

ENVIRONMENTAL SAMPLING CORPORATION

Dedicated to Environmental Monitoring, Science & Technology

January 12, 2022

Mr. David Buser
Wisconsin Department of Natural Resources
2300 N. Dr. Martin Luther King Jr. Drive
Milwaukee, WI 53212

**Re: October 2021 Monitoring Event
Emerald Park Landfill, LLC - WDNR License No. 03290
Waukesha County, Wisconsin**

Dear Mr. Buser:

On behalf of Emerald Park Landfill (EPL), Environmental Sampling Corporation (ESC) has prepared this environmental monitoring report in accordance with the June 9, 2011 Southwestern Expansion Plan of Operation approval. The report provides a preliminary analysis of the cause and significance of well specific and WI Adm. Code Ch. NR140 exceedances.

ESC personnel were on site in October 2021 to conduct the following monitoring:

- Sample 44 groundwater monitoring wells including 8 subtitle D wells
- Measure 15 additional groundwater elevations
- Collect 5 gradient control sump samples
- Collect 13 surface water point samples
- Measure 26 staff gauge elevations
- Collect 1 leachate sample
- Collect 1 gas condensate lift station sample

Additional monitoring was conducted during October 2021 by site personnel:

- Collect readings from 69 landfill gas extraction wells
- Collect readings from the gas blower
- Collect readings from 11 landfill gas monitoring probes

Additional monitoring was conducted during October 2021 by Tetra Tech personnel:

- Record 16 leachate headwell elevations,

Information regarding the monitoring program conducted at EPL during October 2021 is provided in the following sections. The environmental monitoring data files and certification page for the October 2021 monitoring event are also provided to the GEMS Data Submittal Contact for upload to the GEMS database.

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GROUNDWATER SAMPLING

Groundwater samples were collected from 41 of the 44 monitoring wells in October 2021. One groundwater monitoring well (MW-4AR) was unable to be sampled during the October event because it was dry while two other wells (MW-3A & MW-4BR) had insufficient volume for sampling. MW-4AR is typically dry during the semi-annual monitoring events while the insufficient volume at MW-3 & MW-4BR is most likely due to the severe drought conditions. Pending Department concurrence, a Plan Modification will be submitted under separate cover to request a change to the current monitoring program.

All groundwater samples collected were analyzed for: alkalinity, chloride, sulfate, hardness, sodium and VOCs. Groundwater samples were collected with dedicated bladder pumps, electronic submersible pumps, or dedicated bailers. Monitoring wells had a minimum of four well volumes purged or the wells were purged dry before sample collection. Samples for metals and inorganic analyses were field filtered using disposable 0.45-micron filters. All samples were placed on ice, chain-of-custody forms were established, and samples were sent to Pace Analytical Services laboratory (WI Certification #405132750) for analysis via Waltco courier service.

Field parameters, pH, specific conductivity and temperature, were measured using Cole-Parmer dual pH/conductivity meters that were calibrated and checked in the field during the sampling event. ESC personnel also recorded groundwater elevation measurements, sample color, odor and turbidity.

ESC collected four duplicate samples DUP-01 (MW-5B), DUP-02 (MW-115E), DUP-03 (MW-303D), and DUP-04 (MW-305C) and one field blank (FB-01) for analysis. The inorganic and field parameter concentrations detected in the duplicate samples were consistent with the results from the original samples. FB-01 was collected using the distilled water utilized for equipment decontamination. Laboratory supplied trip blanks accompanied the samples collected during October 2021 event. The collection of the duplicate samples, the field blank, and the accompanying trip blank follow both the WDNR and ESC's QA/QC procedures.

In addition to the groundwater elevations from the monitoring wells that were sampled, water elevations were recorded from an additional 15 wells at the site. Groundwater elevations were generally lower than those observed during last sampling event (April 2021) and the previous October 2020 event. Groundwater elevation at one groundwater monitoring well (MW-4AR) was unable to be measured because the well was dry during this semi-annual event. Based on elevations recorded during this event, groundwater flow in the deep wells is toward the east/northeast and in the shallow wells is toward the southwest, which are consistent with historic observations.

Exceedances

Attached are the October 2021 Exceedance Summaries. Exceedances of well-specific Preventive Action Limits (PALs) and Alternative Concentration Limits (ACLs) were determined based on standards included in the Southwestern Expansion Plan of Operation approval dated June 9, 2011. The October 2021 groundwater analytical data has been compared to these well-specific PAL and ACL standards and the NR140 PALs and Enforcement Standards (ESs). Explanations of the NR140 PAL and ES exceedances, as well as the well-specific PAL and ACL exceedances are provided below.

Groundwater Indicator PAL Exceedances

Sodium

The sodium concentrations exceeded the well-specific PALs for the samples collected from groundwater monitoring wells MW-3B, MW-8AR, MW-106A, MW-107A, MW-115A, and MW-121A. The concentrations of sodium at MW-3B, MW-8AR, MW-107A, MW-115A, and MW-121A were consistent with data reported over the past five years and may be a result of the proximity of these wells to the haul roads and access roads which can be a source of road dust and salt. The reported concentrations of sodium in the sample collected from MW-106A has increased over the last two sampling events to slightly exceed the standard for the first time in over three years and may be a result of the recent cell construction activities and/or the significantly lower water table due to the severe drought conditions of 2021. The reported concentration of sodium in the samples collected from the upgradient well MW-3B was increased from typical historic data but are similar to results since October 2019. Future monitoring will help determine what, if any, trend exists.

Alkalinity

Exceedances of the well-specific PALs for alkalinity were reported in samples collected from groundwater monitoring wells: MW-5A and MW-115A. The concentrations of alkalinity in the samples at MW-5A and MW-115A were consistent with recent historic data. The alkalinity exceedance at MW-5A can be attributed to its location adjacent to a parking lot which can be the source of road dust and salt. The alkalinity concentration reported in the MW-115A sample may be a result of the proximity of the well to the haul road which can be a source of road salt and dust.

Specific Conductance and Hardness

Exceedances of well-specific PALs for specific conductance and hardness were reported for samples collected from groundwater monitoring wells MW-5A, MW-5B, MW-8AR, MW-107A, MW-115A, MW-120A and MW-121A. The October 2021 specific conductance and hardness concentrations reported for MW-5A, MW-5B, MW-8AR, MW-107A, MW-115A, MW-120A and MW-121A were similar to recent historical data. The reported concentrations of hardness and specific conductance for these wells may be a result of the proximity of these wells to the haul road which can be a source of road salt and dust or spatial and temporal fluctuations in groundwater quality due to a change in groundwater elevation.

Indicator parameters for samples collected from site monitoring wells generally remained within the range of historic concentrations. Well-specific exceedances of sodium, alkalinity, specific conductance and hardness are not due to migration from the landfill but rather are likely a result of construction activities and road salt/dust or spatial and temporal fluctuations in groundwater quality due to a change in groundwater elevation. No additional groundwater indicator parameter exceedances of the water quality standards were observed for any of the remaining groundwater samples collected during the October 2021 sampling event. See attached **Table 1** for a summary of groundwater indicator parameters exceedances.

Groundwater Indicator ACL and NR 140 Public Welfare Groundwater Standard Exceedances

Sulfate

Sulfate was detected at concentrations in excess of the NR140 ES in the samples collected from MW-19AR and MW-120C. Concentrations of sulfate exceeded the well-specific ACLs in the samples collected from MW-8AR MW-106A MW-121A and MW-305C. The sulfate concentration reported in the sample collected from MW-8AR, MW-19AR, MW-120C and MW-305C were generally consistent with historic data. Sulfate is naturally occurring and is found in the glacial till of Southeastern Wisconsin. Dissolution of anhydrite, or gypsum, or the oxidation of pyrite can result in natural sulfate concentrations above the NR140 standards. The sulfate exceedance in the sample collected from MW106A was the highest concentration reported in the last 3 to 4 years. The sulfate results for the sample collected at MW-121A were the highest reported but were similar to results from April 2018 the last time the water level elevation was similar. Both the results from MW-106A and MW-121A could possibly be related to changes in groundwater elevation due to the severe drought of 2021 that has likely altered the general chemistry of the groundwater. Future monitoring will help determine what, if any, trend exists.

Chloride

Concentrations of chloride exceeded the NR140PAL in the sample collected from MW-303A & MW-305A and exceeded the NR140 ES in the samples collected from MW-5A and MW-115A. The concentrations of chloride in the samples collected from the all of the wells were consistent with historic data. The chloride concentrations in the samples collected from all of the wells may be attributed to road salt and dust since they are all either adjacent to the parking lot or located adjacent to the entrance road to the site or Eight Mile Road.

Exceedances of sulfate and chloride concentrations during the October 2021 sampling event have been attributed to increase in groundwater elevation, road salt and dust, or natural occurring sulfate and are not related to any migration from the landfill. There were no other ACL or PAL/ES exceedances for public welfare parameters for any of the remaining groundwater samples collected during the October 2021 sampling event. A summary of the ACL and NR 140 PAL/ES exceedances is included with this report in **Table 2**.

Volatile Organic Compounds

During the October 2021 event, VOC analyses were conducted on the samples collected from all of the groundwater monitoring wells. No VOCs were detected in the groundwater samples or the trip blanks during the October 2021 monitoring event.

Groundwater Conclusions

Results from the October 2021 groundwater sampling were fairly consistent with historic data and exceedances of standards are not due to migration from the landfill but may be related to spatial and temporal fluctuations in the groundwater quality due to a change in groundwater elevation. Slight variations in the concentrations of sodium, alkalinity, hardness, specific conductance, sulfate and chloride have been observed during the past several events in samples collected from select monitoring wells and may be related to changes in groundwater elevation that has likely altered the general chemistry of the groundwater. These changes may also be related to the proximity of many of these wells to road salt and dust from the haul road, access roads, and the active construction area. In general, the parameters that exceeded well-specific and NR 140 standards were consistent with previous data.

GRADIENT CONTROL SYSTEM MONITORING

Samples were collected from five gradient control sumps (GSUMP-6E, GSUMP-6W, GSUMP-7N, GSUMP -SE and GSUMP-7SC) in October 2021. All gradient control sump samples collected in October 2021 were analyzed for: field parameters, chloride, sulfate, hardness, alkalinity, sodium and VOCs. ESC also collected one duplicate sample (GSUMP-DUP) and one field blank (GSUMP-Field Blank) in October 2021 for analysis. GSUMP-DUP was collected at GSUMP-6E and GSUMP-Field Blank was collected near GSUMP-7N. The results from GSUMP-DUP were consistent with the results of the original sample. Trip blanks provided by the laboratory accompanied the GSUMP VOC samples from their collection back to the laboratory.

All five of the gradient control samples and the duplicate sample collected in October 2021 had reported concentrations of sulfate above the ES. The reported concentrations of sulfate were consistent with historic data. Sulfate is naturally occurring and is found in the glacial till of Southeastern Wisconsin. Dissolution of anhydrite, or gypsum, or the oxidation of pyrite can result in natural sulfate concentrations above the NR140 standards. A summary of the NR 140 ES exceedances is included with this report in **Table 2**.

In October 2021, no VOCs were detected in any of the samples collected from the five gradient control sumps or the trip blank that accompanied the samples from and to the laboratory. All of the other parameters detected in the samples collected from the gradient control sumps in October 2021 were generally consistent with historic data; there is no indication that the landfill has affected the water quality in these gradient control sumps. A summary of the NR 140 PAL/ES exceedances is included with this report in **Table 2**.

SURFACE WATER MONITORING

Surface water samples were collected from four of the 13 of the surface water points in October 2021. Samples were not collected from SB-1, SB-3, SB-6, SW-1, SW-2, SW-3, SW-4, SW-5 and SW-22 because the locations were dry. Samples collected from the sedimentation basins (SB-2, SB-5 and SB-7) were analyzed for total suspended solids. Samples collected from surface water point SW-35 were analyzed for field parameters, TSS, BOD, potassium, sodium, chloride, hardness, sulfate, and alkalinity. All surface water samples were collected with a polyethylene dipper. In addition to the surface water samples collected, 26 staff gauge elevations were also measured in October 2021. Analytical data for the samples collected from the surface water locations were generally consistent with historic data; there is no indication that the landfill has affected surface water quality.

LEACHATE SAMPLE

One leachate sample was collected in October 2021 as a grab sample using a Hach Autosampler. One trip blank prepared by the laboratory accompanied the Leachate and Gas Condensate VOC samples from their collection back to the laboratory. No VOCs were detected in the trip blank that accompanied the samples from and to the laboratory. Leachate analytical results from the monitoring conducted during the October 2021 event were consistent with historical data. A discussion of leachate quality and trends can be found in the annual report submitted in April each year.

GAS CONDENSATE LIFT STATION SAMPLE

One gas condensate lift station sample was collected during the October 2021 sampling event. The gas condensate sample was collected with dedicated sampling equipment. Results from the sample collected at the gas condensate lift station in October 2021 were consistent with historic data. One trip blank prepared by the laboratory accompanied the Leachate and Gas Condensate VOC samples from their collection back to the laboratory. No VOCs were detected in the trip blank that accompanied the samples from and to the laboratory. A discussion of gas condensate quality can be found in the annual report submitted in April each year.

LEACHATE HEAD WELL ELEVATIONS

Leachate head elevation measurements are required to be monitored monthly at 16 leachate head wells. As indicated in prior communication with the Department, it was determined in May 2020 that several leachate headwell levels exceeded the regulatory requirements. Since that time, weekly headwell readings have been taken by ESC and/or Tetra Tech personnel, beyond the scope of the monthly permit requirement. Leachate headwells have decreased since the issue was first identified in May 2020. During the October 2021 weekly monitoring events, there were three leachate headwells, LH-12, LH-4 and LH-17, that had levels greater than one foot during one or more of the weekly readings. Average liquid levels across the facility have also decreased since May 2020 and averaged 0.39 ft. to 0.47 ft. in October 2021. Currently, as of December 29, 2021 the average liquid level across the site is 0.66 ft. and leachate headwells (LH-12, LH-14 & LH-17) indicate liquid levels greater than one foot. The leachate head elevation data is submitted to the WDNR quarterly under separate cover for upload to the GEMS database.

GAS EXTRACTION WELL AND BLOWER MONITORING

The landfill gas blower was monitored by EPL personnel for percent methane, oxygen, gas temperature, flow, and header pressure twice monthly during this reporting period. Percent methane, oxygen, gas temperature, flow, well head pressure, and valve % open were measured in the headspace of 69 gas extraction wells using an Envision gas meter. The landfill gas blower and gas extraction well data are submitted to the WDNR GEMS Data Submittal Contact quarterly under separate cover.

GAS PROBE MONITORING

Eleven gas monitoring probes were measured by EPL personnel in October 2021 for percent methane, oxygen, carbon dioxide, ambient air temperature, barometric pressure, trend in barometric pressure, ground conditions and gas pressure using an Envision gas meter. No methane was detected at the gas monitoring probes during the monitoring event in October 2021. The gas probe data are submitted to the WDNR GEMS Data Submittal Contact quarterly under separate cover.

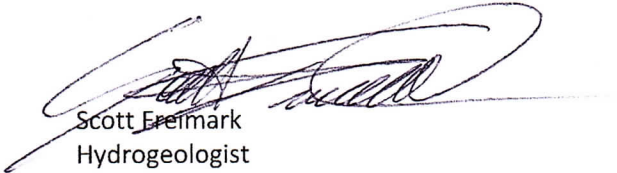
CONCLUSIONS AND RECOMMENDATIONS

Results from the groundwater, leachate, gas condensate, and surface water samples collected during the October 2021 event were generally consistent with historic data. There is no indication that the landfill has affected the environment and the site should remain in detection monitoring. The exceedances reported for samples collected from the groundwater monitoring wells were consistent with historic data and did not display any significant increasing trends. Spatial and temporal fluctuations in the groundwater quality may be due to changes in groundwater elevation. These changes may also be related to the proximity of many of these groundwater wells to road salt and dust from the haul road, access roads, and the active construction area. The sulfate concentrations that were reported at all of the gradient control system samples in October 2021 can be attributed to the sulfate that is naturally occurring and are not landfill related. These points will continue to be monitored to determine what, if any, trends exist.

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This information satisfies the reporting requirements for the October 2021 environmental monitoring. If you have any questions or comments regarding this submittal, please contact Dan Otzelberger of EPL at (262) 758-3777, or the undersigned at (414) 427-5033.

Sincerely,
Environmental Sampling Corporation



Scott Freemark
Hydrogeologist

Attachments

cc: GEMS Data Submittal Contact: WDNR (w/CD)
Ann Bekta: WDNR (electronic copy)
Tim Curry: Midwest (electronic copy)
Kari Rabideau: Midwest (electronic copy)
Dan Otzelberger: EPL (electronic copy)
Chad Siegle: EPL (electronic copy)
Scott Croft: EPL (electronic copy)
EPL File Copy
Nick Dykstra: Tetra Tech (electronic copy)
Jo Spear: JSA Environmental (electronic copy)
Sherren Clark: SCS Engineers (electronic copy)
Mark Slocomb: EPL Standing Committee (electronic copy)
EPL Standing Committee (electronic copy)
Frank Perugini: ESC (electronic copy)

Table 1

**Groundwater Indicator Parameter Preventative Action Limits (PAL) Summary
Emerald Park Landfill
License #03290
October 2021**

WDNR WELL ID#	CLIENT ID	ANALYTE	WDNR CODE	SAMPLE DATE	RESULT	UNITS	EXCEEDS
020	MW-3B	Sodium	00930	10/20/21	104	mg/L	Site PAL (66)
030	MW-5A	Alkalinity	39036	10/20/21	489	mg/L	Site PAL (400)
030	MW-5A	Hardness	22413	10/20/21	910	mg/L	Site PAL (470)
030	MW-5A	Specific Conductance	00094	10/20/21	1,781	umhos/cm	Site PAL (870)
032	MW-5B	Hardness	22413	10/20/21	426	mg/L	Site PAL (160)
032	MW-5B	Specific Conductance	00094	10/20/21	992	umhos/cm	Site PAL (430)
048	MW-8AR	Hardness	22413	10/20/21	868	mg/L	Site PAL (680)
048	MW-8AR	Specific Conductance	00094	10/20/21	1,415	umhos/cm	Site PAL (1,300)
048	MW-8AR	Sodium	00930	10/20/21	24.0	mg/L	Site PAL (23)
120	MW-106A	Sodium	00930	10/22/21	26.8	mg/L	Site PAL (24)
128	MW-107A	Sodium	00930	10/22/21	65.7	mg/L	Site PAL (31)
128	MW-107A	Hardness	22413	10/22/21	504	mg/L	Site PAL (430)
128	MW-107A	Specific Conductance	00094	10/22/21	1,189	umhos/cm	Site PAL (840)
144	MW-115A	Alkalinity	39036	10/20/21	711	mg/L	Site PAL (550)
144	MW-115A	Hardness	22413	10/20/21	1,010	mg/L	Site PAL (690)
144	MW-115A	Sodium	00930	10/20/21	172	mg/L	Site PAL (160)
144	MW-115A	Specific Conductance	00094	10/20/21	2,480	umhos/cm	Site PAL (1,400)
156	MW-120A	Hardness	22413	10/20/21	736	mg/L	Site PAL (500)
156	MW-120A	Specific Conductance	00094	10/20/21	1,218	umhos/cm	Site PAL (1,100)
162	MW-121A	Hardness	22413	10/22/21	854	mg/L	Site PAL (550)
162	MW-121A	Sodium	00930	10/22/21	77.0	mg/L	Site PAL (36)
162	MW-121A	Specific Conductance	00094	10/22/21	1,750	umhos/cm	Site PAL (980)

Table 2

**Groundwater Alternative Concentration Limits (ACL), NR 140 PAL,
and NR 140 Enforcement Standards (ES) Exceedance Summary
Emerald Park Landfill
License #03290
October 2021**

WDNR WELL ID#	CLIENT ID	ANALYTE	WDNR CODE	SAMPLE DATE	RESULT	UNITS	EXCEEDS
030	MW-5A	Chloride	00941	10/20/21	263	mg/L	NR140 ES (250)
048	MW-8AR	Sulfate	00946	10/20/21	329	mg/L	Site ACL (210)
091	MW-19AR	Sulfate	00946	10/20/21	505	mg/L	NR140 ES (250)
120	MW-106A	Sulfate	00946	10/22/21	145	mg/L	Site ACL (130)
144	MW-115A	Chloride	00941	10/20/21	336	mg/L	NR140 ES (250)
158	MW-120C	Sulfate	00946	10/20/21	297	mg/L	NR140 ES (250)
162	MW-121A	Sulfate	00946	10/22/21	551	mg/L	Site ACL (330)
196	MW-303A	Chloride	00941	10/22/21	134	mg/L	NR140 PAL (125)
208	MW-305A	Chloride	00941	10/22/21	149	mg/L	NR140 PAL (125)
212	MW-305C	Sulfate	00946	10/22/21	308	mg/L	Site ACL (190)
516	GSUMP-6E	Sulfate	00946	10/25/21	1,100	mg/L	NR140 ES (250)
516	GSUMP-DUP(6E)	Sulfate	00946	10/25/21	1030	mg/L	NR140 ES (250)
517	GSUMP-6W	Sulfate	00946	10/25/21	905	mg/L	NR140 ES (250)
518	GSUMP-7N	Sulfate	00946	10/25/21	464	mg/L	NR140 ES (250)
519	GSUMP-7SE	Sulfate	00946	10/25/21	604	mg/L	NR140 ES (250)
521	GSUMP-7SC	Sulfate	00946	10/25/21	727	mg/L	NR140 ES (250)

Notes:
None.