	µg/L	100027									
Acenaphthene	µg/L	83329	1300	38							
Acenaphthylene	µg/L	208968	52	ID							
Acetophenone	µg/L	98862	1500	ID							
Anthracene	µg/L	120127	43 (S)	ID							
Atrazine	µg/L	1912249	3.0 (A)	7.3							
Benzaldehyde	µg/L	100527									
Benzo(a)anthracene	µg/L	56553	2.1	ID							
Benzo(a)pyrene	µg/L	50328	5.0 (A)	ID							
Benzo(b)fluoranthene	µg/L	205992	1.5 (S,AA)	ID							
Benzo(g,h,i)perylene	µg/L	191242	1.0 (M); 0.26 (S)	ID							
Benzo(k)fluoranthene	µg/L	207089	1.0 (M); 0.8 (S)	NA							
Bis(2-chloroethoxy)methane	µg/L	111911									
Bis(2-chloroethyl)ether	µg/L	111444	2	1.0 (M); 0.79							
Bis(2-ethylhexyl)phthalate	µg/L	117817	6.0 (A)	25							
Butylbenzylphthalate	µg/L	85687	1200	67 (X)							
Caprolactam	µg/L	105602	5800	NA							
Carbazole	µg/L	86748	85	10 (M); 4.0							
Chrysene	µg/L	218019	1.6 (S)	ID							
Dibenzo(a,h)anthracene	µg/L	53703	2.0 (M); 0.21	ID							
Dibenzofuran	µg/L	132649	ID	4							
Diethylphthalate	µg/L	84662	5500	110							
Dimethylphthalate	µg/L	131113	73000	NA							
Di-n-butylphthalate	µg/L	84742	880	9.7							
Di-n-octylphthalate	µg/L	117840	130	ID							
Fluoranthene	µg/L	206440	210 (S)	1.6							
Fluorene	µg/L	86737	880	12							
Hexachlorobenzene	ug/L	118741	1.0 (A)	0.2 (M); 0.0003							
Hexachlorobutadiene	µg/L	87683	15	0.053							
Hexachlorocyclopentadiene	µg/L	77474	50 (A)	ID							
Hexachloroethane	µg/L	67721	7.3	6.7 (X)							
Indeno(1,2,3-cd)pyrene	µg/L	193395	2.0 (M); 0.022 (S)	ID							
Isophorone	µg/L	78591	770	1,300 (X)							
Naphthalene	µg/L	91203	520	11							
Nitrobenzene	µg/L	98953	3.4	180 (X)							
N-Nitroso-di-n-propylamine	µg/L	621647	5.0 (M); 0.19	NA							
N-Nitrosodiphenylamine	µg/L	86306	270	NA							
Pentachlorophenol	µg/L	87865	1.0 (A)	(G,X)							
Phenanthrene	µg/L	85018	52	2.0 (M); 1.4							
Phenol	µg/L	108952	4400	450							
Pyrene	µg/L	129000	140 (S)	ID							

TABLE 3-2
Groundwater Analytical Results
Allied Landfill Groundwater Investigation, Kalamazoo, Michigan

Chemical Name	Units	CAS	Michigan Cleanup Criteria Requirements for Response Activity* Residential Drinking Water	GSI	Trip Blank 10/15/2014 E53R7	Trip Blank 10/16/2014 E53T3	Trip Blank 10/16/2014 E53T4	Trip Blank 10/16/2014 E53T5	Trip Blank 10/16/2014 E53T6	Trip Blank 10/16/2014 E53T7	Trip Blank 10/16/2014 E53T8
Volatile Organic Compounds (VOCs)											
1,1,1-Trichloroethane	µg/L	71556	200 (A)	89	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,1,2,2-Tetrachloroethane	µg/L	79345	8.5	78 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,1,2-Trichloro-1,2,2-trifluoroethane	µg/L	76131	1.7E+5 (S)	32	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,1,2-Trichloroethane	µg/L	79005	5.0 (A)	330 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,1-Dichloroethane	µg/L	75343	880	740	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,1-Dichloroethene	µg/L	75354	7.0 (A)	130	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,2,3-Trichlorobenzene	µg/L	87616			0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,2,4-Trichlorobenzene	µg/L	120821	70 (A)	99 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dibromo-3-chloropropane	µg/L	96128	0.2 (A)	ID	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dibromoethane	µg/L	106934	0.05 (A)	5.7 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dichlorobenzene	µg/L	95501	600 (A)	13	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dichloroethane	µg/L	107062	5.0 (A)	360 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dichloropropane	µg/L	78875	5.0 (A)	230 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,3-Dichlorobenzene	µg/L	541731	6.6	28	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,4-Dichlorobenzene	µg/L	106467	75 (A)	17	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
2-Butanone	µg/L	78933	13000	2200	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2-Hexanone	µg/L	591786	1000	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
4-Methyl-2-pentanone	µg/L	108101	1800	ID	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Acetone	µg/L	67641	730	1700	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Benzene	µg/L	71432	5.0 (A)	200 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Bromochloromethane	µg/L	74975			0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Bromodichloromethane	µg/L	75274	80 (A,W)	ID	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Bromoform	µg/L	75252	80 (A,W)	ID	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Bromomethane	µg/L	74839	10	35	0.50 UJ	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Carbon disulfide	µg/L	75150	800	ID	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Carbon tetrachloride	µg/L	56235	5.0 (A)	45 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Chlorobenzene	µg/L	108907	100 (A)	25	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Chloroethane	µg/L	75003	430	1,100 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Chloroform	µg/L	67663	80 (A,W)	350	**5.0**	**4.4**	**4.2**	**3.8**	0.50 U	**4.1**	**4.2**
Chloromethane	µg/L	74873	260	ID	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
cis-1,2-Dichloroethene	µg/L	156592	70 (A)	620	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
cis-1,3-Dichloropropene	µg/L	10061015			0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Cyclohexane	µg/L	110827			0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Dibromochloromethane	µg/L	124481	80 (A,W)	ID	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Dichlorodifluoromethane	µg/L	75718	1700	ID	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Ethylbenzene	µg/L	100414	74 (E)	18	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Isopropylbenzene	µg/L	98828	800	28	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
m,p-Xylene	µg/L	179601231	280 (E)	41	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Methyl Acetate	µg/L	79209			0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Methyl tert-butyl ether	µg/L	1634044	40 (E)	7,100 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Methylcyclohexane	µg/L	108872			0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Methylene chloride	µg/L	75092	5.0 (A)	1,500 (X)	1.0 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
o-Xylene	µg/L	95476	280 (E)	41	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Styrene	µg/L	100425	100 (A)	80 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Tetrachloroethene	µg/L	127184	5.0 (A)	60 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Toluene	µg/L	108883	790 (E)	270	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
trans-1,2-Dichloroethene	µg/L	156605	100 (A)	1,500 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
trans-1,3-Dichloropropene	µg/L	10061026			0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Trichloroethene	µg/L	79016	5.0 (A)	200 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Trichlorofluoromethane	µg/L	75694	2600	NA	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Vinyl chloride	µg/L	75014	2.0 (A)	13 (X)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U

TABLE 3-2
Groundwater Analytical Results
Allied Landfill Groundwater Investigation, Kalamazoo, Michigan

Chemical Name	Units	CAS	Michigan Cleanup Criteria Requirements for Response Activity* Residential Drinking Water	Michigan Cleanup Criteria Requirements for Response Activity* GSI	Trip Blank 10/15/2014 E53R7	Trip Blank 10/16/2014 E53T3	Trip Blank 10/16/2014 E53T4	Trip Blank 10/16/2014 E53T5	Trip Blank 10/16/2014 E53T6	Trip Blank 10/16/2014 E53T7	Trip Blank 10/16/2014 E53T8

Notes:
* Formerly known as the Part 201 Generic Cleanup Criteria and Screening Levels, now found at Sections 299.1 to 299.50, which became effective on December 30, 2013.
Footnotes associated with the criteria are included at:
http://www.michigan.gov/deq/0,1607,7-135-3311_4109_9846_30022-251790--,00.html
Bold value indicates a detection
Highlighted value indicates an exceedance of Michigan Residential Drinking Water Criteria
Highlighted value indicates an exceedance of Michigan Groundwater Surface Water Interface Criteria
GSI = groundwater surface water interface criteria
J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample
J+ = The result is an estimated quantity, but the result may be biased high
J- = The result is an estimated quantity, but the result may be biased low.
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit
UJ = The analyte was analyzed for, but not detected. The reported quantitation limit is approximate concentration of the analyte in the sample
µg/L = micrograms per liter

TABLE 3-3

Summary of 2014 Detections and Exceedances

Allied Landfill Groundwater Investigation, Kalamazoo, Michigan

Chemical Name	Units	Michigan Cleanup Criteria Requirements for Response Activity* Residential Drinking Water	GSI	Maximum Detection (µg/L)	Detection Frequency	2014 Exceedance Frequency		FS Exceedance Frequency		FS and 2014 Exceedance RPD
PCBs										
Aroclors	µg/L	0.5 (A)	0.2 (M); 2.6E-5	0.17 J	1 / 32	0 / 32	0%	46 / 403	11%	200%
Metals										
Aluminum	µg/L	50 (V)	NA	136	14 / 32	3 / 32	9%	5 / 72	7%	30%
Arsenic	µg/L	10 (A)	10	233	27 / 32	10 / 32	31%	23 / 72	32%	2%
Barium	µg/L	2,000 (A)	(G)	773	32 / 32	0 / 32	0%	4 / 72	6%	200%
Cadmium	µg/L	5.0 (A)	(G,X)	1.5	3 / 32	0 / 32	0%	0 / 72	0%	0%
Calcium	µg/L			222,000	32 / 32	No Drinking Water or GSI Criteria				
Chromium	µg/L	100 (A)	11	31	15 / 32	2 / 32	6%	1 / 72	1%	127%
Cobalt	µg/L	40	100	1.9 J+	6 / 32	0 / 32	0%	0 / 72	0%	0%
Copper	µg/L	1,000 (E)	(G)	3.8	14 / 32	0 / 32	0%	0 / 72	0%	0%
Iron	µg/L	300 (E)	NA	51,900	32 / 32	31 / 32	97%	64 / 72	89%	9%
Lead	µg/L	4.0 (L)	(G,X)	17.4	8 / 32	2 / 32	6%	1 / 72	1%	127%
Magnesium	µg/L	400000	NA	52,600	32 / 32	0 / 32	0%	0 / 72	0%	0%
Manganese	µg/L	50 (E)	(G,X)	1320	32 / 32	28 / 32	88%	66 / 72	92%	5%
Mercury	µg/L	2.0 (A)	0.0013	0.072 J	2 / 32	0 / 32	0%	0 / 72	0%	0%
Nickel	µg/L	100 (A)	(G)	59.2	23 / 32	0 / 32	0%	4 / 72	6%	200%
Potassium	µg/L			11,500	32 / 32	No Drinking Water or GSI Criteria				
Selenium	µg/L	50 (A)	5	0.84 J	14 / 32	0 / 32	0%	0 / 72	0%	0%
Sodium	µg/L			132,000	32 / 32	No Drinking Water or GSI Criteria				
Zinc	µg/L	2400	(G)	2340	20 / 32	0 / 32	0%	7 / 72	10%	200%
Semi-Volatile Organic Compounds										
2,3,4,6-Tetrachlorophenol	µg/L			1.1 J	1 / 32	No Drinking Water or GSI Criteria				
Acenaphthene	µg/L	1300	38	0.85 J	1 / 32	0 / 32	0%	0%		0%
Bis(2-ethylhexyl)phthalate	µg/L	6.0 (A)	25	3.1 J	1 / 32	0 / 32	0%	0%		0%
Caprolactam	µg/L	5800	NA	0.71 J	1 / 32	0 / 32	0%	0%		0%
Di-n-butylphthalate	µg/L	880	9.7	2.1 J	4 / 32	0 / 32	0%	0%		0%
Pentachlorophenol	µg/L	1.0 (A)	(G,X)	1.7 J	1 / 32	1 / 32	3%	0%		100%
Volatile Organic Compounds										
Acetone	µg/L	730	1700	2.4 J	1 / 32	0 / 32	0%	0%		0%
Bromodichloromethane	µg/L	80 (A,W)	ID	0.77	1 / 32	0 / 32	0%	0%		0%
Chlorobenzene	µg/L	100 (A)	25	0.68	1 / 32	0 / 32	0%	0%		0%
cis-1,2-Dichloroethene	µg/L	70 (A)	620	1.7	1 / 32	0 / 32	0%	0%		0%
Cyclohexane	µg/L			0.28 J	1 / 32	No Drinking Water or GSI Criteria				
Dibromochloromethane	µg/L	80 (A,W)	ID	1.4	1 / 32	0 / 32	0%	0%		0%
Isopropylbenzene	µg/L	800	28	0.097 J	1 / 32	0 / 32	0%	0%		0%
Tetrachloroethene	µg/L	5.0 (A)	60 (X)	8.0	2 / 32	1 / 32	3%	0%		100%
Toluene	µg/L	790 (E)	270	0.27 J	1 / 32	0 / 32	0%	0%		0%
Trichloroethene	µg/L	5.0 (A)	200 (X)	1.1	3 / 32	0 / 32	0%	0%		0%

Notes:

* Formerly known as the Part 201 Generic Cleanup Criteria and Screening Levels, now found at Sections 299.1 to 299.50, effective on December 30, 2013. Footnotes associated with the criteria are included at: http://www.michigan.gov/deq/0,1607,7-135-3311_4109_9846_30022-251790--,00.html

FS = Feasibility Study - the exceedance frequency summarized in the *Feasibility Study Report: Allied Paper Landfill—Operable Unit 1, Allied Paper/Portage Creek/Kalamazoo River Site, City of Kalamazoo, Michigan.* (CH2M HILL 2013)

GSI = groundwater surface water interface criteria

J = Value is estimated

J+ = Value is estimated and may be biased high

RPD = Relative Percent Difference

µg/L = micrograms per liter

$$RPD = \frac{(X_1 - X_2) \times 100}{(X_1 + X_2) \div 2}$$

TABLE 3-4

Analytical Results Provided by City of Kalamazoo

Allied Landfill Groundwater Investigation, Kalamazoo, Michigan

		Michigan Cleanup Criteria Requirements for Response Activity*		MW-7	MW-7I	MW-7D	MW-8	MW-8D	MW-16B	MW-16I	MW-16D	MW-40S	MW-40	MW-40D
Analyte	**Units**	**Residential Drinking Water**	**GSI**	10/14/14	10/14/14	10/14/14	10/14/14	10/15/14	10/14/14	10/14/14	10/15/14	10/14/14	10/14/14	10/15/14
Dioxane	µg/L	85	2,500	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07
Fluoride	mg/L	2 (E)	-	0.16	0.36	0.20	0.17	0.29	0.18	0.20	0.44	0.16	0.17	0.21
Hexametaphosphate	mg/L	-	-	0.20	0.30	0.22	0.17	0.29	0.22	0.18	0.21	0.18	0.17	0.23
Trihalomethanes														
1,1,1,2-Tetrachloroethane	µg/L	77	ID	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	µg/L	200 (A)	89	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,2,2-Tetrachloroethane	µg/L	8.5	78 (X)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,2-Trichloroethane	µg/L	5.0 (A)	330 (X)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethane	µg/L	880	740	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethene	µg/L	7.0 (A)	130	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1-Dichloropropene	µg/L			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2,3-Trichlorobenzene	µg/L			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2,3-Trichloropropane	µg/L	42	NA	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2,4-Trichlorobenzene	µg/L	70 (A)	99 (X)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2,4-Trimethylbenzene	µg/L	63 (E)	17	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dibromo-3-chloropropane	µg/L	0.2 (A)	ID	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichlorobenzene	µg/L	600 (A)	13	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloroethane	µg/L	5.0 (A)	360 (X)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	µg/L	5.0 (A)	230 (X)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,3,5-Trimethylbenzene	µg/L	72 (E)	45	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	µg/L	6.6	28	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,3-Dichloropropane	µg/L			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	µg/L	75 (A)	17	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,2-Dichloropropane	µg/L			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2-Chlorotoluene	µg/L	150	ID	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4-Chlorotoluene	µg/L			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzene	µg/L	5.0 (A)	200 (X)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromobenzene	µg/L	18	NA	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromochloromethane	µg/L			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromodichloromethane	µg/L	80 (A,W)	ID	<0.5	**0.8**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoform	µg/L	80 (A,W)	ID	<0.5	**0.9**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromomethane	µg/L	10	35	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Carbon tetrachloride	µg/L	5.0 (A)	45 (X)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorobenzene	µg/L	100 (A)	25	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroethane	µg/L	430	1100 (X)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroform	µg/L	80 (A,W)	350	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloromethane	µg/L	260	ID	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cis-1,2-Dichloroethene	µg/L	70 (A)	620	<0.5	<0.5	<0.5	**1.7**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cis-1,3-Dichloropropene	µg/L	8.5	9.0 (X)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	µg/L	80 (A,W)	ID	<0.5	**1.5**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromomethane	µg/L	80	NA	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dichlorodifluoromethane	µg/L	1,700	ID	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	µg/L	74 (E)	18	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylene dibromide	µg/L	0.05 (A)	5.7 (X)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Hexachlorobutadiene by 524.2	µg/L	15	0.053	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Isopropylbenzene	µg/L	800	28	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
M-and/or p-xylene	µg/L	280 (E)	41	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Methylene chloride	µg/L	5.0 (A)	1,500 (X)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
N-Butylbenzene	µg/L	80	ID	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
N-Propylbenzene	µg/L	80	ID	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	µg/L	520	11	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

TABLE 3-4

Analytical Results Provided by City of Kalamazoo

Allied Landfill Groundwater Investigation, Kalamazoo, Michigan

		Michigan Cleanup Criteria Requirements for Response Activity*		MW-7	MW-7I	MW-7D	MW-8	MW-8D	MW-16B	MW-16I	MW-16D	MW-40S	MW-40	MW-40D
Analyte	**Units**	**Residential Drinking Water**	**GSI**	10/14/14	10/14/14	10/14/14	10/14/14	10/15/14	10/14/14	10/14/14	10/15/14	10/14/14	10/14/14	10/15/14
O-Xylene	µg/L	280 (E)	41	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
P-Isopropyltoluene	µg/L			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Sec-Butylbenzene	µg/L	80	ID	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Styrene	µg/L	100 (A)	80 (X)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Tert-Butylbenzene	µg/L	80	ID	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Tetrachloroethene	µg/L	5.0 (A)	60 (X)	<0.5	<0.5	<0.5	**8.4**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	µg/L	790 (E)	270	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trans-1,2-Dichloroethene	µg/L	100 (A)	1,500 (X)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trans-1,3-Dichloropropene	µg/L			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trichloroethene	µg/L	5.0 (A)	200 (X)	<0.5	<0.5	<0.5	**0.7**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane	µg/L	2600	NA	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Vinyl chloride	µg/L	2.0 (A)	13 (X)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

Notes:

* Formerly known as the Part 201 Generic (Highlighted value indicates an exceedance of Michigan Part 201 Residential Drinking Water criteria

http://www.michigan.gov/deq/0,1607,7-135-3311_4109_9846_30022-251790--,00.html

Bold value indicates a detection

Highlighted value indicates an exceedance of Michigan Residential Drinking Water Criteria

GSI = groundwater surface water interface criteria

ID = insufficient data to develop criteria

NA = not applicable

µg/L = micrograms per liter

< = The analyte was analyzed for, but was not detected above the reported sample quantitation limit

TABLE 3-5

City of Kalamazoo Detections and Screening Level Exceedances and U.S. EPA Data for the Same Sample

Allied Landfill Groundwater Investigation, Kalamazoo, Michigan

Analyte	Units	Michigan Cleanup Criteria Requirements for Response Activity* Residential Drinking Water		MW-7I 10/14/14		MW-8 10/14/14	
				City Detections	EPA value for City-Detected compound	City Detections	EPA value for City-detected compound
Fluoride	mg/L	2 (E)	-	0.36	Not analyzed	0.17	Not analyzed
Hexametaphosphate	mg/L	-	-	0.30	Not analyzed	0.17	Not analyzed
Trihalomethanes							
Bromodichloromethane	µg/L	80 (A,W)	ID	**0.8**	**0.77**		
Bromoform	µg/L	80 (A,W)	ID	**0.9**	0.50U		
Cis-1,2-Dichloroethene	µg/L	70 (A)	620			**1.7**	**1.7**
Dibromochloromethane	µg/L	80 (A,W)	ID	**1.5**	**1.4**		
Tetrachloroethene	µg/L	5.0 (A)	60 (X)			**8.4**	**8.0**
Trichloroethene	µg/L	5.0 (A)	200 (X)			**0.7**	**0.43J**

Notes:

Only City of Kalamazoo detections are shown - U.S. EPA data is then provided in the adjacent column for comparison

* Formerly known as the Part 201 Generic (Highlighted value indicates an exceedance of Michigan Residential Drinking Water criteria that can be found at:

http://www.michigan.gov/deq/0,1607,7-135-3311_4109_9846_30022-251790--,00.html

Bold value indicates a detection

Highlighted value indicates an exceedance of Michigan Residential Drinking Water Criteria

GSI = groundwater surface water interface criteria

ID = insufficient data to develop criteria

NA = not applicable

µg/L = micrograms per liter

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample

TABLE 3-6

Investigation Derived Waste—Soil Waste Characterization Analytical Results

Allied Landfill Groundwater Investigation, Kalamazoo, Michigan

Analyte	Units	IDW-Roll Off 10/17/2014 15CA01-01	IDW-Drums 10/17/2014 15CA01-02
TCLP Metals			
Arsenic	µg/L	200 U	200 U
Barium	µg/L	174	404
Cadmium	µg/L	50.0 U	50.0 U
Chromium	µg/L	100 U	100 U
Lead	µg/L	100 U	100 U
Selenium	µg/L	350 U	350 U
Silver	µg/L	100 U	100 U
Mercury	µg/L	0.5 U	0.5 U
TCLP SVOCs			
2,4,5-Trichlorophenol	µg/L	9.6 U	9.4 U
2,4,6-Trichlorophenol	µg/L	9.6 U	9.4 U
2,4-Dinitrotoluene	µg/L	9.6 U	9.4 U
2-Methylphenol	µg/L	9.6 U	9.4 U
3 & 4-Methylphenol	µg/L	96 U	94 U
Hexachlorobenzene	µg/L	9.6 U	9.4 U
Hexachlorobutadiene	µg/L	48 U	47 U
Hexachloroethane	µg/L	9.6 U	9.4 U
Nitrobenzene	µg/L	9.6 U	9.4 U
Pentachlorophenol	µg/L	48 U	47 U
Pyridine	µg/L	9.6 U	9.4 U
PCBs			
PCB-1016	µg/kg dry	116 U	121 U
PCB-1221	µg/kg dry	116 U	121 U
PCB-1232	µg/kg dry	116 U	121 U
PCB-1242	µg/kg dry	116 U	419
PCB-1248	µg/kg dry	116 U	121 U
PCB-1254	µg/kg dry	116 U	121 U
PCB-1260	µg/kg dry	116 U	121 U
PCB-1262	µg/kg dry	116 U	121 U
PCB-1268	µg/kg dry	116 U	121 U

Notes:

TCLP = toxicity characteristic leaching procedure

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit

µg/kg = micrograms per kilogram

µg/L = micrograms per liter

TABLE 3-7

Investigation Derived Waste—Water Characterization Analytical Results

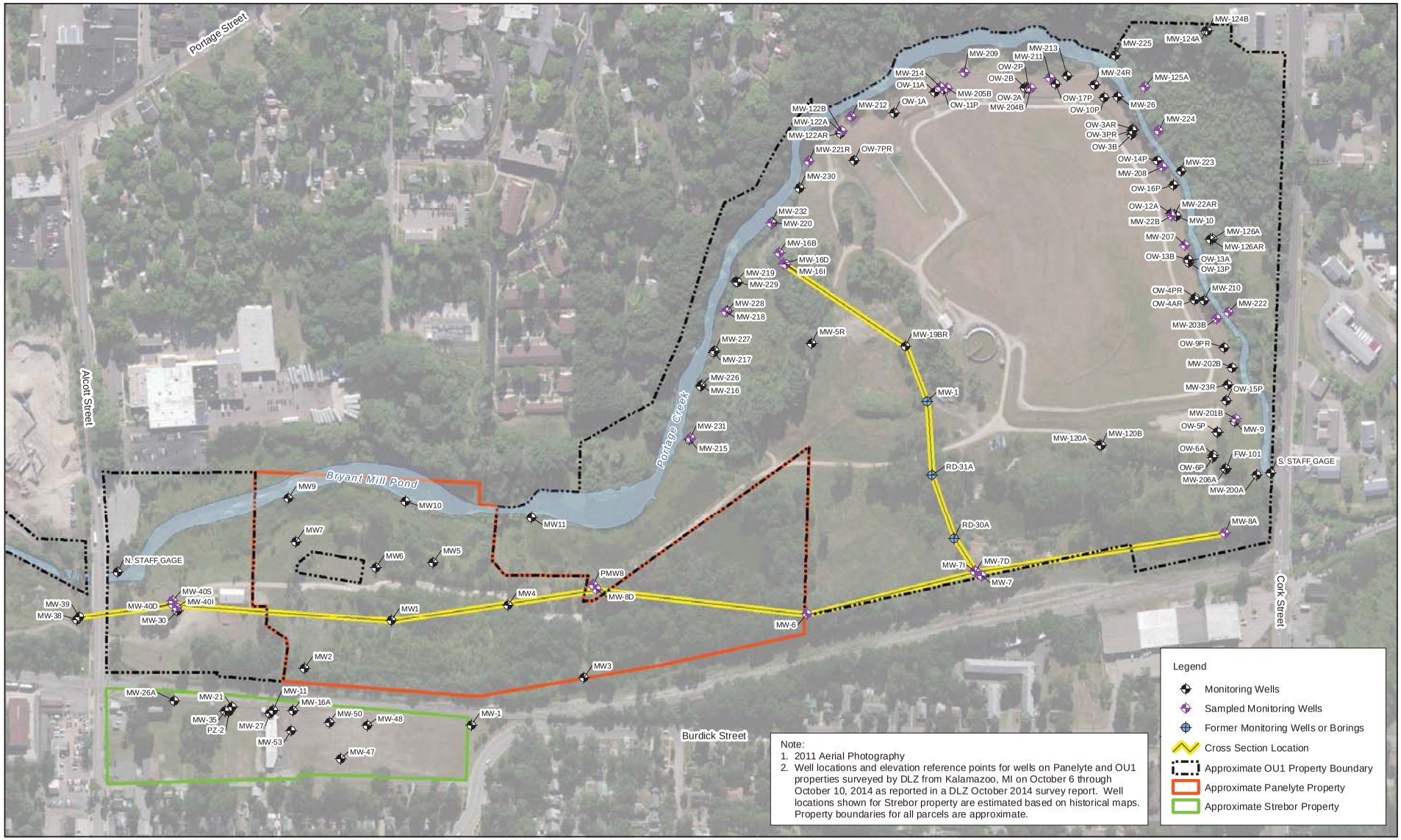
Allied Landfill Groundwater Investigation, Kalamazoo, Michigan

Analyte	Units	IDW-Frac Tank (Filtered) 10/17/2014 15CA01-03	IDW-Frac Tank (Unfiltered) 10/17/2014 15CA01-04
PCB-1016	µg/L	0.962 U	0.980 U
PCB-1221	µg/L	0.962 U	0.980 U
PCB-1232	µg/L	0.962 U	0.980 U
PCB-1242	µg/L	0.962 U	0.980 U
PCB-1248	µg/L	0.962 U	0.980 U
PCB-1254	µg/L	0.962 U	0.980 U
PCB-1260	µg/L	0.962 U	0.980 U
PCB-1262	µg/L	0.962 U	0.980 U
PCB-1268	µg/L	0.962 U	0.980 U

Notes:

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit

µg/L = micrograms per liter



N

0 300 600
Feet

Figure 3-1
Cross Section Location Map
2014 Groundwater Report
Allied Landfill
Kalamazoo, Michigan

CH2MHILL

MKE \\LAKEFRONT\PROJ\EPA\ALLIEDPAPER_KALAMAZOOM\MAPFILES\GWREPORT2014\FIGURE 03-01 - CROSS SECTION LOCATION MAP.MXD JHANSEN1 1/30/2015 1:49:37 PM

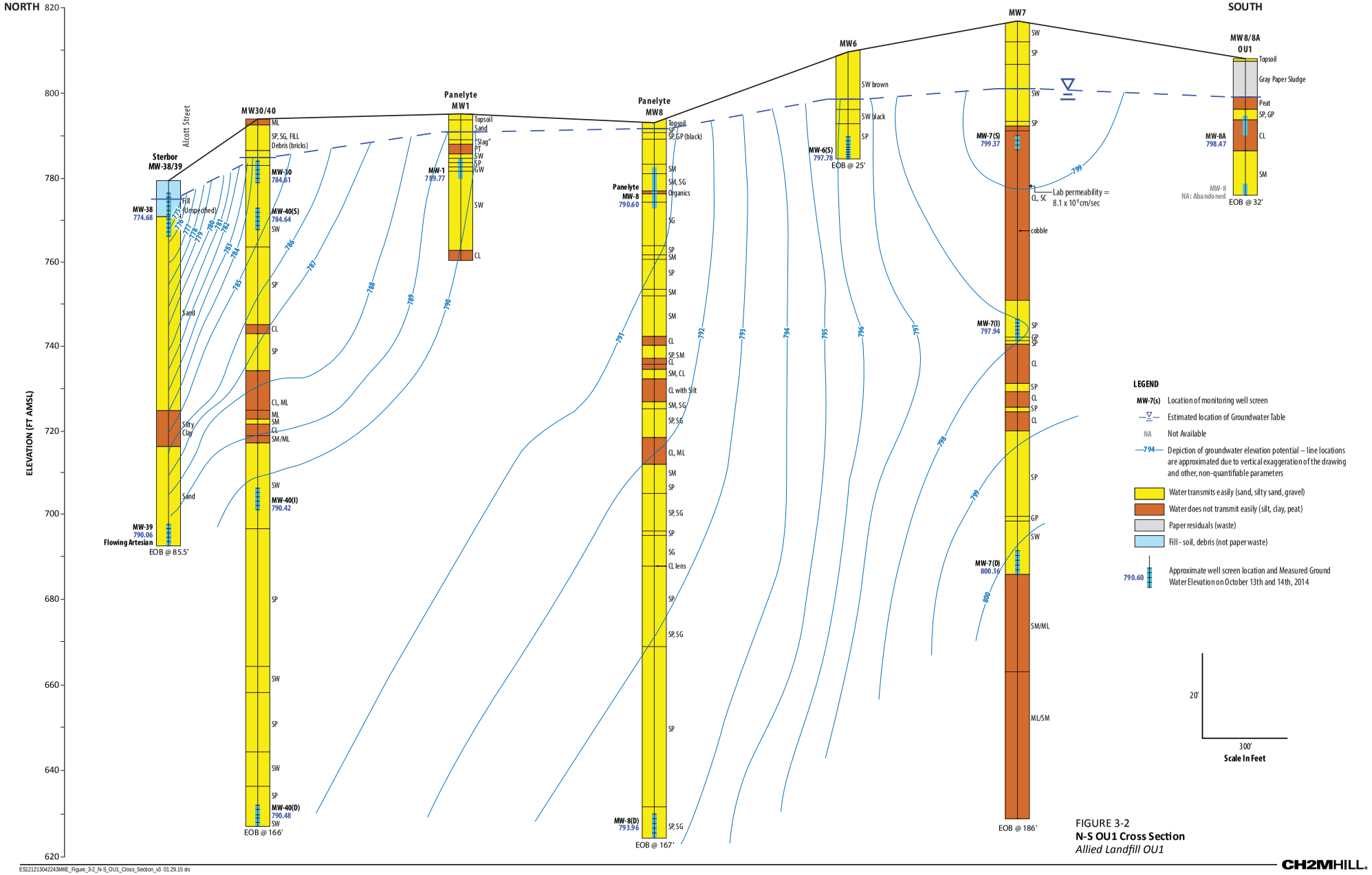
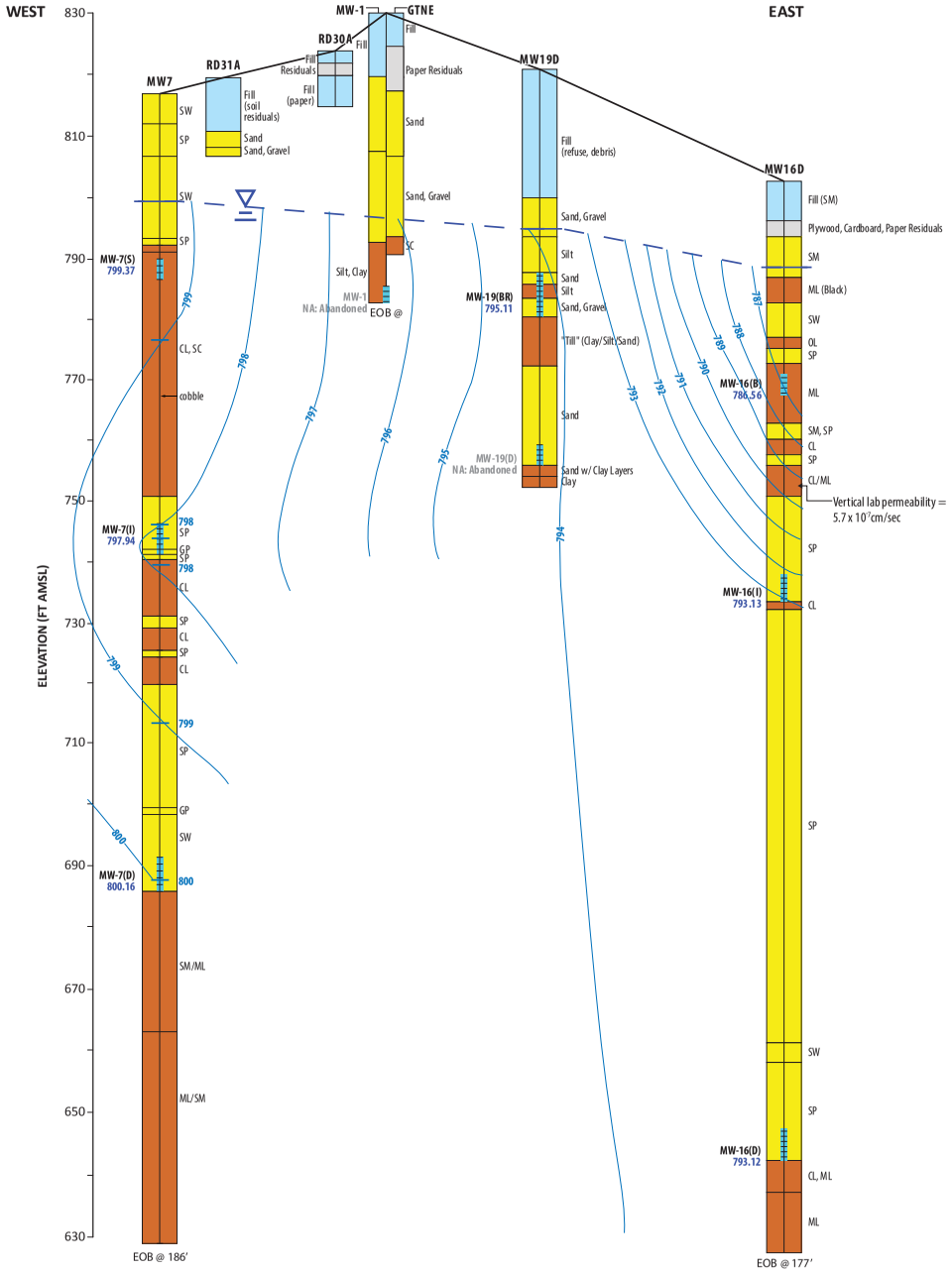


FIGURE 3-2
N-S OU1 Cross Section
Allied Landfill OU1

ES121213042243MKE_Figure_3-2_N-S_OU1_Cross_Section_v3 01.29.15 sls

CH2MHILL.



LEGEND

MW-7(s)	Location of monitoring well screen
	Estimated location of Groundwater Table
NA	Not Available
—794—	Depiction of groundwater elevation potential – line locations are approximated due to vertical exaggeration of the drawing and other, non-quantifiable parameters
	Water transmits easily (sand, silty sand, gravel)
	Water does not transmit easily (silt, clay, peat)
	Paper residuals (waste)
	Fill - soil, debris (not paper waste)
790.60	Approximate well screen location and Measured Ground Water Elevation on October 13th and 14th, 2014

20'

300'

Scale In Feet

FIGURE 3-3
W-E OU1 Cross Section
Allied Landfill OU1

CH2MHILL.

ES121213042243MKE Figure_3-3_W-E_OU1_Cross_Section_v2 01.28.15 sls

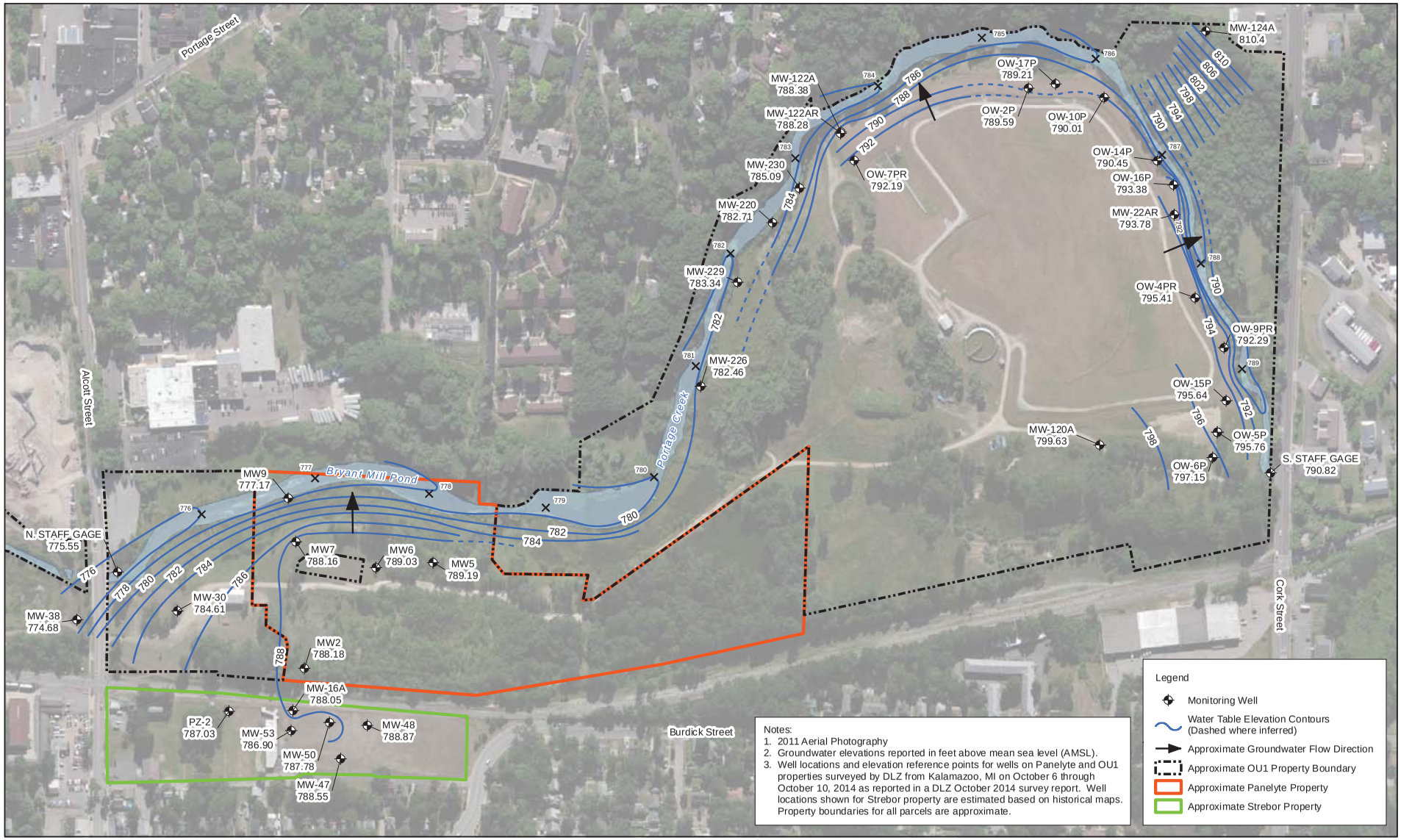
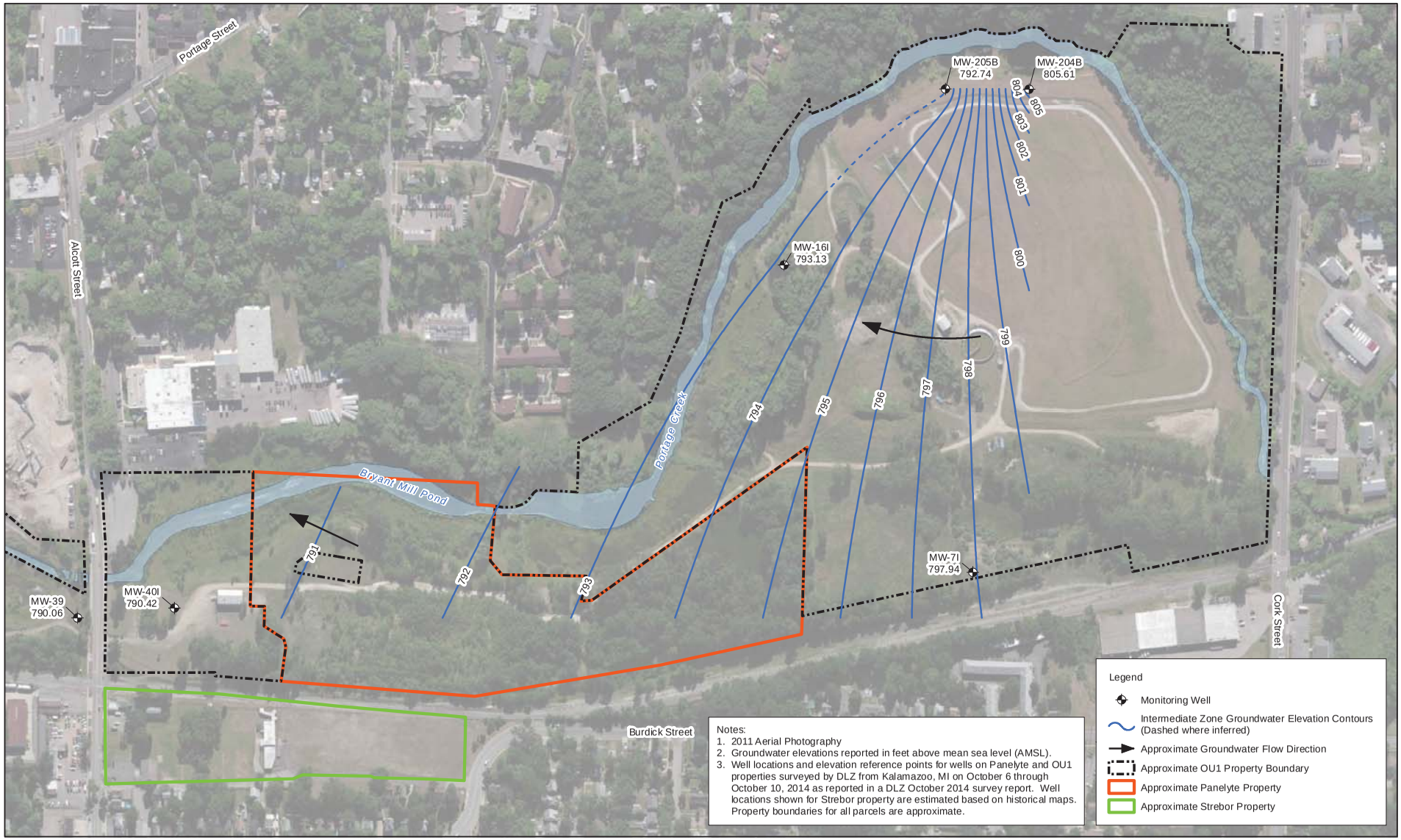


Figure 3-4
Water Table Groundwater Elevation Contours - October 2014
2014 Groundwater Report
Allied Landfill
Kalamazoo, Michigan

CH2MHILL

MKE \\LAKEFRONT\PROJ\EPA\ALLIEDPAPER_KALAMAZOOMI\MAPFILES\GWREPORT2014\FIGURE 03-04 - WATER TABLE GW ELEV CONTOURS OCTOBER 2014.MXD JHANSEN1 1/30/2015 1:51:28 PM



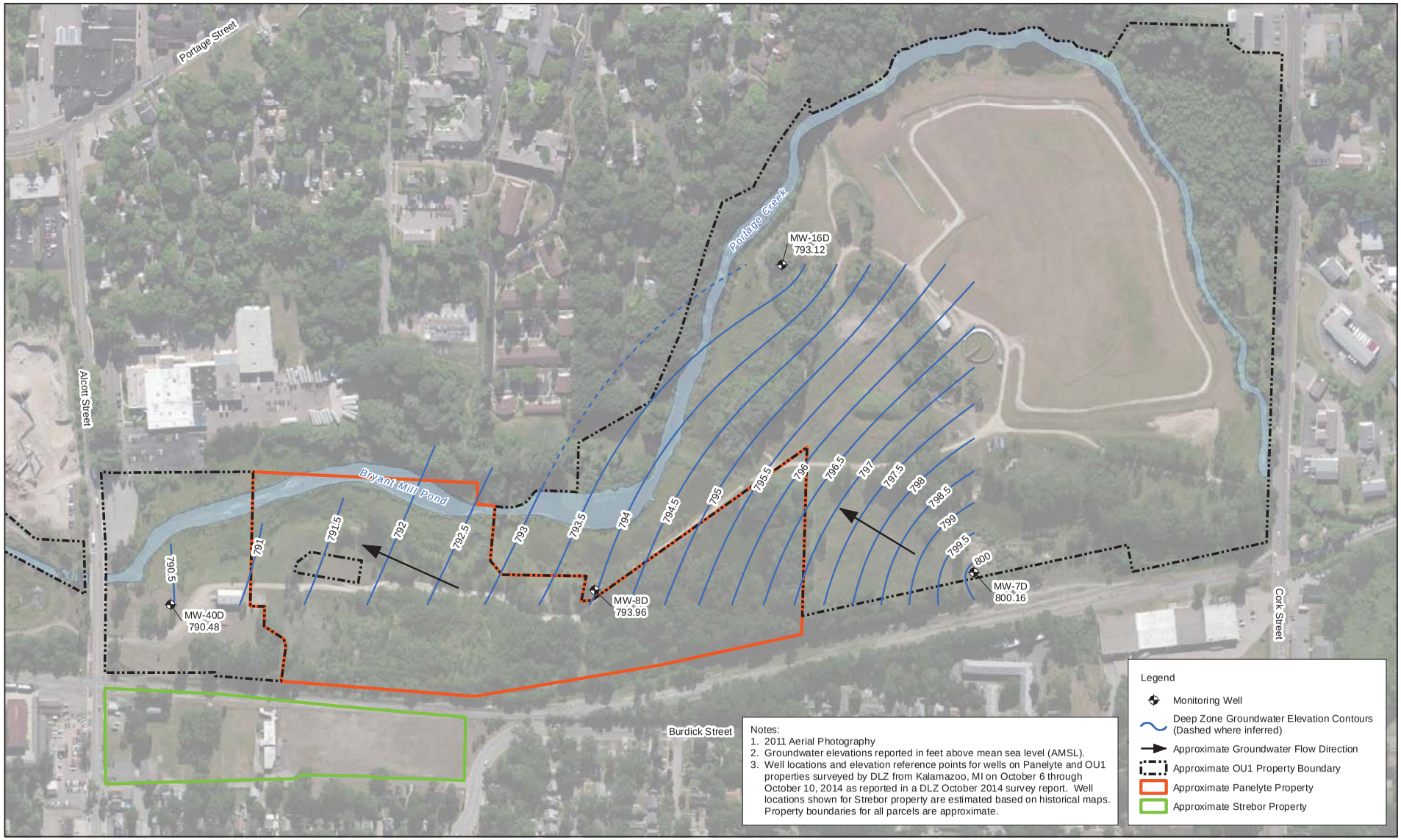
N

0 300 600
Feet

Figure 3-5
Intermediate Zone Groundwater Elevation Contours - October 2014
2014 Groundwater Report
Allied Landfill
Kalamazoo, Michigan

CH2MHILL

MKE \\LAKEFRONT\PROJ\EPA\ALLIEDPAPER_KALAMAZOOMI\MAPFILES\GWREPORT2014\FIGURE 03-05 - INTERM ZONE GW ELEV CONTOURS OCTOBER 2014.MXD JHANSEN1 1/30/2015 2:14:05 PM



N

0 300 600
Feet

Figure 3-6
Deep Zone Groundwater Elevation Contours - October 2014
2014 Groundwater Report
Allied Landfill
Kalamazoo, Michigan

CH2MHILL

MKE \\LAKEFRONT\PROJ\EPA\ALLIEDPAPER_KALAMAZOOMI\MAPFILES\GWREPORT2014\FIGURE 03-06 - DEEP ZONE GW ELEV CONTOURS OCTOBER 2014.MXD JHANSEN1 1/30/2015 2:31:52 PM

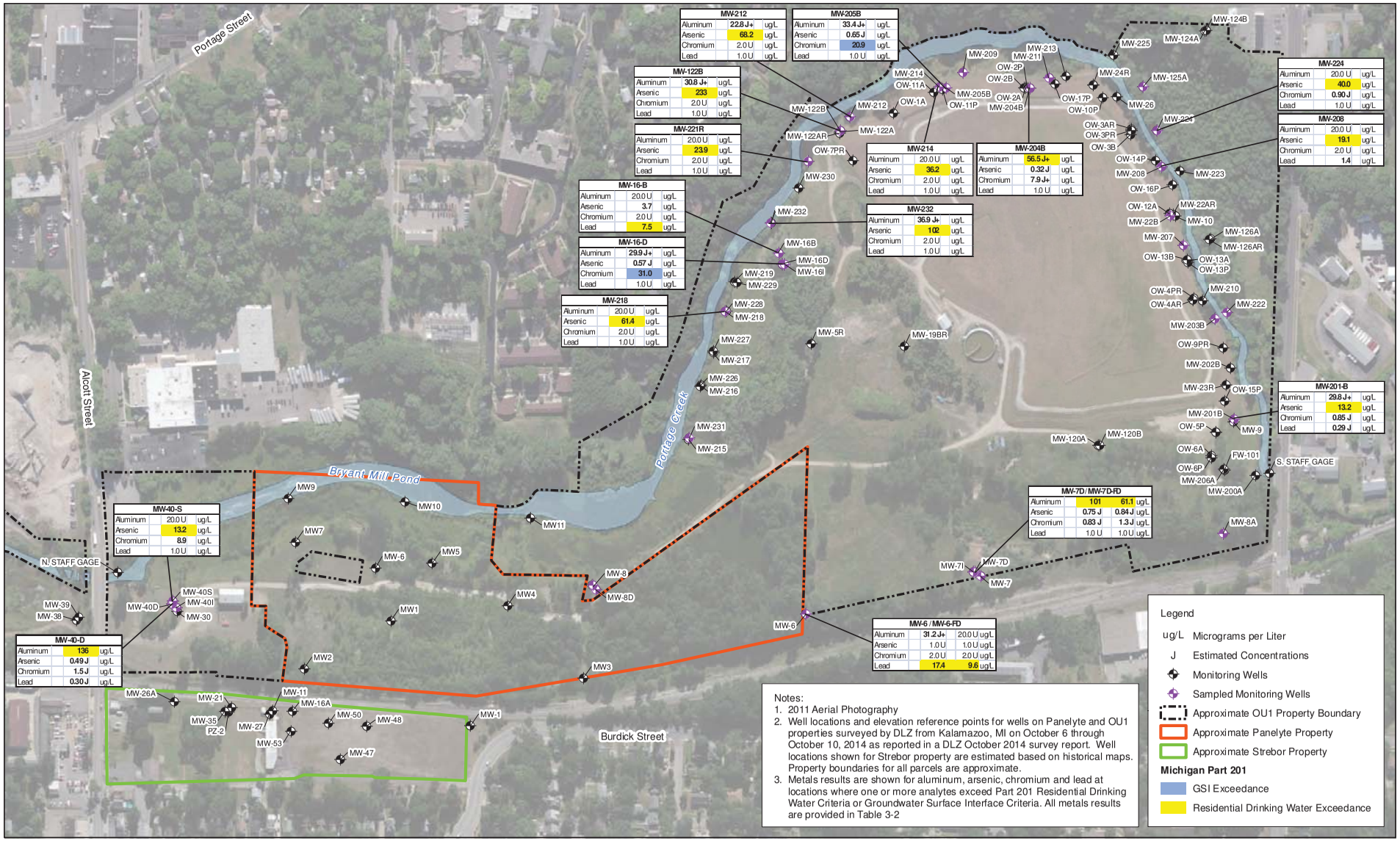
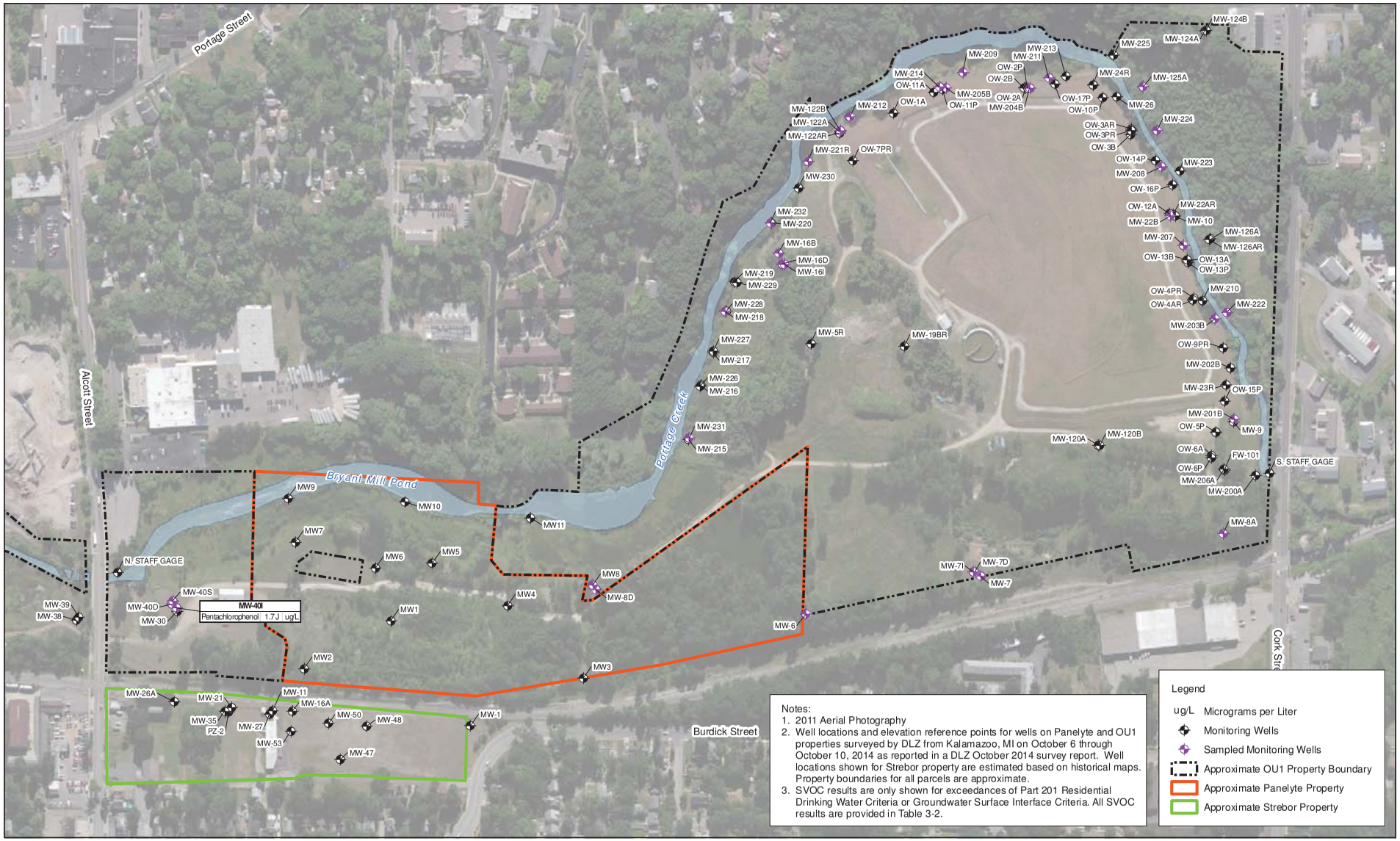


Figure 3-7
Metal Concentrations Exceeding Michigan Groundwater Screening Levels
2014 Groundwater Report
Allied Landfill
Kalamazoo, Michigan

CH2MHILL

MKE \\LAKEFRONT\PROJ\EPA\ALLIEDPAPER_KALAMAZOOMI\MAPFILES\GWREPORT2014\FIGURE 03-07 - METAL CONC EXCEEDING MI GW SCREENING LEVELS.MXD JHANSEN1 1/30/2015 3:12:54 PM

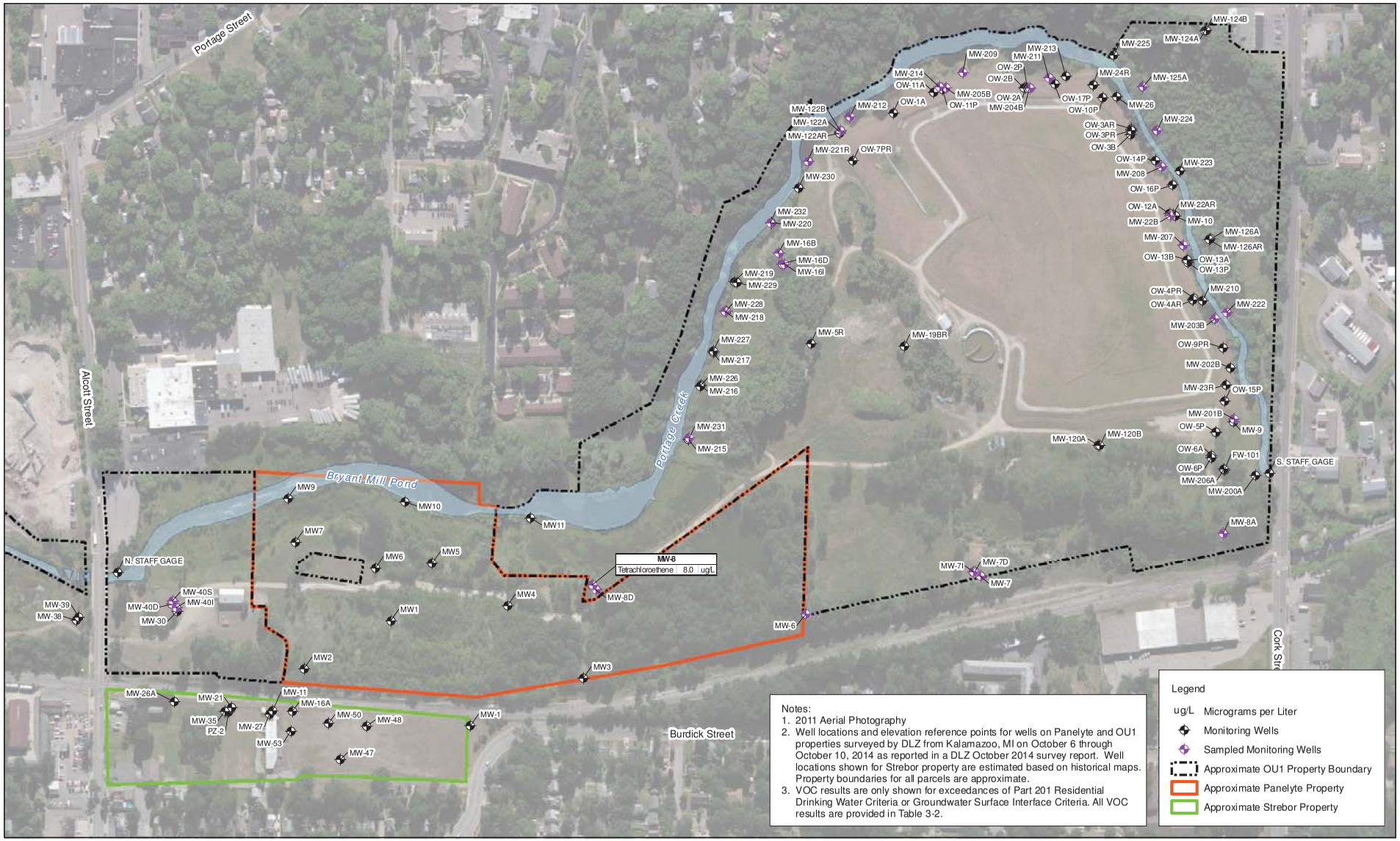


Notes:
1. 2011 Aerial Photography
2. Well locations and elevation reference points for wells on Panelyte and OU1 properties surveyed by DLZ from Kalamazoo, MI on October 6 through October 10, 2014 as reported in a DLZ October 2014 survey report. Well locations shown for Strebor property are estimated based on historical maps. Property boundaries for all parcels are approximate.
3. SVOC results are only shown for exceedances of Part 201 Residential Drinking Water Criteria or Groundwater Surface Interface Criteria. All SVOC results are provided in Table 3-2.

Figure 3-8
SVOC Concentrations Exceeding Michigan Groundwater Screening Levels
2014 Groundwater Report
Allied Landfill
Kalamazoo, Michigan

CH2MHILL

MKE \\LAKEFRONT\PROJ\EPA\ALLIEDPAPER_KALAMAZOOMI\MAPFILES\GWREPORT2014\FIGURE 03-08 - SVOC CONC EXCEEDING MI GW SCREENING LEVELS.MXD JHANSEN1 1/30/2015 4:47:53 PM



Notes:
1. 2011 Aerial Photography
2. Well locations and elevation reference points for wells on Panelyte and OU1 properties surveyed by DLZ from Kalamazoo, MI on October 6 through October 10, 2014 as reported in a DLZ October 2014 survey report. Well locations shown for Strebor property are estimated based on historical maps. Property boundaries for all parcels are approximate.
3. VOC results are only shown for exceedances of Part 201 Residential Drinking Water Criteria or Groundwater Surface Interface Criteria. All VOC results are provided in Table 3-2.

Figure 3-9
VOC Concentrations Exceeding Michigan Groundwater Screening Levels
2014 Groundwater Report
Allied Landfill
Kalamazoo, Michigan

CH2MHILL

MKE \\LAKEFRONT\PROJ\EPA\ALLIEDPAPER_KALAMAZOOMI\MAPFILES\GWREPORT2014\FIGURE 03-09 - VOC CONC EXCEEDING MI GW SCREENING LEVELS.MXD JHANSEN1 1/30/2015 3:28:18 PM

SECTION 4

Conceptual Site Model Update

In 2009, a supplemental groundwater investigation was performed to evaluate geologic and hydrogeologic conditions at or near OU1 to address the City's concern that shallow groundwater at OU1 could pose a risk to City Well Fields 3 and 7 (Arcadis 2009). City groundwater modelling results for the wellhead protection plan reportedly indicated OU1 was within the 5-year groundwater time of travel zone from the vicinity of City Well Fields 3 and 7 (north of OU1). The nearest City drinking water/extraction well is approximately 2,200 feet north of the extreme northwest boundary (near Alcott Street) of OU1.

The groundwater flow direction in the uppermost/shallow unconsolidated aquifer generally follows the land surface topography and drainage. As the land surface slopes toward Portage Creek, so does the groundwater surface until it nears the creek and eventually discharges into the creek (MDEQ 2008; Arcadis 2009). The groundwater flow direction within the deeper unconsolidated materials, in which City wells are screened, is described as having a northern flow direction.

The following section describes the findings of the 2014 groundwater investigation as they relate to the CSM and the potential for offsite transport of groundwater contamination.

4.1 Geologic and Hydrogeologic Setting

4.1.1 Regional Geology

OU1 is located in a geologic region of unconsolidated glacial deposits consisting of outwash (deposited in streams from glacial meltwater) and river alluvium associated with Portage Creek (Farrand and Bell 1982). The outwash and alluvium is described in the geological literature as consisting of alternating layers of variable grain sizes, from small gravel to heavy cobbles. The layers occur as terraces deposited along former glacial meltwater streams and the present day creek (the present floodplain) as fan- and sheet-shaped units. Glacial streams often cascaded across relatively high topographical features, such as end-moraines (material pushed together as a ridge at the end of glacial ice), and/or emptied into larger water bodies, such as glacial lakes (meltwater dammed up because of the presence of end-moraines or ice blocks), to form fan-shaped deposits similar to present-day deltas.

The unconsolidated deposits in OU1 vicinity vary from approximately 200 to 400 feet thick. The gravelly or sandy deposits that are present have characteristics that allow subsurface water (groundwater) to move through it. The unconsolidated deposits that can transmit water are typically referred to as "aquifers". Material that does not transmit water, such as clayey or silty deposits, are referred to as "aquitards" (limited water flow) or "aquicludes" (no water flow). Taken as a whole, the unconsolidated glacial aquifer materials beneath the OU1 consist of interbedded aquifers, aquitards, and aquicludes throughout its depth (Western Michigan University 1981).

The depiction of the 2009 understanding of the regional geologic units, as part of the physical characteristics of the CSM, is shown on Figure 4-1 (Arcadis 2009). The geological units shown at the City's well fields, where the deepest information is available, indicate the presence of relatively consistent materials that form continuous horizontal layers. A more detailed and a larger variety of layers is shown beneath and adjacent to OU1, again in a more or less horizontal layering fashion (Figure 4-2). However, the presence of a consistent clay or silt aquitard or aquiclude beneath OU1 is not apparent. The 2014 soil boring data were plotted onto a version of Figure 4-1 because it was produced in the field to accommodate discussions between EPA, MDEQ, and the City as to the placement of well screens. Additional details on this process are included in Appendix B.

The 2014 soil log information was used to refine the information from 2009, using the 2009 soil unit coloring and description scheme as much as possible, as shown on Figure 4-2. Information from 2014 provided additional and deeper detail beneath and adjacent to OU1. The resultant layers depicted on Figure 4-2 are

not continuous among the boring locations across the studied area and do not appear to form regionally defined shallow, intermediate, or deep layers or aquifers.

The geologic information shown on Figure 4-2 was simplified for Figure 4-3 using a category scheme denoting mainly two types of soil materials: those that are relatively permeable and allow for groundwater flow and those that are not. Former landfill paper waste residuals and fill units also are noted on Figure 4-3 near the ground surface. The simplified view shown on Figure 4-3 still implies consistent, continuous layering at the City's Millwood Well Field on the south and east (right side of Figure 4-3), and at City Well Fields 3 and 7 on the north (left side of Figure 4-3), but the presence of a continuous aquitard or aquiclude layer(s) beneath OU1 is not evident, confirming statements of the 2009 report (Arcadis 2009).

4.1.2 Groundwater Flow

As outlined in Section 3.1, horizontal groundwater flow directions established using October 2014 water elevation data confirmed 2009 groundwater flow direction data for the shallow and deeper zones. The flow directions can be generally stated as the following:

- Water table flow direction is toward Portage Creek.
- Flow directions in the intermediate and deeper zones are toward the north-northeast.

The 2009 summary report also measured and established the presence of upward vertical groundwater gradients across the studied area. A groundwater gradient is a mathematical calculation that compares the water level pressure reading at more than one depth. An upward vertical gradient results from a higher water level measured at depth in comparison to the water level measured in shallow material. Because water flows from regions of higher water levels (and associated pressures) to lower water levels, an upward gradient indicates that potential groundwater flow would be upward, not downward—water would not flow in a direction opposite to the measured water level/pressure gradient—thus, downward groundwater flow or transport of contamination present in the groundwater is precluded. Groundwater elevation data from 2014 confirmed the prevalence of upward vertical gradients from the deeper aquifer across OU1. Upward vertical gradients were confirmed at most locations from the intermediate to shallow zones with the exception of the upgradient MW-7 well nest.

4.2 Contaminant Fate and Transport

PCBs were detected in one 2014 groundwater sample at a concentration below the residential drinking water and GSI SLs. No PCB concentrations exceeded SLs. Although PCBs have been historically present or detected in shallow groundwater collected and analyzed from wells immediately adjacent to former waste disposal areas at OU1, PCBs are hydrophobic (not readily dissolved in water but preferentially attach to soil particles), and do not transport easily within groundwater systems. The 2014 groundwater sampling and analysis supports the PCB fate and transport data with a single low-level detection in a well screened beneath soil with residuals.

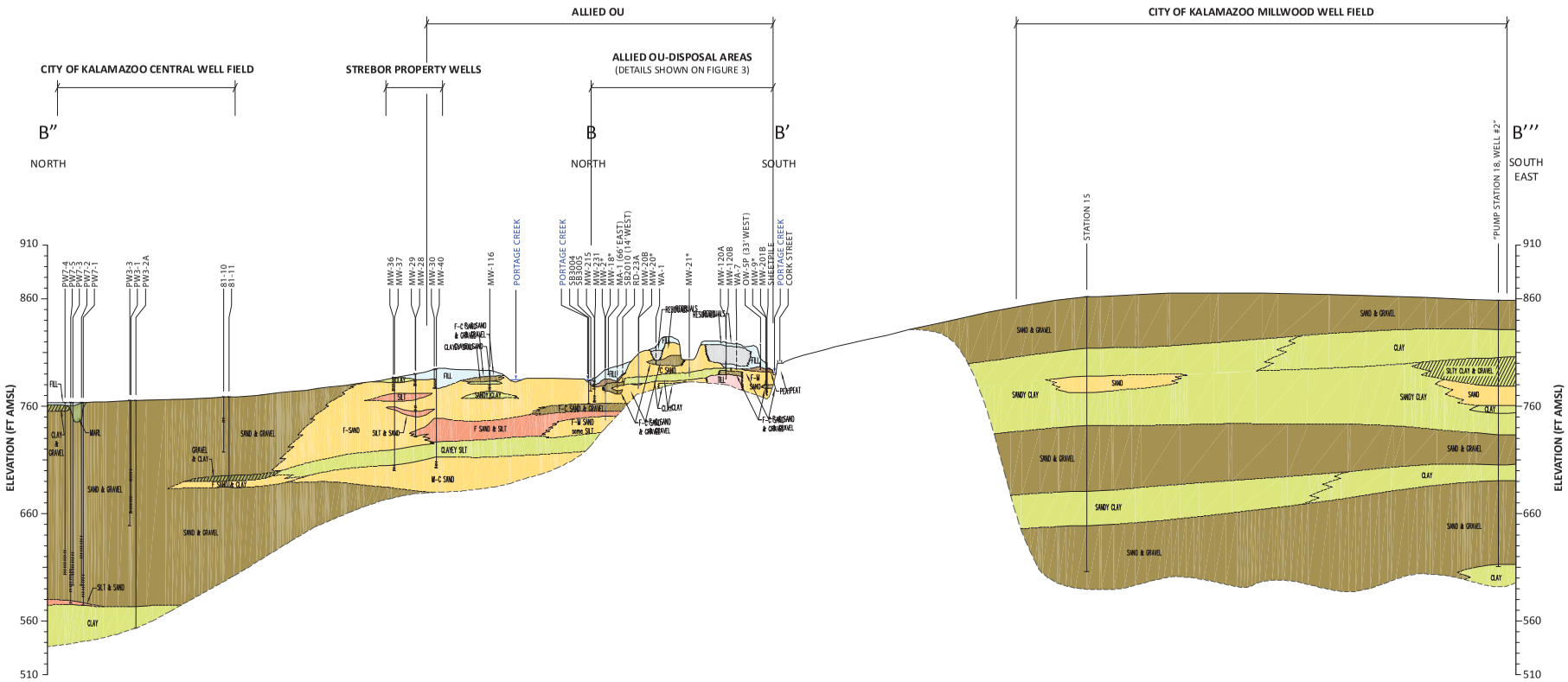
4.3 Groundwater Contaminant Exposure Pathways

MDEQ completed a *Site-wide Final (Revised) Human Health Risk Assessment* (Camp Dresser & McKee 2003) (HHRA) for the entire site, which includes:

- OU1: Allied Paper Landfill
- OU2: Willow Boulevard/A Site Landfill
- OU3: King Highway Landfill
- OU4: 12th Street Landfill
- OU5: Kalamazoo River and Portage Creek

The HHRA quantitatively assessed potential risks to human health through exposure to media impacted with PCBs. The primary exposure pathway related to groundwater at OU1 is from potential ingestion of or direct contact with groundwater impacted with site-related contaminants. In 2014, PCBs were only detected in

one groundwater sample collected at OU1 and was from a well screened near waste material. This concentration was below drinking water and GSI SLs. Wells screened downgradient from waste material did not have any detections of PCBs.



- FILL: Consists chiefly of a heterogeneous mixture of sand and silt with variable amounts of gravel and occasional discontinous intervals of reworked peat. May contain trace amounts of residuals.
- RESIDUALS: Residuals may contain thin layers of sand or other fill.
- SAND AND GRAVEL: Interbedded sand and gravels, may contain small amounts of silt and clay.
- MARL: Unconsolidated deposits of clay and calcium carbonate.
- PEAT: Deposits of post-glacial age consisting of peat or organic-rich silt or clay.
- SAND: Predominant grain size of sand shown as fine [f], medium [m], or coarse [c]. May contain small amounts of clay, silt, or gravel.
- CLAY: Clay may contain small amounts of f-c sand and silt.
- SILT: Silt may contain small amounts of f-c sand and clay.
- TILL: A generally hard deposit with little or no sorting and consisting chiefly of f sand, silt, and/or clay in varying proportions, with lesser amounts of m-c sand and gravel. May contain occasional, discontinous lenses of silt, sand, and/or gravel.
- GRAVEL AND CLAY
- ALTERNATING LAYERS: Sand, silty sand, gravelley sand, clay (0.5'-2' thick)

Figure from 2009 Supplemental Groundwater Report (Arcadis, 2009 - Figure 1-3) .

LEGEND:

- NOT CONTINUOUSLY SAMPLED. SAMPLED AT 5 FOOT INTERVALS.
- DISTANCE AND DIRECTION FROM WHICH BORING/WELL IS PROJECTED ONTO SECTION LINE (IF GREATER THAN 10 FEET)
- BORING/WELL ID
- SOIL BORING
- MONITORING WELL
- SCREENED INTERVAL
- BOTTOM OF BORING

? = LIMITS OF UNITS(S) UNKNOWN

NOTES:

1. SURFACE ELEVATIONS FROM TOPOGRAPHIC MAPPING BY LOCKWOOD MAPPING, INC., AND MONITORING WELL/BORING SURVEY DATA.
2. AMSL = ABOVE MEAN SEA LEVEL (NGVD OF 1929).

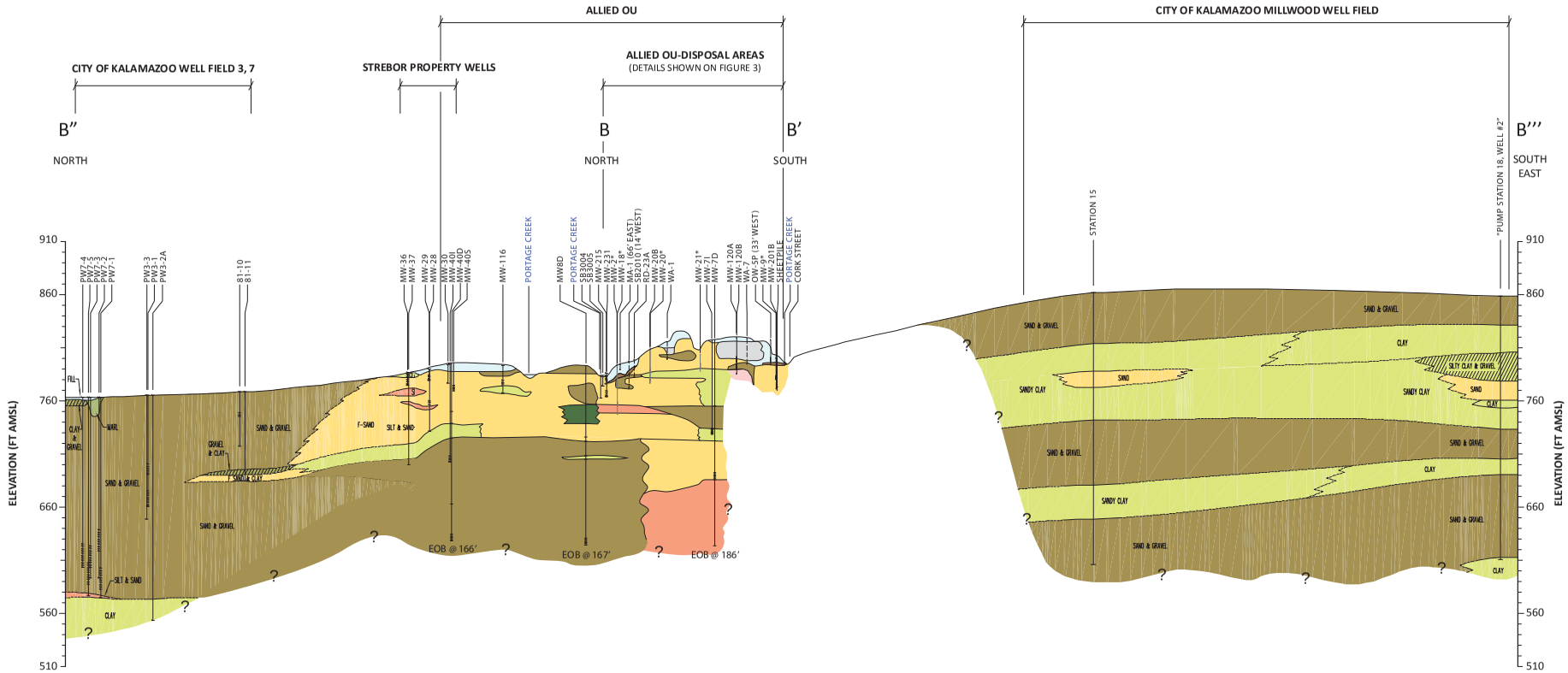
0 — 100' VERTICAL SCALE

0 — 600' — 1200' HORIZONTAL SCALE

FIGURE 4-1
2009 – Regional Geologic Cross Section
Allied Landfill OU1

CH2MHILL

ES121213042243MKE_Figure_4-1_2009_Cross_Section_B-B_v1 01.29.15 sls



- FILL: Consists chiefly of a heterogeneous mixture of sand and silt with variable amounts of gravel and occasional discontinous intervals of reworked peat. May contain trace amounts of residuals.
- RESIDUALS: Residuals may contain thin layers of sand or other fill.
- SAND AND GRAVEL: Interbedded sand and gravels, may contain small amounts of silt and clay.
- MARL: Unconsolidated deposits of clay and calcium carbonate.
- PEAT: Deposits of post-glacial age consisting of peat or organic-rich silt or clay.
- SAND: Predominant grain size of sand shown as fine [f], medium [m], or coarse [c]. May contain small amounts of clay, silt, or gravel.
- CLAY: Clay may contain small amounts of f-c sand and silt.
- SILT: Silt may contain small amounts of f-c sand and clay.
- TILL: A generally hard deposit with little or no sorting and consisting chiefly of f sand, silt, and/or clay in varying proportions, with lesser amounts of m-c sand and gravel. May contain occasional, discontinous lenses of silt, sand, and/or gravel.
- GRAVEL AND CLAY
- ALTERNATING LAYERS: Sand, silty sand, gravelley sand, clay (0.5'-2' thick)

Adapted from 2009 Supplemental Groundwater Report (Arcadis 2009 - Figure 1-3) and modified with U.S. EPA field information obtained Sept/Oct 2014.

LEGEND:

- NOT CONTINUOUSLY SAMPLED. SAMPLED AT 5 FOOT INTERVALS.
- DISTANCE AND DIRECTION FROM WHICH BORING/WELL IS PROJECTED ONTO SECTION LINE (IF GREATER THAN 10 FEET)
- BORING/WELL ID
- SOIL BORING
- MONITORING WELL
- SCREENED INTERVAL
- BOTTOM OF BORING

? = LIMITS OF UNITS(S) UNKNOWN

NOTES:

1. SURFACE ELEVATIONS FROM TOPOGRAPHIC MAPPING BY LOCKWOOD MAPPING, INC., AND MONITORING WELL/BORING SURVEY DATA.
2. AMSL = ABOVE MEAN SEA LEVEL (NGVD OF 1929).

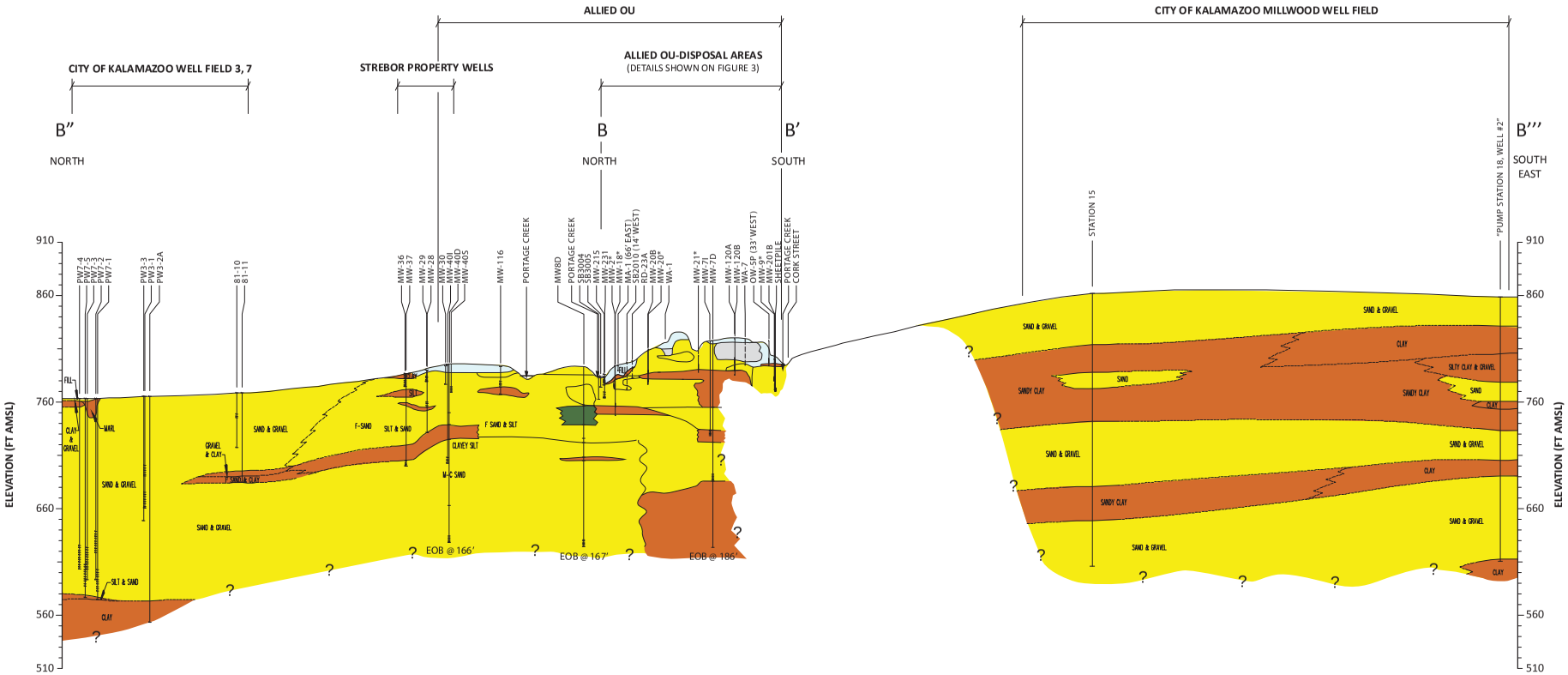
0 — 100' VERTICAL SCALE

0 — 600' — 1200' HORIZONTAL SCALE

FIGURE 4-2
2014 – Regional Geologic Cross Section
Allied Landfill OU1

CH2MHILL.

ES121213042243MKE_Figure_4-2_Cross_Section_B-B_v7 01.29.15 sls



FILL: Consists chiefly of a heterogeneous mixture of sand and silt with variable amounts of gravel and occasional discontinous intervals of reworked peat. May contain trace amounts of residuals.

RESIDUALS: Residuals may contain thin layers of sand or other fill.

Silts and/or clays, organics (peat) – water not easily transmitted

Sands and/or gravel – water more easily transmitted

ALTERNATING LAYERS: Sand, silty sand, gravelley sand, clay (0.5'-2' thick)

LEGEND:

NOT CONTINUOUSLY SAMPLED. SAMPLED AT 5 FOOT INTERVALS.

DISTANCE AND DIRECTION FROM WHICH BORING/WELL IS PROJECTED ONTO SECTION LINE (IF GREATER THAN 10 FEET)

BORING/WELL ID

SOIL BORING

MONITORING WELL

SCREENED INTERVAL

BOTTOM OF BORING

? = LIMITS OF UNITS(S) UNKNOWN

NOTES:

1. SURFACE ELEVATIONS FROM TOPOGRAPHIC MAPPING BY LOCKWOOD MAPPING, INC., AND MONITORING WELL/BORING SURVEY DATA.
2. AMSL = ABOVE MEAN SEA LEVEL (NGVD OF 1929).

0 100'
VERTICAL SCALE

0 600' 1200'
HORIZONTAL SCALE

FIGURE 4-3
2014 – Simplified Geologic Cross Section
Allied Landfill OU1

Adapted from 2009 Supplemental Groundwater Report (Arcadis 2009 - Figure 1-3) and modified with U.S. EPA field information obtained Sept/Oct 2014, using a simplified color scheme.

ES1212130422243MKE_Figure_4-3_Simplified_Cross_Section_B-B_v79 01.29.15 sls

CH2MHILL

SECTION 5

Conclusions

Conclusions from the 2014 groundwater investigation at OU1 include:

- In general, the 2014 investigation supports the previous findings that PCBs are not migrating offsite in groundwater based on the following data:
  - There was a single PCB detection that was in a well screened immediately adjacent to waste material. PCBs were detected in 2014 in one groundwater sample (MW-8A). The well screen at MW-8A is located immediately below waste material. The detected concentration was below both the GSI and drinking water protection criteria.
  - No PCB detections were in wells screened below, but not immediately adjacent to, waste material. Based on boring logs, the majority of the wells in the 2014 groundwater sampling investigation were located outside the lateral extents of waste material; however, waste material was observed during drilling of the MW-16 well nest. PCBs were not detected in 2014 in the MW-16 well nest at any depth interval sampled.
  - There were no PCB detections in perimeter samples located outside the extents of waste material.
- The percentage of inorganics detected at concentrations exceeding SLs and/or background was comparable between the RI data set and the 2014 data.
- Based on the 2014 groundwater investigation data, no VOC groundwater exceedances were attributed to OU1.
  - The single PCE exceedance (MW-8) is believed to be related to the Panelyte property. PCE was a contaminant of concern at Panelyte, and the 2014 result was within the range of historical concentrations at the Panelyte property.
  - The lack of VOC exceedances from OU1 is consistent with the determination of contaminants of concern in the FS report (CH2M HILL 2013).
- Based on the 2014 groundwater investigation data, no SVOC groundwater exceedances were attributed to OU1.
  - The single PCP exceedance is believed to be related to the Strebor site because of the location in former Strebor well MW-40I. PCP was a contaminant of concern at Strebor and historically was detected in the same well.
  - The FS identified 4-methylphenol as the only SVOC contaminant of concern for OU1 and was based on soil exceedances (CH2M HILL 2013). There were no groundwater exceedances of 4-methylphenol in samples in either the RI or the 32 samples analyzed in 2014.
- The general groundwater flow directions established for the CSM were confirmed as:
  - Water table flow direction is toward Portage Creek.
  - Intermediate and deep zone flow directions are toward the north-northeast.
  - Vertical hydraulic groundwater gradients are predominantly upward across OU1 and at the neighboring properties, preventing downward groundwater flow to the deep zone. In an isolated instance (MW-7 well nest), a downward vertical gradient was present between the shallow and intermediate zones. However, groundwater flow to the deep zone was still prevented by an upward vertical gradient present between the intermediate and deep zones.

- Deeper soil type information (to an approximate elevation of 630 feet amsl) confirms the following CSM characteristics for unconsolidated soil deposits:
  - Alternating layers of permeable and less-permeable materials are present throughout each boring.
  - Soil layer types are not continuous in thickness or occurrence between each boring location.
  - A continuous clay or silt aquitard or aquiclude does not appear to be present beneath OU1.
- Silt and clay layers, where present, have a low permeability that impedes groundwater flow, as evidenced by geotechnical laboratory analysis (5.7×10^{-7} to 8.1×10^{-8} centimeters per second).
- A continuous aquitard or aquiclude is not present between shallow and deep zones at OU1; however, upward vertical gradients are present from the deeper regional aquifer. Based on existing data, a migration pathway beneath the central waste mass at OU1 and the downgradient City municipal wellfields is not currently apparent.
- The results from the 2014 investigation represent the current groundwater conditions. An LTM network should be developed with state and local agencies for continued monitoring if EPA selects a remedy that includes a waste in-place component. The development of the LTM network and monitoring program would consider monitoring locations, both laterally and vertically, and analytes to be included.

SECTION 6

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Appendix A
Technical Memorandum: Reconnaissance Activities and Documentation

Allied Landfill Site Reconnaissance Activities and Documentation
Allied Paper, Inc./Portage Creek/Kalamazoo River OU1
WA No. 109-RICO-059B/Contract No. EP-S5-06-01

PREPARED FOR:	USEPA Region 5
PREPARED BY:	CH2M HILL
DATE:	January 30, 2015
PROJECT NUMBER:	419665.FI.01

Introduction

This technical memorandum (TM) summarizes site activities and findings for the June 2014 site reconnaissance performed by CH2M HILL at the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site Operable Unit No. 1 (OU1) Allied Landfill (site) in Kalamazoo, Michigan. This TM also serves to finalize the sampling locations for the 2014 groundwater investigation at the Site.

The site reconnaissance was performed for the areas/properties (Figure 1) located on or near the site, identified as: Allied Landfill (OU1), Monarch Landfill (OU1), Panelyte property, Strebor property, and the Performance Paper property. There is also a small portion of OU1 located north of the Allied Landfill property along Alcott St. Existing wells identified at all areas were accessible, but most Performance Paper wells and many Panelyte wells shown on the property maps were not found. Water level information for Strebor wells located on both the Strebor and Performance Paper properties was provided to CH2M HILL by Strebor for inclusion in the evaluation.

Objectives

The site reconnaissance involved three parts:

- Locate and identify existing wells, measure depth to water and bottom of well, collect global positioning system (GPS) coordinates, note the general condition of the protective casing and well casing, and photograph the location.
- Determine if the proposed locations for the new deep and intermediate monitoring wells (MW-40D, MW-7I, MW-7D, and MW-8D) are suitable for drilling using a rotosonic rig.
- Identify a drilling location for a proposed deep and intermediate well along Portage Creek, beyond the northern limit of the sheet pile wall, generally located near MW-16B (Figure 1).

Site Activities

The site reconnaissance was performed June 17 through June 19, 2014. Jeff Keiser, Amanda Swisher, and Andrew Walter of CH2M HILL arrived onsite the morning of June 17. CH2M HILL met with Ann Gilchrist of Tetra Tech for a safety briefing and update of current site conditions. CH2M HILL then toured the site by vehicle. After the vehicle tour, Swisher and Walter performed the site reconnaissance, beginning with the assessment of the existing wells, followed by evaluation/confirmation of proposed deep and intermediate monitoring well locations.

On June 19, CH2M HILL was joined by NTH Consultants staff, acting as a representative for the City of Kalamazoo, to continue the evaluation of the existing monitoring wells. After assessing the condition of wells at the Monarch Landfill, John Paquin, from the City of Kalamazoo, arrived to observe the proposed locations for deep and intermediate wells.

Summary of Findings

The following subsections include a summary of the field observations by area, based on the findings of the site reconnaissance performed June 17 to 19, 2014.

Allied Landfill

A total of 84 wells and piezometers were identified at the Allied Landfill. The Allied wells were in good condition, with the following exceptions:

- Concrete surface seals at many of the wells are eroded and those with square steel risers are no longer rigid (unsecure).
- Multiple wells have intact concrete surface seals that are completely heaved off of the ground surface.
- Well MW-26 was completely concealed by overgrowth, but was located with significant effort.
- Wells OW-5P and OW-11A were slanted approximately 15 and 5 degrees, respectively, off vertical and are not considered to be appropriate for groundwater sampling or groundwater elevation collection.
- Although in good condition, wells along the downgradient side of the sheet pile wall (between Portage Creek and the sheet pile wall) had groundwater levels indicating artesian conditions. Water levels in the wells were measured to be above the elevation of the ground surface, at or near the top of casing.

Detailed observations are shown in Attachment A, Table A-1.

Monarch Landfill

A total of 9 wells were identified at the Monarch Landfill. Some wells located in Monarch are very remote and hard to access. Wells are in good condition, with the exception of MW-223, which does not have a protective casing.

Panelyte Property

A total of 12 wells were found at the Panelyte property: 11 were identified by historical records (MW-1 through MW-11) and 1 unidentified well was found approximately 150 feet south of MW-3. The Panelyte wells are in good condition, with the following exceptions:

- All wells were missing locks.
- Well MW-10 has a square steel casing and a 2-inch polyvinyl chloride (PVC) riser. A steel cap and unknown length of steel pipe was found inside the PVC riser (Attachment C, Figure 80). The steel pipe and cap could not be removed; therefore, depth to water and bottom measurements were not collected and the well is not available for future groundwater elevation measurement.

Detailed observations are shown in Attachment A, Table A-2.

Strebor Wells

Two former Strebor wells, MW-30 and MW-40, are located within the Allied site boundary in the northernmost portion of OU1 (Figure 1) and were accessible. Ownership of the wells was previously conveyed to the Lyondell Trust and the wells are in good condition. Detailed observations are shown in Attachment A, Table A-2.

The Strebor contractor, Bay West, collected water level data for Strebor wells on June 19 and provided the data electronically to CH2M HILL. The depth to water measurements and well construction information provided by Strebor is included in Attachment A, Table A-3.

Performance Paper Property

No wells were located at the Performance Paper property, with the exception of a Strebor well nest (MW-38 and MW-39) located within the Performance Paper site boundary. The area north of the Illinois Envelope

building (Figure 1) appears to be recently graded and it is assumed that the wells were abandoned during grading activities. Existing conditions are shown in Attachment C, Figures 84-87.

Recommendations

The following subsections include recommendations for the groundwater investigation, based on the findings of the site reconnaissance performed June 17 through 19.

Proposed Intermediate or Deep Boring/Well Locations

The proposed location for deep well MW-40D (to be paired with existing Strebor well MW-40 on OU1 property) is located approximately 100 yards south of the Alcott Street entrance. The area is flat, and can be considered an unpaved parking area. No obstructions are anticipated for the proposed location (Attachment C, Figure 88).

The proposed location for MW-8S and MW-8D are in a relatively flat grassy area about 100 feet west of the gravel road, near the existing Panelyte well MW-8. The proposed location is located uphill of the marshy area adjacent to Portage Creek, and should support a drill rig (Attachment C, Figure 90).

The proposed location for MW-7D and MW-7I is located along the western boundary of the site. Although the proposed location is a substantial distance west of the gravel access road, there is an established two-track path to the location. The last 100 yards will be navigated off the path on firm, relatively flat ground (Attachment C, Figure 89).

The locations for the deep boring location along Portage Creek were investigated (Attachment B1, identified on the draft figure as MW-300I and MW-300D). The marshy flat area adjacent to Portage Creek was deemed to be unsuitable for drilling for two reasons. First, the area is inaccessible due to steep terrain leading to the marshy area. Second, the ground surface is soft, with areas of standing water, and will not likely support the weight of a rig that is capable of drilling the deep borehole.

The recommended location for the deep and possible intermediate well is near existing well MW-16B, located on a flat area of high ground northwest of the end of the sheet pile wall. The area is accessible from the access roads and has adequate space for drilling activities, as shown in Attachment C, Figure 91. The boring log for MW-16B indicated some residuals at depths from 0 to 17 feet below ground surface (bgs) and potential paper fibers from 24 to 29 feet bgs. The depth of the boring for MW-16B was 35 feet bgs. Although residuals were previously noted at MW-16B, the location is recommended due to the accessibility limitations for a truck-mounted rig, location near Portage Creek, and to provide effective triangulation with other deep wells. Isolation casing will be installed to an estimated depth of 40 feet bgs due to the previous indications of residuals (note small amounts of residuals are noted—no paper sludge material is noted). The wells previously identified as MW-300I and MW-300D will be paired with MW-16B and hereafter be referred to as MW-16I and MW-16D.

Well Redevelopment

There are 29 existing wells proposed for sampling by the U.S. Environmental Protection Agency. The 29 wells are recommended for redevelopment during the field investigation, prior to groundwater sampling. An additional 6 wells (4 Allied and 2 Panelyte) are recommended for redevelopment based on a measured variance of 1 foot or more between the measured depth to bottom and the bottom depth noted on the original well construction records. Table 1 and Figure 1 identify the wells for redevelopment.

Groundwater Evaluation Maps

Groundwater elevation maps were not constructed using June 2014 depth to water data because they would not be deemed accurate until a re-survey of the tops of the well casings (TOCs) can be performed. It is likely that the reference elevations for TOCs noted in historical documents are inaccurate based on the observed settlement and/or surface heave at wells. A survey will be performed to identify locational coordinates and TOC and ground surface elevations for each of the newly-installed wells and all remaining

wells at Allied and Monarch Landfills, and at the Panelyte property once drilling activities are complete. Wells designated for water level measurements are summarized in Table 1.

Attachments

Attachment A includes three summary tables. Table A-1 includes June 2014 field notes and measurements for the wells located within OU1, consisting of Allied and Monarch Landfill areas. Table A-2 includes June 2014 notes and measurements for wells located within the Panelyte, Strebor, or Performance Paper properties. Table A-3 includes water level measurements collected in June 2014 by the Strebor contractor.

Attachment B includes two figures with notations. Figure B-1 is the CH2M HILL map with well locations and IDs generated from available historical records. Figure B-2 is a map provided by Bay West of Strebor wells with an “X” over recently abandoned wells.

Attachment C is the photo log and photographs from the site reconnaissance. Photos of wells are alpha-numerically listed on the table (except where nested wells are shown in the same picture) by area, Allied (including Monarch), Panelyte, Strebor, and Performance Paper, followed by the proposed well locations and potential well locations.

Tables

TABLE 1
Summary of Activities to be Performed at Each Monitoring Well based on Reconaissance Activities, June 2014
Allied Landfill (OU1)

Site	Well Number	Water Level Measurement	Survey	Redevelop	Groundwater Sampling
Allied Landfill	FW-101	X	X		
	MW-5R	X	X	X	
	MW-6	X	X	X	X
	MW-7	X	X	X	X
	MW-7I	X	X	X [a]	X
	MW-7D	X	X	X [a]	X
	MW-8A	X	X	X	X
	MW-16B	X	X	X	X
	MW-16I	X	X	X [a]	X
	MW-16D	X	X	X [a]	X
	MW-19BR	X	X	X	
	MW-22AR	X	X	X	X
	MW-22B	X	X	X	X
	MW-23R	X	X		
	MW-26	X	X		
	MW-120A	X	X		
	MW-120B	X	X		
	MW-122A	X	X	X	
	MW-122AR	X	X	X	X
	MW-122B	X	X	X	X
	MW-124A	X	X		
	MW-124B	X	X	X	X
	MW-125A	X	X	X	X
	MW-126A	X	X		
	MW-24R	X	X		
	MW-126AR	X	X		
	MW-200A	X	X		
	MW-201B	X	X	X	X
	MW-202B	X	X		
	MW-203B	X	X	X	X
	MW-204B	X	X	X	X
	MW-205B	X	X	X	X
	MW-206A	X	X		
	MW-207	X	X	X	X
	MW-208	X	X	X	X
	MW-209	X	X	X	X
	MW-210	X	X		
	MW-211	X	X	X	X
	MW-212	X	X	X	X
	MW-213	X	X		
	MW-214	X	X	X	X
	MW-215	X	X		
	MW-216	X	X		
	MW-217	X	X		
	MW-218	X	X	X	X
	MW-219	X	X		
	MW-220	X	X		
	MW-221R	X	X	X	X
	MW-222	X	X	X	X
	MW-223	X	X	X	
	MW-224	X	X	X	X
	MW-225	X	X		
	MW-226	X	X		
	MW-227	X	X		
	MW-228	X	X		
	MW-229	X	X	X	
	MW-230	X	X		
	MW-231	X	X	X	X
	MW-232	X	X	X	X
	OW-1A	X	X		

TABLE 1
Summary of Activities to be Performed at Each Monitoring Well based on Reconaissance Activities, June 2014
Allied Landfill (OU1)

Site	Well Number	Water Level Measurement	Survey	Redevelop	Groundwater Sampling
	OW-1P	X	X		
	OW-2A	X	X		
	OW-2B	X	X		
	OW-2P	X	X		
	OW-3AR	X	X		
	OW-3PR	X	X		
	OW-4AR	X	X		
	OW-4PR	X	X		
	OW-6A	X	X		
	OW-6P	X	X		
	OW-7PR	X	X		
	OW-9PR	X	X		
	OW-11A	X	X		
	OW-12A	X	X		
	OW-13A	X	X		
	OW-14P	X	X		
	OW-15P	X	X		
	OW-16P	X	X		
	OW-17P	X	X		
Panelyte	MW1	X	X		
	MW2	X	X		
	MW3	X	X		
	MW4	X	X		
	MW5	X	X	X	
	MW6	X	X	X	
	MW7	X	X		
	MW8	X	X	X	X
	MW8D [d]	X	X	X [a]	X
	MW9	X	X		
	MW10	X	X		
	MW11	X	X		
Strebor	MW-1	X [b]			
	MW-11	X [b]			
	MW-16A	X [b]			
	MW-21	X [b]			
	MW-26A	X [b]			
	MW-27	X [b]			
	MW-30 [c]	X	X	X	X
	MW-35	X [b]			
	MW-38	X [b]			
	MW-39	X [b]			
	MW-40 [c]	X	X	X	X
	MW-40D [d]	X	X	X [a]	X
	MW-47	X [b]			
	MW-48	X [b]			
	MW-50	X [b]			
	MW-53	X [b]			
	PZ-2	X [b]			

[a] New well to be installed during groundwater investigation. Well will be developed.
[b] Measurement to be collected by Strebor contractor concurrent with EPA activities
[c] Well ownership transferred to the Lyondell Trust. Deep well to be installed by EPA will be nested with the wells.
[d] Deep well to be installed by EPA will be nested with the wells.

TABLE 2

Proposed Well Network for Laboratory Analysis

Allied Landfill OU1

Area	Well/ Piezometer	Date Installed	Total Depth of Monitoring Well (feet bgs)	Top of Casing Elevation (feet AMSL)	Ground Surface Elevation (feet AMSL)	Elevation of Bottom of Screen (feet AMSL)	Screen Length (feet)	Elevation of Mid Point of Screen (feet AMSL)	Hydrostratigraphic Unit Screened (Units as Defined in RI)	Well Screen material	Well riser material	Double Cased Well Installation Drillhole[I]	Residuals-like Waste noted X feet above top of screen	Screened in waste?	Residuals description (if noted)	Background Well
Allied Landfill	MW-6	11/16/1985	25.0	812.70	810.7	785.7	3	787.2	Upper Sand	SS	Galvanized			No		X
	MW-7	11/16/1985	31.0	818.94	817.4	786.4	3	787.9	Upper Sand	SS	Galvanized		NA	No		X
	MW-7D	new	new	new	new	new	new	new	Screen sandy material in vicinity of El. 630, ~187 ft deep, if present	new	new	X	NA	No		x
	MW-7I	new	new	new	new	new	new	new	Target = "Intermediate sand" butwhether constructed and where screened will depend on deep boring results	new	new	X	NA	No		x
	MW-8A	8/10/1993	18.0	810.74	809.0	791.0	5	793.5	Peat/Upper Sand/Upper Aquitard	SS	SS			Yes	"Gray Paper Fibers"	
	MW-16B	6/13/1988	33.0	803.26	801.9	768.9	3	770.4	Intermediate Sand	SS	Galvanized		12	No	"some paper residuals"	
	MW-16D	new	new	new	new	new	new	new	Screen sandy material in vicinity of El. 630, ~160 to 180 ft deep, if present	new	new	x	NA	No		
	MW-16I	new	new	new	new	new	new	new	Target = "Intermediate sand" but whether constructed and where screened will depend on deep boring results	new	new	x	NA	No		
	MW-22AR	4/1/1998	16.5	805.79	807.5	791.0	5	793.5	Upper Sand/Peat	SS	SS	x	3	No	"Clay, trace cinders, damp (Fill)"	
	MW-22B	8/11/1993	48.0	809.25	804.6	757.6	5	760.1	Intermediate/Lower Sand	SS	SS		NA	No		
	MW-30[S]	11/4/1987	14.7	796.32	793.8	779.2	4.6	781.7	Upper sand	SS	SS		"fill"	??		
	MW-40D[N]	new	new	new	new	new	new	new	Screen sandy material in vicinity of El. 630, ~160 ft deep, if present	new	new	X	NA	No		
	MW-40[S]	9/20/1990	92	797.16	794.76	702.76	5	705.26	Intermediate sand	SS	SS		"fill"	??		
	MW-122AR	3/31/1998	19.3	807.25	804.0	784.7	10	789.7	Upper Sand/Peat	SS	SS	x	NA	No		
	MW-122B	8/4/1993	60.3	806.58	803.6	743.3	5	745.8	Lower Sand	SS	SS		NA	No		
	MW-124B	8/19/1993	59.0	844.43	842.1	783.1	5	785.6	Upper Sand	SS	SS		NA	No		
	MW-125A	8/22/1993	25.0	810.05	807.7	783.2	5	785.7	Upper Sand/Peat	SS	SS		0.5	No	"Light gray Paper Fibers"	
	MW-201B	10/5/2000	28.0	802.20	800.3	772.3	5	774.8	Upper/int sand	SS	SS	x	18	No	"trace residuals"	
	MW-203B	9/23/2000	23.7	801.97	798.3	774.7	4.7	777.0	Upper/int sand	SS	SS	x	5	No	"whitish gray Residual"	
	MW-204B	10/9/2000	84.0	807.05	800.6	716.6	5	719.1	Lower Sand	SS	SS	x	66	No	"residuals"	
	MW-205B	10/11/2000	64.0	805.72	799.5	735.5	5	738.0	Lower Sand	SS	SS	x	49	No	"residuals"	
	MW-207	5/31/2002	33.0	805.00	797.9	765.3	4.6	767.6	Intermediate/Lower Sand	SS	SS	x	NA	No	--	
	MW-208	5/30/2002	23.0	804.42	796.3	773.3	5	775.8	Intermediate/Lower Sand	SS	SS	x	8	No	"geotextile fragments"	
	MW-209	6/17/2002	33.0	792.40	787.0	754.0	5	756.5	Intermediate Sand	SS	SS	x	NA	No		
	MW-211	6/17/2002	28.6	793.15	788.1	759.9	4.7	762.3	Intermediate Sand	SS	SS	x	20	No	"trace residuals"	
	MW-212	6/18/2002	17.3	791.52	786.8	769.9	4.7	772.3	Intermediate Sand	SS	SS	x	NA	No		
	MW-214	7/8/2002	30.0	803.66	794.2	764.6	4.6	766.9	Upper Aquitard/Intermediate Sand	SS	SS	x	16	No		
	MW-218	3/28/2003	12.0	790.73	783.5	771.7	4.8	774.1	Upper Sand	PVC	PVC	x	NA	No		
	MW-221R	4/8/2003	8.0	791.11	785.9	778.0	1.9	778.9	Upper Sand	PVC	PVC	x	NA	No		
	MW-222	4/3/2003	10.0	797.32	792.8	783.2	4.6	785.5	Peat/Upper Sand	SS	SS	x	NA	No		
	MW-224	3/12/2003	24.0	813.28	810.3	786.7	4.6	789.0	Upper Sand	SS	SS	x	7	No	residuals	
	MW-231	3/31/2003	22.0	790.66	785.9	764.1	4.8	766.5	Intermediate Sand	PVC	PVC	x	NA	No		
	MW-232	3/31/2003	12.0	790.64	785.3	773.3	3	774.8	Upper Sand	PVC	PVC	x	NA	No		
Panelyte Property	MW-8	5/21/2002	18.6	795.9	793.3	777.3	10	782.3			PVC					
	MW-8D	new	new	new	new	new	new	new	Screen sandy material in vicinity of El. 630, ~160 to 180 ft deep, if present	new	new	x	NA	No		

Notes:

Analyses from Arcadis Figure 1-4 from 2009 Supplemental Groundwater Investigation Report; Table 4-3D (CD) from the RI Report; and Figures 4-4B, 4-4D, and 4-4H of CDM.

[S]Strebor well on OU1 northern parcel

[P]Panelyte well on OU1

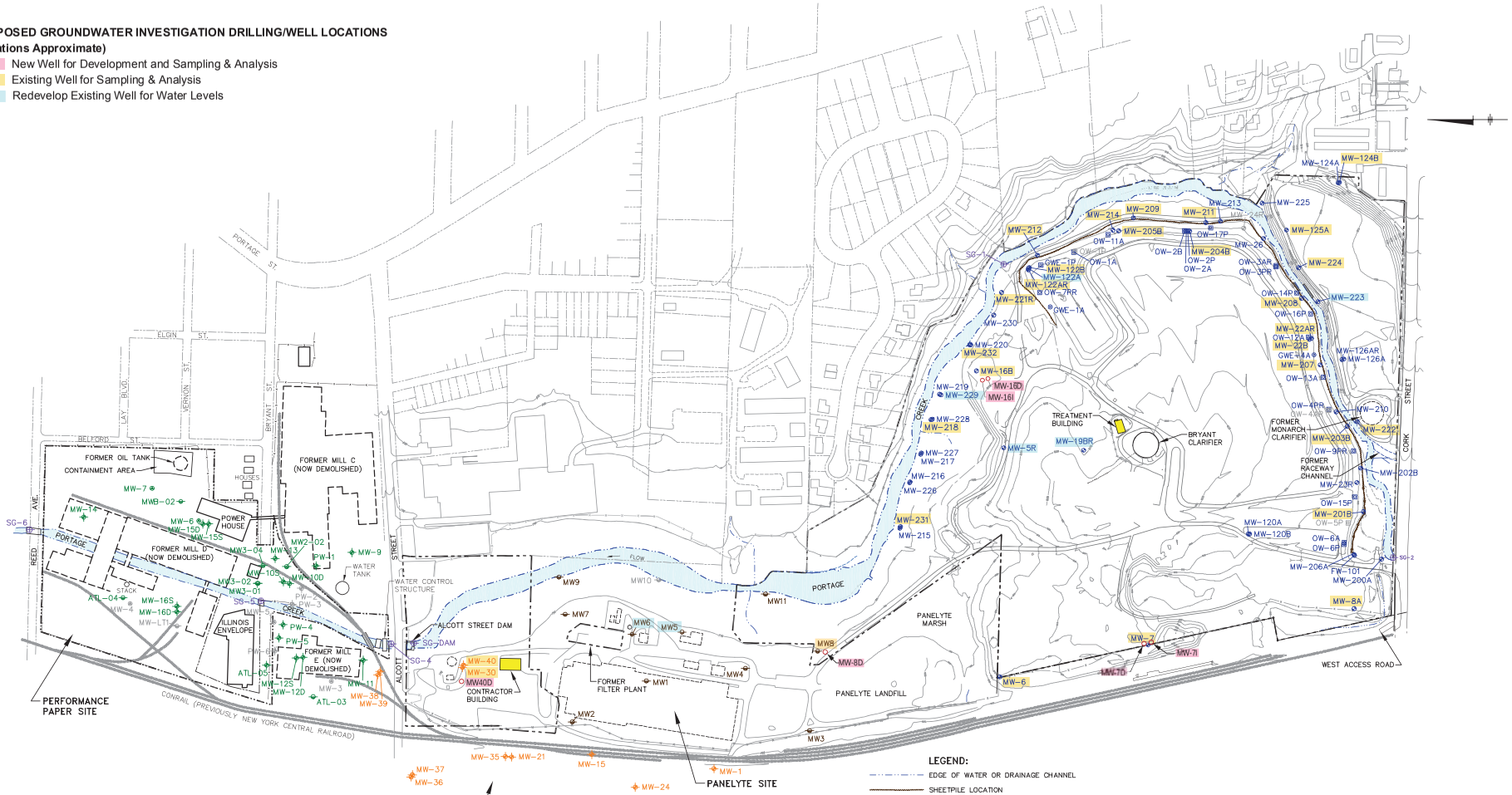
[N]newly proposed "deep" boring located at OU1 North

[I]Per BBL Figure 14

Figures

PROPOSED GROUNDWATER INVESTIGATION DRILLING/WELL LOCATIONS
(Locations Approximate)

- New Well for Development and Sampling & Analysis
- Existing Well for Sampling & Analysis
- Redevelop Existing Well for Water Levels



NOTES:

1. TOPOGRAPHIC MAPPING NORTH OF FORMER TYPE III LANDFILL AREA, AND BRYANT HRDLs/FRDLs PRODUCED USING PHOTOGRAMETRIC METHODS BY LOCKWOOD, INC. FROM AERIAL PHOTOGRAPHY FLOWN MAY 1991. BASE MAP INFORMATION WITHIN FORMER TYPE III LANDFILL AREA AND AREA NORTH OF WESTERN DISPOSAL AREA FIELD SURVEY OBTAINED FROM PLAN ENTITLED "TOPOGRAPHIC AND BOUNDARY SURVEY OF ALLIED PAPER, INC. KALAMAZOO, MI. SECTION 27, TOWN 2 SOUTH, RANGE 11 WEST," PREPARED BY WADE-TRIM, INC., DATED 7/8/99. BASE MAP INFORMATION WITHIN BRYANT HRDLs/FRDLs AREA OBTAINED FROM PLAN ENTITLED "AS BUILT SURVEY OF ALLIED PAPER SITE" PREPARED BY PREIN AND NEWHOF, KALAMAZOO, MI. DATED 1/27/05 (PROJECT NO. 2000171K). TOPOGRAPHIC CONTOUR LINES INSIDE THE MONARCH HRDL AREA SURVEYED BY PREIN & NEWHOF SURVEYORS ON 4/03. NGVD 1929. BASE MAP INFORMATION IN THE WESTERN DISPOSAL AREA BASED ON TOPOGRAPHIC SURVEY PERFORMED BY PREIN & NEWHOF, DRAWING FILE NUMBER 2060643K, DATED SEPTEMBER 27, 2006. BASE MAP INFORMATION AND PERFORMANCE PAPER WELL LOCATIONS BY MACTEC (2002), AND ATLANTIC TESTING (1990) NORTH OF ALCOTT STREET PREPARED BY DIGITIZING A PAPER COPY OF A PDF OF A DRAWING MADE BY "FISHBECK, THOMPSON, CARR & HUBER ENGINEERS-SCIENTISTS-ARCHITECTS" TITLED BASELINE ENVIRONMENTAL ASSESSMENT-SITE PLAN PROJECT NUMBER 003561A, DATED 2005, AT A SCALE OF 1"=150'. PERFORMANCE PAPER WELL LOCATIONS BY "ENVIRONMENTAL CONSULTING & TECHNOLOGY, INC." (ECT), DIGITIZED FROM PAPER COPY OF A PDF OF A DRAWING MADE BY "ECT" TITLED "SITE MAP WITH SAMPLING LOCATIONS - FIGURE 4", DATED 2005, AT A SCALE OF 1"=200'.
2. ELEVATIONS ARE REFERENCED TO THE NATIONAL GEODETIC VERTICAL DATUM (NGVD) 1929.
3. COORDINATE GRID IS REFERENCED TO THE MICHIGAN STATE PLANE (SOUTH ZONE) COORDINATE SYSTEM (NAD83).
4. ALLIED PROPERTY LINES ESTABLISHED USING: WADE-TRIM SURVEY (9/1999)-NORTHERN PARCEL ONLY; ATWELL HICKS, INC. SURVEY (11/2002); AND PREIN AND NEWHOF SURVEY (12/2002).
5. PORTAGE CREEK OUTLINE WITHIN THE ALLIED PROPERTY UPDATED ON 12/4/02 USING DIGITAL ORTHOGRAPHY BY AIR LAND SURVEYS, INC.(4/24/00) SCANNED FROM CDM DRAWING DETSVR/DETL007770/C:/PROJ/28963/_GIS/OU1/OU1_REPORT.APR REVISED 11/10/02. PORTAGE CREEK OUTLINE NORTH OF THE ALLIED PROPERTY UPDATED ON 12/4/02 USING A CDM CREEK OUTLINE PREPARED ON 9/23/02 PROVIDED ON COMPACT DISK.
6. PERFORMANCE PAPER, STREBOR AND PANELYTE SITE MONITORING WELLS SURVEY BY PREIN AND NEWHOF (6/2009).

LEGEND:

- EDGE OF WATER OR DRAINAGE CHANNEL
- SHEETPILE LOCATION
- SURVEYED ALLIED OU PROPERTY BOUNDARY
- APPROXIMATE PERFORMANCE PAPER PROPERTY BOUNDARY
- TOPOGRAPHIC CONTOUR LINE (SEE NOTE 1)
- RAILROAD TRACK
- ROAD/TRAIL

ALLIED OU
- MW-26 MONITORING WELL
- OW-12A PIEZOMETER LOCATION
- GWE-1A RECOVERY WELL LOCATION

PANELYTE
- MW1 MONITORING WELL INSTALLED BY PANELYTE

STREBOR
- MW-1 STREBOR WELL LOCATION

PERFORMANCE PAPER
- MW-16S MONITORING WELL (ECT-2005)
- MW-4 MONITORING WELL (ATLANTIC TESTING-1990)

- SG-2 EXISTING SURFACE WATER STAFF GAUGE
- MW-4 MONITORING WELL NOT LOCATED OR DAMAGED

0 400' 800'
GRAPHIC SCALE

Basemap Source: Arcadis 2009 Supplemental Groundwater Report

FIGURE 1
Proposed Groundwater Investigation Locations
Allied Landfill OU1

CH2MHILL

ES121213042343MKE_Figure_1_Proposed_Long_Term_Monitoring_v9 07.11-.14.mjl

Attachment A
Summary of Field Measurements and Observations

TABLE A-1
OU1 Site Monitoring Well Characteristics and Notes - June 2014
Allied Paper Operable Unit No. 1 Superfund Site, Kalamazoo, MI

Well/ Piezometer	Total Depth of Monitoring Well (feet bgs)	Top of Casing Elevation (feet AMSL)	Ground Surface Elevation (feet AMSL)	Stick up Height (ft)	Elevation of Bottom of Screen (feet AMSL)	Elevation of Top of Screen (feet AMSL)	Depth to Bottom (ft)	Well Located (Y/N)	Northing	Westing	Surface Seal Intact (Y / N)	J Plug Seals (Y/N)	Depth to Water (ft)	Depth to Bottom (ft)	Photo Number	GPS +/-	Protective Casing Type	Inner Well Riser Type	Notes
FW-101	5.0	800.4	797.3	3.1	793.1	795.3	7.3	y	42.26012	85.57655	na	y	4.41	7.48	1589	16	na	Steel 2"	
MW-5R	26.1	811.9	810.1	1.8	783.6	789.6	28.3	y	42.2639	85.57512	n	y	18.75	28.06	1645	18	Sqr. Steel	Steel 2"	
MW-6	25.0	812.7	810.7	2.0	785.7	788.7	27.0	y	42.26389	85.57842	na	y	14.22	28	1650	20	Sqr. Steel	Steel 2"	
MW-7	31.0	818.9	817.4	1.5	786.4	789.4	32.5	y	42.26236	85.57792	y	y	18.88	33.2	1651	20	steel 4"	Steel 2"	casing cap does not close
MW-8A	18.0	810.7	809.0	1.7	791.0	796.0	19.7	y	42.2602	85.57736	y/n	y	11.5	20.28	1634, 1635		steel 4"	Steel 2"	seal intact, but heaved off the ground 4"
MW-16B	33.0	803.3	801.9	1.4	768.9	771.9	34.4	y	42.26424	85.57405	na	y	15.85	35.4	1646	18	Sqr. Steel	PVC 2"	
MW-19BR	39.0	822.1	819.5	2.6	780.5	785.5	41.6	y	42.2631	85.57313	na	y	25.68	40.9	1647		steel 4"	Steel 2"	no surface seal
MW-22AR	16.5	805.8	807.5	-1.7	791.0	796.0	14.8	y	42.26366	85.57256	na	y	15.78	16.73	1629	16	steel	Steel 2"	no surface seal
MW-22B	48.0	809.3	804.6	4.6	757.6	762.6	51.7	y	42.26068	85.57352	na	y	16.37	51.83	1607	15	steel	Steel 2"	no surface seal
MW-23R	25.0	809.3	804.0	5.3	779.0	784.0	30.3	y	42.26016	85.57554	na	y	15.41	32.31	1598		steel	Steel 2"	no surface seal
MW-26	9.0	792.1	790.0	2.1	781.0	784.0	11.1	y	42.26114	85.57205	na	y	4.94	11.31	1619, 1620	20	Sqr. Steel	Steel 2"	excssive vegetation around well, needs clearing
MW-120A	23.5	822.2	819.6	2.6	796.1	801.1	26.1	y	42.26125	85.57628	y/n	y	21.08	26.32	1648	14	steel 4"	Steel 2"	surface seal intact, but heaved off the ground 6"
MW-120B	30.5	821.9	819.4	2.5	788.9	793.9	33.0	y	42.26132	85.57631	y/n	y	22.86	33.19	1648	17	steel 4"	Steel 2"	surface seal intact, but heaved off the ground 12"
MW-122A	21.5	806.5	803.4	3.1	781.9	791.9	24.6	y	42.26368	85.57257	na	y	15.53	22.56	1629	17	steel	Steel 2"	no surface seal
MW-22AR	19.3	807.3	804.0	3.3	784.7	794.7	22.6	y	42.26063	85.57348	na	y	16.12	19.02	1609	12	steel	Steel 2"	no surface seal
MW-122B	60.3	806.6	803.6	3.0	743.3	748.3	63.3	y	42.26366	85.57258	na	y	16.29	61.4	1629	17	steel	Steel 2"	no surface seal
MW-124A	36.0	843.7	841.3	2.4	805.3	815.3	38.4	y	42.26036	85.57125	y	y	29.27	39.25	1678	18	steel 4"	Steel 2"	
MW-124B	59.0	844.4	842.1	2.3	783.1	788.1	61.3	y	42.26637	85.57121	y	y	40.71	61.3	1678	16	steel 4"	Steel 2"	
MW-125A	25.0	810.1	807.7	2.3	783.2	788.2	26.8	y	42.26091	85.57198	n	y	16.75	27.1	1679		steel 4"	Steel 2"	surface seal cracked in half
MW-126A	20.5	805.7	802.8	2.9	782.3	787.3	23.4	y	42.26031	85.57376	y	y	9.7	23.6	1682	18	steel 4"	Steel 2"	
MW-126AR	21.5	805.1	803.6	1.5	782.1	787.1	23.0	y	42.26035	85.57378	y	y	10.76	23.45	1682	14	Sqr. Steel	Steel 2"	
MW-200A	15.8	803.7	800.9	2.8	785.1	790.1	18.6	y	42.25986	85.57668	y	y	7.99	18.93	1588	18	Sqr. Steel	Steel 2"	
MW-201B	28.0	802.2	800.3	1.9	772.3	777.3	29.9	y	42.26008	85.57593	y	y	6.15	30.19	1596	18	steel	pvc	
MW-202B	35.0	803.7	801.1	2.6	767.9	772.6	35.8	y	42.26012	85.57533	na	y	11.26	40.08	1599	18	steel	Steel 2"	
MW-203B	23.7	802.0	798.3	3.7	774.7	779.4	27.3	y	42.26028	85.57469	na	y	11.3	31.84	1601	13	steel	Steel 2"	
MW-204B	84.0	807.1	800.6	6.4	716.6	721.6	90.4	y	42.26197	85.57197	na	y	1.56	92.4	1622	15	steel	Steel 2"	
MW-205B	64.0	805.7	799.5	6.2	735.5	740.5	70.2	y	42.2627	85.57198	na	y	12.12	70.1	1624	11	steel	Steel 2"	
MW-206A	12.0	800.9	797.7	3.1	785.7	790.7	15.2	y	42.26015	85.57625	na	y	4.38	15.22	1589	16	steel	Steel 2"	
MW-207	33.0	805.0	797.9	7.1	765.3	769.9	39.7	y	42.26055	85.57385	na	y	9.73	40.13	1605	12	steel	Steel 2"	
MW-208	23.0	804.4	796.3	8.1	773.3	778.3	31.1	y	42.26073	85.57284	na	y	9.19	31.04	1612	15	steel	Steel 2"	
MW-209	33.0	792.4	787.0	5.4	754.0	759.0	38.4	y	42.26254	85.5718	n	y	0	38	1632	16	steel	Steel 2"	casing not secure, water to the top of riser
MW-210	18.1	806.6	797.0	9.5	779.0	784.0	27.6	y	42.26038	85.57451	na	y	11.78	27.3	1602	15	steel	Steel 2"	
MW-211	28.6	793.2	788.1	5.0	759.9	764.6	33.3	y	42.26178	85.57187	n	y	1.31	33.49	1630	15	steel	Steel 2"	casing not secure
MW-212	17.3	791.5	786.8	4.7	769.9	774.6	21.6	y	42.26356	85.57236	y	y	3.9	22.12	1633		steel	Steel 2"	casing not secure
MW-213	21.0	791.7	787.4	4.3	766.8	771.4	24.9	y	42.26161	85.57181	y	y	0.025	25.02	1631		steel	Steel 2"	casing not secure
MW-214	30.0	803.7	794.2	9.5	764.6	769.2	39.1	y	42.26277	85.57198	na	y	16.08	39.57	1626	10	steel	Steel 2"	
MW-215	6.0	790.6	783.6	7.0	777.8	782.6	12.8	y	42.26498	85.57632	y	y	8.04	12.95	1644	12	Sqr. Steel	PVC 2"	3' pvc protective case
MW-216	9.6	790.5	783.6	6.9	774.2	779.0	16.3	y	42.26486	85.57557	y	y	8.35	16.46	1643	17	Sqr. Steel	PVC 2"	12" pvc protective case
MW-217	9.6	790.8	783.2	7.6	774.7	776.7	16.1	y	42.26477	85.5753	na	y	7.93	17.52	1642	11	Sqr. Steel	PVC 2"	
MW-218	12.0	790.7	783.5	7.2	771.7	776.5	19.0	y	42.26465	85.57476	na	y	5.27	19.42	1641	17	Sqr. Steel	PVC 2"	
MW-219	13.5	791.0	788.9	2.1	775.6	780.4	15.4	y	42.26458	85.57411	y	y	2.02	20.4	1640	14	Sqr. Steel	PVC 2"	12" pvc protective case
MW-220	6.0	790.8	785.9	4.9	780.1	784.9	10.7	y	42.2643	85.57364	y	y	7.08	10.9	1639	19	Sqr. Steel	PVC 2"	3' pvc protective case
MW-221R	8.0	791.1	785.9	5.2	778.0	779.9	13.1	y	42.26393	85.57291	y	y	9.24	13.32	1636	14	Sqr. Steel	PVC 2"	12" pvc protective case
MW-222	10.0	797.3	792.8	4.5	783.2	787.8	14.1	y	42.26012	85.5747	y	y	3.34	14.41	1683	12	Sqr. Steel	Steel 2"	
MW-223	9.0	797.9	794.3	3.6	785.3	788.2	12.6	y	42.26059	85.57299	na	y	dry	5.2	1681	14	none	Steel 2"	12" steel protective case that is unsecure
MW-224	24.0	813.3	810.3	3.0	786.7	791.3	26.6	y	42.26079	85.57247	y	y	21.91	26.97	1680	15	Sqr. Steel	Steel 2"	12" steel protective case
MW-225	9.5	792.9	789.4	3.5	780.3	784.9	12.6	y	42.26117	85.57174	y	y	5.71	12.43	1677	17	Sqr. Steel	Steel 2"	
MW-226	2.0	790.7	783.8	6.9	781.8	783.8	8.9	y	42.26489	85.57562	y	y	7.31	9.04	1643	12	Sqr. Steel	Steel 2"	3' pvc protective case
MW-227	2.0	790.7	782.1	8.6	780.1	782.1	10.6	y	42.2648	85.57523	na	y	8.14	10.06	1642	16	Sqr. Steel	Steel 2"	
MW-228	3.0	791.0	783.4	7.6	780.4	783.4	10.6	y	42.26465	85.57479	y	y	8	10.55	1641		Sqr. Steel	PVC 2"	3' pvc protective case
MW-229	4.0	791.3	784.3	7.0	780.3	784.3	11.0	y	42.2646	85.57434	y	y	8.45	8.95	1640	15	Sqr. Steel	PVC 2"	3' pvc protective case
MW-230	4.0	790.9	785.9	5.0	781.9	785.9	9.0	y	42.26403	85.57318	y	y	6.45	9.03	1637	18	Sqr. Steel	PVC 2"	3' pvc protective case
MW-231	22.0	790.7	785.9	4.8	764.1	768.9	26.6	y	42.265	85.57629	y	y	3.89	28.93	1644	18	Sqr. Steel	PVC 2"	12" pvc protective case
MW-232	12.0	790.6	785.3	5.3	773.3	776.3	17.3	y	42.26426	85.57364	y	y	7.49	17.56	1639	20	Sqr. Steel	PVC 2"	12" pvc protective case
OW-1A	20.5	803.1	806.7	-3.6	786.3	788.3	16.8	y	42.2632	85.57227	na	y	17.63	24.4	1628	15	steel	PVC 1"	at a 5 degree slant
OW-2A	18.5	804.0	804.6	-0.6	786.2	788.1	17.8	y	42.26199	85.57198	na	y	16.67	20.6	1623	13	steel	PVC 1"	
OW-2B	34.4	803.8	804.4	-0.6	770.4	775.2	33.4	y	42.262	85.572	na	y	13.91	36.37	1623	13	steel	PVC 1"	
OW-2P	15.5	804.2	804.7	-0.5	789.3	794.1	14.9	y	42.26199	85.57198	na	y	17.06	17.66	1623	11	steel	PVC 1"	
OW-3AR	15.0	803.9	799.1	4.8	784.1	788.7	19.8	y	42.261	85.57243	na	y	15.41	22.09	1616	14	steel	PVC 1"	
OW-4PR	8.4	811.3	801.4	9.9	793.0	800.5	18.3	y	42.26048	85.57445	na	y	15.15	18.62	1603	14	steel	PVC 1"	
OW-6A	31.9	817.3	818.2	-0.9	786.3	791.1	31.0	y	42.26026	85.57638	na	n	dry	34.59	1592	15	Sqr. Steel	PVC 2"	extraction well 15' to the east
OW-6P	21.5	817.4	818.2	-0.8	796.8	801.6	20.6	y	42.26023	85.57646	na	y	18.05	22.11	1591	15	steel	pvc	stick up top does not cover riser
OW-7PR	16.8	806.0	805.9	0.1	789.4	794.2	16.6	y	42.26355	85.5729	na	y	16.27	19.66	1630	12	steel	PVC 1"	

TABLE A-1
OU1 Site Monitoring Well Characteristics and Notes - June 2014
Allied Paper Operable Unit No. 1 Superfund Site, Kalamazoo, MI

Well/ Piezometer	Total Depth of Monitoring Well (feet bgs)	Top of Casing Elevation (feet AMSL)	Ground Surface Elevation (feet AMSL)	Stick up Height (ft)	Elevation of Bottom of Screen (feet AMSL)	Elevation of Top of Screen (feet AMSL)	Depth to Bottom (ft)	Well Located (Y/N)	Northing	Westing	Surface Seal Intact (Y / N)	J Plug Seals (Y/N)	Depth to Water (ft)	Depth to Bottom (ft)	Photo Number	GPS +/-	Protective Casing Type	Inner Well Riser Type	Notes
OW-9PR	10.0	811.5	801.1	10.4	791.1	796.1	20.4	y	42.26019	85.57507	na	y	18.77	20.55	1600	11	steel	pvc	
OW-11A	18.5	804.0	799.4	4.6	781.2	785.9	22.8	y	42.26284	85.57201	na	y	15.25	22.46	1627	15	steel	PVC 1"	at a 5 degree slant
OW-12A	24.4	807.7	803.9	3.8	779.7	784.4	28.0	y	42.26069	85.5735	na	n	16.37	32.24	1608, 1610	14	steel	PVC 1"	riser above top of casing
OW-13A	14.8	800.8	798.0	2.8	783.4	786.2	17.4	y	42.26052	85.57404	na	y	14.55	21.79	1604	15	steel	PVC 1"	
OW-14P	8.0	804.2	795.8	8.4	788.0	792.8	16.2	y	42.26081	85.57283	na	y	13.5	16.45	1613	11	steel	PVC 1"	
OW-15P	16.7	813.8	809.3	4.5	792.7	797.6	21.1	y	42.26014	85.57574	na	y	17.28	20.36	1597	10	steel	PVC 1"	
OW-16P	7.1	806.1	797.7	8.4	790.7	795.6	15.4	y	42.26064	85.57317	na	y	12.11	15.5	1611	16	steel	PVC 1"	
OW-17P	6.5	803.6	794.0	9.6	787.6	792.5	16.0	y	42.26172	85.57192	na	y	14.03	16.05	1621	10	steel	PVC 1"	
Undocumented Wells																			
SP611								y	42.26012	85.57655	na	y	4.04	4.54	1590	15	na	PVC 2"	15' south of FW-101
P1 (unmarked)								y	42.26039	85.5765	na	y	na	na	1593		na	PVC 2"	40' NW of OW-6P. DTW, DTB not collected due to odor
MW-9								y	42.26006	85.57597	na	y	6.48	29.98	1595	12	Sqr. Steel	pvc	very rusty casing. 8' west of MW-201B
MW-10								y	42.2606	85.5735	na	y	14.83	29.33	1606	12	steel	steel	in nest with MW-22
MW-24R								y	42.26139	85.57186	na	y	dry	7.9	1618		steel	steel	extention on riser
OW-5P								y	42.26024	85.57603	na	y	dry	4.56	1594	17	steel	PVC 1"	15 deg slant, casing will not close with J-Plug on
OW-4AR								y	42.26046	85.57449	na	y	16.67	17.74	1603	16	steel	PVC 1"	in nest with OW-3AR
OW-13P								y	42.26049	85.57407	na	y	dry	10.75	1604	12	steel	PVC 1"	next to OW-13A
OW-13B								y	42.26051	85.57401	na	y	dry	7.52	1604	12	steel	PVC 1"	next to OW-13A
OW-3B								y	42.26102	85.57252	na	y	13.23	44.28	1614	11	steel	PVC 1"	in nest with OW-3AR
OW-3PR								y	42.26104	85.57242	na	y	dry	15.96	1615	18	steel	PVC 1"	in nest with OW-3AR
OW-10P								y	42.26129	85.57205	na	y	dry	16	1617	18	steel	PVC 1"	By OW-3AR
OW-11P								y	42.26273	85.57201	na	y	dry	9.94	1625	11	steel	PVC 1"	By MW-205B

Notes: Sqr. Steel is a square shaped well casing
DTW was collected where paint marks or notches were visible on the top of riser, otherwise facing north

TABLE A-2
Offsite Monitoring Well Characteristics and Notes - June 2014
Allied Paper Operable Unit No. 1 Superfund Site, Kalamazoo, MI

Well Number	Boring Log Available	Date Installed	Top of Casing Elevation (feet AMSL)1	Ground Elevation (feet AMSL)1	Stick up Height (ft)	Screened Interval (feet bgs)	Top of Screen (feet AMSL)1	Bottom of Screen (feet AMSL)1	Depth to Bottom (ft)	Aquifer Unit	Well Located (Y/N)	Northing	Easting	Surface Seal Intact (Y / N)	J Plug Seals (Y/N)	Depth to Water (ft)	Depth to Bottom (ft)	Photo Number	GPS +/-	Notes
Strebor Property																				
MW-1	No	NA	802.79	801.2	1.59	11 -16	790.2	785.2	17.59	Surficial										No access. Strebor to provide.
MW-7	No	NA	795.28	793.2	2.08	7 -12	786.2	781.2	14.08	Surficial										ABANDONED
MW-15	No	NA	797.23	796.2	1.03	5.5 -10.5	790.7	785.7	11.53	Surficial										ABANDONED. Strebor to provide MW-15A.
MW-21	No	NA	794.63	792.8	1.83	5 -10	787.8	782.8	11.83	Surficial										No access. Strebor to provide.
MW-24	Yes	9/1/1987	799.97	797.6	2.37	5.3 -13.1	792.3	784.5	15.47	Surficial										ABANDONED
MW-25	Yes	9/7/1987	795.04	792.9	2.14	22.3 -27.1	775.3	765.8	29.24	Surficial										ABANDONED
MW-30	Yes	11/5/1987	796.32	793.8	2.52	9.7 -14.7	784.1	779.1	17.22	Surficial	y	42.26955	85.57845	y	y	12.51	17.57	1665	12	Transferred to Lyondell Trust. Steel riser, steel casing
MW-35	Yes	11/13/1988	794.88	792	2.88	15.3 -20.3	776.7	771.7	23.18	Surficial										No access. Strebor to provide.
MW-36	Yes	9/17/1990	788.55	785.7	2.85	2 -12	783.7	773.7	14.85	Surficial										ABANDONED
MW-37	Yes	9/18/1990	788.28	785.9	2.38	82 -87	703.9	698.9	89.38	Regional										ABANDONED
MW-38	Yes	9/19/1990	781.5	779.2	2.3	2.2 -12.2	777	767	14.5	Surficial										No access. Strebor to provide.
MW-39	Yes	9/20/1990	781.55	778.9	2.65	80.5 -85.5	698.4	693.4	88.15	Regional										No access. Strebor to provide.
MW-40	Yes	9/2/1990	796.51	794.1	2.41	87 -92	707.1	702.1	94.41	Regional	y	42.26954	85.57838	y	y	5.49	87	1666	13	Transferred to Lyondell Trust. Steel riser, steel casing
Panelyte Property																				
MW1	Yes	5/23/2002	797.16	794.6	2.56	7 -17	787.6	777.6	19.56	Surficial	y	42.26757	85.57861	y	y	7.68	20.05	1662	18	steel, pvc, no lock
MW2	Yes	5/22/2002	795.98	793.6	2.38	5 -15	788.6	778.6	17.38	Surficial	y	42.26844	85.57917	y	n	7.92	17.39	1663		steel, pvc, no lock
MW3	Yes	5/22/2002	799.44	797	2.44	6 -16	791	781	18.44	Surficial	y	42.26583	85.57926	y	n	4.89	18.64	1654		no lock
MW4	Yes	5/23/2002	795.33	793	2.33	4 -14	789	779	16.33	Surficial	y	42.26648	85.57839	y	y	4.76	16.97	1656		steel, pvc, no lock
MW5	Yes	5/24/2002	795.05	792.5	2.55	2 -12	790.5	780.5	14.55	Surficial	y	42.26779	85.57792	y	y	6.37	7.1	1664		
MW6	Yes	5/28/2002	795	792.7	2.3	4 -14	791	781	14	Surficial	y	42.26728	85.57784	y	n	6.35	6.43	1661	20	TOC and Ground Elevation were reversed
MW7	Yes	5/28/2002	795.4	793.3	2.1	4 -14	789.3	779.3	16.1	Surficial	y	42.26854	85.57761	y	y	7.58	16.55	1657	12	steel, pvc, no lock
MW8	Yes	5/21/2002	795.9	793.3	2.6	6 -16	787.3	777.3	18.6	Surficial	y	42.2659	85.57803	y	y	5.29	18.8	1652		steel, pvc, no lock
MW9	Yes	5/20/2002	781.11	778.9	2.21	1 -3.5	777.9	775.4	5.71	Surficial	y	42.2686	85.5771	y	n	1.58	5.74	1658	17	steel, pvc, no lock
MW10	Yes	5/20/2002	781.56	779.1	2.46	4 -5.7	775.1	773.4	8.16	Surficial	y	42.26751	85.57707	y	cap	nr	nr	1659, 1660	18	steel, pvc, no lock. Could not remove metal cap on pvc riser
MW11	Yes	5/20/2002	782.95	780.8	2.15	3 -5.5	777.8	775.3	7.65	Surficial	y	42.26641	85.57728	y	n	1.79	8.07	1653	18	steel, pvc, no lock
Unknown											y	42.2656	85.57909	y	n	5.17	25	1655		steel, pvc, no lock. 150' south of MW3
Performance Paper Property																				
ATL-03	Yes	8/11/1990	777.38	773.6	3.78	10.2 -15.2	763.4	758.4	18.98	Surficial	abandoned, as shown in area photos 84-87, Attachment C									
ATL-04	Yes	8/11/1990	780.27	777.6	2.67	19.7 -24.7	757.9	752.9	27.37	Surficial										Remaining onsite
ATL-05	Yes	8/11/1990	773.42	769.9	3.52	9.6 -14.6	760.3	755.3	18.12	Surficial										Remaining onsite
MW2-02	No	NA	783.4	781	2.4	13.1 -18.1	767.9	762.9	20.5	Surficial										Remaining onsite
MW-3	No	NA	NA	NA		5 -15	NA	NA	NA	Surficial										
MW3-01	No	NA	777.44	775.3	2.14	22 -27	753.3	748.3	29.14	Surficial										
MW3-02	No	NA	777.81	775.6	2.21	8.7 -13.7	766.9	761.9	15.91	Surficial										
MW3-04	No	NA	776.07	776.2	-0.13	17.7 -22.7	758.5	753.5	22.57	Surficial										
MW-4	No	NA	NA	NA		15 -25	NA	NA	NA	Surficial										
MW-5	No	NA	NA	NA		5 -15	NA	NA	NA	Surficial										
MW-6	No	NA	780.27	777.7	2.57	13 -23	764.7	754.7	25.57	Surficial										
MW-7	No	NA	783.72	780.8	2.92	15 -25	765.8	755.8	27.92	Surficial										Remaining onsite
MW-9	No	NA	787.64	784.8	2.84	15.4 -20.4	769.4	764.4	23.24	Surficial										
MW-10D	No	NA	781.52	778.5	3.02	33.6 -38.6	744.9	739.9	41.62	Surficial										
MW-10S	No	NA	780.73	778.1	2.63	10.9 -15.9	767.2	762.2	18.53	Surficial										
MW-11	No	NA	778.96	776.1	2.86	8.3 -13.3	767.8	762.8	16.16	Surficial										
MW-12D	No	NA	771.65	768.8	2.85	28.7 -33.7	740.1	735.1	36.55	Surficial										
MW-12S	No	NA	771.41	768.6	2.81	6.4 -11.4	762.2	757.2	14.21	Surficial										
MW-13	No	NA	788.4	785.5	2.9	19.6 -24.6	765.9	760.9	27.5	Surficial										
MW-14	No	NA	767.76	764.5	3.26	3.2 -8.2	761.3	756.3	11.46	Surficial										
MW-15D	No	NA	779.79	777.1	2.69	35.8 -40.8	741.3	736.3	43.49	Surficial										
MW-15S	No	NA	779.72	777.2	2.52	15.1 -20.1	762.1	757.1	22.62	Surficial										
MW-16D	No	NA	777.36	774.5	2.86	31.5 -36.5	743	738	39.36	Surficial										
MW-16S	No	NA	776.94	774.5	2.44	12.3 -17.3	762.2	757.2	19.74	Surficial										
MWB-02	No	NA	783.25	780.5	2.75	17.3 -22.3	763.2	758.2	25.05	Surficial										Remaining onsite
MWB-03	No	NA	NA	NA		20.4 -25.4	NA	NA	NA	Surficial										Remaining onsite
MWLTI	No	NA	NA	NA		16.3 -21.3	NA	NA	NA	Surficial										
PW-1	No	NA	789.47	786.4	3.07	34.7 -39.7	751.7	746.7	42.77	Surficial										
PW-2	No	NA	786.18	783	3.18	22.1 -27.1	760.9	755.9	30.28	Surficial										
PW-3	No	NA	778.22	774.3	3.92	11.6 -16.6	762.8	757.8	20.42	Surficial										
PW-4	No	NA	775.63	772.6	3.03	12.6 -17.6	760	755	20.63	Surficial										
PW-5	No	NA	775.04	772.1	2.94	21.6 -26.6	750.4	745.4	29.64	Surficial										
PW-6	No	NA	774.24	771	3.24	24.2 -29.2	746.9	741.9	32.34	Surficial										

Table A-3
Groundwater Elevations
Strebor, Inc.
Kalamazoo, Michigan

Well Number	TOC Elevation (ft NVGD)	DTP (ft BTOC)	DTW (ft BTOC)	Water Elevation (ft NVGD)	
Date Collected		**6/19/2014**			
MW-1	803.2		9.40	793.80	
MW-11	796.23			NM	Well being purged
MW-16A	797.31		9.26	788.05	
MW-21	795.01		7.93	787.08	
MW-26A	791.19		5.68	785.51	
MW-27	796.56		9.56	787.00	
MW-35	795.83		8.02	787.81	
MW-38	782.17		7.48	774.69	
MW-39	782.18		-8.43	790.61	**flowing artesian**
MW-47	800.17		9.21	790.96	
MW-48	800.75		8.91	791.84	
MW-50	799.59		9.49	790.10	
MW-53	797.76		8.67	789.09	
PZ-2	794.39		7.30	787.09	

Notes
TOC - top of casing
ft - feet
NGVD - National Geodetic Vertical Datum
BTOC - below top of casing
DTP - depth to product
DTW - depth to water
NM - not measured
MW-39 is a flowing artesian well - DTW values are negative values because the water level is above the top of the casing, as determined by pressure measurements. Conversion factor: 1lb. = 27"
Field measurements performed and provided by Bay West under contract to Strebor.

Attachment B
Field Notes

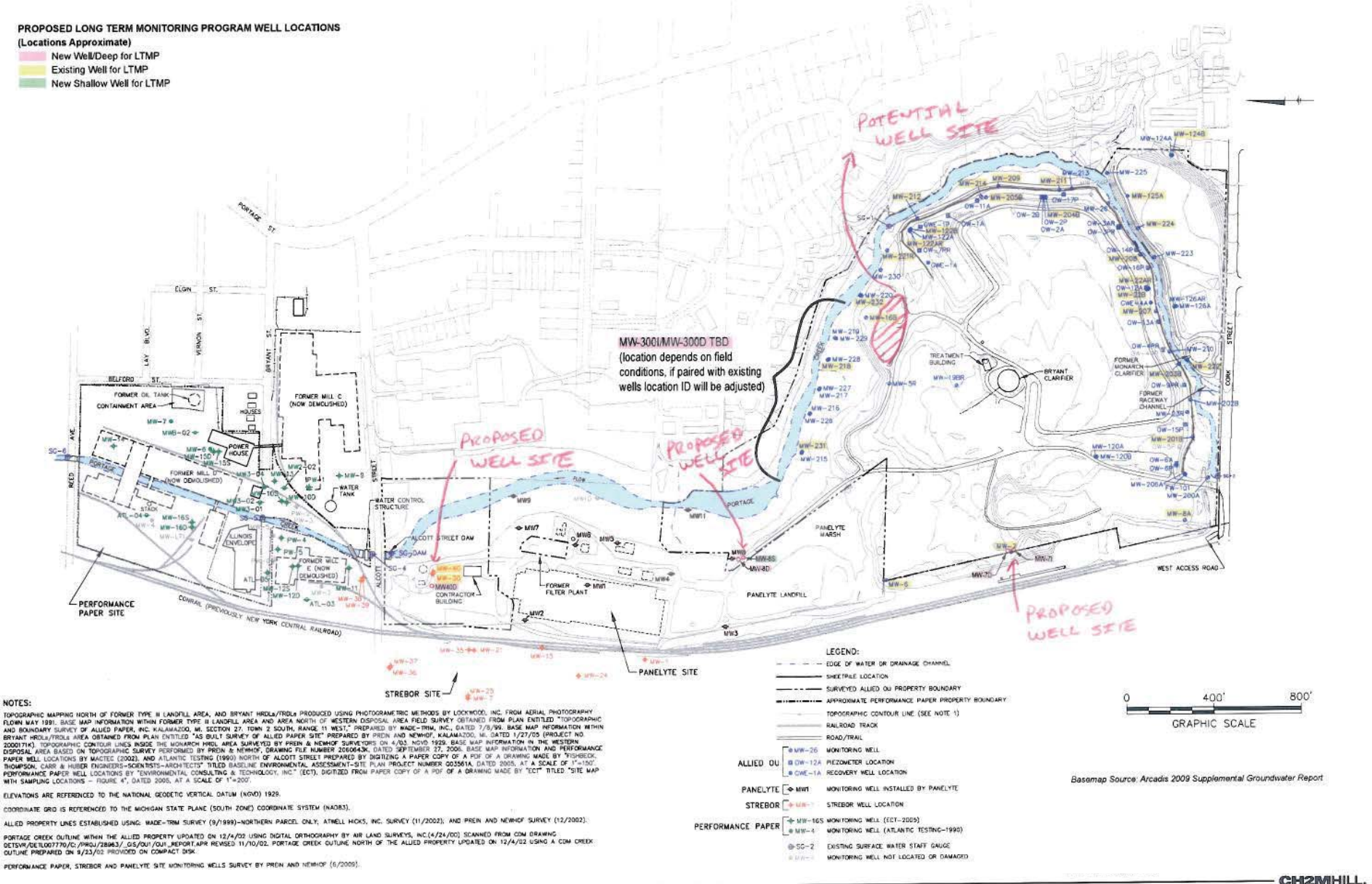
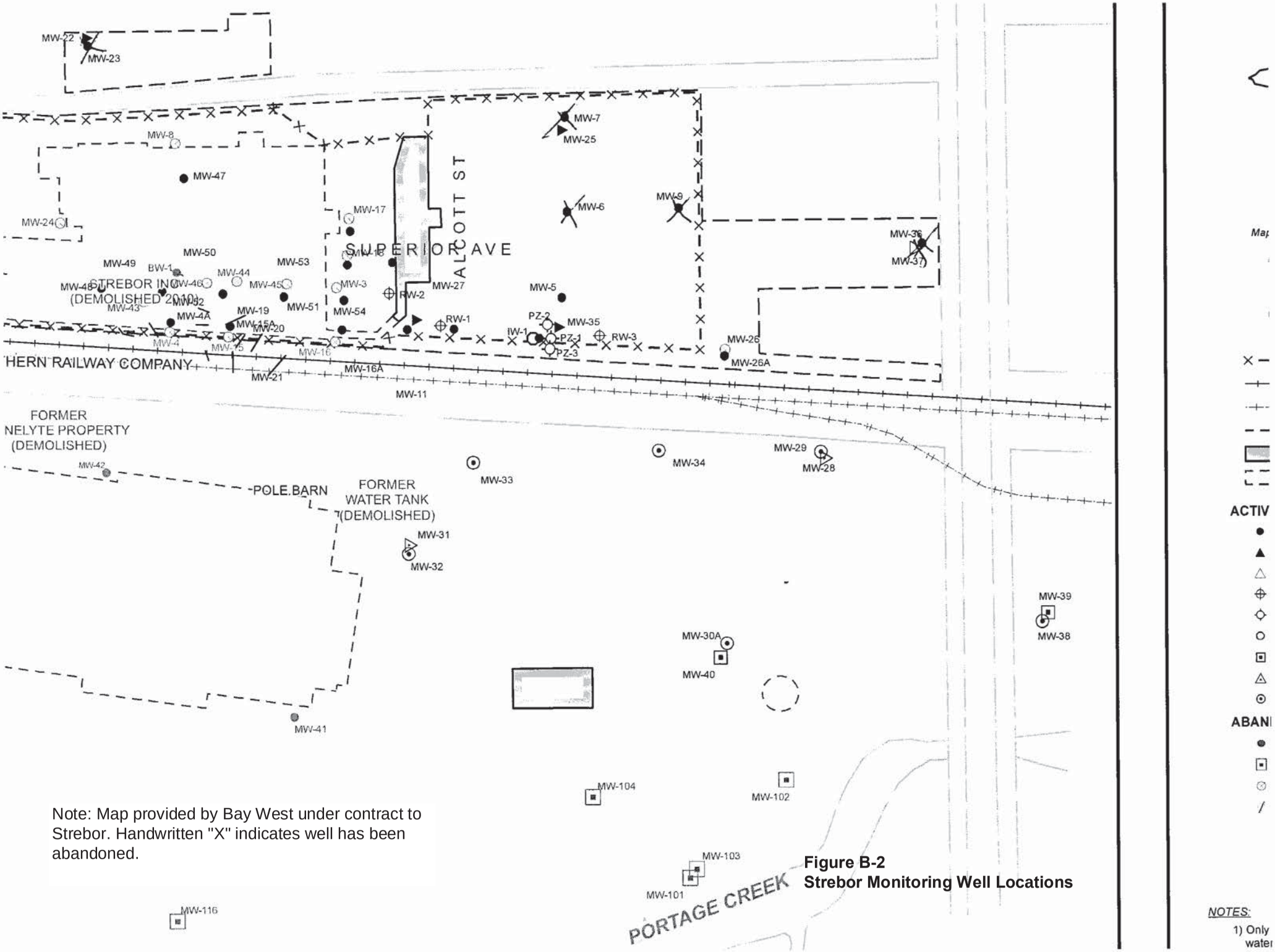


Figure B-1
CH2M HILL Field Observations for Boring Placement



Note: Map provided by Bay West under contract to Strebor. Handwritten "X" indicates well has been abandoned.

Figure B-2
Strebor Monitoring Well Locations

Attachment C
Photo Log

Well/Photo ID	Figure No.	Well/Photo ID	Figure No.	Well/Photo ID	Figure No.
FW-101	Figure 1	MW-211	Figure 31	OW-10P	Figure 57
MW-5R	Figure 2	MW-211R	Figure 32	OW-11A	Figure 58
MW-6	Figure 3	MW-212	Figure 33	OW-11P	Figure 59
MW-7	Figure 4	MW-213	Figure 34	OW-12A	Figure 60
MW-8A	Figure 5	MW-214	Figure 35	OW-13A	Figure 61
MW-8A	Figure 6	MW-215	Figure 36	OW-13B	Figure 61
MW-9	Figure 7	MW-216	Figure 37	OW-13P	Figure 61
MW-10	Figure 8	MW-217	Figure 38	OW-14P	Figure 62
MW-16B	Figure 9	MW-218	Figure 39	OW-15P	Figure 63
MW-19-BR	Figure 10	MW-219	Figure 40	OW-16P	Figure 64
MW-22AR	Figure 11	MW-220	Figure 41	OW-17P	Figure 65
MW-22B	Figure 12	MW-222	Figure 42	SP-611	Figure 66
MW-23R	Figure 13	MW-223	Figure 43	SP-N	Figure 67
MW-24R	Figure 14	MW-224	Figure 44	Unmarked PVC (50' SE of MW-120 nest)	Figure 68
MW-26	Figure 15	MW-225	Figure 45	Unmarked PVC (40' N of OW-6P)	Figure 69
MW-120A	Figure 16	MW-226	Figure 37	MW-1 (Panelyte)	Figure 70
MW-120B	Figure 16	MW-227	Figure 38	MW-2 (Panelyte)	Figure 71
MW-122A	Figure 17	MW-228	Figure 39	MW-3 (Panelyte)	Figure 72
MW-122B	Figure 17	MW-229	Figure 40	MW-4 (Panelyte)	Figure 73
MW-122AR	Figure 17	MW-230	Figure 46	MW-5 (Panelyte)	Figure 74
MW-124A	Figure 18	MW-231	Figure 36	MW-6 (Panelyte)	Figure 75
MW-124B	Figure 18	MW-232	Figure 41	MW-7 (Panelyte)	Figure 76
MW-125A	Figure 19	OW-1A	Figure 47	MW-8 (Panelyte)	Figure 77
MW-126A	Figure 20	OW-2A	Figure 48	MW-9 (Panelyte)	Figure 78
MW-126AR	Figure 20	OW-2B	Figure 48	MW-10 (Panelyte)	Figure 79
MW-200A	Figure 21	OW-2P	Figure 48	MW-10 (Panelyte)	Figure 80
MW-201B	Figure 22	OW-3AR	Figure 49	MW-11 (Panelyte	Figure 81
MW-202B	Figure 23	OW-3B	Figure 50	MW-30 (Strebor)	Figure 82
MW-203B	Figure 24	OW-3PR	Figure 51	MW-40 (Strebor)	Figure 83
MW-204B	Figure 25	OW-4AR	Figure 52	Performance Paper	Figure 84-87
MW-205B	Figure 26	OW-4PR	Figure 52	Proposed location for MW-40D	Figure 88
MW-207	Figure 27	OW-5P	Figure 53	Proposed location for MW-7I and MW-7D	Figure 89
MW-208	Figure 28	OW-6A	Figure 54	Proposed location for MW-8S and MW-8D	Figure 90
MW-209	Figure 29	OW-6P	Figure 55	Location for potential wells MW-300I and MW-300D	Figure 91
MW-210	Figure 30	OW-9PR	Figure 56		

Well/Photo ID	Figure No.	Well/Photo ID	Figure No.	Well/Photo ID	Figure No.
FW-101	Figure 1	MW-211	Figure 31	OW-10P	Figure 57
MW-5R	Figure 2	MW-211R	Figure 32	OW-11A	Figure 58
MW-6	Figure 3	MW-212	Figure 33	OW-11P	Figure 59
MW-7	Figure 4	MW-213	Figure 34	OW-12A	Figure 60
MW-8A	Figure 5	MW-214	Figure 35	OW-13A	Figure 61
MW-8A	Figure 6	MW-215	Figure 36	OW-13B	Figure 61
MW-9	Figure 7	MW-216	Figure 37	OW-13P	Figure 61
MW-10	Figure 8	MW-217	Figure 38	OW-14P	Figure 62
MW-16B	Figure 9	MW-218	Figure 39	OW-15P	Figure 63
MW-19-BR	Figure 10	MW-219	Figure 40	OW-16P	Figure 64
MW-22AR	Figure 11	MW-220	Figure 41	OW-17P	Figure 65
MW-22B	Figure 12	MW-222	Figure 42	SP-611	Figure 66
MW-23R	Figure 13	MW-223	Figure 43	SP-N	Figure 67
MW-24R	Figure 14	MW-224	Figure 44	Unmarked PVC (50' SE of MW-120 nest)	Figure 68
MW-26	Figure 15	MW-225	Figure 45	Unmarked PVC (40' N of OW-6P)	Figure 69
MW-120A	Figure 16	MW-226	Figure 37	MW-1 (Panelyte)	Figure 70
MW-120B	Figure 16	MW-227	Figure 38	MW-2 (Panelyte)	Figure 71
MW-122A	Figure 17	MW-228	Figure 39	MW-3 (Panelyte)	Figure 72
MW-122B	Figure 17	MW-229	Figure 40	MW-4 (Panelyte)	Figure 73
MW-122AR	Figure 17	MW-230	Figure 46	MW-5 (Panelyte)	Figure 74
MW-124A	Figure 18	MW-231	Figure 36	MW-6 (Panelyte)	Figure 75
MW-124B	Figure 18	MW-232	Figure 41	MW-7 (Panelyte)	Figure 76
MW-125A	Figure 19	OW-1A	Figure 47	MW-8 (Panelyte)	Figure 77
MW-126A	Figure 20	OW-2A	Figure 48	MW-9 (Panelyte)	Figure 78
MW-126AR	Figure 20	OW-2B	Figure 48	MW-10 (Panelyte)	Figure 79
MW-200A	Figure 21	OW-2P	Figure 48	MW-10 (Panelyte)	Figure 80
MW-201B	Figure 22	OW-3AR	Figure 49	MW-11 (Panelyte	Figure 81
MW-202B	Figure 23	OW-3B	Figure 50	MW-30 (Strebor)	Figure 82
MW-203B	Figure 24	OW-3PR	Figure 51	MW-40 (Strebor)	Figure 83
MW-204B	Figure 25	OW-4AR	Figure 52	Performance Paper	Figure 84-87
MW-205B	Figure 26	OW-4PR	Figure 52	Proposed location for MW-40D	Figure 88
MW-207	Figure 27	OW-5P	Figure 53	Proposed location for MW-7I and MW-7D	Figure 89
MW-208	Figure 28	OW-6A	Figure 54	Proposed location for MW-8S and MW-8D	Figure 90
MW-209	Figure 29	OW-6P	Figure 55	Location for potential wells MW-300I and MW-300D	Figure 91
MW-210	Figure 30	OW-9PR	Figure 56		

Figure 1: FW-101

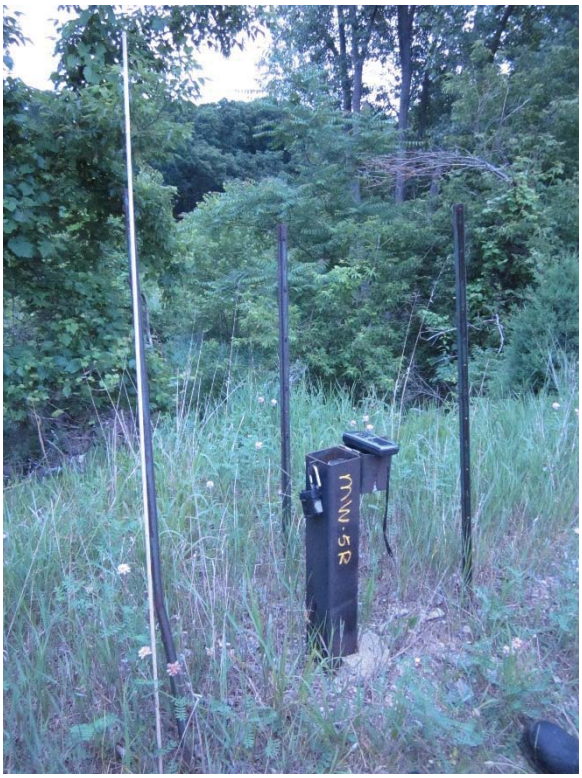


Figure 2: MW-5R

Figure 3: MW-6

Figure 4: MW-7

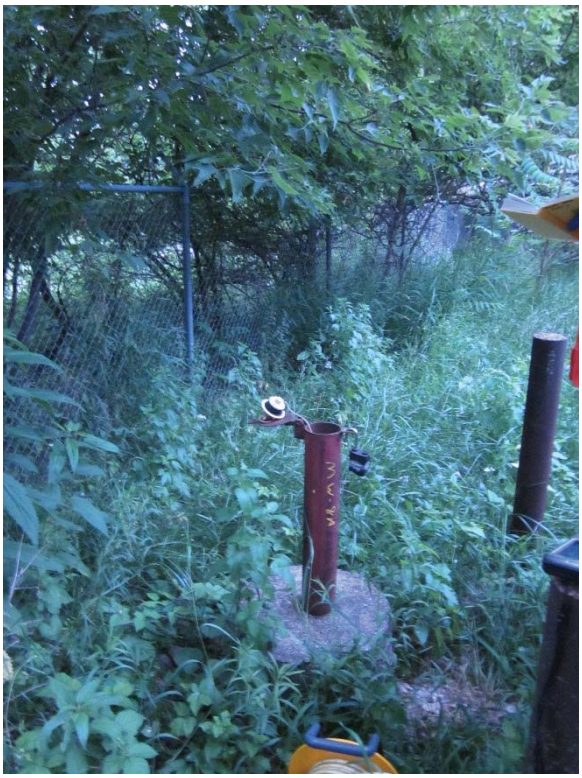


Figure 5: MW-8A

Figure 6: MW-8A (Heaved Surface Seal)

Figure 7: MW-9

Figure 8: MW-10

Figure 9: MW-16B

Figure 10: MW-19-BR

Figure 11: MW-22AR

Figure 12: MW-22B

Figure 13: MW-23R

Figure 14: MW-24R

Figure 15: MW-26

Figure 16: MW-120A (Right), MW-120B (Left)

Figure 17: MW-122AR, MW-122A, and MW-122B (left to right)

Figure 18: MW-124B and MW-124A (left to right)

Figure 19: MW-125A

Figure 20: MW-126AR and MW-126A (foreground to background)

Figure 21: MW-200A

Figure 22: MW-201B

Figure 23: MW-202B

Figure 24: MW-203B

Figure 25: MW-204B

Figure 26: MW-205B

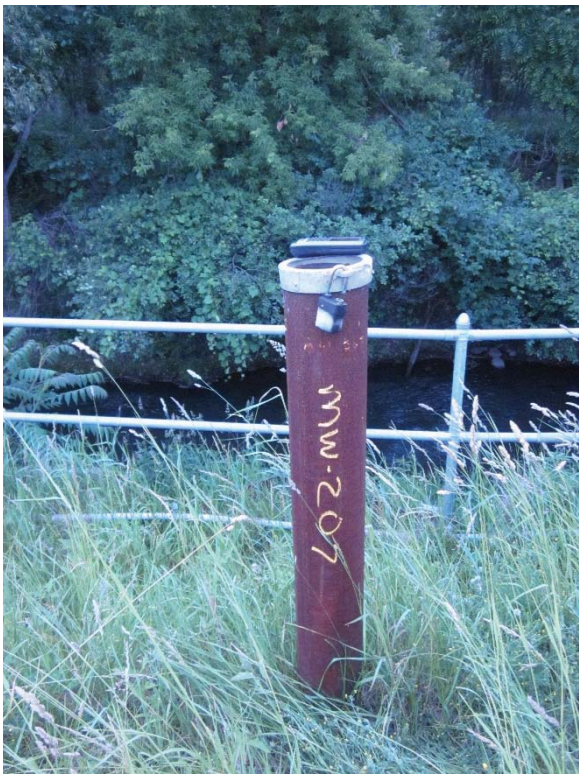


Figure 27: MW-207

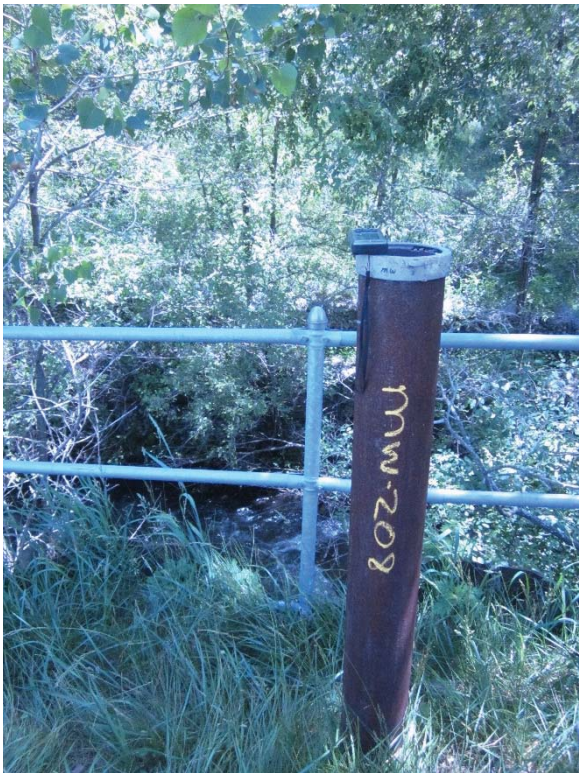


Figure 28: MW-208

Figure 29: MW-209

Figure 30: MW-210

Figure 31: MW-211

Figure 32: MW-211R

Figure 33: MW-212

Figure 34: MW-213

Figure 35: MW-214

Figure 36: MW-215 and MW-231 (left to right)

Figure 37: MW-226 and MW-216 (left to right)

Figure 38: MW-217 and MW-227 (left to right)

Figure 39: MW-228 and MW-218 (foreground to background)

Figure 40: MW-229 and MW-219 (foreground to background)

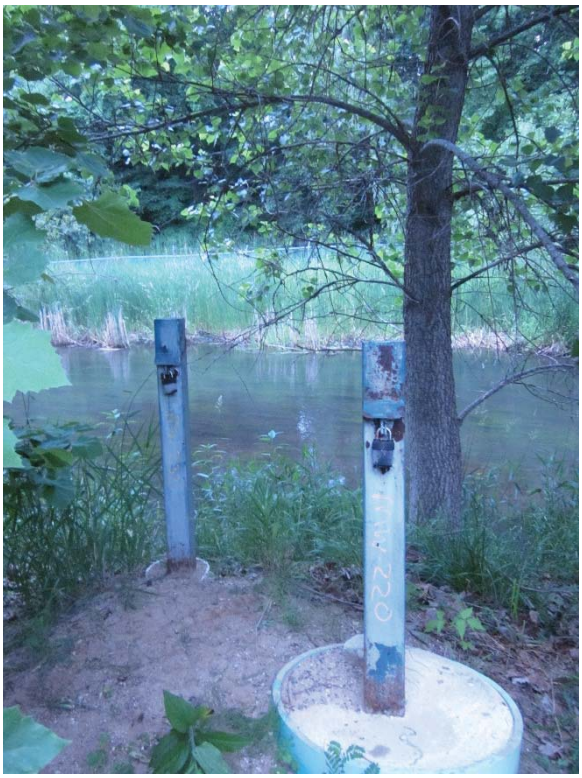


Figure 41: MW-220 and MW-232 (foreground to background)

Figure 42: MW-222

Figure 43: MW-223

Figure 44: MW-224

Figure 45: MW-225

Figure 46: MW-230

Figure 47: OW-1A

Figure 48: OW-2B, OW-2A, OW-2P (left to right)

Figure 49: OW-3AR

Figure 50: OW-3B

Figure 51: OW-3PR

Figure 52: OW-4PR and OW-4AR (left to right)

Figure 53: OW-5P

Figure 54: OW-6A

Figure 55: OW-6P

Figure 56: OW-9PR

Figure 57: OW-10P

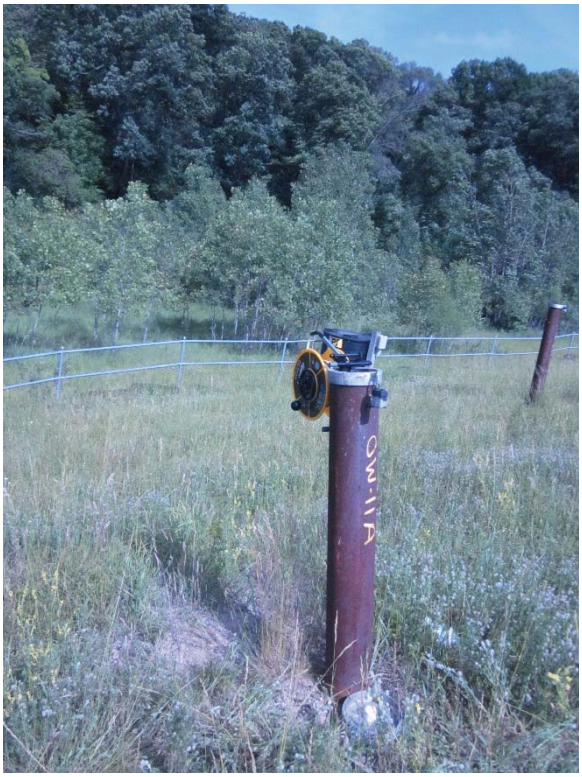


Figure 58: OW-11A

Figure 59: OW-11P

Figure 60: OW-12A

Figure 61: OW-13B, OW-13A and OW-13P (left to right)

Figure 62: OW-14P

Figure 63: OW-15P

Figure 64: OW-16P

Figure 65: OW-17P

Figure 66: SP-611

Figure 67: SP-N

Figure 68: Unmarked PVC (50' SE of MW-120 nest)

Figure 69: Unmarked PVC (40' N of OW-6P)

Figure 70: MW-1 (Panelyte)

Figure 71: MW-2 (Panelyte)

Figure 72: MW-3 (Panelyte)

Figure 73: MW-4 (Panelyte)

Figure 74: MW-5 (Panelyte)

Figure 75: Mw-6 (Panelyte)

Figure 76: MW-7 (Panelyte)

Figure 77: MW-8 (Panelyte)

Figure 78: MW-9 (Panelyte)

Figure 79: MW-10 (Panelyte)

Figure 80: Seized well cap at MW-10 (Panelyte)

Figure 81: MW-11 (Panelyte)

Figure 82: MW-30 (Strebor)

Figure 83: MW-40 (Strebor)

Figure 84: Performance Paper, south towards Alcott St.

Figure 85: Performance Paper, south towards Alcott St. #2

Figure 86: Performance Paper, North of F.M. Envelope, looking North

Figure 87: Performance Paper, N of F.M. Envelope, looking NW

Figure 88: Proposed location for MW-40D

Figure 89: Proposed location for MW-7I and MW-7D

Figure 90: Proposed location for MW-8S and MW-8D

Figure 91: Location for proposed wells MW-300I and MW-300D (south of MW-230)

Drilling photos are located in the folder title "Drilling Photos" on the CD.

Appendix B
Technical Memorandum: Field Investigation Activities and Documentation

2014 Field Investigation Activities and Documentation Allied Paper, Inc./Portage Creek/Kalamazoo River OU1 WA No. 109-RICO-059B/Contract No. EP-S5-06-01

PREPARED FOR:	USEPA Region 5
PREPARED BY:	CH2M HILL
DATE:	January 30, 2015
PROJECT NUMBER:	419665.DE.01

Introduction

This technical memorandum (TM) describes the field investigation activities that were concluded at the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site Operable Unit 1 (OU1): Allied Landfill in Kalamazoo, Michigan during 2014. The work, including preparation of the TM, was performed for the U.S. Environmental Protection Agency (EPA) under Contract No. EP-S5-06-01. The field reconnaissance and well inventory completed in June 2014 is reported in a separate TM. Remaining field investigation activities completed in 2014 and described herein include:

- Soil boring and monitoring well installation
- Development of new wells and re-development of existing wells
- Well and staff gage surveying
- Water level measurement and low-flow groundwater sampling
- Investigation-derived waste characterization and disposal

Soil Boring and Monitoring Well Installation

Seven borings (MW-7I, MW-7D, MW-8D, MW-16I, MW-16D, MW-40S, and MW-40D) were completed at four separate map locations (Figure 1) across OU1 (MW-7, MW-16B, MW-8, and MW-30/40) using rotosonic drilling methods. Cascade Drilling LP (Cascade) from Flint, Michigan performed drilling activities. A private utility location company was retained by Cascade to check for subsurface utilities prior to drilling activities. Relevant utilities near proposed drilling locations were marked in the field.

Each drilling location consisted of an existing well to be supplemented with a new deep well and, at select locations, an intermediate depth well. The deep boring was first completed and a continuous soil boring log was recorded to establish subsurface soil conditions. Boreholes were drilled to 8 inches in diameter to allow for the placement of a surface isolation casing to protect against carry-down of potential waste residuals during drilling. Depth of the isolation casing was typically 10 feet at each borehole, but was increased up to 57 feet at the MW-16 location due to the potential presence of waste material in the area. Isolation casings were set in the borehole and grouted with a Portland cement and bentonite slurry. A 6-inch-diameter borehole was then drilled through the bottom of the isolation casing to an approximate elevation of 630 feet above mean sea level and sampled to depth with a continuous soil sampler unit.

The soil boring log was used to determine screened intervals for the deep well and subsequent intermediate well, if identified for installation at the location. Draft soil boring logs and photographs of the soil core were reviewed and provided to Michigan Department of Environmental Quality and City of Kalamazoo representatives for discussion. Soil boring logs are included in Attachment A. Screen intervals were selected to monitor the water quality below less transmissive layers, if present, in the intermediate and deep zones. If a deep boring ended within a less transmissive layer, the screen interval was selected at the bottom of the more permeable zone.

After discussion and concurrence on the screened intervals, the deep well was constructed and intermediate depth boring, if applicable, was subsequently blind drilled. Well construction reports are included in Attachment B. Completed well screen depths and elevations are included on Table 1. Photographs taken during drilling operations are included in Attachment C.

Well Development

Cascade performed the redevelopment of 35 existing wells and development of 7 new monitoring wells at OU1 and Panelyte properties under the oversight of CH2M HILL. Well development activities were performed between September 22 and October 2, 2014. Well development records are included in Attachment D.

Surging of the monitoring wells (both newly installed and existing) was performed with the monsoon pump that was also used for purging. The pump itself fit snugly inside the well casing, acting as a surge block and creating a vacuum when lifted through the water column. The well was surged for 10 minutes prior to starting the pump to pull the particles/fines from the formation surrounding the well screen. Development was performed until turbidity was less than 50 Nephelometric Turbidity Units (ntu) or greater than 10 boring volumes was purged. The turbidity at MW-7D was stable at approximately 75 ntu when well development was stopped after 8.5 well volumes were removed. However, additional purging at MW-7D prior to sample collection resulted in the removal of a total of 11 well volumes.

Wells were identified for redevelopment if they were selected for groundwater sampling or if the depth to bottom measured in June 2014 varied more than 1 foot from the original well construction log. Wells that were unable to be redeveloped were removed from the sampling plan. The sampling plan was then re-evaluated to assess spatial distribution of sampling locations. The following bullets describe wells that were unable to be redeveloped and the resulting modifications to the sampling plan:

- Several wells (MW-22AR, MW-122AR, and MW-229) were unable to be developed due to the low initial water level and failure to recover after pumping. MW-223 was dry and therefore not developed. No modifications to the sampling plan were required to address the wells.
- MW-30 was unable to be developed due to low initial water level and failure to recover after pumping. Well drilling and well development activities were being performed concurrently. As a result, MW-40S was drilled and developed at the MW-30/MW-40 location to provide an alternate shallow monitoring well in place of MW-30.
- MW-124A was not able to be purged/redeveloped due to suspected fouling from iron bacteria. As a result, MW-124B was attempted to be purged/redeveloped for an alternate sample location, but it also exhibited signs of iron fouling and was not able to be redeveloped. An alternate well was not present in the area, but it was believed that the elimination of the well would not limit the effectiveness of the investigation.

Well and Staff Gage Surveying

CH2M HILL escorted the surveying subcontractor (DLZ Industrial Surveying Inc. from Kalamazoo, Michigan) on October 6 through October 10, 2014 at OU1 and Panelyte properties. The surveying provided new horizontal and vertical coordinate data for two staff gages and 101 existing and newly-installed monitoring wells. Data recorded included X-Y coordinates, top of inner well casing elevation (cap off), and ground surface elevation at each monitoring well. Staff gages were measured at the easiest to read marking denoted on the gage and the corresponding elevation was recorded; X-Y coordinates were also collected. Control loops were established and several benchmarks were set for future use.

DLZ's report is included as Attachment E. Coordinate and elevation data for the monitoring wells and staff gages is summarized on Table 1.

Water Level Measurement and Low-Flow Groundwater Sampling

Water level measurements were recorded on October 13 and 14, 2014, in advance of the groundwater sampling effort. Water level measurements were collected from 2 staff gages and 101 monitoring wells and piezometers at the OU1 and Panelyte properties (Table 1, Figure 1). A steel cap could not be removed at Panelyte well MW-10; therefore, a measurement was not collected at this location. Strebor's contractor, Bay West, obtained water levels on October 14 and 15, 2014 for 13 wells owned by Strebor and located on the Strebor property (Table 1).

Groundwater samples were collected October 13 through October 17, 2014 using low-flow sampling techniques at OU1 and Panelyte wells as indicated on Figure 1 and Table 2. Field parameters were monitored during the low-flow purging process using a YSI or Horiba with flow-through cell and a Hach turbidity meter. Parameters were recorded on field sheets throughout purging. Groundwater samples were collected after parameters were stabilized and the turbidity was less than 10 ntu. Stabilized readings are included on Table 2. Copies of groundwater sampling and field parameter collection field sheets are included in Attachment F.

Groundwater samples were submitted by CH2M HILL for analysis of polychlorinated biphenyls (PCBs), volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and metals. Samples were analyzed through the EPA Contract Laboratory Program by Spectrum Analytical PEL in Tampa, Florida.

A representative from NTH Consultants, LTD (NTH) was onsite on behalf of the City of Kalamazoo on October 14 and 15, 2014 to collect split samples from the following wells:

- MW-7
- MW-7I
- MW-7D
- MW-8 (a Panelyte well on OU1 property)
- MW-8D
- MW-16B
- MW-16I
- MW-16D
- MW-40S
- MW-40I (a former Strebor well on OU1 property, previously called MW-40)
- MW-40D

The CH2M HILL representative filled sample containers provided by NTH concurrent with the samples for EPA. NTH samples were analyzed for 1,4-dioxane; fluoride; hexametaphosphate; and VOCs (specifically trihalomethanes).

Investigation-derived Waste Characterization and Disposal

Soil cuttings generated during drilling and sampling operations were containerized and transferred by Cascade to an onsite, centralized storage location near the existing contractor building at OU1. Cuttings from the MW-16 well nest, located in a possible section of residual waste materials, were segregated into six 55-gallon drums at the central storage location. Cuttings from the remainder of the borings were combined into a roll-off container. Waste characterization samples were collected from soil cuttings on October 17, 2014. Samples were analyzed through the Central Regional Laboratory by TechLaw Inc. (TechLaw) Environmental Services Assistance Team for Region 5, located in Chicago, Illinois. Waste characterization results included in Attachment G and summarized in Table 3 indicate there is no hazardous waste or Toxic Substances Control Act-level PCB contamination in the cuttings containerized in the drums or roll-off.

Drilling and development water were transferred by Cascade from individual well locations to an 8,400-gallon mini-frac tank (provided by Cascade) near the existing onsite groundwater treatment system. CH2M HILL personnel transferred purge water collected during groundwater sampling to the mini-frac tank.

Water samples were collected from the mini-frac tank on October 17, 2014 and were analyzed by TechLaw for PCBs. PCBs were not detected in the waste characterization samples (Attachment G) summarized in Table 4. Cascade returned to the project site in November 2014 to perform additional filtering prior to transfer of the stored/filtered water into the onsite groundwater treatment system. Water was transferred to the onsite groundwater treatment system on November 25, 2014. Settled solids were removed from the mini-frac tank on November 25, 2014 and sent offsite for disposal. Soil cuttings and remaining investigation-derived wastes were transported offsite in January 2015. Wastes were disposed of at disposal facilities approved to receive waste under the Comprehensive Environmental Response, Compensation, and Liability Act Off-site Rule. Waste manifests are provided in Attachment H.

Tables

TABLE 1

Well Construction and Groundwater Level Elevations

Allied Paper Operable Unit No. 1 Superfund Site, Kalamazoo, MI

Area	Well/ Piezometer	Date Installed	2014 Groundwater Unit Assignment for Water Elevation Maps [1]	Northing (NAD83)	Easting (NAD83)	Top of Casing Elevation 2014 (feet AMSL)	Ground Surface Elevation 2014 (feet AMSL)	Screen Length (feet)	Depth to Water (ft btoc) 10/13/2014	Depth to Bottom (ft) 10/13/2014	Top of Screen Elevation 10/13/14	Bottom Elevation 10/13/2014	October 13, 2014 Water Elevation
Allied Landfill	FW-101	6/10/2002	S	279370.2	12795845.2	800.21	797.86	2.2	3.75	7.48	794.93	792.73	796.46
	MW-5R	3/26/1998	S	280731.6	12796258.9	811.31	809.41	6	18.9	28.06	789.25	783.25	792.41
	MW-6	11/16/1985	S	280747.2	12795370.9	812.16	809.53	3	14.38	28	787.16	784.16	797.78
	MW-7	11/16/1985	S	280173.2	12795495.6	818.43	817.06	3	19.06	33.2	788.23	785.23	799.37
	MW-7D	9/30/2014	D	280192.5	12795510.3	817.91	814.94	5	17.75	130	692.91	687.91	800.16
	MW-7I	10/1/2014	I	280196.3	12795510.2	817.91	815.02	5	19.97	75.5	747.41	742.41	797.94
	MW-8A	8/10/1993	S	279375.1	12795636.4	809.50	806.74	5	11.03	20.28	794.22	789.22	798.47
	MW-8D	9/24/2014	D	281439.3	12795451.8	796.74	793.75	5	2.78	167	634.74	629.74	793.96
	MW-9	11/7/1985	S	279341.6	12796002.3	802.39	799.55	3	6.5	29.98	775.41	772.41	795.89
	MW-10	11/7/1985	S	279533.5	12796677.7	808.39	804.93	3	14.18	29.33	782.06	779.06	794.21
	MW-16B	6/13/1988	S	280838.4	12796557.1	802.89	800.17	3	16.33	35.4	770.49	767.49	786.56
	MW-16D	9/19/2014	D	280823.7	12796520.9	805.64	802.61	5	12.52	162	648.64	643.64	793.12
	MW-16I	9/22/2014	I	280816.9	12796519.9	805.80	802.63	5	12.67	70	740.80	735.8	793.13
	MW-19BR	8/20/1993	S	280422.9	12796250.6	821.49	819.11	5	26.38	40.9	785.59	780.59	795.11
	MW-22AR	4/1/1998	S	279540.1	12796682.8	809.89	806.46	5	16.11	16.73	798.16	793.16	793.78
	MW-22B	8/11/1993	S	279549	12796679.1	811.51	807.92	5	16.57	51.83	764.68	759.68	794.94
	MW-23R	10/19/2000	S	279364.7	12796123.8	811.45	807.20	5	15.48	32.31	784.14	779.14	795.97
	MW-24R	3/27/1998	S	279803	12797109.3	803.85	799.69	5	dry	24	784.85	779.85	dry
	MW-26	8/25/1989	S	279726	12797070.2	791.27	789.20	3	4.61	11.31	782.96	779.96	786.66
	MW-30	11/5/1987	S	282815.7	127995380	796.16	793.67	5	11.55	17.57	783.8	778.59	784.61
	SMW-40S	9/29/2014	S	282830.9	12795413.5	796.3	793.02	5	11.66	25	776.3	771.3	784.64
	MW-40I	9/2/1990	I	282819.1	12795392.3	796.35	793.96	5	5.93	87	714.35	709.35	790.42
	MW-40D	9/26/2014	D	282831.8	12795403.8	796.29	792.89	5	5.81	166	635.29	630.29	790.48
	MW-120A	7/28/1993	S	279785.4	12795925.2	821.65	818.42	5	22.02	26.32	800.33	795.33	799.63
	MW-120B	7/27/1993	S	279779.9	12795924.9	821.55	817.64	5	22.99	33.19	793.36	788.36	798.56
	MW-122A	8/6/1993	S	280636	12796954.1	803.92	801.69	10	15.54	22.56	791.36	781.36	788.38
	MW-122AR	3/31/1998	S	280636.3	12796949.7	804.24	802.35	10	15.96	19.02	795.22	785.22	788.28
	MW-122B	8/4/1993	S	280633.7	12796957.5	804.09	801.65	5	16.49	61.4	747.69	742.69	787.60
	MW-124A	8/23/1993	S	279436.5	12797286	843.07	840.48	10	32.67	39.25	813.82	803.82	810.40
	MW-124B	8/19/1993	S	279431	12797286.9	843.81	841.44	5	41.5	61.3	787.51	782.51	802.31
	MW-125A	8/22/1993	S	279636.8	12797102.6	808.66	806.12	5	17.12	27.1	786.56	781.56	791.54
	MW-126A	7/21/1993	S	279415	12796602.9	803.86	801.42	5	9.62	23.6	785.26	780.26	794.24
	MW-126AR	4/1/1998	S	279422.3	12796600.9	804.13	802.20	5	10.86	23.45	785.68	780.68	793.27
	MW-200A	10/4/2000	S	279269	12795826.8	803.49	800.74	5	7.94	18.93	789.56	784.56	795.55
	MW-201B	10/5/2000	S	279338.5	12796010.9	801.96	799.78	5	6.15	30.19	776.77	771.77	795.81
	MW-202B	9/24/2000	S	279350.5	12796179.1	807.15	803.12	4.7	11.26	40.08	771.77	767.07	795.89
	MW-203B	9/23/2000	S	279401.6	12796341.3	805.86	802.60	4.7	11.19	31.84	778.72	774.02	794.67
	MW-204B	10/9/2000	I	280011.7	12797097.9	807.77	803.33	5	2.16	92.4	720.37	715.37	805.61
	MW-205B	10/11/2000	I	280286.4	12797098.5	805.41	801.08	5	12.67	70.1	740.31	735.31	792.74
	MW-206A	6/10/2002	S	279372.4	12795848.4	800.71	797.82	5	4.44	15.22	790.49	785.49	796.27
	MW-207	5/31/2002	S	279505.5	12796581.7	804.73	801.02	4.6	9.77	40.13	769.20	764.6	794.96
	MW-208	5/30/2002	S	279578.5	12796839.6	804.09	799.54	5	9.36	31.04	778.05	773.05	794.73
	MW-209	6/17/2002	S	280230.2	12797150.2	792.26	787.32	5	0.2	38	759.26	754.26	792.06
	MW-210	6/5/2002	S	279442.6	12796400.6	806.21	802.93	5	11.84	27.3	783.91	778.91	794.37
	MW-211	6/17/2002	S	279949.1	12797132.4	793.00	788.32	4.7	1.4	33.49	764.21	759.51	791.60
	MW-212	6/18/2002	S	280601.8	12797004.4	791.34	786.93	4.7	3.99	22.12	773.92	769.22	787.35
	MW-213	7/3/2002	S	279892.7	12797138.1	791.54	787.67	4.6	0.3	25.02	771.12	766.52	791.24
	MW-214	7/8/2002	S	280308.8	12797102	803.33	798.51	4.6	15.73	39.57	768.36	763.76	787.60
	MW-215	3/31/2003	S	281132.8	12795943.5	790.66	785.14	4.8	7.34	12.95	782.51	777.71	783.32
	MW-216	3/28/2003	S	281093.8	12796122.9	790.29	785.33	4.8	7.05	16.46	778.63	773.83	783.24
	MW-217	3/28/2003	S	281053.2	12796229.8	790.49	785.04	2	7.71	17.52	774.97	772.97	782.78
	MW-218	3/28/2003	S	281013.6	12796364.6	790.46	785.61	4.8	5.33	19.42	775.84	771.04	785.13
	MW-219	3/28/2003	S	280980.8	12796462.8	790.67	785.78	4.8	7.03	20.4	775.07	770.27	783.64
	MW-220	3/31/2003	S	280860.5	12796655.7	790.50	787.44	4.8	7.79	10.9	784.40	779.6	782.71
	MW-221R	4/8/2003	S	280741.6	12796858.1	791.01	786.66	1.9	8.96	13.32	779.59	777.69	782.05
	MW-222	4/3/2003	S	279363	12796361.6	797.07	792.46	4.6	3.31	14.41	787.26	782.66	793.76
	MW-223	4/3/2003	S	279518.4	12796825.8	796.92	793.52	2.9	dry	5.2	794.62	791.72	dry
	MW-224	3/12/2003	S	279592	12796958.5	813.02	810.05	4.6	22.09	26.97	790.65	786.05	790.93
	MW-225	3/7/2003	S	279734.1	12797207	792.67	789.07	4.6	6.1	12.43	784.84	780.24	786.57
	MW-226	3/3/2003	S	281095.8	12796118.7	790.46	785.40	2	8	9.04	783.42	781.42	782.46
	MW-227	3/28/2003	S	281050.7	12796235.1	790.38	784.93	2	7.88	10.06	782.32	780.32	782.50
	MW-228	3/28/2003	S	281008.5	12796366.4	790.80	784.92	3	7.4	10.55	783.25	780.25	783.40
	MW-229	3/28/2003	S	280975.3	12796460.3	791.05	785.45	4	7.71	8.95	786.10	782.1	783.34
	MW-230	4/3/2003	S	280771.8	12796770.2	790.63	787.62	4	5.54	9.03	785.60	781.6	785.09

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	MW-231	3/31/2003	S	281130.7	12795948.6	790.45	785.50	4.8	3.64	28.93	766.32	761.52	786.81
	MW-232	3/31/2003	S	280864.6	12796655	790.39	787.06	3	7.45	17.56	775.83	772.83	782.94
	OW-1A	2/17/2000	S	280460.8	12797016.4	807.19	802.84	2	17.87	24.4	784.79	782.79	789.32
	OW-2A	2/22/2000	S	280025.3	12797098.6	806.42	803.13	1.9	16.69	20.6	787.72	785.82	789.73
	OW-2B	2/21/2000	S	280031.6	12797099	806.21	803.11	4.8	14.07	36.37	774.64	769.84	792.14
	OW-2P	2/22/2000	S	280019.5	12797098	806.67	803.37	4.8	17.08	17.66	793.81	789.01	789.59
	OW-3AR	9/28/2000	S	279676.5	12796963.8	806.04	802.33	4.6	15.23	22.09	788.55	783.95	790.81
	OW-3B	2/21/2000	S	279680.5	12796945.4	809.46	805.12	5	13.51	44.28	770.18	765.18	795.95
	OW-3PR	9/28/2000	S	279677	12796959.1	806.84	803.33	4.8	dry	9	802.64	797.84	dry
	OW-4AR	9/27/2000	S	279473.3	12796403	811.19	807.58	5	16.43	17.74	798.45	793.45	794.76
	OW-4AR	9/27/2000	S	279473.3	12796403	811.19	807.58	4.6	16.43	25	790.79	786.19	794.76
	OW-4PR	6/25/2002	S	279471.8	12796409.2	810.88	806.97	7.5	15.47	18.62	799.76	792.26	795.41
	OW-5P	3/2/2000	S	279398.8	12795967.5	815.96	813.02	5	20.2	4.56	816.40	811.4	795.76
	OW-5P	3/2/2000	S	279398.8	12795967.5	815.96	813.02	4.8	20.2	21	799.76	794.96	795.76
	OW-6A	3/3/2000	S	279412.9	12795891.9	816.98	813.52	4.8	20.71	34.59	787.19	782.39	796.27
	OW-6P	3/7/2000	S	279414	12795884.5	817.02	813.54	4.8	19.87	22.11	799.71	794.91	797.15
	OW-7PR	6/14/2000	S	280592.2	12796860.4	809.00	804.82	4.8	16.81	19.66	794.14	789.34	792.19
	OW-9PR	9/26/2000	S	279376.5	12796245.4	811.18	807.66	5	18.89	20.55	795.63	790.63	792.29
	OW-10P	3/1/2000	S	279770.8	12797067.2	805.98	802.29	5	15.97	16	794.98	789.98	790.01
	OW-11A	10/7/2000	S	280327.2	12797085.4	803.59	800.23	4.7	15.24	22.46	785.83	781.13	788.35
	OW-11P	3/10/2000	S	280297.8	12797094.3	805.59	801.23	5	15.98	9.94	800.65	795.65	789.61
	OW-12A	9/1/2000	S	279552	12796686	811.96	807.99	4.7	17.71	32.24	784.42	779.72	794.25
	OW-13A	10/3/2000	S	279493.4	12796530.5	805.00	801.85	2.8	14.51	21.79	786.01	783.21	790.49
	OW-13B	10/3/2000	S	279494.3	12796535.2	805.13	801.60	5	dry	7.52	802.61	797.61	DRY
	OW-13P	10/2/2000	S	279492.6	12796525.6	805.02	801.92	5	dry	10.75	799.27	794.27	DRY
	OW-14P	5/31/2002	S	279596.4	12796859.8	803.81	800.22	4.8	13.36	16.45	792.16	787.36	790.45
	OW-15P	6/26/2002	S	279369.9	12796071	813.09	809.05	4.9	17.45	20.36	797.63	792.73	795.64
	OW-16P	6/26/2002	S	279542.5	12796779.9	805.72	801.04	4.9	12.34	15.5	795.12	790.22	793.38
	OW-17P	6/26/2002	S	279930.3	12797112.1	803.20	799.70	4.9	13.99	16.05	792.05	787.15	789.21
Panelyte	MW1	5/23/2002	S	282113	12795349	797.02	794.47	10	7.25	20.05	787.6	776.97	789.77
	MW2	5/22/2002	S	282398.1	12795191.9	795.84	793.43	10	7.66	17.39	788.6	778.45	788.18
	MW3	5/22/2002	S	281479.8	12795161.2	799.3	796.91	10	4.94	18.64	791	780.66	794.36
	MW4	5/23/2002	S	281729.2	12795398.8	795.15	792.77	10	5.28	16.97	789	778.18	789.87
	MW5	5/24/2002	S	281975.9	12795539.2	795	792.35	10	5.81	7.1	790.5	787.9	789.19
	MW6	5/28/2002	S	282163.3	12795522.9	794.88	792.71	10	5.85	6.43	791	788.45	789.03
	MW7	5/28/2002	S	282426.8	12795607.3	795.26	793.18	10	7.1	16.55	789.3	778.71	788.16
	MW8	5/21/2002	S	281449.5	12795465.6	795.77	793.32	10	5.17	18.8	787.3	776.97	790.6
	MW9	5/20/2002	S	282451.8	12795750.7	781.07	778.92	2.5	3.9	5.74	777.9	775.33	777.17
	MW10	5/20/2002		282066.2	12795740.3	781.52	779.06		NM	NM	775.1	NM	NM
	MW11	5/20/2002	S	281652.3	12795686.8	782.81	780.63	2.5	1.83	8.07	777.8	774.74	780.98
Strebor [2]	MW-1	NA	S	NA	NA	803.20	801.60	5	9.77	NM	790.2	785.2	793.43
	MW-16A	9/20/2010	S	NA	NA	797.31	792.39	5	9.26	NM			788.05
	MW-21	NA	S	NA	NA	795.01	793.00	5	8.04	NM			786.97
	MW-26A		S	NA	NA	790.27	791.19	8	5.79	NM			785.4
	MW-27		S	NA	NA	796.56	793.90	10.7	9.64	NM			786.92
	MW-35	11/13/1988	S	NA	NA	795.83	793.00	5	8.1	NM	776.7	771.7	787.73
	MW-38	9/19/1990	S	NA	NA	782.17	779.2	10	7.49	NM	777	767	774.68
	MW-39	9/20/1990	I	NA	NA	782.18	778.9	5	-7.88	NM	698.4	693.4	790.06
	MW-47	9/28/2010	S	NA	NA	797.95	795.59	5	9.4	NM	790.09	785.09	790.77
	MW-48	9/28/2010	S	NA	NA	798.53	796.14	10	9.66	NM	793.14	783.14	791.09
	MW-50	9/29/2010	S	NA	NA	797.37	794.88	10	9.59	NM	790.88	780.88	790
	MW-53	9/29/2010	S	NA	NA	795.54	793.16	5	8.64	NM	787.16	782.16	789.12
	PZ-2	9/30/2010	S	NA	NA	794.39	792.51	5	7.36	NM	784.51	779.51	787.03

					Staff Gauge Reference Point	Survey Elevation	Staff Gauge Reading	Water Level
Staff Gage	N. STAFF GAGE	283011.753	12795508.02		780	778.3	777.25	775.55
	S. STAFF GAGE	279223.994	12795833.82		794	793.817	791	790.817

[1] S = Shallow; I = Intermediate; D = Deep

[2] Strebor well construction information taken from 2013 Annual Report prepared by Bay West.

[3] 2014 survey data used preferentially - previous data used if 2014 data not available

TABLE 2
Summary of Field Parameter Values Recorded Prior to Sampling
Allied Landfill Groundwater Investigation, Kalamazoo, Michigan

Well ID	Sample Date	Sample Time	pH SU	Specific Conductance mS/cm	Dissolved Oxygen mg/L	ORP mV	Turbidity NTU	Temperature °Celcius	Purge / Flow Rate mL/minute
MW-6	10/15/2014	15:35	7.29	1.032	4.82	24.2	6.39	14.21	240
MW-7	10/14/2014	16:00	7.48	1.118	3.05	85.6	7.72	15.39	260
MW-7I	10/14/2014	14:05	7.99	0.91	3.11	-168.8	4.49	16.07	90
MW-7D	10/14/2014	15:50	7.25	0.606	0.19	-110.5	2.88	12.92	>500
MW-8*	10/14/2014	11:05	7.33	1.102	11.99	7.4	2.35	13.77	220
MW-8D	10/15/2014	12:35	7.78	0.673	3.08	-247.4	9.90	12.19	1000
MW-8A	10/15/2014	17:00	7.00	0.873	0.10	-86.2	7.20	14.09	375
MW-16B	10/14/2014	18:00	7.58	0.777	3.06	-113.2	9.30	14.59	110
MW-16I	10/14/2014	18:10	7.59	0.625	0.96	-140.6	10.30	13.67	250
MW-16D	10/15/2014	14:00	8.19	0.443	0.08	-274.9	8.43	12.98	425
MW-22B	10/16/2014	15:15	6.95	0.925	1.89	-69.0	2.07	12.87	250
MW-40S	10/14/2014	9:30	7.19	1.041	2.12	-97.1	7.56	14.39	200
MW-40	10/14/2014	11:25	7.43	0.543	0.31	-32.1	5.81	14.46	250
MW-40D	10/15/2014	10:10	7.76	0.548	0.58	-153.6	5.90	13.31	350
MW-122B	10/17/2014	12:35	6.56	1.056	0.20	-34.4	8.61	13.72	190
MW-125A	10/13/2014	15:07	6.61	1.238	1.25	-27.7	2.20	14.07	280
MW-201B	10/15/2014	17:10	6.35	1.341	2.38	-65.7	9.69	13.29	280
MW-203B	10/16/2014	10:00	7.06	0.91	1.24	-86.8	6.26	12.53	270
MW-204B	10/16/2014	17:45	7.17	0.897	1.88	-84.2	9.50	13.72	180
MW-205B	10/17/2014	8:45	9.69	0.314	4.58	184.0	5.15	12.56	260
MW-207	10/16/2014	13:35	7.09	0.955	2.51	-86.2	9.80	14.52	120
MW-208	10/16/2014	15:45	6.79	1.45	0.10	-62.0	9.79	13.70	250
MW-209	10/16/2014	11:21	7.17	0.691	0.09	-77.9	6.20	12.82	375
MW-211	10/16/2014	10:10	9.20	0.648	0.12	-92.1	6.02	12.50	375
MW-212	10/16/2014	12:50	6.36	1.174	0.13	-42.4	9.95	13.25	370
MW-214	10/17/2014	11:10	6.69	1.421	0.61	-71.2	3.18	12.87	80
MW-218	10/17/2014	8:45	6.93	0.834	1.65	-81.5	5.61	13.20	380
MW-221R	10/17/2014	11:25	6.52	1.068	3.34	-72.6	10.00	15.70	300
MW-222	10/13/2014	16:50	7.17	0.662	0.71	-64.2	1.60	13.25	350
MW-224	10/13/2014	15:00	6.29	1.312	2.44	-62.0	3.30	14.06	160
MW-231	10/16/2014	17:35	6.89	0.933	0.08	-56.6	7.58	12.68	360
MW-232	10/17/2014	9:45	6.47	0.845	1.88	-66.4	8.14	13.52	310

* Panelyte well

Figures

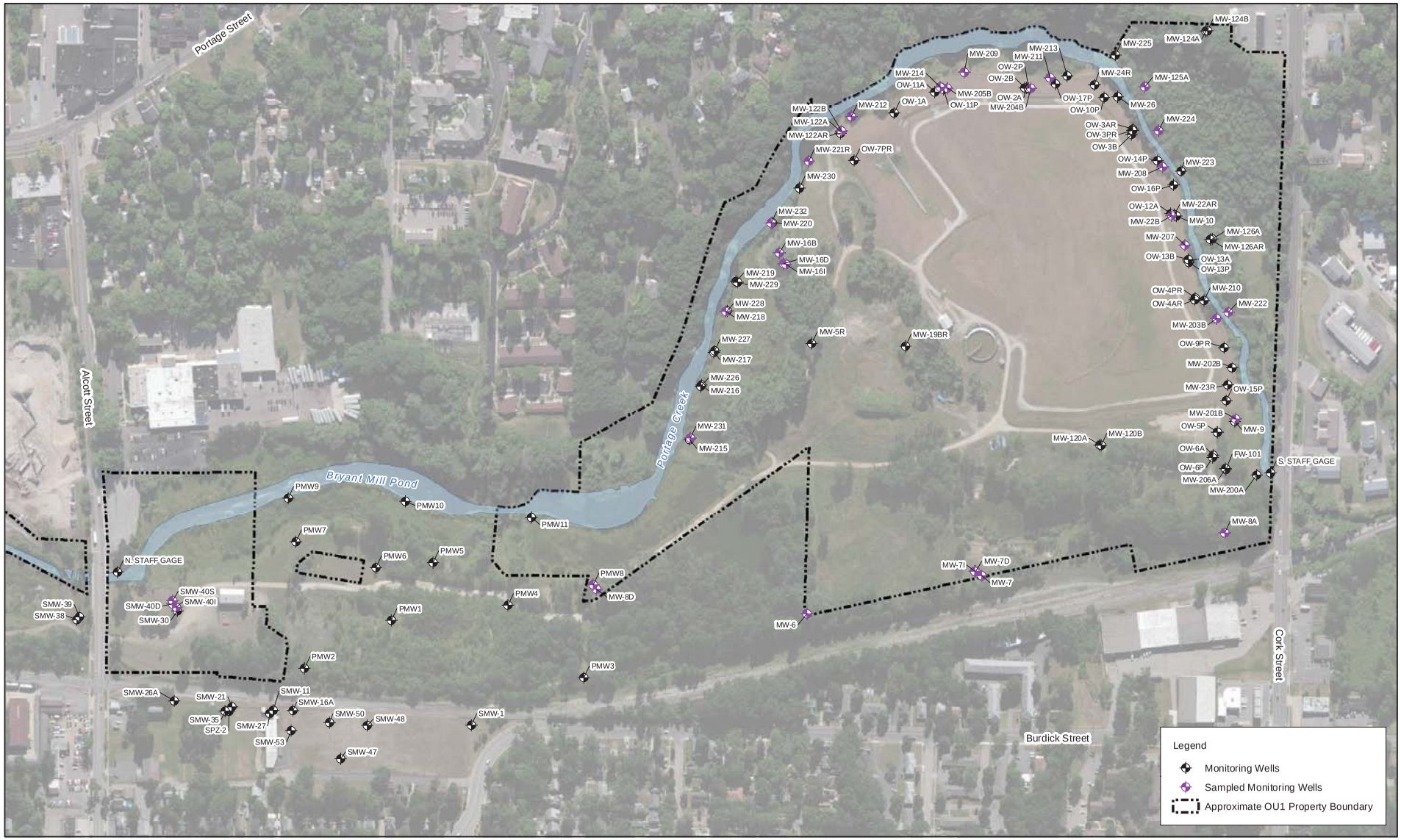

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Figure 1
Sampled Locations
2014 Groundwater Report
Allied Landfill
Kalamazoo, Michigan

CH2MHILL

MKE \\LAKEFRONT\PROJ\EPA\ALLIEDPAPER_KALAMAZOOMI\MAPFILES\GWREPORT2014\FIGURE 01 - WELLS SAMPLED.MXD JHANSEN1 12/12/2014 5:42:00 PM

Attachment A
Soil Boring Logs

CH2MHILL	PROJECT NUMBER 419665.FI.01	BORING NUMBER MW-7D / 7I	SHEET / OF 7

SOIL BORING LOG

PROJECT : Allied Paper / Kalamazoo River OU1 LOCATION : Kalamazoo, MI DATE: 9/16/14 + 9/29/14

WEATHER: DRILLING CONTRACTOR : Cascade

DRILLING METHOD AND EQUIPMENT USED : Rotosonic, Prosonic 600 T Sonic Drill

WATER LEVELS START : 1420 9/16, 1402 9/29 END : 1450 9/16 1700 9/29 LOGGER : G. KOSTER

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	TYPE	Pocket Penetrometer or Torvane Results TSF	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, SOIL STRUCTURE	COMMENTS: DEPTH OF CASING, DRILLING RATE, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Core
0	0/10	10	SW	N/A	0/4.5 SAND, FINE TO COARSE, WELL GRADED, BROWN, MOIST LITTLE GRAVEL. OCCURANCE OF CLAY CHUNKS	0
5			SP	N/A	4.5/9.5 SAND, FINE TO MEDIUM, POORLY GRADED, LIGHT BROWN, MOIST, TRACE GRAVEL	0
10	10/16	5	SW	NA	9.5/24 SAND, FINE TO MEDIUM WELL GRADED, LIGHT BROWN, MOIST, TRACE GRAVEL. NOTE: 10-14' BENTONITE FROM ISOLATION CASING RECOVERED.	10' END DRILLING. INSTALL ISOLATION CASING 9/16/14.
15	16/26	8.5				0
20						
25			SP	N/A	24/26 SAND. MEDIUM TO COARSE, BROWN. MOIST	0
30	26/36	10	CL/SC	3.5 to 5.0+	26/65.5 SANDY CLAY TO CLAYEY SAND WITH SOME GRAVEL. BROWNISH GRAY, WET	0

Sampler Signature: _____ Date: _____

CH2MHILL	PROJECT NUMBER 419665.FI.01	BORING NUMBER MW-70/7I	SHEET 2 OF 7

SOIL BORING LOG

PROJECT : Allied Paper / Kalamazoo River OU1 LOCATION : Kalamazoo, MI DATE: 9/29/14

WEATHER: DRILLING CONTRACTOR : Cascade

DRILLING METHOD AND EQUIPMENT USED : Rotosonic, Prosonic 600 T Sonic Drill

WATER LEVELS START : 1450 END : 1700 LOGGER : G KOSTER

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	TYPE	Pocket Penetrometer or Torvane Results	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, SOIL STRUCTURE	COMMENTS: DEPTH OF CASING, DRILLING RATE, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Core
30			CL/SC	3.5 to 5.0+		0
35	36/46	10.5'				0
40						0
45	46/56	10.5				0
50					49' LARGE ROCK PRESENT	0
55	56/66	10.5				0
60						

Sampler Signature: _____ Date: _____

CH2MHILL	PROJECT NUMBER 419665.FI.01	BORING NUMBER MW-70/71	SHEET 3 OF 7

SOIL BORING LOG

PROJECT : Allied Paper / Kalamazoo River OU1 LOCATION : Kalamazoo, MI DATE: 9/29/14

WEATHER: DRILLING CONTRACTOR : Cascade

DRILLING METHOD AND EQUIPMENT USED : Rotosonic, Prosonic 600 T Sonic Drill

WATER LEVELS START : END : LOGGER : G. KOSTER

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	TYPE	Pocket Penetrometer or Torvane Results TSF	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, SOIL STRUCTURE	COMMENTS: DEPTH OF CASING, DRILLING RATE, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Core
60			CL/SC	3.5 to 5.0+		0
65	66/76	9.5'	SP	N/A	65.5/74 SAND (MEDIUM TO FINE) BROWN, MOIST TO WET, LITTLE TO SOME GRAVEL THROUGHOUT.	0
70						
75			GP	N/A	74/75 GRAVEL W/ COARSE SAND	75'6" MW-71 B.O.S INSTALLED
			SP	N/A	75/76.5 SAND, FINE TO MEDIUM BROWN, WET	0
	76/86	10'	CL	5.0+	76.5/86 SILTY CLAY, BROWNISH GREY, MOIST	
80						0
85						
	86/96	11'	SP	N/A	86/88 SAND, MEDIUM TO COARSE, BROWN, WET	0
			CL	1.5 to 4.5	88/92 SILTY CLAY, BROWNISH GREY, MOIST	
90						

Sampler Signature: _____ Date: _____

CH2MHILL	PROJECT NUMBER 419665.FI.01	BORING NUMBER MW-70/7I	SHEET 4 OF 7

SOIL BORING LOG

PROJECT : Allied Paper / Kalamazoo River OU1 LOCATION : Kalamazoo, MI DATE: 9/29/14+

WEATHER: DRILLING CONTRACTOR : Cascade 9/30/14

DRILLING METHOD AND EQUIPMENT USED : Rotosonic, Prosonic 600 T Sonic Drill

WATER LEVELS START : 1450 9/29, 755 9/30 END : 1700 9/29, 1040 9/30 LOGGER : G. KOSTER

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	TYPE	Pocket Penetrometer or Torvane Results	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, SOIL STRUCTURE	COMMENTS: DEPTH OF CASING, DRILLING RATE, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Core
90			CL	1.5 to 4.5		
			SP		92/93 FINE SAND	0
			CL	5.0+	93/96 SILTY CLAY, BROWNISH GREY, WET	
95						END DRILLING 9/29
	96/106	7'	SP	N/A	96/116 SAND, MEDIUM TO FINE, BROWN, MOIST TO WET	
100						
105						0
	106/116	8.5				
110						
115						
	116/126	9'	GP	N/A	116/117 GRAVEL + COARSE SAND, WET	
			SW	N/A	117/129.5 SAND, MEDIUM TO COARSE, WITH SOME GRAVEL AND COBBLES, WET	0
120						

Sampler Signature: _____ Date: _____

CH2MHILL	PROJECT NUMBER 419665.FI.01	BORING NUMBER MW-70/7I	SHEET 5 OF 7

SOIL BORING LOG

PROJECT : Allied Paper / Kalamazoo River OU1 LOCATION : Kalamazoo, MI DATE: 9/30/14

WEATHER: DRILLING CONTRACTOR : Cascade

DRILLING METHOD AND EQUIPMENT USED : Rotosonic, Prosonic 600 T Sonic Drill

WATER LEVELS START : 755 END : 1140 LOGGER : G. KOSTER

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	TYPE	Pocket Penetrometer or Torvane Results	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, SOIL STRUCTURE	COMMENTS: DEPTH OF CASING, DRILLING RATE, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Core
120			SW	N/A		0
125						
	126/136	7'				2" PVC WELL W/ 5' SCREEN INSTALLED AT 130' B.O.S.
130			SM/ML	N/A	129.5/152 SILTY SAND / SANDY SILT, FINE TO VERY FINE SAND, BROWN, WET	0
135						
	136/146	10'				
140						0
145						
	146/156	10				
150						

Sampler Signature: _____ Date: _____

CH2MHILL	PROJECT NUMBER 419665.FI.01	BORING NUMBER MW-70/77	SHEET 6 OF 7

SOIL BORING LOG

PROJECT : Allied Paper / Kalamazoo River OU1 LOCATION : Kalamazoo, MI DATE: 9/30/14

WEATHER: DRILLING CONTRACTOR : Cascade

DRILLING METHOD AND EQUIPMENT USED : Rotosonic, Prosonic 600 T Sonic Drill

WATER LEVELS START : 755 END : 1040 LOGGER : G. KOSTER

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	TYPE	Pocket Penetrometer or Torvane Results	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, SOIL STRUCTURE	COMMENTS: DEPTH OF CASING, DRILLING RATE, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Core
150			SM/ML	N/A		0
			ML		152/173 SILT, BROWNISH GREY, VERY DENSE, WET	
155						
	156/166	10'				0
160						
165						
	166/176	10'				0
170						
			ML/SM		173/186 SANDY SILT, VERY FINE SAND, BROWNISH GREY, FINE LAMINATIONS THROUGHOUT	
175						
	176/186	11'				0
180					179.5-180 CLAY LENSE	

Sampler Signature: _____ Date: _____

CH2MHILL	PROJECT NUMBER 419665.FI.01	BORING NUMBER MW-7D/7I	SHEET 7 OF 7

SOIL BORING LOG

PROJECT : Allied Paper / Kalamazoo River OU1 LOCATION : Kalamazoo, MI DATE: 9/30/14

WEATHER: DRILLING CONTRACTOR : Cascade

DRILLING METHOD AND EQUIPMENT USED : Rotosonic, Prosonic 600 T Sonic Drill

WATER LEVELS START : 755 END : 1040 LOGGER : G. KOSTER

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	TYPE	Pocket Penetrometer or Torvane Results	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, SOIL STRUCTURE	COMMENTS: DEPTH OF CASING, DRILLING RATE, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Core
180				TSF		
			ML/SM	N/A		0
185						
186					END OF BORING	

Sampler Signature: _____ Date: _____

CH2MHILL	PROJECT NUMBER 419665.FI.01	BORING NUMBER MW-8D	SHEET 1 OF 6

SOIL BORING LOG

PROJECT : Allied Paper / Kalamazoo River OU1 LOCATION : Kalamazoo, MI DATE: 9/17/14 + 9/23/14

WEATHER: DRILLING CONTRACTOR : Cascade

DRILLING METHOD AND EQUIPMENT USED : Rotosonic, Prosonic 600 T Sonic Drill

WATER LEVELS START : 0735 9/17, 0830 9/23 END : 0805 9/17, 1330 9/23 LOGGER :

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	TYPE	Pocket Penetrometer or Torvane Results TSF	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, SOIL STRUCTURE	COMMENTS: DEPTH OF CASING, DRILLING RATE, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Core
0			SM	N/A	0-1' DARK BROWN SILTY SAND, MOIST	0
			SP	N/A	1-2' MED. SAND w/ FINE GRAVEL	
	0-6'	6'	SP-GP	N/A	2-3.5' BLACK COARSE SAND w/ GRAVEL AND FINE COBBLES	
5					3.5-4' SAA, RED TO DARK BROWN	0
					4-6' SAA, MOIST TO WET	
	6-10'	4'			6-10 SAA, WET w/ SOME RUBBISH (GLASS)	0
10						END DRILLING 9/17/14 START DRILLING 9/23/14
	10-17'	7'	SM	N/A	10-12' BLACK SILTY SAND, SOME ORGANICS	
			SM-SG	N/A	12-15' BLACK SILTY SAND w/ GRAVEL, VERY WET	
15			SG	N/A	15-16' BLACK SAND AND FINE GRAVEL. WOOD DEBRIS AT 16'	0.2
			SM	N/A		OLD SURFACE ?
	17-27'	6'	SG		16-16.5' SILTY ORGANIC LAYER	
					16.5-26' TAN-BROWN, COARSE SAND AND GRAVEL. GRAVEL CONTENT DECREASING w/ DEPTH	0
20						
25						
			SP	N/A	26-27' CLEAN MEDIUM SAND	0
	27-37'	10'	SG	N/A	27-29' COARSE SAND AND FINE GRAVEL, MOIST	0
30			SP	N/A	29-31' COARSE SAND	0

Sampler Signature: _____ Date: _____

CH2MHILL

PROJECT NUMBER	BORING NUMBER	SHEET 2 OF 6
419665.FI.01	MW-8D	

SOIL BORING LOG

PROJECT : Allied Paper / Kalamazoo River OU1 LOCATION : Kalamazoo, MI DATE: 9/23/2014

WEATHER: DRILLING CONTRACTOR : Cascade

DRILLING METHOD AND EQUIPMENT USED : Rotosonic, Prosonic 600 T Sonic Drill

WATER LEVELS START : END : LOGGER : A. WALTER

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	TYPE	Pocket Penetrometer or Torvane Results TSF	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, SOIL STRUCTURE	COMMENTS: DEPTH OF CASING, DRILLING RATE, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone	Core
30	27-37'	10'	SP	N/A	29-31' COARSE SAND		0
			SM	N/A	31-32' SANDY SILT, MOIST, GREY		0
			SP	N/A	32-33' GREY MEDIUM SAND 33-39' BROWN MEDIUM-COARSE SAND W/ GRAVEL LOOSE, MOIST		
35							0
	37-47'	10'					
			SM	N/A	39-41' SILTY SAND, WET		
40							0
			CL	N/O	41-41.5' SILTY CLAY, STIFF		0
			SM	N/A	41.5-50' SILTY SAND W/ GRAVEL, FINE TO MEDIUM SAND.		
45							
	47-57'	10					
50			CL	N/O	50-52' SILTY CLAY W/ FINE SAND		0
			SP	N/A	52-55.5 MEDIUM SAND TRANSITIONING INTO FINE SAND W/ SILT		0
55			SM				
			CL	N/O	55.5-57.5' SILTY CLAY W/ GRAVEL, SOME SILT LENSES		0
	57-67'		SM		57.5-60' SAND W/ SILT BECOMING FINER W/ DEPTH		0
60			SM-ML				

Sampler Signature: Date:

CH2MHILL	PROJECT NUMBER 419665.FI.01	BORING NUMBER MW-8D	SHEET 3 OF 6

SOIL BORING LOG

PROJECT : Allied Paper / Kalamazoo River OU1 LOCATION : Kalamazoo, MI DATE: 9/23/2014

WEATHER: DRILLING CONTRACTOR : Cascade

DRILLING METHOD AND EQUIPMENT USED : Rotosonic, Prosonic 600 T Sonic Drill

WATER LEVELS START : END : LOGGER : A. WALTER

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	TYPE	Pocket Penetrometer or Torvane Results	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, SOIL STRUCTURE	COMMENTS: DEPTH OF CASING, DRILLING RATE, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Core
60			TSF	TSF		
	57-67'	10	SM-ML	N/A	60-60.5' SILT/SAND/CLAY MIX	0.0
			CL	5+	60.5-65 CLAY W/ SILT, SOME SMALL SAND POCKETS, VERY STIFF	0.0
65			SM SP	N/A	65-67 SILTY SAND TRANSITION INTO MEDIUM SAND, MOIST	0.0
	67-77	10	SP-SG	N/A	67-73.5 FINE TO MEDIUM SAND TRANSITIONING TO MEDIUM COARSE SAND, SOME FINE GRAVEL	0.0
70						
			CL	N/A	73.5-75 SILTY CLAY, VERY STIFF	0.0
75			ML	N/A	75-76 SILT W/ FINE SAND	
			CL		76-76.5 SILTY CLAY, VERY STIFF	
	77-87	10'	ML	N/A	76.5-79.5 SANDY SILT, WET	
80			SM	N/A	79.5 MEDIUM SAND LENSE 79.5-87 FINE SAND W/ SILT TRANSITION TO FINE-MEDIUM SAND	0.0
85			SP	NA		
	87-97	10	SP-SG	N/A	87-96 MEDIUM SAND, SOME FINE SAND AND FINE GRAVEL	0.0
90						

Sampler Signature: _____ Date: _____

CH2MHILL

PROJECT NUMBER	BORING NUMBER	SHEET 4 OF 6
419665.FI.01	MW-8D	

SOIL BORING LOG

PROJECT : Allied Paper / Kalamazoo River OU1 LOCATION : Kalamazoo, MI DATE: 9/23/2014

WEATHER: DRILLING CONTRACTOR : Cascade

DRILLING METHOD AND EQUIPMENT USED : Rotosonic, Prosonic 600 T Sonic Drill

WATER LEVELS START : END : LOGGER : A. WACKER

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	TYPE	Pocket Penetrometer or Torvane Results	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, SOIL STRUCTURE	COMMENTS: DEPTH OF CASING, DRILLING RATE, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Core
90						
	87-97'	10	SP-SG	N/A	87-96 MEDIUM SAND, SOME FINE SAND & FINE GRAVEL	0.0
95						
			SP	N/A	96-97 FINE SAND	0.0
	97-107	9.5'	SG	N/A	97-104.5 MEDIUM SAND AND GRAVEL	
100						0.0
105			CL	N/O	104.5 STIFF CLAY LENSE	
			SP	N/A	104.5-123 MEDIUM SAND WITH SOME GRAVEL. GRAVEL INCREASING WITH DEPTH.	
	107-117	9.5'				
110						0.0
115						
	117-127	10'				
120			SP-SG	N/A		

Sampler Signature: _____ Date: _____

CH2MHILL

PROJECT NUMBER	BORING NUMBER	SHEET 5 OF 6
419665.FI.01	MW-8D	

SOIL BORING LOG

PROJECT : Allied Paper / Kalamazoo River OU1 LOCATION : Kalamazoo, MI DATE: 9/23/2014

WEATHER: DRILLING CONTRACTOR : Cascade

DRILLING METHOD AND EQUIPMENT USED : Rotosonic, Prosonic 600 T Sonic Drill

WATER LEVELS START : END : LOGGER : A. WALTER

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	TYPE	Pocket Penetrometer or Torvane Results	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, SOIL STRUCTURE	COMMENTS: DEPTH OF CASING, DRILLING RATE, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Core
120			SP-SG	NA		
			SP	NA	123-160 MEDIUM SAND	0.0
125						
	127-137	81				
130						
135						
	137-147	10'				0.0
140						
145						
	147-157'	10'				
150						

Sampler Signature: _____ Date: _____

CH2MHILL	PROJECT NUMBER 419665.FI.01	BORING NUMBER MW-8D	SHEET 6 OF 6

SOIL BORING LOG

PROJECT : Allied Paper / Kalamazoo River OU1 LOCATION : Kalamazoo, MI DATE: 9/23/14

WEATHER: DRILLING CONTRACTOR : Cascade

DRILLING METHOD AND EQUIPMENT USED : Rotosonic, Prosonic 600 T Sonic Drill

WATER LEVELS START : END : 1330 LOGGER : A. WALTER

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	TYPE	Pocket Penetrometer or Torvane Results	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, SOIL STRUCTURE	COMMENTS: DEPTH OF CASING, DRILLING RATE, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Core
150						
			SP			0.0
155						
	157-167	10				
160			SP-SG	NA	160-167' SAND + COARSE GRAVEL	0.0
165						
167	2.48				END OF BORING	1330 9/23/2014 2" PVC WELL w/ 5' SCREEN INSTALLED AT 167' B.O.S.

Sampler Signature: A.W. Walter Date: 9/23/2014

CH2MHILL

PROJECT NUMBER	BORING NUMBER	SHEET / OF 5
419665.FI.01	MW-16D	

SOIL BORING LOG

PROJECT : Allied Paper / Kalamazoo River OU1 LOCATION : Kalamazoo, MI DATE: 9/15/14

WEATHER: DRILLING CONTRACTOR : Cascade

DRILLING METHOD AND EQUIPMENT USED : Rotosonic, Prosonic 600 T Sonic Drill

WATER LEVELS START : 1545 END : 1724 LOGGER : G. KOSTER

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	TYPE	Pocket Penetrometer or Torvane Results TSF	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, SOIL STRUCTURE	COMMENTS: DEPTH OF CASING, DRILLING RATE, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Core
0	0/6	6'	SM	N/A	0/3 SILTY SAND (MED), BROWN MOIST, SOME GRAVEL 3/14 SILTY SAND, LIGHT BROWN, TRACE GRAVEL.	0
5						0
	6/16	7'			10' PAPER RESIDUALS	
10						0
15			SM/ML	N/A	14/20 SILTY SAND CHANGING TO SILT, BLACK, MOIST TO WET. PAPER RESIDUALS AT 15-16'	
	16/26	9.5				2-3
20			SW	N/A	20/26 CLEAN SAND (MEDIUM TO FINE) BROWN, WET, TRACE GRAVEL	0
25						
	26/40	14	OL	1.25	26/27 SILTY CLAY, RED, WET	
			SP	NA	27/30 SAND, MEDIUM TO FINE, BROWNISH-GREY, WET	
30						

Sampler Signature: _____ Date: _____

CH2MHILL	PROJECT NUMBER 419665.FI.01	BORING NUMBER MW-16D	SHEET 2 OF 5

SOIL BORING LOG

PROJECT : Allied Paper / Kalamazoo River OU1 LOCATION : Kalamazoo, MI DATE: 9/15/14 + 9/17/14

WEATHER: DRILLING CONTRACTOR : Cascade

DRILLING METHOD AND EQUIPMENT USED : Rotosonic, Prosonic 600 T Sonic Drill

WATER LEVELS START : 1545 9/15 1320 9/17 END : 1724 9/15 1850 9/17 LOGGER : G. KOSTER

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	TYPE	Pocket Penetrometer or Torvane Results TSF	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, SOIL STRUCTURE	COMMENTS: DEPTH OF CASING, DRILLING RATE, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Core
30			ML	NA	30/40 SANDY SILT, PURPLE-BROWN, MOIST	0
35						
40	40/47	7	SM-SP		40/42.5 SILTY SAND (FINE TO VERY FINE, GREY-BROWN,	END DRILLING 9/15. INSTALL ISOLATION CASING
			CL	2.0 - 3.75 5+ @ 45	42.5/45 SILTY CLAY, GREY-BROWN, MOIST. DRY + HARD AT 44.5'	0
45			SP	N/A	45/47 VERY FINE SAND, GREY-BROWN, WET	0
	47/57	8.5	CL/ML		47/52 SILTY CLAY, GREY-BROWN, LITTLE MED. SAND MIXED THROUGHOUT (ALTERNATES W/ CLAYEY-SILT)	
50						0
			SP	N/A	52/70 SAND VERY FINE COARSENING W/DEPTH TO VERY COARSE AT 65'	
55						0
	57/67	8.5				
60						

Sampler Signature: _____ Date: _____

CH2MHILL

PROJECT NUMBER 419665.FI.01

BORING NUMBER

SHEET 3 OF 5

SOIL BORING LOG

PROJECT : Allied Paper / Kalamazoo River OU1 LOCATION : Kalamazoo, MI DATE: 9/17/14

WEATHER: DRILLING CONTRACTOR : Cascade

DRILLING METHOD AND EQUIPMENT USED : Rotosonic, Prosonic 600 T Sonic Drill

WATER LEVELS START : 1320 END : 1850 LOGGER : G. KOSTER

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	TYPE	Pocket Penetrometer or Torvane Results TSF	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, SOIL STRUCTURE	COMMENTS: DEPTH OF CASING, DRILLING RATE, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone	Core
60			SP				0
65							
	67/77	10'					
70			CL	1.5	70/71 SANDY CLAY, GREY-BROWN MOIST, FIRM		0
			SP	NA	71/143 SAND (FINE TO MEDIUM), BROWN, MOIST TO WET. SOME SILTY SAND AT 76'		0
75							
76							
77							
87	77/87	9'					
97	87/97	9.5'					0
107	97/107	10'					0
117	107/117	9'					0
127	117/127	9'					0
128	127/137						0
							0
130							
							0
135							

Sampler Signature: _____ Date: _____

CH2MHILL

PROJECT NUMBER	BORING NUMBER	SHEET 4 OF 5
419665.FI.01		

SOIL BORING LOG

PROJECT : Allied Paper / Kalamazoo River OU1 LOCATION : Kalamazoo, MI DATE: 9/17/14

WEATHER: DRILLING CONTRACTOR : Cascade

DRILLING METHOD AND EQUIPMENT USED : Rotosonic, Prosonic 600 T Sonic Drill

WATER LEVELS START : 1320 END : 1850 LOGGER : G KOSPER

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	TYPE	Pocket Penetrometer or Torvane Results TSF	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, SOIL STRUCTURE	COMMENTS: DEPTH OF CASING, DRILLING RATE, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Core
135						
						0
140						
			SW	N/A	143/146 SAND (FINE TO COARSE) GREY-BROWN, MOIST TO WET, SOME GRAVEL THROUGHOUT	
145						0
	147/157	9.5	SP	NA	146/162 SAND (FINE TO MEDIUM) BROWN TO GREY-BROWN. TRACE GRAVEL. DISCOLORED FROM HEAT OF DRILLING	2.8 FROM HOT CORE 3 COULD NOT REPRODUCE
150						
155						0
160						
			CL/ML	5.0+	162/168 SILTY CLAY / CLAYEY SILT. REDISH-BROWN MOIST TO DRY. VERY HARD. LITTLE GRAVEL, COBBLE PRESENT	0
165						

Sampler Signature: _____ Date: _____

CH2MHILL

PROJECT NUMBER 419665.FI.01

BORING NUMBER

SHEET 5 OF 5

SOIL BORING LOG

PROJECT : Allied Paper / Kalamazoo River OU1 LOCATION : Kalamazoo, MI DATE: 9/17/14

WEATHER: DRILLING CONTRACTOR : Cascade

DRILLING METHOD AND EQUIPMENT USED : Rotosonic, Prosonic 600 T Sonic Drill

WATER LEVELS START : 1320 END : 1650 LOGGER : G. KOSTER

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	TYPE	Pocket Penetrometer or Torvane Results TSF	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, SOIL STRUCTURE	COMMENTS: DEPTH OF CASING, DRILLING RATE, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Core
165						
	167/177	10				
			ML		168/177 SILT, BROWN, MOIST, TRANSITION TO SANDY SILT AT 173'	
170						
175						
177					END OF BORING	

Sampler Signature: _____ Date: _____

CH2MHILL

PROJECT NUMBER 419665.FI.01

BORING NUMBER MW-16I

SHEET 1 OF 2

SOIL BORING LOG

PROJECT : Allied Paper / Kalamazoo River OU1 LOCATION : Kalamazoo, MI DATE: 9/18/2014

WEATHER: DRILLING CONTRACTOR : Cascade

DRILLING METHOD AND EQUIPMENT USED : Rotosonic, Prosonic 600 T Sonic Drill

WATER LEVELS START : 940 END : 1220 LOGGER : A. WALTER

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	TYPE	Pocket Penetrometer or Torvane Results TSF	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, SOIL STRUCTURE	COMMENTS: DEPTH OF CASING, DRILLING RATE, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Core
0	0/7	6'	SM	N/A	0/1 LIGHT BROWN SILTY SAND	
			SP-SG	N/A	1/3 BLACK COARSE SAND W/ GRAVEL	3.0
			SP	N/A	3/3.5 TAN MED. SAND	1.0
5			SP-SG	N/A	3.5/4 BLACK COARSE SAND 4/7 BROWN MEDIUM SAND WITH GRAVEL	2.0
	7/17	6'	FILL	N/A	7/9 PLYWOOD, CARDBOARD, RUBBISH, PAPER RESIDUALS	2.3
10			SP	N/A	9/14 TAN COARSE SAND	0
15			SP/FILL FILL	N/A	14/16 BLACK COARSE SAND W/ WOOD DEBRIS + PAPER RESIDUALS 16/17 WOOD + CARDBOARD DEBRIS	1.8
	17/27	6'	SG/FILL	NA	17/19 BROWN TO BLACK SAND AND GRAVEL, SMALL DEBRIS AND RESIDUALS	0.9
20			FILL	NA	19/21.5 CARDBOARD/WOOD DEBRIS. VERY WET @ 21.5'	
			ML/SM	N/A	21.5/23.5 SANDY SILT W/ WOOD DEBRIS + SOME ORGANICS	1.7
25			SP	N/A	23.5/27 SAND, MEDIUM TO FINE, TAN.	0
	27/37	9.5	ML	N/A	27/28.5 CLAYEY SILT. SOME CLAY LENSES. RED-BROWN. MOIST	0
30			SP	N/A	28.5/35 MEDIUM SAND, LOOSE, MOIST	0

Sampler Signature: _____ Date: _____

CH2MHILL	PROJECT NUMBER 419665.FI.01	BORING NUMBER MW-16I	SHEET 2 OF 2

SOIL BORING LOG

PROJECT : Allied Paper / Kalamazoo River OU1 LOCATION : Kalamazoo, MI DATE: 9/18/2014

WEATHER: DRILLING CONTRACTOR : Cascade

DRILLING METHOD AND EQUIPMENT USED : Rotosonic, Prosonic 600 T Sonic Drill

WATER LEVELS START : 940 END : 1220 LOGGER : A. WACIER

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	TYPE	Pocket Penetrometer or Torvane Results	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, SOIL STRUCTURE	COMMENTS: DEPTH OF CASING, DRILLING RATE, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Core
5a			SP			0
35			ML		35/47 CLAYEY SILT TRANSITIONING INTO SILTY CLAY INTO CLAY VERY DENSE. SOME CLAY BEDDING AND SOME SILT LENSES THROUGHOUT	
	37/47	10'				0
40			ML/CL			
45						
47	EOB		CL		END OF BORING	0

Sampler Signature: [signature] Date: 9/18/2014

CH2MHILL

PROJECT NUMBER: 419665.FI.01

BORING NUMBER: MW-40 D / 40 S

SHEET 1 OF 6

SOIL BORING LOG

PROJECT : Allied Paper / Kalamazoo River OU1 | LOCATION : Kalamazoo, MI | DATE: 9/17/14 + 9/25/14

WEATHER: | DRILLING CONTRACTOR : Cascade

DRILLING METHOD AND EQUIPMENT USED : Rotosonic, Prosonic 600 T Sonic Drill

WATER LEVELS | START : 954 9/17 730 9/25 END : 1020 9/17 1150 9/25 | LOGGER : A. WALTER / G. KOSTER

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	TYPE	Pocket Penetrometer or Torvane Results TSF	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, SOIL STRUCTURE	COMMENTS: DEPTH OF CASING, DRILLING RATE, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Core
0	0-10	10'	ML	N/A	0-2 SANDY SILT TO SILTY SAND W/ GRAVEL, BROWN, MOIST	
5			SP-SG		2-7.5 SAND (MEDIUM TO COARSE) WITH FINE GRAVEL, VERY LOOSE, MOIST FINE COBBLES AT 3-5' WHITE FINE SAND 7-7.75'	
			SP / FILL		7.75-9.5 FINE SAND, WHITE, AND GRAVEL. CONCRETE/ BRICK FILL	
10			SP		9.5-10 BLACK COARSE SAND + GRAVEL	END DRILLING 9/17 INSTALL ISOLATION CASING.
	10-16		SW		10-12.5 SILTY SAND (MEDIUM) WITH GRAVEL. BROWN, MOIST 12.5-13 SAA, DARK BROWN TO BLACK	
15			SW		13-30 SAND (FINE TO COARSE) BROWN TO GREY-BROWN, MOIST TO WET	
	16-26	3.5				
20					19 SINGLE FRACTURED ROCK	
25						MW-40S B.OS. 25'
	26-36	7'				
30						

Sampler Signature: _____ Date: _____

CH2MHILL

PROJECT NUMBER 419665.FI.01

BORING NUMBER MW-40D / 40S

SHEET 2 OF 6

SOIL BORING LOG

PROJECT : Allied Paper / Kalamazoo River OU1 LOCATION : Kalamazoo, MI DATE: 9/25

WEATHER: DRILLING CONTRACTOR : Cascade

DRILLING METHOD AND EQUIPMENT USED : Rotosonic, Prosonic 600 T Sonic Drill

WATER LEVELS START : 750 END : 1150 LOGGER : G. LOSTER

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	TYPE	Pocket Penetrometer or Torvane Results TSF	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, SOIL STRUCTURE	COMMENTS: DEPTH OF CASING, DRILLING RATE, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Core
30			SP	N/A	30-48 SAND (FINE TO MED) BROWN TO GREY-BROWN (ALL BROWN BELOW 36') WET.	
35	36-46	9'				
40					SINGLE COBBLE AT 42.5'	
45	46-56	9.8				
			CL	5.0+	48-49.5 SILTY CLAY, GREY, MOIST VERY HARD	
50			SP	N/A	49.5-59 SAND (FINE TO MED) WET, BROWN	
55	56-66	9.5				
60			ML	N/A	59-60 SILT, BROWN, MOIST, DENSE	

Sampler Signature: _____ Date: _____

CH2MHILL	PROJECT NUMBER 419665.FI.01	BORING NUMBER MW-40D/40S	SHEET 3 OF 6

SOIL BORING LOG

PROJECT : Allied Paper / Kalamazoo River OU1 LOCATION : Kalamazoo, MI DATE: 9/25/14

WEATHER: DRILLING CONTRACTOR : Cascade

DRILLING METHOD AND EQUIPMENT USED : Rotosonic, Prosonic 600 T Sonic Drill

WATER LEVELS START : 730 END : 1150 LOGGER : G. Koster

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	TYPE	Pocket Penetrometer or Torvane Results TSF	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, SOIL STRUCTURE	COMMENTS: DEPTH OF CASING, DRILLING RATE, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Core
60						
			CL	5.0+	60-68 SILTY CLAY, BROWN TO REDDISH BROWN, MOIST, VERY HARD. 66.5-67 COARSE SAND LENSE	
65						
	66-76	10				
			ML	N/A	68-70 SILT, BROWN, WET VERY DENSE. SOME CLAY AT 70'	
70			SM	N/A	70-70.5 SILTY SAND, BROWN, WET	
			CL	5.0+	70.5-74 SILTY CLAY, BROWN TO REDDISH-BROWN. MOIST TO WET	
75			SM/ML	NA	74-76 SILTY SAND (FINE) TO SANDY SILT. BROWN, WET	
	76-86	9.5	SW	NA	76-96 SAND (MED TO COARSE) BROWN, WET, TRACE GRAVEL, TRACE OCCURANCES OF CLAY	
80						
85						
	86-96	9'			88-96 30-40% GRAVEL	
90						

Sampler Signature: _____ Date: _____

CH2MHILL

PROJECT NUMBER 419665.FI.01

BORING NUMBER MW-40D/40S

SHEET 4 OF 6

SOIL BORING LOG

PROJECT : Allied Paper / Kalamazoo River OU1 LOCATION : Kalamazoo, MI DATE: 9/25/14

WEATHER: DRILLING CONTRACTOR : Cascade

DRILLING METHOD AND EQUIPMENT USED : Rotosonic, Prosonic 600 T Sonic Drill

WATER LEVELS START : 730 END : 1150 LOGGER : G. KOSIER

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	TYPE	Pocket Penetrometer or Torvane Results TSF	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, SOIL STRUCTURE	COMMENTS: DEPTH OF CASING, DRILLING RATE, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Core
90			SW	N/A		
95						
	96-106	9'	SP	N/A	96-128 MEDIUM SAND, BROWN, WET, TRACE GRAVEL	
100						
105						
	106-116	9'			107' COBBLE PRESENT	
110						
115						
	116-126	9'			118-122' SOME COARE SAND	
120						

Sampler Signature: _____ Date: _____

CH2MHILL

PROJECT NUMBER 419665.FI.01

BORING NUMBER MW-400/405

SHEET 5 OF 6

SOIL BORING LOG

PROJECT : Allied Paper / Kalamazoo River OU1 LOCATION : Kalamazoo, MI DATE:

WEATHER: DRILLING CONTRACTOR : Cascade

DRILLING METHOD AND EQUIPMENT USED : Rotosonic, Prosonic 600 T Sonic Drill

WATER LEVELS: START : 730 END : 1150 LOGGER :

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	TYPE	Pocket Penetrometer or Torvane Results TSF	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, SOIL STRUCTURE	COMMENTS: DEPTH OF CASING, DRILLING RATE, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Core
120			SP	N/A		
125						
	126-136	9				
			SW	NA	128-132 SAA w/ GRAVEL	
130						
			ML		132 SILT/FINE SAND LENSE	
			SW	N/A	132-134 SAND (MED TO COARSE BROWN, WET	
135			SP	N/A	134-148 SAND (MED) BROWN, WET	
	136-146	8.5				
140						
145					144-145 COARSE SAND + GRAVEL PRESENT	
	146-156	8'				
150			SW	NA	148-156 SAND (MEDIUM TO COARSE) BROWN, WET. SOME/TRACE GRAVEL	

Sampler Signature: _____ Date: _____

CH2MHILL

PROJECT NUMBER 419665.FI.01

BORING NUMBER

SHEET 6 OF 6

SOIL BORING LOG

PROJECT : Allied Paper / Kalamazoo River OU1 LOCATION : Kalamazoo, MI DATE: 9/25/14

WEATHER: DRILLING CONTRACTOR : Cascade

DRILLING METHOD AND EQUIPMENT USED : Rotosonic, Prosonic 600 T Sonic Drill

WATER LEVELS START : 730 END : 1150 LOGGER : G KUSTER

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	TYPE	Pocket Penetrometer or Torvane Results	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, SOIL STRUCTURE	COMMENTS: DEPTH OF CASING, DRILLING RATE, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Core
150						
			SW			0
155						
	156-166	8.5	SP	NA	156-163 SAND (MED) BROWN, WET, TRACE GRAVEL	0
160						
			SW		163-166 SAND, MED-COARSE, BROWN, WET. GRAVELY SILT AT 165.5	0
165						
166					END OF BORING	

Sampler Signature: _____ Date: _____

Attachment B
Well Construction Reports

CASCADE DRILLING, L.P.
LEADERS IN SAFETY

Well Construction Report

Job Name KALAMAZOO,MI
Job Number 119-14-7344
Location KALAMAZOO MI

Well Name MW-08D
Driller CHRIS BARDEN
Helper JOEL HALLOWEL,RODNEY ADKINSON
Date Installed 09/24/14
Ground Surface Elevation 793.75 ft. amsl
Top of Casing Elevation 796.74 ft. amsl

Type of Well:
X Water Table Observation
___ Piezometer
___ Other _____

A. Height of Well Casing above ground 3.0 ft.

B. Diameter of Well Casing 2.0 in.

C. Surface Seal Bottom 153.0 ft.

D. Well Casing: Flush Threaded PVC
___ Schedule 40
X Schedule 80
___ Other _____

E. Bentonite Seal Top 153.0 ft.

F. Fine Sand Top _____ ft.

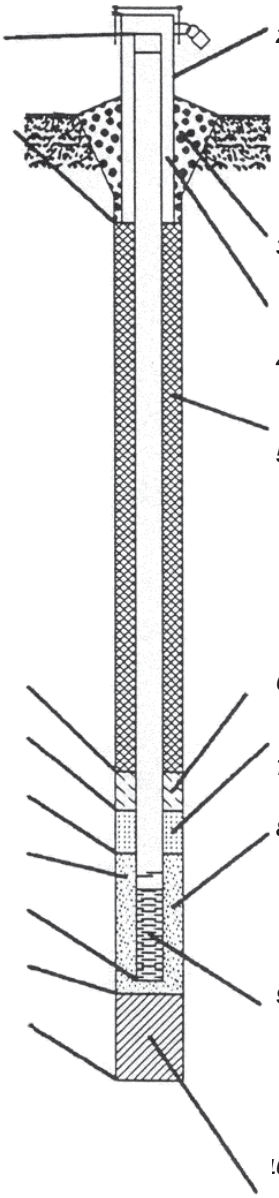
G. Filter Pack Top 160.0 #

H. Screen Joint Top 162.0 ft.

I. Well Bottom 167.0 ft.

J. Filter Pack Bottom 167.0 ft.

K. Borehole Bottom 167.0 ft.



1. Locking Cap? X Yes ___ No

2. Protective Cover:
a. Inside diam. 4.0 in.
b. Length 5.0 ft.
c. Material
X Steel
___ Other _____
d. Bumper Post _____ qty
___ 3" ___ 4"

3. Surface Seal:
___ Bentonite
X Concrete
___ Other _____

4. Material between Casing and Protop:
___ Bentonite
X Other RTLAND SLURRY GRC

5. Annular Space Seal:
___ Granular Bentonite
___ Bentonite Slurry
X Cement-Bentonite Grout
___ Other _____

How Installed:
___ Gravity
X Tremie Pumped

6. Bentonite Seal:
___ Granules
X Pellets

7. Type of Fine Sand:
_____

8. Type of Filter Pack:
GLOBAL#5

9. Screen Material:
Type: X Factory Cut
___ Continuous Slot
Slot Size: 0.100 in.
Length: 5.0 ft.

10. Backfill Material: (Below filter pack)
___ None
X Other CHIP&SAND

CASCADE DRILLING, L.P.
LEADERS IN SAFETY
6215 Lehman Drive
Flint, MI. 48507
Phone (810) 877.7176
Fax (810) 877.7156

CASCADE DRILLING, L.P.
LEADERS IN SAFETY

Well Construction Report

Job Name KALAMAZOO,MI
Job Number 119-14-7344
Location KALAMAZOO MI

Well Name MW-16D
Driller CHRIS BARDEN
Helper JOEL HALLOWEL,RODNEY ADKINSON
Date Installed 09/19/14
Ground Surface Elevation 802.61 ft. amsl
Top of Casing Elevation 805.64 ft. amsl

Type of Well:
X Water Table Observation
___ Piezometer
___ Other _____

A. Height of Well Casing above ground 3.0 ft.

B. Diameter of Well Casing 2.0 in.

C. Surface Seal Bottom 150.0 ft.

D. Well Casing: Flush Threaded PVC
___ Schedule 40
X Schedule 80
___ Other _____

E. Bentonite Seal Top 150.0 ft.

F. Fine Sand Top _____ ft.

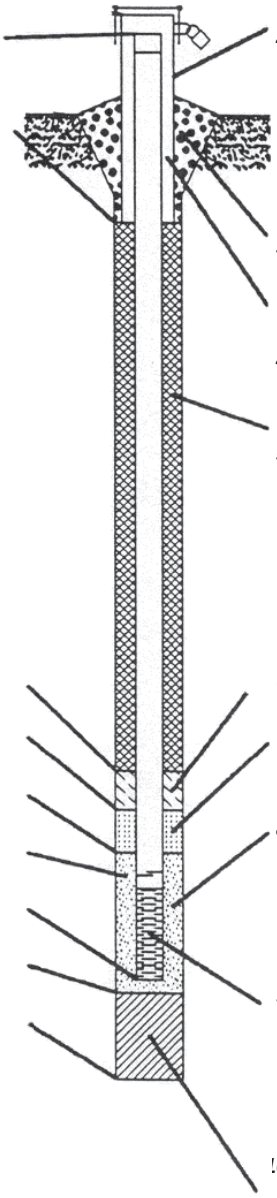
G. Filter Pack Top 155.0 #

H. Screen Joint Top 157.0 ft.

I. Well Bottom 162.0 ft.

J. Filter Pack Bottom 160.0 ft.

K. Borehole Bottom 177.0 ft.



1. Locking Cap? X Yes ___ No

2. Protective Cover:
a. Inside diam. 4.0 in.
b. Length 5.0 ft.
c. Material
X Steel
___ Other _____
d. Bumper Post _____ qty
___ 3" ___ 4"

3. Surface Seal:
___ Bentonite
X Concrete
___ Other _____

4. Material between Casing and Protop:
___ Bentonite
X Other RTLAND SLURRY GRC

5. Annular Space Seal:
___ Granular Bentonite
___ Bentonite Slurry
X Cement-Bentonite Grout
___ Other _____

How Installed:
___ Gravity
X Tremie Pumped

6. Bentonite Seal:
___ Granules
X Pellets

7. Type of Fine Sand:
_____

8. Type of Filter Pack:
GLOBAL#5

9. Screen Material:
Type: X Factory Cut
___ Continuous Slot
Slot Size: 0.100 in.
Length: 5.0 ft.

10. Backfill Material: (Below filter pack)
___ None
X Other CHIP&SAND

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CASCADE DRILLING, L.P.
LEADERS IN SAFETY

Well Construction Report

Job Name	KALAMAZOO,MI	**Well Name**	MW-16I
Job Number	119-14-7344	**Driller**	CHRIS BARDEN
Location	KALAMAZOO MI	**Helper**	JOEL HALLOWEL,RODNEY ADKINSON
		Date Installed	09/22/14
		Ground Surface Elevation	802.63 ft. amsl
		Top of Casing Elevation	805.80 ft. amsl

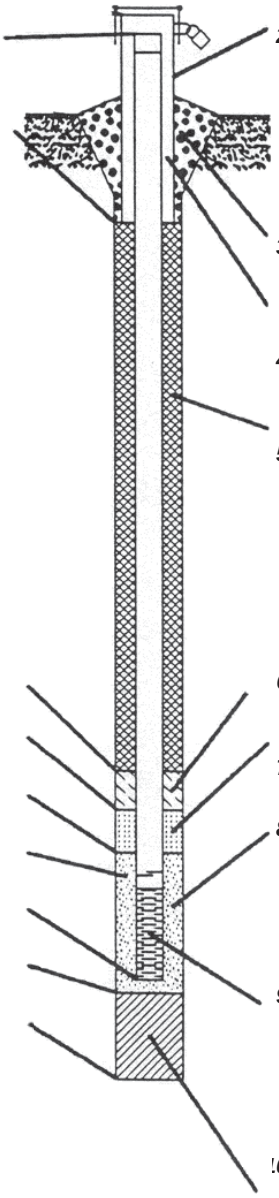
Type of Well:
- X Water Table Observation
- ___ Piezometer
- ___ Other _____

A. Height of Well Casing above ground 3.0 ft.

B. Diameter of Well Casing 2.0 in.

C. Surface Seal Bottom 57.0 ft.

D. Well Casing: Flush Threaded PVC
- ___ Schedule 40
- X Schedule 80
- ___ Other _____



1. Locking Cap? X Yes ___ No

2. Protective Cover:
- a. Inside diam. 4.0 in.
- b. Length 5.0 ft.
- c. Material
  - X Steel
  - ___ Other _____
- d. Bumper Post ___ qty
  - ___ 3" ___ 4"

3. Surface Seal:
- ___ Bentonite
- X Concrete
- ___ Other _____

4. Material between Casing and Protop:
- ___ Bentonite
- X Other RTLAND SLURRY GRC

5. Annular Space Seal:
- ___ Granular Bentonite
- ___ Bentonite Slurry
- X Cement-Bentonite Grout
- ___ Other _____

How Installed:
- ___ Gravity
- X Tremie Pumped

6. Bentonite Seal:
- ___ Granules
- X Pellets

7. Type of Fine Sand: _____

8. Type of Filter Pack: GLOBAL#5

9. Screen Material:
- Type: X Factory Cut
- ___ Continuous Slot
- Slot Size: 0.100 in.
- Length: 5.0 ft.

10. Backfill Material: (Below filter pack)
- ___ None
- X Other CHIP&SAND

E. Bentonite Seal Top 57.0 ft.

F. Fine Sand Top ___ ft.

G. Filter Pack Top 62.0 #

H. Screen Joint Top 65.0 ft.

I. Well Bottom 70.0 ft.

J. Filter Pack Bottom 70.0 ft.

K. Borehole Bottom 70.0 ft.

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LEADERS IN SAFETY

Well Construction Report

Job Name ALLIED PAPER
Job Number 119-14-7344
Location KALAMAZOO,MI

Well Name MW-40D
Driller CHRIS BARDEN
Helper RODNEY ADKINSON,DAVE GORDON
Date Installed 09/26/14
Ground Surface Elevation 792.89 ft. amsl
Top of Casing Elevation 796.29 ft. amsl

Type of Well:
X Water Table Observation
___ Piezometer
___ Other _____

A. Height of Well Casing above ground 3.0 ft.

B. Diameter of Well Casing 2.0 in.

C. Surface Seal Bottom 153.0 ft.

D. Well Casing: Flush Threaded PVC
___ Schedule 40
X Schedule 80
___ Other _____

E. Bentonite Seal Top 153.0 ft.

F. Fine Sand Top _____ ft.

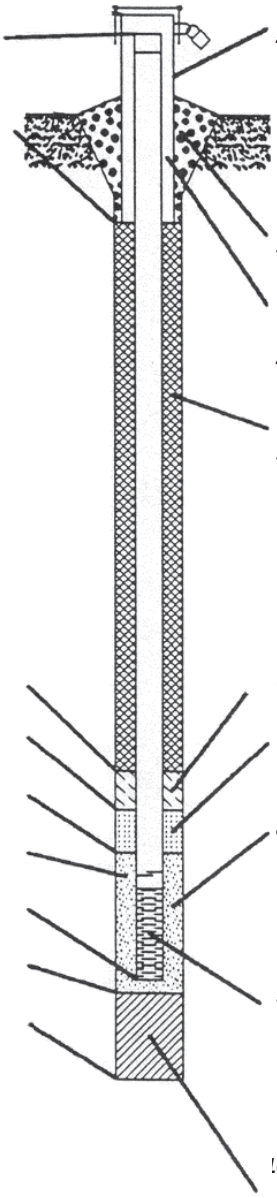
G. Filter Pack Top 158.0 ft.

H. Screen Joint Top 161.0 ft.

I. Well Bottom 166.0 ft.

J. Filter Pack Bottom 166.0 ft.

K. Borehole Bottom 166.0 ft.



1. Locking Cap? X Yes ___ No

2. Protective Cover:
a. Inside diam. 4.0 in.
b. Length 5.0 ft.
c. Material
X Steel
___ Other _____
d. Bumper Post _____ qty
___ 3" ___ 4"

3. Surface Seal:
___ Bentonite
X Concrete
___ Other _____

4. Material between Casing and Protop:
___ Bentonite
X Other SAND

5. Annular Space Seal:
___ Granular Bentonite
___ Bentonite Slurry
X Cement-Bentonite Grout
___ Other _____

How Installed:
___ Gravity
X Tremie Pumped

6. Bentonite Seal:
X Granules
___ Pellets

7. Type of Fine Sand:
_____

8. Type of Filter Pack:
GLOBAL#5

9. Screen Material:
Type: X Factory Cut
___ Continuous Slot
Slot Size: 0.100 in.
Length: 5.0 ft.

10. Backfill Material: (Below filter pack)
X None
___ Other _____

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CASCADE DRILLING, L.P.
LEADERS IN SAFETY

Well Construction Report

Job Name ALLIED PAPER
Job Number 119-14-7344
Location KALAMAZOO,MI

Well Name MW-40S
Driller CHRIS BARDEN
Helper RODNEY ADKINSON,DAVE GORDON
Date Installed 09/29/14
Ground Surface Elevation 793.02 ft. amsl
Top of Casing Elevation 796.3 ft. amsl

Type of Well:
X Water Table Observation
___ Piezometer
___ Other _____

A. Height of Well Casing above ground 3.0 ft.

B. Diameter of Well Casing 2.0 in.

C. Surface Seal Bottom 13.0 ft.

D. Well Casing: Flush Threaded PVC
___ Schedule 40
X Schedule 80
___ Other _____

E. Bentonite Seal Top 13.0 ft.

F. Fine Sand Top _____ ft.

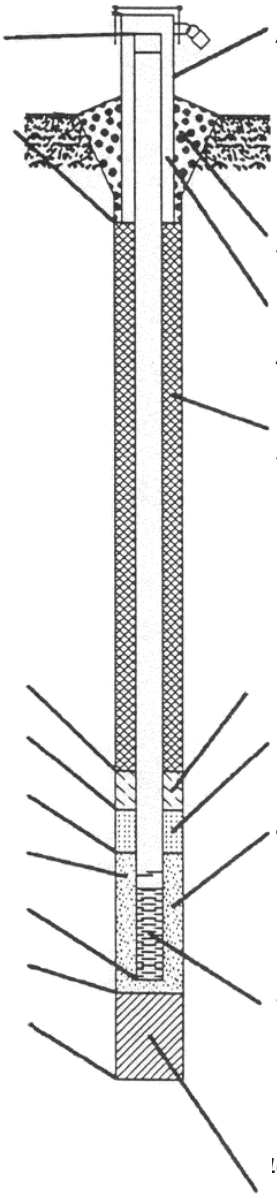
G. Filter Pack Top 17.0 ft.

H. Screen Joint Top 20.0 ft.

I. Well Bottom 25.0 ft.

J. Filter Pack Bottom 25.0 ft.

K. Borehole Bottom 25.0 ft.



1. Locking Cap? X Yes ___ No

2. Protective Cover:
a. Inside diam. 4.0 in.
b. Length 5.0 ft.
c. Material
X Steel
___ Other _____
d. Bumper Post _____ qty
___ 3" ___ 4"

3. Surface Seal:
___ Bentonite
X Concrete
___ Other _____

4. Material between Casing and Protop:
___ Bentonite
X Other SAND

5. Annular Space Seal:
___ Granular Bentonite
___ Bentonite Slurry
X Cement-Bentonite Grout
___ Other _____

How Installed:
___ Gravity
X Tremie Pumped

6. Bentonite Seal:
X Granules
___ Pellets

7. Type of Fine Sand:
_____

8. Type of Filter Pack:
GLOBAL#5

9. Screen Material:
Type: X Factory Cut
___ Continuous Slot
Slot Size: 0.100 in.
Length: 5.0 ft.

10. Backfill Material: (Below filter pack)
X None
___ Other _____

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6215 Lehman Drive
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Fax (810) 877.7156

CASCADE DRILLING, L.P.
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Well Construction Report

Job Name ALLIED PAPER
Job Number 119-14-7344
Location KALAMAZOO,MI

Well Name MW-7D
Driller CHRIS BARDEN
Helper RODNEY ADKINSON,DAVE GORDON
Date Installed 09/30/14
Ground Surface Elevation 814.94 ft. amsl
Top of Casing Elevation 817.91 ft. amsl

Type of Well:
X Water Table Observation
___ Piezometer
___ Other _____

A. Height of Well Casing above ground 3.0 ft.

B. Diameter of Well Casing 2.0 in.

C. Surface Seal Bottom 118.0 ft.

D. Well Casing: Flush Threaded PVC
___ Schedule 40
X Schedule 80
___ Other _____

E. Bentonite Seal Top 118.0 ft.

F. Fine Sand Top _____ ft.

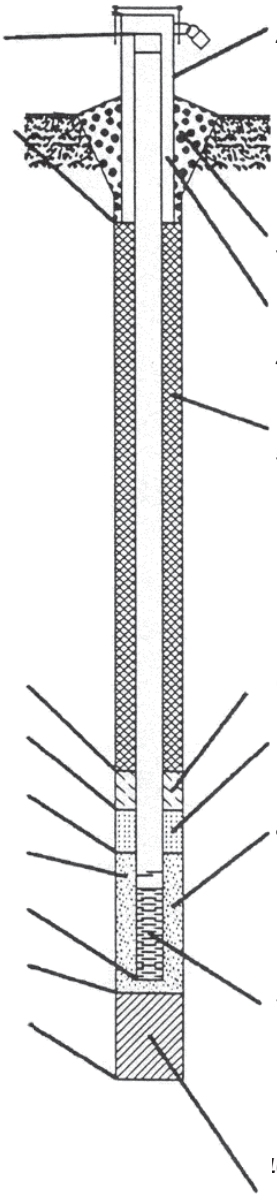
G. Filter Pack Top 122.0 ft.

H. Screen Joint Top 125.0 ft.

I. Well Bottom 130.0 ft.

J. Filter Pack Bottom 133.0 ft.

K. Borehole Bottom 186.0 ft.



1. Locking Cap? X Yes ___ No

2. Protective Cover:
a. Inside diam. 4.0 in.
b. Length 5.0 ft.
c. Material
X Steel
___ Other _____
d. Bumper Post _____ qty
___ 3" ___ 4"

3. Surface Seal:
___ Bentonite
X Concrete
___ Other _____

4. Material between Casing and Protop:
___ Bentonite
X Other SAND

5. Annular Space Seal:
___ Granular Bentonite
___ Bentonite Slurry
X Cement-Bentonite Grout
___ Other _____

How Installed:
___ Gravity
X Tremie Pumped

6. Bentonite Seal:
X Granules
___ Pellets

7. Type of Fine Sand:
_____

8. Type of Filter Pack:
GLOBAL#5

9. Screen Material:
Type: X Factory Cut
___ Continuous Slot
Slot Size: 0.100 in.
Length: 5.0 ft.

10. Backfill Material: (Below filter pack)
___ None
X Other BENTONITE CHIP

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LEADERS IN SAFETY
6215 Lehman Drive
Flint, MI. 48507
Phone (810) 877.7176
Fax (810) 877.7156

CASCADE DRILLING, L.P.
LEADERS IN SAFETY

Well Construction Report

Job Name ALLIED PAPER
Job Number 119-14-7344
Location KALAMAZOO,MI

Well Name MW-7I
Driller CHRIS BARDEN
Helper RODNEY ADKINSON,DAVE GORDON
Date Installed 10/01/14
Ground Surface Elevation 815.02 ft. amsl
Top of Casing Elevation 817.91 ft. amsl

Type of Well:
X Water Table Observation
___ Piezometer
___ Other _____

A. Height of Well Casing above ground 3.0 ft.

B. Diameter of Well Casing 2.0 in.

C. Surface Seal Bottom 60.0 ft.

D. Well Casing: Flush Threaded PVC
___ Schedule 40
X Schedule 80
___ Other _____

E. Bentonite Seal Top 60.0 ft.

F. Fine Sand Top _____ ft.

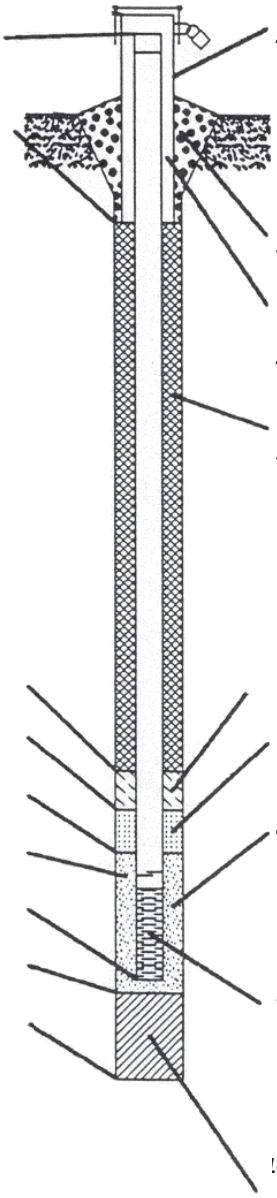
G. Filter Pack Top 66.0 ft.

H. Screen Joint Top 70.0 ft.

I. Well Bottom 75.0 ft.

J. Filter Pack Bottom 75.0 ft.

K. Borehole Bottom 75.0 ft.



1. Locking Cap? X Yes ___ No

2. Protective Cover:
a. Inside diam. 4.0 in.
b. Length 5.0 ft.
c. Material
X Steel
___ Other _____
d. Bumper Post _____ qty
___ 3" ___ 4"

3. Surface Seal:
___ Bentonite
X Concrete
___ Other _____

4. Material between Casing and Protop:
___ Bentonite
X Other SAND

5. Annular Space Seal:
___ Granular Bentonite
___ Bentonite Slurry
X Cement-Bentonite Grout
___ Other _____

How Installed:
___ Gravity
X Tremie Pumped

6. Bentonite Seal:
X Granules
___ Pellets

7. Type of Fine Sand:
_____

8. Type of Filter Pack:
GLOBAL#5

9. Screen Material:
Type: X Factory Cut
___ Continuous Slot
Slot Size: 0.100 in.
Length: 5.0 ft.

10. Backfill Material: (Below filter pack)
X None
___ Other _____

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LEADERS IN SAFETY
6215 Lehman Drive
Flint, MI. 48507
Phone (810) 877.7176
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Attachment C
Photographs

GW Sampling Photos 10/13/14 to 10/17/14

MICHIGAN
TECH

Survey photos 10/6/14 to 10/10/14

Attachment D
Well Development Records

CH2MHILL	PROJECT NUMBER	WELL ID	DATE	SHEET
		MW 5R	9-22-14	of

PROJECT: Allied Paper, Inc. OU1
CONTRACTOR:
METHOD:
EQUIPMENT:
LOGGER:

LOCATION: Kalamazoo, MI
START: 1550
END: 1613
WATER LEVEL START: 19.05
WATER LEVEL END: 19.95

MAXIMIUM DRAWDOWN DURING PUMPING:
RANGE AND AVERAGE DISCHARGE RATE:
TOTAL QUANTITY OF WATER DISCHARGED:
DISPOSITION OF DISCHARGE WATER:

Time	Volume Removed, gal	Water Level, ft	Turbidity	Clarity / Color	Temp, °C	pH	Conductivity	Remarks
1550	–	19.05	–					
1610	15	19.95	5.04					

COMMENTS:

CH2MHILL	PROJECT NUMBER	WELL ID	DATE	SHEET
		MW 06 allied	5-22-14	of

PROJECT: Allied Paper, Inc. OU1
CONTRACTOR:
METHOD:
EQUIPMENT:
LOGGER:

LOCATION: Kalamazoo, MI
START: 1455
END: 1535
WATER LEVEL START: 14.58
WATER LEVEL END: 14.53

MAXIMIUM DRAWDOWN DURING PUMPING:
RANGE AND AVERAGE DISCHARGE RATE:
TOTAL QUANTITY OF WATER DISCHARGED:
DISPOSITION OF DISCHARGE WATER:

Time	Volume Removed, gal	Water Level, ft	Turbidity	Clarity / Color	Temp, °C	pH	Conductivity	Remarks
1455	—	14.58	—					
1535	25	14.53	13.5					

COMMENTS:

16' deep

CH2MHILL	PROJECT NUMBER	WELL ID	DATE	SHEET
		MW 6panelyte	9-22-14	of

PROJECT: Allied Paper, Inc. OU1
CONTRACTOR:
METHOD:
EQUIPMENT:
LOGGER:

LOCATION: Kalamazoo, MI
START: 1340
END: 1435
WATER LEVEL START: 6.0
WATER LEVEL END: 6.6

MAXIMIUM DRAWDOWN DURING PUMPING:
RANGE AND AVERAGE DISCHARGE RATE:
TOTAL QUANTITY OF WATER DISCHARGED:
DISPOSITION OF DISCHARGE WATER:

Time	Volume Removed, gal	Water Level, ft	Turbidity	Clarity / Color	Temp, °C	pH	Conductivity	Remarks
1340	–	6.0	98.6					
1350	18	–	20.1					re-surge
1415		–	115					
1430	75	6.6	392					>10 well volumes purged

COMMENTS:

CH2MHILL	PROJECT NUMBER	WELL ID	DATE	SHEET
		MW-7	9-22-14	of

PROJECT: Allied Paper, Inc. OU1
CONTRACTOR:
METHOD:
EQUIPMENT:
LOGGER:

LOCATION: Kalamazoo, MI
START:
END:
WATER LEVEL START:
WATER LEVEL END:

MAXIMIUM DRAWDOWN DURING PUMPING:
RANGE AND AVERAGE DISCHARGE RATE:
TOTAL QUANTITY OF WATER DISCHARGED:
DISPOSITION OF DISCHARGE WATER:

Time	Volume Removed, gal	Water Level, ft	Turbidity	Clarity / Color	Temp, °C	pH	Conductivity	Remarks
1710	–	19.35	-					
1740	60	19.33	12.5					

COMMENTS:

CH2MHILL	PROJECT NUMBER	WELL ID	DATE	SHEET
	419665.F5.01	MW-7D	10/2/14	1 of 1

PROJECT: Allied Paper, Inc. OU1
CONTRACTOR: CASCADE
METHOD: SURGE
EQUIPMENT: DOWN HOLE PUMP
LOGGER: A. WALTER

LOCATION: Kalamazoo, MI
START: 1010
END: 1240
WATER LEVEL START: 19.45
WATER LEVEL END: 18.40

MAXIMIUM DRAWDOWN DURING PUMPING: 1'
RANGE AND AVERAGE DISCHARGE RATE: 1 GPM
TOTAL QUANTITY OF WATER DISCHARGED: 150 gal
DISPOSITION OF DISCHARGE WATER: TURBID - CLOUDY TO SOMEWHAT CLEAR

Time	Volume Removed, gal	Water Level, ft	Turbidity	Clarity / Color	Temp, °C	pH	Conductivity	Remarks
1010		19.45	–	–	–	–	–	SURGE + PUMP
1022	12	–	NA***	V. POOR	14.14	8.81	0.903	RESURGE
1030	20	–	NA	V. POOR	14.02	7.86	0.86	RESURGE DISCONNECT VSI
1035	25	–	NA	V. POOR	–	–	–	RESURGE
1043	33	–	612	V. POOR	–	–	–	RESURGE
1050	40	–	501	V. POOR	–	–	–	RESURGE
1055	45	–	714	V. POOR	–	–	–	RESURGE
1108	58	–	81.3	GOOD	–	–	–	RESURGE
1117	67	–	131	POOR	13.87	7.5	0.813	RESURGE
1127	77	–	126	POOR	13.88	7.45	0.812	RESURGE
1137	87	–	223	POOR	13.90	7.47	0.811	RESURGE
1147	97	–	187	POOR	13.92	7.46	0.809	
1150	100	–	170	POOR	–	–	–	
1200	110	–	152	POOR	13.87	7.46	0.808	RESURGE
1210	120	–	72.4	GOOD	13.81	7.43	0.807	
1220	130	–	75.6	GOOD	13.84	7.44	0.807	RESURGE
1230	140	–	73.8	GOOD	13.79	7.46	0.808	RESURGE
1240	150	18.40	74.3	GOOD	13.80	7.43	0.808	

COMMENTS: ***NA = OUT OF RANGE FOR HACH METER

WELL STABLE @ ~74 NTU.

CH2MHILL	PROJECT NUMBER	WELL ID	DATE	SHEET
	419665.FI.01	MW-7I	10/2/14	1 of 1

PROJECT: Allied Paper, Inc. OU1
CONTRACTOR: CASCADE
METHOD: SURGE + PURGE
EQUIPMENT: DOWN HOLE PUMP
LOGGER: A. WALTER

LOCATION: Kalamazoo, MI
START: 1004
END: 1115
WATER LEVEL START: 20.2 TOC
WATER LEVEL END: 20.6 TOC

MAXIMIUM DRAWDOWN DURING PUMPING: 0.5'
RANGE AND AVERAGE DISCHARGE RATE:
TOTAL QUANTITY OF WATER DISCHARGED:
DISPOSITION OF DISCHARGE WATER:

Time	Volume Removed, gal	Water Level, ft	Turbidity	Clarity / Color	Temp, °C	pH	Conductivity	Remarks
1005	–	20.2	–	–	–	–	–	START SURGE/PUMP
1015	10	–	118	POOR	14.9	7.86	0.850	RESURGE
1025	20	–	437	V. POOR	14.9	7.65	0.831	RESURGE
1030	25	–	40.2	GOOD	14.9	7.62	0.84	RESURGE
1035	30	–	869	V. POOR	14.9	7.60	0.833	RESURGE
1045	40	–	201	POOR	14.82	7.59	0.838	RESURGE
1055	50	–	58.6	GOOD	14.76	7.58	0.832	RESURGE
1105	60	–	20.0	V. GOOD	14.73	7.59	0.818	RESURGE
1115	70	20.6	39.1	V. GOOD	14.72	7.59	0.807	DEV. COMPLETE.

COMMENTS: NONE.

CH2MHILL	PROJECT NUMBER	WELL ID	DATE	SHEET
		MW-8A	9-24-14	of

PROJECT: Allied Paper, Inc. OU1
CONTRACTOR:
METHOD:
EQUIPMENT:
LOGGER:

LOCATION: Kalamazoo, MI
START:
END:
WATER LEVEL START:
WATER LEVEL END:

MAXIMIUM DRAWDOWN DURING PUMPING:
RANGE AND AVERAGE DISCHARGE RATE:
TOTAL QUANTITY OF WATER DISCHARGED:
DISPOSITION OF DISCHARGE WATER:

Time	Volume Removed, gal	Water Level, ft	Turbidity	Clarity / Color	Temp, °C	pH	Conductivity	Remarks
0845	–	12.5	–					
0925	18	13.7	11.1					

COMMENTS:

CH2MHILL	PROJECT NUMBER	WELL ID	DATE	SHEET
		MW 8D	9-25-14	of

PROJECT: Allied Paper, Inc. OU1
CONTRACTOR:
METHOD:
EQUIPMENT:
LOGGER:

LOCATION: Kalamazoo, MI
START:
END:
WATER LEVEL START:
WATER LEVEL END:

MAXIMIUM DRAWDOWN DURING PUMPING:
RANGE AND AVERAGE DISCHARGE RATE:
TOTAL QUANTITY OF WATER DISCHARGED:
DISPOSITION OF DISCHARGE WATER:

Time	Volume Removed, gal	Water Level, ft	Turbidity	Clarity / Color	Temp, °C	pH	Conductivity	Remarks
1415	–	2.89	–	–	–	–	–	surge & purge
1435	25	–	502	poor	15.31	8.15	0.614	
1445	40	–	331	poor	15.10	7.97	0.625	resurge
1455	52	–	140	mod	14.98	7.95	0.615	resurge
1505	60	–	150	mod	15.23	7.93	0.625	
1515	70	–	47.5	good	15.17	7.92	0.627	resurge
1525	80	–	83.9	mod	15.09	7.92	0.627	
1530	85	2.92	27.5	good	15.05	7.91	0.627	

COMMENTS:
PCB odor in turbid water

depth = 20'

CH2MHILL	PROJECT NUMBER	WELL ID	DATE	SHEET
		MW 8 panelyte	5-22-14	of

PROJECT: Allied Paper, Inc. OU1
CONTRACTOR:
METHOD:
EQUIPMENT:
LOGGER:

LOCATION: Kalamazoo, MI
START: 1445
END: 1505
WATER LEVEL START: 5.7
WATER LEVEL END: 17.84

MAXIMIUM DRAWDOWN DURING PUMPING:
RANGE AND AVERAGE DISCHARGE RATE:
TOTAL QUANTITY OF WATER DISCHARGED:
DISPOSITION OF DISCHARGE WATER:

Time	Volume Removed, gal	Water Level, ft	Turbidity	Clarity / Color	Temp, °C	pH	Conductivity	Remarks
1445		5.7	–					
1505	25	17.84	22.4					

COMMENTS:

CH2MHILL	PROJECT NUMBER	WELL ID	DATE	SHEET
		MW 16B	9-22-14	of

PROJECT: Allied Paper, Inc. OU1
CONTRACTOR:
METHOD:
EQUIPMENT:
LOGGER:

LOCATION: Kalamazoo, MI
START: 1620
END:
WATER LEVEL START: 16.90
WATER LEVEL END:

MAXIMIUM DRAWDOWN DURING PUMPING:
RANGE AND AVERAGE DISCHARGE RATE:
TOTAL QUANTITY OF WATER DISCHARGED:
DISPOSITION OF DISCHARGE WATER:

Time	Volume Removed, gal	Water Level, ft	Turbidity	Clarity / Color	Temp, °C	pH	Conductivity	Remarks
1620	–	16.9	–					
1655	12	20.1	644					well pumped dry
								& allowed to recharge multiple
								times

COMMENTS:

CH2MHILL	PROJECT NUMBER	WELL ID	DATE	SHEET
		MW 16 D	9-25-14	of

PROJECT: Allied Paper, Inc. OU1
CONTRACTOR:
METHOD:
EQUIPMENT:
LOGGER:

LOCATION: Kalamazoo, MI
START:
END:
WATER LEVEL START:
WATER LEVEL END:

MAXIMIUM DRAWDOWN DURING PUMPING:
RANGE AND AVERAGE DISCHARGE RATE:
TOTAL QUANTITY OF WATER DISCHARGED:
DISPOSITION OF DISCHARGE WATER:

Time	Volume Removed, gal	Water Level, ft	Turbidity	Clarity / Color	Temp, °C	pH	Conductivity	Remarks
~~1100~~ 1130	–	12.72	–	–	–	–	–	
1140	8	–	162	mod	13.74	7.31	0.874	
1150	15	–	143	mod	14.06	7.63	0.820	
1200	20	–	319	mod	14.79	7.87	0.804	resurged
1210	28	–	871	poor	14.15	8.52	0.856	resurged
1220	disconnect from YSI - continue purging							resurged
1245	resume pumping through YSI							
1250	40	–	336	mod	17.76	7.73	0.644	
1300	45	–	30.6	good	16.71	7.70	0.623	resurged
1310	48	–	95.5	poor	16.17	7.66	0.623	
1320	51	–	40.8	good	16.44	7.67	0.623	resurged
1330	55	–	592	~~mod~~ poor	16.60	7.68	0.636	
1340	60	–	125	good	16.25	7.65	0.623	
1350	65	156.32	22.7	good	16.94	7.64	0.626	

COMMENTS:
low flow

CH2MHILL	PROJECT NUMBER	WELL ID	DATE	SHEET
		MW16I	9-25-14	of

PROJECT: Allied Paper, Inc. OU1
CONTRACTOR:
METHOD:
EQUIPMENT:
LOGGER:

LOCATION: Kalamazoo, MI
START:
END:
WATER LEVEL START:
WATER LEVEL END:

MAXIMIUM DRAWDOWN DURING PUMPING:
RANGE AND AVERAGE DISCHARGE RATE:
TOTAL QUANTITY OF WATER DISCHARGED:
DISPOSITION OF DISCHARGE WATER:

Time	Volume Removed, gal	Water Level, ft	Turbidity	Clarity / Color	Temp, °C	pH	Conductivity	Remarks
1145 ~~1100~~	–	12.9	–	–	–	–		
1155	8	–	out of range	poor	13.63 ~~[illegible]~~	6.44	0.687	
1205	15	–	72.1	good	13.17	7.05	0.667	
1215	20	–	88.0	good	13.17	7.29	0.666	resurged
1225	26	–	out of range	poor	13.13	7.38	0.660	resurged
1235	32	–	45.3	good	13.12	7.38	0.658	
1245	38	–	75.7	good	13.12	7.41	0.658	
1255	50	–	59.2	good	13.10	7.41	0.658	
1305	60	12.9	45.9	good	13.15	7.42	0.660	
		cease development						

COMMENTS:

CH2MHILL	PROJECT NUMBER	WELL ID	DATE	SHEET
		MW19 BR	9-22-14	of

PROJECT: Allied Paper, Inc. OU1
CONTRACTOR:
METHOD:
EQUIPMENT:
LOGGER:

LOCATION: Kalamazoo, MI
START: 1600
END: 1630
WATER LEVEL START: 26.5
WATER LEVEL END: 24.7

MAXIMIUM DRAWDOWN DURING PUMPING:
RANGE AND AVERAGE DISCHARGE RATE:
TOTAL QUANTITY OF WATER DISCHARGED:
DISPOSITION OF DISCHARGE WATER:

Time	Volume Removed, gal	Water Level, ft	Turbidity	Clarity / Color	Temp, °C	pH	Conductivity	Remarks
1600	–	26.5	–					
1630	20gal	24.7	20.3					

COMMENTS:

CH2MHILL	PROJECT NUMBER	WELL ID	DATE	SHEET
		MW22AR	9-23-14	of

PROJECT: Allied Paper, Inc. OU1
CONTRACTOR:
METHOD:
EQUIPMENT:
LOGGER:

LOCATION: Kalamazoo, MI
START:
END:
WATER LEVEL START:
WATER LEVEL END:

MAXIMIUM DRAWDOWN DURING PUMPING:
RANGE AND AVERAGE DISCHARGE RATE:
TOTAL QUANTITY OF WATER DISCHARGED:
DISPOSITION OF DISCHARGE WATER:

Time	Volume Removed, gal	Water Level, ft	Turbidity	Clarity / Color	Temp, °C	pH	Conductivity	Remarks
1655	-	1635	-					

COMMENTS:
well has <1' water - no development completed
pumped dry & failed to recharge

CH2MHILL	PROJECT NUMBER	WELL ID	DATE	SHEET
		MW 22B	9-23-14	of

PROJECT: Allied Paper, Inc. OU1
CONTRACTOR:
METHOD:
EQUIPMENT:
LOGGER:

LOCATION: Kalamazoo, MI
START:
END:
WATER LEVEL START:
WATER LEVEL END:

MAXIMIUM DRAWDOWN DURING PUMPING:
RANGE AND AVERAGE DISCHARGE RATE:
TOTAL QUANTITY OF WATER DISCHARGED:
DISPOSITION OF DISCHARGE WATER:

Time	Volume Removed, gal	Water Level, ft	Turbidity	Clarity / Color	Temp, °C	pH	Conductivity	Remarks
1745	-	16.79	-					
1810	35	10.91	13.4					

COMMENTS:

CH2MHILL	PROJECT NUMBER	WELL ID	DATE	SHEET
		MW30	9-22-14	of

PROJECT: Allied Paper, Inc. OU1
CONTRACTOR:
METHOD:
EQUIPMENT:
LOGGER:

LOCATION: Kalamazoo, MI
START:
END:
WATER LEVEL START:
WATER LEVEL END:

MAXIMIUM DRAWDOWN DURING PUMPING:
RANGE AND AVERAGE DISCHARGE RATE:
TOTAL QUANTITY OF WATER DISCHARGED:
DISPOSITION OF DISCHARGE WATER:

Time	Volume Removed, gal	Water Level, ft	Turbidity	Clarity / Color	Temp, °C	pH	Conductivity	Remarks
1100	–	13	–					
1105	3.5	14.6	–					

COMMENTS:
not enough wate to develop

92' × 0.163 = 15 gal × 10 = 150 gal max

CH2MHILL	PROJECT NUMBER	WELL ID	DATE	SHEET
		MW 40	9-22-14	of

PROJECT: Allied Paper, Inc. OU1
CONTRACTOR:
METHOD:
EQUIPMENT:
LOGGER:

LOCATION: Kalamazoo, MI
START: 1140
END: 1323
WATER LEVEL START: 22.92
WATER LEVEL END: 6.10

MAXIMIUM DRAWDOWN DURING PUMPING:
RANGE AND AVERAGE DISCHARGE RATE:
TOTAL QUANTITY OF WATER DISCHARGED:
DISPOSITION OF DISCHARGE WATER:

Time	Volume Removed, gal	Water Level, ft	50 Turbidity	Clarity / Color	Temp, °C	pH	Conductivity	Remarks
1140		22.92	–					
1323	13	6.10'	38					

COMMENTS:

CH2MHILL	PROJECT NUMBER	WELL ID	DATE	SHEET
		MW 122 A	9-23-14	of

PROJECT: Allied Paper, Inc. OU1
CONTRACTOR:
METHOD:
EQUIPMENT:
LOGGER:

LOCATION: Kalamazoo, MI
START:
END:
WATER LEVEL START:
WATER LEVEL END:

MAXIMIUM DRAWDOWN DURING PUMPING:
RANGE AND AVERAGE DISCHARGE RATE:
TOTAL QUANTITY OF WATER DISCHARGED:
DISPOSITION OF DISCHARGE WATER:

Time	Volume Removed, gal	Water Level, ft	Turbidity	Clarity / Color	Temp, °C	pH	Conductivity	Remarks
1100	-	15.7	-					very low flow
1155	6	-	-					well pumped
1225	11	17.2	7.09					dry, allowed
								to recharge
								& pumped again
								in cycle

COMMENTS:

CH2MHILL	PROJECT NUMBER	WELL ID	DATE	SHEET
		MW122AR	9-23-14	of

PROJECT: Allied Paper, Inc. OU1
CONTRACTOR:
METHOD:
EQUIPMENT:
LOGGER:

LOCATION: Kalamazoo, MI
START:
END:
WATER LEVEL START:
WATER LEVEL END:

MAXIMIUM DRAWDOWN DURING PUMPING:
RANGE AND AVERAGE DISCHARGE RATE:
TOTAL QUANTITY OF WATER DISCHARGED:
DISPOSITION OF DISCHARGE WATER:

Time	Volume Removed, gal	Water Level, ft	Turbidity	Clarity / Color	Temp, °C	pH	Conductivity	Remarks
1225	-	16.2	-					<1' water in well

COMMENTS:

not enough water to develop - pumped dry & failed to recharge

CH2MHILL	PROJECT NUMBER	WELL ID	DATE	SHEET
		MW122B	9-23	of

PROJECT: Allied Paper, Inc. OU1
CONTRACTOR:
METHOD:
EQUIPMENT:
LOGGER:

LOCATION: Kalamazoo, MI
START:
END:
WATER LEVEL START:
WATER LEVEL END:

MAXIMIUM DRAWDOWN DURING PUMPING:
RANGE AND AVERAGE DISCHARGE RATE:
TOTAL QUANTITY OF WATER DISCHARGED:
DISPOSITION OF DISCHARGE WATER:

Time	Volume Removed, gal	Water Level, ft	Turbidity	Clarity / Color	Temp, °C	pH	Conductivity	Remarks
1000	—	16.6	—					
1055	20	46.7	21.8					

COMMENTS:

CH2MHILL	PROJECT NUMBER	WELL ID	DATE	SHEET
	419665.FI.01	MW-124A	10/2/14	1 of 1

PROJECT: Allied Paper, Inc. OU1
CONTRACTOR: CASCADE
METHOD: SURGE & PURGE
EQUIPMENT: DOWN HOLE PUMP
LOGGER: A. WINTER

LOCATION: Kalamazoo, MI
START: 859
END: 919
WATER LEVEL START: 32.6 TOC, 39' B.O.C
WATER LEVEL END: 35.9 TOC.

MAXIMIUM DRAWDOWN DURING PUMPING: ~3'
RANGE AND AVERAGE DISCHARGE RATE: 1 GPM
TOTAL QUANTITY OF WATER DISCHARGED: 1.5 gallons
DISPOSITION OF DISCHARGE WATER: Thick, RED, PRESENCE OF IRON

Time	Volume Removed, gal	Water Level, ft	Turbidity	Clarity / Color	Temp, °C	pH	Conductivity	Remarks
859	—	32.9						START SURGE.
909								START PUMP, THICK RED
910	1							PUMPED DRY
911	1/2	35.9						PUMPED DRY, RED

COMMENTS:
NOT ENOUGH VOLUME TO DEVELOP.

CH2MHILL	PROJECT NUMBER	WELL ID	DATE	SHEET
		MW-124B	9-24-14	of

PROJECT: Allied Paper, Inc. OU1
CONTRACTOR:
METHOD:
EQUIPMENT:
LOGGER:

LOCATION: Kalamazoo, MI
START:
END:
WATER LEVEL START:
WATER LEVEL END:

MAXIMIUM DRAWDOWN DURING PUMPING:
RANGE AND AVERAGE DISCHARGE RATE:
TOTAL QUANTITY OF WATER DISCHARGED:
DISPOSITION OF DISCHARGE WATER:

Time	Volume Removed, gal	Water Level, ft	Turbidity	Clarity / Color	Temp, °C	pH	Conductivity	Remarks
1320	–	41.84	–					
1400	4	54.0	–					pumped dry
								fail to
								recharge

COMMENTS: Significant quantities of iron bacteria present in purge water. Casing pumped dry & did not recharge enough to continue development after 30 min

CH2MHILL	PROJECT NUMBER	WELL ID	DATE	SHEET
		MW-125A	9-24-13	of

PROJECT: Allied Paper, Inc. OU1
CONTRACTOR:
METHOD:
EQUIPMENT:
LOGGER:

LOCATION: Kalamazoo, MI
START:
END:
WATER LEVEL START:
WATER LEVEL END:

MAXIMIUM DRAWDOWN DURING PUMPING:
RANGE AND AVERAGE DISCHARGE RATE:
TOTAL QUANTITY OF WATER DISCHARGED:
DISPOSITION OF DISCHARGE WATER:

Time	Volume Removed, gal	Water Level, ft	Turbidity	Clarity / Color	Temp, °C	pH	Conductivity	Remarks
1435	–	18.0	–					
1525	25		5.37					

COMMENTS:

CH2MHILL	PROJECT NUMBER	WELL ID	DATE	SHEET
		MW 201B	9-24-14	of

PROJECT: Allied Paper, Inc. OU1
CONTRACTOR:
METHOD:
EQUIPMENT:
LOGGER:

LOCATION: Kalamazoo, MI
START:
END:
WATER LEVEL START:
WATER LEVEL END:

MAXIMIUM DRAWDOWN DURING PUMPING:
RANGE AND AVERAGE DISCHARGE RATE:
TOTAL QUANTITY OF WATER DISCHARGED:
DISPOSITION OF DISCHARGE WATER:

Time	Volume Removed, gal	Water Level, ft	Turbidity	Clarity / Color	Temp, °C	pH	Conductivity	Remarks
0800	–	6.25	–					
0830	45	6.35	41.8					

COMMENTS:

CH2MHILL	PROJECT NUMBER	WELL ID	DATE	SHEET
		MW 203 B	9-23-14	of

PROJECT: Allied Paper, Inc. OU1
CONTRACTOR:
METHOD:
EQUIPMENT:
LOGGER:

LOCATION: Kalamazoo, MI
START:
END:
WATER LEVEL START:
WATER LEVEL END:

MAXIMIUM DRAWDOWN DURING PUMPING:
RANGE AND AVERAGE DISCHARGE RATE:
TOTAL QUANTITY OF WATER DISCHARGED:
DISPOSITION OF DISCHARGE WATER:

Time	Volume Removed, gal	Water Level, ft	Turbidity	Clarity / Color	Temp, °C	pH	Conductivity	Remarks
1745	–	11.52	–					
1830	70	11.55	20.3					

COMMENTS:

CH2MHILL	PROJECT NUMBER	WELL ID	DATE	SHEET
		MW204B	9-23-14	of

PROJECT: Allied Paper, Inc. OU1
CONTRACTOR:
METHOD:
EQUIPMENT:
LOGGER:

LOCATION: Kalamazoo, MI
START:
END:
WATER LEVEL START:
WATER LEVEL END:

MAXIMIUM DRAWDOWN DURING PUMPING:
RANGE AND AVERAGE DISCHARGE RATE:
TOTAL QUANTITY OF WATER DISCHARGED:
DISPOSITION OF DISCHARGE WATER:

Time	Volume Removed, gal	Water Level, ft	Turbidity	Clarity / Color	Temp, °C	pH	Conductivity	Remarks
1600	–	2.3	–					
1730	115	2.4	13.7					

COMMENTS:

CH2MHILL	PROJECT NUMBER	WELL ID	DATE	SHEET
		MW205B	9-23-14	of

PROJECT: Allied Paper, Inc. OU1
CONTRACTOR:
METHOD:
EQUIPMENT:
LOGGER:

LOCATION: Kalamazoo, MI
START:
END:
WATER LEVEL START:
WATER LEVEL END:

MAXIMIUM DRAWDOWN DURING PUMPING:
RANGE AND AVERAGE DISCHARGE RATE:
TOTAL QUANTITY OF WATER DISCHARGED:
DISPOSITION OF DISCHARGE WATER:

Time	Volume Removed, gal	Water Level, ft	Turbidity	Clarity / Color	Temp, °C	pH	Conductivity	Remarks
1516	–	13.1	–					
1615	50	13.6	29.0					

COMMENTS:

CH2MHILL	PROJECT NUMBER	WELL ID	DATE	SHEET
		MW 207	9-25-14	of

PROJECT: Allied Paper, Inc. OU1
CONTRACTOR:
METHOD:
EQUIPMENT:
LOGGER:

LOCATION: Kalamazoo, MI
START:
END:
WATER LEVEL START:
WATER LEVEL END:

MAXIMIUM DRAWDOWN DURING PUMPING:
RANGE AND AVERAGE DISCHARGE RATE:
TOTAL QUANTITY OF WATER DISCHARGED:
DISPOSITION OF DISCHARGE WATER:

Time	Volume Removed, gal	Water Level, ft	Turbidity	Clarity / Color	Temp, °C	pH	Conductivity	Remarks
0750	–	4.65	–					
0910	48	10.05	45.9					

COMMENTS:

CH2MHILL	PROJECT NUMBER	WELL ID	DATE	SHEET
		MW208	9-23-14	of

PROJECT: Allied Paper, Inc. OU1
CONTRACTOR:
METHOD:
EQUIPMENT:
LOGGER:

LOCATION: Kalamazoo, MI
START:
END:
WATER LEVEL START:
WATER LEVEL END:

MAXIMIUM DRAWDOWN DURING PUMPING:
RANGE AND AVERAGE DISCHARGE RATE:
TOTAL QUANTITY OF WATER DISCHARGED:
DISPOSITION OF DISCHARGE WATER:

Time	Volume Removed, gal	Water Level, ft	Turbidity	Clarity / Color	Temp, °C	pH	Conductivity	Remarks
1525	-	9.61	-					
1625	35	9.59	4.3					

COMMENTS:

CH2MHILL	PROJECT NUMBER	WELL ID	DATE	SHEET
		MW209	9-23-14	of

PROJECT: Allied Paper, Inc. OU1
CONTRACTOR:
METHOD:
EQUIPMENT:
LOGGER:

LOCATION: Kalamazoo, MI
START:
END:
WATER LEVEL START:
WATER LEVEL END:

MAXIMIUM DRAWDOWN DURING PUMPING:
RANGE AND AVERAGE DISCHARGE RATE:
TOTAL QUANTITY OF WATER DISCHARGED:
DISPOSITION OF DISCHARGE WATER:

Time	Volume Removed, gal	Water Level, ft	Turbidity	Clarity / Color	Temp, °C	pH	Conductivity	Remarks
1130	–	0.6	–					
1210	25	2.4	11.3					

COMMENTS:

CH2MHILL	PROJECT NUMBER	WELL ID	DATE	SHEET
		MW211	9-23-14	of

PROJECT: Allied Paper, Inc. OU1
CONTRACTOR:
METHOD:
EQUIPMENT:
LOGGER:

LOCATION: Kalamazoo, MI
START:
END:
WATER LEVEL START:
WATER LEVEL END:

MAXIMIUM DRAWDOWN DURING PUMPING:
RANGE AND AVERAGE DISCHARGE RATE:
TOTAL QUANTITY OF WATER DISCHARGED:
DISPOSITION OF DISCHARGE WATER:

Time	Volume Removed, gal	Water Level, ft	Turbidity	Clarity / Color	Temp, °C	pH	Conductivity	Remarks
1305	–	1.8	–					
1400	20	2.6	40.1					

COMMENTS:

CH2MHILL	PROJECT NUMBER	WELL ID	DATE	SHEET
		MW212	9-23	of

PROJECT: Allied Paper, Inc. OU1
CONTRACTOR:
METHOD:
EQUIPMENT:
LOGGER:

LOCATION: Kalamazoo, MI
START:
END:
WATER LEVEL START:
WATER LEVEL END:

MAXIMIUM DRAWDOWN DURING PUMPING:
RANGE AND AVERAGE DISCHARGE RATE:
TOTAL QUANTITY OF WATER DISCHARGED:
DISPOSITION OF DISCHARGE WATER:

Time	Volume Removed, gal	Water Level, ft	Turbidity	Clarity / Color	Temp, °C	pH	Conductivity	Remarks
1005	–	4.31	–					
1120	30	5.05	287					water clears but becomes cloudy again w/ resurging
								greater than 10 well volumes purged

COMMENTS:

CH2MHILL	PROJECT NUMBER	WELL ID	DATE	SHEET
		MW 214	9-23-14	of

PROJECT: Allied Paper, Inc. OU1
CONTRACTOR:
METHOD:
EQUIPMENT:
LOGGER:

LOCATION: Kalamazoo, MI
START:
END:
WATER LEVEL START:
WATER LEVEL END:

MAXIMIUM DRAWDOWN DURING PUMPING:
RANGE AND AVERAGE DISCHARGE RATE:
TOTAL QUANTITY OF WATER DISCHARGED:
DISPOSITION OF DISCHARGE WATER:

Time	Volume Removed, gal	Water Level, ft	Turbidity	Clarity / Color	Temp, °C	pH	Conductivity	Remarks
1300	–	16.35	–					
1410	45	22.4	2.14					

COMMENTS:

CH2MHILL	PROJECT NUMBER	WELL ID	DATE	SHEET
		MW218	9-24-14	of

PROJECT: Allied Paper, Inc. OU1
CONTRACTOR:
METHOD:
EQUIPMENT:
LOGGER:

LOCATION: Kalamazoo, MI
START:
END:
WATER LEVEL START:
WATER LEVEL END:

MAXIMIUM DRAWDOWN DURING PUMPING:
RANGE AND AVERAGE DISCHARGE RATE:
TOTAL QUANTITY OF WATER DISCHARGED:
DISPOSITION OF DISCHARGE WATER:

Time	Volume Removed, gal	Water Level, ft	Turbidity	Clarity / Color	Temp, °C	pH	Conductivity	Remarks
1110	–	5.31	–					
1215	30	5.48	72.5					>10 well
								volumes
								purged

COMMENTS:

CH2MHILL	PROJECT NUMBER	WELL ID	DATE	SHEET
		MW221R		of

PROJECT: Allied Paper, Inc. OU1
CONTRACTOR:
METHOD:
EQUIPMENT:
LOGGER:

LOCATION: Kalamazoo, MI
START:
END:
WATER LEVEL START:
WATER LEVEL END:

MAXIMIUM DRAWDOWN DURING PUMPING:
RANGE AND AVERAGE DISCHARGE RATE:
TOTAL QUANTITY OF WATER DISCHARGED:
DISPOSITION OF DISCHARGE WATER:

Time	Volume Removed, gal	Water Level, ft	Turbidity	Clarity / Color	Temp, °C	pH	Conductivity	Remarks
1655	-	5.	-					
1755	25	9.9	81.4					>10 well volumes purged
								well being pumped dry
								visible sediment on
								water level meter

COMMENTS:

CH2MHILL	PROJECT NUMBER	WELL ID	DATE	SHEET
		MW222	9-24-14	of

PROJECT: Allied Paper, Inc. OU1
CONTRACTOR:
METHOD:
EQUIPMENT:
LOGGER:

LOCATION: Kalamazoo, MI
START:
END:
WATER LEVEL START:
WATER LEVEL END:

MAXIMIUM DRAWDOWN DURING PUMPING:
RANGE AND AVERAGE DISCHARGE RATE:
TOTAL QUANTITY OF WATER DISCHARGED:
DISPOSITION OF DISCHARGE WATER:

Time	Volume Removed, gal	Water Level, ft	Turbidity	Clarity / Color	Temp, °C	pH	Conductivity	Remarks
1725	–	3.49	–					
1805	28	3.59	44.1					

COMMENTS:

CH2MHILL	PROJECT NUMBER	WELL ID	DATE	SHEET
		MW 223	9-24-14	of

PROJECT: Allied Paper, Inc. OU1
CONTRACTOR:
METHOD:
EQUIPMENT:
LOGGER:

LOCATION: Kalamazoo, MI
START:
END:
WATER LEVEL START:
WATER LEVEL END:

MAXIMUM DRAWDOWN DURING PUMPING:
RANGE AND AVERAGE DISCHARGE RATE:
TOTAL QUANTITY OF WATER DISCHARGED:
DISPOSITION OF DISCHARGE WATER:

Time	Volume Removed, gal	Water Level, ft	Turbidity	Clarity / Color	Temp, °C	pH	Conductivity	Remarks
1645	–	dry	–					no water in casing

COMMENTS:

CH2MHILL	PROJECT NUMBER	WELL ID	DATE	SHEET
		MW 224	9-24-14	of

PROJECT: Allied Paper, Inc. OU1
CONTRACTOR:
METHOD:
EQUIPMENT:
LOGGER:

LOCATION: Kalamazoo, MI
START:
END:
WATER LEVEL START:
WATER LEVEL END:

MAXIMIUM DRAWDOWN DURING PUMPING:
RANGE AND AVERAGE DISCHARGE RATE:
TOTAL QUANTITY OF WATER DISCHARGED:
DISPOSITION OF DISCHARGE WATER:

Time	Volume Removed, gal	Water Level, ft	Turbidity	Clarity / Color	Temp, °C	pH	Conductivity	Remarks
1530	–	22.95	–					
1710	15		48.3					

COMMENTS:
well recharges slowly. went dry frequently pumping at < 1 gpm

CH2MHILL	PROJECT NUMBER	WELL ID	DATE	SHEET
		MW229	9-24-14	of

PROJECT: Allied Paper, Inc. OU1
CONTRACTOR:
METHOD:
EQUIPMENT:
LOGGER:

LOCATION: Kalamazoo, MI
START:
END:
WATER LEVEL START:
WATER LEVEL END:

MAXIMIUM DRAWDOWN DURING PUMPING:
RANGE AND AVERAGE DISCHARGE RATE:
TOTAL QUANTITY OF WATER DISCHARGED:
DISPOSITION OF DISCHARGE WATER:

Time	Volume Removed, gal	Water Level, ft	Turbidity	Clarity / Color	Temp, °C	pH	Conductivity	Remarks
1055	-	8.06	-					<3' wate
1150	2	10.5						in well

COMMENTS: not enough water to develop
very slow to recharge

CH2MHILL	PROJECT NUMBER	WELL ID	DATE	SHEET
		MW231	9-25-14	of

PROJECT: Allied Paper, Inc. OU1
CONTRACTOR:
METHOD:
EQUIPMENT:
LOGGER:

LOCATION: Kalamazoo, MI
START:
END:
WATER LEVEL START:
WATER LEVEL END:

MAXIMIUM DRAWDOWN DURING PUMPING:
RANGE AND AVERAGE DISCHARGE RATE:
TOTAL QUANTITY OF WATER DISCHARGED:
DISPOSITION OF DISCHARGE WATER:

Time	Volume Removed, gal	Water Level, ft	Turbidity	Clarity / Color	Temp, °C	pH	Conductivity	Remarks
0930	–	3.72	–					
1045	55	4.05	101					>10 well
								volumes removed

COMMENTS:

CH2MHILL	PROJECT NUMBER	WELL ID	DATE	SHEET
		MW232	9-24-14	of

PROJECT: Allied Paper, Inc. OU1
CONTRACTOR:
METHOD:
EQUIPMENT:
LOGGER:

LOCATION: Kalamazoo, MI
START:
END:
WATER LEVEL START:
WATER LEVEL END:

MAXIMIUM DRAWDOWN DURING PUMPING:
RANGE AND AVERAGE DISCHARGE RATE:
TOTAL QUANTITY OF WATER DISCHARGED:
DISPOSITION OF DISCHARGE WATER:

Time	Volume Removed, gal	Water Level, ft	Turbidity	Clarity / Color	Temp, °C	pH	Conductivity	Remarks
0945	–	7.48	–					7/D well
1045	30	8.65	55.7					volumes
								purged

COMMENTS:

Attachment E
Surveyor Report

SURVEYOR'S REPORT

Project Name: Allied Landfill

Date: October 17, 2014

DLZ Acct. # 1450-9590-90

Project Location: Kalamazoo, Michigan

Horizontal coordinates are derived from the North American Datum of 1983, Michigan South Zone. Control point and feature coordinates were established using Real Time Network GPS techniques from the MDOT CORS Network.

One fixed height pole mounted Trimble R8 antenna (serial #4748141726) steadied by a bipod with clamp assembly, was used for all observations. The receiver was set to a 180-second observation rate with a 13° elevation mask. Trimble Business Center software was used to convert geodetic coordinates to the local system.

Control point and feature elevations were established based on differential leveling techniques using a digital level and bar encoded level rod. The elevation of the primary benchmark used for the leveling techniques was derived from a WGS84 ellipsoid height adjusted to an orthometric height (elevation) using GEOID12A. The results of the leveling techniques were compared to corresponding RTK GPS orthometric heights on 21 control points. Elevations are expressed relative to NAVD 88, North American Vertical Datum of 1988. All coordinate values are expressed in terms of International feet.

Prepared by:

Steven Jones, PS, CFedS
Michigan Professional Surveyor #56304

Monitoring Wells

Well Designation	Horizontal Coordinates (NAD 83)		Elevations (NAVD 88)	
	North	East	Ground	Top of Casing
FW-101	279370.2	12795845.2	797.86	800.21
MW-1	282113.0	12795349.0	794.47	797.02
MW-10	282066.2	12795740.3	779.06	781.52
MW-10A	279533.5	12796677.7	804.93	808.39
MW-11	281652.3	12795686.8	780.63	782.81
MW-120A	279785.4	12795925.2	818.42	821.65
MW-120B	279779.9	12795924.9	817.64	821.55
MW-122A	280636.0	12796954.1	801.69	803.92
MW-122AR	280636.3	12796949.7	802.35	804.24
MW-122B	280633.7	12796957.5	801.65	804.09
MW-124A	279436.5	12797286.0	840.48	843.07
MW-124B	279431.0	12797286.9	841.44	843.81
MW-125A	279636.8	12797102.6	806.12	808.66
MW-126A	279415.0	12796602.9	801.42	803.86
MW-126AR	279422.3	12796600.9	802.20	804.13
MW-16B	280838.4	12796557.1	800.17	802.89
MW-16D	280823.7	12796520.9	802.61	805.64
MW-16I	280816.9	12796519.9	802.63	805.80
MW-19BR	280422.9	12796250.6	819.11	821.49
MW-2	282398.1	12795191.9	793.43	795.84
MW-200A	279269.0	12795826.8	800.74	803.49
MW-201B	279338.5	12796010.9	799.78	801.96
MW-202B	279350.5	12796179.1	803.12	807.15
MW-203B	279401.6	12796341.3	802.06	805.86
MW-204B	280011.7	12797097.9	803.33	807.77
MW-205B	280286.4	12797098.5	801.08	805.41
MW-206A	279372.4	12795848.4	797.82	800.71
MW-207	279505.5	12796581.7	801.02	804.73
MW-208	279578.5	12796839.6	799.54	804.09
MW-209	280230.2	12797150.2	787.32	762.26
MW-210	279442.6	12796400.6	802.93	806.21
MW-211	279949.1	12797132.4	788.32	793.00
MW-212	280601.8	12797004.4	786.93	791.34
MW-213	279892.7	12797138.1	787.67	791.54
MW-214	280308.8	12797102.0	798.51	803.33
MW-215	281132.8	12795943.5	785.14	790.66
MW-216	281093.8	12796122.9	785.33	790.29
MW-217	281053.2	12796229.8	785.04	790.49
MW-218	281013.6	12796364.6	785.61	790.46
MW-219	280980.8	12796462.8	785.78	790.67
MW-220	280860.5	12796655.7	787.44	790.50
MW-221R	280741.6	12796858.1	786.66	791.01
MW-222	279363.0	12796361.6	792.46	797.07
MW-223	279518.4	12796825.8	793.52	796.92
MW-224	279592.0	12796958.5	810.05	813.02

Units are International Feet

Monitoring Wells

Well Designation	Horizontal Coordinates (NAD 83)		Elevations (NAVD 88)	
	North	East	Ground	Top of Casing
MW-225	279734.1	12797207.0	789.07	792.67
MW-226	281095.8	12796118.7	785.40	790.46
MW-227	281050.7	12796235.1	784.93	790.38
MW-228	281008.5	12796366.4	784.92	790.80
MW-229	280975.3	12796460.3	785.45	791.05
MW-22AR	279540.1	12796682.8	806.46	809.89
MW-22B	279549.0	12796679.1	807.92	811.51
MW-230	280771.8	12796770.2	787.62	790.63
MW-231	281130.7	12795948.6	785.50	790.45
MW-232	280864.6	12796655.0	787.06	790.39
MW-23R	279364.7	12796123.8	807.20	811.45
MW-24R	279803.0	12797109.3	799.69	803.85
MW-26	279726.0	12797070.2	789.20	791.27
MW-3	281479.8	12795161.2	796.91	799.30
MW-30	282815.7	12795380.0	793.67	796.16
MW-4	281729.2	12795398.8	792.77	795.15
MW-40D	282831.8	12795403.8	792.89	796.29
MW-40I	282819.1	12795392.3	793.96	796.35
MW-40S	282830.9	12795413.5	793.02	796.30
MW-5	281975.9	12795539.2	792.35	795.00
MW-5R	280731.6	12796258.9	809.41	811.31
MW-6	282163.3	12795522.9	792.71	794.88
MW-6A	280747.2	12795370.9	809.53	812.16
MW-7	282426.8	12795607.3	793.18	795.26
MW-7A	280173.2	12795495.6	817.06	818.43
MW-7D	280192.5	12795510.3	814.94	817.91
MW-7I	280196.3	12795510.2	815.02	817.91
MW-8	281449.5	12795465.6	793.32	795.77
MW-8A	279375.1	12795636.4	806.74	809.50
MW-8D	281439.3	12795451.8	793.75	796.74
MW-9	282451.8	12795750.7	778.92	781.07
MW-9A	279341.6	12796002.3	799.55	802.39
OW-10P	279770.8	12797067.2	802.29	805.98
OW-11A	280327.2	12797085.4	800.23	803.59
OW-11P	280297.8	12797094.3	801.23	805.59
OW-12A	279552.0	12796686.0	807.99	811.96
OW-13A	279493.4	12796530.5	801.85	805.00
OW-13B	279494.3	12796535.2	801.60	805.13
OW-13P	279492.6	12796525.6	801.92	805.02
OW-14P	279596.4	12796859.8	800.22	803.81
OW-15P	279369.9	12796071.0	809.05	813.09
OW-16P	279542.5	12796779.9	801.04	805.72
OW-17P	279930.3	12797112.1	799.70	803.20
OW-1A	280460.8	12797016.4	802.84	807.19
OW-2A	280025.3	12797098.6	803.13	806.42

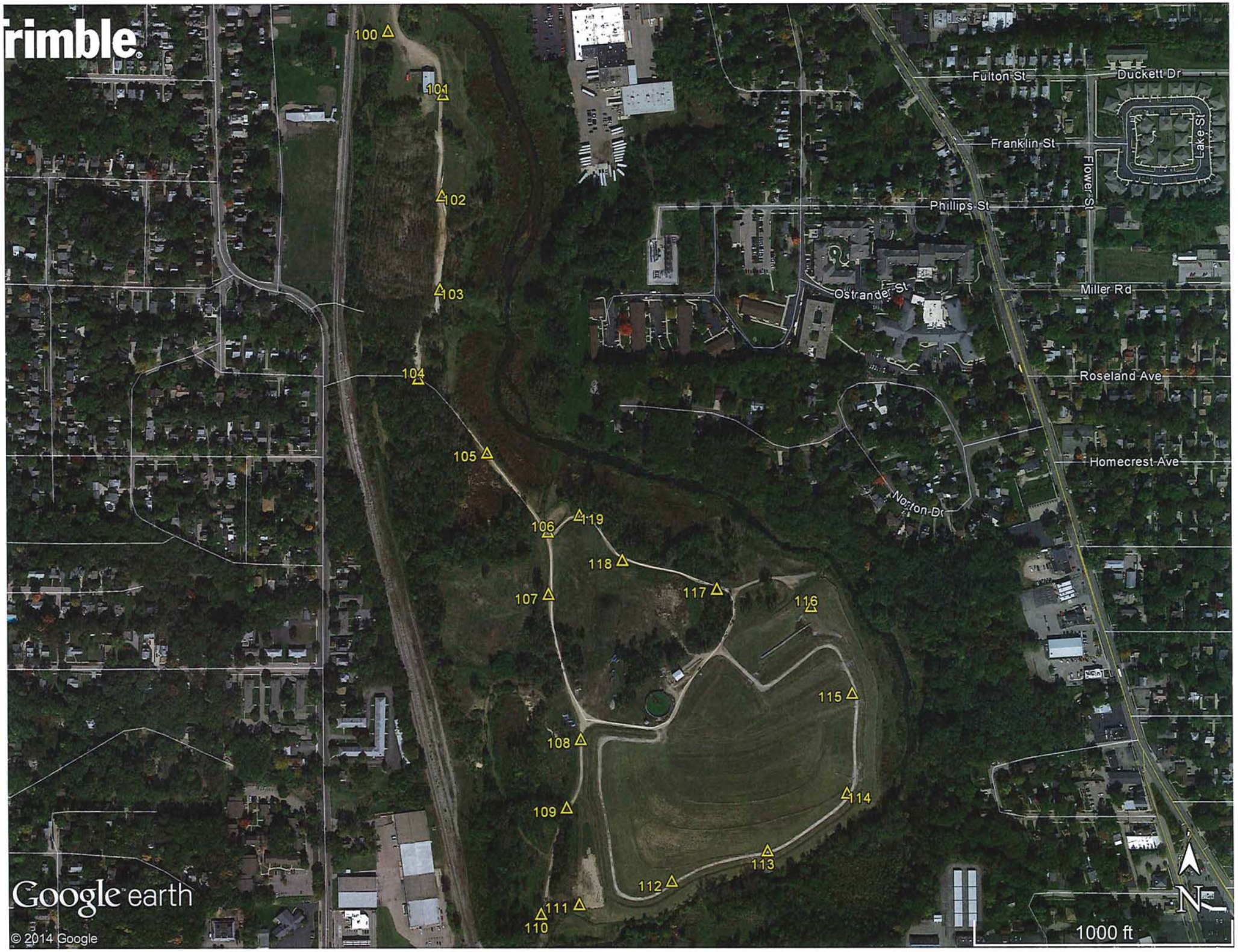
Units are International Feet

Monitoring Wells

Well Designation	Horizontal Coordinates (NAD 83)		Elevations (NAVD 88)	
	North	East	Ground	Top of Casing
OW-2B	280031.6	12797099.0	803.11	806.21
OW-2P	280019.5	12797098.0	803.37	806.67
OW-3AR	279676.5	12796963.8	802.33	806.04
OW-3B	279680.5	12796945.4	805.12	809.46
OW-3PR	279677.0	12796959.1	803.33	806.84
OW-4AR	279473.3	12796403.0	807.58	811.19
OW-4PR	279471.8	12796409.2	806.97	810.88
OW-5P	279398.8	12795967.5	813.02	815.96
OW-6A	279412.9	12795891.9	813.52	816.98
OW-6P	279414.0	12795884.5	813.54	817.02
OW-7PR	280592.2	12796860.4	804.82	809.00
OW-9PR	279376.5	12796245.4	807.66	811.18
N. STAFF GAGE	283011.8	12795508.0		778.30
S. STAFF GAGE	279224.0	12795833.8		793.82

Units are International Feet

Trimble
Remine St
Millview Ave
Hillside Pl
Superior Ave
Inkster Ave
Outlook St
Crescent Dr
E Crescent Dr
Kalanco St
Ravinia St
Fairview Ave
Ridgewood St
S Burdick St
Imperial St
Aud St
East Cork Street
Adelaide St
Luella St
Golden Dr
Ostrander St
Palmer Ave
Fulton St
Duckett Dr
Franklin St
Lake St
Flower St
Phillips St
Miller Rd
Roseland Ave
Homecrest Ave
Norton Dr
Southern Ave
Cambridge Dr
Vassar Dr
Monarch St
Burke St
Sheridan Dr
Loyers Ln
Pomeroy St
MW-40I
MW-30
MW-2
MW-7
MW-9
MW-6
MW-1
MW-10
MW-5
MW-4
MW-11
MW-3
MW-8
MW-8D
MW-215
MW-231
MW-226
MW-217
MW-229
MW-219
MW-232
MW-220
MW-16B
MW-230
MW-221R
MW-6A
MW-5R
MW-122A
OW-7PR
MW-212
OW-1A
MW-19BR
OW-11P
MW-205B
MW-209
MW-7D
MW-7I
MW-7A
OW-2P
MW-204B
OW-17P
MW-211
MW-213
MW-24R
OW-10P
MW-26
MW-225
OW-3PR
OW-3AR
MW-125A
MW-224
OW-16B
MW-223
MW-120A
MW-120B
MW-10A
OW-13
MW-207
MW-126AR
MW-126A
MW-124A
MW-124B
OW-6P
OW-5P
MW-203B
OW-9PR
MW-222
MW-8A
FW-101
MW-9A
MW-200A
Google earth
© 2014 Google
1000 ft
N


Trimble
100
101
102
103
104
105
106
107
108
109
110
111
112
113
114
115
116
117
118
119
Fulton St
Duckett Dr
Franklin St
Lake St
Flower St
Phillips St
Ostrander St
Miller Rd
Roseland Ave
Homecrest Ave
Norton Dr
Google earth
© 2014 Google
1000 ft
N

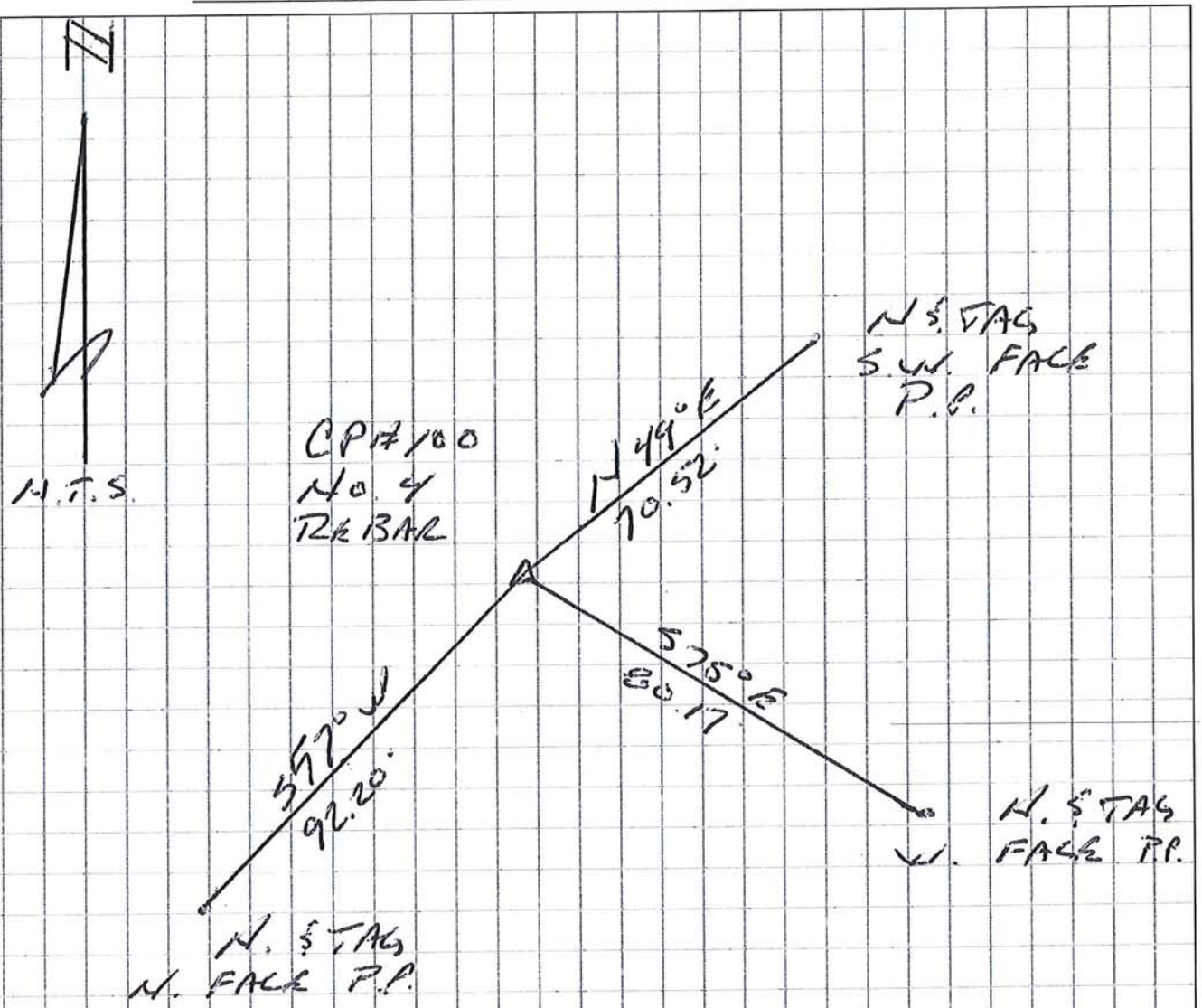
Pt ID	Horizontal Coordinates (NAD83)		NAVD88	Description
	North	East	Elev	
100	282846.19	12795269.35	792.32	#4 Rebar Set
101	282596.39	12795479.30	793.86	#4 Rebar Set
102	282198.36	12795468.91	792.91	#4 Rebar Set
103	281829.61	12795453.37	793.22	#4 Rebar Set
104	281478.99	12795361.92	794.20	#4 Rebar Set
105	281185.02	12795626.24	793.21	#4 Rebar Set
106	280871.51	12795859.00	796.72	#4 Rebar Set
107	280627.58	12795856.67	807.85	#4 Rebar Set
108	280053.39	12795971.75	825.45	#4 Rebar Set
109	279789.78	12795911.09	816.77	#4 Rebar Set
110	279376.79	12795801.98	804.44	#4 Rebar Set
111	279412.23	12795952.98	813.09	#4 Rebar Set
112	279491.89	12796318.81	811.21	#4 Rebar Set
113	279606.53	12796699.31	807.79	#4 Rebar Set
114	279826.90	12797017.14	806.70	#4 Rebar Set
115	280217.04	12797045.87	805.93	#4 Rebar Set
116	280563.80	12796889.66	805.37	#4 Rebar Set
117	280637.05	12796520.23	807.03	#4 Rebar Set
118	280755.51	12796149.88	805.97	#4 Rebar Set
119	280934.48	12795984.47	798.60	#4 Rebar Set

NAD83 Michigan South Zone
NAVD 88
Units: International Feet

DLZ
ENGINEERS • ARCHITECTS • SCIENTISTS
PLANNERS • SURVEYORS

CLIENT CH2M HILL
PROJECT ALLIED LANDFILL
SUBJECT WITNESS SHEET
CP# 100

PROJECT NO. 1450-9590-90
SHEET NO. 4 OF 4
COMP. BY CC DATE 10/17
CHECKED BY _____ DATE _____



DLZ
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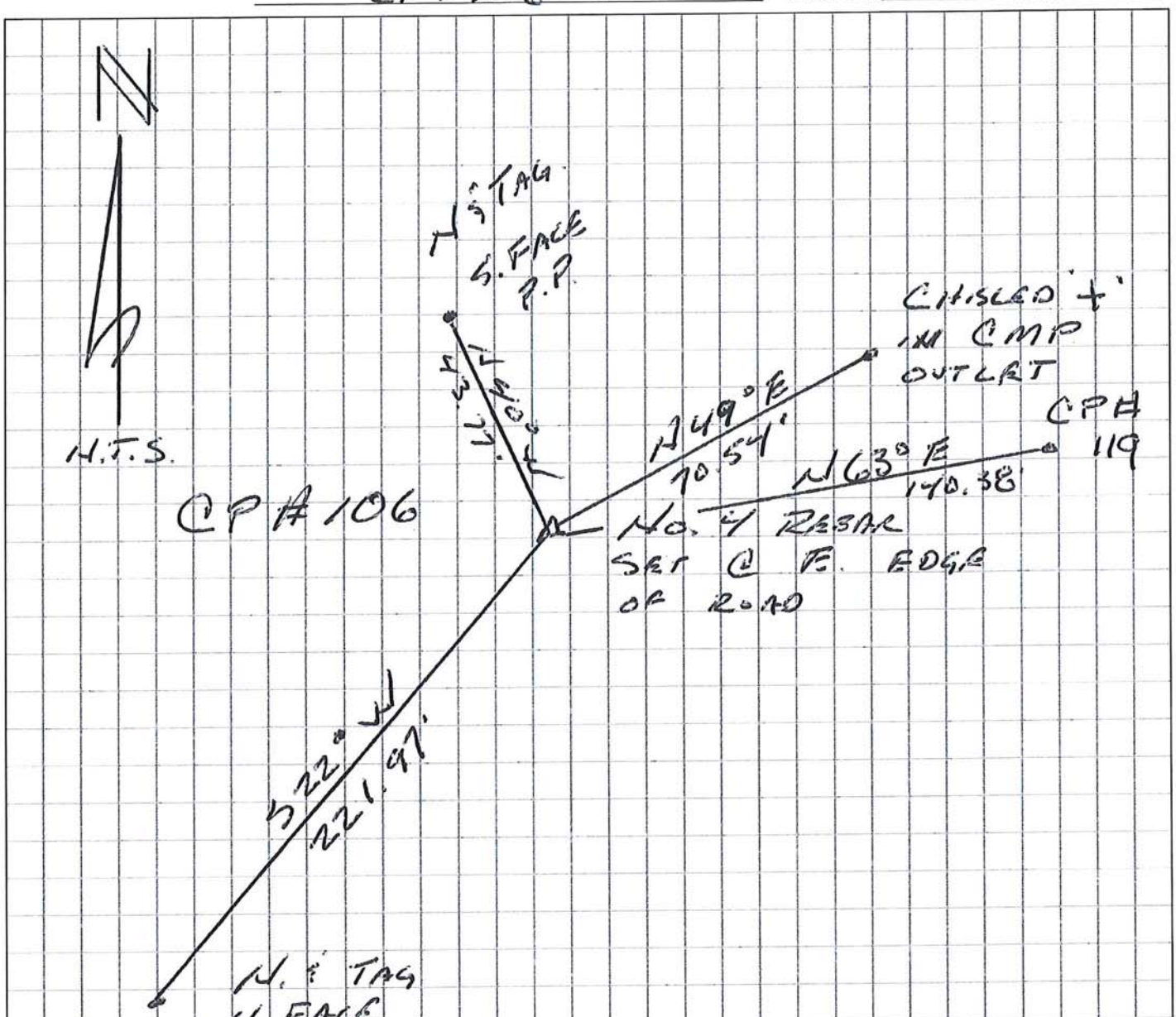
PLANNERS • SURVEYORS

CLIENT: CHZM HILL
PROJECT: ALLIED LANDFILL
SUBJECT: WITNESS SKETCH CPA106

PROJECT NO. 1450-3590-90
SHEET NO. 2 OF 4
COMP. BY: CC DATE: 10/17
CHECKED BY: DATE:



DLZ
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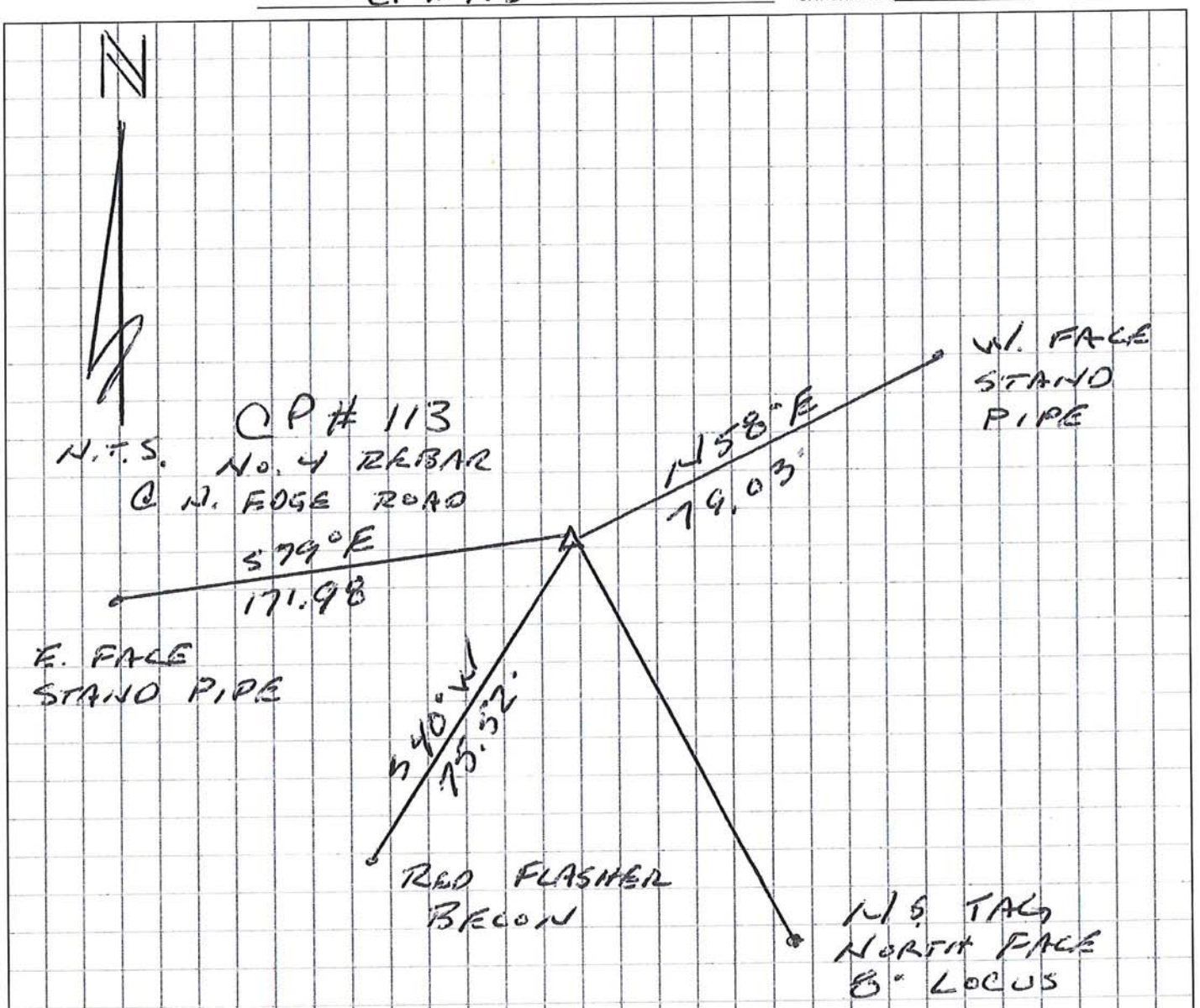
PLANNERS • SURVEYORS

CLIENT: CHZM HILL
PROJECT: ALLIED LANDFILL
SUBJECT: WITNESS SHAFT CP # 113

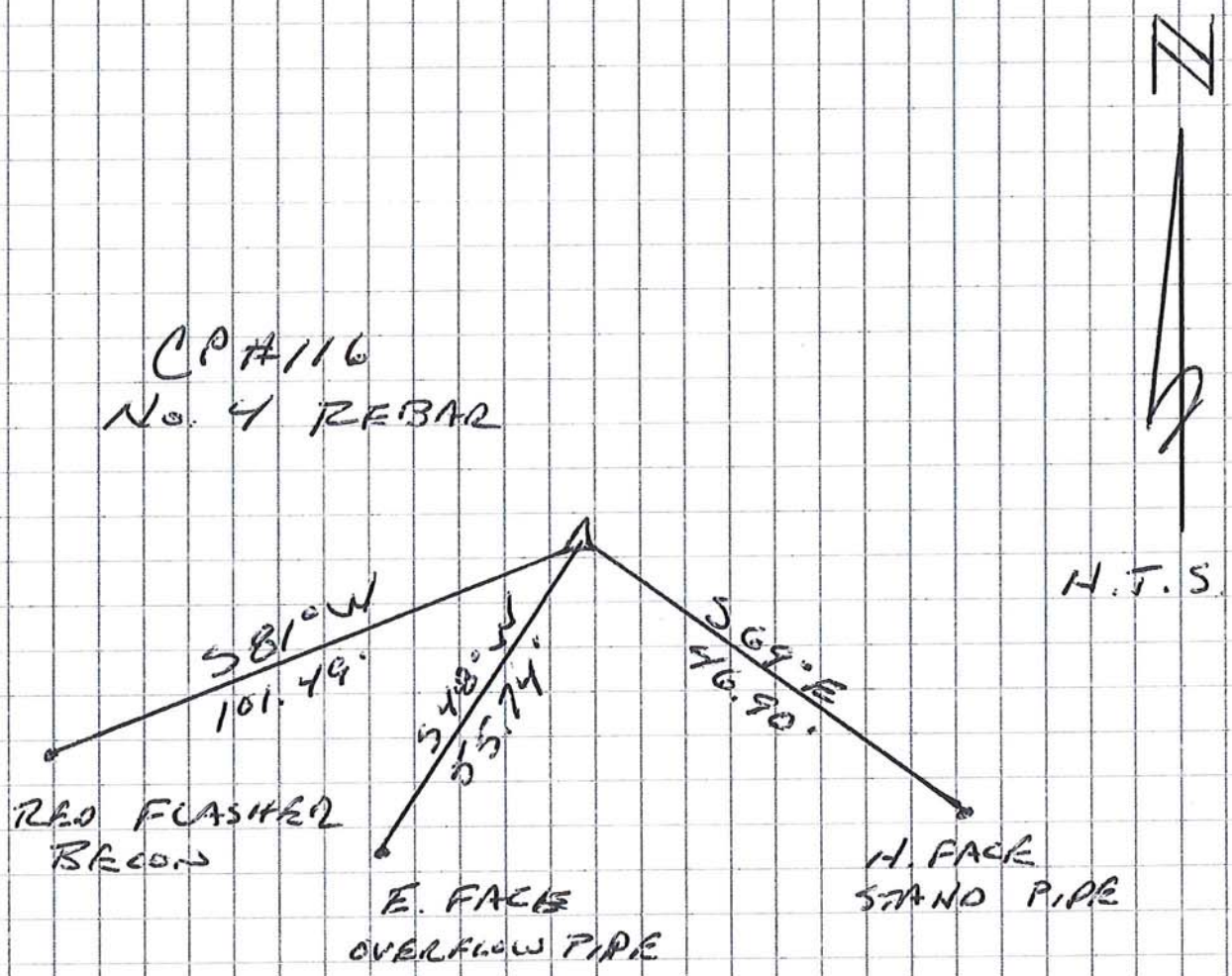
PROJECT NO. 1450-3590-90
SHEET NO. 2 OF 4
COMP. BY CC DATE 10/17
CHECKED BY _____ DATE _____



DLZ
ENGINEERS • ARCHITECTS • SCIENTISTS
PLANNERS • SURVEYORS

CLIENT: CH2M HILL
PROJECT: ALLIED LAND FILL
SUBJECT: WITNESS SHEET
CP # 116

PROJECT NO. 1450-9590-90
SHEET NO. 3 OF 4
COMP. BY _____ DATE 10/17
CHECKED BY _____ DATE _____



NGVD '88 LEVEL DATUM

OCT. 6, 2014
60 CLEAR
CREW: CTC/FGJR

Point	Plus (+)	HI	Minus (-)	Elev. (Ft)	
100	6.89	799.21		792.32	#4 REBAR SET
101	5.12	798.98	5.35	793.86	#4 REBAR SET
102	5.23	798.14	6.07	792.91	#4 REBAR SET
103	5.61	798.83	4.92	793.22	#4 REBAR SET
104	4.66	798.86	4.63	794.20	#4 REBAR SET
105	6.18	799.39	5.65	793.21	#4 REBAR SET
106	12.16	808.88	2.67	796.72	#4 REBAR SET
107	14.43	822.28	1.03	807.85	#4 REBAR SET
TP	11.02	832.46	0.84	821.44	
108	2.13	827.58	7.01	825.45	#4 REBAR SET
109	1.40	818.17	10.81	816.77	#4 REBAR SET
TP	3.41	812.72	8.86	809.31	
110	10.49	814.93	8.28	804.44	#4 REBAR SET
111	2.23	815.32	1.84	813.09	#4 REBAR SET
112	3.34	814.55	4.11	811.21	#4 REBAR SET
113	4.98	812.77	6.76	807.79	#4 REBAR SET
114	4.40	811.10	6.07	806.70	#4 REBAR SET
115	5.29	811.22	5.17	805.93	#4 REBAR SET
116	3.06	808.43	5.85	805.37	#4 REBAR SET
117	7.69	814.72	1.40	807.03	#4 REBAR SET
118	2.04	808.01	8.75	805.97	#4 REBAR SET
	121.76		106.07		

NGVD '88 LEVEL DATUM

OCT. 6, 2014
60 CLEAR
CREW: CTC/FGJR

Point	Plus (+)	HI	Minus (-)	Elev. (Ft)	
118	2.04	808.01		805.97	#4 REBAR SET
119	3.78	802.38	9.41	798.60	#4 REBAR SET
106	2.49	799.15	5.72	796.66	#4 REBAR SET
105	5.37	798.52	6.00	793.15	#4 REBAR SET
104	4.09	798.24	4.37	794.15	#4 REBAR SET
103	4.56	797.73	5.07	793.17	#4 REBAR SET
102	5.81	798.68	4.86	792.87	#4 REBAR SET
101	4.95	798.77	4.86	793.82	#4 REBAR SET
100			6.49	792.28	#4 REBAR SET
	31.05		46.78		
P1 TOT	121.76		106.07		
	152.81	-	152.85	-0.04	

Attachment F
Groundwater Sampling Field Sheets

GROUNDWATER SAMPLING FORM

PROJECT: Allied Paper, Inc. OU1		WELL ID: MW6 (Allied) (MW-6A) DATE/TIME: 10-15-14
Sampler(s): A. Swisher R. Vaughan	Well Diameter: 2 inch Breathing Zone PID Reading: 0.2	Weather Conditions: cloudy 57° Purge Method: Low Flow Volumetric

SECTION 1: Purge Volume Information

(1) TD = Total Depth of Well (ft): ~~14.33~~ 28.02 (2) DTW = Depth to Water (ft): 14.33

SECTION 2: For Volumetric Sampling Only

(3) Height of Water in Well = TD - DTW = [(1)-(2)]: 13.69 (4) One Purge Volume[2,3]: 2.19

SECTION 3: Field Parameter Data

Parameter	DTW	Time	pH[1]	Sp Cond.[1]	DO[1]	ORP[1]	Turbidity	Temperature	Purge/Flow Rate
Parameter Units	ft		SU	mS/cm	mg/L	mV	NTUs	C°	ml/minute
Acceptable Range	–	–	6.00 - 8.00	0.300-1.300 mS/cm	See Note 4	-190.0 - 240.0 mV	–	4.00 - 20.00 C°	100-500 (see SOP)
Stabilization Criteria	0.4		+/- 10%	+/- 3%	+/- 10%	+/- 10 mV	+/- 10%	+/- 0.5 C°	
First Water	14.34	1500	7.82	1.019	11.46	53.0	49.6	15.30	240
1	14.34	1505	7.49	1.033	4.27	52.6	35.7	14.50	240
2	14.34	1510	7.40	1.033	4.49	36.6	21.3	14.36	240
3	14.39	1515	7.35	1.033	4.75	36.7	10.4	14.28	240
4	14.37	1520	7.30	1.032	4.80	25.0	8.36	14.21	240
5	14.37	1525	7.29	1.032	4.82	24.2	6.39	14.21	240
6		1530	S	A	M	P	L	E	D
7									
8									
9									

Stabilization Parameters Used (min. three): pH Sp. Cond. DO ORP

SECTION 4: Equipment and Method Information

Purging Equipment: peristaltic pump

Purge/Flow Rate: 240 mL/min Total Volume Purged: 3 gallons

Field Parameter Instruments: YSI / Hach

SECTION 5: Sample Information

Samples	ID	Time	VOCs	Other	Other	Other
Parent	AP-OU1-MW-6A		✓	✓	✓	✓
Duplicate	AP-OU1-MW-6A-FD		✓	✓	✓	✓
MS/MSD						
Equipment Blank						

REMARKS:

NOTES:
1 - DENOTES STABILIZATION PARAMETERS.
2 - One purge volume (gallons) for a 1.25" dia. well: (Height of Water in Well) x 0.06 gal/ft
3 - One purge volume (gallons) for a 2" dia. well: (Height of Water in Well) x 0.16 gal/ft
4 - Varies from 0.0 to 9.5 at water temperature 15-25C°; 0.0 to 14.5 at water temperature 1-14C°
- milliliters per minute = gallons per minute/0.0002641

Form Checked by _____

GROUNDWATER SAMPLING FORM

PROJECT: Allied Paper, Inc. OU1		WELL ID: MW-7
		DATE/TIME: 10-14-14 1520
Sampler(s): A. Swishe, R. Vaughan	Well Diameter: 2 inch	Weather Conditions: cloudy
	Breathing Zone PID Reading: 0.0	Purge Method: Low Flow Volumetric

SECTION 1: Purge Volume Information

(1) TD = Total Depth of Well (ft): 33.20

(2) DTW = Depth to Water (ft): 18.99

SECTION 2: For Volumetric Sampling Only

(3) Height of Water in Well = TD - DTW = [(1)-(2)]: 14.21

(4) One Purge Volume[2,3]: 2.27

SECTION 3: Field Parameter Data

Parameter	DTW	Time	pH[1]	Sp Cond.[1]	DO[1]	ORP[1]	Turbidity	Temperature	Purge/Flow Rate
Parameter Units	ft		SU	mS/cm	mg/L	mV	NTUs	C°	ml/minute
Acceptable Range	--	--	6.00 - 8.00	0.300-1.300 mS/cm	See Note 4	-190.0 - 240.0 mV	--	4.00 - 20.00 C°	100-500 (see SOP)
Stabilization Criteria	0.4		+/- 10%	+/- 3%	+/- 10%	+/- 10 mV	+/- 10%	+/- 0.5 C°	
First Water	18.99	1530	7.74	1.107	8.14	94.7	9.83	15.95	260
1	19.07	1535	7.72	1.113	6.15	95.9	7.94	15.71	260
2	19.07	1540	7.60	1.113	3.71	97.4	7.84	15.50	260
3	19.07	1545	7.53	1.115	3.24	92.4	8.04	15.48	260
4	19.07	1550	7.51	1.116	3.31	90.4	7.29	15.40	260
5	19.07	1555	7.49	1.118	3.13	87.4	8.24	15.39	260
6	19.07	1600	7.48	1.118	3.05	85.6	7.72	15.39	260
7									
8									
9									

Stabilization Parameters Used (min. three): pH Sp. Cond. DO ORP

SECTION 4: Equipment and Method Information

Purging Equipment: peristaltic pump

Purge/Flow Rate: 260 mL/min

Total Volume Purged: approx 2 gallons

Field Parameter Instruments: YSI / Hach

SECTION 5: Sample Information

Samples	ID	Time	VOCs	Other	Other	Other
Parent	AP-OU1-MW-7		✓	✓	✓	✓
Duplicate						
MS/MSD						
Equipment Blank						

REMARKS:

NOTES:

1 - DENOTES STABILIZATION PARAMETERS.

2 - One purge volume (gallons) for a 1.25" dia. well: (Height of Water in Well) x 0.06 gal/ft

3 - One purge volume (gallons) for a 2" dia. well: (Height of Water in Well) x 0.16 gal/ft

4 - Varies from 0.0 to 9.5 at water temperature 15-25C°; 0.0 to 14.5 at water temperature 1-14C°
- milliliters per minute = gallons per minute/0.0002641

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GROUNDWATER SAMPLING FORM

PROJECT: Allied Paper, Inc. OU1		WELL ID: MW-7I DATE/TIME: 10-14-14 1300
Sampler(s): A. Swisher R. Vaughan	Well Diameter: 2 inch Breathing Zone PID Reading: 0.0	Weather Conditions: rainy Purge Method: *Low Flow* *Volumetric*

SECTION 1: Purge Volume Information

(1) TD = Total Depth of Well (ft): 78.96	(2) DTW = Depth to Water (ft): 19.98

SECTION 2: For Volumetric Sampling Only

(3) Height of Water in Well = TD - DTW = [(1)-(2)]: 58.98	(4) One Purge Volume[2,3]:

SECTION 3: Field Parameter Data

Parameter	DTW	Time	pH[1]	Sp Cond.[1]	DO[1]	ORP[1]	Turbidity	Temperature	Purge/Flow Rate
Parameter Units	ft		SU	mS/cm	mg/L	mV	NTUs	C°	ml/minute
Acceptable Range	--	--	6.00 - 8.00	0.300-1.300 mS/cm	See Note 4	-190.0 - 240.0 mV	--	4.00 - 20.00 C°	100-500 (see SOP)
Stabilization Criteria	0.4		+/- 10%	+/- 3%	+/- 10%	+/- 10 mV	+/- 10%	+/- 0.5 C°	
First Water	19.98	1315	8.07	0.936	13.20	-37.6	4.92	15.31	150
1	20.01	1320	8.04	0.932	8.89	-51.2	4.48	15.61	120
2	20.02	1325	8.02	0.931	6.82	-59.4	3.68	15.73	140
3	20.01	1330	8.00	0.930	5.38	-68.0	3.32	15.56	130
4	20.01	1335	8.00	0.927	4.39	-100.3	3.83	15.75	110
5	20.01	1340	8.00	0.925	3.92	-110.6	4.26	15.82	110
6	20.01	1345	7.99	0.923	3.58	-127.3	4.37	16.04	110
7	20.02	1350	8.00	0.919	3.38	-145.6	3.85	16.24	120
8	20.02	1355	7.99	0.910	3.12	-173.0	4.42	16.01	90
9	20.01	1400	7.99	0.910	3.11	-168.8	4.49	16.01	90

Stabilization Parameters Used (min. three): pH Sp. Cond DO ORP

SECTION 4: Equipment and Method Information

Purging Equipment: peristaltic pump	
Purge/Flow Rate: approx 100	Total Volume Purged: approx 2 gall
Field Parameter Instruments: YSI / Hach	

SECTION 5: Sample Information

Samples	ID	Time	VOCs	Other	Other	Other
Parent	AP-OU1-MW-7I		✓	✓	✓	✓
Duplicate						
MS/MSD						
Equipment Blank						

REMARKS:

NOTES:
1 - DENOTES STABILIZATION PARAMETERS.
2 - One purge volume (gallons) for a 1.25" dia. well: (Height of Water in Well) x 0.06 gal/ft
3 - One purge volume (gallons) for a 2" dia. well: (Height of Water in Well) x 0.16 gal/ft
4 - Varies from 0.0 to 9.5 at water temperature 15-25C°; 0.0 to 14.5 at water temperature 1-14C°
- milliliters per minute = gallons per minute/0.0002641

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GROUNDWATER SAMPLING FORM

PROJECT: Allied Paper, Inc. OU1	WELL ID: MW-7D
	DATE/TIME: 10/14/14 @ 1305
Sampler(s): T. Sutton K. Engle	Well Diameter: 2"
	Breathing Zone PID Reading: Ø
	Weather Conditions: 60's Rainy
	Purge Method: (Low Flow) Volumetric

SECTION 1: Purge Volume Information

(1) TD = Total Depth of Well (ft): 132.78	(2) DTW = Depth to Water (ft): 17.74

SECTION 2: For Volumetric Sampling Only

(3) Height of Water in Well = TD - DTW = [(1)-(2)]:	(4) One Purge Volume[2,3]:

SECTION 3: Field Parameter Data

Parameter	DTW	Time	pH[1]	Sp Cond.[1]	DO[1]	ORP[1]	Turbidity	Temperature	Purge/Flow Rate
Parameter Units	ft		SU	mS/cm	mg/L	mV	NTUs	C°	ml/minute
Acceptable Range	--	--	6.00 - 8.00	0.300-1.300 mS/cm	See Note[4]	-190.0 - 240.0 mV	--	4.00 - 20.00 C°	100-500 (see SOP)
Stabilization Criteria	0.4		+/- 10%	+/- 3%	+/- 10%	+/- 10 mV	+/- 10%	+/- 0.5 C°	
First Water	17.72	1337	9.75	Ø.818	4.96	65.Ø	>1ØØØ	14.25	435
1	17.72	1342	9.55	Ø.745	1.97	-77.8	>1ØØØ	14.25	35Ø
2	17.71	143Ø	7.69	Ø.611	2.72	-1Ø5.6	178	13.64	325
3	17.69	1435	7.45	Ø.613	Ø.47	-112.4	525	13.82	325
4	17.69	144Ø	7.47	Ø.619	Ø.45	-1Ø1.3	945	13.98	
5		1534	7.33	Ø.6Ø4	1.Ø8	-97.8	12.8	12.4Ø	75ØØ
6	18.Ø9	1536	7.27	Ø.6Ø5	Ø.32	-103.2	5.28	12.92	75ØØ
7	18.Ø9	1539	7.24	Ø.6Ø5	Ø.22	-107.9	3.22	12.91	75ØØ
8	18.Ø9	1541	7.25	Ø.6Ø6	Ø.19	-110.5	2.88	12.42	75ØØ
9		1545	S	A	M	P	L	E	D

Stabilization Parameters Used (min. three): pH Sp. Cond. DO ORP

SECTION 4: Equipment and Method Information

Purging Equipment: Hurricane Pump

Purge/Flow Rate: >500 Total Volume Purged: 48 gallons

Field Parameter Instruments: YSI, WLM, turbidimeter

SECTION 5: Sample Information

Samples	ID	Time	VOCs	Other	Other	Other
Parent	AP-OU1-MW-7D	~~1539~~ 1545	✓	✓	✓	✓
Duplicate	AP-OU1-MW-7D-FD	1550	✓	✓	✓	✓
MS/MSD						
Equipment Blank						

REMARKS:
After Parameter #1 we disconnected the flow through cell in order to purge the well. This was done in hopes of clearing up the turbid water. Purged ~16 gallons between parameter 1 & 2 without the flowthrough cell. Purged ~32 gallons between parameter 4 & 5 without the flow through cell

NOTES:
1 - DENOTES STABILIZATION PARAMETERS.
2 - One purge volume (gallons) for a 1.25" dia. well: (Height of Water in Well) x 0.06 gal/ft
3 - One purge volume (gallons) for a 2" dia. well: (Height of Water in Well) x 0.16 gal/ft
4 - Varies from 0.0 to 9.5 at water temperature 15-25C°; 0.0 to 14.5 at water temperature 1-14C°
- milliliters per minute = gallons per minute/0.0002641

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GROUNDWATER SAMPLING FORM

PROJECT: Allied Paper, Inc. OU1	WELL ID: MW-8
	DATE/TIME: 10-14-14 1030
Sampler(s): A. Swishe, R. Vaughan	Well Diameter: 2"
	Breathing Zone PID Reading: 0.0
	Weather Conditions: Cloudy Windy
	Purge Method: Low Flow Volumetric

SECTION 1: Purge Volume Information

(1) TD = Total Depth of Well (ft): 18.86	(2) DTW = Depth to Water (ft): 5.19

SECTION 2: For Volumetric Sampling Only

(3) Height of Water in Well = TD - DTW = [(1)-(2)]: 13.67	(4) One Purge Volume[2,3]: 2.19

SECTION 3: Field Parameter Data

Parameter	DTW	Time	pH[1]	Sp Cond.[1]	DO[1]	ORP[1]	Turbidity	Temperature	Purge/Flow Rate
Parameter Units	ft		SU	mS/cm	mg/L	mV	NTUs	C°	ml/minute
Acceptable Range	--	--	6.00 - 8.00	0.300-1.300 mS/cm	See Note 4	-190.0 - 240.0 mV	--	4.00 - 20.00 C°	100-500 (see SOP)
Stabilization Criteria	0.4		+/- 10%	+/- 3%	+/- 10%	+/- 10 mV	+/- 10%	+/- 0.5 C°	
First Water	5.30	10:35	7.64	1.094	17.72	52.3	7.23	14.34	230
1	5.30	10:40	7.51	1.100	26.70	22.0	7.85	13.98	230
2	5.30	10:45	7.43	1.099	13.61	7.2	4.18	14.03	180
3	5.29	10:50	7.38	1.099	13.24	6.9	3.52	14.06	180
4	5.32	1055	7.36	1.100	12.74	8.4	2.95	14.03	220
5	5.33	1100	7.33	1.102	11.99	7.4	2.35	13.77	220
6									
7									
8									
9									

Stabilization Parameters Used (min. three): pH Sp. Cond. DO ORP

SECTION 4: Equipment and Method Information

Purging Equipment: peristaltic pump

Purge/Flow Rate: Total Volume Purged:

Field Parameter Instruments: YSI / Hach

SECTION 5: Sample Information

Samples	ID	Time	VOCs	Other	Other	Other
Parent	AP-OU1-MW-8		✓	✓	✓	✓
Duplicate						
MS/MSD						
Equipment Blank						

REMARKS:

NOTES:

1 - DENOTES STABILIZATION PARAMETERS.

2 - One purge volume (gallons) for a 1.25" dia. well: (Height of Water in Well) x 0.06 gal/ft

3 - One purge volume (gallons) for a 2" dia. well: (Height of Water in Well) x 0.16 gal/ft

4 - Varies from 0.0 to 9.5 at water temperature 15-25C°; 0.0 to 14.5 at water temperature 1-14C°
- milliliters per minute = gallons per minute/0.0002641

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GROUNDWATER SAMPLING FORM

PROJECT: Allied Paper, Inc. OU1		WELL ID: MW-8D
		DATE/TIME: 10-15-14 0900
Sampler(s):	Well Diameter: 2 inch	Weather Conditions: cloudy
	Breathing Zone PID Reading: 0.5	Purge Method: Low Flow Volumetric

SECTION 1: Purge Volume Information

(1) TD = Total Depth of Well (ft): 173.16 | (2) DTW = Depth to Water (ft): 2.77

SECTION 2: For Volumetric Sampling Only

(3) Height of Water in Well = TD - DTW = [(1)-(2)]: 170.39 | (4) One Purge Volume[2,3]: 27.26

SECTION 3: Field Parameter Data

Parameter	DTW	Time	pH[1]	Sp Cond.[1]	DO[1]	ORP[1]	Turbidity	Temperature	Purge/Flow Rate
Parameter Units	ft		SU	mS/cm	mg/L	mV	NTUs	C°	ml/minute
Acceptable Range	--	--	6.00 - 8.00	0.300-1.300 mS/cm	See Note 4	-190.0 - 240.0 mV	--	4.00 - 20.00 C°	100-500 (see SOP)
Stabilization Criteria	0.4		+/- 10%	+/- 3%	+/- 10%	+/- 10 mV	+/- 10%	+/- 0.5 C°	
First Water	2.93	1100	8.02	0.837	6.40	-137.0	187	12.74	500
1	2.87	1105	8.00	0.696	4.27	-204.2	exceeds limits	12.79	400
2	3.20	1130	7.81	0.657	2.25	-246.2	87.5	12.20	NM
3	2.86	1135	7.80	0.656	2.22	-241.5	66.3	12.26	600
4	2.86	1140	7.80	0.657	2.26	-245.4	49.6	12.55	400
5	2.87	1145	7.80	0.664	2.30	-238.8	73.3	12.56	400
6	2.87	1150	7.74	0.655	4.06	-187.7	95.7	12.67	440
7	3.10	1155	7.77	0.665	2.71	-210.9	88.0	12.61	380
8	3.15	1205	7.78	0.671	2.37	-237.5	20.3	12.12	1500
9	3.15	1210	7.77	0.669	2.51	-239.2	16.8	12.12	2000

jump due to cleaning out flow through cell

Stabilization Parameters Used (min. three): pH Sp. Cond. DO ORP

SECTION 4: Equipment and Method Information

Purging Equipment:

Purge/Flow Rate: | Total Volume Purged:

Field Parameter Instruments:

SECTION 5: Sample Information

Samples	ID	Time	VOCs	Other	Other	Other
Parent	AP-OU1-MW-8D		✓	✓	✓	✓
Duplicate						
MS/MSD	AP-OU1-MW-8D		✓	✓	✓	✓
Equipment Blank						

REMARKS:

break between 1105 & 1130 due to heavy purging to remove turbid water from well after having to remove pump/tubing twice to troubleshoot. Pump removal causes swirling which increases turbidity

NOTES:
1 - DENOTES STABILIZATION PARAMETERS.
2 - One purge volume (gallons) for a 1.25" dia. well: (Height of Water in Well) x 0.06 gal/ft
3 - One purge volume (gallons) for a 2" dia. well: (Height of Water in Well) x 0.16 gal/ft
4 - Varies from 0.0 to 9.5 at water temperature 15-25C°; 0.0 to 14.5 at water temperature 1-14C°
- milliliters per minute = gallons per minute/0.0002641

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Sheet 2 of MW-8D pg 2 of 2

GROUNDWATER SAMPLING FORM

		WELL ID: MW-8D
PROJECT: Allied Paper, Inc. OU1		DATE/TIME:
Sampler(s):	Well Diameter:	Weather Conditions:
	Breathing Zone PID Reading:	Purge Method: *Low Flow Volumetric*

SECTION 1: Purge Volume Information

(1) TD = Total Depth of Well (ft):	(2) DTW = Depth to Water (ft):

SECTION 2: For Volumetric Sampling Only

(3) Height of Water in Well = TD - DTW = [(1)-(2)]:	(4) One Purge Volume[2,3]:

SECTION 3: Field Parameter Data

Parameter	DTW	Time	pH[1]	Sp Cond.[1]	DO[1]	ORP[1]	Turbidity	Temperature	Purge/Flow Rate
Parameter Units	ft		SU	mS/cm	mg/L	mV	NTUs	C°	ml/minute
Acceptable Range	--	--	6.00 - 8.00	0.300-1.300 mS/cm	See Note 4	-190.0 - 240.0 mV	--	4.00 - 20.00 C°	100-500 (see SOP)
Stabilization Criteria	0.4		+/- 10%	+/- 3%	+/- 10%	+/- 10 mV	+/- 10%	+/- 0.5 C°	
~~First Water~~ 10	3.05	1225	7.77	0.673	3.02	-247	9.99	12.16	1000
11	3.02	1230	7.78	0.673	3.08	-247.4	9.90	12.19	1000
2		1235	S	A	M	P	L	E	D
3									
4									
5									
6									
7									
8									
9									

Stabilization Parameters Used (min. three): pH Sp. Cond. DO ORP

SECTION 4: Equipment and Method Information

Purging Equipment: Monsoon pump

Purge/Flow Rate: 700mL/min Total Volume Purged: 35 gall

Field Parameter Instruments: YSI / Hach

SECTION 5: Sample Information

Samples	ID	Time	VOCs	Other	Other	Other
Parent	AP-OU1-MW-8D		✓	✓	✓	✓
Duplicate						
MS/MSD	AP-OU1-MW-8D		✓	✓	✓	✓
Equipment Blank						

REMARKS:

NOTES:
1 - DENOTES STABILIZATION PARAMETERS.
2 - One purge volume (gallons) for a 1.25" dia. well: (Height of Water in Well) x 0.06 gal/ft
3 - One purge volume (gallons) for a 2" dia. well: (Height of Water in Well) x 0.16 gal/ft
4 - Varies from 0.0 to 9.5 at water temperature 15-25C°; 0.0 to 14.5 at water temperature 1-14C°
- milliliters per minute = gallons per minute/0.0002641

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GROUNDWATER SAMPLING FORM

PROJECT: Allied Paper, Inc. OU1		WELL ID: MW-8A DATE/TIME: 10/15/14 @ 1615
Sampler(s): J. Sutton K. Engle	Well Diameter: 2" Breathing Zone PID Reading: Ø	Weather Conditions: 60's cloudy Purge Method: (Low Flow) Volumetric

SECTION 1: Purge Volume Information

(1) TD = Total Depth of Well (ft): 20.21

(2) DTW = Depth to Water (ft): 11.Ø2

SECTION 2: For Volumetric Sampling Only

(3) Height of Water in Well = TD - DTW = [(1)-(2)]:

(4) One Purge Volume[2,3]:

SECTION 3: Field Parameter Data

Parameter	DTW	Time	pH[1]	Sp Cond.[1]	DO[1]	ORP[1]	Turbidity	Temperature	Purge/Flow Rate
Parameter Units	ft		SU	mS/cm	mg/L	mV	NTUs	C°	ml/minute
Acceptable Range	--	--	6.00 - 8.00	0.300-1.300 mS/cm	See Note 4	-190.0 - 240.0 mV	--	4.00 - 20.00 C°	100-500 (see SOP)
Stabilization Criteria	0.4		+/- 10%	+/- 3%	+/- 10%	+/- 10 mV	+/- 10%	+/- 0.5 C°	
First Water	11.58	1624	7.22	Ø.888	Ø.89	-99.1	7.4	14.16	375
1	11.59	1629	7.Ø9	Ø.893	Ø.29	-9Ø.8	6.9	14.18	375
2	11.59	1634	7.Ø3	Ø.896	Ø.18	-89.2	7.8	14.14	375
3	11.59	1639	7.Ø2	Ø.882	Ø.13	-87.3	7.4	14.11	375
4	11.59	1644	7.Ø1	Ø.878	Ø.11	-87.1	7.5	14.Ø9	375
5	11.59	1649	7.ØØ	Ø.873	Ø.1Ø	-86.2	7.2	14.Ø9	375
6		17ØØ	S	A	M	P	L	E	D
7									
8									
9									

Stabilization Parameters Used (min. three): (pH) (Sp. Cond.) (DO) (ORP)

SECTION 4: Equipment and Method Information

Purging Equipment: Grop pump

Purge/Flow Rate: 375

Total Volume Purged: 3 gallons

Field Parameter Instruments: YSI; Horiba; WLM

SECTION 5: Sample Information

Samples	ID	Time	VOCs	Other	Other	Other
Parent	AP-OU1-MW-8A	17ØØ	✓	✓	✓	✓
Duplicate						
MS/MSD						
Equipment Blank						

REMARKS:

NOTES:

1 - DENOTES STABILIZATION PARAMETERS.

2 - One purge volume (gallons) for a 1.25" dia. well: (Height of Water in Well) x 0.06 gal/ft

3 - One purge volume (gallons) for a 2" dia. well: (Height of Water in Well) x 0.16 gal/ft

4 - Varies from 0.0 to 9.5 at water temperature 15-25C°; 0.0 to 14.5 at water temperature 1-14C°
- milliliters per minute = gallons per minute/0.0002641

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GROUNDWATER SAMPLING FORM

		WELL ID: MW16B
PROJECT: Allied Paper, Inc. OU1		DATE/TIME: 10-14-14 1655
Sampler(s): A. Swisher, R. Vaughan	Well Diameter: 2 inch	Weather Conditions: cloudy
	Breathing Zone PID Reading: 0.0	Purge Method: *Low Flow* *Volumetric*

SECTION 1: Purge Volume Information

(1) TD = Total Depth of Well (ft): 35.38	(2) DTW = Depth to Water (ft): 16.58

SECTION 2: For Volumetric Sampling Only

(3) Height of Water in Well = TD - DTW = [(1)-(2)]: 18.8	(4) One Purge Volume[2,3]: 3.008

SECTION 3: Field Parameter Data

Parameter	DTW	Time	pH[1]	Sp Cond.[1]	DO[1]	ORP[1]	Turbidity	Temperature	Purge/Flow Rate
Parameter Units	ft		SU	mS/cm	mg/L	mV	NTUs	C°	ml/minute
Acceptable Range	–	–	6.00 - 8.00	0.300-1.300 mS/cm	See Note[4]	-190.0 - 240.0 mV	–	4.00 - 20.00 C°	100-500 (see SOP)
Stabilization Criteria	0.4		+/- 10%	+/- 3%	+/- 10%	+/- 10 mV	+/- 10%	+/- 0.5 C°	
First Water	16.98	1705	8.09	0.651	13.52	40.2	41.9	15.00	250
1	17.58	1710	7.85	0.753	4.06	-77.8	48.2	13.88	250
2	17.62	1715	7.80	0.750	3.42	-89.9	48.1	13.94	180
3	17.61	1720	7.76	0.750	3.22	-92.1	45.6	13.92	180
4	17.53	1725	7.70	0.761	3.00	-102.7	33.9	13.88	160
5	17.25	1730	7.66	0.766	3.11	-113.0	30.9	14.02	160
6	17.10	1735	7.64	0.770	3.07	-115.8	24.2	14.30	160
7	17.04	1740	7.64	0.771	3.17	-115.8	19.8	14.46	160
8	17.00	1745	7.61	0.775	3.13	-115.2	15.8	14.54	110
9	16.95	1755	7.58	0.777	3.06	-113.2	9.3	14.59	110

Stabilization Parameters Used (min. three): pH Sp. Cond. DO ORP

SECTION 4: Equipment and Method Information

Purging Equipment: peristaltic pump

Purge/Flow Rate: approx 160 mL/min Total Volume Purged: 2.5 gallons

Field Parameter Instruments: YSI / Hach

SECTION 5: Sample Information

Samples	ID	Time	VOCs	Other	Other	Other
Parent	AP-OU1-MW-16B		✓	✓	✓	✓
Duplicate						
MS/MSD						
Equipment Blank						

REMARKS:

NOTES:
1 - DENOTES STABILIZATION PARAMETERS.
2 - One purge volume (gallons) for a 1.25" dia. well: (Height of Water in Well) x 0.06 gal/ft
3 - One purge volume (gallons) for a 2" dia. well: (Height of Water in Well) x 0.16 gal/ft
4 - Varies from 0.0 to 9.5 at water temperature 15-25C°; 0.0 to 14.5 at water temperature 1-14C°
- milliliters per minute = gallons per minute/0.0002641

Form Checked by _____

GROUNDWATER SAMPLING FORM

Pg. 1 of 2

PROJECT: Allied Paper, Inc. OU1	WELL ID: MW-16I
	DATE/TIME: 10/14/14
Sampler(s): I. Sutton K. Engle	Well Diameter: 2"
	Breathing Zone PID Reading: Ø
	Weather Conditions: 60's cloudy
	Purge Method: (Low Flow) Volumetric

SECTION 1: Purge Volume Information

(1) TD = Total Depth of Well (ft): 72.52	(2) DTW = Depth to Water (ft): 12.63

SECTION 2: For Volumetric Sampling Only

(3) Height of Water in Well = TD - DTW = [(1)-(2)]:	(4) One Purge Volume[2,3]:

SECTION 3: Field Parameter Data

Parameter	DTW	Time	pH[1]	Sp Cond.[1]	DO[1]	ORP[1]	Turbidity	Temperature	Purge/Flow Rate
Parameter Units	ft		SU	mS/cm	mg/L	mV	NTUs	C°	ml/minute
Acceptable Range	--	--	6.00 - 8.00	0.300-1.300 mS/cm	See Note 4	-190.0 - 240.0 mV	--	4.00 - 20.00 C°	100-500 (see SOP)
Stabilization Criteria	0.4		+/- 10%	+/- 3%	+/- 10%	+/- 10 mV	+/- 10%	+/- 0.5 C°	
First Water	12.64	1705	9.37	0.543	5.29	33.1	840	14.84	250
1	12.64	1710	8.33	0.578	2.32	4.0	282	14.26	250
2	12.64	1715	8.02	0.594	1.66	-26.9	140	14.00	250
3	12.65	1720	7.86	0.600	1.41	-105.6	73.6	13.84	225
4	12.63	1725	7.76	0.606	1.16	-138.1	38.1	13.83	200
5	12.64	1730	7.72	0.613	1.23	-137.9	27.3	13.93	200
6	12.64	1735	7.70	0.617	1.25	-139.3	26	14.04	225
7	12.64	1740	7.68	0.626	1.18	-135.6	18.4	14.15	225
8	12.64	1745	7.65	0.626	1.06	-134.7	17.0	14.05	225
9	12.64	1750	7.64	0.627	1.07	-132.5	16.3	14.02	200

Stabilization Parameters Used (min. three): pH Sp. Cond. DO ORP

SECTION 4: Equipment and Method Information

Purging Equipment: Geopump

Purge/Flow Rate: 250 Total Volume Purged: 3.5 gallons

Field Parameter Instruments: YSI; WLM; turbidimeter

SECTION 5: Sample Information

Samples	ID	Time	VOCs	Cy Other	Metals Other	SVOC Other
Parent	AP-OU1-MW-16I		✓	✓	✓	✓
Duplicate						
MS/MSD						
Equipment Blank						

REMARKS:

NOTES:
1 - DENOTES STABILIZATION PARAMETERS.
2 - One purge volume (gallons) for a 1.25" dia. well: (Height of Water in Well) x 0.06 gal/ft
3 - One purge volume (gallons) for a 2" dia. well: (Height of Water in Well) x 0.16 gal/ft
4 - Varies from 0.0 to 9.5 at water temperature 15-25C°; 0.0 to 14.5 at water temperature 1-14C°
- milliliters per minute = gallons per minute/0.0002641

Form Checked by _____

GROUNDWATER SAMPLING FORM

PROJECT: Allied Paper, Inc. OU1		WELL ID: MW-16I
		DATE/TIME: 10/14/14
Sampler(s): T. Sutten K. Engle	Well Diameter: 2"	Weather Conditions: 60's cloudy
	Breathing Zone PID Reading: 0	Purge Method: (Low Flow) Volumetric

SECTION 1: Purge Volume Information

(1) TD = Total Depth of Well (ft): 72.52 | (2) DTW = Depth to Water (ft): 12.63

SECTION 2: For Volumetric Sampling Only

(3) Height of Water in Well = TD - DTW = [(1)-(2)]: | (4) One Purge Volume[2,3]:

SECTION 3: Field Parameter Data

Parameter	DTW	Time	pH[1]	Sp Cond.[1]	DO[1]	ORP[1]	Turbidity	Temperature	Purge/Flow Rate
Parameter Units	ft		SU	mS/cm	mg/L	mV	NTUs	C°	ml/minute
Acceptable Range	--	--	6.00 - 8.00	0.300-1.300 mS/cm	See Note 4	-190.0 - 240.0 mV	--	4.00 - 20.00 C°	100-500 (see SOP)
Stabilization Criteria	0.4		+/- 10%	+/- 3%	+/- 10%	+/- 10 mV	+/- 10%	+/- 0.5 C°	
First Water	12.64	1755	7.62	0.628	1.12	-135.8	16.1	13.85	200
1	12.64	1800	7.60	0.628	1.06	-138.5	18.4	13.86	250
2	12.64	1805	7.59	0.625	0.96	-140.6	10.3	13.67	•
3		1810	S	A	M	P	L	E	D
4									
5									
6									
7									
8									
9									

Stabilization Parameters Used (min. three): (pH) (Sp. Cond.) DO (ORP)

SECTION 4: Equipment and Method Information

Purging Equipment: Geopump

Purge/Flow Rate: 250 | Total Volume Purged: 3.5 gallons

Field Parameter Instruments: YSI; WLM; Turbidimeter

SECTION 5: Sample Information

Samples	ID	Time	VOCs	Other	Other	Other
Parent	AP-OU1-MW-16I		✓	✓	✓	✓
Duplicate						
MS/MSD						
Equipment Blank						

REMARKS:

NOTES:
1 - DENOTES STABILIZATION PARAMETERS.
2 - One purge volume (gallons) for a 1.25" dia. well: (Height of Water in Well) x 0.06 gal/ft
3 - One purge volume (gallons) for a 2" dia. well: (Height of Water in Well) x 0.16 gal/ft
4 - Varies from 0.0 to 9.5 at water temperature 15-25C°; 0.0 to 14.5 at water temperature 1-14C°
- milliliters per minute = gallons per minute/0.0002641

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GROUNDWATER SAMPLING FORM

PROJECT: Allied Paper, Inc. OU1		WELL ID: MW-160
		DATE/TIME: 10/15/14 @ 1115
Sampler(s): T. Sutton K. Engle	Well Diameter: 2"	Weather Conditions: 60's cloudy
	Breathing Zone PID Reading: 0	Purge Method: Low Flow Volumetric

SECTION 1: Purge Volume Information

(1) TD = Total Depth of Well (ft): 166.00	(2) DTW = Depth to Water (ft): 12.54

SECTION 2: For Volumetric Sampling Only

(3) Height of Water in Well = TD - DTW = [(1)-(2)]:	(4) One Purge Volume[2,3]:

SECTION 3: Field Parameter Data

Parameter	DTW	Time	pH[1]	Sp Cond.[1]	DO[1]	ORP[1]	Turbidity	Temperature	Purge/Flow Rate
Parameter Units	ft		SU	mS/cm	mg/L	mV	NTUs	C°	ml/minute
Acceptable Range	--	--	6.00 - 8.00	0.300-1.300 mS/cm	See Note 4	-190.0 - 240.0 mV	--	4.00 - 20.00 C°	100-500 (see SOP)
Stabilization Criteria	0.4		+/- 10%	+/- 3%	+/- 10%	+/- 10 mV	+/- 10%	+/- 0.5 C°	
First Water	13.73	1150	8.10	0.514	3.50	-46.7	6.5	13.20	375
1	13.73	1155	8.05	0.508	1.29	-169.5	6.2	13.40	375
2	13.57	1200	8.06	0.509	1.09	-188.3	7.2	13.61	375
3	13.57	1205	8.11	0.509	0.72	-203.6		14.17	375
4	57.04	1342	8.24	0.458	0.12	-259.9	17.2	13.07	200
5	56.81	1347	8.22	0.440	0.10	-267.0	13.7	13.04	425
6	56.64	1352	8.20	0.441	0.11	-269.3	10.3	13.00	425
7	56.52	1355	8.19	0.443	0.08	-274.9	8.43	12.95	425
8		1400	S	A	M	P	L	E	D
9									

Stabilization Parameters Used (min. three): pH Sp. Cond. DO ORP

SECTION 4: Equipment and Method Information

Purging Equipment: Mega Monsoon

Purge/Flow Rate: 425 Total Volume Purged: 17 gallons

Field Parameter Instruments: Horiba & turbidimeter; WLM; YSI

SECTION 5: Sample Information

Samples	ID	Time	VOCs	Other	Other	Other
Parent	AP-OU1-MW-16D	1400	✓	✓	✓	✓
Duplicate						
MS/MSD						
Equipment Blank						

REMARKS: pump set @ 164 originally then raised to 162. Hit a time of of very turbid water ~~that~~ after parameter 3 and did not take readings until it cleared up around parameter 4 (1342)

NOTES:
1 - DENOTES STABILIZATION PARAMETERS.
2 - One purge volume (gallons) for a 1.25" dia. well: (Height of Water in Well) x 0.06 gal/ft
3 - One purge volume (gallons) for a 2" dia. well: (Height of Water in Well) x 0.16 gal/ft
4 - Varies from 0.0 to 9.5 at water temperature 15-25C°; 0.0 to 14.5 at water temperature 1-14C°
- milliliters per minute = gallons per minute/0.0002641

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GROUNDWATER SAMPLING FORM

PROJECT: Allied Paper, Inc. OU1		WELL ID: MW-22B
		DATE/TIME: 10/16/14
Sampler(s): Z. Sutton	Well Diameter: 2"	Weather Conditions: Over cast
	Breathing Zone PID Reading: 0.0	Purge Method: (Low Flow) Volumetric

SECTION 1: Purge Volume Information

(1) TD = Total Depth of Well (ft): 51.81

(2) DTW = Depth to Water (ft): 16.52

SECTION 2: For Volumetric Sampling Only

(3) Height of Water in Well = TD - DTW = [(1)-(2)]:

(4) One Purge Volume[2,3]:

SECTION 3: Field Parameter Data

Parameter	DTW	Time	pH[1]	Sp Cond.[1]	DO[1]	ORP[1]	Turbidity	Temperature	Purge/Flow Rate
Parameter Units	ft		SU	mS/cm	mg/L	mV	NTUs	C°	ml/minute
Acceptable Range	--	--	6.00 - 8.00	0.300-1.300 mS/cm	See Note 4	-190.0 - 240.0 mV	--	4.00 - 20.00 C°	100-500 (see SOP)
Stabilization Criteria	0.4		+/- 10%	+/- 3%	+/- 10%	+/- 10 mV	+/- 10%	+/- 0.5 C°	
First Water	16.68	1435	6.97	0.930	3.74	-24.1	~~257.2~~	14.06	250
1	16.69	1440	6.82	0.931	2.37	-33.7	5.38	13.44	250
2	16.69	1445	6.80	0.928	1.96	-39.4	3.48	13.19	250
3	16.69	1450	6.82	0.927	1.84	-47.8	2.33	12.95	250
4	16.69	1455	6.86	0.926	1.76	-54.9	2.26	12.85	250
5	16.69	1500	6.90	0.926	1.73	-62.1	1.60	12.81	250
6	16.69	1505	6.93	0.925	1.86	-66.6	1.76	12.79	250
7	16.69	1510	6.95	0.925	1.89	-69.0	2.07	12.87	250
8	–	S	A	M	P	L	E	D	–
9									

Stabilization Parameters Used (min. three): (pH) Sp. Cond. (DO) (ORP)

SECTION 4: Equipment and Method Information

Purging Equipment: geopump

Purge/Flow Rate: 250 mL/min

Total Volume Purged:

Field Parameter Instruments: YSI 650 MDS, Turbidmeter, WLM, MiniRAE

SECTION 5: Sample Information

Samples	ID	Time	VOCs	Other	Other	Other
Parent	AP-OU1-MW-22B	1511	✓	✓	✓	✓
Duplicate	AP-OU1-MW-22B-FD	1515	✓	✓	✓	✓
MS/MSD						
Equipment Blank						

REMARKS:

NOTES:

1 - DENOTES STABILIZATION PARAMETERS.

2 - One purge volume (gallons) for a 1.25" dia. well: (Height of Water in Well) x 0.06 gal/ft

3 - One purge volume (gallons) for a 2" dia. well: (Height of Water in Well) x 0.16 gal/ft

4 - Varies from 0.0 to 9.5 at water temperature 15-25C°; 0.0 to 14.5 at water temperature 1-14C°
- milliliters per minute = gallons per minute/0.0002641

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GROUNDWATER SAMPLING FORM

		WELL ID: MW-40S
PROJECT: Allied Paper, Inc. OU1		DATE/TIME: 10-14-14 0835
Sampler(s): A. Swisher, R. Vaughan	Well Diameter: 2 inch	Weather Conditions: Cloudy/windy
	Breathing Zone PID Reading: 0.0	Purge Method: Low Flow Volumetric

SECTION 1: Purge Volume Information

(1) TD = Total Depth of Well (ft): 27.39

(2) DTW = Depth to Water (ft): 11.69

SECTION 2: For Volumetric Sampling Only

(3) Height of Water in Well = TD - DTW = [(1)-(2)]: 15.7

(4) One Purge Volume[2,3]: 2.512

SECTION 3: Field Parameter Data

Parameter	DTW	Time	pH[1]	Sp Cond.[1]	DO[1]	ORP[1]	Turbidity	Temperature	Purge/Flow Rate
Parameter Units	ft		SU	mS/cm	mg/L	mV	NTUs	C°	ml/minute
Acceptable Range	--	--	6.00 - 8.00	0.300-1.300 mS/cm	See Note 4	-190.0 - 240.0 mV	--	4.00 - 20.00 C°	100-500 (see SOP)
Stabilization Criteria	0.4		+/- 10%	+/- 3%	+/- 10%	+/- 10 mV	+/- 10%	+/- 0.5 C°	
First Water	11.69	0845	7.50	1.035	6.27	-42.3	613	15.25	180
1	12.01	0850	7.12	1.039	2.88	-96.6	132	14.73	180
2	12.02	0855	7.13	1.041	2.51	-106.2	39.0	14.47	190
3	12.02	0900	7.14	1.043	2.33	-109.3	25.1	14.43	190
4	12.02	0905	7.15	1.043	2.27	-109.2	18.5	14.42	200
5	12.02	0910	7.16	1.043	2.23	-104.0	15.3	14.40	200
6	12.02	0915	7.17	1.042	2.20	-104.0	13.2	14.41	200
7	12.02	0920	7.18	1.042	2.18	-99.9	10.8	14.40	200
8	12.02	0925	7.19	1.041	2.20	-93.3	9.14	14.39	200
9	12.02	0930	7.19	1.041	2.12	-97.1	7.56	14.39	200

Stabilization Parameters Used (min. three): pH Sp. Cond. DO ORP

SECTION 4: Equipment and Method Information

Purging Equipment: peristaltic pump

Purge/Flow Rate: approx 200 mL/min Total Volume Purged: approx 3 gall

Field Parameter Instruments: YSI / Hach

SECTION 5: Sample Information

Samples	ID	Time	VOCs	Other	Other	Other
Parent	AP-OU1-MW-40S		✓	✓	✓	✓
Duplicate						
MS/MSD						
Equipment Blank						

REMARKS:

begin sampling at 0930

NOTES:

1 - DENOTES STABILIZATION PARAMETERS.

2 - One purge volume (gallons) for a 1.25" dia. well: (Height of Water in Well) x 0.06 gal/ft

3 - One purge volume (gallons) for a 2" dia. well: (Height of Water in Well) x 0.16 gal/ft

4 - Varies from 0.0 to 9.5 at water temperature 15-25C°; 0.0 to 14.5 at water temperature 1-14C°

- milliliters per minute = gallons per minute/0.0002641

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GROUNDWATER SAMPLING FORM

PROJECT: Allied Paper, Inc. OU1		WELL ID: MW-40I
		DATE/TIME: 10/14/14 @ 1030
Sampler(s):	Well Diameter: 2"	Weather Conditions: 65° cloudy - chance of rain
T. Sutton K. Engle	Breathing Zone PID Reading: Ø	Purge Method: Low Flow Volumetric

SECTION 1: Purge Volume Information

(1) TD = Total Depth of Well (ft): ~~87.57~~ 85.81	(2) DTW = Depth to Water (ft): 5.91

SECTION 2: For Volumetric Sampling Only

(3) Height of Water in Well = TD - DTW = [(1)-(2)]:	(4) One Purge Volume[2,3]:

SECTION 3: Field Parameter Data

Parameter	DTW	Time	pH[1]	Sp Cond.[1]	DO[1]	ORP[1]	Turbidity	Temperature	Purge/Flow Rate
Parameter Units	ft		SU	mS/cm	mg/L	mV	NTUs	C°	ml/minute
Acceptable Range	--	--	6.00 - 8.00	0.300-1.300 mS/cm	See Note 4	-190.0 - 240.0 mV	--	4.00 - 20.00 C°	100-500 (see SOP)
Stabilization Criteria	0.4		+/- 10%	+/- 3%	+/- 10%	+/- 10 mV	+/- 10%	+/- 0.5 C°	
First Water	5.93	1045	8.10	0.550	3.25	100.3	11.4	14.52	320
1	5.93	1050	7.57	0.543	1.03	32.8	13.5	14.61	250
2	5.93	1055	7.53	0.546	0.74	0.0	12.9	14.65	250
3	5.93	1100	7.48	0.545	0.54	-22.6	9.04	14.63	250
4	5.93	1106	7.45	0.544	0.38	-27.0	7.63	14.53	250
5	5.93	1110	7.45	0.543	0.30	-30.1	7.52	14.46	250
6	5.93	1115	7.43	0.543	0.31	-32.1	5.81	14.46	250
7		1125	S	A	M	P	L	E	D
8									
9									

Stabilization Parameters Used (min. three): pH Sp. Cond. DO ORP

SECTION 4: Equipment and Method Information

Purging Equipment: geopump	
Purge/Flow Rate: 250	Total Volume Purged: 3 gal
Field Parameter Instruments: YSI; WLM; turbidimeter	

SECTION 5: Sample Information

Samples	ID	Time	VOCs	Other	Other	Other
Parent	AP-OU1-MW-40I	1125	✓	✓	✓	✓
Duplicate						
MS/MSD						
Equipment Blank						

REMARKS:

NOTES:
1 - DENOTES STABILIZATION PARAMETERS.
2 - One purge volume (gallons) for a 1.25" dia. well: (Height of Water in Well) x 0.06 gal/ft
3 - One purge volume (gallons) for a 2" dia. well: (Height of Water in Well) x 0.16 gal/ft
4 - Varies from 0.0 to 9.5 at water temperature 15-25C°; 0.0 to 14.5 at water temperature 1-14C°
- milliliters per minute = gallons per minute/0.0002641

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GROUNDWATER SAMPLING FORM

page 1

PROJECT: Allied Paper, Inc. OU1		WELL ID: MW-4ØD DATE/TIME: 1Ø/14/14 @ Ø83Ø
Sampler(s): I. Sutton K. Engle	Well Diameter: 2in Breathing Zone PID Reading: Ø	Weather Conditions: 7Ø cloudy - chance of rain Purge Method: (Low Flow) Volumetric

SECTION 1: Purge Volume Information

(1) TD = Total Depth of Well (ft): 169.85	(2) DTW = Depth to Water (ft): 5.84

SECTION 2: For Volumetric Sampling Only

(3) Height of Water in Well = TD - DTW = [(1)-(2)]:	(4) One Purge Volume[2,3]:

SECTION 3: Field Parameter Data

Parameter	DTW	Time	pH[1]	Sp Cond.[1]	DO[1]	ORP[1]	Turbidity	Temperature	Purge/Flow Rate
Parameter Units	ft		SU	mS/cm	mg/L	mV	NTUs	C°	ml/minute
Acceptable Range	--	--	6.00 - 8.00	0.300-1.300 mS/cm	See Note 4	-190.0 - 240.0 mV	--	4.00 - 20.00 C°	100-500 (see SOP)
Stabilization Criteria	0.4		+/- 10%	+/- 3%	+/- 10%	+/- 10 mV	+/- 10%	+/- 0.5 C°	
First Water	5.85	Ø9Ø7	7.44	Ø.675	4.73	81.4	62.5	15.75	325
1	5.9Ø	Ø912	7.5Ø	Ø.646	2.Ø5	-1Ø4.1	69.3	14.52	325
2	5.93	Ø917	7.59	Ø.622	Ø.64	-153.9	42.3	13.95	5ØØ
3	5.9Ø	Ø922	7.64	Ø.615	Ø.47	-168.4	23.5	14.Ø3	325
4	5.9Ø	Ø927	7.69	Ø.615	Ø.42	-168.Ø	15.8	14.33	325
5	5.9Ø	Ø932	7.73	Ø.6Ø9	Ø.42	-172.1	12.8	14.31	325
6	5.9Ø	Ø937	7.77	Ø.595	Ø.42	-169.Ø	1Ø.3	14.28	325
7	5.9Ø	Ø942	7.81	Ø.581	Ø.4Ø	-163.2	7.95	14.19	325
8	5.9Ø	Ø947	7.83	Ø.575	Ø.39	-161.3	9.37	14.28	325
9	5.9Ø	Ø952	7.86	Ø.565	Ø.38	-161.8	5.71	14.17	325

Stabilization Parameters Used (min. three): pH Sp. Cond. DO ORP

SECTION 4: Equipment and Method Information

Purging Equipment: Hurricane Pump

Purge/Flow Rate: Total Volume Purged:

Field Parameter Instruments: Turbidimeter, YSI, WLM

SECTION 5: Sample Information

Samples	ID	Time	VOCs	Other	Other	Other
Parent	~~AP-OU1-MW-4ØD~~					
Duplicate	no sample collected					
MS/MSD						
Equipment Blank						

REMARKS: Pump set @153'. Not long enough to reach screen directed to wait before sampling until a longer pump is obtained.

NOTES:
1 - DENOTES STABILIZATION PARAMETERS.
2 - One purge volume (gallons) for a 1.25" dia. well: (Height of Water in Well) x 0.06 gal/ft
3 - One purge volume (gallons) for a 2" dia. well: (Height of Water in Well) x 0.16 gal/ft
4 - Varies from 0.0 to 9.5 at water temperature 15-25C°; 0.0 to 14.5 at water temperature 1-14C°
- milliliters per minute = gallons per minute/0.0002641

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GROUNDWATER SAMPLING FORM

page 2

PROJECT: Allied Paper, Inc. OU1		WELL ID: MW-40D
		DATE/TIME: 10/14/14 @ 0830
Sampler(s): I. Sutton K. Engle	Well Diameter: 2"	Weather Conditions: 65° cloudy-chance of rain
	Breathing Zone PID Reading: 0	Purge Method: (Low Flow) Volumetric

SECTION 1: Purge Volume Information

(1) TD = Total Depth of Well (ft): 169.65	(2) DTW = Depth to Water (ft): 5.84

SECTION 2: For Volumetric Sampling Only

(3) Height of Water in Well = TD - DTW = [(1)-(2)]:	(4) One Purge Volume[2,3]:

SECTION 3: Field Parameter Data

	Parameter	DTW	Time	pH[1]	Sp Cond.[1]	DO[1]	ORP[1]	Turbidity	Temperature	Purge/Flow Rate
	Parameter Units	ft		SU	mS/cm	mg/L	mV	NTUs	C°	ml/minute
	Acceptable Range	--	--	6.00 - 8.00	0.300-1.300 mS/cm	See Note 4	-190.0 - 240.0 mV	--	4.00 - 20.00 C°	100-500 (see SOP)
	Stabilization Criteria	0.4		+/- 10%	+/- 3%	+/- 10%	+/- 10 mV	+/- 10%	+/- 0.5 C°	
10	~~First Water~~	5.90	0957	7.89	0.556	0.34	-167.9	4.93	14.05	325
11	~~1~~		1002							
12	~~2~~									
13	~~3~~									
14	~~4~~									
15	~~5~~									
16	~~6~~									
17	~~7~~									
18	~~8~~									
19	~~9~~									

Stabilization Parameters Used (min. three): pH Sp. Cond. DO ORP

SECTION 4: Equipment and Method Information

Purging Equipment: Hurricane Pump	
Purge/Flow Rate:	Total Volume Purged:
Field Parameter Instruments: YSI; WLM; Turbidimeter	

SECTION 5: Sample Information

Samples	ID	Time	VOCs	Other	Other	Other
Parent	no sample collected					
Duplicate						
MS/MSD						
Equipment Blank						

REMARKS:

see note on pg 1

NOTES:
1 - DENOTES STABILIZATION PARAMETERS.
2 - One purge volume (gallons) for a 1.25" dia. well: (Height of Water in Well) x 0.06 gal/ft
3 - One purge volume (gallons) for a 2" dia. well: (Height of Water in Well) x 0.16 gal/ft
4 - Varies from 0.0 to 9.5 at water temperature 15-25C°; 0.0 to 14.5 at water temperature 1-14C°
- milliliters per minute = gallons per minute/0.0002641

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GROUNDWATER SAMPLING FORM

PROJECT: Allied Paper, Inc. OU1		WELL ID: MW-40D
		DATE/TIME: 10/15/14 @ 0840
Sampler(s):	Well Diameter: 2"	Weather Conditions: 50's cloudy
I. Sutton K. Engle	Breathing Zone PID Reading: 0	Purge Method: (Low Flow) Volumetric

SECTION 1: Purge Volume Information

(1) TD = Total Depth of Well (ft): 169.6	(2) DTW = Depth to Water (ft): 5.92

SECTION 2: For Volumetric Sampling Only

(3) Height of Water in Well = TD - DTW = [(1)-(2)]:	(4) One Purge Volume[2,3]:

SECTION 3: Field Parameter Data

Parameter	DTW	Time	pH[1]	Sp Cond.[1]	DO[1]	ORP[1]	Turbidity	Temperature	Purge/Flow Rate
Parameter Units	ft		SU	mS/cm	mg/L	mV	NTUs	C°	ml/minute
Acceptable Range	--	--	6.00 - 8.00	0.300-1.300 mS/cm	See Note 4	-190.0 - 240.0 mV	--	4.00 - 20.00 C°	100-500 (see SOP)
Stabilization Criteria	0.4		+/- 10%	+/- 3%	+/- 10%	+/- 10 mV	+/- 10%	+/- 0.5 C°	
First Water	5.92	0857	7.60	0.637	4.33	44.9		13.25	250
1	5.89	0902	7.66	0.614	2.87	-143.9		13.60	350
2	5.89	0907	7.68	0.608	2.35	-168.9		13.57	350
3	5.89	0912	7.69	0.601	2.02	-175.1		13.58	350
4	5.89	0917	7.71	0.593	1.71	-166.1		13.54	350
5		0922	7.73	0.586	1.37	-161.1		13.49	350
6	5.89	0950	7.77	0.558	0.72	-153.6	8.1	13.39	250
7	5.89	0955	7.77	0.551	0.63	-155.5	6.3	13.30	350
8	5.89	1000	7.76	0.548	0.58	-153.6	5.9	13.31	350
9		1010	S	A	M	P	L	E	D

Stabilization Parameters Used (min. three): (pH) (Sp. Cond.) DO (ORP)

SECTION 4: Equipment and Method Information

Purging Equipment: Mega Monsoon

Purge/Flow Rate: 350 Total Volume Purged: 6 gallons

Field Parameter Instruments: Horiba; YSI; WLM

SECTION 5: Sample Information

Samples	ID	Time	VOCs	Other	Other	Other
Parent	AP-OU1-MW-40D	1010	✓	✓	✓	✓
Duplicate						
MS/MSD						
Equipment Blank						

REMARKS:
pump @ 166' Turbidimeter was not working so we switched to Horiba @ 0950 to collect turbidity readings

NOTES:
1 - DENOTES STABILIZATION PARAMETERS.
2 - One purge volume (gallons) for a 1.25" dia. well: (Height of Water in Well) x 0.06 gal/ft
3 - One purge volume (gallons) for a 2" dia. well: (Height of Water in Well) x 0.16 gal/ft
4 - Varies from 0.0 to 9.5 at water temperature 15-25C°; 0.0 to 14.5 at water temperature 1-14C°
- milliliters per minute = gallons per minute/0.0002641

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GROUNDWATER SAMPLING FORM

PROJECT: Allied Paper, Inc. OU1		WELL ID: MW-122B
		DATE/TIME: 10/17/14 @ 1200
Sampler(s): I. Sutton, K. Engle	Well Diameter: 2"	Weather Conditions: 60's Sunny
	Breathing Zone PID Reading: 0	Purge Method: (Low Flow) Volumetric

SECTION 1: Purge Volume Information

(1) TD = Total Depth of Well (ft):

(2) DTW = Depth to Water (ft): 17.02

SECTION 2: For Volumetric Sampling Only

(3) Height of Water in Well = TD - DTW = [(1)-(2)]:

(4) One Purge Volume[2,3]:

SECTION 3: Field Parameter Data

Parameter	DTW	Time	pH[1]	Sp Cond.[1]	DO[1]	ORP[1]	Turbidity	Temperature	Purge/Flow Rate
Parameter Units	ft		SU	mS/cm	mg/L	mV	NTUs	C°	ml/minute
Acceptable Range	–	–	6.00 - 8.00	0.300-1.300 mS/cm	See Note 4	-190.0 - 240.0 mV	–	4.00 - 20.00 C°	100-500 (see SOP)
Stabilization Criteria	0.4		+/- 10%	+/- 3%	+/- 10%	+/- 10 mV	+/- 10%	+/- 0.5 C°	
First Water	18.18	1201	6.71	1.055	1.53	-71.1	15.3	13.34	400
1	19.00	1206	6.69	1.044	0.41	-63.5	12.7	13.46	300
2	19.40	1211	6.63	1.046	0.36	-59.3	12.3	13.51	225
3	19.79	1216	6.60	1.050	0.27	-59.0	11.2	13.52	225
4	20.53	1221	6.58	1.045	0.21	-58.4	10.7	13.41	225
5	20.51	1226	6.57	1.048	0.21	-54.2	7.91	13.64	190
6	20.47	1231	6.56	1.056	0.20	-34.4	8.61	13.72	190
7		1235	S	A	M	P	L	E	D
8									
9									

Stabilization Parameters Used (min. three): pH Sp. Cond. DO ORP

SECTION 4: Equipment and Method Information

Purging Equipment: geopump

Purge/Flow Rate: 190 Total Volume Purged: 2.5

Field Parameter Instruments: YSI; WLM; turbidimeter

SECTION 5: Sample Information

Samples	ID	Time	VOCs	Other	Other	Other
Parent	AP-OU1-MW-122B	1235	✓	✓	✓	✓
Duplicate						
MS/MSD						
Equipment Blank						

REMARKS:

NOTES:
1 - DENOTES STABILIZATION PARAMETERS.
2 - One purge volume (gallons) for a 1.25" dia. well: (Height of Water in Well) x 0.06 gal/ft
3 - One purge volume (gallons) for a 2" dia. well: (Height of Water in Well) x 0.16 gal/ft
4 - Varies from 0.0 to 9.5 at water temperature 15-25C°; 0.0 to 14.5 at water temperature 1-14C°
- milliliters per minute = gallons per minute/0.0002641

Form Checked by

GROUNDWATER SAMPLING FORM

PROJECT: Allied Paper, Inc. OU1		WELL ID: MW-125A
		DATE/TIME: 10/13/14 @ 1420
Sampler(s): K. Engle I. Sutton	Well Diameter: 2"	Weather Conditions: Balmy
	Breathing Zone PID Reading: Ø	Purge Method: (Low Flow) Volumetric

SECTION 1: Purge Volume Information

(1) TD = Total Depth of Well (ft):	(2) DTW = Depth to Water (ft): 17.10

SECTION 2: For Volumetric Sampling Only

(3) Height of Water in Well = TD - DTW = [(1)-(2)]:	(4) One Purge Volume[2,3]:

SECTION 3: Field Parameter Data

Parameter	DTW	Time	pH[1]	Sp Cond.[1]	DO[1]	ORP[1]	Turbidity	Temperature	Purge/Flow Rate
Parameter Units	ft		SU	mS/cm	mg/L	mV	NTUs	C°	ml/minute
Acceptable Range	--	--	6.00 - 8.00	0.300-1.300 mS/cm	See Note 4	-190.0 - 240.0 mV	--	4.00 - 20.00 C°	100-500 (see SOP)
Stabilization Criteria	0.4		+/- 10%	+/- 3%	+/- 10%	+/- 10 mV	+/- 10%	+/- 0.5 C°	
First Water	17.46	1424	6.52	1.245	2.53	-12.2	4.1	14.09	300
1	17.46	1429	6.49	1.240	1.26	-21.0	2.5	14.09	225
2	17.46	1439	6.59	1.246	1.14	-26.9	2.4	14.14	225
3	17.52	1449	6.61	1.252	1.73	-26.9	3.1	14.43	280
4	17.52	1454	6.60	1.235	1.25	-22.6	~~0.6~~	13.94	280
5	17.52	1459	6.60	1.234	1.21	-25.0	0.6	14.00	280
6	17.52	1504	6.61	1.238	1.25	-27.7	2.2	14.07	280
7		1507	S	A	M	P	L	E	D
8									
9									

Stabilization Parameters Used (min. three): (pH) (Sp. Cond.) (DO) (ORP)

SECTION 4: Equipment and Method Information

Purging Equipment: Geopump

Purge/Flow Rate: ~ 280 ml/min | Total Volume Purged: 2.5 gallons

Field Parameter Instruments: YSI, Horiba, WLM, ~~Geopump~~

SECTION 5: Sample Information

Samples	ID	Time	VOCs	Other	Other	Other
Parent	AP-OU1-MW-125A	1507	✓	✓	✓	✓
Duplicate						
MS/MSD						
Equipment Blank						

REMARKS:

tubing was replaced at 1442 to 1445 so the pump was stopped. resumed purging at 1446

NOTES:

1 - DENOTES STABILIZATION PARAMETERS.

2 - One purge volume (gallons) for a 1.25" dia. well: (Height of Water in Well) x 0.06 gal/ft

3 - One purge volume (gallons) for a 2" dia. well: (Height of Water in Well) x 0.16 gal/ft

4 - Varies from 0.0 to 9.5 at water temperature 15-25C°; 0.0 to 14.5 at water temperature 1-14C°

- milliliters per minute = gallons per minute/0.0002641

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GROUNDWATER SAMPLING FORM

PROJECT: Allied Paper, Inc. OU1		WELL ID: MW-201B
		DATE/TIME: 10-15-14 1630
Sampler(s): ASwisher R Vaughan	Well Diameter: 2 inch	Weather Conditions: Cloudy 57°
	Breathing Zone PID Reading: 0.0	Purge Method: Low Flow Volumetric

SECTION 1: Purge Volume Information

(1) TD = Total Depth of Well (ft): 30.94

(2) DTW = Depth to Water (ft): 6.05

SECTION 2: For Volumetric Sampling Only

(3) Height of Water in Well = TD - DTW = [(1)-(2)]: 24.89

(4) One Purge Volume[2,3]: 3.98

SECTION 3: Field Parameter Data

Parameter	DTW	Time	pH[1]	Sp Cond.[1]	DO[1]	ORP[1]	Turbidity	Temperature	Purge/Flow Rate
Parameter Units	ft		SU	mS/cm	mg/L	mV	NTUs	C°	ml/minute
Acceptable Range	–	–	6.00 - 8.00	0.300-1.300 mS/cm	See Note[4]	-190.0 - 240.0 mV	–	4.00 - 20.00 C°	100-500 (see SOP)
Stabilization Criteria	0.4		+/- 10%	+/- 3%	+/- 10%	+/- 10 mV	+/- 10%	+/- 0.5 C°	
First Water	6.07	1635	7.01	1.196	15.26	-67.5	27.6	14.13	320
1	6.07	1640	6.59	1.224	5.82	-69.1	33.0	13.59	320
2	6.07	1645	6.39	1.326	3.52	-66.4	25.6	13.39	280
3	6.07	1650	6.37	1.331	2.97	-66.2	20.1	13.39	280
4	6.07	1655	6.36	1.335	2.58	-66.5	16.0	13.36	280
5	6.07	1700	6.35	1.341	2.48	-66.8	11.6	13.33	280
6	6.07	1705	6.35	1.341	2.38	-65.7	9.69	13.29	280
7		1710	S	A	M	P	L	E	D
8									
9									

Stabilization Parameters Used (min. three): pH Sp. Cond. DO ORP

SECTION 4: Equipment and Method Information

Purging Equipment: peristaltic pump

Purge/Flow Rate: 280 mL/min Total Volume Purged: 2.5 gallons

Field Parameter Instruments: YSI / HACH

SECTION 5: Sample Information

Samples	ID	Time	VOCs	Other	Other	Other
Parent	AP-OU1-MW-201B		✓	✓	✓	✓
Duplicate						
MS/MSD						
Equipment Blank						

REMARKS:

NOTES:

1 - DENOTES STABILIZATION PARAMETERS.

2 - One purge volume (gallons) for a 1.25" dia. well: (Height of Water in Well) x 0.06 gal/ft

3 - One purge volume (gallons) for a 2" dia. well: (Height of Water in Well) x 0.16 gal/ft

4 - Varies from 0.0 to 9.5 at water temperature 15-25C°; 0.0 to 14.5 at water temperature 1-14C°

- milliliters per minute = gallons per minute/0.0002641

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GROUNDWATER SAMPLING FORM

PROJECT: Allied Paper, Inc. OU1		WELL ID: MW-203B DATE/TIME: 10/16/14
Sampler(s): A. WALTER K. VAUGHN	Well Diameter: 2" Breathing Zone PID Reading: 0.0	Weather Conditions: Foggy Purge Method: Geopump (Low Flow) Volumetric

SECTION 1: Purge Volume Information

(1) TD = Total Depth of Well (ft): 31.89	(2) DTW = Depth to Water (ft): 11.23

SECTION 2: For Volumetric Sampling Only

(3) Height of Water in Well = TD - DTW = [(1)-(2)]: 20.66	(4) One Purge Volume[2,3]: 3.31

SECTION 3: Field Parameter Data

Parameter	DTW	Time	pH[1]	Sp Cond.[1]	DO[1]	ORP[1]	Turbidity	Temperature	Purge/Flow Rate
Parameter Units	ft		SU	mS/cm	mg/L	mV	NTUs	C°	ml/minute
Acceptable Range	--	--	6.00 - 8.00	0.300-1.300 mS/cm	See Note 4	-190.0 - 240.0 mV	--	4.00 - 20.00 C°	100-500 (see SOP)
Stabilization Criteria	0.4		+/- 10%	+/- 3%	+/- 10%	+/- 10 mV	+/- 10%	+/- 0.5 C°	
First Water	11.26	0925	7.26	0.878	5.83	-27.8	10.02	12.56	270
1	11.28	0930	7.05	0.897	2.25	-68.3	9.56	12.54	270
2	11.28	0935	7.02	0.900	1.83	-75.0	9.11	12.55	270
3	11.28	0935	7.02	0.907	1.37	-84.5	8.80	12.54	270
4	11.28	0940	7.03	0.908	1.29	-86.1	9.56	12.53	270
5	11.28	0945	7.04	0.909	1.25	-86.9	7.59	12.53	270
6	11.28	0950	7.05	0.910	1.23	-86.1	6.26	12.53	270
7	11.28	0955	7.06	0.910	1.24	-86.8	6.26	12.53	270
8	S	A	M	P	L	E	D	—	—
9									

Stabilization Parameters Used (min. three): (pH) Sp. Cond. (DO) (ORP)

SECTION 4: Equipment and Method Information

Purging Equipment: Geopump

Purge/Flow Rate: 270 mL/min | Total Volume Purged: 2.0 gallons

Field Parameter Instruments: YSI, Sonde, turbidimeter, MiniRAE

SECTION 5: Sample Information

Samples	ID	Time	VOCs	~~Other~~ PCBs/SVOCs	~~Other~~ Metals	~~Other~~ Cyanide
Parent	AP-OU1-MW-203B	1000	✓	✓	✓	✓
Duplicate						
MS/MSD	AP-OU1-MW-203B-~~FB~~ MS	1000	✓	✓	✓	✓
Equipment Blank						

REMARKS:

NOTES:
1 - DENOTES STABILIZATION PARAMETERS.
2 - One purge volume (gallons) for a 1.25" dia. well: (Height of Water in Well) x 0.06 gal/ft
3 - One purge volume (gallons) for a 2" dia. well: (Height of Water in Well) x 0.16 gal/ft
4 - Varies from 0.0 to 9.5 at water temperature 15-25C°; 0.0 to 14.5 at water temperature 1-14C°
- milliliters per minute = gallons per minute/0.0002641

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GROUNDWATER SAMPLING FORM

PROJECT: Allied Paper, Inc. OU1		WELL ID: MW-204B DATE/TIME: 10/16/14
Sampler(s): A. Walter R. Vaughan	Well Diameter: 2.00" Breathing Zone PID Reading: 0.0 ppm	Weather Conditions: Overcast, breezy Purge Method: (Low Flow) Volumetric

SECTION 1: Purge Volume Information

(1) TD = Total Depth of Well (ft): 91.24	(2) DTW = Depth to Water (ft): 2.17

SECTION 2: For Volumetric Sampling Only

(3) Height of Water in Well = TD - DTW = [(1)-(2)]:	(4) One Purge Volume[2,3]: ~~91.24~~

SECTION 3: Field Parameter Data

Parameter	DTW	Time	pH[1]	Sp Cond.[1]	DO[1]	ORP[1]	Turbidity	Temperature	Purge/Flow Rate
Parameter Units	ft		SU	mS/cm	mg/L	mV	NTUs	C°	ml/minute
Acceptable Range	–	–	6.00 - 8.00	0.300-1.300 mS/cm	See Note 4	-190.0 - 240.0 mV	–	4.00 - 20.00 C°	100-500 (see SOP)
Stabilization Criteria	0.4		+/- 10%	+/- 3%	+/- 10%	+/- 10 mV	+/- 10%	+/- 0.5 C°	
First Water	2.18	1705	7.29	0.895	2.19	-74.0	74.0	13.52	280
1	2.18	1710	7.22	0.899	1.94	-80.4	60.7	13.79	180
2	2.18	1715	7.21	0.898	1.89	-82.2	54.4	13.89	180
3	2.18	1725	7.19	0.897	1.82	-82.9	31.9	13.90	180
4	2.17	1730	7.18	0.897	1.83	-83.6	19.4	13.86	180
5	2.17	1735	7.17	0.897	1.79	-84.2	16.2	13.77	180
6	2.17	1740	7.17	0.897	1.88	-84.2	9.5	13.72	180
7	—	S	A	M	P	L	E	D	—
8									
9									

Stabilization Parameters Used (min. three): pH Sp. Cond. DO ORP

SECTION 4: Equipment and Method Information

Purging Equipment: geopump

Purge/Flow Rate: Total Volume Purged:

Field Parameter Instruments: Mini RAE, Sonde, YSI, turbidimeter

SECTION 5: Sample Information

Samples	ID	Time	VOCs	~~SVOCs~~ PCBs/ ~~Other~~	~~Metals~~ ~~Other~~	~~Cyanide~~ ~~Other~~
Parent	AP-OU1-MW-204B	1745	✓	✓	✓	✓
Duplicate						
MS/MSD						
Equipment Blank						

REMARKS:

Between 1715 and 1725, purged well at low flow (~180 mL/min) until turbidity was lower.

NOTES:
1 - DENOTES STABILIZATION PARAMETERS.
2 - One purge volume (gallons) for a 1.25" dia. well: (Height of Water in Well) x 0.06 gal/ft
3 - One purge volume (gallons) for a 2" dia. well: (Height of Water in Well) x 0.16 gal/ft
4 - Varies from 0.0 to 9.5 at water temperature 15-25C°; 0.0 to 14.5 at water temperature 1-14C°
- milliliters per minute = gallons per minute/0.0002641

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GROUNDWATER SAMPLING FORM

PROJECT: Allied Paper, Inc. OU1		WELL ID: MW-205B DATE/TIME: 10/27/14
Sampler(s): A. WALTER R. VAUGHAN	Well Diameter: 2.00" Breathing Zone PID Reading: 0.0 ppm	Weather Conditions: cool, cloudy Purge Method: (Low Flow) Volumetric

SECTION 1: Purge Volume Information

(1) TD = Total Depth of Well (ft): ~~70.10~~ 70.01 (2) DTW = Depth to Water (ft): ~~12.63~~ 12.65

SECTION 2: For Volumetric Sampling Only

(3) Height of Water in Well = TD - DTW = [(1)-(2)]: (4) One Purge Volume[2,3]:

SECTION 3: Field Parameter Data

Parameter	DTW	Time	pH[1]	Sp Cond.[1]	DO[1]	ORP[1]	Turbidity	Temperature	Purge/Flow Rate
Parameter Units	ft		SU	mS/cm	mg/L	mV	NTUs	C°	ml/minute
Acceptable Range	--	--	6.00 - 8.00	0.300-1.300 mS/cm	See Note 4	-190.0 - 240.0 mV	--	4.00 - 20.00 C°	100-500 (see SOP)
Stabilization Criteria	0.4		+/- 10%	+/- 3%	+/- 10%	+/- 10 mV	+/- 10%	+/- 0.5 C°	
First Water									260
1	12.71	820	9.57	0.314	4.50	191.5	5.49	12.6	260
2	M ~~12.66~~ 12.70	830	9.65	0.314	4.55	188.9	4.46	12.56	260
3	12.71	840	9.69	0.314	4.58	184.0	5.15	12.56	260
4	–	S	A	M	P	L	E	D	–
5									
6									
7									
8									
9									

Stabilization Parameters Used (min. three): (pH) (Sp. Cond.) (DO) (ORP)

SECTION 4: Equipment and Method Information

Purging Equipment: Geopump

Purge/Flow Rate: 260 ml/min Total Volume Purged: ~2.5 gallons

Field Parameter Instruments: YSI, Sonde, MiniRAE, HACH Turb

SECTION 5: Sample Information

Samples	ID	Time	VOCs	RCBs/ ~~SVOCs~~ ~~Other~~	~~Metals~~ ~~Other~~	~~Cyanide~~ ~~Other~~
Parent	AP-OU1-MW-205B	0845	✓	✓	✓	✓
Duplicate						
MS/MSD						
Equipment Blank						

REMARKS:

NOTES:
1 - DENOTES STABILIZATION PARAMETERS.
2 - One purge volume (gallons) for a 1.25" dia. well: (Height of Water in Well) x 0.06 gal/ft
3 - One purge volume (gallons) for a 2" dia. well: (Height of Water in Well) x 0.16 gal/ft
4 - Varies from 0.0 to 9.5 at water temperature 15-25C°; 0.0 to 14.5 at water temperature 1-14C°
- milliliters per minute = gallons per minute/0.0002641

Form Checked by

GROUNDWATER SAMPLING FORM

PROJECT: Allied Paper, Inc. OU1		WELL ID: MW-207
		DATE/TIME: 10/16/14
Sampler(s): A. WALTER, R. VAUGHAN	Well Diameter: 2.00"	Weather Conditions: Foggy
	Breathing Zone PID Reading: 0.0	Purge Method: Low Flow / Volumetric

SECTION 1: Purge Volume Information

(1) TD = Total Depth of Well (ft): 40.09

(2) DTW = Depth to Water (ft): 9.85

SECTION 2: For Volumetric Sampling Only

(3) Height of Water in Well = TD - DTW = [(1)-(2)]: 30.24

(4) One Purge Volume[2,3]:

SECTION 3: Field Parameter Data

Parameter	DTW	Time	pH[1]	Sp Cond.[1]	DO[1]	ORP[1]	Turbidity	Temperature	Purge/Flow Rate
Parameter Units	ft		SU	mS/cm	mg/L	mV	NTUs	C°	ml/minute
Acceptable Range	–	–	6.00 - 8.00	0.300-1.300 mS/cm	See Note 4	-190.0 - 240.0 mV	–	4.00 - 20.00 C°	100-500 (see SOP)
Stabilization Criteria	0.4		+/- 10%	+/- 3%	+/- 10%	+/- 10 mV	+/- 10%	+/- 0.5 C°	
First Water	9.85	1140	8.41	0.564	4.38	-82.5	~~4.44~~ NM	13.77	260
1	9.85	1145	8.42	0.570	2.84	-77.7	27.1	13.61	260
2	9.85	1150	8.04	0.635	2.21	-43.5	37.2	13.44	260
3	9.81	1155	7.62	0.739	1.64	-25.0	36.6	13.44	210
4	9.81	1200	7.33	0.832	1.50	-8.3	36.2	13.42	210
5	9.80	1235	7.19	0.917	2.12	-78.4	37.5	13.99	120
6	9.79	1320	7.10	0.953	2.42	-86.6	18.9	14.62	120
7	9.79	1325	7.10	0.953	2.44	-86.2	14.6	14.64	120
8	9.79	1330	7.09	0.955	2.51	-86.2	9.8	14.52	120
9	—	S	A	M	P	L	E	D	—

Stabilization Parameters Used (min. three): pH Sp. Cond. DO ORP

SECTION 4: Equipment and Method Information

Purging Equipment: Geopump

Purge/Flow Rate:

Total Volume Purged: ~5 gallons

Field Parameter Instruments: YSI, Sonde, turbidimeter, ~~Multi~~ MiniRAE

SECTION 5: Sample Information

Samples	ID	Time	VOCs	~~SVOCs~~ PCBs/ ~~Other~~	~~Metals~~ ~~Other~~	~~Cyanide~~ ~~Other~~
Parent	AP-OU1-MW-207	1335	✓	✓	✓	✓
Duplicate						
MS/MSD						
Equipment Blank						

REMARKS:

Between 1200 and 1230 purged well at higher flow rate (approx. 1000 ml/min) due to high turbidity readings.

Between 1235 and 1320 purged well at low flow until turbidity began to drop. Then resumed recording other field parameters.

NOTES:

1 - DENOTES STABILIZATION PARAMETERS.

2 - One purge volume (gallons) for a 1.25" dia. well: (Height of Water in Well) x 0.06 gal/ft

3 - One purge volume (gallons) for a 2" dia. well: (Height of Water in Well) x 0.16 gal/ft

4 - Varies from 0.0 to 9.5 at water temperature 15-25C°; 0.0 to 14.5 at water temperature 1-14C°

- milliliters per minute = gallons per minute/0.0002641

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GROUNDWATER SAMPLING FORM

PROJECT: Allied Paper, Inc. OU1		WELL ID: MW-208
		DATE/TIME: 10/16/14 @ 1445
Sampler(s): K. Engle F. Sutton	Well Diameter: 2"	Weather Conditions: 50's Cloudy
	Breathing Zone PID Reading: 0	Purge Method: Low Flow Volumetric

SECTION 1: Purge Volume Information

(1) TD = Total Depth of Well (ft): 31.04

(2) DTW = Depth to Water (ft): 9.36

SECTION 2: For Volumetric Sampling Only

(3) Height of Water in Well = TD - DTW = [(1)-(2)]:

(4) One Purge Volume[2,3]:

SECTION 3: Field Parameter Data

Parameter	DTW	Time	pH[1]	Sp Cond.[1]	DO[1]	ORP[1]	Turbidity	Temperature	Purge/Flow Rate
Parameter Units	ft		SU	mS/cm	mg/L	mV	NTUs	C°	ml/minute
Acceptable Range	--	--	6.00 - 8.00	0.300-1.300 mS/cm	See Note 4	-190.0 - 240.0 mV	--	4.00 - 20.00 C°	100-500 (see SOP)
Stabilization Criteria	0.4		+/- 10%	+/- 3%	+/- 10%	+/- 10 mV	+/- 10%	+/- 0.5 C°	
First Water	9.40	1450	6.83	1.530	0.48	-56.6	37.3	13.59	425
1	9.40	1455	6.81	1.492	0.19	-61.7	17.4	13.43	375
2	9.40	~~145~~ 1500	6.80	1.479	0.14	-62.0	13.8	13.42	375
3	9.40	1505	6.80	1.464	0.11	-62.5	13.3	13.40	375
4	9.40	1510	6.80	1.447	0.11	-62.9	19.2	13.57	375
5	9.38	1515	6.79	1.449	0.11	-62.5	20.3	13.76	200
6	9.38	1520	6.79	1.452	0.12	-63.0	16.6	13.73	250
7	9.38	1525	6.79	1.454	0.11	-61.9	14.7	13.76	250
8	9.43	1530	6.79	1.451	0.11	-61.4	11.8	13.70	250
9	9.43	1535	6.79	1.450	0.10	-62.0	9.79	13.70	250

1545 sampled

Stabilization Parameters Used (min. three): pH Sp. Cond. DO ORP

SECTION 4: Equipment and Method Information

Purging Equipment: geopump

Purge/Flow Rate: 250

Total Volume Purged: 3.5 gallons

Field Parameter Instruments: YSI; WLM; turbidimeter

SECTION 5: Sample Information

Samples	ID	Time	VOCs	Other	Other	Other
Parent	AP-OU1-MW-208	1545	✓	✓	✓	✓
Duplicate						
MS/MSD						
Equipment Blank						

REMARKS:

NOTES:

1 - DENOTES STABILIZATION PARAMETERS.

2 - One purge volume (gallons) for a 1.25" dia. well: (Height of Water in Well) x 0.06 gal/ft

3 - One purge volume (gallons) for a 2" dia. well: (Height of Water in Well) x 0.16 gal/ft

4 - Varies from 0.0 to 9.5 at water temperature 15-25C°; 0.0 to 14.5 at water temperature 1-14C°

- milliliters per minute = gallons per minute/0.0002641

Form Checked by

GROUNDWATER SAMPLING FORM

PROJECT: Allied Paper, Inc. OU1		WELL ID: MW-209
		DATE/TIME: 10/16/14 - 1040
Sampler(s): I. Sutton / K Engle	Well Diameter: 2"	Weather Conditions: Cloudy - 55°F
	Breathing Zone PID Reading: 0.0	Purge Method: (Low Flow) Volumetric

SECTION 1: Purge Volume Information

(1) TD = Total Depth of Well (ft): 37.99 | (2) DTW = Depth to Water (ft): 0.36

SECTION 2: For Volumetric Sampling Only

(3) Height of Water in Well = TD - DTW = [(1)-(2)]: | (4) One Purge Volume[2,3]:

SECTION 3: Field Parameter Data

Parameter	DTW	Time	pH[1]	Sp Cond.[1]	DO[1]	ORP[1]	Turbidity	Temperature	Purge/Flow Rate
Parameter Units	ft		SU	mS/cm	mg/L	mV	NTUs	C°	ml/minute
Acceptable Range	--	--	6.00 - 8.00	0.300-1.300 mS/cm	See Note 4	-190.0 - 240.0 mV	--	4.00 - 20.00 C°	100-500 (see SOP)
Stabilization Criteria	0.4		+/- 10%	+/- 3%	+/- 10%	+/- 10 mV	+/- 10%	+/- 0.5 C°	
First Water	.47	1050	7.36	0.699	2.48	-62.1	19.6	13.35	375
1	.47	1055	7.20	0.696	0.25	-75.8	26.4	13.00	375
2	.47	1100	7.18	0.696	0.18	-77.0	21.0	12.90	375
3	.53	1105	7.18	0.693	0.13	-78.2	15.3	12.86	375
4	.53	1110	7.17	0.691	0.10	-78.5	10.7	12.84	375
5	.47	1115	7.17	0.691	0.09	-77.9	6.20	12.82	375
6		1121	S	A	M	P	L	E	D
7									
8									
9									

Stabilization Parameters Used (min. three): (pH) (Sp. Cond.) (DO) (ORP)

SECTION 4: Equipment and Method Information

Purging Equipment: geopump

Purge/Flow Rate: 375 mL/min | Total Volume Purged: 2.5 gal

Field Parameter Instruments: YSI 1050 MDS, WLM, MiniRAE, turbidimeter

SECTION 5: Sample Information

Samples	ID	Time	VOCs	Other	Other	Other
Parent	AP-OU1-MW-209	1121	✓	✓	✓	✓
Duplicate						
MS/MSD						
Equipment Blank						

REMARKS:

NOTES:
1 - DENOTES STABILIZATION PARAMETERS.
2 - One purge volume (gallons) for a 1.25" dia. well: (Height of Water in Well) x 0.06 gal/ft
3 - One purge volume (gallons) for a 2" dia. well: (Height of Water in Well) x 0.16 gal/ft
4 - Varies from 0.0 to 9.5 at water temperature 15-25C°; 0.0 to 14.5 at water temperature 1-14C°
- milliliters per minute = gallons per minute/0.0002641

Form Checked by

GROUNDWATER SAMPLING FORM

PROJECT: Allied Paper, Inc. OU1		WELL ID: MW-211
		DATE/TIME: 10/16/14 - 0930
Sampler(s): I. Sutton / K. Engle	Well Diameter: 2"	Weather Conditions: Cloudy, 55°F
	Breathing Zone PID Reading: 0.0	Purge Method: (Low Flow) Volumetric

SECTION 1: Purge Volume Information

(1) TD = Total Depth of Well (ft): 33.49	(2) DTW = Depth to Water (ft): 1.54

SECTION 2: For Volumetric Sampling Only

(3) Height of Water in Well = TD - DTW = [(1)-(2)]:	(4) One Purge Volume[2,3]:

SECTION 3: Field Parameter Data

Parameter	DTW	Time	pH[1]	Sp Cond.[1]	DO[1]	ORP[1]	Turbidity	Temperature	Purge/Flow Rate
Parameter Units	ft		SU	mS/cm	mg/L	mV	NTUs	C°	ml/minute
Acceptable Range	--	--	6.00 - 8.00	0.300-1.300 mS/cm	See Note 4	-190.0 - 240.0 mV	--	4.00 - 20.00 C°	100-500 (see SOP)
Stabilization Criteria	0.4		+/- 10%	+/- 3%	+/- 10%	+/- 10 mV	+/- 10%	+/- 0.5 C°	
First Water	1.81	0940	7.21	0.632	0.94	-39.2	39.8	12.58	450
1	1.79	0945	7.17	0.639	0.34	-67.7	18.2	12.56	375
2	1.86	0950	7.16	0.652	0.18	-84.1	17.3	12.51	375
3	1.89	0955	7.18	0.650	0.14	-90.7	7.05	12.50	375
4	1.92	1000	7.20	0.648	0.12	-92.1	6.02	12.50	375
5		1005	S	A	M	P	L	E	D
6									
7									
8									
9									

Stabilization Parameters Used (min. three): (pH) (Sp. Cond.) (DO) (ORP)

SECTION 4: Equipment and Method Information

Purging Equipment: geopump

Purge/Flow Rate: 375 mL/min | Total Volume Purged: 3 gallons

Field Parameter Instruments: YSI 650 MDS, WLM, Turbidimeter

SECTION 5: Sample Information

Samples	ID	Time	VOCs	Other	Other	Other
Parent	AP-OU1-MW-211	1005	✓	✓	✓	✓
Duplicate	AP-OU1-MW-211-FD	1010	✓	✓	✓	✓
MS/MSD		~~1005~~				
Equipment Blank						

REMARKS:

NOTES:
1 - DENOTES STABILIZATION PARAMETERS.
2 - One purge volume (gallons) for a 1.25" dia. well: (Height of Water in Well) x 0.06 gal/ft
3 - One purge volume (gallons) for a 2" dia. well: (Height of Water in Well) x 0.16 gal/ft
4 - Varies from 0.0 to 9.5 at water temperature 15-25C°; 0.0 to 14.5 at water temperature 1-14C°
- milliliters per minute = gallons per minute/0.0002641

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GROUNDWATER SAMPLING FORM

		WELL ID:	MW-212
PROJECT: Allied Paper, Inc. OU1		DATE/TIME:	10/16/14 @ 1150
Sampler(s):	Well Diameter: 2"	Weather Conditions:	cloudy 57°
I. Sutton K. Eagle	Breathing Zone PID Reading: Ø	Purge Method:	(Low Flow) Volumetric

SECTION 1: Purge Volume Information

(1) TD = Total Depth of Well (ft): 22.12	(2) DTW = Depth to Water (ft): 4.Ø7

SECTION 2: For Volumetric Sampling Only

(3) Height of Water in Well = TD - DTW = [(1)-(2)]:	(4) One Purge Volume[2,3]:

SECTION 3: Field Parameter Data

Parameter	DTW	Time	pH[1]	Sp Cond.[1]	DO[1]	ORP[1]	Turbidity	Temperature	Purge/Flow Rate
Parameter Units	ft		SU	mS/cm	mg/L	mV	NTUs	C°	ml/minute
Acceptable Range	--	--	6.00 - 8.00	0.300-1.300 mS/cm	See Note 4	-190.0 - 240.0 mV	--	4.00 - 20.00 C°	100-500 (see SOP)
Stabilization Criteria	0.4		+/- 10%	+/- 3%	+/- 10%	+/- 10 mV	+/- 10%	+/- 0.5 C°	
First Water	4.4Ø	1205	6.7Ø	1.124	2.51	-39.2	116	13.35	48Ø
1	4.38	1210	6.44	1.154	Ø.26	-42.8	79.3	13.15	425
2	4.36	1215	6.41	1.164	Ø.19	-42.5	57.2	13.17	37Ø
3	4.36	1220	6.39	1.168	Ø.29	-42.3	41.5	13.15	37Ø
4	4.36	1225	6.38	1.168	Ø.14	-41.7	32.4	13.15	37Ø
5	4.36	1230	6.37	1.170	Ø.19	-42.2	24.Ø	13.18	37Ø
6	4.36	1235	6.37	1.172	Ø.14	-42.2	17.5	13.2Ø	37Ø
7	4.36	1240	6.36	1.173	Ø.15	-42.5	13.6	13.24	37Ø
8	4.36	1245	6.36	1.174	Ø.13	-42.4	9.95	13.25	37Ø
9		125Ø	S	A	M	P	L	E	D

Stabilization Parameters Used (min. three): (pH) (Sp. Cond.) ~~DO~~ (ORP)

SECTION 4: Equipment and Method Information

Purging Equipment: geopump	
Purge/Flow Rate: 37Ø	Total Volume Purged: 3 gallons
Field Parameter Instruments: YSI; WLM; turbidimeter	

SECTION 5: Sample Information

Samples	ID	Time	VOCs	Other	Other	Other
Parent	AP-OU1-MW-212	125Ø	✓	✓	✓	✓
Duplicate						
MS/MSD						
Equipment Blank						

REMARKS:

NOTES:
1 - DENOTES STABILIZATION PARAMETERS.
2 - One purge volume (gallons) for a 1.25" dia. well: (Height of Water in Well) x 0.06 gal/ft
3 - One purge volume (gallons) for a 2" dia. well: (Height of Water in Well) x 0.16 gal/ft
4 - Varies from 0.0 to 9.5 at water temperature 15-25C°; 0.0 to 14.5 at water temperature 1-14C°
- milliliters per minute = gallons per minute/0.0002641

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GROUNDWATER SAMPLING FORM

PROJECT: Allied Paper, Inc. OU1		WELL ID: MW-214
		DATE/TIME: 10/17/14
Sampler(s): A. WALTER R. VAUGHAN	Well Diameter: 2.00"	Weather Conditions: Cool, cloudy
	Breathing Zone PID Reading: 0.0	Purge Method: Low Flow / Volumetric

SECTION 1: Purge Volume Information

(1) TD = Total Depth of Well (ft): 39.57

(2) DTW = Depth to Water (ft): 15.66

SECTION 2: For Volumetric Sampling Only

(3) Height of Water in Well = TD - DTW = [(1)-(2)]: 23.91

(4) One Purge Volume[2,3]:

SECTION 3: Field Parameter Data

Parameter	DTW	Time	pH[1]	Sp Cond.[1]	DO[1]	ORP[1]	Turbidity	Temperature	Purge/Flow Rate
Parameter Units	ft		SU	mS/cm	mg/L	mV	NTUs	C°	ml/minute
Acceptable Range	--	--	6.00 - 8.00	0.300-1.300 mS/cm	See Note[4]	-190.0 - 240.0 mV	--	4.00 - 20.00 C°	100-500 (see SOP)
Stabilization Criteria	0.4		+/- 10%	+/- 3%	+/- 10%	+/- 10 mV	+/- 10%	+/- 0.5 C°	
First Water	16.54	1025	6.96	1.451	1.79	-76.3	14.0	12.69	230
1	16.71	1045	6.76	1.431	0.60	-70.2	5.44	12.77	160
2	16.69	1050	6.72	1.427	0.55	-65.4	5.34	12.79	160
3	16.69	1055	6.70	1.424	0.53	-68.7	4.29	12.83	160
4	16.65	1100	6.69	1.422	0.59	-70.9	3.61	12.85	~~160~~ 120
5	16.65	1105	6.69	1.421	0.61	-71.2	3.18	12.87	80
6	—	S	A	M	P	L	E	D	—
7									
8									
9									

Stabilization Parameters Used (min. three): pH Sp. Cond. DO ORP

SECTION 4: Equipment and Method Information

Purging Equipment: Geopump

Purge/Flow Rate:

Total Volume Purged:

Field Parameter Instruments: YSI, Sondc, MiniRAE, HACH turbidimeter

SECTION 5: Sample Information

Samples	ID	Time	VOCs	PCBs SVOCs ~~Other~~	Metals ~~Other~~	Cyanide ~~Other~~
Parent	AP-OU1-MW-214	1110	✓	✓	✓	✓
Duplicate						
MS/MSD						
Equipment Blank						

REMARKS:

From 1025 to 1045, purged well at low flow (~160 ml/min) to reduce amount of visible black specs.

NOTES:

1 - DENOTES STABILIZATION PARAMETERS.

2 - One purge volume (gallons) for a 1.25" dia. well: (Height of Water in Well) x 0.06 gal/ft

3 - One purge volume (gallons) for a 2" dia. well: (Height of Water in Well) x 0.16 gal/ft

4 - Varies from 0.0 to 9.5 at water temperature 15-25C°; 0.0 to 14.5 at water temperature 1-14C°
- milliliters per minute = gallons per minute/0.0002641

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SCH 80 PVC - FM
NOV 3 - PUMP ORDER / G. LAKE TRAINING

GROUNDWATER SAMPLING FORM

PROJECT: Allied Paper, Inc. OU1		WELL ID: MW-218
		DATE/TIME: 10/17/14 @ 0805
Sampler(s): I. Sutton K. Engle	Well Diameter: 2"	Weather Conditions: 50's partly cloudy
	Breathing Zone PID Reading: 0	Purge Method: (Low Flow) Volumetric

SECTION 1: Purge Volume Information

(1) TD = Total Depth of Well (ft): 19.39	(2) DTW = Depth to Water (ft): 5.34

SECTION 2: For Volumetric Sampling Only

(3) Height of Water in Well = TD - DTW = [(1)-(2)]:	(4) One Purge Volume[2,3]:

SECTION 3: Field Parameter Data

Parameter	DTW	Time	pH[1]	Sp Cond.[1]	DO[1]	ORP[1]	Turbidity	Temperature	Purge/Flow Rate
Parameter Units	ft		SU	mS/cm	mg/L	mV	NTUs	C°	ml/minute
Acceptable Range	--	--	6.00 - 8.00	0.300-1.300 mS/cm	See Note 4	-190.0 - 240.0 mV	--	4.00 - 20.00 C°	100-500 (see SOP)
Stabilization Criteria	0.4		+/- 10%	+/- 3%	+/- 10%	+/- 10 mV	+/- 10%	+/- 0.5 C°	
First Water	5.45	0805	7.40	0.827	3.72	-59.6	26.3	13.04	380
1	5.45	0820	7.16	0.832	1.92	-73.4	24.6	13.11	380
2	5.45	0825	7.02	0.834	1.75	-78.4	11.8	13.13	380
3	5.45	0830	6.95	0.834	1.61	-81.1	10.0	13.18	380
4	5.45	0835	6.93	0.834	1.65	-81.5	5.61	13.20	380
5		0845	S	A	M	P	L	E	D
6									
7									
8									
9									

Stabilization Parameters Used (min. three): (pH) (Sp. Cond) (DO) (ORP)

SECTION 4: Equipment and Method Information

Purging Equipment: geopump

Purge/Flow Rate: 380 | Total Volume Purged: 2 gallons

Field Parameter Instruments: YSI; WLM; turbidimeter

SECTION 5: Sample Information

Samples	ID	Time	VOCs	Other	Other	Other
Parent	AP-OU1-MW-218	0845	✓	✓	✓	✓
Duplicate						
MS/MSD						
Equipment Blank						

REMARKS:

NOTES:
1 - DENOTES STABILIZATION PARAMETERS.
2 - One purge volume (gallons) for a 1.25" dia. well: (Height of Water in Well) x 0.06 gal/ft
3 - One purge volume (gallons) for a 2" dia. well: (Height of Water in Well) x 0.16 gal/ft
4 - Varies from 0.0 to 9.5 at water temperature 15-25C°; 0.0 to 14.5 at water temperature 1-14C°
- milliliters per minute = gallons per minute/0.0002641

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GROUNDWATER SAMPLING FORM

		WELL ID: MW-221R
PROJECT: Allied Paper, Inc. OU1		DATE/TIME: 10/17/14 @ 1000
Sampler(s):	Well Diameter: 2"	Weather Conditions: 50's partly sunny
I. Sutton K. Engle	Breathing Zone PID Reading: 0	Purge Method: Low Flow Volumetric

SECTION 1: Purge Volume Information

(1) TD = Total Depth of Well (ft): 13.37	(2) DTW = Depth to Water (ft): 9.04

SECTION 2: For Volumetric Sampling Only

(3) Height of Water in Well = TD - DTW = [(1)-(2)]:	(4) One Purge Volume[2,3]:

SECTION 3: Field Parameter Data

Parameter	DTW	Time	pH[1]	Sp Cond.[1]	DO[1]	ORP[1]	Turbidity	Temperature	Purge/Flow Rate
Parameter Units	ft		SU	mS/cm	mg/L	mV	NTUs	C°	ml/minute
Acceptable Range	--	--	6.00 - 8.00	0.300-1.300 mS/cm	See Note 4	-190.0 - 240.0 mV	--	4.00 - 20.00 C°	100-500 (see SOP)
Stabilization Criteria	0.4		+/- 10%	+/- 3%	+/- 10%	+/- 10 mV	+/- 10%	+/- 0.5 C°	
First Water	9.28	1015	6.67	0.619	4.18	-13.7	252	14.60	275
1	9.30	1020	6.42	0.629	1.88	-10.5	205	14.75	275
2	9.30	1025	6.37	0.641	1.70	-10.9	111	14.83	275
3	9.30	1030	6.39	0.795	1.71	-17.0	71.3	14.91	275
4	9.31	1035	6.46	0.913	1.89	-41.0	41.0	15.05	275
5	9.31	1045	6.49	0.969	2.08	-58.0	20.5	15.08	275
6	9.31	1050	6.51	1.004	2.20	-64.2	29.3	15.27	275
7	9.31	1055	6.51	1.023	2.41	-67.8	37.8	15.48	275
8	9.35	1109	6.52	1.056	3.01	-71.4	15.5	15.79	~~275~~ 300
9	9.35	1114	6.53	1.065	3.11	-72.2	8.80	15.69	~~310~~ 300

Stabilization Parameters Used (min. three): pH Sp. Cond. DO ORP

SECTION 4: Equipment and Method Information

Purging Equipment: geopump	
Purge/Flow Rate: 300	Total Volume Purged: 5 gallons
Field Parameter Instruments: YSI; WLM; turbidimeter	

SECTION 5: Sample Information

Samples	ID	Time	VOCs	Other	Other	Other
Parent	AP-OU1-MW-221R	1125	✓	✓	✓	✓
Duplicate						
MS/MSD						
Equipment Blank						

REMARKS: Extra time was taken between 4 and 5, 7 and 8 to let parameters stabilize.

NOTES:
1 - DENOTES STABILIZATION PARAMETERS.
2 - One purge volume (gallons) for a 1.25" dia. well: (Height of Water in Well) x 0.06 gal/ft
3 - One purge volume (gallons) for a 2" dia. well: (Height of Water in Well) x 0.16 gal/ft
4 - Varies from 0.0 to 9.5 at water temperature 15-25C°; 0.0 to 14.5 at water temperature 1-14C°
- milliliters per minute = gallons per minute/0.0002641

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GROUNDWATER SAMPLING FORM

Pg 2 of 2

PROJECT: Allied Paper, Inc. OU1	WELL ID: MW-221R
	DATE/TIME: 10/17/14 @ 1000
Sampler(s): T. Sutton K. Engle	Well Diameter: 2"
	Breathing Zone PID Reading: 0
	Weather Conditions: 50's sunny
	Purge Method: Low Flow Volumetric

SECTION 1: Purge Volume Information

(1) TD = Total Depth of Well (ft): 13.37	(2) DTW = Depth to Water (ft): 9.04

SECTION 2: For Volumetric Sampling Only

(3) Height of Water in Well = TD - DTW = [(1)-(2)]:	(4) One Purge Volume[2,3]:

SECTION 3: Field Parameter Data

Parameter	DTW	Time	pH[1]	Sp Cond.[1]	DO[1]	ORP[1]	Turbidity	Temperature	Purge/Flow Rate
Parameter Units	ft		SU	mS/cm	mg/L	mV	NTUs	C°	ml/minute
Acceptable Range	--	--	6.00 - 8.00	0.300-1.300 mS/cm	See Note 4	-190.0 - 240.0 mV	--	4.00 - 20.00 C°	100-500 (see SOP)
Stabilization Criteria	0.4		+/- 10%	+/- 3%	+/- 10%	+/- 10 mV	+/- 10%	+/- 0.5 C°	
First Water	9.35	1119	6.52	1.067	3.34	-72.6	10.0	15.70	300
1		1125	S	A	M	P	L	E	D
2									
3									
4									
5									
6									
7									
8									
9									

Stabilization Parameters Used (min. three): pH Sp. Cond. DO ORP

SECTION 4: Equipment and Method Information

Purging Equipment: geopump	
Purge/Flow Rate: 300	Total Volume Purged: 5 gallons
Field Parameter Instruments: YSI; WLM; turbidimeter	

SECTION 5: Sample Information

Samples	ID	Time	VOCs	Other	Other	Other
Parent	AP-OU1-MW-221R	1125	✓	✓	✓	✓
Duplicate						
MS/MSD						
Equipment Blank						

REMARKS:

NOTES:
1 - DENOTES STABILIZATION PARAMETERS.
2 - One purge volume (gallons) for a 1.25" dia. well: (Height of Water in Well) x 0.06 gal/ft
3 - One purge volume (gallons) for a 2" dia. well: (Height of Water in Well) x 0.16 gal/ft
4 - Varies from 0.0 to 9.5 at water temperature 15-25C°; 0.0 to 14.5 at water temperature 1-14C°
- milliliters per minute = gallons per minute/0.0002641

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GROUNDWATER SAMPLING FORM

PROJECT: Allied Paper, Inc. OU1	WELL ID: MW-222
Sampler(s): I. Sutton K. Engle	DATE/TIME: 10/13/14 @ 1414
Well Diameter: 2in	Weather Conditions: Balmy
Breathing Zone PID Reading: Ø	Purge Method: Low Flow / Volumetric

SECTION 1: Purge Volume Information

(1) TD = Total Depth of Well (ft):

(2) DTW = Depth to Water (ft): 3.38

SECTION 2: For Volumetric Sampling Only

(3) Height of Water in Well = TD - DTW = [(1)-(2)]:

(4) One Purge Volume[2,3]:

SECTION 3: Field Parameter Data

Parameter	DTW	Time	pH[1]	Sp Cond.[1]	DO[1]	ORP[1]	Turbidity	Temperature	Purge/Flow Rate
Parameter Units	ft		SU	mS/cm	mg/L	mV	NTUs	C°	ml/minute
Acceptable Range	–	–	6.00 - 8.00	0.300-1.300 mS/cm	See Note 4	-190.0 - 240.0 mV	–	4.00 - 20.00 C°	100-500 (see SOP)
Stabilization Criteria	0.4		+/- 10%	+/- 3%	+/- 10%	+/- 10 mV	+/- 10%	+/- 0.5 C°	
First Water	3.43	1617	7.29	0.737	2.67	-72.9	2.7	14.22	400
1	3.43	1627	7.14	Ø.664	Ø.86	-65.1	1.3	13.23	350
2	3.43	1637	7.16	Ø.664	Ø.75	-64.3	2.3	13.35	350
3	3.43	1642	7.17	Ø.664	Ø.73	-64.4	2.7	13.39	350
4	3.43	1647	7.17	Ø.662	Ø.71	-64.2	1.6	13.25	350
5	~~3.43~~	1650	S	A	M	P	L	E	D
6									
7									
8									
9									

Stabilization Parameters Used (min. three): pH Sp. Cond. DO ORP

SECTION 4: Equipment and Method Information

Purging Equipment: Geopump

Purge/Flow Rate: 350 mL/min

Total Volume Purged: 3 gallons

Field Parameter Instruments: YSI, Horiba, WLM

SECTION 5: Sample Information

Samples	ID	Time	VOCs	Other	Other	Other
Parent	AP-OU1-MW-222	1650	✓	✓	✓	✓
Duplicate						
MS/MSD						
Equipment Blank						

REMARKS:

NOTES:

1 - DENOTES STABILIZATION PARAMETERS.

2 - One purge volume (gallons) for a 1.25" dia. well: (Height of Water in Well) x 0.06 gal/ft

3 - One purge volume (gallons) for a 2" dia. well: (Height of Water in Well) x 0.16 gal/ft

4 - Varies from 0.0 to 9.5 at water temperature 15-25C°; 0.0 to 14.5 at water temperature 1-14C°

- milliliters per minute = gallons per minute/0.0002641

Form Checked by _____

GROUNDWATER SAMPLING FORM

PROJECT: Allied Paper, Inc. OU1	WELL ID: MW-224
	DATE/TIME: 10-13-14 1420
Sampler(s): A. Swishe, R. Vaughan	Well Diameter: 2" steel
	Weather Conditions: Cloudy 67°
	Breathing Zone PID Reading: 0.5
	Purge Method: Low Flow Volumetric

SECTION 1: Purge Volume Information

(1) TD = Total Depth of Well (ft): 26.94

(2) DTW = Depth to Water (ft): 22.09

SECTION 2: For Volumetric Sampling Only

(3) Height of Water in Well = TD - DTW = [(1)-(2)]: 4.85

(4) One Purge Volume[2,3]: 0.776

SECTION 3: Field Parameter Data

Parameter	DTW	Time	pH[1]	Sp Cond.[1]	DO[1]	ORP[1]	Turbidity	Temperature	Purge/Flow Rate
Parameter Units	ft		SU	mS/cm	mg/L	mV	NTUs	C°	ml/minute
Acceptable Range	--	--	6.00 - 8.00	0.300-1.300 mS/cm	See Note 4	-190.0 - 240.0 mV	--	4.00 - 20.00 C°	100-500 (see SOP)
Stabilization Criteria	0.4		+/- 10%	+/- 3%	+/- 10%	+/- 10 mV	+/- 10%	+/- 0.5 C°	
First Water	~~22.09~~	1420							
1	22.41	1435	6.28	1.301	2.84	-68.1	3.5	14.66	160
2	22.41	1440	6.27	1.312	2.62	-68.7	3.3	14.06	160
3	22.40	1445	6.27	1.310	2.52	-65.1	3.2	13.99	160
4	22.39	1450	6.28	1.311	2.50	-64.1	3.2	14.00	160
5	22.38	1455	6.29	1.312	2.44	-62.0	3.3	14.06	160
6									
7									
8									
9									

Stabilization Parameters Used (min. three): pH Sp. Cond. DO ORP

SECTION 4: Equipment and Method Information

Purging Equipment: peristaltic pump ~~YSI / Horiba (turbidity)~~

Purge/Flow Rate: 160 mL/min

Total Volume Purged: ≈ 1 gallon

Field Parameter Instruments: YSI / Horiba (turbidity)

SECTION 5: Sample Information

Samples	ID	Time	VOCs	~~Cyanide~~ Other	~~Metals~~ Other	~~SVOCs~~ Other
Parent	AP-OU1-MW-224	1500	✓	✓	✓	✓
Duplicate	n/a					
MS/MSD	n/a					
Equipment Blank						

REMARKS:

NOTES:

1 - DENOTES STABILIZATION PARAMETERS.

2 - One purge volume (gallons) for a 1.25" dia. well: (Height of Water in Well) x 0.06 gal/ft

3 - One purge volume (gallons) for a 2" dia. well: (Height of Water in Well) x 0.16 gal/ft

4 - Varies from 0.0 to 9.5 at water temperature 15-25C°; 0.0 to 14.5 at water temperature 1-14C°

- milliliters per minute = gallons per minute/0.0002641

Form Checked by _____

GROUNDWATER SAMPLING FORM

PROJECT: Allied Paper, Inc. OU1		WELL ID: MW-231
		DATE/TIME: 10/16/14 @ 1710
Sampler(s):	Well Diameter: 2"	Weather Conditions: 50's cloudy
T. Sutton K. Engle	Breathing Zone PID Reading: 0	Purge Method: (Low Flow) Volumetric

SECTION 1: Purge Volume Information

(1) TD = Total Depth of Well (ft): 28.90 | (2) DTW = Depth to Water (ft): 3.68

SECTION 2: For Volumetric Sampling Only

(3) Height of Water in Well = TD - DTW = [(1)-(2)]: | (4) One Purge Volume[2,3]:

SECTION 3: Field Parameter Data

Parameter	DTW	Time	pH[1]	Sp Cond.[1]	DO[1]	ORP[1]	Turbidity	Temperature	Purge/Flow Rate
Parameter Units	ft		SU	mS/cm	mg/L	mV	NTUs	C°	ml/minute
Acceptable Range	--	--	6.00 - 8.00	0.300-1.300 mS/cm	See Note 4	-190.0 - 240.0 mV	--	4.00 - 20.00 C°	100-500 (see SOP)
Stabilization Criteria	0.4		+/- 10%	+/- 3%	+/- 10%	+/- 10 mV	+/- 10%	+/- 0.5 C°	
First Water	3.86	1701	7.27	0.976	2.18	53.9	167	13.53	450
1	3.86	1706	7.00	0.945	0.30	-65.9	173	13.95	360
2	3.86	1711	6.96	0.943	0.22	-64.0	123	12.88	360
3	3.86	1716	6.93	0.939	0.16	-62.6	69.0	12.81	360
4	3.86	1721	6.91	0.936	0.13	-60.3	20.7	12.73	360
5	3.86	1726	6.90	0.934	0.10	-58.1	13.5	12.71	360
6	3.86	1731	6.89	0.933	0.08	-56.6	7.58	12.68	360
7		1735	S	A	M	P	L	E	D
8									
9									

Stabilization Parameters Used (min. three): (pH) (Sp. Cond.) (DO) (ORP)

SECTION 4: Equipment and Method Information

Purging Equipment: geopump

Purge/Flow Rate: 360 | Total Volume Purged: 3 gallons

Field Parameter Instruments: YSI; WLM; Turbidimeter

SECTION 5: Sample Information

Samples	ID	Time	VOCs	Other	Other	Other
Parent	AP-OU1-MW-231	1735	✓	✓	✓	✓
Duplicate						
MS/MSD						
Equipment Blank						

REMARKS:

NOTES:
1 - DENOTES STABILIZATION PARAMETERS.
2 - One purge volume (gallons) for a 1.25" dia. well: (Height of Water in Well) x 0.06 gal/ft
3 - One purge volume (gallons) for a 2" dia. well: (Height of Water in Well) x 0.16 gal/ft
4 - Varies from 0.0 to 9.5 at water temperature 15-25C°; 0.0 to 14.5 at water temperature 1-14C°
- milliliters per minute = gallons per minute/0.0002641

Form Checked by _____

GROUNDWATER SAMPLING FORM

PROJECT: Allied Paper, Inc. OU1	WELL ID: MW-232
	DATE/TIME: 10/17/14 @ 0900
Sampler(s): I. Sutton K. Engle	Well Diameter: 2"
	Weather Conditions: 50's partly sunny
	Breathing Zone PID Reading: 0
	Purge Method: (Low Flow) Volumetric

SECTION 1: Purge Volume Information

(1) TD = Total Depth of Well (ft): 17.52	(2) DTW = Depth to Water (ft): 7.50

SECTION 2: For Volumetric Sampling Only

(3) Height of Water in Well = TD - DTW = [(1)-(2)]:	(4) One Purge Volume[2,3]:

SECTION 3: Field Parameter Data

Parameter	DTW	Time	pH[1]	Sp Cond.[1]	DO[1]	ORP[1]	Turbidity	Temperature	Purge/Flow Rate
Parameter Units	ft		SU	mS/cm	mg/L	mV	NTUs	C°	ml/minute
Acceptable Range	--	--	6.00 - 8.00	0.300-1.300 mS/cm	See Note 4	-190.0 - 240.0 mV	--	4.00 - 20.00 C°	100-500 (see SOP)
Stabilization Criteria	0.4		+/- 10%	+/- 3%	+/- 10%	+/- 10 mV	+/- 10%	+/- 0.5 C°	
First Water	8.91	0905	6.61	0.899	2.93	-47.6	125	13.60	425
1	8.92	0910	6.50	0.894	1.59	-55.5	103	13.52	310
2	8.92	0915	6.49	0.869	1.57	-59.6	53.0	13.50	310
3	8.93	0920	6.48	0.854	1.59	-62.8	27.9	13.51	310
4	8.93	0925	6.48	0.847	1.62	-64.2	22.0	13.51	310
5	8.94	0930	6.48	0.846	1.71	-65.0	17.3	13.52	310
6	8.94	0935	6.47	0.845	1.76	-65.7	11.9	13.52	310
7	8.94	0940	6.47	0.845	1.80	-66.4	8.14	13.52	310
8		0945	S	A	M	P	L	E	D
9									

Stabilization Parameters Used (min. three): (pH) (Sp. Cond.) (DO) (ORP)

SECTION 4: Equipment and Method Information

Purging Equipment: geopump

Purge/Flow Rate: 310 Total Volume Purged: 3 gallons

Field Parameter Instruments: YSI; WLM; turbidimeter

SECTION 5: Sample Information

Samples	ID	Time	VOCs	Other	Other	Other
Parent	AP-OU1-MW-232	0945	✓	✓	✓	✓
Duplicate						
MS/MSD						
Equipment Blank						

REMARKS:

NOTES:
1 - DENOTES STABILIZATION PARAMETERS.
2 - One purge volume (gallons) for a 1.25" dia. well: (Height of Water in Well) x 0.06 gal/ft
3 - One purge volume (gallons) for a 2" dia. well: (Height of Water in Well) x 0.16 gal/ft
4 - Varies from 0.0 to 9.5 at water temperature 15-25C°; 0.0 to 14.5 at water temperature 1-14C°
- milliliters per minute = gallons per minute/0.0002641

Form Checked by _____

Attachment G
Waste Characterization Analytical Reports

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5 CENTRAL REGIONAL LABORATORY

536 SOUTH CLARK STREET

CHICAGO, ILLINOIS 60605

Date:

Subject: Review of Region 5 Data for **Allied Paper**

From: **Deborah Connet, Chemist, TechLaw Inc. / ESAT**
Contractor to Region 5 Central Regional Laboratory
Submitted to CRL on 11-6-14 FOR D. CONNET

To:

Attached are the results for: **Allied Paper**

CRL data set number(s): **E141002**

Samples analyzed for: **Mercury**

Results are reported for sample designations: **E141002-01, E141002-02**

_____ / / _____

Data Management Coordinator and Date Received

Date Transmitted: ____/____/

Please have the U.S. EPA Project Manager/Officer call the CRL Sample Coordinator at 3-0375 for any comments or questions.

Please sign and date this form below and return it with any comments to:

ESAT Region V
Techlaw
Patricia A. Joyner
ESAT Data Coordinator
536 South Clark – Suite 734
Chicago, Il 60605

_____ / /

Received by and Date

Comments:

Attached are the results for: **Allied Paper**

CRL data set number(s): **E141002**

Samples analyzed for: **Mercury**

Results are reported for sample designations: **E141002-01, E141002-02**

Rev. 4/10/02

Data Set E141002 Mercury Water (TCLP)

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Bench sheet	20-21
TCLP prep sheet	22-24
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TechLaw Inc ESAT Region 5
536 South Clark Street, Suite 734
Chicago, IL 60605
(312) 353-8302
(312) 353-5814 (Fax)
www.techlawinc.com

Date: November 4, 2014

To: Michelle Kerr, EPA TOCOR

From: Deborah Connet, ESAT Chemist

Thru: James Burden, ESAT Team Manager

Ref: TDF: 5-0001-1-044
Job Number: 03074.2.01.102.1A.059B.01.0044
Contract #: EP-W-13-025

SUBJECT: Data Set: E141002: Inorganic Analyses of Mercury by CVAA in Water Using Method 245.1/7470A (CRL Method AIG044D)

Attached is the deliverable for Data Set E141002 mercury analysis for two (2) water samples. Included in the deliverable are the case narrative, raw data, LIMS reports and QC reports.

Data are stored in the folder:

R5CRL\VOL2\IITRI-AIG\DConnet\Mercury\Hg E141002

If you have any questions please feel free to contact me.

Deborah Connet 11-4-14

TechLaw Inc ESAT Region 5
536 South Clark Street, Suite 734
Chicago, IL 60605
(312) 353-2964
(312) 353-5814 (Fax)
www.techlawinc.com

WORK ORDER

Printed: 10/30/2014 1:14:08PM

E141002

TechLaw - ESAT Contract

Client: Superfund, US EPA Region 5
Project: Allied Paper
Project Manager: James D. Burden
Project Number: [none]

Report To:
James D. Burden
Superfund, US EPA Region 5
77 West Jackson Boulevard
Chicago, IL 60604
Phone: (312) 353-2310
Fax: (312) 886-6171

Date Due: Nov-18-14 15:00 (27 day TAT)
Received By: Paul Little
Date Received: Oct-21-14 13:15
Logged In By: Paul Little
Date Logged In: Oct-22-14 09:49

Samples Received at:	0.6°C
Custody Seals	Yes
Containers Intact	Yes
COC/Labels Agree	Yes
Preservation Confirmed	Yes

Analysis	Due	TAT	Expires	Comments
E141002-01 15CA01-01 [Soil] Sampled Oct-17-14 09:00 (GMT-06:00) Central Time (US & Canada)				**AP-OU1-IDW-001-101714**
SVOA TCLP List	Nov-18-14 12:00	27	Oct-31-14 09:00	
Metals ICP TCLP RCRA	Nov-18-14 12:00	27	Apr-15-15 09:00	
TCLP Extraction	Oct-31-14 12:00	10	Nov-14-14 09:00	
Solids, Dry Weight	Oct-31-14 12:00	10	Oct-24-14 09:00	
PCB by ASE	Nov-18-14 12:00	27	Oct-31-14 09:00	
Hg TCLP	Nov-18-14 12:00	27	Nov-14-14 09:00	
E141002-02 15CA01-02 [Soil] Sampled Oct-17-14 09:05 (GMT-06:00) Central Time (US & Canada)				**AP-OU1-IDW-002-101714**
SVOA TCLP List	Nov-18-14 12:00	27	Oct-31-14 09:05	
Metals ICP TCLP RCRA	Nov-18-14 12:00	27	Apr-15-15 09:05	
TCLP Extraction	Oct-31-14 12:00	10	Nov-14-14 09:05	
Solids, Dry Weight	Oct-31-14 12:00	10	Oct-24-14 09:05	
PCB by ASE	Nov-18-14 12:00	27	Oct-31-14 09:05	
Hg TCLP	Nov-18-14 12:00	27	Nov-14-14 09:05	
E141002-03 15CA01-03 [Water] Sampled Oct-17-14 09:10 (GMT-06:00) Central Time (US & Canada)				**AP-OU1-IDW-003-101714**
PCB by SPE	Nov-18-14 12:00	27	Oct-24-14 09:10	

Delivered Contract 11-4-14

WORK ORDER

Printed: 10/30/2014 1:14:08PM

E141002

TechLaw - ESAT Contract

Client:	**Superfund, US EPA Region 5**	**Project Manager:**	**James D. Burden**
Project:	**Allied Paper**	**Project Number:**	**[none]**

Analysis	Due	TAT	Expires	Comments
E141002-04 15CA01-04 [Water] Sampled Oct-17-14 09:15 (GMT-06:00) Central Time (US & Canada)				**AP-OU1-IDW-004-101714**
PCB by SPE	Nov-18-14 12:00	27	Oct-24-14 09:15	

Reviewed By

11-4-14

Date

TechLaw
Quality & Integrity

TechLaw Inc ESAT Region 5
536 South Clark Street, Suite 734
Chicago, IL 60605
(312) 353-2964
(312) 353-5814 (Fax)
www.techlawinc.com

Date: 11/4/2014

Data Review Checklist

Work Order: E141002
Project: Allied Paper
Analysis: Hg TCLP
CRL SOP Used: 245.1 & 245.2

Electronic Pathway(s):
R5CRL/VOL2IITRI-AIG/DConnet/Mercury/Hg E141002
File Name(s):
W.O. E141002 Batch EJ42801

Question #	Question	Analyst Response (YES/ NO/ NA)	Reviewer Response (Circle Response)
1	Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	YES	YES / NO / NA
2	Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	YES	YES / NO / NA
3	Were all samples prepared and analyzed within holding times?	YES	YES / NO / NA
4	Other than those results < RL, were all other raw values bracketed by calibration standards?	YES	YES / NO / NA
5	Were calculations checked?	YES	YES / NO / NA
6	Were all analyte results checked?	YES	YES / NO / NA
7	Were all results for soil and sediment samples reported on a dry weight basis?	NA	YES / NO / NA
8	Were % moisture (or solids) reported for all soil and sediment samples?	NA	YES / NO / NA
9	Were appropriate type(s) of blanks analyzed?	YES	YES / NO / NA
10	Were blanks analyzed at the appropriate frequency?	YES	YES / NO / NA
11	Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	YES	YES / NO / NA

Deborah Connet 11-4-14

Data Review Checklist

Work Order: E141002
Project: Allied Paper
Analysis: Hg TCLP
CRL SOP Used: 245.1 & 245.2

Electronic Pathway(s):
R5CRL/VOL2IITRI-AIG/DConnet/Mercury/Hg E141002
File Name(s):
W.O. E141002 Batch EJ42801

Question #	Question	Analyst Response (YES/ NO/ NA)	Reviewer Response (Circle Response)
12	Were blank concentrations <= MDL?	YES	YES / NO / NA
13	Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	YES	YES / NO / NA
14	Were LCSs analyzed at the required frequency?	YES	YES / NO / NA
15	Were LCS %Rs within the laboratory QC limits?	YES	YES / NO / NA
16	Were the project/method specified analytes included in the MS?	YES	YES / NO / NA
17	Were MS analyzed at the appropriate frequency?	YES	YES / NO / NA
18	Were MS %Rs within the laboratory QC limits?	YES	YES / NO / NA
19	Were appropriate analytical duplicates analyzed for each matrix?	YES	YES / NO / NA
20	Were analytical duplicates analyzed at the appropriate frequency?	YES	YES / NO / NA
21	Were RPDs or relative standard deviations within the laboratory QC limits?	YES	YES / NO / NA
22	Are the RLs for each method analyte included in the laboratory data package?	YES	YES / NO / NA
23	Are RLs adjusted for dilutions?	NA	YES / NO / NA
24	Was all necessary troubleshooting (if applicable) performed for the reported data?	NA	YES / NO / NA
25	Were calibration correlation coefficient criteria met?	YES	YES / NO / NA

Deborah Connet 11-4-14

Data Review Checklist

Work Order: E141002
Analysis: Hg TCLP
Project: Allied Paper
CRL SOP Used: 245.1 & 245.2

Electronic Pathway(s):
R5CRL/VOL2IITRI-AIG/DConnet/Mercury/Hg E141002
File Name(s):
W.O. E141002 Batch EJ42801

Question #	Question	Analyst Response (YES/ NO/ NA)	Reviewer Response (Circle Response)
26	Was the number of standards recommended in the method used for all analytes?	YES	YES / NO / NA
27	Were all points generated between the lowest and highest standard used to calculate the curve?	YES	YES / NO / NA
28	Are calibration data available for all instruments used?	YES	YES / NO / NA
29	Has the calibration curve been verified using an appropriate second source standard?	YES	YES / NO / NA
30	Was the ICV/CCV analyzed at the method-required frequency?	YES	YES / NO / NA
31	Was the calibration curve verified for each analyte?	YES	YES / NO / NA
32	Was the absolute value of the analyte concentration in the ICB/CCB <= MDL?	YES	YES / NO / NA
33	Were the raw data (for example, chromatograms, spectral data) reviewed?	YES	YES / NO / NA
34	Were data associated with manual integrations flagged on the raw data?	NA	YES / NO / NA
35	Were percent recoveries for all QC within method QC limits?	YES	YES / NO / NA
36	Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	YES	YES / NO / NA
37	Is the MDL or RL study up-to-date for each reported analyte?	YES	YES / NO / NA
38	Is the MDL adjusted for dilutions?	NA	YES / NO / NA
39	Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	YES	YES / NO / NA

Deborah Connet 11-4-14

Data Review Checklist

Work Order: E141002
Analysis: Hg TCLP
Project: Allied Paper
CRL SOP Used: 245.1 & 245.2

Electronic Pathway(s):
R5CRL/VOL2IITRI-AIG/DConnet/Mercury/Hg E141002
File Name(s):
W.O. E141002 Batch EJ42801

Question #	Question	Analyst Response (YES/ NO/ NA)	Reviewer Response (Circle Response)
40	Are the procedures for compound/analyte identification documented?	YES	YES / NO / NA

Signature: Deborah Connet
Date: 11-4-14

11-4-14

Parameter: Mercury
Method: 245.1/7470A (AIG044D Rev. 1.0)
Date: November 4, 2014
Prepared by: Deborah Connet

TDF: 5-0001-1-044
TechLaw Job #: 03074.2.01.102.1A.059B.01.0044
Task Order #: R05-0-0001
Data Set(s): E141002

NARRATIVE

Two (2) soil samples from the Allied Paper Site were collected on October 17, 2014 and were received by ESAT on October 21, 2014. The samples were submitted to ESAT for analysis of TCLP RCRA mercury. The sample point identifications are on the first page of the LIMS report following this narrative.

Extraction fluid determinations indicated that soil samples E141002-01 and -02 required extraction fluid #1. The samples were extracted for TCLP by Method 1311 (CRL SOP GEN019) on October 22, 2014. These samples were filtered and preserved on October 23, 2014. The TCLP extracts were digested and analyzed for mercury by CRL SOP AIG044D Rev. 1.0, EPA Method 245.1/7470A, using a CPI ModBlock and a Nippon Instruments Corporation RA-3A Reducing Vaporization Mercury Analyzer on October 29, 2014 (LIMS digestion batch EJ42801). The TCLP extraction blank was added to the digestion batch as EJ42801-BLK2 (fluid #1). The TCLP extraction blank spike was added to the digestion batch as EJ42801-BS5 (fluid #1). All QC for this analytical run were within limits. Because reported QC values are less than 5 times the MDL for E141002-01/ EJ42801-DUP1, duplicate difference criteria are used for control purposes and were acceptable for those QC samples; the matrix duplicate is flagged "<5X" in LIMS. The sample result for EJ42801-MRL1 is greater than the MDL but less than the RL; the result for this sample is flagged "J" in LIMS.

QC reports which include analytical QC are provided as Excel spreadsheets.

Analytical data packages prepared by the EPA Region 5 Chicago Regional Laboratory (CRL) or the Superfund ESAT contractors working in our space are verified in accordance with the CRL Quality Management Plan or ESAT Quality Management Plan, respectively. CRL and ESAT data reports in the final analytical data package include the data qualifiers assigned through our data verification processes, as well as an explanation of the data qualifiers assigned by the scientists who performed the analyses as well as the chemist that conducted the data verification. A report narrative, which explains quality control outliers and other significant issues affecting data quality, is also provided. This information constitutes the Region 5 CRL and ESAT processes that are equivalent to the data validation report provided with Contract Laboratory Program (CLP) data packages.

Deborah Connet 11-4-14

TechLaw Inc ESAT Region 5
536 South Clark Street, Suite 734
Chicago, IL 60605
(312) 353-2964
(312) 353-5814 (Fax)
www.techlawinc.com

Superfund, US EPA Region 5	Project:	Allied Paper	
77 West Jackson Boulevard	Project Number:	[none]	**Reported:**
Chicago IL, 60604	Project Manager:	James D. Burden	Nov-04-14 14:31

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
15CA01-01	E141002-01	Soil	Oct-17-14 09:00	Oct-21-14 13:15
15CA01-02	E141002-02	Soil	Oct-17-14 09:05	Oct-21-14 13:15

Deborah Connet 11-4-14
Deborah Connet, Mid Chemist

TechLaw Inc ESAT Region 5
536 South Clark Street, Suite 734
Chicago, IL 60605
(312) 353-2964
(312) 353-5814 (Fax)
www.techlawinc.com

Superfund, US EPA Region 5 77 West Jackson Boulevard Chicago IL, 60604	Project: Allied Paper Project Number: [none] Project Manager: James D. Burden	Reported: Nov-04-14 14:31

Mercury by Cold Vapor AA, TCLP Extract
TechLaw - ESAT Contract

15CA01-01 (E141002-01) Soil Sampled: Oct-17-14 09:00 Received: Oct-21-14 13:15

Analyte	Result	Flags / Qualifiers	MDL	Limit	Units	Dilution	Batch	Prepared	Analyzed
Mercury	U		0.2	0.5	ug/L	1	EJ42801	Oct-29-14	Oct-29-14

15CA01-02 (E141002-02) Soil Sampled: Oct-17-14 09:05 Received: Oct-21-14 13:15

Analyte	Result	Flags / Qualifiers	MDL	Limit	Units	Dilution	Batch	Prepared	Analyzed
Mercury	U		0.2	0.5	ug/L	1	EJ42801	Oct-29-14	Oct-29-14

Deborah Connet 11-4-14
Deborah Connet, Mid Chemist

TechLaw Inc ESAT Region 5
536 South Clark Street, Suite 734
Chicago, IL 60605
(312) 353-2964
(312) 353-5814 (Fax)
www.techlawinc.com

Superfund, US EPA Region 5	Project: Allied Paper	
77 West Jackson Boulevard	Project Number: [none]	Reported:
Chicago IL, 60604	Project Manager: James D. Burden	Nov-04-14 14:31

Mercury by Cold Vapor AA, TCLP Extract - Quality Control
TechLaw - ESAT Contract

Batch EJ42801 - 245.2

Blank (EJ42801-BLK1) — Prepared & Analyzed: Oct-29-14

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Mercury	U		0.2	0.5	ug/L						

Blank (EJ42801-BLK2) — Prepared & Analyzed: Oct-29-14

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Mercury	U		0.2	0.5	ug/L						

LCS (EJ42801-BS1) — Prepared & Analyzed: Oct-29-14

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Mercury	4.1		0.2	0.5	ug/L	4.00		102	85-115		

LCS (EJ42801-BS5) — Prepared & Analyzed: Oct-29-14

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Mercury	4.0		0.2	0.5	ug/L	4.00		101	85-115		

Duplicate (EJ42801-DUP1) — Source: E141002-01 — Prepared & Analyzed: Oct-29-14

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Mercury	U	< 5X	0.2	0.5	ug/L		U				20

MRL Check (EJ42801-MRL1) — Prepared & Analyzed: Oct-29-14

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Mercury	0.5	J	0.2	0.5	ug/L	0.500		97.2	50-150		

Matrix Spike (EJ42801-MS1) — Source: E141002-01 — Prepared & Analyzed: Oct-29-14

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Mercury	4.1		0.2	0.5	ug/L	4.00	U	102	70-130		

Deborah Connet 11-4-14
Deborah Connet, Mid Chemist

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536 South Clark Street, Suite 734
Chicago, IL 60605
(312) 353-2964
(312) 353-5814 (Fax)
www.techlawinc.com

Superfund, US EPA Region 5	Project:	Allied Paper	
77 West Jackson Boulevard	Project Number:	[none]	**Reported:**
Chicago IL, 60604	Project Manager:	James D. Burden	Nov-04-14 14:31

Deborah Connet 11-4-14
Deborah Connet, Mid Chemist

TechLaw Inc ESAT Region 5
536 South Clark Street, Suite 734
Chicago, IL 60605
(312) 353-2964
(312) 353-5814 (Fax)
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Superfund, US EPA Region 5 77 West Jackson Boulevard Chicago IL, 60604	Project: Project Number: Project Manager:	Allied Paper [none] James D. Burden	**Reported:** Nov-04-14 14:31

Notes and Definitions

J	The identification of the analyte is acceptable; the reported value is an estimate.
< 5X	One or both concentration values for the duplicate analysis audit were less than 5 times the RL value AND the difference between the two values was less than the RL value. The duplicate audit is acceptable. No qualification made for this QC audit.
U	Not Detected
NR	Not Reported

Deborah Connet 11-4-14
Deborah Connet, Mid Chemist

Items for Project Manager Review

LabNumber	Analysis	Analyte	Exception
EJ42801-DUP1	Hg TCLP	Mercury	< 5X: One or both concentration values for the duplicate analysis audit were less than 5 times the RL value AND the difference between the two values was less than the RL value. The duplicate audit is acceptable. No
	Hg TCLP	(TCLP EXTRACT)	Result calculations based on MDL
			VERSION 6.12:2014
			This is a modified report

Deborah Conrad 11-4-14

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5 CHICAGO REGIONAL LABORATORY

536 SOUTH CLARK STREET

CHICAGO, ILLINOIS 60605

Date:

Subject: Review of Region 5 Data for **Allied Paper**

From: **Paul Little, Chemist, TechLaw Inc. / ESAT**
Contractor to Region 5 Central Regional Laboratory
Submitted to CRL on 11/12/14 Paul L

To:

Attached are the results for: **Allied Paper**

CRL data set number(s): **E141002**

Samples analyzed for: **TCLP ICP Metals**

Results are reported for sample designations: **E141002-01 thru -02**

_____ / / _____

ESAT Data Management Coordinator and Date Received

Date Transmitted: ____/____/

Please have the U.S. EPA Project Manager/Officer call the CRL Sample Coordinator at 3-0375 for any comments or questions.

Please sign and date this form below and return it with any comments to:

ESAT Region V
Techlaw
Patricia A. Joyner
ESAT Data Coordinator
536 South Clark – Suite 734
Chicago, Il 60605

_____ / /

Received by and Date

Comments:

Attached are the results for: **Allied Paper**

CRL data set number(s): **E141002**

Samples analyzed for: **TCLP ICP Metals**

Results are reported for sample designations: **E141002-01 thru -02**

TechLaw Inc ESAT Region 5
536 South Clark Street, Suite 734
Chicago, IL 60605
(312) 353-2964
(312) 353-5814 (Fax)
www.techlawinc.com

WORK ORDER

Printed: 11/3/2014 1:11:48PM

E141002

TechLaw - ESAT Contract

Client: Superfund, US EPA Region 5
Project: Allied Paper
Project Manager: James D. Burden
Project Number: [none]

Report To:
James D. Burden
Superfund, US EPA Region 5
77 West Jackson Boulevard
Chicago, IL 60604
Phone: (312) 353-2310
Fax: (312) 886-6171

Date Due: Nov-18-14 15:00 (27 day TAT)
Received By: Paul Little
Date Received: Oct-21-14 13:15
Logged In By: Paul Little
Date Logged In: Oct-22-14 09:49

Samples Received at:	0.6°C
Custody Seals	Yes
Containers Intact	Yes
COC/Labels Agree	Yes
Preservation Confirmed	Yes

Analysis	Due	TAT	Expires	Comments
E141002-01 15CA01-01 [Soil] Sampled Oct-17-14 09:00 (GMT-06:00) Central Time (US & Canada)				**AP-OU1-IDW-001-101714**
SVOA TCLP List	Nov-18-14 12:00	27	Oct-31-14 09:00	
Metals ICP TCLP RCRA	Nov-18-14 12:00	27	Apr-15-15 09:00	
TCLP Extraction	Oct-31-14 12:00	10	Nov-14-14 09:00	
Solids, Dry Weight	Oct-31-14 12:00	10	Oct-24-14 09:00	
PCB by ASE	Nov-18-14 12:00	27	Oct-31-14 09:00	
Hg TCLP	Nov-18-14 12:00	27	Nov-14-14 09:00	
E141002-02 15CA01-02 [Soil] Sampled Oct-17-14 09:05 (GMT-06:00) Central Time (US & Canada)				**AP-OU1-IDW-002-101714**
SVOA TCLP List	Nov-18-14 12:00	27	Oct-31-14 09:05	
Metals ICP TCLP RCRA	Nov-18-14 12:00	27	Apr-15-15 09:05	
TCLP Extraction	Oct-31-14 12:00	10	Nov-14-14 09:05	
Solids, Dry Weight	Oct-31-14 12:00	10	Oct-24-14 09:05	
PCB by ASE	Nov-18-14 12:00	27	Oct-31-14 09:05	
Hg TCLP	Nov-18-14 12:00	27	Nov-14-14 09:05	
E141002-03 15CA01-03 [Water] Sampled Oct-17-14 09:10 (GMT-06:00) Central Time (US & Canada)				**AP-OU1-IDW-003-101714**
PCB by SPE	Nov-18-14 12:00	27	Oct-24-14 09:10	

WORK ORDER

Printed: 11/3/2014 1:11:48PM

E141002

TechLaw - ESAT Contract

Client:	Superfund, US EPA Region 5	Project Manager:	James D. Burden
Project:	Allied Paper	Project Number:	[none]

Analysis	Due	TAT	Expires	Comments
E141002-04 15CA01-04 [Water] Sampled Oct-17-14 09:15 (GMT-06:00) Central Time (US & Canada)				**AP-OU1-IDW-004-101714**
PCB by SPE	Nov-18-14 12:00	27	Oct-24-14 09:15	

Reviewed By

11/4/14
Date

Method: 200.7 (ICP Metals)
Site: Allied Paper
Date: November 3, 2014
Prepared by: Paul Little

TDF: 5-0001-1-044
TechLaw Job #: 03074.2.01.102.1A.059B.01.0044
Task Order #: R05-0-0001
Data Set(s): E141002

NARRATIVE

Two (2) soil samples from the Allied Paper Site were collected on October 17, 2014 and were received by ESAT on October 21, 2014. The samples were submitted to ESAT for analysis of TCLP RCRA metals by ICP. The sample point identifications are on the first page of the LIMS report following this narrative.

Extraction fluid determinations indicated that soil samples E141002-01 and -02 required extraction fluid #1. The samples were extracted for TCLP by Method 1311 (CRL SOP GEN019) on October 22, 2014. These samples were filtered and preserved on October 23, 2014. The TCLP extracts were digested following standard CRL 200.2 hot block digestion protocols (CRL SOP METALS025) on October 23, 2014 (LIMS digestion batch EJ42402). The TCLP extraction blank was added to the digestion batch as EJ42402-BLK2 (fluid #1). The TCLP extraction blank spike was added to the digestion batch as EJ42402-BS2 (fluid #1). To reduce Na concentrations and interferences in the digests, all samples were digested at a 10X dilution. The samples were analyzed on October 28, 2014 according to CRL SOP METALS003 using the Thermo 6500 Duo. The data was evaluated using ESAT MDL values.

The following analytes will be addressed in this case narrative:

As, Ba, Cd, Cr, Pb, Ag. Se

Blank qualification: For elements where no samples are affected by blank detects (positive or negative), the blank levels are not listed. Sample results to 10 times the absolute blank value are qualified. Blank results bracketing sample results are used for qualification. Preparation blank results are used for qualifying all sample results within the appropriate preparation batch.

Duplicates:

EJ42402-DUP1 (E141002-01):	As1890, Cd2265, Cr2677, Pb2203	<5X
	Ag328, Se1960	<5X

<5X: Sample and/or duplicate <5X MDL; duplicate difference acceptable (<MDL). Duplicate flagged "<5X" in LIMS.

No problems were found for the blanks, blank spikes, matrix spike or serial dilution.

Sample element qualifications:

For Ba, the sample results for E141002-01 thru -02 are greater than the MDL but less than the CRQL; the Ba results for those samples are flagged "J" in LIMS.

All flagged results except those flagged <5X are considered estimated.

Paul L 11/4/14

Other comments

No samples were identified as field duplicates or field/equipment blanks.

Analytical data packages prepared by the EPA Region 5 Chicago Regional Laboratory (CRL) or the Superfund ESAT contractors are verified in accordance with the CRL Quality Management Plan or ESAT Quality Management Plan, respectively. CRL and ESAT data reports in the final analytical data package include the data qualifiers assigned through our data verification processes. This includes an explanation of the data qualifiers assigned by the scientists who performed the analyses, as well as, the chemist that conducted the data verification. This report narrative, which explains quality control outliers and other significant issues affecting data quality, is also provided. This information constitutes the Region 5 CRL and ESAT processes that are equivalent to the data validation report provided with Contract Laboratory Program (CLP) data packages.

D. [illegible] 1/4/14

TechLaw Inc ESAT Region 5
536 South Clark Street, Suite 734
Chicago, IL 60605
(312) 353-2964
(312) 353-5814 (Fax)
www.techlawinc.com

Superfund, US EPA Region 5	Project:	Allied Paper	
77 West Jackson Boulevard	Project Number:	[none]	**Reported:**
Chicago IL, 60604	Project Manager:	James D. Burden	Nov-04-14 14:36

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
15CA01-01	E141002-01	Soil	Oct-17-14 09:00	Oct-21-14 13:15
15CA01-02	E141002-02	Soil	Oct-17-14 09:05	Oct-21-14 13:15

Paul Little 11/5/14
Paul Little, Chemist

TechLaw Inc ESAT Region 5
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Chicago, IL 60605
(312) 353-2964
(312) 353-5814 (Fax)
www.techlawinc.com

Superfund, US EPA Region 5	Project:	Allied Paper	
77 West Jackson Boulevard	Project Number:	[none]	**Reported:**
Chicago IL, 60604	Project Manager:	James D. Burden	Nov-04-14 14:36

Metals by ICP, TCLP Extract
TechLaw - ESAT Contract

15CA01-01 (E141002-01) Soil Sampled: Oct-17-14 09:00 Received: Oct-21-14 13:15

Analyte	Result	Flags / Qualifiers	MDL	Limit	Units	Dilution	Batch	Prepared	Analyzed
Arsenic	U		50.0	200	ug/L	1	EJ42402	Oct-24-14	Oct-28-14
Barium	**174**	J	5.0	2000	"	"	"	"	"
Cadmium	U		5.0	50.0	"	"	"	"	"
Chromium	U		10.0	100	"	"	"	"	"
Lead	U		40.0	100	"	"	"	"	"
Selenium	U		200	350	"	"	"	"	"
Silver	U		10.0	100	"	"	"	"	"

15CA01-02 (E141002-02) Soil Sampled: Oct-17-14 09:05 Received: Oct-21-14 13:15

Analyte	Result	Flags / Qualifiers	MDL	Limit	Units	Dilution	Batch	Prepared	Analyzed
Arsenic	U		50.0	200	ug/L	1	EJ42402	Oct-24-14	Oct-28-14
Barium	**404**	J	5.0	2000	"	"	"	"	"
Cadmium	U		5.0	50.0	"	"	"	"	"
Chromium	U		10.0	100	"	"	"	"	"
Lead	U		40.0	100	"	"	"	"	"
Selenium	U		200	350	"	"	"	"	"
Silver	U		10.0	100	"	"	"	"	"

11/5/14
Paul Little, Chemist

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Chicago, IL 60605
(312) 353-2964
(312) 353-5814 (Fax)
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Superfund, US EPA Region 5	Project: Allied Paper	
77 West Jackson Boulevard	Project Number: [none]	**Reported:**
Chicago IL 60604	Project Manager: James D. Burden	Nov-04-14 14:36

Metals by ICP, TCLP Extract - Quality Control
TechLaw - ESAT Contract

Batch EJ42402 - Hot Block Digestion

Blank (EJ42402-BLK1) — **Prepared: Oct-24-14 Analyzed: Oct-28-14**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Arsenic	U		50.0	200	ug/L						
Barium	U		5.0	2000	"						
Cadmium	U		5.0	50.0	"						
Chromium	U		10.0	100	"						
Lead	U		40.0	100	"						
Selenium	U		200	350	"						
Silver	U		10.0	100	"						

Blank (EJ42402-BLK2) — **Prepared: Oct-24-14 Analyzed: Oct-28-14**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Arsenic	U		50.0	200	ug/L						
Barium	U		5.0	2000	"						
Cadmium	U		5.0	50.0	"						
Chromium	U		10.0	100	"						
Lead	U		40.0	100	"						
Selenium	U		200	350	"						
Silver	U		10.0	100	"						

LCS (EJ42402-BS1) — **Prepared: Oct-24-14 Analyzed: Oct-28-14**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Arsenic	**2164**		50.0	200	ug/L	2000		108	85-115		
Barium	**2082**		5.0	2000	"	2000		104	85-115		
Cadmium	**508.9**		5.0	50.0	"	500		102	85-115		
Chromium	**962.1**		10.0	100	"	1000		96.2	85-115		
Lead	**5216**		40.0	100	"	5000		104	85-115		
Selenium	**5201**		200	350	"	5000		104	85-115		
Silver	**233.8**		10.0	100	"	250		93.5	85-115		

LCS (EJ42402-BS2) — **Prepared: Oct-24-14 Analyzed: Oct-28-14**

11/5/14
Paul Little, Chemist

TechLaw Inc ESAT Region 5
536 South Clark Street, Suite 734
Chicago, IL 60605
(312) 353-2964
(312) 353-5814 (Fax)
www.techlawinc.com

Superfund, US EPA Region 5	Project: Allied Paper	
77 West Jackson Boulevard	Project Number: [none]	**Reported:**
Chicago IL, 60604	Project Manager: James D. Burden	Nov-04-14 14:36

Metals by ICP, TCLP Extract - Quality Control
TechLaw - ESAT Contract

Batch EJ42402 - Hot Block Digestion

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Arsenic	**5341**		50.0	200	ug/L	5000		107	85-115		
Barium	**5152**		5.0	2000	"	5000		103	85-115		
Cadmium	**1040**		5.0	50.0	"	1000		104	85-115		
Chromium	**4824**		10.0	100	"	5000		96.5	85-115		
Lead	**5187**		40.0	100	"	5000		104	85-115		
Selenium	**1049**		200	350	"	1000		105	85-115		
Silver	**101.4**		10.0	100	"	100		101	85-115		

Duplicate (EJ42402-DUP1) **Source: E141002-01** **Prepared: Oct-24-14 Analyzed: Oct-28-14**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Arsenic	**U**	< 5X	50.0	200	ug/L		U				20
Barium	**172.6**		5.0	2000	"		173.9			0.750	20
Cadmium	**U**	< 5X	5.0	50.0	"		U				20
Chromium	**U**	< 5X	10.0	100	"		U				20
Lead	**U**	< 5X	40.0	100	"		U				20
Selenium	**U**	< 5X	200	350	"		U				20
Silver	**U**	< 5X	10.0	100	"		U				20

Matrix Spike (EJ42402-MS1) **Source: E141002-01** **Prepared: Oct-24-14 Analyzed: Oct-28-14**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Arsenic	**5427**		50.0	200	ug/L	5000	U	109	75-125		
Barium	**5353**		5.0	2000	"	5000	173.9	104	75-125		
Cadmium	**1029**		5.0	50.0	"	1000	U	103	75-125		
Chromium	**4765**		10.0	100	"	5000	U	95.3	75-125		
Lead	**5185**		40.0	100	"	5000	U	104	75-125		
Selenium	**1032**		200	350	"	1000	U	103	75-125		
Silver	**102.5**		10.0	100	"	100	U	102	75-125		

Paul Little, Chemist

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Chicago, IL 60605
(312) 353-2964
(312) 353-5814 (Fax)
www.techlawinc.com

Superfund. US EPA Region 5	Project:	Allied Paper	
77 West Jackson Boulevard	Project Number:	[none]	**Reported:**
Chicago IL. 60604	Project Manager:	James D. Burden	Nov-04-14 14:36

Notes and Definitions

J	The identification of the analyte is acceptable; the reported value is an estimate.
< 5X	One or both concentration values for the duplicate analysis audit were less than 5 times the RL value AND the difference between the two values was less than the RL value. The duplicate audit is acceptable. No qualification made for this QC audit.
U	Not Detected
NR	Not Reported

11/5/14
Paul Little, Chemist

Items for Project Manager Review

LabNumber	Analysis	Analyte	Exception
EJ42402-DUP1	Metals ICP TCLP RCRA	Silver	< 5X: One or both concentration values for the duplicate analysis audit were less than 5 times the RL value AND the difference between the two values was less than the RL value. The duplicate audit is acceptable. No
EJ42402-DUP1	Metals ICP TCLP RCRA	Selenium	< 5X: One or both concentration values for the duplicate analysis audit were less than 5 times the RL value AND the difference between the two values was less than the RL value. The duplicate audit is acceptable. No
EJ42402-DUP1	Metals ICP TCLP RCRA	Lead	< 5X: One or both concentration values for the duplicate analysis audit were less than 5 times the RL value AND the difference between the two values was less than the RL value. The duplicate audit is acceptable. No
EJ42402-DUP1	Metals ICP TCLP RCRA	Chromium	< 5X: One or both concentration values for the duplicate analysis audit were less than 5 times the RL value AND the difference between the two values was less than the RL value. The duplicate audit is acceptable. No
EJ42402-DUP1	Metals ICP TCLP RCRA	Cadmium	< 5X: One or both concentration values for the duplicate analysis audit were less than 5 times the RL value AND the difference between the two values was less than the RL value. The duplicate audit is acceptable. No
EJ42402-DUP1	Metals ICP TCLP RCRA	Arsenic	< 5X: One or both concentration values for the duplicate analysis audit were less than 5 times the RL value AND the difference between the two values was less than the RL value. The duplicate audit is acceptable. No
E141002-02	Metals ICP TCLP RCRA		Soil batched as TCLP EXTRACT
E141002-01	Metals ICP TCLP RCRA		Soil batched as TCLP EXTRACT
	Metals ICP TCLP RCRA	(TCLP EXTRACT)	Result calculations based on MDL.
			VERSION 6.12:2014
			Default Report (not modified)

TechLaw
Quality & Integrity

Date: 11/05/14

Subject: Review of Region 5 Data for **Allied Paper**

From: Michele Traina, **Chemist, TechLaw ESAT** MT
Contractor to Region 5 Central Regional Laboratory
Submitted to CRL on 11/12/14

To:

Attached are the results for: **Allied Paper**

CRL data set number(s): **E141002**

Samples analyzed for: **PCB by SPE**

Results are reported for sample designations: **E141002-03, -04**

_____ / / _____

Data Management Coordinator and Date Received

Date Transmitted: ____/____/

Please have the U.S. EPA Project Manager/Officer call the CRL Sample Coordinator at 3-0375 for any comments or questions.

Please sign and date this form below and return it with any comments to:

ESAT Region V
Techlaw
Patricia A. Joyner
ESAT Data Coordinator
536 South Clark – Suite 734
Chicago, Il 60605

_____ / /

Received by and Date

Comments:

Attached are the results for: Allied Paper

CRL data set number(s): E141002

Samples analyzed for: PCB by SPE

Results are reported for sample designations: E141002-03, -04

Rev. 9/9/14

TechLaw Inc ESAT Region 5
536 South Clark Street, Suite 734
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WORK ORDER

Printed: 10/24/2014 11:25:31AM

E141002

TechLaw - ESAT Contract

Client: Superfund, US EPA Region 5
Project: Allied Paper
Project Manager: James D. Burden
Project Number: |none|

Report To:
James D. Burden
Superfund, US EPA Region 5
77 West Jackson Boulevard
Chicago, IL 60604
Phone: (312) 353-2310
Fax: (312) 886-6171

Date Due: Nov-18-14 15:00 (27 day TAT)
Received By: Paul Little
Date Received: Oct-21-14 13:15
Logged In By: Paul Little
Date Logged In: Oct-22-14 09:49

Samples Received at:	0.6°C
Custody Seals	Yes
Containers Intact	Yes
COC/Labels Agree	Yes
Preservation Confirmed	Yes

Analysis	Due	TAT	Expires	Comments
E141002-01 15CA01-01 [Soil] Sampled Oct-17-14 09:00 (GMT-06:00) Central Time (US & Canada)				**AP-OU1-IDW-001-101714**
SVOA TCLP List	Nov-18-14 12:00	27	Oct-31-14 09:00	
Metals ICP TCLP RCRA	Nov-18-14 12:00	27	Apr-15-15 09:00	
TCLP Extraction	Oct-31-14 12:00	10	Nov-14-14 09:00	
Solids, Dry Weight	Oct-31-14 12:00	10	Oct-24-14 09:00	
PCB by ASE	Nov-18-14 12:00	27	Oct-31-14 09:00	
Hg TCLP	Nov-18-14 12:00	27	Nov-14-14 09:00	
E141002-02 15CA01-02 [Soil] Sampled Oct-17-14 09:05 (GMT-06:00) Central Time (US & Canada)				**AP-OU1-IDW-002-101714**
SVOA TCLP List	Nov-18-14 12:00	27	Oct-31-14 09:05	
Metals ICP TCLP RCRA	Nov-18-14 12:00	27	Apr-15-15 09:05	
TCLP Extraction	Oct-31-14 12:00	10	Nov-14-14 09:05	
Solids, Dry Weight	Oct-31-14 12:00	10	Oct-24-14 09:05	
PCB by ASE	Nov-18-14 12:00	27	Oct-31-14 09:05	
Hg TCLP	Nov-18-14 12:00	27	Nov-14-14 09:05	
E141002-03 15CA01-03 [Water] Sampled Oct-17-14 09:10 (GMT-06:00) Central Time (US & Canada)				**AP-OU1-IDW-003-101714**
PCB by SPE	Nov-18-14 12:00	27	Oct-24-14 09:10	

WORK ORDER

Printed: 10/24/2014 11:25:31AM

E141002

TechLaw - ESAT Contract

Client: Superfund, US EPA Region 5
Project: Allied Paper

Project Manager: James D. Burden
Project Number: [none]

Analysis	Due	TAT	Expires	Comments
E141002-04 15CA01-04 [Water] Sampled Oct-17-14 09:15 (GMT-06:00) Central Time (US & Canada)				**AP-OU1-IDW-004-101714**
PCB by SPE	Nov-18-14 12:00	27	Oct-24-14 09:15	

Reviewed By

Date

Case Inventory

Method: GC002 rev 5

Site Name: Allied Paper

Date Generated: 11\04\2014

Author: Michele Traina

Job#: 03074.2.01.202.1A.059B.01.0042

TDF#: 5-0001-2-042 C

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Case Narrative & LIMS Analytical Report

CASE NARRATIVE

DATE: 11/04/2014
PROJECT NAME: PCB SPE
DATA SET NUMBER: E141002
ANALYST(s): Michele Traina, ESAT for MT

I. CASE DESCRIPTION:

ESAT was tasked with the extraction and analysis of two (2) water samples (E141002-03, -04) for PCB by SPE. The samples were SPE extracted on October 23, 2014 according to CRL SOP GC011 rev 6.0. All samples underwent acid cleanup according to CRL SOP GC016 rev 3.0. Samples were analyzed on October 27, 2014 according to CRL SOP GC002 rev 5. All analyses were within holding time criteria. The data was reviewed according to CRL SOP GEN016 rev 6.0.

II. INSTRUMENT QUALITY CONTROLS:

1. Initial Calibration

An acceptable ICAL is required before analyses of any target analytes. An aroclor-1660 ICAL was analyzed on 10/27/14. All reported aroclors are acceptable, therefore no qualifications are necessary. Column number 2 was designated as the primary column, and column 1 was designated as the confirmation column.

Decachlorobiphenyl (20.95%) is outside the limit. No qualifications are necessary as this is on the confirmation column.

2. CCV

Decachlorobiphenyl (-16% Dev) is outside the limit on CCV 1.0 ug/ml run October 27, 2014 @ 17:51. No qualifications are necessary as this is on the confirmation column.

III. SAMPLE RESULTS:

Results on the first column are used for aroclor pattern confirmation only, therefore no qualifications are applied to the samples. Quality control measures for the primary column (reported values) are discussed in this narrative.

The following Lims IDs were created for reporting purposes only.

Acid Clean-up QC analyzed on 10/27/14:
Acid Clean-up Blank – EJ42405-BLK2

Acid Clean-up Spike – EJ42405-BS4

Clean-up standards and blanks were analyzed, evaluated and flagged according to the most recent update of SOP GC002 r5_PCB_08.25.14. Recovery limits in SOP GEN16 r6.0_GC data review_06.11.14 differ from those in the analytical SOP.

Quality control measures not specifically discussed in this narrative met all quality criteria stated in the SOP.

Analytical data packages prepared by the EPA Region 5 Chicago Regional Laboratory (CRL) or the Superfund ESAT contractors working in our space are verified in accordance with the CRL Quality Management Plan or ESAT Quality Management Plan, respectively. CRL and ESAT data reports in the final analytical data package include the data qualifiers assigned through our data verification processes, as well as an explanation of the data qualifiers assigned by the scientists who performed the analyses as well as the chemist that conducted the data verification. This report narrative, which explains quality control outliers and other significant issues affecting data quality, is provided. This information constitutes the Region 5 CRL and ESAT processes that are equivalent to the data validation report provided with Contract Laboratory Program (CLP) data packages.

WATER	Column#2	Response	8RE102712_PCB.M	
	ICAL analyte1	2.208E+08		
	ICAL analyte2	4.861E+08		
GC#8	ICAL analyte3	9.330E+08		
	ICAL analyte4	3.678E+08		
	ICAL analyte5	2.300E+08		
	ICAL analyte6	2.204E+08		
	ICAL analyte7	2.913E+08		
	ICAL analyte8	2.148E+08		
	Total Response	2.964E+09		
	Avg Response (RF)	3.705E+08		
EJ42405-BS1	**Column#2**	**Response**	**Concentration**	**ug/mL**
	Sample analyte1	1.94E+08	8.777E-01	0.878
	Sample analyte2	4.16E+08	8.550E-01	0.855
	Sample analyte3	8.362E+08	8.962E-01	0.896
	Sample analyte4	3.204E+08	8.711E-01	0.871
	Sample analyte5	1.987E+08	8.639E-01	0.864
	Sample analyte6	2.182E+08	9.900E-01	0.990
	Sample analyte7	2.530E+08	8.685E-01	0.869
	Sample analyte8	1.878E+08	8.743E-01	0.874
	Total Response	2.624E+09	Total Conc ug/mL	7.097
	Avg Response (AR)	3.508E+08	Avg Conc ug/mL (AR / RF)	0.887
			Avg Conc ug/mL (C)	0.887
Df = 1			Sample Conc ug/L	
FV = 10mL				
IV = 1000mL			**LIMS Sample Conc ug/L**	**8.87**

C = (AR / RF)

C * (FV / IV) * Df

C = Sample Concentration (ug/mL)
AR = Average Response of Analyte
RF = ICAL Response Factor
FV = Final Volume of Sample (mL)
IV = Initial Volume of Sample (mL)
Df = Dilution Factor

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Chicago, IL 60605
(312) 353-2964
(312) 353-5814 (Fax)
www.techlawinc.com

Superfund, US EPA Region 5	Project: Allied Paper	
77 West Jackson Boulevard	Project Number: [none]	**Reported:**
Chicago IL, 60604	Project Manager: James D. Burden	Nov-06-14 12:34

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
15CA01-03	E141002-03	Water	Oct-17-14 09:10	Oct-21-14 13:15
15CA01-04	E141002-04	Water	Oct-17-14 09:15	Oct-21-14 13:15

for MT

Christina Rice, Chemist

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Chicago, IL 60605
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Superfund, US EPA Region 5	Project: Allied Paper	
77 West Jackson Boulevard	Project Number: [none]	**Reported:**
Chicago IL, 60604	Project Manager: James D. Burden	Nov-06-14 12:34

PCB/Pesticide by GC/ECD
TechLaw - ESAT Contract

15CA01-03 (E141002-03) Water Sampled: Oct-17-14 09:10 Received: Oct-21-14 13:15

Analyte	Result	Flags / Qualifiers	MDL	Limit	Units	Dilution	Batch	Prepared	Analyzed
Surrogate: Decachlorobiphenyl	0.154			*80.0 %*		*11.1-160*	*EJ42405*	*Oct-23-14*	*Oct-27-14*
Surrogate: Tetrachloro-meta-xylene	0.183			*95.0 %*		*21.9-122*	"	"	"
PCB-1016	U			0.962	"	"	"	"	"
PCB-1221	U			0.962	"	"	"	"	"
PCB-1232	U			0.962	"	"	"	"	"
PCB-1242	U			0.962	"	"	"	"	"
PCB-1248	U			0.962	"	"	"	"	"
PCB-1254	U			0.962	"	"	"	"	"
PCB-1260	U			0.962	"	"	"	"	"
PCB-1262	U			0.962	"	"	"	"	"
PCB-1268	U			0.962	"	"	"	"	"

15CA01-04 (E141002-04) Water Sampled: Oct-17-14 09:15 Received: Oct-21-14 13:15

Analyte	Result	Flags / Qualifiers	MDL	Limit	Units	Dilution	Batch	Prepared	Analyzed
Surrogate: Decachlorobiphenyl	0.167			*85.0 %*		*11.1-160*	*EJ42405*	*Oct-23-14*	*Oct-27-14*
Surrogate: Tetrachloro-meta-xylene	0.186			*95.0 %*		*21.9-122*	"	"	*Oct-27-14*
PCB-1016	U			0.980	"	"	"	"	Oct-27-14
PCB-1221	U			0.980	"	"	"	"	"
PCB-1232	U			0.980	"	"	"	"	"
PCB-1242	U			0.980	"	"	"	"	"
PCB-1248	U			0.980	"	"	"	"	"
PCB-1254	U			0.980	"	"	"	"	"
PCB-1260	U			0.980	"	"	"	"	"
PCB-1262	U			0.980	"	"	"	"	"
PCB-1268	U			0.980	"	"	"	"	"

for MT

Christina Rice, Chemist

TechLaw Inc ESAT Region 5
536 South Clark Street, Suite 734
Chicago, IL 60605
(312) 353-2964
(312) 353-5814 (Fax)
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Superfund. US EPA Region 5 77 West Jackson Boulevard Chicago IL, 60604	Project: Allied Paper Project Number: [none] Project Manager: James D. Burden	**Reported:** Nov-06-14 12:34

PCB/Pesticide by GC/ECD - Quality Control
TechLaw - ESAT Contract

Batch EJ42405 - EPA 3535

Blank (EJ42405-BLK1) — **Prepared: Oct-23-14 Analyzed: Oct-27-14**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Surrogate: Tetrachloro-meta-xylene	*0.120*				*ug/L*	*0.200*		*60.0*	*21.9-122*		
Surrogate: Decachlorobiphenyl	*0.110*				*"*	*0.200*		*55.0*	*11.1-160*		
PCB-1016	U			1.00	"						
PCB-1221	U			1.00	"						
PCB-1232	U			1.00	"						
PCB-1242	U			1.00	"						
PCB-1248	U			1.00	"						
PCB-1254	U			1.00	"						
PCB-1260	U			1.00	"						
PCB-1262	U			1.00	"						
PCB-1268	U			1.00	"						

Blank (EJ42405-BLK2) — **Prepared: Oct-24-14 Analyzed: Oct-27-14**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Surrogate: Tetrachloro-meta-xylene	*0.220*				*ug/L*	*0.200*		*110*	*21.9-122*		
Surrogate: Decachlorobiphenyl	*0.200*				*"*	*0.200*		*100*	*11.1-160*		
PCB-1016	U			1.00	"						
PCB-1221	U			1.00	"						
PCB-1232	U			1.00	"						
PCB-1242	U			1.00	"						
PCB-1248	U			1.00	"						
PCB-1254	U			1.00	"						
PCB-1260	U			1.00	"						
PCB-1262	U			1.00	"						
PCB-1268	U			1.00	"						

LCS (EJ42405-BS1) — **Prepared: Oct-23-14 Analyzed: Oct-27-14**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Surrogate: Tetrachloro-meta-xylene	*0.180*				*ug/L*	*0.200*		*90.0*	*21.9-122*		
Surrogate: Decachlorobiphenyl	*0.170*				*"*	*0.200*		*85.0*	*11.1-160*		

for MT

Christina Rice, Chemist

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(312) 353-2964
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Superfund, US EPA Region 5	Project: Allied Paper	
77 West Jackson Boulevard	Project Number: [none]	Reported:
Chicago IL, 60604	Project Manager: James D. Burden	Nov-06-14 12:34

PCB/Pesticide by GC/ECD - Quality Control
TechLaw - ESAT Contract

Batch EJ42405 - EPA 3535

LCS (EJ42405-BS1) — **Prepared: Oct-23-14 Analyzed: Oct-27-14**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
PCB-1016	**8.87**			1.00	ug/L	10.0		88.7	31.9-127		
PCB-1260	**8.85**			1.00	"	10.0		88.5	30.8-140		

LCS (EJ42405-BS2) — **Prepared: Oct-23-14 Analyzed: Oct-27-14**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Surrogate: Tetrachloro-meta-xylene	*0.190*				*ug/L*	*0.200*		*95.0*	*21.9-122*		
Surrogate: Decachlorobiphenyl	*0.180*				*"*	*0.200*		*90.0*	*11.1-160*		
PCB-1016	**9.07**			1.00	"	10.0		90.7	31.9-127		
PCB-1260	**9.30**			1.00	"	10.0		93.0	30.8-140		

LCS (EJ42405-BS3) — **Prepared: Oct-23-14 Analyzed: Oct-27-14**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Surrogate: Tetrachloro-meta-xylene	*0.180*				*ug/L*	*0.200*		*90.0*	*21.9-122*		
Surrogate: Decachlorobiphenyl	*0.170*				*"*	*0.200*		*85.0*	*11.1-160*		
PCB-1016	**8.48**			1.00	"	10.0		84.8	31.9-127		
PCB-1260	**8.80**			1.00	"	10.0		88.0	30.8-140		

LCS (EJ42405-BS4) — **Prepared: Oct-24-14 Analyzed: Oct-27-14**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Surrogate: Tetrachloro-meta-xylene	*0.260*				*ug/L*	*0.200*		*130*	*21.9-122*		
Surrogate: Decachlorobiphenyl	*0.240*				*"*	*0.200*		*120*	*11.1-160*		
PCB-1016	**1280**				"	1000		128	31.9-127		
PCB-1260	**1300**				"	1000		130	30.8-140		

LCS Dup (EJ42405-BSD1) — **Prepared: Oct-23-14 Analyzed: Oct-27-14**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Surrogate: Tetrachloro-meta-xylene	*0.160*				*ug/L*	*0.200*		*80.0*	*21.9-122*		

for MT

Christina Rice, Chemist

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Chicago, IL 60605
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Superfund, US EPA Region 5	Project: Allied Paper	
77 West Jackson Boulevard	Project Number: [none]	**Reported:**
Chicago IL, 60604	Project Manager: James D. Burden	Nov-06-14 12:34

PCB/Pesticide by GC/ECD - Quality Control
TechLaw - ESAT Contract

Batch EJ42405 - EPA 3535

LCS Dup (EJ42405-BSD1) — **Prepared: Oct-23-14 Analyzed: Oct-27-14**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Surrogate: Decachlorobiphenyl	*0.180*				*ug/L*	*0.200*		*90.0*	*11.1-160*		
PCB-1016	**8.50**			1.00	"	10.0		85.0	31.9-127	4.26	30
PCB-1260	**9.15**			1.00	"	10.0		91.5	30.8-140	3.33	30

MRL Check (EJ42405-MRL1) — **Prepared: Oct-24-14 Analyzed: Oct-27-14**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Surrogate: Tetrachloro-meta-xylene	*0.180*				*ug/L*	*0.200*		*90.0*	*21.9-122*		
Surrogate: Decachlorobiphenyl	*0.160*				*"*	*0.200*		*80.0*	*11.1-160*		
PCB-1016	**1.25**			1.00	"	1.00		125	0-200		
PCB-1221	**U**			1.00	"				0-200		
PCB-1232	**U**			1.00	"				0-200		
PCB-1242	**U**			1.00	"				0-200		
PCB-1248	**U**			1.00	"				0-200		
PCB-1254	**U**			1.00	"				0-200		
PCB-1260	**1.05**			1.00	"	1.00		105	0-200		
PCB-1262	**U**			1.00	"				0-200		
PCB-1268	**U**			1.00	"				0-200		

for MT

Christina Rice, Chemist

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Chicago, IL 60605
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Superfund. US EPA Region 5	Project: Allied Paper	
77 West Jackson Boulevard	Project Number: [none]	**Reported:**
Chicago IL, 60604	Project Manager: James D. Burden	Nov-06-14 12:34

Notes and Definitions

U	Not Detected
NR	Not Reported

for MT

Christina Rice, Chemist

Items for Project Manager Review

LabNumber	Analysis	Analyte	Exception
EJ42405-BS4	PCB by SPE	Tetrachloro-meta-xylene	Exceeds upper control limit
EJ42405-BS4	PCB by SPE	PCB-1016	Exceeds upper control limit
			VERSION 6.12:2014
			Default Report (not modified)

Sample, Log and Extraction Comments

E141002-03
PCB by SPE

AP-OU1-IDW-003-101714

E141002-04
PCB by SPE

AP-OU1-IDW-004-101714

TechLaw
Quality & Integrity

Date: 11/05/14

Subject: Review of Region 5 Data for **Allied Paper**

From: Michele Traina, **Chemist, TechLaw ESAT** MT
Contractor to Region 5 Central Regional Laboratory
Submitted to CRL on 11/12/14

To:

Attached are the results for: **Allied Paper**

CRL data set number(s): **E141002**

Samples analyzed for: **PCB by ASE**

Results are reported for sample designations: **E141002-01, -02**

_____ / / _____

Data Management Coordinator and Date Received

Date Transmitted: ____/____/

Please have the U.S. EPA Project Manager/Officer call the CRL Sample Coordinator at 3-0375 for any comments or questions.

Please sign and date this form below and return it with any comments to:

ESAT Region V
Techlaw
Patricia A. Joyner
ESAT Data Coordinator
536 South Clark – Suite 734
Chicago, Il 60605

_____ / / _____

Received by and Date

Comments:

Attached are the results for: Allied Paper

CRL data set number(s): E141002

Samples analyzed for: PCB by ASE

Results are reported for sample designations: E141002-01, -02

Rev. 9/9/14

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WORK ORDER

Printed: 10/24/2014 11:25:25AM

E141002

TechLaw - ESAT Contract

Client: Superfund, US EPA Region 5
Project: Allied Paper
Project Manager: James D. Burden
Project Number: [none]

Report To:
James D. Burden
Superfund, US EPA Region 5
77 West Jackson Boulevard
Chicago, IL 60604
Phone: (312) 353-2310
Fax: (312) 886-6171

Date Due: Nov-18-14 15:00 (27 day TAT)
Received By: Paul Little
Date Received: Oct-21-14 13:15
Logged In By: Paul Little
Date Logged In: Oct-22-14 09:49

Samples Received at:	0.6°C
Custody Seals	Yes
Containers Intact	Yes
COC/Labels Agree	Yes
Preservation Confirmed	Yes

Analysis	Due	TAT	Expires	Comments
E141002-01 15CA01-01 [Soil] Sampled Oct-17-14 09:00 (GMT-06:00) Central Time (US & Canada)				**AP-OU1-IDW-001-101714**
SVOA TCLP List	Nov-18-14 12:00	27	Oct-31-14 09:00	
Metals ICP TCLP RCRA	Nov-18-14 12:00	27	Apr-15-15 09:00	
TCLP Extraction	Oct-31-14 12:00	10	Nov-14-14 09:00	
Solids, Dry Weight	Oct-31-14 12:00	10	Oct-24-14 09:00	
PCB by ASE	Nov-18-14 12:00	27	Oct-31-14 09:00	
Hg TCLP	Nov-18-14 12:00	27	Nov-14-14 09:00	
E141002-02 15CA01-02 [Soil] Sampled Oct-17-14 09:05 (GMT-06:00) Central Time (US & Canada)				**AP-OU1-IDW-002-101714**
SVOA TCLP List	Nov-18-14 12:00	27	Oct-31-14 09:05	
Metals ICP TCLP RCRA	Nov-18-14 12:00	27	Apr-15-15 09:05	
TCLP Extraction	Oct-31-14 12:00	10	Nov-14-14 09:05	
Solids, Dry Weight	Oct-31-14 12:00	10	Oct-24-14 09:05	
PCB by ASE	Nov-18-14 12:00	27	Oct-31-14 09:05	
Hg TCLP	Nov-18-14 12:00	27	Nov-14-14 09:05	
E141002-03 15CA01-03 [Water] Sampled Oct-17-14 09:10 (GMT-06:00) Central Time (US & Canada)				**AP-OU1-IDW-003-101714**
PCB by SPE	Nov-18-14 12:00	27	Oct-24-14 09:10	

WORK ORDER

Printed: 10/24/2014 11:25:25AM

E141002

TechLaw - ESAT Contract

Client:	**Superfund, US EPA Region 5**	**Project Manager:**	**James D. Burden**
Project:	**Allied Paper**	**Project Number:**	**[none]**

Analysis	Due	TAT	Expires	Comments
E141002-04 15CA01-04 [Water] Sampled Oct-17-14 09:15 (GMT-06:00) Central Time (US & Canada)				**AP-OU1-IDW-004-101714**
PCB by SPE	Nov-18-14 12:00	27	Oct-24-14 09:15	

Reviewed By

Date 11/3/14

Case Inventory

Method: GC002 rev 5

Site Name: Allied Paper

Date Generated: 11\04\2014

Author: Michele Traina

Job#: 03074.2.01.202.1A.059B.01.0042

TDF#: 5-0001-2-042C

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Case Narrative & LIMS Analytical Report

CASE NARRATIVE

DATE: 11/04/2014
PROJECT NAME: PCB ASE
DATA SET NUMBER: E141002
ANALYST(s): Michele Traina, ESAT cw for MT

I. CASE DESCRIPTION:

ESAT was tasked with the extraction and analysis of two (2) soil samples (E141002-01, -02) for PCB by ASE. The samples were ASE extracted on October 23, 2014 according to CRL SOP GC013 rev 3.0. All samples underwent acid cleanup according to CRL SOP GC016 rev 3.0. Samples were analyzed on October 27 and 28, 2014 according to CRL SOP GC002 rev 5. All analyses were within holding time criteria. The data was reviewed according to CRL SOP GEN016 rev 6.0.

II. INSTRUMENT QUALITY CONTROLS:

1. Initial Calibration

An acceptable ICAL is required before analyses of any target analytes. An aroclor-1660 ICAL was analyzed on 10/27/14. An aroclor-1242 ICAL was analyzed on 10/28/14. All reported aroclors are acceptable, therefore no qualifications are necessary. Column number 2 was designated as the primary column, and column 1 was designated as the confirmation column.

Decachlorobiphenyl (20.95%) is outside the limit. No qualifications are necessary as this is on the confirmation column.

2. CCV

Decachlorobiphenyl (-16% Dev) is outside the limit on CCV 1.0 ug/ml run October 27, 2014 @ 17:51. No qualifications are necessary as this is on the confirmation column.

III. SAMPLE RESULTS:

Results on the first column are used for aroclor pattern confirmation only, therefore no qualifications are applied to the samples. Quality control measures for the primary column (reported values) are discussed in this narrative.

The following Lims IDs were created for reporting purposes only.

Acid Clean-up QC analyzed on 10/27/14:
Acid Clean-up Blank – EJ42404-BLK2

Acid Clean-up Spike – EJ42404-BS4

Quality control measures not specifically discussed in this narrative met all quality criteria stated in the SOP.

Analytical data packages prepared by the EPA Region 5 Chicago Regional Laboratory (CRL) or the Superfund ESAT contractors working in our space are verified in accordance with the CRL Quality Management Plan or ESAT Quality Management Plan, respectively. CRL and ESAT data reports in the final analytical data package include the data qualifiers assigned through our data verification processes, as well as an explanation of the data qualifiers assigned by the scientists who performed the analyses as well as the chemist that conducted the data verification. This report narrative, which explains quality control outliers and other significant issues affecting data quality, is provided. This information constitutes the Region 5 CRL and ESAT processes that are equivalent to the data validation report provided with Contract Laboratory Program (CLP) data packages.

Manual Calculation Aroclor-1016

SOIL	Column#2	Response	8RE102714_PCB.M	
	ICAL analyte1	2.208E+08		
	ICAL analyte2	4.861E+08		
GC#8	ICAL analyte3	9.330E+08		
	ICAL analyte4	3.678E+08		
	ICAL analyte5	2.300E+08		
	ICAL analyte6	2.204E+08		
	ICAL analyte7	2.913E+08		
	ICAL analyte8	2.148E+08		
	Total Response	2.964E+09		
	Avg Response (RF)	3.705E+08		
EJ42404-BS1	**Column#2**	**Response**	**Concentration**	**ug/mL**
	Sample analyte1	1.750E+08	7.926E-01	0.793
	Sample analyte2	3.793E+08	7.803E-01	0.780
	Sample analyte3	7.524E+08	8.064E-01	0.806
	Sample analyte4	2.804E+08	7.624E-01	0.762
	Sample analyte5	1.793E+08	7.796E-01	0.780
	Sample analyte6	1.777E+08	8.063E-01	0.806
	Sample analyte7	2.317E+08	7.954E-01	0.795
	Sample analyte8	1.722E+08	8.017E-01	0.802
	Total Response	2.348E+09	Total Conc ug/mL	6.325
	Avg Response (AR)	2.935E+08	Avg Conc ug/mL (AR / RF)	0.791
			Avg Conc ug/mL (C)	0.7906
FV = 10mL				
Df = 1			Sample Conc mg/Kg	[redacted]
D = 1			Sample Conc ug/Kg	749.356
W = 10.55g			**LIMS Sample Conc ug/Kg**	**750**

C = (AR / RF)

[redacted]

C = Sample Concentration (ug/mL)
AR = Average Response of Analyte
RF = ICAL Response Factor
D = % Dry Solids / 100
FV = Final Volume of Sample (mL)
W = Sample Weight (g)
Df = Dilution Factor

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536 South Clark Street, Suite 734
Chicago, IL 60605
(312) 353-2964
(312) 353-5814 (Fax)
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Superfund, US EPA Region 5	Project:	Allied Paper	
77 West Jackson Boulevard	Project Number:	[none]	**Reported:**
Chicago IL, 60604	Project Manager:	James D. Burden	Nov-07-14 10:09

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
15CA01-01	E141002-01	Soil	Oct-17-14 09:00	Oct-21-14 13:15
15CA01-02	E141002-02	Soil	Oct-17-14 09:05	Oct-21-14 13:15

for MT

Christina Rice, Chemist

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536 South Clark Street, Suite 734
Chicago, IL 60605
(312) 353-2964
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Superfund, US EPA Region 5	Project: Allied Paper	
77 West Jackson Boulevard	Project Number: [none]	**Reported:**
Chicago IL, 60604	Project Manager: James D. Burden	Nov-07-14 10:09

PCB/Pesticide by GC/ECD
TechLaw - ESAT Contract

15CA01-01 (E141002-01) Soil Sampled: Oct-17-14 09:00 Received: Oct-21-14 13:15

Analyte	Result	Flags / Qualifiers	MDL	Limit	Units	Dilution	Batch	Prepared	Analyzed
Surrogate: Decachlorobiphenyl	20.9			*90.0 %*		*56.9-149*	*EJ42404*	*Oct-23-14*	*Oct-27-14*
Surrogate: Tetrachloro-meta-xylene	17.4			*75.0 %*		*33.5-135*	"	"	"
PCB-1016	U			116	"	"	"	"	"
PCB-1221	U			116	"	"	"	"	"
PCB-1232	U			116	"	"	"	"	"
PCB-1242	U			116	"	"	"	"	"
PCB-1248	U			116	"	"	"	"	"
PCB-1254	U			116	"	"	"	"	"
PCB-1260	U			116	"	"	"	"	"
PCB-1262	U			116	"	"	"	"	"
PCB-1268	U			116	"	"	"	"	"

15CA01-02 (E141002-02) Soil Sampled: Oct-17-14 09:05 Received: Oct-21-14 13:15

Analyte	Result	Flags / Qualifiers	MDL	Limit	Units	Dilution	Batch	Prepared	Analyzed
Surrogate: Decachlorobiphenyl	27.9			*115 %*		*56.9-149*	*EJ42404*	*Oct-23-14*	*Oct-27-14*
Surrogate: Tetrachloro-meta-xylene	21.8			*90.0 %*		*33.5-135*	"	"	"
PCB-1016	U			121	"	"	"	"	"
PCB-1221	U			121	"	"	"	"	"
PCB-1232	U			121	"	"	"	"	"
PCB-1242	419			121	"	"	"	"	Oct-28-14
PCB-1248	U			121	"	"	"	"	Oct-27-14
PCB-1254	U			121	"	"	"	"	"
PCB-1260	U			121	"	"	"	"	"
PCB-1262	U			121	"	"	"	"	"
PCB-1268	U			121	"	"	"	"	"

for MT

Christina Rice, Chemist

Report Name: E141002 FINAL Nov 07 14 1009

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536 South Clark Street, Suite 734
Chicago, IL 60605
(312) 353-2964
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Superfund. US EPA Region 5	Project: Allied Paper	
77 West Jackson Boulevard	Project Number: [none]	Reported:
Chicago IL, 60604	Project Manager: James D. Burden	Nov-07-14 10:09

PCB/Pesticide by GC/ECD - Quality Control
TechLaw - ESAT Contract

Batch EJ42404 - EPA 3545 ASE

Blank (EJ42404-BLK1) — **Prepared: Oct-23-14 Analyzed: Oct-27-14**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Surrogate: Tetrachloro-meta-xylene	*16.7*				*ug/kg wet*	*19.7*		*85.0*	*33.5-135*		
Surrogate: Decachlorobiphenyl	*17.7*				*"*	*19.7*		*90.0*	*56.9-149*		
PCB-1016	U			98.3	"						
PCB-1221	U			98.3	"						
PCB-1232	U			98.3	"						
PCB-1242	U			98.3	"						
PCB-1248	U			98.3	"						
PCB-1254	U			98.3	"						
PCB-1260	U			98.3	"						
PCB-1262	U			98.3	"						
PCB-1268	U			98.3	"						

Blank (EJ42404-BLK2) — **Prepared: Oct-23-14 Analyzed: Oct-27-14**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Surrogate: Tetrachloro-meta-xylene	*20.0*				*ug/kg wet*	*20.0*		*100*	*33.5-135*		
Surrogate: Decachlorobiphenyl	*19.0*				*"*	*20.0*		*95.0*	*56.9-149*		
PCB-1016	U			100	"						
PCB-1221	U			100	"						
PCB-1232	U			100	"						
PCB-1242	U			100	"						
PCB-1248	U			100	"						
PCB-1254	U			100	"						
PCB-1260	U			100	"						
PCB-1262	U			100	"						
PCB-1268	U			100	"						

LCS (EJ42404-BS1) — **Prepared: Oct-23-14 Analyzed: Oct-27-14**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Surrogate: Tetrachloro-meta-xylene	*14.2*				*ug/kg wet*	*19.0*		*75.0*	*33.5-135*		
Surrogate: Decachlorobiphenyl	*15.2*				*"*	*19.0*		*80.0*	*56.9-149*		

for MT

Christina Rice, Chemist

TechLaw Inc ESAT Region 5
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Chicago, IL 60605
(312) 353-2964
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Superfund, US EPA Region 5	Project: Allied Paper	
77 West Jackson Boulevard	Project Number: [none]	**Reported:**
Chicago IL, 60604	Project Manager: James D. Burden	Nov-07-14 10:09

PCB/Pesticide by GC/ECD - Quality Control
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Batch EJ42404 - EPA 3545 ASE

LCS (EJ42404-BS1) — **Prepared: Oct-23-14 Analyzed: Oct-27-14**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
PCB-1016	**750**			94.8	ug/kg wet	948		79.1	24.4-164		
PCB-1260	**779**			94.8	"	948		82.2	30.1-180		

LCS (EJ42404-BS2) — **Prepared: Oct-23-14 Analyzed: Oct-27-14**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Surrogate: Tetrachloro-meta-xylene	*16.5*				*ug/kg wet*	*19.4*		*85.0*	*33.5-135*		
Surrogate: Decachlorobiphenyl	*18.4*				"	*19.4*		*95.0*	*56.9-149*		
PCB-1016	**846**			97.0	"	970		87.2	24.4-164		
PCB-1260	**910**			97.0	"	970		93.8	30.1-180		

LCS (EJ42404-BS3) — **Prepared: Oct-23-14 Analyzed: Oct-27-14**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Surrogate: Tetrachloro-meta-xylene	*16.6*				*ug/kg wet*	*19.6*		*85.0*	*33.5-135*		
Surrogate: Decachlorobiphenyl	*18.6*				"	*19.6*		*95.0*	*56.9-149*		
PCB-1016	**851**			97.8	"	978		87.0	24.4-164		
PCB-1260	**917**			97.8	"	978		93.7	30.1-180		

LCS (EJ42404-BS4) — **Prepared: Oct-23-14 Analyzed: Oct-27-14**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Surrogate: Tetrachloro-meta-xylene	*22.0*				*ug/kg wet*	*20.0*		*110*	*33.5-135*		
Surrogate: Decachlorobiphenyl	*22.0*				"	*20.0*		*110*	*56.9-149*		
PCB-1016	**1100**			100	"	1000		110	24.4-164		
PCB-1260	**1120**			100	"	1000		112	30.1-180		

LCS Dup (EJ42404-BSD1) — **Prepared: Oct-23-14 Analyzed: Oct-27-14**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Surrogate: Tetrachloro-meta-xylene	*15.4*				*ug/kg wet*	*19.3*		*80.0*	*33.5-135*		

for MT

Christina Rice, Chemist

TechLaw Inc ESAT Region 5
536 South Clark Street, Suite 734
Chicago, IL 60605
(312) 353-2964
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Superfund, US EPA Region 5	Project: Allied Paper	
77 West Jackson Boulevard	Project Number: [none]	**Reported:**
Chicago IL, 60604	Project Manager: James D. Burden	Nov-07-14 10:09

PCB/Pesticide by GC/ECD - Quality Control
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Batch EJ42404 - EPA 3545 ASE

LCS Dup (EJ42404-BSD1) **Prepared: Oct-23-14 Analyzed: Oct-27-14**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Surrogate: Decachlorobiphenyl	*17.4*				*ug/kg wet*	*19.3*		*90.0*	*56.9-149*		
PCB-1016	**0.833**				"	1.00		83.3	24.4-164	200	30
PCB-1260	**0.879**				"	1.00		87.9	30.1-180	200	30

MRL Check (EJ42404-MRL1) **Prepared: Oct-23-14 Analyzed: Oct-27-14**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Surrogate: Tetrachloro-meta-xylene	*16.0*				*ug/kg wet*	*20.0*		*80.0*	*33.5-135*		
Surrogate: Decachlorobiphenyl	*16.0*				*"*	*20.0*		*80.0*	*56.9-149*		
PCB-1016	**102**			100	"	100		102	0-200		
PCB-1221	**U**			100	"				0-200		
PCB-1232	**U**			100	"				0-200		
PCB-1242	**U**			100	"				0-200		
PCB-1248	**U**			100	"				0-200		
PCB-1254	**U**			100	"				0-200		
PCB-1260	**103**			100	"	100		103	0-200		
PCB-1262	**U**			100	"				0-200		
PCB-1268	**U**			100	"				0-200		

Matrix Spike (EJ42404-MS1) **Source: E141002-02** **Prepared: Oct-23-14 Analyzed: Oct-27-14**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Surrogate: Tetrachloro-meta-xylene	*20.1*				*ug/kg dry*	*23.6*		*85.0*	*33.5-135*		
Surrogate: Decachlorobiphenyl	*23.6*				*"*	*23.6*		*100*	*56.9-149*		
PCB-1016	**1430**			118	"	1180	U	121	24.4-164		
PCB-1260	**1210**			118	"	1180	57.0	97.5	30.1-180		

Matrix Spike Dup (EJ42404-MSD1) **Source: E141002-02** **Prepared: Oct-23-14 Analyzed: Oct-27-14**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Surrogate: Tetrachloro-meta-xylene	*20.1*				*ug/kg dry*	*23.6*		*85.0*	*33.5-135*		

for MT

Christina Rice, Chemist

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536 South Clark Street, Suite 734
Chicago, IL 60605
(312) 353-2964
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Superfund. US EPA Region 5	Project: Allied Paper	
77 West Jackson Boulevard	Project Number: [none]	**Reported:**
Chicago IL. 60604	Project Manager: James D. Burden	Nov-07-14 10:09

PCB/Pesticide by GC/ECD - Quality Control
TechLaw - ESAT Contract

Batch EJ42404 - EPA 3545 ASE

Matrix Spike Dup (EJ42404-MSD1) **Source: E141002-02** **Prepared: Oct-23-14 Analyzed: Oct-27-14**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Surrogate: Decachlorobiphenyl	*23.6*				*ug/kg dry*	*23.6*		*100*	*56.9-149*		
PCB-1016	**1350**			118	"	1180	U	115	24.4-164	5.25	30
PCB-1260	**1200**			118	"	1180	57.0	96.4	30.1-180	0.984	30

for MT

Christina Rice, Chemist

TechLaw Inc ESAT Region 5
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Chicago, IL 60605
(312) 353-2964
(312) 353-5814 (Fax)
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Superfund, US EPA Region 5	Project:	Allied Paper	
77 West Jackson Boulevard	Project Number:	[none]	**Reported:**
Chicago IL, 60604	Project Manager:	James D. Burden	Nov-07-14 10:09

Notes and Definitions

U Not Detected

NR Not Reported

Christina Rice, Chemist

Sample, Log and Extraction Comments

E141002-01
PCB by ASE

AP-OU1-IDW-001-101714

E141002-02
PCB by ASE

AP-OU1-IDW-002-101714

TechLaw, Inc. ESAT Region 5
536 South Clark Street
Chicago, IL 60605

Date: 11/4/14

Subject: Review of Region 5 Data for **Allied Paper TCLP SVOA**

From: Christina Rice**, Chemist, TechLaw ESAT**
Contractor to Region 5 Central Regional Laboratory
Submitted to CRL on 11/13/14

To:

Attached are the results for: **Allied Paper**

CRL data set number(s): **E141002**

Samples analyzed for: **SVOA (TCLP list)**

Results are reported for sample designations: **E141002-01 and -02**

_____ / / _____

Data Management Coordinator and Date Received

Date Transmitted: ____/____/

Please have the U.S. EPA Project Manager/Officer call the CRL Sample Coordinator at 3-0375 for any comments or questions.

Please sign and date this form below and return it with any comments to:

ESAT Region V
Techlaw
Patricia A. Joyner
ESAT Data Coordinator
536 South Clark – Suite 734
Chicago, Il 60605

_____ / / _____

Received by and Date

Comments:

Attached are the results for: **Allied Paper**

CRL data set number(s): **E141002**

Samples analyzed for: **SVOA (TCLP list)**

Results are reported for sample designations: **E141002-01 and -02**

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536 South Clark Street, Suite 734
Chicago, IL 60605
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WORK ORDER

Printed: 10/24/2014 1:09:53PM

E141002

TechLaw - ESAT Contract

Client: Superfund, US EPA Region 5
Project: Allied Paper
Project Manager: James D. Burden
Project Number: [none]

Report To:
James D. Burden
Superfund, US EPA Region 5
77 West Jackson Boulevard
Chicago, IL 60604
Phone: (312) 353-2310
Fax: (312) 886-6171

Date Due: Nov-18-14 15:00 (27 day TAT)
Received By: Paul Little
Date Received: Oct-21-14 13:15
Logged In By: Paul Little
Date Logged In: Oct-22-14 09:49

Samples Received at:	0.6°C
Custody Seals	Yes
Containers Intact	Yes
COC/Labels Agree	Yes
Preservation Confirmed	Yes

Analysis	Due	TAT	Expires	Comments
E141002-01 15CA01-01 [Soil] Sampled Oct-17-14 09:00 (GMT-06:00) Central Time (US & Canada)				**AP-OU1-IDW-001-101714**
SVOA TCLP List	Nov-18-14 12:00	27	Oct-31-14 09:00	
Metals ICP TCLP RCRA	Nov-18-14 12:00	27	Apr-15-15 09:00	
TCLP Extraction	Oct-31-14 12:00	10	Nov-14-14 09:00	
Solids, Dry Weight	Oct-31-14 12:00	10	Oct-24-14 09:00	
PCB by ASE	Nov-18-14 12:00	27	Oct-31-14 09:00	
Hg TCLP	Nov-18-14 12:00	27	Nov-14-14 09:00	
E141002-02 15CA01-02 [Soil] Sampled Oct-17-14 09:05 (GMT-06:00) Central Time (US & Canada)				**AP-OU1-IDW-002-101714**
SVOA TCLP List	Nov-18-14 12:00	27	Oct-31-14 09:05	
Metals ICP TCLP RCRA	Nov-18-14 12:00	27	Apr-15-15 09:05	
TCLP Extraction	Oct-31-14 12:00	10	Nov-14-14 09:05	
Solids, Dry Weight	Oct-31-14 12:00	10	Oct-24-14 09:05	
PCB by ASE	Nov-18-14 12:00	27	Oct-31-14 09:05	
Hg TCLP	Nov-18-14 12:00	27	Nov-14-14 09:05	
E141002-03 15CA01-03 [Water] Sampled Oct-17-14 09:10 (GMT-06:00) Central Time (US & Canada)				**AP-OU1-IDW-003-101714**
PCB by SPE	Nov-18-14 12:00	27	Oct-24-14 09:10	

WORK ORDER

Printed: 10/24/2014 1:09:53PM

E141002

TechLaw - ESAT Contract

Client:	**Superfund, US EPA Region 5**	**Project Manager:**	**James D. Burden**
Project:	**Allied Paper**	**Project Number:**	**[none]**

Analysis	Due	TAT	Expires	Comments
E141002-04 15CA01-04 [Water] Sampled Oct-17-14 09:15 (GMT-06:00) Central Time (US & Canada)				**AP-OU1-IDW-004-101714**
PCB by SPE	Nov-18-14 12:00	27	Oct-24-14 09:15	

Reviewed By

10/24/14

Date

CASE INVENTORY

Method(s) Number:	MS026 rev. 8.0	**Site Name:**	Allied Paper
Date Generated:	11/12/2014	**Author:**	Christina Rice
Job Number:	03074.2.01.202.1A.059B.01.0042	**TDF #:**	5-0001-2-042C

E141002 - TCLP SVOA by Continuous L/L	**From Page**	**To Page**
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Case Narrative & LIMS Report

CASE NARRATIVE

DATE: 11/4/2014

PROJECT NAME: Allied Paper – SVOA TCLP List

DATA SET NUMBER: E141002

ANALYST(s): Christina Rice, ESAT

I. CASE DESCRIPTION:

ESAT was tasked with the analysis of two (2) soil samples (E141002-01 and E141002-02) for the SVOA TCLP list of compounds. The samples were received on October 21, 2014 at 0.6°C.

The two soil samples were TCLP tumbled on October 22, 2014. The resulting TCLP extracts were then extracted by the continuous liquid-liquid method on October 29, 2014. All extractions and analyses were within holding time criteria. No qualifications are necessary.

All extractions and analyses were performed according to CRL SOP MS026 rev 8.0, effective January 29, 2014. All samples were reviewed according to CRL SOP GEN010 rev 9.0, effective April 7, 2010.

II. INSTRUMENT CONTROLS:

No problems were found.

III. QUALITY CONTROLS:

1. Method Reporting Limit (MRL) :

Two reporting limit verification checks (5 ug/L and 1 ug/L) are used to assess extraction performance and sensitivity at or near the reporting limit. They function as a low level blank spike and are required to be within the blank spike statistical limits. If recovery is not met, the reporting limit is raised to a level that meets blank spike statistical limits. All compounds were within limits for sample EJ42901-MRL1 (5 ug/L). All compounds were within limits for sample EJ42901-MRL2 (1 ug/L) with the exception of:

Compound	EJ42901-MRL2 Result (ug/L)	Limits (ug/L)
Hexachlorobutadiene	0.20	0.27 – 0.95

The reporting limit for hexachlorobutadiene has been raised to the EJ42901-MRL1 level (5 ug/L) for samples E141002-01 and E141002-02. No qualifications are necessary.

IV. SAMPLE RESULTS:

Samples were initially extracted by the equilibrium liquid-liquid micro-extraction method October 24, 2014. Due to poor recovery of certain acid compounds, the samples were re-extracted October 29, 2014 by the continuous liquid-liquid method. No problems were observed in the second extraction method.

The source sample for the MS / MSD analysis is E141002-01.

No samples were identified as field blanks or field duplicates.

All samples are reported in ug/L in LIMS.

Reporting limit checks are not addressed in CRL SOP GEN010 rev 9.0. Action was taken based on CRL SOP MS026 rev 8.0, section 10.1.3.

Quality control measures not specifically discussed in this narrative met all quality criteria stated in the SOPs.

Analytical data packages prepared by the EPA Region 5 Chicago Regional Laboratory (CRL) or the Superfund ESAT contractors are verified in accordance with the CRL Quality Management Plan or ESAT Quality Management Plan, respectively. CRL and ESAT data reports in the final analytical data package include the data qualifiers assigned through our data verification processes. This includes an explanation of the data qualifiers assigned by the scientists who performed the analyses, as well as, the chemist that conducted the data verification. This report narrative, which explains quality control outliers and other significant issues affecting data quality, is also provided. This information constitutes the Region 5 CRL and ESAT processes that are equivalent to the data validation report provided with Contract Laboratory Program (CLP) data packages.

Manual Calculation:

Concentration for Pentachlorophenol in EJ42901-BS1:

$$ug / L = \frac{(Ax \times Is \times Vt \times Df)}{(Ais \times ARF \times Vol)}$$

Ax= Area of the characteristic ion for the compound to be measured
Ais= Area of the characteristic ion for the internal standard
Is= Amount of internal standard injected in micrograms per milliliter (ug/mL)
Vt= Volume of the concentrated extract in microliters (uL)
Df = Dilution factor
ARF= Average Response Factor for the compound from the calibration curve
Vol= Volume of water extracted in milliliters (mL)

$$ug / L = \frac{(503862 \times 50 \times 1000 \times 1)}{(7547594 \times 0.160 \times 1000)}$$

Calculated concentration = 20.86 ug/L, which rounds to 20.9 ug/L.
The value reported in LIMS is 20.9 ug/L.

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536 South Clark Street, Suite 734
Chicago, IL 60605
(312) 353-2964
(312) 353-5814 (Fax)
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Superfund, US EPA Region 5	Project:	Allied Paper	
77 West Jackson Boulevard	Project Number:	[none]	**Reported:**
Chicago IL, 60604	Project Manager:	James D. Burden	Nov-07-14 09:21

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
15CA01-01	E141002-01	Soil	Oct-17-14 09:00	Oct-21-14 13:15
15CA01-02	E141002-02	Soil	Oct-17-14 09:05	Oct-21-14 13:15

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Christina Rice, Chemist

TechLaw Inc ESAT Region 5
536 South Clark Street, Suite 734
Chicago, IL 60605
(312) 353-2964
(312) 353-5814 (Fax)
www.techlawinc.com

Superfund, US EPA Region 5	Project: Allied Paper	
77 West Jackson Boulevard	Project Number: [none]	**Reported:**
Chicago IL, 60604	Project Manager: James D. Burden	Nov-07-14 09:21

Semivolatiles by GC/MS
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15CA01-01 (E141002-01) Soil Sampled: Oct-17-14 09:00 Received: Oct-21-14 13:15

Analyte	Result	Flags / Qualifiers	MDL	Limit	Units	Dilution	Batch	Prepared	Analyzed
Surrogate: 2,4,6-Tribromophenol	177			*73.4 %*		*40-113*	*EJ42901*	*Oct-29-14*	*Oct-31-14*
Surrogate: 2-Fluorobiphenyl	134			*55.9 %*		*10-130*	"	"	"
Surrogate: 2-Fluorophenol	136			*56.5 %*		*23-102*	"	"	"
Surrogate: Nitrobenzene-d5	132			*54.9 %*		*18-111*	"	"	"
Surrogate: Phenol-d5	136			*56.4 %*		*26-111*	"	"	"
Surrogate: Pyridine-d5	165			*68.6 %*		*50-150*	"	"	"
Surrogate: Terphenyl-d14	194			*80.5 %*		*10-163*	"	"	"
2,4,5-Trichlorophenol	U			9.6	"	"	"	"	"
2,4,6-Trichlorophenol	U			9.6	"	"	"	"	"
2,4-Dinitrotoluene	U			9.6	"	"	"	"	"
2-Methylphenol	U			9.6	"	"	"	"	"
3 & 4-Methylphenol	U			96	"	"	"	"	"
Hexachlorobenzene	U			9.6	"	"	"	"	"
Hexachlorobutadiene	U			48	"	"	"	"	"
Hexachloroethane	U			9.6	"	"	"	"	"
Nitrobenzene	U			9.6	"	"	"	"	"
Pentachlorophenol	U			48	"	"	"	"	"
Pyridine	U			9.6	"	"	"	"	"

15CA01-02 (E141002-02) Soil Sampled: Oct-17-14 09:05 Received: Oct-21-14 13:15

Analyte	Result	Flags / Qualifiers	MDL	Limit	Units	Dilution	Batch	Prepared	Analyzed
Surrogate: 2,4,6-Tribromophenol	175			*74.0 %*		*40-113*	*EJ42901*	*Oct-29-14*	*Oct-31-14*
Surrogate: 2-Fluorobiphenyl	179			*75.9 %*		*10-130*	"	"	"
Surrogate: 2-Fluorophenol	177			*75.2 %*		*23-102*	"	"	"
Surrogate: Nitrobenzene-d5	173			*73.4 %*		*18-111*	"	"	"
Surrogate: Phenol-d5	173			*73.2 %*		*26-111*	"	"	"
Surrogate: Pyridine-d5	197			*83.6 %*		*50-150*	"	"	"
Surrogate: Terphenyl-d14	210			*88.9 %*		*10-163*	"	"	"
2,4,5-Trichlorophenol	U			9.4	"	"	"	"	"
2,4,6-Trichlorophenol	U			9.4	"	"	"	"	"
2,4-Dinitrotoluene	U			9.4	"	"	"	"	"
2-Methylphenol	U			9.4	"	"	"	"	"
3 & 4-Methylphenol	U			94	"	"	"	"	"

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Chicago, IL 60605
(312) 353-2964
(312) 353-5814 (Fax)
www.techlawinc.com

Superfund, US EPA Region 5	Project: Allied Paper	
77 West Jackson Boulevard	Project Number: [none]	**Reported:**
Chicago IL, 60604	Project Manager: James D. Burden	Nov-07-14 09:21

Semivolatiles by GC/MS
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15CA01-02 (E141002-02) Soil Sampled: Oct-17-14 09:05 Received: Oct-21-14 13:15

Analyte	Result	Flags / Qualifiers	MDL	Limit	Units	Dilution	Batch	Prepared	Analyzed
Hexachlorobenzene	U			9.4	ug/L	1	EJ42901	Oct-29-14	Oct-31-14
Hexachlorobutadiene	U			47	"	"	"	"	"
Hexachloroethane	U			9.4	"	"	"	"	"
Nitrobenzene	U			9.4	"	"	"	"	"
Pentachlorophenol	U			47	"	"	"	"	"
Pyridine	U			9.4	"	"	"	"	"

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Chicago, IL 60605
(312) 353-2964
(312) 353-5814 (Fax)
www.techlawinc.com

Superfund, US EPA Region 5	Project: Allied Paper	
77 West Jackson Boulevard	Project Number: [none]	Reported:
Chicago IL, 60604	Project Manager: James D. Burden	Nov-07-14 09:21

Semivolatiles by GC/MS - Quality Control
TechLaw - ESAT Contract

Batch EJ42901 - BP SVOA

Blank (EJ42901-BLK1) **Prepared: Oct-29-14 Analyzed: Oct-31-14**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Surrogate: Pyridine-d5	*19.4*				*ug/L*	*25.0*		*77.8*	*50-150*		
Surrogate: 2-Fluorophenol	*19.3*				*"*	*25.0*		*77.1*	*23-102*		
Surrogate: Phenol-d5	*19.8*				*"*	*25.0*		*79.2*	*26-111*		
Surrogate: Nitrobenzene-d5	*18.8*				*"*	*25.0*		*75.1*	*18-111*		
Surrogate: 2-Fluorobiphenyl	*18.8*				*"*	*25.0*		*75.0*	*10-130*		
Surrogate: 2,4,6-Tribromophenol	*19.7*				*"*	*25.0*		*78.7*	*40-113*		
Surrogate: Terphenyl-dl4	*21.8*				*"*	*25.0*		*87.1*	*10-163*		
Pyridine	U			1.0	"						
2-Methylphenol	U			1.0	"						
3 & 4-Methylphenol	U			10	"						
Hexachloroethane	U			1.0	"						
Nitrobenzene	U			1.0	"						
Hexachlorobutadiene	U			1.0	"						
2,4,6-Trichlorophenol	U			1.0	"						
2,4,5-Trichlorophenol	U			1.0	"						
2,4-Dinitrotoluene	U			1.0	"						
Hexachlorobenzene	U			1.0	"						
Pentachlorophenol	U			5.0	"						

Blank (EJ42901-BLK2) **Prepared: Oct-29-14 Analyzed: Oct-31-14**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Surrogate: Pyridine-d5	*196*				*ug/L*	*245*		*79.9*	*50-150*		
Surrogate: 2-Fluorophenol	*179*				*"*	*245*		*73.0*	*23-102*		
Surrogate: Phenol-d5	*194*				*"*	*245*		*79.0*	*26-111*		
Surrogate: Nitrobenzene-d5	*188*				*"*	*245*		*76.9*	*18-111*		
Surrogate: 2-Fluorobiphenyl	*174*				*"*	*245*		*71.1*	*10-130*		
Surrogate: 2,4,6-Tribromophenol	*225*				*"*	*245*		*92.0*	*40-113*		
Surrogate: Terphenyl-dl4	*223*				*"*	*245*		*91.1*	*10-163*		
Pyridine	U			9.8	"						
2-Methylphenol	U			9.8	"						
3 & 4-Methylphenol	U			98	"						

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TechLaw Inc ESAT Region 5
536 South Clark Street, Suite 734
Chicago, IL 60605
(312) 353-2964
(312) 353-5814 (Fax)
www.techlawinc.com

Superfund, US EPA Region 5	Project: Allied Paper	
77 West Jackson Boulevard	Project Number: [none]	Reported:
Chicago IL, 60604	Project Manager: James D. Burden	Nov-07-14 09:21

Semivolatiles by GC/MS - Quality Control
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Batch EJ42901 - BP SVOA

Blank (EJ42901-BLK2) — **Prepared: Oct-29-14 Analyzed: Oct-31-14**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Hexachloroethane	U			9.8	ug/L						
Nitrobenzene	U			9.8	"						
Hexachlorobutadiene	U			9.8	"						
2,4,6-Trichlorophenol	U			9.8	"						
2,4,5-Trichlorophenol	U			9.8	"						
2,4-Dinitrotoluene	U			9.8	"						
Hexachlorobenzene	U			9.8	"						
Pentachlorophenol	U			49	"						

LCS (EJ42901-BS1) — **Prepared: Oct-29-14 Analyzed: Oct-31-14**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Surrogate: Pyridine-d5	*14.4*				*ug/L*	*25.0*		*57.5*	*50-150*		
Surrogate: 2-Fluorophenol	*13.8*				*"*	*25.0*		*55.3*	*23-102*		
Surrogate: Phenol-d5	*13.6*				*"*	*25.0*		*54.6*	*26-111*		
Surrogate: Nitrobenzene-d5	*13.5*				*"*	*25.0*		*53.8*	*18-111*		
Surrogate: 2-Fluorobiphenyl	*13.9*				*"*	*25.0*		*55.8*	*10-130*		
Surrogate: 2,4,6-Tribromophenol	*20.2*				*"*	*25.0*		*80.8*	*40-113*		
Surrogate: Terphenyl-d14	*20.1*				*"*	*25.0*		*80.4*	*10-163*		
Pyridine	**14.2**			1.0	"				14.6-116.9		
2-Methylphenol	**13.4**			1.0	"	25.0		53.7	47-107		
3 & 4-Methylphenol	**27.8**			10	"	50.0		55.7	45-137		
Hexachloroethane	**11.2**			1.0	"	25.0		44.7	16-94		
Nitrobenzene	**13.8**			1.0	"	25.0		55.1	43-110		
Hexachlorobutadiene	**12.0**			1.0	"	25.0		48.1	27-95		
2,4,6-Trichlorophenol	**17.0**			1.0	"	25.0		67.8	54-118		
2,4,5-Trichlorophenol	**17.7**			1.0	"	25.0		70.9	60-118		
2,4-Dinitrotoluene	**21.2**			1.0	"	25.0		84.8	54-143		
Hexachlorobenzene	**18.6**			1.0	"	25.0		74.4	63-114		
Pentachlorophenol	**20.9**			5.0	"	25.0		83.4	64-124		

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TechLaw Inc ESAT Region 5
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Chicago, IL 60605
(312) 353-2964
(312) 353-5814 (Fax)
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Superfund, US EPA Region 5	Project: Allied Paper	
77 West Jackson Boulevard	Project Number: [none]	**Reported:**
Chicago IL, 60604	Project Manager: James D. Burden	Nov-07-14 09:21

Semivolatiles by GC/MS - Quality Control
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Batch EJ42901 - BP SVOA

LCS Dup (EJ42901-BSD1) **Prepared: Oct-29-14 Analyzed: Oct-31-14**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Surrogate: Pyridine-d5	*17.9*				*ug/L*	*25.0*		*71.8*	*50-150*		
Surrogate: 2-Fluorophenol	*16.3*				"	*25.0*		*65.4*	*23-102*		
Surrogate: Phenol-d5	*17.1*				"	*25.0*		*68.5*	*26-111*		
Surrogate: Nitrobenzene-d5	*17.5*				"	*25.0*		*69.8*	*18-111*		
Surrogate: 2-Fluorobiphenyl	*18.0*				"	*25.0*		*71.8*	*10-130*		
Surrogate: 2,4,6-Tribromophenol	*21.5*				"	*25.0*		*85.9*	*40-113*		
Surrogate: Terphenyl-d14	*22.3*				"	*25.0*		*89.2*	*10-163*		
Pyridine	**17.9**			1.0	"				14.6-116.9		25
2-Methylphenol	**18.4**			1.0	"	25.0		73.6	47-107	31.2	41.6
3 & 4-Methylphenol	**36.3**			10	"	50.0		72.5	45-137	26.3	81.2
Hexachloroethane	**14.7**			1.0	"	25.0		58.7	16-94	27.2	60.5
Nitrobenzene	**18.4**			1.0	"	25.0		73.4	43-110	28.4	22.5
Hexachlorobutadiene	**15.2**			1.0	"	25.0		60.8	27-95	23.4	37.7
2,4,6-Trichlorophenol	**19.5**			1.0	"	25.0		78.0	54-118	13.9	25.9
2,4,5-Trichlorophenol	**21.0**			1.0	"	25.0		84.0	60-118	16.8	22.9
2,4-Dinitrotoluene	**23.5**			1.0	"	25.0		93.8	54-143	10.1	26.3
Hexachlorobenzene	**20.7**			1.0	"	25.0		82.8	63-114	10.6	8.65
Pentachlorophenol	**22.7**			5.0	"	25.0		90.6	64-124	8.23	32.9

MRL Check (EJ42901-MRL1) **Prepared: Oct-29-14 Analyzed: Oct-31-14**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Surrogate: Pyridine-d5	*18.3*				*ug/L*	*25.0*		*73.1*	*50-150*		
Surrogate: 2-Fluorophenol	*16.2*				"	*25.0*		*65.0*	*23-102*		
Surrogate: Phenol-d5	*17.5*				"	*25.0*		*70.0*	*26-111*		
Surrogate: Nitrobenzene-d5	*16.2*				"	*25.0*		*65.0*	*18-111*		
Surrogate: 2-Fluorobiphenyl	*16.6*				"	*25.0*		*66.2*	*10-130*		
Surrogate: 2,4,6-Tribromophenol	*18.8*				"	*25.0*		*75.3*	*40-113*		
Surrogate: Terphenyl-d14	*20.2*				"	*25.0*		*80.9*	*10-163*		
Pyridine	**3.3**			1.0	"				0-200		
2-Methylphenol	**3.5**			1.0	"	5.00		69.2	0-200		
3 & 4-Methylphenol	**5.5**			10	"	10.0		55.3	0-200		

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Christina Rice, Chemist

TechLaw Inc ESAT Region 5
536 South Clark Street, Suite 734
Chicago, IL 60605
(312) 353-2964
(312) 353-5814 (Fax)
www.techlawinc.com

Superfund, US EPA Region 5	Project: Allied Paper	
77 West Jackson Boulevard	Project Number: [none]	**Reported:**
Chicago IL, 60604	Project Manager: James D. Burden	Nov-07-14 09:21

Semivolatiles by GC/MS - Quality Control
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Batch EJ42901 - BP SVOA

Matrix Spike (EJ42901-MS1) **Source: E141002-01** **Prepared: Oct-29-14 Analyzed: Oct-31-14**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Surrogate: Pyridine-d5	*169*				*ug/L*	*250*		*67.6*	*50-150*		
Surrogate: 2-Fluorophenol	*141*				*"*	*250*		*56.6*	*23-102*		
Surrogate: Phenol-d5	*154*				*"*	*250*		*61.6*	*26-111*		
Surrogate: Nitrobenzene-d5	*154*				*"*	*250*		*61.8*	*18-111*		
Surrogate: 2-Fluorobiphenyl	*155*				*"*	*250*		*61.8*	*10-130*		
Surrogate: 2,4,6-Tribromophenol	*182*				*"*	*250*		*72.6*	*40-113*		
Surrogate: Terphenyl-d14	*181*				*"*	*250*		*72.3*	*10-163*		
Pyridine	**168**			10	"		U		14.6-116.9		
2-Methylphenol	**171**			10	"	250	U	68.3	55-88		
3 & 4-Methylphenol	**317**			100	"	500	U	63.3	38-132		
Hexachloroethane	**123**			10	"	250	U	49.2	17-102		
Nitrobenzene	**157**			10	"	250	U	62.9	42-100		
Hexachlorobutadiene	**134**			10	"	250	U	53.4	25-102		
2,4,6-Trichlorophenol	**173**			10	"	250	U	69.1	10-147		
2,4,5-Trichlorophenol	**172**			10	"	250	U	68.7	16-151		
2,4-Dinitrotoluene	**195**			10	"	250	U	78.1	59-118		
Hexachlorobenzene	**176**			10	"	250	U	70.4	44-118		
Pentachlorophenol	**195**			50	"	250	U	78.0	10-162		

Matrix Spike Dup (EJ42901-MSD1) **Source: E141002-01** **Prepared: Oct-29-14 Analyzed: Oct-31-14**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Surrogate: Pyridine-d5	*154*				*ug/L*	*245*		*62.7*	*50-150*		
Surrogate: 2-Fluorophenol	*119*				*"*	*245*		*48.4*	*23-102*		
Surrogate: Phenol-d5	*132*				*"*	*245*		*54.0*	*26-111*		
Surrogate: Nitrobenzene-d5	*127*				*"*	*245*		*51.9*	*18-111*		
Surrogate: 2-Fluorobiphenyl	*131*				*"*	*245*		*53.4*	*10-130*		
Surrogate: 2,4,6-Tribromophenol	*178*				*"*	*245*		*72.4*	*40-113*		
Surrogate: Terphenyl-d14	*181*				*"*	*245*		*74.0*	*10-163*		
Pyridine	**154**			9.8	"		U		14.6-116.9		25
2-Methylphenol	**138**			9.8	"	245	U	56.2	55-88	19.5	28
3 & 4-Methylphenol	**269**			98	"	490	U	54.9	38-132	14.2	81

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Christina Rice, Chemist

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Chicago, IL 60605
(312) 353-2964
(312) 353-5814 (Fax)
www.techlawinc.com

Superfund. US EPA Region 5	Project: Allied Paper	
77 West Jackson Boulevard	Project Number: [none]	**Reported:**
Chicago IL, 60604	Project Manager: James D. Burden	Nov-07-14 09:21

Semivolatiles by GC/MS - Quality Control
TechLaw - ESAT Contract

Batch EJ42901 - BP SVOA

MRL Check (EJ42901-MRL1) **Prepared: Oct-29-14 Analyzed: Oct-31-14**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Hexachloroethane	**2.3**			1.0	ug/L	5.00		46.6	0-200		
Nitrobenzene	**3.3**			1.0	"	5.00		66.0	0-200		
Hexachlorobutadiene	**2.6**			1.0	"	5.00		51.0	0-200		
2,4,6-Trichlorophenol	**3.1**			1.0	"	5.00		61.0	0-200		
2,4,5-Trichlorophenol	**3.7**			1.0	"	5.00		73.2	0-200		
2,4-Dinitrotoluene	**3.8**			1.0	"	5.00		75.4	0-200		
Hexachlorobenzene	**3.5**			1.0	"	5.00		70.6	0-200		
Pentachlorophenol	**3.8**			5.0	"	5.00		75.4	0-200		

MRL Check (EJ42901-MRL2) **Prepared: Oct-29-14 Analyzed: Oct-31-14**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Surrogate: Pyridine-d5	*16.2*				*ug/L*	*25.0*		*64.9*	*50-150*		
Surrogate: 2-Fluorophenol	*16.6*				*"*	*25.0*		*66.6*	*23-102*		
Surrogate: Phenol-d5	*17.7*				*"*	*25.0*		*70.9*	*26-111*		
Surrogate: Nitrobenzene-d5	*16.3*				*"*	*25.0*		*65.0*	*18-111*		
Surrogate: 2-Fluorobiphenyl	*16.3*				*"*	*25.0*		*65.1*	*10-130*		
Surrogate: 2,4,6-Tribromophenol	*18.8*				*"*	*25.0*		*75.3*	*40-113*		
Surrogate: Terphenyl-d14	*20.1*				*"*	*25.0*		*80.4*	*10-163*		
Pyridine	**0.7**			1.0	"				0-200		
2-Methylphenol	**0.6**			1.0	"	1.00		64.0	0-200		
3 & 4-Methylphenol	**U**			10	"	2.00			0-200		
Hexachloroethane	**0.3**			1.0	"	1.00		26.0	0-200		
Nitrobenzene	**0.7**			1.0	"	1.00		69.0	0-200		
Hexachlorobutadiene	**U**			1.0	"	1.00			0-200		
2,4,6-Trichlorophenol	**0.6**			1.0	"	1.00		58.0	0-200		
2,4,5-Trichlorophenol	**0.8**			1.0	"	1.00		83.0	0-200		
2,4-Dinitrotoluene	**0.7**			1.0	"	1.00		65.0	0-200		
Hexachlorobenzene	**0.7**			1.0	"	1.00		73.0	0-200		
Pentachlorophenol	**U**			5.0	"	1.00			0-200		

11/7/14
Christina Rice, Chemist

TechLaw Inc ESAT Region 5
536 South Clark Street, Suite 734
Chicago, IL 60605
(312) 353-2964
(312) 353-5814 (Fax)
www.techlawinc.com

Superfund, US EPA Region 5	Project: Allied Paper	
77 West Jackson Boulevard	Project Number: [none]	**Reported:**
Chicago IL, 60604	Project Manager: James D. Burden	Nov-07-14 09:21

Semivolatiles by GC/MS - Quality Control
TechLaw - ESAT Contract

Batch EJ42901 - BP SVOA

Matrix Spike Dup (EJ42901-MSD1) **Source: E141002-01** **Prepared: Oct-29-14 Analyzed: Oct-31-14**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Hexachloroethane	**78.3**			9.8	ug/L	245	U	32.0	17-102	42.4	79.7
Nitrobenzene	**126**			9.8	"	245	U	51.2	42-100	20.4	33.4
Hexachlorobutadiene	**94.4**			9.8	"	245	U	38.5	25-102	32.4	44.7
2,4,6-Trichlorophenol	**148**			9.8	"	245	U	60.5	10-147	13.3	189
2,4,5-Trichlorophenol	**159**			9.8	"	245	U	64.8	16-151	5.93	142
2,4-Dinitrotoluene	**190**			9.8	"	245	U	77.4	59-118	0.875	12.2
Hexachlorobenzene	**165**			9.8	"	245	U	67.3	44-118	4.59	17.7
Pentachlorophenol	**191**			49	"	245	U	78.0	10-162	0.103	164

11/7/14

Christina Rice, Chemist

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Chicago, IL 60605
(312) 353-2964
(312) 353-5814 (Fax)
www.techlawinc.com

Superfund, US EPA Region 5	Project:	Allied Paper	
77 West Jackson Boulevard	Project Number:	[none]	**Reported:**
Chicago IL, 60604	Project Manager:	James D. Burden	Nov-07-14 09:21

Notes and Definitions

U Not Detected

NR Not Reported

11/7/14

Christina Rice, Chemist

Sample, Log and Extraction Comments

E141002-01
SVOA TCLP List

AP-OU1-IDW-001-101714

E141002-02
SVOA TCLP List

AP-OU1-IDW-002-101714

Attachment H
Waste Manifests

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator ID Number: M I D 0 0 6 0 0 7 3 0 8 1

2. Page 1 of: 1

3. Emergency Response Phone: 269-375-9595

4. Manifest Tracking Number: 012232070 JJK

GENERATOR

5. Generator's Name and Mailing Address: Att: Michael Berkoff
US Environmental Protection Agency (EPA) / Allied Paper
250 E Alcott Street
Portage MI 49001

Generator's Site Address (if different than mailing address)

Generator's Phone: 3 1 2 3 5 3 - 8 9 8 3

6. Transporter 1 Company Name: Terra Contracting Services, LLC

U.S. EPA ID Number: M I K 7 6 8 6 8 9 1 2 7

7. Transporter 2 Company Name

U.S. EPA ID Number

8. Designated Facility Name and Site Address
Autumn Hills Recycling and Disposal Facility
700 56th Avenue
Zeeland MI 49464

Facility's Phone: 616 688-5777

U.S. EPA ID Number: M I D 9 8 5 6 6 5 0 2 5

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes
	1. NON HAZ NON TSCA REGULATED LIQUIDS PROFILE 111759MI	1	DM		G	D29L
	2.					
	3.					
	4.					

14. Special Handling Instructions and Additional Information: 1)TCS# 19140996

15. **GENERATOR'S/OFFEROR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name: [illegible] EPA

Signature

Month 1 Day 27 Year 15

INT'L

16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:

Transporter signature (for exports only): Date leaving U.S.:

TRANSPORTER

17. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name | Signature | Month | Day | Year

Transporter 2 Printed/Typed Name | Signature | Month | Day | Year

DESIGNATED FACILITY

18. Discrepancy

18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

18b. Alternate Facility (or Generator)

U.S. EPA ID Number

Facility's Phone:

18c. Signature of Alternate Facility (or Generator) | Month | Day | Year

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)

1.	2.	3.	4.

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a

Printed/Typed Name | Signature | Month | Day | Year

EPA Form 8700-22 (Rev. 3-05) Previous editions are obsolete.

GENERATOR'S INITIAL COPY

WASTE MANAGEMENT

NON-HAZARDOUS MANIFEST

NON-HAZARDOUS MANIFEST	1. Generator's US EPA ID No. MID006007306	Manifest Doc No.	2. Page 1 of	

3. Generator's Mailing Address: USEPA/ALLIED PAPER 258 E ALCOTT STREET PORTAGE, MI 49001	Generator's Site Address (If different than mailing): USEPA/ALLIED PAPER 258 E ALCOTT STREET PORTAGE, MI 49001 KALAMAZOO COUNTY	A. Manifest Number WMNA T356954
4. Generator's Phone 312-353-8985		B. State Generator's ID

5. Transporter 1 Company Name: Terra Contracting Services	6. US EPA ID Number: MIK768689127	C. State Transporter's ID
		D. Transporter's Phone
7. Transporter 2 Company Name	8. US EPA ID Number	E. State Transporter's ID
		F. Transporter's Phone
9. Designated Facility Name and Site Address: Westside RDF 14094 M-60 West Three Rivers, MI 49093	10. US EPA ID Number	G. State Facility ID
		H. State Facility Phone 269-279-5444

GENERATOR

11. Description of Waste Materials	12. Containers No.	12. Containers Type	13. Total Quantity	14. Unit Wt./Vol.	I. Misc. Comments
a. non-haz tasca regulated solls		CM			
WM Profile # 110555MI					
b.					
WM Profile #					
c.					
WM Profile #					
d.					
WM Profile #					

J. Additional Descriptions for Materials Listed Above

color brown odor no state solid

K. Disposal Location

Cell		Level	
Grid			

15. Special Handling Instructions and Additional Information

Purchase Order # Project#413665.F1.01 EMERGENCY CONTACT / PHONE NO.: Vanessa Petura/ 414-847-0113

16. GENERATOR'S CERTIFICATE:

I hereby certify that the above-described materials are not hazardous wastes as defined by CFR Part 261 or any applicable state law, have been fully and accurately described, classified and packaged and are in proper condition for transportation according to applicable regulations.

Printed Name	Signature "On behalf of"	Month	Day	Year
[redacted] on behalf of USEPA	[redacted] on behalf of USEPA	1	20	15

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed Name	Signature	Month	Day	Year
Jaime Allen		1	20	15

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed Name	Signature	Month	Day	Year

FACILITY

19. Certificate of Final Treatment/Disposal

I certify, on behalf of the above listed treatment facility, that to the best of my knowledge, the above-described waste was managed in compliance with all applicable laws, regulations, permits and licenses on the dates listed above.

20. Facility Owner or Operator: Certification of receipt of non-hazardous materials covered by this manifest.

Printed Name	Signature	Month	Day	Year

White- TREATMENT, STORAGE, DISPOSAL FACILITY COPY Blue- GENERATOR #2 COPY Yellow- GENERATOR #1 COPY

Pink- FACILITY USE ONLY Gold- TRANSPORTER #1 COPY

WASTE MANAGEMENT

NON-HAZARDOUS MANIFEST

NON-HAZARDOUS MANIFEST	1. Generator's US EPA ID No. / Manifest Doc No.	2. Page 1 of	
	MIDD06007306		

3. Generator's Mailing Address:	Generator's Site Address (If different than mailing):	A. Manifest Number	
USEPA/ALLIED PAPER 258 E ALCOTT STREET PORTAGE, MI 49001	USEPA/ALLIED PAPER 258 E ALCOTT STREET PORTAGE, MI 49001 KALAMAZOO COUNTY	WMNA	T356955
4. Generator's Phone 312-353-8583		B. State Generator's ID	

5. Transporter 1 Company Name	6. US EPA ID Number	
Terra Contracting Services	MIK768689127	C. State Transporter's ID
		D. Transporter's Phone
7. Transporter 2 Company Name	8. US EPA ID Number	
		E. State Transporter's ID
		F. Transporter's Phone
9. Designated Facility Name and Site Address	10. US EPA ID Number	
Westside RDF 14094 M-60 West Three Rivers, MI 49093		G. State Facility ID
		H. State Facility Phone 269-279-5444

GENERATOR

11. Description of Waste Materials	12. Containers No.	12. Containers Type	13. Total Quantity	14. Unit Wt./Vol.	I. Misc. Comments
a. non-haz tasca regulated soils	6	DM	330		
WM Profile # 110555MI					
b.					
WM Profile #					
c.					
WM Profile #					
d.					
WM Profile #					

J. Additional Descriptions for Materials Listed Above	K. Disposal Location			
color brown odor no state solid	Cell		Level	
	Grid			

15. Special Handling Instructions and Additional Information

Purchase Order # Project#419665.FI.01 EMERGENCY CONTACT / PHONE NO.: Vanessa Petura/ 414-847-0113

16. GENERATOR'S CERTIFICATE:

I hereby certify that the above-described materials are not hazardous wastes as defined by CFR Part 261 or any applicable state law, have been fully and accurately described, classified and packaged and are in proper condition for transportation according to applicable regulations.

Printed Name	Signature "On behalf of"	Month	Day	Year
Amanda Sroka ~~on behalf~~ on behalf of USEPA	~~on behalf~~ behalf of USEPA	9	20	15

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed Name	Signature	Month	Day	Year
Brian Torrey		9	20	15

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed Name	Signature	Month	Day	Year

FACILITY

19. Certificate of Final Treatment/Disposal

I certify, on behalf of the above listed treatment facility, that to the best of my knowledge, the above-described waste was managed in compliance with all applicable laws, regulations, permits and licenses on the dates listed above.

20. Facility Owner or Operator: Certification of receipt of non-hazardous materials covered by this manifest.

Printed Name	Signature	Month	Day	Year

White- TREATMENT, STORAGE, DISPOSAL FACILITY COPY Blue- GENERATOR #2 COPY Yellow- GENERATOR #1 COPY

Pink- FACILITY USE ONLY Gold- TRANSPORTER #1 COPY

Terra Contracting Services, LLC
5100 West Michigan Ave
Kalamazoo, MI 49006
(269) 375-9595 Fax: (269) 375-2830

Container Report

Container #: B20-924 Job #: _____ Work Order #: _____

Picked Up Date: 250 ALCOTT ST 1-20-15
Picked Up Address: KALAMAZOO

Delivery Date: 1-20-15
Delivery Address: K700 YARD

Container Condition

Upon Delivery:	☐ New	☐ Near New	☐ Good	☐ Fair
At Pick-Up:	☒ New	☐ Near New	☐ Good	☐ Fair

Tarp Condition (if applicable)

Upon Delivery:	☐ New	☐ Near New	☐ Good	☐ Fair
At Pick-Up:	☒ New	☐ Near New	☐ Good	☐ Fair

Specify Any Existing Damage: _____

Driver (Delivery) _____ Customer Representative (Delivery) _____

Driver (Pick-Up) _____ Customer Representative (Pick-up) _____

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator ID Number: MID 006 678 316
2. Page 1 of 1
3. Emergency Response Phone: 877-457-7455
4. Manifest Tracking Number: 013301909 JJK

5. Generator's Name and Mailing Address: [illegible]

Generator's Site Address (if different than mailing address): [illegible]

Generator's Phone: 312-363-8785

6. Transporter 1 Company Name: SETL

U.S. EPA ID Number: MID 181 [illegible]

7. Transporter 2 Company Name:

U.S. EPA ID Number:

8. Designated Facility Name and Site Address: Citiwide Lockport Landfill (Facility) 1905 - 181st Ave., Lockport, Ill

U.S. EPA ID Number: MID 185 532 072

Facility's Phone:

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes
	1. Non hazardous Sludges	1	TT	1250	Gallons	
	2.					
	3.					
	4.					

14. Special Handling Instructions and Additional Information

15. **GENERATOR'S/OFFEROR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name | Signature | Month | Day | Year: 11 | 25 | 14

GENERATOR

INT'L

16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:

Transporter signature (for exports only): Date leaving U.S.:

TRANSPORTER

17. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: Todd Lockerill | Signature | Month | Day | Year: 11 | 25 | 14

Transporter 2 Printed/Typed Name | Signature | Month | Day | Year

DESIGNATED FACILITY

18. Discrepancy

18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

18b. Alternate Facility (or Generator) | U.S. EPA ID Number

Facility's Phone:

18c. Signature of Alternate Facility (or Generator) | Month | Day | Year

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)

1. | 2. | 3. | 4.

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a

Printed/Typed Name | Signature | Month | Day | Year

EPA Form 8700-22 (Rev. 3-05) Previous editions are obsolete.

GENERATOR'S INITIAL COPY

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167-BLC-O 6 10496

Appendix C
Physical Data—Geotechnical Laboratory Reports

FALLING HEAD / RISING TAIL PERMABILITY
ASTM D 5084 (Method C)

Project Name: Allied Landfill	Sample Identification: MW-70, 36.8-37.55 ft
Project No: 381-757	Sample Description: Light Gray, Clayey Sand w/silt

INITIAL CONDITIONS				FINAL CONDITIONS			
WATER CONTENT		SPECIMEN DATA		WATER CONTENT		SPECIMEN DATA	
Tare No.:	AL4	Length, in:	3.713	Tare No.:	C21	Length, in:	3.713
Wet+Tare, gms:	60.96	Diameter, in:	2.868	Wet+Tare, gms:	198.36	Diameter, in:	2.886
Dry+Tare, gms:	56.38	Wet mass wt., gms:	909.12	Dry+Tare, gms:	186.43	Wet mass wt., gms:	889.34
Tare Weight, gms:	11.21	Area, sq.cm.:	41.68	Tare Weight, gms:	90.23	Area, sq.cm.:	42.20
Moisture, %	10.14	Volume, cc:	393.07	Moisture, %	12.40	Volume, cc:	398.02
Unit wet wt, pcf:	144.3	Vol. of Dry Soil, cc:	298.57	Unit wet wt, pcf:	139.4	Dry mass wt., gms:	791.22
Unit dry wt, pcf:	131.0	Vol. of Voids, cc:	94.50	Unit dry wt, pcf:	124.0	Vol. of Voids, cc:	99.45
Saturation, %:	84.9	Void Ratio:	0.32	Saturation, %:	98.7	Void Ratio:	0.33
Perm. Cell No.:	Perm 1	Burret diam, cm:	1.07	Burret area,sq.cm.:	0.91	Burret factor,cm/cc:	1.1018
Cell Pressure, psi:	50.0	Head Pressure, psi:	42.0	Tail Pressure, psi:	40.0	Specific Gravity:	2.65

PERMEABILITY MEASUREMENTS

Date	Time	Elapse Time (sec)	Temp (^oC)	Pressure Diff. (psi)	Head Rdg (cc)	Tail Rdg (cc)	Head Change (cm)	Tail Change (cm)	Total Head (cm)	Permeability Kt (cm/sec)	Permeability K_{20} (cm/sec)
10/15/2014	07:30	0	22.0	2.0	0.0	24.5	0.000	0.0000	167.59	-	-
10/15/2014	8:20	3000	22.0	2.0	0.4	24.1	-0.441	-0.4407	166.71	1.8E-07	1.7E-07
10/15/2014	11:50	15600	22.0	2.0	1.0	23.1	-0.661	-1.1018	164.95	6.9E-08	6.6E-08
10/15/2014	17:15	35100	22.1	2.0	2.0	21.5	-1.102	-1.7629	162.09	5.1E-08	4.8E-08
10/16/2014	7:15	82500	22.3	2.0	4.2	18.7	-2.424	-3.0850	156.58	4.3E-08	4.0E-08

Coefficient of Permeability, k : **8.1E-08** **cm/sec**
2.7E-09 **ft/sec**

Remarks

Computed By: ag Date: 10/9/2014 Checked By: Date:

FALLING HEAD / RISING TAIL PERMABILITY
ASTM D 5084 (Method C)

Project Name: Allied Landfill	Sample Identification: MW 16I, 47.67-48.5 ft.
Project No: 381-757	Sample Description: Light Gray, Clayey Silt

INITIAL CONDITIONS				FINAL CONDITIONS			
WATER CONTENT		SPECIMEN DATA		WATER CONTENT		SPECIMEN DATA	
Tare No.:	R20	Length, in:	3.051	Tare No.:	C21	Length, in:	3.096
Wet+Tare, gms:	58.08	Diameter, in:	2.834	Wet+Tare, gms:	200.15	Diameter, in:	2.896
Dry+Tare, gms:	49.82	Wet mass wt., gms:	666.92	Dry+Tare, gms:	183.49	Wet mass wt., gms:	634.13
Tare Weight, gms:	10.33	Area, sq.cm.:	40.70	Tare Weight, gms:	96.23	Area, sq.cm.:	42.50
Moisture, %	20.92	Volume, cc:	315.38	Moisture, %	19.09	Volume, cc:	334.19
Unit wet wt, pcf:	132.0	Vol. of Dry Soil, cc:	200.93	Unit wet wt, pcf:	118.4	Dry mass wt., gms:	532.47
Unit dry wt, pcf:	109.1	Vol. of Voids, cc:	114.45	Unit dry wt, pcf:	99.4	Vol. of Voids, cc:	133.26
Saturation, %:	97.3	Void Ratio:	0.57	Saturation, %:	88.8	Void Ratio:	0.66
Perm. Cell No.:	PERM 4	Burret diam, cm:	1.07	Burret area,sq.cm.:	0.91	Burret factor,cm/cc:	1.1018
Cell Pressure, psi:	58.0	Head Pressure, psi:	20.0	Tail Pressure, psi:	18.0	Specific Gravity:	2.65

PERMEABILITY MEASUREMENTS

Date	Time	Elapse Time (sec)	Temp (°C)	Pressure Diff. (psi)	Head Rdg (cc)	Tail Rdg (cc)	Head Change (cm)	Tail Change (cm)	Total Head (cm)	Permeability Kt (cm/sec)	Permeability K_{20} (cm/sec)
10/15/2014	07:30	0	22.0	2.0	0.0	24.5	0.000	0.0000	167.59	-	-
10/15/2014	8:20	3000	22.0	2.0	2.6	21.7	-2.865	-3.0850	161.64	1.0E-06	9.7E-07
10/15/2014	9:50	8400	22.0	2.0	7.4	17.2	-5.289	-4.9581	151.40	6.5E-07	6.3E-07
10/15/2014	11:50	15600	22.1	2.0	13.4	11.3	-6.611	-6.5006	138.29	4.9E-07	4.6E-07
10/15/2014	17:15	32100	22.3	2.0	18.3	6.2	-5.399	-5.6192	127.27	2.2E-07	2.1E-07

Coefficient of Permeability, k : **5.7E-07** **cm/sec**
1.9E-08 **ft/sec**

Remarks

Computed By: ag Date: 10/15/2014

Appendix D
Chemical Data—Laboratory Reports

Located in the folder titled "AppendixD" on this CD.

Appendix E
Data Usability Evaluation

Data Usability Evaluation
Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site, Operable Unit 1: Allied Landfill, Kalamazoo, Michigan October 2014 Groundwater Sampling
WA No. 109-RICO-059B, Contract No. EP-S5-06-01

PREPARED FOR: U.S. Environmental Protection Agency

PREPARED BY: Megan Morrison/CH2M HILL

DATE: June 29, 2015

This memorandum presents the results of the data usability evaluation of groundwater data from the Allied Landfill Operable Unit (OU) 1 Site in Kalamazoo, Michigan. The CH2M HILL field team collected groundwater samples from October 13 through 17, 2014. Laboratories in the U.S. Environmental Protection Agency's (EPA's) Contract Laboratory Program (CLP) analyzed the samples. Groundwater elevations were measured and samples were collected to verify groundwater flow direction and constituent concentrations presented in the Remedial Investigation/ Feasibility Study (RI/FS) (CH2M HILL 2008). Although the RI was written in 2008, the most recent groundwater data was collected in 2002 and 2003. Therefore, this data is being used to supplement the previous RI report and evaluate the current nature and extent of contaminants in the shallow and deeper water bearing units.

Groundwater samples were analyzed for the parameters and methods listed in Table 1.

TABLE 1
Analytical Parameters
Data Usability Evaluation—October 2014
Allied Landfill OU1 Groundwater

Parameter Class	Method	Laboratory
Target Compound List (TCL) Volatile Organic Compounds (VOCs)	CLP Statement of Work (SOW) SOM01.2	PEL Laboratory
TCL Polychlorinated Biphenyls (PCBs)	CLP SOW SOM01.2	PEL Laboratory (Original), Shealy Environmental (Reanalysis)
TCL Semivolatile Organic Compounds (SVOCs)	CLP SOW SOM01.2	PEL Laboratory
Target Analyte List (TAL) Total Metals	CLP SOW ISM01.3	Mitkem Laboratory
Mercury	CLP SOW ISM01.3	Mitkem Laboratory
Cyanide	CLP SOW ISM01.3	Mitkem Laboratory

As part of the quality assurance (QA) process outlined in the site-specific quality assurance project plan (QAPP) (CH2M HILL 2014), quality control (QC) samples were collected in the field to complement the assessment of overall data quality and usability. The QC samples consisted of field duplicates, aliquots for laboratory matrix spike (MS)/matrix spike duplicates (MSD), field blank, equipment blank, and volatile organic compound (VOC) trip blank samples.

Data Evaluation

The Sample Management Office (SMO) completed the data assessment for the samples analyzed by laboratories in the EPA CLP. EPA's Environmental Service Assistance Team (ESAT) contractor, TechLaw,

reviewed the data set to assess the accuracy and precision of the method and the matrix. TechLaw used criteria established in the *EPA CLP National Functional Guidelines for Superfund Organic Methods Data Review (SOM01.2)* (EPA 2008) and *EPA CLP National Functional Guidelines for Inorganic Superfund Data Review (ISM01.2)* (EPA 2010) and verified that the data set was complete. EPA validators also added data qualifiers when the QC statistics indicated a possible bias to specific compounds or analytes associated with a particular method and sample batch.

Standard data qualifiers are a means to classify the data with regard to their conformance to QC requirements. The applied data qualifiers are defined as follows:

[U] The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

[J] The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

[J+] Biased High. The analyte was positively identified, but the associated numerical value is approximate (metals only).

[J-] Biased Low. The analyte was positively identified, but the associated numerical value is approximate (metals only).

[UJ] The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

[R] The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.

CH2M HILL reviewed the validation performed by EPA for the groundwater samples in Case Number 44796, SDGs E53P2, E53R2, and E53T2. The data set includes 32 parent samples, 4 field duplicates, 2 samples designated as MS/MSD samples, 2 field blanks, 2 equipment blanks, and 13 trip blank samples. All collected samples were analyzed by the designated laboratories.

In order to report the PCB data with reporting limits below the QAPP Project Action Limits, the original groundwater samples were shipped from PEL Laboratory to Shealy Environmental in March 2015 for reanalysis. Shealy analyzed the samples, under Case Number 45155, using a modified version of SOM01.2. The qualifications of these particular results are included in this memo; however, the usability of the data is discussed in more detail in **Attachment 1**.

The EPA validation case narratives indicate that some sample results should be qualified as biased based on the applicable QC statistics or other National Functional Guidelines requirements. The TechLaw narratives are presented in **Attachment 2**.

Field QC

EPA validators reviewed field QC samples, including field and equipment blank samples, trip blank samples, and field duplicates, but did not qualify results. CH2M HILL validators reviewed the field QC samples in accordance with the QAPP, and several qualifications were made to metals results in SDG E53P2. See **Attachment 3** for the marked up Form 1 result pages:

- Field duplicate pair E53Q0 and E53Q1 had unacceptable precision results between the parent and duplicate samples for aluminum. Aluminum was J qualified in both samples.
- Field duplicate pair E53R1 and E53R2 had unacceptable precision results between the parent and duplicate samples for lead and zinc. Lead and zinc were J qualified in both samples.

Findings

The following subsections summarize the data validation findings and usability of the final reportable results. The sample numbers and locations do not include QA/QC samples.

Volatile Organic Compound Data

The VOC data set consists of the results for 51 analytes for each of the monitoring well samples, resulting in 1,836 results.

Analysis Group	Validator Qualifier	Count	Percent
VOCs	U	1,801	98.09%
	UJ	22	1.20%
	NULL [Detect]	7	0.38%
	J	6	0.33%
		1,836	100.00%

100.00% not R-flagged and available for use

The data validation summary indicates the following:

- UJ qualifiers were applied to sample results that were potentially affected by QC deficiencies.
- U qualifiers were either reported as non-detects by the laboratory or qualified U by the data validator due to sample results that were potentially affected by QC deficiencies.
- J qualifiers were applied to sample results that were reported between the method detection limit and the reporting limit or were qualified as estimated by the data validator.

One hundred percent of the VOC data, as qualified, can be used to make project decisions.

Polychlorinated Biphenyl Aroclor Data

The PCB Aroclor data set consists of the results for 9 PCB Aroclors for each of the monitoring wells, resulting in 684 results. The PCB samples were first analyzed using methods with detection limits that exceed Michigan Part 201 criteria. PCBs were not detected in these samples and the results were acceptable for use. The sample extracts were reanalyzed utilizing methods with lower detection limits to allow comparison to Michigan Part 201 criteria. These results were rejected due to contract required holding time exceedances, but were used based on information identifying PCB samples may be held for up to 1 year with acceptable results.

Analysis Group	Validator Qualifier	Count	Percent
PEST_PCB	R	359	49.86%
PEST_PCB	U	360	50.00%
PEST_PCB	J	1	0.14%
		720	100.00%

50.14% not R-flagged and available for use according to data validators. However, 100% of the data was used for project decisions.

The validation summary of the PCB Aroclor data indicates the following:

- J qualifiers were applied to sample results that were reported between the method detection limit and the reporting limit or were qualified as estimated by the data validator.
- U qualifiers were either reported as non-detects by the laboratory or qualified U by the data validator due to sample results that were potentially affected by QC deficiencies.

- 359 of the reported PCB results were rejected. These PCB samples were reanalyzed outside of holding time in order to achieve lower CRQLs. The sample extracts were reanalyzed 166-169 days after extraction; the EPA contract required holding time is 40 days after extraction. Although these results were rejected by the data validators due to contract requirements for validation, the project team used the data as if it was "UJ" qualified for project decisions in the RI/FS report. There is significant documentation that PCBs do not readily degrade and may be analyzed up to one year after extraction. See **Attachment 1** for more discussion.

One-hundred percent of the PCB data, as qualified, was used to make project decisions.

Semivolatile Organic Compound Data

The SVOC data set consists of the results for 67 analytes for each of the monitoring well samples, resulting in 2,412 results.

Analysis Group	Validator Qualifier	Count	Percent
SVOA	U	2,397	99.38%
SVOA	J	9	0.37%
SVOA	UJ	6	0.25%
		2,412	100.00%

100.00% not R-flagged and available for use

The data validation summary indicates the following:

- UJ qualifiers were applied to sample results that were potentially affected by QC deficiencies.
- U qualifiers were either reported as non-detects by the laboratory or qualified U by the data validator due to sample results that were potentially affected by QC deficiencies.
- J qualifiers were applied to sample results that were reported between the method detection limit and the reporting limit or were qualified as estimated by the data validator.

One hundred percent of the SVOC data, as qualified, can be used to make project decisions.

Total Metals Data

The Total Metals data set (including mercury and cyanide) consists of the results for 24 analytes for each of the monitoring well samples, resulting in 864 results.

Analysis Group	Validator Qualifier	Count	Percent
METAL	U	454	52.55%
METAL	NULL	288	33.33%
METAL	J	62	7.18%
METAL	J+	38	4.40%
METAL	J-	22	2.55%
		864	100.00%

100.00% not R-flagged and available for use

The data validation summary indicates the following:

- U qualifiers were either reported as non-detects by the laboratory or qualified U by the data validator due to sample results that were potentially affected by QC deficiencies.
- J qualifiers were applied to sample results that were reported between the method detection limit and the reporting limit or were qualified as estimated by the data validator.
- J+ qualifiers were applied to sample results that are suspected to be biased high.
- J- qualifiers were applied to sample results that are suspected to be biased low.

One hundred percent of the Metals data, as qualified, can be used to make project decisions.

Overall Assessment

The final activity in the data quality evaluation is an assessment of whether the data meet the data quality objectives. The goal of the assessment was to demonstrate that a sufficient number of representative samples were collected, and the resulting analytical data can be used to support the decision making process. The following summary highlights the data evaluation findings for the above-defined events:

1. The completeness objective of 90 percent was met for all method/analyte combinations. Although some PCB data was rejected by the validator, 100 percent of this data was used by the project team as discussed in attachment 1.
2. The precision and accuracy of the data, as measured by field and laboratory QC indicators, indicate that the data quality objectives were met.

References Cited

CH2M HILL. 2014. *Quality Assurance Project Plan, Allied Paper, Inc./ Portage Creek/ Kalamazoo River Superfund Site Operable Unit 1: Allied Landfill, Kalamazoo, Michigan. WA No. 109-RICO-059B, Contract No. EP-S5-06-01.* August.

U.S. Environmental Protection Agency (EPA). 2008. *Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review*. EPA-540-R-08-01. June.

U.S. Environmental Protection Agency (EPA). 2010. *Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review*. EPA-540-R-10-011. January.

Attachment 1
PCBs Data Usability Recommendation Memorandum

PCBs Data Usability Recommendation Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site: Operable Unit 1, Allied Landfill, Kalamazoo, Michigan October 2014 Groundwater Investigation WA No. 109-RICO-059B, Contract No. EP-S5-06-01

PREPARED FOR: U.S. Environmental Protection Agency

PREPARED BY: Megan Morrison/CH2M HILL

DATE: June 29, 2015

The objective of the Data Usability memorandum is to assess the data quality and usability of polychlorinated biphenyl (PCB) analytical results for samples collected during the field investigation conducted at the Allied Landfill OU1 Site in Kalamazoo, Michigan from October 13-17, 2014. Groundwater samples were collected with the objective to verify groundwater concentrations and flow directions presented in the Remedial Investigation/ Feasibility Study (RI/FS) (CH2M HILL 2008). Although the RI was written in 2008, the most recent groundwater data was collected in 2002 and 2003. Therefore, this data is being used to supplement the previous RI report and evaluate the current nature and extent of contaminants in the shallow and deeper water bearing units.

Analytical Data

CH2M HILL collected groundwater samples in October 2014 as described in the OU 1 Quality Assurance Project Plan (QAPP) (CH2M HILL 2014). The samples were analyzed by Spectrum Analytical's Rhode Island and Florida divisions for various parameters. Although the QAPP requirements were met, the contract required quantitation limits (CRQLs) of 1 µg/L for PCB Aroclors were not lower than the Project Action Limits (PALs) specified in the QAPP: the Michigan Department of Environmental Quality (DEQ) Residential Drinking Water criteria of 0.5 µg/L and the Michigan DEQ Groundwater Surface Water Interface (GSI) criteria of 0.2 µg/L. All PCB results were nondetect during this investigation and reported at the 1 µg/L CRQL. This data was analyzed within holding times and there were no PAL exceedances.

In order to achieve CRQLs below the PALs, the sample extracts were sent to Shealy Laboratories in March 2015 for reanalysis. They were analyzed by a modified version of SOM01.2 Modification Reference Number 2403.1, titled 'Aroclor Analysis at Lower CRQLs'. There were three low-level detections in this data that were less than ¼ of the CRQL, and the RPD was greater than 25 percent; therefore, the validator raised the value to the CRQL and identified these results as nondetects.

The extracts were re-analyzed 166-169 days after extraction. The holding time for analysis is 40 days after extraction. The EPA National Functional Guidelines recommends that in times of gross exceedance, the data validator should qualify the detects with a J and nondetects using professional judgment. The data validator chose to R qualify the nondetect data according to the functional guidelines.

Discussion

Technical Discussion of PCB Holding Times

Although the EPA CLP Method SOM01.2 gives a recommended holding time of 7 days until extraction and 40 days until analysis, there is technical basis from other EPA methods showing that PCBs may be held up to one year after extraction with little to no loss of concentration of PCBs.

- EPA Clean Water Act method 608 for Aroclors recommends 1 year until extraction, then 1 year until analysis
- EPA SW-846 Chapter 4 gives "None" as the holding time for PCBs by 8082A

- EPA Clean Water Act method 1668C for PCB congeners (high resolution method for individual congeners) says that if the samples are stored properly, the holding time is one year

PCBs are known to be very stable and persistent in the environment. They do not break down readily, which has caused many of the above methods to lengthen the prescribed holding times in the past few years.

Intended Data Use

The intended use of this data is to supplement previous RI data and show that no major changes have occurred since 2002-2003. The re-analyzed data did not show any detections above the PALs. Due to the stability of PCBs in the environment, it is not likely that there was significant degradation to PCB concentrations between October and March. Therefore, CH2M HILL converted the R-qualified PCB data to UJ-qualifiers in order to use the data to validate the OU1 CSM with regards to the nature and extent of PCB contamination.

Conclusions

While the SMO validator followed the functional guidelines when assigning the R qualifier, there is sufficient evidence suggesting that PCB samples may be stored up to a year after collection without significant degradation of concentration. CH2M HILL recommends that all re-analyzed PCB data is available for project use as J/UJ qualified for the holding time exceedances.

Attachment 2
CLP Validation Narratives

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION V
SUPERFUND DIVISION

DATE:

SUBJECT: Review of Data
Received for Review on: 5 November 2014

FROM: Timothy Prendiville, Supervisor (**SR-6J**)
Superfund Contract Management Section

TO: Data User: CH2M Hill
Kaitlin.Ma@CH2M.com

Level 3 Data Validation for EDM EXES Reports

We have reviewed the data for the following case:

SITE Name: Allied Paper, Inc (MI)

Case Number: 44796 SDG Number: E53T2

Number and Type of Samples: 13 Waters (13 trace volatiles, 7 semivolatiles/aroclors)

Sample Numbers: E53T2-E53T9, E53W0-E53W4

Laboratory: PEL (Spectrum) Hrs for Review:

Following are our findings:

CC: Howard Pham
Region 5 TPO
Mail Code: **SA-5J**

Case Number: 44796 SDG Number: E53T2
Site Name: Allied Paper, Inc (MI) Laboratory: PEL (Spectrum)

Below is a summary of the out-of-control audits and the possible effects on the data for this case:

Thirteen (13) preserved water samples labeled E53T2-E53T9 and E53W0-E53W4, were shipped to PEL, Spectrum Analytical, Inc., located in Tampa, FL. All samples were collected 10/16/14 and 10/17/14 and received 10/18/14 intact. All samples arrived at the proper shipping temperature range of 2 - 6°C, except for trace volatile samples E53T4, E53T5, E53T9, E53W0, E53W2 (1 vial), E53W3 (2 vials) and E53W4 (2 vials) and semivolatile and aroclor samples E53T9 and E53W0. Trace volatile samples E53T4, E53W0, E53W2 (1 vial), E53W3 (2 vials) and E53W4 (2 vials) arrived in a cooler with a temperature of 1.8°C. All of the fractions for E53T9 and both semivolatile and aroclor fractions for E53W0 arrived in a cooler with a temperature of 1.2°C. Both semivolatile and aroclor fractions for E53W2, E53W3, and E53W4 arrived in a cooler with a temperature of 0.6°C. Trace volatile sample E53T5 arrived in a cooler with a temperature of 0.8°C. Sample results are not qualified for this discrepancy.

All samples were analyzed for the trace volatile list of compounds. Seven samples; E53T2, E53T9, and E53W0-E53W4, were analyzed for the semivolatile and aroclor lists of compounds. All samples were analyzed according to CLP SOW SOM01.2 (6/2007) and reviewed according to the NFG for SOM01.2 and the SOP for ESAT 5/TechLaw Validation of Contract Laboratory Program Organic Data (Version 2.6.2).

No samples were designated by the samplers to be used for laboratory QC, i.e. MS/MSD analyses. Per the Region, the laboratory QC was canceled for this SDG due to insufficient sample volumes.

Samples E53T3, E53T4, E53T5, E53T6, E53T7, and E53T8 were identified as trip blanks.

No samples were identified as field duplicates.

Case Number: 44796 SDG Number: E53T2
Site Name: Allied Paper, Inc (MI) Laboratory: PEL (Spectrum)

1. HOLDING TIME

No problems were found.

2. GC/MS TUNING AND GC INSTRUMENT PERFORMANCE

No problems were found.

3. CALIBRATION

The following trace volatile samples are associated with an initial calibration percent relative standard deviation (%RSD) outside criteria. The compound was not detected in any of the samples. Non-detected compounds are not qualified.

E53T2, E53T3, E53T4, E53T5, E53T6, E53T7, E53T8, E53T9, E53W0, E53W1, E53W2, E53W3, E53W4, VBLK7E, VHBLK7D
Bromomethane

4. BLANKS

The following trace volatile samples have common contaminant analyte concentrations reported less than 2x the CRQL. The associated method blank has common contaminant analyte concentration less than 2x the concentration criteria. Detected compounds are qualified U. Non-detected compounds are not qualified. Reported sample concentrations have been elevated to 2x the CRQL.

Acetone
E53W2, VHBLK7D

The following semivolatile samples have TIC concentrations reported less than 5X the method blank concentration. Detected compounds are qualified U and deleted from the TIC report.

Unknown @ 3.994
E53T2, E53T9, E53W0, E53W3, E53W4

Unknown @ 7.727
E53W2, E53W3

CAS No. 1599-67-3 1-Docosene
E53T2, E53T9, E53W0, E53W1, E53W2, E53W3, E53W4

CAS No. 7683-64-9 Squalene (also known by CAS No. 111-02-4)
E53W2

5. DEUTERATED MONITORING COMPOUND AND SURROGATE RECOVERY

The following semivolatile samples have deuterated monitoring compound recovery above the upper limit of the criteria window. The compounds were not detected in the sample. Non-detected compounds are not qualified.

E53W0
2-Chlorophenol

E53W2
2-Chlorophenol, 4,6-Dinitro-2-methylphenol

6A. MATRIX SPIKE/MATRIX SPIKE DUPLICATE

No samples were designated by the samplers to be used for laboratory QC, i.e. MS/MSD analyses. Per the Region, the laboratory QC was canceled for this SDG due to insufficient sample volumes.

6B. LABORATORY CONTROL SAMPLE

No problems were found.

7. FIELD BLANK AND FIELD DUPLICATE

Samples E53T3, E53T4, E53T5, E53T6, E53T7, and E53T8 were identified as trip blanks. No trace volatile compounds were in trip blank E53T6. Results are summarized in the following table:

	E53T3	E53T4	E53T5	E53T7	E53T8
Trace volatile analytes:	µg/L	µg/L	µg/L	µg/L	µg/L
Chloroform	4.4	4.2	3.8	4.1	4.2
# of TVOA TICs	0	0	0	0	0

No samples were identified as field duplicates.

8. INTERNAL STANDARDS

No problems were found.

9. COMPOUND IDENTIFICATION

After reviewing the mass spectra and chromatograms it appears that all trace volatile, semivolatile, and aroclor compounds were properly identified.

10. COMPOUND QUANTITATION AND REPORTED DETECTION LIMITS

The following trace volatile samples have analyte concentrations below the quantitation limit (CRQL). Detected compounds are qualified J.

VBLK7E
Acetone

A library search indicates a match at or above 85% for a TIC compound in the trace volatile sample. Detected compounds are qualified NJ.

CAS No. 7446-09-5 Sulfur dioxide
E53W4

The following semivolatile samples have analyte concentrations below the quantitation limit (CRQL). Detected compounds are qualified J.

E53T2
Di-n-butylphthalate

SBLK4D, SBLK4E
Acetophenone

A library search indicates a match below 85% for a TIC compound in the semivolatile sample. Detected compounds are qualified J.

Unknown @ 3.769; Unknown @ 14.776
E53W3

Unknown @ 3.994
SBLK4D, SBLK4E

Unknown @ 7.732; Unknown @ 8.834
SBLK4E

Unknown @ 9.080; Unknown @ 9.299
E53W4

Unknown @ 9.658
E53W0

Unknown @ 13.327
E53W0, E53W1, E53W2, E53W3

Unknown @ 13.450; Unknown @ 13.594
E53W1, E53W2, E53W3

Unknown @ 13.493; Unknown @ 15.606; Unknown @ 15.873
E53W1

Unknown @ 14.942
E53T2, E53W4

A library search indicates a match at or above 85% for a TIC compound in the semivolatile sample. Detected compounds are qualified NJ.

CAS No. 57-10-3 n-Hexadecanoic acid
E53W0, E53W1, E53W2, E53W3

CAS No. 80-05-7 Phenol, 4,4'-(1-methylethylidene)bis-
E53W4

CAS No. 1599-67-3 1-Docosene
SBLK4D, SBLK4E

CAS No. 7683-64-9 Squalene
SBLK4E

The following semivolatile samples have analyte concentrations below the quantitation limit (CRQL). Detected compounds are qualified J.

ALCS4D
Aroclor-1016, Aroclor-1260

11. SYSTEM PERFORMANCE

GC/MS and GC baselines indicated acceptable performance.

12. ADDITIONAL INFORMATION

When evaluating TIC compounds, a library search is supposed to be performed. Then, the three closest matches are to be included in the report. The laboratory did not always perform/print out the searches for the trace volatile and semivolatile samples.

TICs with no CAS Numbers were not reported in the EXES Sample Summary Report for the semivolatile fraction. Please refer to Word document "44796 E53T2 TIC Report" for the validated TIC results.

Case Number: 44796 SDG Number: E53T2
Site Name: Allied Paper, Inc (MI) Laboratory: PEL (Spectrum)

Manual integrations were performed. The manual integrations appear to follow Good Laboratory Practices.

The following aroclor sample was not included in the sample summary or superset. Form Is are included with the hard copy data package.

ALCS4D

The following semivolatile samples have a compound identified by CAS No. in some samples and as an "unknown" TIC or different CAS No. in other samples. A comparison of the chromatograms demonstrated that the TICs are most probably the same compound in the respective samples. Copies of the chromatograms are included with the validation report. See Section 4 for blank qualifications.

CAS No. 74339-53-0 Trichloroacetic acid, pentadecyl ester (@ RT 13.7)
E53W2
versus
CAS No. 629-96-9 1-Eicosanol (@ RT 13.7)
E53W0, E53W1, E53W3
versus
CAS No. 1599-67-3 1-Docosene (@ RT 13.7)
E53T9, E53W4, SBLK4D, SBLK4E
versus
CAS No. 18435-45-5 1-Nonadecene (@ RT 13.7)
E53T2

CAS No. 7683-64-9 Squalene (@ RT 14.9)
SBLK4E
versus
CAS No. 111-02-4 2,6,10,14,18,22-Tetracosahexaene, 2,6,10,15,19,2 (@ RT 14.9)
E53W2

Case Number: 44796 SDG Number: E53T2
Site Name: Allied Paper, Inc (MI) Laboratory: PEL (Spectrum)

CADRE Data Qualifier Sheet

Qualifiers	Data Qualifier Definitions
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J	The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte in the sample.
UJ	The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the action limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
N	The analysis indicates the presence of an analyte for which there is presumptive evidence to make a tentative identification.
NJ	The analysis indicates the presence of an analyte for which there is presumptive evidence to make a tentative identification and the associated numerical value represents its approximate concentration.
R	The data are unusable. (The compound may or may not be present.)

Reviewed by: Deborah Connet / Techlaw-ESAT
Date: 11/21/2014

Regional Transmittal Form

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION V

DATE: **11/14/14**

SUBJECT: **Review of Data**
Received for review on 11/7/14

FROM: **Timothy Prendiville, Supervisor, Chief (SR-6J)**
Superfund Contract Management Section

TO: **Data User: CH2M Hill**
Email address: kaitlin.ma@CH2M.com

LEVEL 3 DATA VALIDATION

We have reviewed the data for the following case:

SITE NAME: Allied Paper, Inc. (MI)

CASE NUMBER: 44796 **SDG NUMBER: ME53P2**

Number and Type of Samples: 20 waters (metals/Hg/CN)

Sample Numbers: ME53P2-P4, P6-P9, Q0-Q4, Q8, Q9, R0-R4, R8

Laboratory: Spectrum Analytical (MITKEM) **Hrs. for Review: __**

Following are our findings:

CC: Howard Pham
Region 5 TPO
Mail Code: SA-5J

Below is a summary of the out-of-control audits and the possible effects on the data for this case:

Twenty (20) water samples, numbered ME53P2-P4, P6-P9, Q0-Q4, Q8, Q9, R0-R4, R8, were collected between October 13 and 16, 2014. The lab received the samples between October 15 and 18, 2014 in good condition. All samples were analyzed for metals and cyanide. All samples were analyzed using the CLP SOW ISM01.3 analysis procedures.

Mercury analysis was performed using a Cold Vapor AA Technique. Cyanide analysis was performed using the MIDI Distillation procedure. The remaining inorganic analyses were performed using an Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS) procedure.

The samples for this SDG were prepared in two digestion batches. A sample from each batch was used for serial dilution (ME53P9 and ME53R0). Failures occurred in only 1 of the serial dilutions. Results for that sample (ME53R0) only are qualified.

1. HOLDING TIME:

No defects were found.

2. CALIBRATIONS:

No defects were found for the calibrations.

3. BLANKS:

The following inorganic samples are associated with an ICB/CCB or preparation blank concentration which is greater than the method detection limit (MDL). The sample result is greater than the MDL.

Hits less than the CRQL are qualified "U". The sample result is raised to the CRQL.
Hits greater than the CRQL but less than 5 times the blank are qualified "J+".

Aluminum
ME53P2, ME53P4, ME53P6, ME53P7, ME53P8, ME53P9, ME53Q2, ME53Q3, ME53Q4, ME53Q9, ME53R0, ME53R1, ME53R2, ME53R3, ME53R4, ME53R8

Antimony
ME53P2, ME53P6, ME53P7, ME53P8, ME53P9, ME53Q2, ME53Q4, ME53Q8, ME53Q9, ME53R0, ME53R1, ME53R2, ME53R4

Cobalt
ME53P3, ME53P4, ME53P6, ME53P7, ME53P8, ME53P9, ME53Q0, ME53Q1, ME53Q2, ME53Q3, ME53Q8, ME53Q9, ME53R1, ME53R2, ME53R3, ME53R8

Iron
ME53R1, ME53R2

Nickel
ME53P7, ME53P8, ME53Q0, ME53Q3, ME53Q4, ME53R0, ME53R1, ME53R2, ME53R8

The following inorganic samples are associated with a negative ICB/CCB or preparation blank concentration whose absolute value is greater than the method detection limit (MDL). The sample result is also greater than the MDL.

Hits less than 5 times the blank are qualified "J-".

Manganese
ME53Q2

Selenium
ME53P8

Zinc
ME53P7, ME53P8, ME53P9, ME53Q0, ME53Q1, ME53Q3, ME53Q8, ME53R0, ME53R3, ME53R4, ME53R8

No samples were identified as field blanks.

4. MATRIX SPIKE/MATRIX SPIKE DUPLICATE AND LAB CONTROL SAMPLE:

No defects were found for matrix spike sample or laboratory control samples.

5. LABORATORY AND FIELD DUPLICATE:

No defects were found for the laboratory duplicate samples.

ME53R0 and ME53R1 are field duplicate pairs. The following inorganic analytes are associated with field duplicate results which did not meet technical data validation criteria; however, no sample results are qualified for field duplicates.

Lead, Zinc

ME53R8 is a field duplicate of samples that are not present in this SDG.

ME53Q0 and ME53Q1 are field duplicate pairs. No defects were found for the field duplicate samples.

6. ICP ANALYSIS:

The following inorganic samples are associated with an ICP serial dilution percent difference which is not in control.
Hits are qualified "J" and non-detects are qualified "UJ".

Iron
ME53R0

Magnesium
ME53R0

No defects were found for the tune, internal standards or ICS samples.

7. SAMPLE RESULTS:

The following inorganic samples have analyte concentrations reported above the method detection limit (MDL) but below the quantitation limit (CRQL).
Results are qualified “J”.

Arsenic
ME53P8, ME53P9, ME53Q0, ME53Q1, ME53Q8, ME53Q9, ME53R8

Cadmium
ME53Q2, ME53R1, ME53R2

Chromium
ME53P2, ME53P7, ME53Q0, ME53Q1, ME53Q3, ME53Q8, ME53R0, ME53R4

Copper
ME53P2, ME53P3, ME53P6, ME53P7, ME53P8, ME53P9, ME53Q2, ME53Q8, ME53Q9, ME53R0, ME53R1, ME53R2, ME53R3, ME53R4

Lead
ME53P8, ME53Q8, ME53R4, ME53R8

Manganese
ME53Q2

Mercury
ME53R8

Selenium
ME53P8, ME53Q9, ME53R0, ME53R1, ME53R2, ME53R3, ME53R4

Zinc
ME53P7, ME53P8, ME53P9, ME53Q0, ME53Q1, ME53Q3, ME53Q8, ME53R0, ME53R3, ME53R4, ME53R8

All data, except those qualified above, are acceptable.

EXES ISM01.3 Data Qualifier Sheet

Qualifiers	Data Qualifier Definitions
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J+	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting Quality Control (QC) criteria. The analyte may or may not be present in the sample.
UJ	The analyte was analyzed for, but not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

Regional Transmittal Form

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION V

DATE: **11/14/2014**

SUBJECT: **Review of Data**
Received for review on 11/7/2014

FROM: **Timothy Prendiville, Supervisor, Chief (SR-6J)**
Superfund Contract Management Section

TO: **Data User: CH2M Hill**
Email address: kaitlin.ma@CH2M.com

LEVEL 3 DATA VALIDATION

We have reviewed the data for the following case:

SITE NAME: Allied Paper, Inc. (MI)

CASE NUMBER: 44796 **SDG NUMBER: ME53R9**

Number and Type of Samples: 20 waters (metals/Hg/CN)

Sample Numbers: ME53R9, S0 – S9, T0 – T2, T9, W0 – W4

Laboratory: Mitkem **Hrs. for Review: __**

Following are our findings:

CC: Howard Pham
Region 5 TPO
Mail Code: SA-5J

Below is a summary of the out-of-control audits and the possible effects on the data for this case:

Twenty (20) water samples, numbered ME53R9, S0 – S9, T0 – T2, T9, and W0 – W4, were collected October 16 – 17, 2014. The lab received the samples on October 18, 2014 in good condition. All samples were analyzed for metals and cyanide. All samples were analyzed using the CLP SOW ISM01.3 analysis procedures.

Mercury analysis was performed using a Cold Vapor AA Technique. Cyanide analysis was performed using the MIDI Distillation procedure. The remaining inorganic analyses were performed using an Inductively Coupled Plasma – Mass Spectroscopy (ICP–MS) procedure.

1. HOLDING TIME:

No defects were found.

2. CALIBRATIONS:

No defects were found for the calibrations.

3. BLANKS:

The following inorganic samples are associated with an ICB/CCB or preparation blank concentration which is greater than the method detection limit (MDL). The sample result is greater than the MDL.

Hits less than the CRQL are qualified "U". The sample result is raised to the CRQL.
Hits greater than the CRQL but less than 5 times the blank are qualified "J+".

Aluminum
ME53R9, ME53S0, ME53S1, ME53S2, ME53S3, ME53S4, ME53S5, ME53S6, ME53S7, ME53S8, ME53S9, ME53T0, ME53T1, ME53T2, ME53T9, ME53W0, ME53W1, ME53W2, ME53W3, ME53W4

Antimony
ME53R9, ME53S0, ME53S1, ME53S2, ME53S3, ME53S4, ME53S5, ME53S6, ME53S7, ME53S8, ME53S9, ME53T0, ME53T2, ME53T9, ME53W0, ME53W2, ME53W4

Barium
ME53S6, ME53S7

Cadmium
ME53W4

Calcium
ME53S4, ME53S5, ME53S6, ME53S7

Cobalt
ME53R9, ME53S0, ME53S1, ME53S2, ME53S3, ME53S8, ME53S9, ME53T0, ME53T1, ME53T2, ME53T9, ME53W0, ME53W1, ME53W2, ME53W3, ME53W4

Copper
ME53S0, ME53S1, ME53S2, ME53S3, ME53S6, ME53T0, ME53T1, ME53T2, ME53T9, ME53W0, ME53W1, ME53W2, ME53W3

Lead
ME53S3, ME53W2, ME53W4

Magnesium
ME53S4, ME53S6, ME53S7

Nickel
ME53R9, ME53S0, ME53S1, ME53S6, ME53S8, ME53S9, ME53T0, ME53T9, ME53W1

Sodium
ME53S4, ME53S5, ME53S6, ME53S7

The following inorganic samples are associated with a negative ICB/CCB or preparation blank concentration whose absolute value is greater than the method detection limit (MDL). The sample result is also greater than the MDL.
Hits less than 5 times the blank are qualified “J-”.

Selenium
ME53S0, ME53S2, ME53S3, ME53S8, ME53S9, ME53T0, ME53W1, ME53W2, ME53W3

Zinc
ME53S7

The following inorganic samples are associated with a field blank concentration which is greater than the MDL but less than the CRQL. Samples ME53S4 – ME53S7 are identified as field blanks.
Hits less than the CRQL are qualified “U”. The sample result is raised to the CRQL. Hits greater than the CRQL but less than 5 times the blank are qualified “J+”. Hits greater than 5 times the blank are not qualified.

Chromium
ME53S0, ME53S2, ME53S3, ME53T0, ME53T2, ME53W0, ME53W1, ME53W2

Manganese
ME53R9, ME53S2, ME53W2, ME53W3, ME53W4

Nickel
ME53S2, ME53S3, ME53T1, ME53T2, ME53W0, ME53W2, ME53W3

Zinc
ME53W2, ME53W4

The following inorganic samples are associated with a field blank concentration which is greater than the method detection limit (MDL) and with a negative ICB/CCB or preparation blank whose absolute value is greater than the MDL but less than the CRQL. The sample result is greater than the MDL. Samples ME53S4 – ME53S7 are identified as field blanks.
Hits less than the CRQL are qualified “U”. The sample result is raised to the CRQL. Hits greater than the CRQL but less than 5 times the blank are qualified “J”.

Zinc
ME53S1, ME53S2, ME53S3, ME53S8, ME53S9, ME53T0, ME53T1, ME53T2, ME53W0, ME53W3

4. MATRIX SPIKE/MATRIX SPIKE DUPLICATE AND LAB CONTROL SAMPLE:

No defects were found for matrix spike and laboratory control samples.

5. LABORATORY AND FIELD DUPLICATE:

No defects were found for the laboratory duplicate samples.

ME53S8/S9 are field duplicates. No defects were found for the field duplicate samples. ME53R9 is a field duplicate of a sample that is not present in this SDG.

6. ICP ANALYSIS:

No defects were found for the tune, internal standards, ICS samples or serial dilution sample.

7. SAMPLE RESULTS:

The following inorganic samples have analyte concentrations reported above the method detection limit (MDL) but below the quantitation limit (CRQL).
Results are qualified “J”.

Arsenic
ME53R9, ME53S0, ME53S1, ME53S3, ME53S8, ME53S9, ME53T2, ME53W4

Chromium
ME53S6

Mercury
ME53W4

Selenium
ME53S0, ME53S2, ME53S3, ME53S8, ME53S9, ME53T0, ME53W1, ME53W2, ME53W3

Zinc
ME53S7

All data, except those qualified above, are acceptable.

EXES ISM01.3 Data Qualifier Sheet

Qualifiers	Data Qualifier Definitions
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J+	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting Quality Control (QC) criteria. The analyte may or may not be present in the sample.
UJ	The analyte was analyzed for, but not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION V
SUPERFUND DIVISION

DATE:

SUBJECT: Review of Data
Received for Review on: 31 October 2014

FROM: Timothy Prendiville, Supervisor (SR-6J)
Superfund Contract Management Section

TO: Data User: CH2M Hill
Email Address: Kaitlin.Ma@ch2m.com

Level 3 Data Validation for EDM EXES database

We have reviewed the data for the following case:

SITE Name: Allied Paper, Inc. (MI)

Case Number: 44796 SDG Number: E53R2

Number and Type of Samples: Water (20 TVOA, 17 SVOA, 17 Aroclor)

Sample Numbers: E53R2 – E53R9, E53S0 – E53S9, E53T0, E53T1

Laboratory: Spectrum Analytical, Inc - PEL Hrs for Review:

Following are our findings:

CC: Howard Pham
Region 5 TPO
Mail Code: SA-5J

Case Number: 44796 SDG Number: E53R2
Site Name: Allied Paper, Inc. (MI) Laboratory: PEL

Below is a summary of the out-of-control audits and the possible effects on the data for this case:

Twenty (20) water samples labeled E53R2 – E53R9, E53S0 – E53S9, E53T0 and E53T1, were shipped to Spectrum Analytical, Inc. located in Tampa, FL (PEL). All samples were collected between 10/15 and 10/16/2014 and received on 10/17 and 10/18/2014 intact. All samples were properly cooled except E53S2, E53S3 and E53S7, which were received below the required temperature range. One VOA vial for sample E53S9 and one SV/ARO amber jar were received already broken. The remaining containers contained sufficient sample volume to allow the requested analyses to be conducted. No qualifications are necessary for this discrepancy.

All samples were analyzed for the Trace VOA list of compounds. Samples E53R2 – E53R4, E53R8, E53R9, E53S0 – E53S9, E53T0 and E53T1 were analyzed for the SVOA and Aroclor list of compounds. All samples were analyzed according to CLP SOW SOM01.2 and reviewed according to the NFG for SOM01.2 and the SOP for ESAT 5/TechLaw Validation of Contract Laboratory Program Organic Data (Version 2.6.2).

Sample E53S0 was designated by the samplers to be used for laboratory QC, i.e. MS/MSD analyses.

Samples E53R5, E53R6, and E53R7 were identified as trip blanks. Samples E53S4 and E53S5 were identified as field blanks. Samples E53S6 and E53S7 were identified as equipment blanks. Samples E53R8 / E53R9 and E53S8 / E53S9 appear to be field duplicate pairs. Sample E53R2 appears to be the field duplicate of a sample not included in this SDG.

Case Number: 44796 SDG Number: E53R2
Site Name: Allied Paper, Inc. (MI) Laboratory: PEL

1. HOLDING TIME

No problems found.

2. GC/MS TUNING AND GC INSTRUMENT PERFORMANCE

No problems found.

3. CALIBRATION

The following trace volatile samples are associated with an initial calibration percent relative standard deviation (%RSD) outside criteria. The compound was not detected in the samples. Non-detected compounds are not qualified for this criteria.

E53R2, E53R3, E53R4, E53R5, E53R6, E53R7, E53R8, E53R9, E53S0, E53S0MS, E53S0MSD, E53S1, E53S2, E53S3, E53S4, E53S5, E53S6, E53S7, E53S8, E53S9, E53T0, E53T1, VBLK1C, VBLK7D, VHBLK7C
Bromomethane

The following trace volatile samples are associated with an opening CCV percent difference (%D) outside criteria. The compound was not detected in the samples. Non-detected compounds are qualified UJ.

E53R2, E53R3, E53R4, E53R5, E53R6, E53R7, VBLK1C
Bromomethane

4. BLANKS

The following trace volatile samples have common contaminant analyte concentrations reported less than 2x the CRQL. The associated method blank has common contaminant analyte concentration less than 2x the concentration criteria. Detected compounds are qualified U. Non-detected compounds are not qualified. Reported sample concentrations have been elevated to 2x the CRQL and qualified U.

E53R3, E53R9, E53S8, E53S9, VHBLK7C
Acetone

E53R5, E53R6, E53R7
Methylene chloride

The following trace volatile samples have contaminant analyte concentrations reported greater than or equal to the CRQL and less than 2x the blank concentration. The associated field blank has contaminant analyte concentration greater than the concentration criteria. Detected compounds are reported at the sample concentration and qualified U.

E53S6, E53S7
Chloroform

The following semivolatile samples have TIC concentrations reported less than 5X the method blank concentration. Detected compounds are qualified U and deleted from the TIC report.

Unknown @ 3.99
E53R3, E53R4, E53R8, E53R9, E53S2, E53S3, E53S4, E53S5, E53S6, E53S7, E53S8, E53T0, E53T1

Cas No. 1599-67-3 1-Docosene / Unknown @ 13.723
E53R2, E53R3, E53R4, E53R8, E53R9, E53S0, E53S1, E53S2, E53S3, E53S4, E53S5, E53S6, E53S7, E53S8, E53S9, E53T0, E53T1

5. DEUTERATED MONITORING COMPOUND AND SURROGATE RECOVERY

The following trace volatile samples have one or more DMC/SMC recovery values less than the primary lower limit but greater than or equal to the expanded lower limit (20%) of the criteria window. The compounds were not detected in the samples. Non-detected compounds are qualified UJ.

E53R2, E53S4
Vinyl chloride

6A. MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Sample E53S0 was designated by the samplers to be used for laboratory QC, i.e. MS/MSD analyses.

The following semivolatile matrix spike/matrix spike duplicate samples have percent recoveries greater than the upper acceptance criteria. Detected compounds are qualified J.

E53S0MS, E53S0MSD
4-Nitrophenol

The associated semivolatile matrix spike/matrix spike duplicate samples have percent recoveries greater than the upper acceptance criteria and less than 100% recovery. The compound was not detected in the unspiked sample. The non-detected compound in the unspiked sample is not qualified.

E53S0
4-Nitrophenol

Case Number: 44796 SDG Number: E53R2
Site Name: Allied Paper, Inc. (MI) Laboratory: PEL

6B. LABORATORY CONTROL SAMPLE

No problems found.

7. FIELD BLANK AND FIELD DUPLICATE

Samples E53R5, E53R6, and E53R7 were identified as trip blanks. Results are summarized in the following table:

	E53R5	**E53R6**	**E53R7**
Sample Identifier:	TB001-10152014	TB002-10152014	TB003-10152014
Collection Date/Time:	10/15/2014	10/15/2014	10/15/2014
Volatile analytes:	µg/L	µg/L	µg/L
Chloroform	5.0	4.9	5.0
# of TICs	1	0	0
Associated samples:	E53R2, E53R3, E53R4		

Samples E53S4 and E53S5 were identified as field blanks. Results are summarized in the following table:

	E53S4	**E53S5**
Sample Identifier:	AP-OU1-FB-01-101714	AP-OU1-FB-02-101714
Collection Date/Time:	10/14/2014 10:00	10/17/2014 10:05
Volatile analytes:	µg/L	µg/L
Chloroform	3.8	4.1
# of TICs	0	0

	E53S4	E53S5
SVOA # of TICs	1	2

Samples E53S6 and E53S7 were identified as equipment blanks. Results are summarized in the following table:

	E53S6	**E53S7**
Sample Identifier:	AP-OU1-EB-01-101714	AP-OU1-EB-02-101714
Collection Date/Time:	10/17/2014 10:10	10/17/2014 10:15
Volatile analytes:	µg/L	µg/L
SVOA # of TICs	2	0

Samples E53R8 / E53R9 and E53S8 / E53S9 appear to be field duplicate pairs. Results are summarized in the following table:

	E53R8	**E53R9**	**E53S8**	**E53S9**
Sample Identifier:	AP-OU1-MW-211	AP-OU1-MW-211-FD	AP-OU1-MW-22-B	AP-OU1-MW-22-B-FD
Collection Date/Time:	10/16/2014 10:05	10/16/2014 10:10	10/16/2014 15:11	10/16/2014 15:15
# of SVOA TICs	3	3	2	1

Results are not qualified based upon the results of the field duplicates.

8. INTERNAL STANDARDS

No problems found.

9. COMPOUND IDENTIFICATION

After reviewing the mass spectra and chromatograms it appears that all VOA, SVOA and aroclor compounds were properly identified.

10. COMPOUND QUANTITATION AND REPORTED DETECTION LIMITS

The following trace volatile samples have analyte concentrations below the quantitation limit (CRQL). Detected compounds are qualified J.

E53S2
Cyclohexane, Isopropylbenzene

VBLK1C
Acetone, Methylene chloride

VBLK7D
Acetone

A library search indicates a match at or above 85% for a TIC compound in the trace volatile sample. Detected compounds are qualified NJ.

Cas No. 7446-09-5 Sulfur dioxide
E53R5, E53T0

A library search indicates a match below 85% for a TIC compound in the trace volatile sample. Detected compounds are qualified J.

Unknown @ 1.33
E53R4

Case Number: 44796 SDG Number: E53R2
Site Name: Allied Paper, Inc. (MI) Laboratory: PEL

The following semivolatile samples have analyte concentrations below the quantitation limit (CRQL). Detected compounds are qualified J.

E53R2, E53R3
Di-n-butlyphthalate

E53R4
Acenaphthene, Di-n-butlyphthalate

SBLK4C, SBLK4D
Acetophenone

A library search indicates a match at or above 85% for a TIC compound in the semivolatile sample. Detected compounds are qualified NJ.

Cas No. 57-10-3 n-Hexadecanoic acid;
Cas No. 126-73-8 Tributyl phosphate
E53S2

Cas No. 1599-67-3 1-Docosene
SBLK4D, SBLK4F

Cas No. 7683-64-9 Squalene
E53R9, SBLK4F

A library search indicates a match below 85% for a TIC compound in the semivolatile sample. Detected compounds are qualified J.

Unknown @ 3.74; Unknown @ 13.20
E53R2

Unknown @ 3.93; Unknown @ 4.30
E53S3

Unknown @ 4.00
SBLK4C, SBLK4D, SBLK4F

Unknown @ 7.73
E53S1

Unknown @ 8.83
SBLK4F

Unknown @ 9.94; Unknown @ 11.65
E53S6

Unknown @ 13.33
E53R4, E53S2, E53T1

Unknown @ 13.45; Unknown @ 13.59; Unknown @ 14.77
E53S2

Unknown @ 13.72
SBLK4C

Unknown @ 14.68
E53S5

Unknown @ 14.94
E53R2, E53R4, E53R8, E53S0, E53S1, E53S2, E53S3, E53T0

The following aroclor samples have analyte concentrations below the quantitation limit (CRQL). Detected compounds are qualified J.

ALCS4C, ALCS4E
Aroclor-1016, Aroclor-1260

11. SYSTEM PERFORMANCE

GC/MS baseline indicated acceptable performance. The GC baselines for the aroclor analyses were acceptable.

12. ADDITIONAL INFORMATION

Manual and automated software baseline integrations were reviewed and found to be acceptable.

TICs with no CAS Numbers were not reported in the EXES Sample Summary Report for the TVOA and SVOA fractions. Please refer to Word document 44796 SDG E53R2 TIC for the validated TIC results.

The EDD spreadsheets did not include the following aroclor samples. The laboratory Form Is for these samples are included with the hard copy data package.

ALCS4C, ALCS4E

The following semivolatile samples have a compound identified by CAS No. in some samples and as an Unknown TIC in other samples. A comparison of the chromatograms demonstrated that the same compound was present in the respective samples. Copies of the chromatograms are included with the validation report.

Case Number: 44796 SDG Number: E53R2
Site Name: Allied Paper, Inc. (MI) Laboratory: PEL

Cas No. 7683-64-9 Squalene
E53R9, SBLK4F
versus
Unknown @ 14.94
E53S1

Cas No. 1599-67-3 1-Docosene
E53R3, E53R9, E53S1, E53S2, E53S4, E53S6, E43S7, SBLK4D, SBLK4F
versus
Cas No. 629-96-9 1-Eicosanol
E53R2, E53R4, E53S9, E53T1
versus
Cas No. 1454-85-9 1-Heptadecanol
E53S8
versus
Cas No. 52078-56-5 11-Tricosene
E53T0
versus
Cas No. 74339-53-0 Trichloroacetic acid, penta
E53R8
versus
Cas No. 18435-45-5 1-Nonadecene
E53S3, E53S5
versus
Unknown @ 13.72
E53S0, SBLK4C

Case Number: 44796 SDG Number: E53R2
Site Name: Allied Paper, Inc. (MI) Laboratory: PEL

CADRE Data Qualifier Sheet

Qualifiers	Data Qualifier Definitions
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J	The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte in the sample.
UJ	The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the action limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
N	The analysis indicates the presence of an analyte for which there is presumptive evidence to make a tentative identification.
NJ	The analysis indicates the presence of an analyte for which there is presumptive evidence to make a tentative identification and the associated numerical value represents its approximate concentration.
R	The data are unusable. (The compound may or may not be present.)

Reviewed by: Michele Traina / Techlaw-ESAT
Date: 12/04/14

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION V
SUPERFUND DIVISION

DATE:

SUBJECT: Review of Data
Received for Review on: October 30, 2014

FROM: Timothy Prendiville, Supervisor (SR-6J)
Superfund Contract Management Section

TO: Data User: CH2M Hill
Email Address: kaitlin.ma@ch2m.com

Level 3 Data Validation for EDM EXES database

We have reviewed the data for the following case:

SITE Name: Allied Paper, Inc. (MI)

Case Number: 44796 SDG Number: E53P2

Number and Type of Samples: 20 Waters (Trace Volatiles, Semivolatiles, Aroclors)

Sample Numbers: E53P2 – E53P9, E53Q0 – E53Q9, E53R0, E53R1

Laboratory: Spectrum Analytical (PEL) Hrs for Review:

Following are our findings:

CC: Howard Pham
Region 5 TPO
Mail Code: SA-5J

Case Number: 44796 SDG Number: E53P2
Site Name: Allied Paper, Inc. (MI) Laboratory: PEL

Below is a summary of the out-of-control audits and the possible effects on the data for this case:

Twenty (20) water samples labeled E53P2 through E53P9, E53Q0 through E53Q9, E53R0, and E53R1; were shipped to Spectrum Analytical (PEL) located in Tampa, FL. All samples were collected between October 13 and 15, 2014 and received between October 15 and 17, 2014. All samples were received intact with the exception of samples E53P3 and E53R0, which had 1 40mL VOA vial broken each. All samples were received within the required shipping temperature range of 2 – 6°C with the exception of; E53P2 through E53P8 and E53Q5, at 1.6°C; and E53Q0, E53Q1, E53Q4, and E53Q7, at 1.8°C. No samples are qualified for temperature receipt deficiency. All volatile samples had a pH of 2 and are considered preserved with the exception of samples E53P5 and E53Q5 through E53Q7, which had a pH of 7 and are considered unpreserved.

Four (4) samples, E53P5 and E53Q5 through E53Q7; were analyzed for only the trace volatile list of target compounds. The remaining sixteen (16) samples, E53P2 through E53P4, E53P6 through E53P9, E53Q0 through E53Q4, E53Q8, E53Q9, E53R0, and E53R1; were analyzed for the trace volatile, semivolatile, and aroclor list of target compounds. All samples were analyzed according to CLP SOW SOM01.2 and reviewed according to the NFG for SOM01.2 and the SOP for ESAT 5/TechLaw Validation of Contract Laboratory Program Organic Data (Version 2.6.2).

Sample E53R0 was designated by the samplers to be used for laboratory QC, i.e. MS/MSD analyses.

Samples E53P5, E53Q5, E53Q6, and E53Q7 were identified as trip blanks. Sample E53Q1 was identified as a field duplicate of sample E53Q0.

Case Number: 44796 SDG Number: E53P2
Site Name: Allied Paper, Inc. (MI) Laboratory: PEL

1. HOLDING TIME

No problems found.

2. GC/MS TUNING AND GC INSTRUMENT PERFORMANCE

No problems found.

3. CALIBRATION

The following trace volatile samples are associated with an initial calibration percent relative standard deviation (%RSD) outside criteria. The compound was not detected in the samples. Non-detected compounds are not qualified. Ultimately, non-detected Bromomethane in some samples is qualified UJ for CCV criteria.

E53P2, E53P3, E53P4, E53P5, E53P6, E53P7, E53P8, E53P9, E53Q0, E53Q1, E53Q2, E53Q3, E53Q4, E53Q5, E53Q6, E53Q7, E53Q8, E53Q9, E53R0, E53R0MS, E53R0MSD, E53R1, VBLK1C, VBLK7A, VBLK7B, VHBLK7B
Bromomethane

The following trace volatile samples are associated with an opening CCV percent difference (%D) outside criteria. The compound was not detected in the samples. Non-detected compounds are qualified UJ.

E53P6, E53P7, E53P8, E53P9, E53Q0, E53Q1, E53Q2, E53Q3, E53Q4, E53Q5, E53Q6, E53Q7, E53Q8, E53Q9, E53R0, E53R0MS, E53R0MSD, E53R1, VBLK1C, VBLK7B, VHBLK7B
Bromomethane

4. BLANKS

The following trace volatile samples have common contaminant analyte concentrations reported less than 2x the CRQL. The associated method blank has common contaminant analyte concentration less than 2x the concentration criteria. Detected compounds are qualified U. Non-detected compounds are not qualified. Reported sample concentrations have been elevated to 2x the CRQL.

Acetone
E53P5, E53Q8

The following semivolatile samples have TIC concentrations reported less than 5X the associated method blank concentration. Detected compounds are re-qualified U and deleted from the TIC report. See Section 12 for additional information.

Unknown @ 3.993 – 4.004
E53P2, E53P3, E53P4, E53P6, E53P7, E53P8, E53P9, E53Q0, E53Q1, E53Q2, E53Q3, E53Q4, E53Q8, E53Q9, E53R0, E53R1

Unknown @ 13.717 – 13.718
E53Q0, E53Q1

CAS No. 506-51-4 1-Tetracosanol @ 13.717
E53R1

CAS No. 629-96-9 1-Eicosanol @ 13.717 – 13.723
E53P6, E53P7, E53Q4

CAS No. 1454-85-9 1-Heptadecanol @ 13.717
E53P8

CAS No. 1599-67-3 1-Docosene @ 13.717 – 13.728
E53P2, E53P3, E53Q3, E53R0

CAS No. 18435-45-5 1-Nonadecene @ 13.717
E53P4, E53P9, E53Q2, E53Q8

CAS No. 74339-53-0 Trichloroacetic acid, penta @ 13.717
E53Q9

5. DEUTERATED MONITORING COMPOUND AND SURROGATE RECOVERY

The following trace volatile sample has DMC/SMC recoveries above the upper limit of the criteria window. Detected compounds are qualified J. Non-detected compounds are not qualified.

E53Q5
1,1-Dichloroethane, Bromochloromethane, Chloroform, Dibromochloromethane, Bromoform

The following trace volatile sample has one or more DMC/SMC recovery values less than the primary lower limit but greater than or equal to the expanded lower limit (20%) of the criteria window. The compounds were not detected in the sample. Non-detected compounds are qualified UJ.

E53R0
Vinyl chloride, Cyclohexane, Methylcyclohexane, 1,2-Dichloropropane, Bromodichloromethane

The following semivolatile sample has deuterated monitoring compound recovery above the upper limit of the criteria window. The compound was not detected in the sample. Non-detected compounds are not qualified.

E53Q3
2-Chlorophenol

The following semivolatile sample has deuterated monitoring compound recovery below the lower limit of the criteria window. The compounds were not detected in the sample. Non-detected compounds are qualified UJ.

E53Q0
Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenzo(a,h)anthracene, Benzo(g,h,i)perylene,

6A. MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Sample E53R0 was designated by the samplers to be used for laboratory QC, i.e. MS/MSD analyses.

The following semivolatile matrix spike/matrix spike duplicate samples have percent recoveries greater than the upper acceptance criteria. Detected compounds are qualified J.

E53R0MS, E53R0MSD
4-Nitrophenol, 2,4-Dinitrotoluene

The associated semivolatile matrix spike/matrix spike duplicate samples have percent recoveries greater than the upper acceptance criteria. The compound was not detected in the unspiked sample. Non-detected compounds are not qualified.

E53R0
2,4-Dinitrotoluene

The associated semivolatile matrix spike/matrix spike duplicate samples have percent recoveries greater than the upper acceptance criteria and less than 100%. Detected and non-detected compounds in the unspiked sample are not qualified.

E53R0
4-Nitrophenol

The aroclor MS/MSD Form III was recalculated using the lower (reportable) values. No problems were found. Results are summarized in the following table:

Analyte	MS Spike (ug/L)	MSD Spike (ug/L)	Source (ug/L)	MS (ug/L)	MS %R	MSD (ug/L)	MSD %R	%R Limit	RPD	RPD Limit
Aroclor-1016	4.0	4.0	0	2.7	**66.3**	2.8	**68.9**	29 – 135	**3.9**	0 – 15
Aroclor-1260	4.0	4.0	0	2.9	**73.3**	3.0	**74.8**	29 – 135	**2.0**	0 – 20

6B. LABORATORY CONTROL SAMPLE

No problems were found.

7. FIELD BLANK AND FIELD DUPLICATE

Samples E53P5, E53Q5, E53Q6, and E53Q7 were identified as trip blanks. Results are summarized in the following table:

Blank Type **Sample ID** **DF** **Units** **Trace Volatile Analytes**	**Trip** **E53P5** 1 ug/L	**Trip** **E53Q5** 1 ug/L	**Trip** **E53Q6** 1 ug/L	**Trip** **E53Q7** 1 ug/L
Methylene chloride	0.46	0.76	0.52	0.40
Chloroform	4.7	5.1	5.0	4.9
#TVOA TICs	0	0	1	0

Sample E53Q1 was identified as a field duplicate of sample E53Q0. Results are summarized in the following table:

Sample ID **DF** **Units** **Semivolatile Analytes**	**E53Q0** 1 ug/L	**E53Q1** 1 ug/L	**RPD**
#SVOA TICs	0	1	---

Results are not qualified based upon the results of the field duplicates.

8. INTERNAL STANDARDS

No problems were found.

9. COMPOUND IDENTIFICATION

After reviewing the mass spectra and chromatograms it appears that all trace volatile, semivolatile, and aroclor compounds were properly identified.

10. COMPOUND QUANTITATION AND REPORTED DETECTION LIMITS

The following trace volatile sample has analyte concentrations below the quantitation limit (CRQL). Detected compounds are qualified J.

E53P3, E53P8
Trichloroethene

E53P5, E53Q7
Methylene chloride

E53P9
Acetone, Toluene

VBLK1C
Acetone, Methylene chloride

VBLK7A
Acetone

A library search indicates a match at or above 85% for a TIC compound in the trace volatile sample. Detected compounds are qualified NJ.

CAS No. 7446-09-5 Sulfur dioxide
E53Q6

A library search indicates a match below 85% for a TIC compound in the trace volatile sample. Detected compounds are qualified J.

Unknown @ 1.343	Unknown @ 1.546	Unknown @ 1.956
Unknown @ 2.050	Unknown @ 2.228	Unknown @ 2.372

E53P9

The following semivolatile sample has analyte concentrations below the quantitation limit (CRQL). Detected compounds are qualified J.

E53P2
Caprolactam

E53P7
Pentachlorophenol, 2,3,4,6-Tetrachlorophenol

E53P9
Bis(2-ethylhexyl)phthalate

SBLK4C
Acetophenone

A library search indicates a match at or above 85% for a TIC compound in the semivolatile sample. Detected compounds are qualified NJ. See Section 12 for additional information.

CAS No. 57-10-3 n-Hexadecanoic acid
E53P2

CAS No. 80-05-7 Phenol, 4,4'-(1-methylethyl
CAS No. 112-34-5 Ethanol, 2-(2-butoxyethoxy)
E53P9

CAS No. 74339-53-0 Trichloroacetic acid, penta
SBLK4B

A library search indicates a match below 85% for a TIC compound in the semivolatile sample. Detected compounds are qualified J. See Section 12 for additional information.

Unknown @ 3.764
E53P3

Unknown @ 3.919
E53Q1, E53Q8

Unknown @ 3.994 – 4.004
SBLK4A, SBLK4B, SBLK4C

Unknown @ 4.298
E53Q8

Unknown @ 6.021 Unknown @ 8.042
E53Q9

Unknown @ 13.723 – 13.728
SBLK4A, SBLK4C

Unknown @ 14.942 – 14.948
E53P7, E53Q2, E53Q4, E53R1

The following aroclor samples have analyte concentrations below the quantitation limit (CRQL). Detected compounds are qualified J.

ALCS4A, ALCS4B, ALCS4C
Aroclor-1016, Aroclor-1260

11. SYSTEM PERFORMANCE

GC/MS baseline indicated acceptable performance. The GC baseline for the aroclor analysis was acceptable.

12. ADDITIONAL INFORMATION

Manual integrations were reviewed and found to be acceptable. Detected and non-detected compounds are not qualified for this criterion.

The following samples are associated with their corresponding trip blank based on cooler receipt. Some samples are not associated with a trip blank, but a trip blank may be present in another SDG. Cooler numbers were not provided; samples are listed by associated cooler custody seals.

Trip Blank:	**E53P5**	**E53Q5**	**E53Q6**	**E53Q7**	**None**
Date Sampled:	**10/13/2014**	**10/14/2014**	**10/14/2014**	**10/14/2014**	**---**
Date Received:	**10/15/2014**	**10/16/2014**	**10/16/2014**	**10/16/2014**	**10/17/2014**
Cooler Custody Seals:	**70309, 70310**	**70315, 70316**	**70313, 70314**	**70317, 70318**	**70321 thru 70326**
Samples:	E53P2	E53P6	E53P9	E53Q0	E53Q8
	E53P3	E53P7	E53Q2	E53Q1	E53Q9
	E53P4	E53P8	E53Q3	E53Q4	E53R0
					E53R1

The following trace volatile sample had alkanes incorrectly listed on the laboratory Form 1J (TIC) and the NFG Report 9 (TIC Report). The compounds were removed by the reviewer. Copies of the chromatograms are included with the hard copy validation report.

Branched Alkane @ 1.189
Branched Alkane @ 1.634
Cyclic Alkane @ 2.163
Branched Alkane @ 2.498
E53P9

The following semivolatile samples have a compound identified by CAS No. in some samples and as an “unknown” TIC or different CAS No. in other samples. A comparison of the chromatograms demonstrated that the TICs are most probably the same compound in the respective samples. Copies of the chromatograms are included with the validation report. See Section 4 for blank qualifications.

CAS No. 506-51-4 1-Tetracosanol @ 13.717
E53R1
vs
CAS No. 629-96-9 1-Eicosanol @ 13.717 – 13.723
E53P6, E53P7, E53Q4
vs
CAS No. 1454-85-9 1-Heptadecanol @ 13.717
E53P8
vs
CAS No. 1599-67-3 1-Docosene @ 13.717 – 13.728
E53P2, E53P3, E53Q3, E53R0
vs
CAS No. 18435-45-5 1-Nonadecene @ 13.717
E53P4, E53P9, E53Q2, E53Q8
vs
CAS No. 74339-53-0 Trichloroacetic acid, penta @ 13.717
E53Q9, SBLK4B
vs
Unknown @ 13.717 – 13.728
E53Q0, E53Q1, SBLK4A, SBLK4C

TICs with no CAS Numbers were not reported in the EXES Sample Summary Report or the EXES Dynamic Deliverables for the trace volatile and semivolatile fractions. Please refer to Word document “44796.E53P2.TIC Report” for the validated TIC results.

The EXES spreadsheets did not include the following aroclor LCS samples. Form Is for this sample are included with the hard copy data package.

ALCS4A, ALCS4B, ALCS4C

Case Number: 44796
Site Name: Allied Paper, Inc. (MI)

SDG Number: E53P2
Laboratory: PEL

CADRE Data Qualifier Sheet

Qualifiers	Data Qualifier Definitions
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J	The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte in the sample.
UJ	The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the action limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
N	The analysis indicates the presence of an analyte for which there is presumptive evidence to make a tentative identification.
NJ	The analysis indicates the presence of an analyte for which there is presumptive evidence to make a tentative identification and the associated numerical value represents its approximate concentration.
R	The data are unusable. (The compound may or may not be present.)

Reviewed by: Christina Rice / TechLaw-ESAT
Date: 11/20/2014

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION V
SUPERFUND DIVISION

DATE:

SUBJECT: Review of Data
Received for Review on: 07 April 2015

FROM: Timothy Prendiville, Supervisor (SR-6J)
Superfund Contract Management Section

TO: Data User: CH2M Hill
Email Address: kaitlin.ma@ch2m.com

Level 3 Data Validation for EDM EXES database

We have reviewed the data for the following case:

SITE Name: Allied Paper, Inc. (MI)

Case Number: 45155 MRN: 2403.1 SDG Number: E53R9

Number and Type of Samples: 20 Waters (Aroclor)

Sample Numbers: E53R9, E53S0 – E53S9, E53T0 – E53T2, E53T9, E53W0 – E53W4

Laboratory: Shealy Environmental Services, Inc. Hrs for Review:

Following are our findings:

CC: Howard Pham
Region 5 TPO
Mail Code: SA-5J

Case Number: 45155 SDG Number: E53R9
Site Name: Allied Paper, Inc. (MI) Laboratory: Shealy

Below is a summary of the out-of-control audits and the possible effects on the data for this case:

Twenty (20) extracts of aqueous samples labeled E53R9, E53S0 – E53S9, E53T0 – E53T2, E53T9, E53W0 – E53W4, were transshipped to Shealy Environmental Services, Inc. located in Tampa, Florida. The samples were collected between 10/16 and 10/17/14 and received on 10/18/14 by PEL Laboratories. The extractions were performed by PEL under Case 44796. The extracts of the samples, including the method blanks and LCS QC samples, were received by Shealy for reanalysis on 03/16/15 intact and properly cooled.

All extracts were analyzed for Aroclors. All extracts were analyzed according to CLP SOW SOM01.2 with modifications listed in the Modification Reference Number 2403.1, Title: Aroclor Analysis at Lower CRQL's. The samples were reviewed according to the NFG for SOM01.2 (10/2006) and the SOP for ESAT 5/TechLaw Validation of Contract Laboratory Program Organic Data (Version 2.7).

Samples for laboratory QC, i.e. MS/MSD were not analyzed in this SDG.

Samples E53S4 and E53S5 were identified as field blanks. Samples E53S6 and E53S7 were identified as equipment blanks. Sample E53R9 was identified as the field duplicate of a sample not included in this SDG. Sample E53S9 was identified as a field duplicate of sample E53S8.

Case Number: 45155 SDG Number: E53R9
Site Name: Allied Paper, Inc. (MI) Laboratory: Shealy

1. HOLDING TIME

The following aroclor water samples are outside the expanded analysis holding time criteria (40 days). Detected compounds are qualified J. Nondetected compounds are qualified R.

ABLK55, ABLK56, ALCS55, ALCS56, E53R9, E53S0, E53S1, E53S2, E53S3, E53S4, E53S5, E53S6, E53S7, E53S8, E53S9, E53T0, E53T1, E53T2, E53T9, E53W0, E53W1, E53W2, E53W3, E53W4

2. GC/MS TUNING AND GC INSTRUMENT PERFORMANCE

No Problems Found.

3. CALIBRATION

No Problems Found.

4. BLANKS

No Problems Found.

5. DEUTERATED MONITORING COMPOUND AND SURROGATE RECOVERY

No Problems Found.

6A. MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Samples for laboratory QC, i.e. MS/MSD were not analyzed in this SDG.

6B. LABORATORY CONTROL SAMPLE

No Problems Found.

7. FIELD BLANK AND FIELD DUPLICATE

Samples E53S4 and E53S5 were identified as field blanks. Samples E53S6 and E53S7 were identified as equipment blanks. Sample E53R9 was identified as the field duplicate of a sample not included in this SDG. Sample E53S9 was identified as a field duplicate of sample E53S8. No detections were reported for any of the samples.

8. INTERNAL STANDARDS

Not applicable to aroclor analyses.

Case Number: 45155 SDG Number: E53R9
Site Name: Allied Paper, Inc. (MI) Laboratory: Shealy

9. COMPOUND IDENTIFICATION

After reviewing the chromatograms it appears that all aroclor compounds were properly identified.

10. COMPOUND QUANTITATION AND REPORTED DETECTION LIMITS

The relative percent difference between analyte results for the following aroclor samples is greater than 25%. Detected compounds are < ¼ CRQL. Reported sample concentrations have been elevated to the CRQL and qualified R due to exceeding hold times.

E53R9, E53S3, E53T0
Aroclor-1260

11. SYSTEM PERFORMANCE

The GC baselines for the aroclor analyses were acceptable.

12. ADDITIONAL INFORMATION

Baseline integrations were reviewed and found to be acceptable.

The EDD spreadsheets did not include the following samples. The laboratory Form Is for these samples are included with the hard copy data package.

ALCS55, ALCS56

The CRQLs originally reported by EXES were incorrect. These values were manually corrected by the Reviewer.

Case Number: 45155 SDG Number: E53R9
Site Name: Allied Paper, Inc. (MI) Laboratory: Shealy

CADRE Data Qualifier Sheet

Qualifiers	Data Qualifier Definitions
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J	The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte in the sample.
UJ	The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the action limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
N	The analysis indicates the presence of an analyte for which there is presumptive evidence to make a tentative identification.
NJ	The analysis indicates the presence of an analyte for which there is presumptive evidence to make a tentative identification and the associated numerical value represents its approximate concentration.
R	The data are unusable. (The compound may or may not be present.)

Reviewed by: Michele Traina / Techlaw-ESAT
Date: 04/15/15

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION V
SUPERFUND DIVISION

DATE:

SUBJECT: Review of Data
Received for Review on: 7 April 2015

FROM: Timothy Prendiville, Supervisor (SR-6J)
Superfund Contract Management Section

TO: Data User: Ch2mHill
Email Addresses: Kaithlin.Ma@ch2m.com

Level 3 Data Validation

We have reviewed the data for the following case:

SITE Name: Allied Paper Incorporated (MI)

Case Number: 45155 MA: 2403.1 SDG Number: E53P2

Number and Type of Samples: 20 waters (Aroclors)

Sample Numbers: E53P2 - E53P4, E53P6 – E53P9, E53Q0 - E53Q4, E53Q8, E53Q9, E53R0 – E53R4, E53R8

Laboratory: SHEALY Hrs for Review:

Following are our findings:

CC: Howard Pham
Region 5 TPO
Mail Code: SA-5J

Case Number: 45155 MA: 2403.1 SDG Number: E53P2
Site Name: Allied Paper Incorporated, (MI) Laboratory: SHEALY

Below is a summary of the out-of-control audits and the possible effects on the data for this case:

Twenty (20) unpreserved water samples were shipped to the FL Division of Spectrum Analytical, Inc., PEL Laboratories, located in Tampa, FL. Three (3) samples; E53P2 through E53P4 were collected on October 13, 2014 and received by PEL on October 15, 2014 with a cooler temperature of 1.6 ºC. Nine (9) samples; E53P6 through E53P9 and E53Q0 through E53Q4 were collected on October 13 - 14, 2014 and received by PEL on October 16, 2014 with cooler temperatures ranging between 1.8 and 3.1 ºC. Seven (7) samples; E53Q8, E53Q9 and E53R0 through E53R4 were collected on October 15, 2014 and received by PEL on October 17, 2014 with the temperature within the preference range of 2 - 6ºC. One (1) sample, E53R8, was collected on October 16, 2014 and received by PEL prior to October 20, 2014 at an unidentified temperature. The samples were originally collected under Case Number 44796. All samples were extracted within holding times by PEL Laboratories between October 15th and 20th, 2014. All extracts including method blanks and LCS samples were transshipped to SHEALY Laboratories, another division of Spectrum Analytical, Inc. on March 16, 2015 well beyond the 40-day holding time for sample extracts and analyzed under Case Number 45155. The extracts were received with a shipping temperature of 5.5 ºC.

All samples were analyzed for only the aroclor compounds according to CLP SOW SOM01.2 and Modification Reference Number 2403.1, titled 'Aroclor Analysis at Lower CRQLs'. The sample results were reviewed according to the NFG for SOM01.2 and the SOP for ESAT 5/TechLaw Validation of Contract Laboratory Program Organic Data (Version 2.7).

No MS/MSD was conducted because no MS/MSD extracts were included in the sample package.

Sample E53Q1 was identified as a field duplicate of sample E53Q0. Sample E53R2 was identified as a field duplicate of sample E53R1. E53R8 was identified as a field duplicate of sample E53R9, however sample E53R9 is not included in this SDG.

1. HOLDING TIME

The following aroclor water samples are outside expanded analysis holding time criteria. Detected compounds are qualified J. Non-detected compounds are qualified R.

ABLK52, ABLK53, ABLK54, ABLK55, ALCS52, ALCS53, ALCS54, ALCS55, E53P2, E53P3, E53P4, E53P6, E53P7, E53P8, E53P9, E53Q0, E53Q1, E53Q2, E53Q3, E53Q4, E53Q8, E53Q9, E53R0, E53R1, E53R2, E53R3, E53R4, E53R8

2. GC/MS TUNING AND GC INSTRUMENT PERFORMANCE

No problems found.

3. CALIBRATION

No problems found.

4. BLANKS

No problems found.

5. DEUTERATED MONITORING COMPOUND AND SURROGATE RECOVERY

No problems found.

6A. MATRIX SPIKE/MATRIX SPIKE DUPLICATE

No MS/MSD was conducted because no MS/MSD extracts were included in the sample package.

6B. LABORATORY CONTROL SAMPLE

No problems found.

7. FIELD BLANK AND FIELD DUPLICATE

Sample E53Q1 was identified as a field duplicate of sample E53Q0. Sample E53R2 was identified as a field duplicate of sample E53R1. E53R8 was identified as a field duplicate of sample E53R9, however sample E53R9 is not included in this SDG. No target compounds were identified in any of the field duplicate samples.

Sample results are not qualified based on the results of field duplicates.

8. INTERNAL STANDARDS

Not applicable for this analysis.

9. COMPOUND IDENTIFICATION

After reviewing the chromatograms it appears that all Aroclor compounds were properly identified.

10. COMPOUND QUANTITATION AND REPORTED DETECTION LIMITS

The relative percent difference between analyte results for the following aroclor samples is greater than 25%. The concentration is greater than 25% of the CRQL. Detected compounds are qualified J.

E53R3
Aroclor-1242

11. SYSTEM PERFORMANCE

GC/MS baseline indicated acceptable performance.

12. ADDITIONAL INFORMATION

Table 1 of Modification Reference Number 2403.1 identified the modified water CRQL desired was 0.050 µg/L. Shealy Laboratory reported the samples with a CRQL of 0.050 µg/L, but the EXES Summary Report incorrectly identified the CRQL as 0.50 µg/L. The lower limits requested in the MA were met.

Manual integrations were performed on the following compounds for the associated samples and standards. Snapshots of the 'before' and 'after' integrations were provided and appear to follow good laboratory practices.

Aroclor-1242:	E53R3
Aroclor-1254:	AR12541A1
Aroclor-1260:	AR16601A1

The EXES Dynamic Deliverables did not include the following laboratory control samples. The laboratory Form Is for these samples are included with the hard copy data package.

ALCS52, ALCS53, ALCS54, ALCS55

Case Number: 45155 MA: 2403.1 SDG Number: E53P2
Site Name: Allied Paper Incorporated, (MI) Laboratory: SHEALY

CADRE Data Qualifier Sheet

Qualifiers	Data Qualifier Definitions
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J	The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte in the sample.
UJ	The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the action limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
N	The analysis indicates the presence of an analyte for which there is presumptive evidence to make a tentative identification.
NJ	The analysis indicates the presence of an analyte for which there is presumptive evidence to make a tentative identification and the associated numerical value represents its approximate concentration.
R	The data are unusable. (The compound may or may not be present.)

Reviewed by: Allison Harvey / Techlaw-ESAT
Date: April 13, 2015

Attachment 3
CH2M HILL Qualifications

Case No: 44796	Contract: EPW09039	SDG No: ME53P2	Lab Code: MITKEM

Sample Number:	ME53Q0	Method:	ICP_MS	Matrix:	Water	MA Number:	DEFAULT
Sample Location:	MW-7D	pH:	2	Sample Date:	10/14/2014	Sample Time:	15:45:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	101	J	ug/L	101		1.0	Yes	S2BVE
Antimony	Target	2.0	U	ug/L	2.0	U	1.0	Yes	S2BVE
Arsenic	Target	0.75	J	ug/L	0.75	J	1.0	Yes	S2BVE
Barium	Target	199		ug/L	199		1.0	Yes	S2BVE
Beryllium	Target	1.0	U	ug/L	1.0	U	1.0	Yes	S2BVE
Cadmium	Target	1.0	U	ug/L	1.0	U	1.0	Yes	S2BVE
Calcium	Target	95600		ug/L	95600		1.0	Yes	S2BVE
Chromium	Target	0.83	J	ug/L	0.83	J	1.0	Yes	S2BVE
Cobalt	Target	1.0	U	ug/L	0.19	J	1.0	Yes	S2BVE
Copper	Target	2.0	U	ug/L	2.0	U	1.0	Yes	S2BVE
Iron	Target	2070		ug/L	2070	E	1.0	Yes	S2BVE
Lead	Target	1.0	U	ug/L	1.0	U	1.0	Yes	S2BVE
Magnesium	Target	29400		ug/L	29400	E	1.0	Yes	S2BVE
Manganese	Target	84.2		ug/L	84.2		1.0	Yes	S2BVE
Nickel	Target	1.0	U	ug/L	0.94	J	1.0	Yes	S2BVE
Potassium	Target	1010		ug/L	1010		1.0	Yes	S2BVE
Selenium	Target	5.0	U	ug/L	5.0	U	1.0	Yes	S2BVE
Silver	Target	1.0	U	ug/L	1.0	U	1.0	Yes	S2BVE
Sodium	Target	15700		ug/L	15700		1.0	Yes	S2BVE
Thallium	Target	1.0	U	ug/L	1.0	U	1.0	Yes	S2BVE
Vanadium	Target	5.0	U	ug/L	5.0	U	1.0	Yes	S2BVE
Zinc	Target	0.53	J-	ug/L	0.53	J	1.0	Yes	S2BVE

MM 6/11/15

Case No:	44796	Contract:	EPW09039	SDG No:	ME53P2	Lab Code:	MITKEM
Sample Number:	ME53Q1	Method:	ICP_MS	Matrix:	Water	MA Number:	DEFAULT
Sample Location:	MW-7D-FD	pH:	2	Sample Date:	10/14/2014	Sample Time:	15:50:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	61.1	J	ug/L	61.1		1.0	Yes	S2BVE
Antimony	Target	2.0	U	ug/L	2.0	U	1.0	Yes	S2BVE
Arsenic	Target	0.84	J	ug/L	0.84	J	1.0	Yes	S2BVE
Barium	Target	204		ug/L	204		1.0	Yes	S2BVE
Beryllium	Target	1.0	U	ug/L	1.0	U	1.0	Yes	S2BVE
Cadmium	Target	1.0	U	ug/L	1.0	U	1.0	Yes	S2BVE
Calcium	Target	99100		ug/L	99100		1.0	Yes	S2BVE
Chromium	Target	1.3	J	ug/L	1.3	J	1.0	Yes	S2BVE
Cobalt	Target	1.0	U	ug/L	0.19	J	1.0	Yes	S2BVE
Copper	Target	2.0	U	ug/L	2.0	U	1.0	Yes	S2BVE
Iron	Target	2080		ug/L	2080	E	1.0	Yes	S2BVE
Lead	Target	1.0	U	ug/L	1.0	U	1.0	Yes	S2BVE
Magnesium	Target	30200		ug/L	30200	E	1.0	Yes	S2BVE
Manganese	Target	83.9		ug/L	83.9		1.0	Yes	S2BVE
Nickel	Target	1.3		ug/L	1.3		1.0	Yes	S2BVE
Potassium	Target	1030		ug/L	1030		1.0	Yes	S2BVE
Selenium	Target	5.0	U	ug/L	5.0	U	1.0	Yes	S2BVE
Silver	Target	1.0	U	ug/L	1.0	U	1.0	Yes	S2BVE
Sodium	Target	16000		ug/L	16000		1.0	Yes	S2BVE
Thallium	Target	1.0	U	ug/L	1.0	U	1.0	Yes	S2BVE
Vanadium	Target	5.0	U	ug/L	5.0	U	1.0	Yes	S2BVE
Zinc	Target	1.2	J-	ug/L	1.2	J	1.0	Yes	S2BVE

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Case No:	44796	Contract:	EPW09039	SDG No:	ME53P2	Lab Code:	MITKEM
Sample Number:	ME53R1	Method:	ICP_MS	Matrix:	Water	MA Number:	DEFAULT
Sample Location:	MW-6-A	pH:	2	Sample Date:	10/15/2014	Sample Time:	15:30:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	31.2	J+	ug/L	31.2		1.0	Yes	S2BVE
Antimony	Target	2.0	U	ug/L	1.1	J	1.0	Yes	S2BVE
Arsenic	Target	1.0	U	ug/L	1.0	U	1.0	Yes	S2BVE
Barium	Target	105		ug/L	105		1.0	Yes	S2BVE
Beryllium	Target	1.0	U	ug/L	1.0	U	1.0	Yes	S2BVE
Cadmium	Target	0.19	J	ug/L	0.19	J	1.0	Yes	S2BVE
Calcium	Target	101000		ug/L	101000		1.0	Yes	S2BVE
Chromium	Target	2.0	U	ug/L	2.0	U	1.0	Yes	S2BVE
Cobalt	Target	1.0	U	ug/L	0.17	J	1.0	Yes	S2BVE
Copper	Target	1.0	J	ug/L	1.0	J	1.0	Yes	S2BVE
Iron	Target	473	J+	ug/L	473	E	1.0	Yes	S2BVE
Lead	Target	17.4	J	ug/L	17.4		1.0	Yes	S2BVE
Magnesium	Target	27700		ug/L	27700	E	1.0	Yes	S2BVE
Manganese	Target	3.7		ug/L	3.7		1.0	Yes	S2BVE
Nickel	Target	1.0	U	ug/L	0.97	J	1.0	Yes	S2BVE
Potassium	Target	2450		ug/L	2450		1.0	Yes	S2BVE
Selenium	Target	0.84	J	ug/L	0.84	J	1.0	Yes	S2BVE
Silver	Target	1.0	U	ug/L	1.0	U	1.0	Yes	S2BVE
Sodium	Target	71700		ug/L	71700		1.0	Yes	S2BVE
Thallium	Target	1.0	U	ug/L	1.0	U	1.0	Yes	S2BVE
Vanadium	Target	5.0	U	ug/L	5.0	U	1.0	Yes	S2BVE
Zinc	Target	874	J	ug/L	874		1.0	Yes	S2BVE

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Case No:	44796	Contract:	EPW09039	SDG No:	ME53P2	Lab Code:	MITKEM
Sample Number:	ME53R2	Method:	ICP_MS	Matrix:	Water	MA Number:	DEFAULT
Sample Location:	MW-6-A-FD	pH:	2	Sample Date:	10/15/2014	Sample Time:	15:35:00
% Moisture :				% Solids :			

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	20.0	U	ug/L	13.5	J	1.0	Yes	S2BVE
Antimony	Target	2.0	U	ug/L	0.62	J	1.0	Yes	S2BVE
Arsenic	Target	1.0	U	ug/L	1.0	U	1.0	Yes	S2BVE
Barium	Target	101		ug/L	101		1.0	Yes	S2BVE
Beryllium	Target	1.0	U	ug/L	1.0	U	1.0	Yes	S2BVE
Cadmium	Target	0.15	J	ug/L	0.15	J	1.0	Yes	S2BVE
Calcium	Target	97200		ug/L	97200		1.0	Yes	S2BVE
Chromium	Target	2.0	U	ug/L	2.0	U	1.0	Yes	S2BVE
Cobalt	Target	1.0	U	ug/L	0.15	J	1.0	Yes	S2BVE
Copper	Target	0.89	J	ug/L	0.89	J	1.0	Yes	S2BVE
Iron	Target	351	J+	ug/L	351	E	1.0	Yes	S2BVE
Lead	Target	9.6	J	ug/L	9.6		1.0	Yes	S2BVE
Magnesium	Target	26700		ug/L	26700	E	1.0	Yes	S2BVE
Manganese	Target	2.9		ug/L	2.9		1.0	Yes	S2BVE
Nickel	Target	1.0	U	ug/L	0.98	J	1.0	Yes	S2BVE
Potassium	Target	2350		ug/L	2350		1.0	Yes	S2BVE
Selenium	Target	0.76	J	ug/L	0.76	J	1.0	Yes	S2BVE
Silver	Target	1.0	U	ug/L	1.0	U	1.0	Yes	S2BVE
Sodium	Target	69200		ug/L	69200		1.0	Yes	S2BVE
Thallium	Target	1.0	U	ug/L	1.0	U	1.0	Yes	S2BVE
Vanadium	Target	5.0	U	ug/L	5.0	U	1.0	Yes	S2BVE
Zinc	Target	604	J	ug/L	604		1.0	Yes	S2BVE

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