

ENVIRONMENTAL SAMPLING CORPORATION

Dedicated to Environmental Monitoring, Science & Technology

June 30, 2021

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

**Re: April 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 April 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 April 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 April 2021 by Tetra Tech personnel:

- Record 16 leachate headwell elevations,

Information regarding the monitoring program conducted at EPL during April 2021 is provided in the following sections. The environmental monitoring data files and certification page for the April 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 43 of the 44 monitoring wells in April 2021. One groundwater monitoring well (MW-4AR) was unable to be sampled during the April event because it was dry. These wells are typically dry during the semi-annual monitoring events. 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 and sodium. The subtitle D wells were also analyzed for 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 Walto courier service.

Field parameters, pH, specific conductivity and temperature, were measured using a Cole-Parmer dual pH/conductivity meter that was 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-106A), DUP-02 (MW-303C), DUP-03 (MW-302B), and DUP-04 (MW-4D) 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 April 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 higher than those observed during last sampling event (October 2020) and the previous April 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 April 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 April 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-3A, MW-3B, MW-8AR, MW-107A, MW-115A, and MW-121A. The concentrations of sodium at MW-8AR, MW-115, 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-107A has decreased over the last three sampling events. The reported concentrations of sodium in the samples collected from the upgradient wells MW-3A and MW-3B were increased from typical historic data but are similar to results since April 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, MW-5B, MW-115A and MW-120DR. The concentrations of alkalinity in the samples at MW-5A, MW-5B, and MW-115A were consistent with recent historic data. The concentration of alkalinity in the sample collected from MW-120DR was consistent with historic data and similar to concentrations reported since 2018. The alkalinity exceedances at MW-5A and MW-5B can be attributed to their 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. The concentration of alkalinity in the sample collected from MW-120DR may be a result of fluctuations in groundwater quality due to changes in groundwater elevation or the proximity 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-3A, MW-5A, MW-5B, MW-115A, MW-120A and MW-121A. Exceedances of well-specific PALs for hardness were also reported in the samples collected from groundwater monitoring wells MW-8AR and MW-120DR. An exceedance of the well-specific PAL for specific conductance was also reported in the sample collected from MW-107A. The April 2021 specific conductance and hardness concentrations reported for MW-5A and MW-5B were similar to or slightly reduced from recent historical data. The April 2021 hardness concentrations reported at MW-3A, MW-8AR, MW-115A, MW-120A, MW-120DR, and MW-121A were similar to historical data. The specific conductance data reported at MW-107A in April 2021 was similar to historic data reported over the past two years. The results for these wells show seasonal functions which may be a result of changes in groundwater elevation with higher concentrations in the Spring and lower concentrations during the Fall events.

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 April 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 PAL in the sample collected from MW-313D and exceeded the NR140 ES in the samples collected from MW-19AR, MW-120A, and MW-120C. Concentrations of sulfate exceeded the well-specific ACLs in the samples collected from MW-3A, MW-8AR and MW-305C. The sulfate concentration reported in the sample collected from upgradient well MW-3A was higher than typical historic data but was similar to concentrations reported in April 2019. The increased sulfate concentration at MW-3A may be due to an increase in groundwater elevation at this location. The concentrations of sulfate in the samples collected from the remaining wells 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.

Chloride

Concentrations of chloride exceeded the NR140PAL in the sample collected from MW-5A and exceeded the NR140 ES in the samples collected from MW-3A and MW-115A. The chloride concentration reported in the sample collected from MW-3A was slightly higher than typical historic data and may be due to an increase in groundwater elevation at this location. The concentrations of chloride in the samples collected from the remaining wells were consistent with data reported over the past five years. The chloride concentrations in the samples collected from MW-5A and MW-115A may be attributed to road salt and dust since MW-5A is adjacent to a parking lot and MW-115A is located adjacent to the entrance road to the site.

Exceedances of sulfate and chloride concentrations during the April 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 April 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 April 2021 event, VOC analyses were conducted on the samples collected from the subtitle D groundwater monitoring wells. No VOCs were detected in the groundwater samples or the trip blanks during the April 2021 monitoring event.

Groundwater Conclusions

Results from the April 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 April 2021. All gradient control sump samples collected in April 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 April 2021 for analysis. GSUMP-DUP was collected at GSUMP-7N and GSUMP-Field Blank was collected near GSUMP-6W. 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 April 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 April 2021, no VOCs were detected in the samples collected from GSUMP-6E, GSUMP-6W, GSUMP-7N and GSUMP-7SE or the trip blank that accompanied the samples from and to the laboratory. One VOC, vinyl chloride, was detected in the samples collected from GSUMP-7SC at a concentration between the laboratory LOD and LOQ. The concentration of vinyl chloride reported in the sample collected from GSUMP-7SC exceeded the NR140 ES; however, estimated concentrations below the LOQ are not considered exceedances in accordance with NR140.14(c).

All of the other parameters detected in the samples collected from the gradient control sumps in April 2021 were generally consistent with historic data; there is no indication that the landfill has affected the water quality in these gradient control sumps. The VOC detection in the sample collected from GSUMP-7SC during the April 2021 sampling event was between the laboratory LOD and LOQ which cannot be confirmed by the laboratory and should be considered an estimate. Future monitoring will help determine what, if any, trends exist. 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 eight of the 13 of the surface water points in April 2021. Samples were not collected from SB-1, SW-1, SW-3, SW-4 and SW-5 because the locations were dry. Samples collected from the sedimentation basins (SB-2, SB-3, SB-5, SB-6 and SB-7) were analyzed for total suspended solids. Samples collected from surface water points SW-2, SW-22 and 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 April 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 April 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 April 2021 event were consistent

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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 April 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 April 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 but have been recorded on a weekly basis following the identification of elevated head levels in May 2020 and subsequent corrective actions. During April 2021, weekly headwell readings were recorded by ESC or Tetra Tech personnel. One leachate head wells (LH-14) had levels greater than one foot during one or more of the weekly readings recorded during the reporting period. These additional readings, beyond the scope of the monthly permit requirement, were discussed with the Department during weekly conference calls. As of June 23, 2021, only head well LH-14 has a liquid level greater than one foot. Average liquid levels across the facility have averaged 0.18 ft. to 0.20 ft. in April 2021. Currently, as of June 23, 2021 the average liquid level across the site has been reduced to 0.24 ft. and only one leachate headwell (LH-14) indicates 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 April 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 April 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 April 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

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that were reported at all of the gradient control system samples in April 2021 can be attributed to the sulfate that is naturally occurring and are not landfill related. The VOC exceedances that were reported at gradient control sumps GSUMP-7SC can likely be attributed to landfill gas migration or lack of operation of the gradient control sump for an extended period of time. These points will continue to be monitored to determine what, if any, trends exist.

This information satisfies the reporting requirements for the April 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 Freimark
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)
Sherrin Clark: SCS Engineers (electronic copy)
Mark Slocumb: 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
April 2021

WDNR WELL ID#	CLIENT ID	ANALYTE	WDNR CODE	SAMPLE DATE	RESULT	UNITS	EXCEEDS
018	MW-3A	Hardness	22413	4/23/21	1,480	mg/L	Site PAL (780)
018	MW-3A	Sodium	00930	4/23/21	99.5	mg/L	Site PAL (99)
018	MW-3A	Specific Conductance	00094	4/23/21	1,561	umhos/cm	Site PAL (1,300)
020	MW-3B	Sodium	00930	4/23/21	91.4	mg/L	Site PAL (66)
030	MW-5A	Alkalinity	39036	4/20/21	494	mg/L	Site PAL (400)
030	MW-5A	Hardness	22413	4/20/21	900	mg/L	Site PAL (470)
030	MW-5A	Specific Conductance	00094	4/20/21	1,353	umhos/cm	Site PAL (870)
032	MW-5B	Alkalinity	39036	4/16/21	2,979	mg/L	Site PAL (260)
032	MW-5B	Hardness	22413	4/16/21	545	mg/L	Site PAL (160)
032	MW-5B	Specific Conductance	00094	4/16/21	999	umhos/cm	Site PAL (430)
048	MW-8AR	Hardness	22413	4/20/21	1,070	mg/L	Site PAL (680)
048	MW-8AR	Sodium	00930	4/20/21	28.5	mg/L	Site PAL (23)
128	MW-107A	Sodium	00930	4/20/21	56.4	mg/L	Site PAL (31)
128	MW-107A	Specific Conductance	00094	4/20/21	920	umhos/cm	Site PAL (840)
144	MW-115A	Alkalinity	39036	4/20/21	683	mg/L	Site PAL (550)
144	MW-115A	Hardness	22413	4/20/21	986	mg/L	Site PAL (690)
144	MW-115A	Sodium	00930	4/20/21	174	mg/L	Site PAL (160)
144	MW-115A	Specific Conductance	00094	4/20/21	1,422	umhos/cm	Site PAL (1,400)
156	MW-120A	Hardness	22413	4/21/21	808	mg/L	Site PAL (500)
156	MW-120A	Specific Conductance	00094	4/21/21	1,134	umhos/cm	Site PAL (1,100)
161	MW-120DR	Alkalinity	39036	4/21/21	345	mg/L	Site PAL (300)
161	MW-120DR	Hardness	22413	4/21/21	471	mg/L	Site PAL (430)
162	MW-121A	Hardness	22413	4/21/21	596	mg/L	Site PAL (550)
162	MW-121A	Sodium	00930	4/21/21	55.6	mg/L	Site PAL (36)
162	MW-121A	Specific Conductance	00094	4/21/21	1,026	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
April 2021**

WDNR WELL ID#	CLIENT ID	ANALYTE	WDNR CODE	SAMPLE DATE	RESULT	UNITS	EXCEEDS
018	MW-3A	Chloride	00941	4/23/21	370	mg/L	NR140 ES (250)
018	MW-3A	Sulfate	00946	4/23/21	829	mg/L	Site ACL (220)
030	MW-5A	Chloride	00941	4/20/21	190	mg/L	NR140 PAL (125)
048	MW-8AR	Sulfate	00946	4/20/21	522	mg/L	Site ACL (210)
091	MW-19AR	Sulfate	00946	4/20/21	453	mg/L	NR140 ES (250)
144	MW-115A	Chloride	00941	4/20/21	373	mg/L	NR140 ES (250)
156	MW-120A	Sulfate	00946	4/21/21	445	mg/L	NR140 ES (250)
158	MW-120C	Sulfate	00946	4/21/21	291	mg/L	NR140 ES (250)
212	MW-305C	Sulfate	00946	4/22/21	349	mg/L	Site ACL (190)
213	MW-313D	Sulfate	00946	4/16/21	182	mg/L	NR140 PAL (125)
516	GSUMP-6E	Sulfate	00946	4/19/21	1,210	mg/L	NR140 ES (250)
517	GSUMP-6W	Sulfate	00946	4/19/21	1,090	mg/L	NR140 ES (250)
518	GSUMP-7N	Sulfate	00946	4/20/21	506	mg/L	NR140 ES (250)
518	GSUMP-DUP(7N)	Sulfate	00946	4/20/21	510	mg/L	NR140 ES (250)
519	GSUMP-7SE	Sulfate	00946	4/19/21	526	mg/L	NR140 ES (250)
521	GSUMP-7SC	Sulfate	00946	4/19/21	580	mg/L	NR140 ES (250)

Notes:

The following analytes were reported at concentrations greater than NR140 standard, but less than the LOQ during the April 2021 event. This estimated concentrations below the LOQ are not considered exceedances in accordance with NR140.14(c) and are not included on the exceedance summary above.

Vinyl Chloride (ES=0.2 ug/L): GSUMP-7SC (0.34 ug/L) on 04/19/21