

OPERATION, MAINTENANCE, AND MONITORING PLAN

VOLUME 1

General Requirements and Surface Systems

Prepared for:

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DOCUMENTS INCORPORATED BY REFERENCE

(MAINTAINED IN LANDFILL OFFICE)

- Bridgeton Landfill Health and Safety Plan
- Security and Access Control Program
- Quarterly Infrastructure Update
- Construction Quality Assurance Plan, by Aquaterra Environmental Solutions, Inc., December 2004
- EVOH Cap System QA/QC Plan, Cornerstone Environmental Group, April 2013
- Construction Documentation Report, 2013 Temporary Cap and Cap Integrity System, by Weaver Boos, October 2013
- 2013 Stormwater Management System Record Documentation Report, by Weaver Boos, October 2013
- Odor Management Plan
- Incident Management Plan
- Gas System Monitoring Equipment Manuals
 - Envision Operating Manual
 - Water Level Meter User Manuals
 - Four-gas Personnel Monitoring Meters
 - Flame Ionization Detector
 - Temperature Monitoring Equipment
- Other documents are listed in the body of this OM&M Plan

1.0 INTRODUCTION

1.1 BACKGROUND

Bridgeton Landfill LLC (Bridgeton Landfill) is located on a 214-acre parcel, of which approximately 52 acres has been permitted for municipal solid waste disposal under the conditions of Permit #118912. In accordance with the permit, waste was placed in former limestone quarries which were reportedly about 240 feet deep. The landfill ceased accepting waste at the end of 2004.

In December 2010, Bridgeton Landfill detected changes in gas extraction well conditions, specifically, elevated temperatures and elevated carbon monoxide levels were detected. Further investigation indicated that the landfill was experiencing an exothermic subsurface reaction (SSR) which, among other effects, increases the potential for fugitive emissions and odors from the facility. Since the time that the subsurface reaction was confirmed, Bridgeton Landfill has worked with the Missouri Department of Natural Resources (MDNR) Solid Waste Management Program (SWMP) along with other local, state and federal agencies to respond.

This Plan is a living document that will be modified as site infrastructure and conditions change. Section 8.0 of this volume describes the process for making future modifications to the OM&M Plan.

1.2 PURPOSE OF OPERATION, MAINTENANCE, AND MONITORING PLAN

The presence of an SSR requires enhanced monitoring and maintenance so that containment and control systems continue to operate efficiently. The purpose of this Operation, Maintenance and Monitoring (OM&M) Plan is to prescribe a detailed and rigorous set of procedures to:

- Create a document that can be implemented by in-house Bridgeton Landfill personnel and/or by a third party to maintain effective, safe, environmental management of the facility;
- Perform regular inspection and maintenance of environmental control, conveyance, and containment systems;
- Enable tracking of the status of the SSR, and provide facility personnel with information needed to contain and manage its byproducts (including sampling and analyses of landfill gas and leachate);
- Provide monitoring to assess the reaction condition including status/progression of the SSR, as indicated by settlement surveys and stability inspections;

- Identify issues and conditions that warrant agency notification (such as significant and sudden data changes, slope movements, or surface fires) and that may require or be conducive to further remedial measures; and,
- Present means for communication, reporting, and revision of the OM&M Plan as conditions warrant.

To meet these objectives, Bridgeton Landfill has prepared this three-volume OM&M Plan, supplemented by other on-site documents, structured as indicated below:

- **Volume 1 – General Requirements and Surface Systems (this volume)**
- Volume 2 - Gas and Subsurface Control Systems
- Volume 3 - Leachate Management Systems
- Miscellaneous documents/manuals incorporated by reference

This OM&M Plan document will extensively reference other documents that will be retained in hard copy format at the Bridgeton Landfill facility office including: a Health and Safety Plan (specifically designed for activities related to this OM&M Program), Incident Management Plan, Odor Management Plan, as-built drawings, equipment operating manuals, etc. The OM&M Plan will be part of the Bridgeton Landfill operations until it is agreed with the SWMP that the thermal event is no longer presenting severe operational challenges and maintenance and monitoring of the landfill can revert to the approved permit, or to a modified permit, which may include modified OM&M procedures.

1.3 OPERATION, MAINTENANCE, AND MONITORING PLAN MANAGEMENT

The OM&M Plan will be managed and administered by the following Bridgeton Landfill personnel:

- Division Manager (DM) – The primary person responsible for implementation of the OM&M Plan. Provides daily on-site management of the implementation of the Plan and is authorized to approve minor changes or deviations from the program. The Environmental Manager and Operations Manager report to the Division Manager;
- Environmental Manager (EM) – Provides daily on-site management of the implementation of the Plan. The Environmental Manager reports to the Division Manager;
- Operations Manager (OM) – Responsible for implementation of the OM&M Plan at the management level, coordinating day-to-day activities. The Operations Manager reports to the Division Manager;

- Environmental Specialists (ES) – Responsible for implementation of the OM&M Plan at the field level. The Environmental Specialists report to the Environmental Manager or the Operations Manager;
- Field Technicians – Bridgeton Landfill or third party personnel that perform the operation and maintenance activities in the field. The Field Technicians report to the Environmental Specialists, Operations Manager, or the Environmental Manager; and,

Actual staffing levels, skills, assignments, and work hours vary with conditions and activities.

Since site features may change and future remedial features may be required to further manage and mitigate the effects of the SSR, this OM&M Plan will be a living document that is amended, as necessary, as site features are installed, abandoned, or changed. Significant changes to procedures or requirements of this OM&M Plan will be submitted to the SWMP for approval and then, upon approval, will be reflected in the revised Plan to be retained on site as described in Section 8.0.

2.0 INSPECTION, MITIGATION, AND REPAIR

As a matter of routine, Bridgeton Landfill technicians perform multi-system inspections early each regular workday morning (Monday through Friday excluding holidays). These inspections are called “Quad-Checks” and are meant to identify items that are, or could develop into, immediate odor or environmental containment issues. Detailed locations (schematics showing quad areas), procedures, and documentation processes for Quad-Checks are presented in Appendix A. Each day (including weekends and holidays) a perimeter inspection is performed. Procedures for these perimeter inspections are also presented in Appendix A.

Issues involving potential odors or leaking liquids are reported to the Operations Manager, Environmental Specialist, or Environmental Manager in a timely manner, and corrective procedures in Table 1 are implemented. Every possible effort is made to eliminate an odor source as soon as possible and no later than the end of the day. If a major repair or structural change is required, the issue will be timely reported to the Operations Manager or his designee, who will generate a non-routine work order to resolve the issue. Records of such identified issues and their resolution or repair are documented in work orders and/or technician field books that will be retained on site.

2.1 SECURITY AND SURVEILLANCE

The Bridgeton Landfill facility is rigorously secured and monitored. A Security and Access Control Program is incorporated into this OM&M Plan by reference. Highlights of the measures include items such as:

- Perimeter fencing enclosing the entire property;
- Gated access points;
- Surveillance cameras monitoring site access 24 hours per day;
- Video monitoring of the cameras available at the site office and the leachate treatment plant; and,
- 24/7 on-site staffing trained to perform routine perimeter inspections and implement procedures outlined in the Incident Management Plan.

3.0 COVER SYSTEMS

Prior to the current SSR conditions, the facility had installed the clay final cover required by its permit. However, in order to contain and manage symptoms of the SSR, Bridgeton Landfill has covered about 45.542 acres with exposed flexible membrane liner (FML) EVOH cover over the entire South Quarry Area and most of the North Quarry.

Approximate current locations of final clay cover and of the EVOH, as well as the major site features, are indicated on Figure 1 of this OM&M Plan. Detailed as-built locations and conditions of the EVOH cover are contained in the current Quarterly Infrastructure Update and other construction record documentation on site.

3.1 FINAL CLAY COVER AREAS

Final clay cover at the facility is comprised of at least 24 inches of compacted clay over waste and 12 inches of soil for vegetation (this is the only cover system that is currently on a small portion of the North Quarry area). The final clay cover is subject to normal erosion and vegetative stress. As needed, hydroseeding is performed to maintain adequate vegetative cover, reduce erosion rills, and enhance maintenance of the clay cap. Appendix A – Site Inspections includes daily inspection and Table 1 provides repair procedures for clay final cover areas.

Final clay cover (that is not EVOH cover) repair QA/QC will be performed in accordance with the Aquaterra Environmental Solutions, Inc. document titled “Construction Quality Assurance Plan,” dated December 2004, and retained on-site. This document includes the QA/QC requirements to achieve the requirements of the facility’s operating permit regarding final clay cover. Major repair areas, covering greater than 0.5 acres, will be documented and shown when appropriate on updated as-built drawings. Documentation and as-built surveys are not required for minor repairs.

3.2 EVOH COVER AREAS

3.2.1 EVOH Membrane Material

EVOH refers to exposed flexible membrane liner material placed over areas where control of gas and/or odors may need to be enhanced (this cover system is currently on the South Quarry area and a majority of the North Quarry in addition to and on top of the final clay cover described in 3.1 above). Appendix A – Site Inspections includes daily inspection and Table 1 provides repair procedures for EVOH final cover areas.

Major repairs or new installation of EVOH cover QA/QC will be performed in accordance with the Cornerstone Environmental Group document titled “EVOH Cap System QA/QC Plan”. This document is retained on-site and includes the QA/QC requirements for subgrade preparation, subcap leachate collection, landfill gas collection components and geosynthetic materials and installation. Safety Data Sheets (SDS) sheets for HDPE and EVOH cap materials are contained in Appendix B.

When applicable, the standard details included in the OM&M Plan will be used to guide the repair process. Major repair areas will be delineated with an as-built survey, documented, and added to the active as-built drawings of the EVOH cover. Documentation and as-built survey are not required for minor repairs which include seam or rip repairs, patches, gas well or structure boot repairs, etc.; such repairs will be noted in daily logs and field books, which are retained on-site.

3.2.2 Subcap Features

Subcap features were installed with the cap membranes. These features are sometimes referred to as “cap integrity systems” and are intended to prevent gas from collecting under the unweighted membrane causing “ballooning,” and to collect subcap leachate and condensation to prevent accumulation at the toe of the slope. Subcap drains are indicated on the as-built infrastructure drawing as 4-inch perforated trench drains. Procedures for inspecting and repairing subcap drains are included in Table 1.

3.2.3 Subcap Voids and Cracks

When localized settlement and subsidence occurs, site personnel erect caution tape (or equivalent) around the area as necessary for safety purposes. The areas of subsidence are monitored until the area is repaired in order to prevent safety hazards; and the cover and localized collection are maintained to prevent release of gas or leachate in order to avoid any increase in odors related to the settlement. Settlement areas that result in a gas or leachate release are repaired as promptly as possible in order to prevent any increase in odors. Two alternate procedures for repairing localized settlement and cracks are presented in Appendix C.

3.2.4 Large Settled Areas

Reaction-related settlements are creating low areas which can collect surface water and cause “bellies” in gas and air lines, reducing or obstructing their function. These areas comprise too much volume to correct with the procedures used for crack and void filling.

These settled areas can occur over several acres and may ultimately require many feet of fill to attain grades which allow surface water drainage and efficient gas management. Surface water that collects in these areas can be readily and easily addressed by pumping non-impacted water out of the low areas after a rainfall; impacted stormwater will be conveyed to the leachate pretreatment facility. In some cases, it is necessary to fill the large settled areas with clean fill as defined at 260.200.1(6) RSMo or soil¹ to restore grades for the piping networks and to promote surface water drainage. Typical procedures for placement of fill on EVOH synthetic cap material are contained in Appendix D.

¹ As of this writing, this definition is “uncontaminated soil, rock, sand, gravel, concrete, asphaltic concrete, cinderblocks, brick, minimal amounts of wood and metal, and inert solids as approved by rule or policy of the department for fill, reclamation, or other beneficial reuse.”

4.0 SURFACE WATER MANAGEMENT SYSTEMS

Precipitation runoff from the cover system enters the surface water management system and is then conveyed off-site. Schematic representation of the surface water management systems are illustrated on Figure 2. Detailed as-builts for these features are contained in the record documentation on-site. The cover and surface water management system must work together to minimize surface water ponding on the landfill, and to prevent erosion and surface water contamination. The facility is currently subject to NPDES Permit No. MO-0112771; permitted outfalls are indicated on Figure 2.

The term “surface water management system” refers to those ditches, swales, culverts, and ponds that are outside of the limits of waste disposal, but that convey stormwater runoff from the landfill proper. If any condition arises (e.g. a spill occurs) that creates a threat to the surface water, Bridgeton Landfill may construct a containment feature between the threat location and a surface water detention or retention pond (see Figure 2).

In several areas, surface water can be retained using an isolation valve should a leachate leak or release be detected on the EVOH cover surface; locations of such isolation valves are indicated on Figure 2. Normally, the gate valves are all kept closed to arrest movement of surface water contamination should it occur. However, whenever rain begins or is imminent, facility personnel shall perform an inspection of the synthetic cap and ditches to assure no leachate is present on the surface, and then open the gate valves to allow normal flow-through operation of the surface water management features.

At or near each on-site culvert, “pigs” or pipe plugs are located for rapid plugging and isolation of a spill prior to reaching the isolation valves. In addition, if an active or potential leak is identified, soil berms are used to trap the liquid before it can reach the ditches, culverts, or isolation valves.

Should a leak or release of contaminated water or leachate occur, it will be handled in accordance with Appendix B of the facility Incident Management Plan (Spill Prevention and Response for Leachate), which is incorporated into this OM&M Plan by reference. Leaks or spills that exceed 55 gallons will be logged with a report of date, time, location, approximate volume, and corrective actions taken; this information will be provided in the Monthly Data Report.

5.0 ODOR MANAGEMENT AND NOTIFICATION

Procedures for work-day, on-site detection and remediation of odor causing issues is described in Section 2.0 of this Plan. In addition, Bridgeton Landfill has an “Odor Management Plan” (OMP), which is incorporated into this OM&M Plan by reference. The OMP contains procedures for self-inspection around the perimeter of the landfill, investigations of odor complaints, management and abatement of odor, record keeping, and reporting related to odor management.

Facility staff is responsible for providing prior notification to the SWMP, St. Louis County, and the Pattonville and Robertson Fire Protection Districts of routine maintenance or planned major replacements, extensions, changes or new installations occurring at the facility in sufficient time to allow for advance notice to be provided to the surrounding community when such work is expected to result in elevated odors extending beyond the property boundaries of the facility and that may enter the community.

6.0 MONITORING AND DATA COLLECTION

6.1 MONITORING PROGRAM OBJECTIVES

The following monitoring objectives have been identified:

- Monitor status/progression of the SSR with specific attention paid to movement into or through the neck into the North Quarry;
- Monitor for and abate odors related to the SSR;
- Monitor characteristics and volume of leachate and gas;
- Maintain gas collection and leachate collection efficiency;
- Assess conditions requiring notification, repair, further evaluation, or corrective action with specific attention to rapid settlement and slope movement/instability; and
- NSPS – Title V air regulation compliance.

Note that perimeter environmental monitoring (e.g., groundwater, gas migration, and air quality monitoring) is not addressed in this OM&M Plan because it is governed by other facility permit and compliance documents. Some of the monitoring described in the following sections is performed using instrumentation and procedures that are more thoroughly described or presented in Volume 2 or Volume 3 of the OM&M Plan.

Monitoring results will be presented in Weekly and Monthly Data Submittals as outlined in the following sections. In addition to these reports, on Friday of each week, Bridgeton Landfill will report to the MDNR a list of work completed in the past week and work planned for the following week.

Non-routine sampling, i.e., sampling that is not done to support OM&M efforts, or not included in an approved work plan, will require at least 48 hours of advance notice to the MDNR unless an emergency response requires sampling on a more expedited basis, in which case Bridgeton shall notify the MDNR via the emergency phone line 573-634-2436. Final QA/QC data collected by Bridgeton or its agents in support of the reports will be maintained at the facility and available upon request to the MDNR.

6.2 SETTLEMENT SURVEYS

A third-party contractor will perform ground surveys as set forth in Table 2 using GPS methods which will obtain northing, easting, and vertical elevations with an anticipated accuracy of ± 0.1 ft. vertical and ± 0.05 ft. horizontal.

Lateral progression of atypical settlement rates and return to typical settlement rates may indicate in which direction the SSR is advancing or retreating, respectively. This information can be valuable for the planning and installation of preemptive remedial measures; such measures could include adjustments to the operation and/or location of temporary cap system, gas collection piping, and leachate transmission piping.

The results of the survey will be presented on a figure in the Monthly Data Submittal as well as the data files as described in Section 7.0. Bridgeton Landfill personnel will compare the survey results with previous months to help determine the rate of settlement and a summary of the results will be provided monthly to the MDNR.

Additionally, a quarterly Stability Assessment will be performed by a professional engineer. The purpose of the assessment will be to visually identify any stability or settlement issues of concern and will include an evaluation of the perimeter of the landfill for evidence of settlement, slip, or separation of waste from the quarry high wall. If issues of concern are noted, Bridgeton Landfill will notify the MDNR and evaluate appropriate next steps, which may include enhanced monitoring via pin monitoring, toe monitoring, or other agreed technology or approach.

6.3 GAS WELL FIELD DATA

Data collected in the field allows the operator to make immediate adjustments to gas wells for improving gas collection efficiency, and may provide data that indicates the conditions within the landfill waste mass. Procedures used to monitor all gas well field points are the same regardless of the point's purpose or designation (e.g. GEW, GIW, SEW, etc.). The purpose and description of these various structures are provided in Volume 2 of this OM&M Plan.

All GCCS monitoring (gas concentrations, temperature, pressure, and flow rate) shall be performed using an instrument with GPS capabilities so that the coordinates of the monitoring point are recorded and stored with each reading, providing an audit trail for the monitoring. Separate recording of coordinates and monitoring data is not permitted. Approved meters include the Landtec GEM units and Elkins Earthworks Envision meter or as otherwise approved or accepted in the industry and the meter used for collection of data should be included with the submitted data.

All GCCS field monitoring equipment must meet the following minimum requirements:

1. Infrared sensor technology for CH₄ and CO₂ measurement;
2. Electrochemical sensor for O₂ measurement;
3. Temperature probe to measure the temperature of the gas stream;

4. Internal pressure sensors to measure static, system, and differential pressures;
5. Ability to be calibrated in the field;
6. Ability to store measured data and user defined comments electronically; and,
7. Data shall be exported via a .csv file.

Procedures for instrument calibration, use, and data collection are provided in Volume 2 of the OM&M Plan.

Gas well field data results will be collected at the frequency specified in Table 2, and will be presented in the Monthly Data Submittals as described in Section 7.0.

The facility is subject to the NSPS regulations. Permit #OP2010-063 requires gas wells to meet certain limits and, if the limits are exceeded, dictate timelines to return to compliance or obtain permission to exceed the limits, unless approved alternate operating parameters exist for the gas well. See Volume 2 for additional detail.

6.4 GAS WELL LAB-ANALYZED GAS PARAMETERS

At times, a gas extraction well may not be suitable for sampling for lab-analyzed gas parameters. Bridgeton Landfill shall provide written notice within 5 days after any sampling event period if wells are not flowing with liquid-free gas or are determined to be unsafe for gas sampling using a condensed version of Table 3.

6.4.1 South Quarry

Gas samples will be collected from functional and accessible gas extraction wells in the South Quarry as specified in Table 3 at the frequency specified in Table 2. Laboratory analyses will be performed for hydrogen, carbon monoxide, methane, oxygen, carbon dioxide, and nitrogen using analytical testing method ASTM D-1946 (Standard Practice for Analysis of Reformed Gas by Gas Chromatography).

6.4.2 North Quarry and Neck Area

Gas samples will be collected from each functional and accessible gas extraction well in the North Quarry area at the frequency specified in Table 2. Laboratory analyses will be performed for hydrogen, carbon monoxide, methane, oxygen, carbon dioxide, and nitrogen using analytical testing method ASTM D-1946 (Standard Practice for Analysis of Reformed Gas by Gas Chromatography).

Procedures for obtaining and analyzing these samples are contained in Volume 2 of the OM&M Plan. Results from these laboratory analyses will be presented in the Monthly Data Submittal as described in Section 7.0. Upon installation of future wells, Figure 3 will be used to identify wells as Neck Area, North Quarry, or South Quarry wells for inclusion in the assigned sampling routine once operational.

6.5 LEACHATE COLLECTION SUMP LIQUID LEVELS

Leachate is removed from the landfill using leachate collection sumps (LCS) at seven locations. These LCSs were designed for insertion of a pump near the base of the landfill. Further description of the operation of these pumps is provided in Volume 3 of the OM&M Plan.

The LCS wells in the South Quarry penetrate deeply into the waste mass, possibly into and through the suspected reaction areas. As a result, subsurface temperatures well above the boiling point may exist and cause steam and liquid ejection that cannot be controlled or managed with a pump. In such situations, the LCS is equipped to collect gas and liquids which appear in the wellhead but conditions are not acceptable for monitoring. These wells will be observed and, if the ejection ceases, equipped with a pump.

When conditions do allow, and a pump is present and operating within the LCS, leachate levels are indicated by pressure transducer readout at the pump location. These levels will be collected at the frequency specified in Table 2 and will be reported in the Monthly Data Submittals.

6.6 GAS WELL LIQUID LEVELS

Results of gas well liquid level measurements may be used to determine if sufficient gas extraction well screen perforations are exposed to allow for efficient gas extraction.

Measurements are to be made with industry-standard water level indicators. The water level tape is introduced into the well via a dedicated sample location drilled and tapped into each well head assembly. This device signals water contact with a bright LED light and a buzzer. The manufacturer claims an accuracy of 1/100th of a foot. However, this reading can be highly inaccurate even when extreme care is taken by the technician. The presence of foam within the well can yield false readings. Additionally, the probe can often cling to the side of a saturated gas well casing giving a false reading. Changes to the instrument may be made including additional weighting of the probe and/or constructing a small cage to prevent probe contact with the casing in an attempt to minimize erroneous readings.

Knowledge about historical readings can be helpful to the field technician when discerning false readings. Bridgeton Landfill will continue to evaluate the accuracy of instruments; other liquid monitoring manufacturing equipment and technology could be utilized to improve reliability of these measurements.

6.7 LEACHATE VOLUME DATA COLLECTION

The volume of leachate processed by the leachate pretreatment facility and the volumes transported off site via truck and direct discharge will be reported in the Monthly Data Report. In addition, the volume of leachate removed by each of the Leachate Collection Sumps (LCSs) will be reported in the Monthly Data Submittal along with the pump type and model in service and the associated flow meter readings from the beginning and end of the reporting period.

6.8 VERTICAL TEMPERATURE PROFILES/TEMPERATURE MONITORING PROBES

Bridgeton Landfill has installed a series of temperature monitoring probes (TMPs) which consist of a set of direct-buried Type T thermocouple strings at each location. These TMPs were strategically positioned to monitor the position of the SSR with respect to the Neck Area between the South and North Quarry (see Figure 3), to evaluate performance of heat extraction, and to monitor conditions in the North Quarry.

Thermocouple tips are buried at 20-foot vertical intervals and the temperatures are used to develop vertical temperature profiles of the waste mass and/or gas within the localized waste mass. Temperature readings from direct buried thermocouples will be made using the procedures described in Appendix E. Raw Data and results of these readings in graphical format showing temperature at each thermocouple depth interval will be provided in the Weekly Data Submittal.

The landfill environment is detrimental to the lifespan and function of the TMPs, especially to those located closest to the SSR. Since installation, many of the TMP intervals have become unreliable, and more will become unreliable in the future. A determination of the reliability of a specific interval can be made using the procedures also described in Appendix E.

6.9 FLARE FIELD-ANALYZED PARAMETERS

Flow and temperature measurements are continuously monitored utilizing inline flow measurement device(s). All of the flares are permitted and flare data is recorded in accordance with the requirements of NSPS. The flow meter(s) provide continuous reading via a data recorder in accordance with NSPS regulation. See Volume 2 of this OM&M Plan for additional detail.

Flow, temperature, and gas quality data obtained as described above will be presented in the Monthly Data Submittals as described in Section 7.0.

6.10 FLARE LAB-ANALYZED PARAMETERS

Gas samples will be taken from the blower outlet (common inlet to the utility flares) at the site. Analyses will be performed for hydrogen, carbon monoxide, methane, carbon dioxide, oxygen, and nitrogen using laboratory testing analytical ASTM D-1946 (Standard Practice for Analysis of Reformed Gas by Gas Chromatography).

Results of these analyses will be presented in the Monthly Data Submittal.

6.11 DATA EVALUATION

Field-obtained data is monitored by trained Bridgeton Landfill personnel in real-time. Adjustments to the gas management system are made immediately based on the data and in accordance with procedures contained in Volume 2 of the OM&M Plan.

Analytical laboratory-obtained data is compiled by a qualified person and presented in the Monthly Data Reports as described in Section 7.0.

7.0 REPORTING

Weekly and Monthly Data Submittal contents are provided in Appendix F and G of this volume. The monitoring and reporting set forth in this document satisfy the needs of Bridgeton Landfill to address the operational challenges, monitoring, and maintenance that are a result of the SSR. SWMP and/or Bridgeton Landfill may request and mutually agree to modifications of the monitoring and reporting program.

8.0 MODIFICATIONS TO OM&M PROCEDURES AND PLAN

Implementation of this OM&M Plan will result in repair, augmentation, extension, and/or major reconstruction of landfill features. For routine maintenance issues which do not fundamentally alter or extend a feature's purpose or function (examples include moving or re-routing of landfill gas or leachate piping, raising or lowering a gas well, abandoning a gas well, repairing a portion of the cap, filling minor subcap voids or cracks, etc.) maintenance records will be kept at the facility and available for inspection by SWMP.

For major replacements, extensions, changes, substantial design revisions, and new installations, Bridgeton Landfill will consult with the SWMP. Examples include new or replacement gas wells, major filling or re-capping projects, fundamental changes to the gas destruction system, or significant changes to the surface water management system. If necessary, Bridgeton Landfill will submit for approval of a permit modification providing documentation, work plan and schedule, as well as any associated modifications to the OM&M procedures. A registered engineer licensed in the State of Missouri is required to seal these documents. If modifications need to be made on an emergency basis to protect human health or the environment, this will require immediate notification of such changes to the SWMP pursuant to the facility's permit. Should field conditions prevent installation as detailed in the approved work plan, notice will be provided by phone call and/or email to SWMP.

Facility as-built drawings are referenced in this volume and will be updated and provided to MDNR SWMP upon completion of work prescribed in the work plan, but no more frequently than on a quarterly basis.

In addition, many of the activities described in the OM&M Plan are self-implementing with no requirement for external authorizations; however, the SWMP shall be notified of significant potential or actual modifications to allow for review and approval of such change. MDNR may request or suggest changes to the Plan; such changes will be incorporated upon mutual agreement with Bridgeton Landfill. Resulting significant changes to the procedures or requirements of this OM&M Plan will be reflected in an updated OM&M Plan document to be retained on-site, and an update of such changes will be provided to the SWMP on a quarterly basis if any changes are made in the prior quarter.

Forms used to operate and maintain the facility may be revised as long as the information required by the version contained in this approved OM&M Plan is modified as to form/format and content and an update provided to SWMP on a quarterly basis if any changes are made in the prior quarter.

Updated pages or sections of the OM&M Plan will include a revision date in the lower right corner of the page, and a running diary of changes and rationale for the changes will be kept in the front of the document (see Appendix H).

9.0 CLOSURE AND TERMINATION OF OM&M PLAN REQUIREMENTS

The SSR causes accelerated thermal decomposition and reduction in volume of the solid waste. Therefore, a strong indicator of the intensity and activity of the SSR is the trend of the total volume of settlement that is occurring. Based on this indicator (see Appendix I), settlement related to the SSR in the South Quarry has slowed. Therefore, it is possible that modifications to the requirements of the OM&M Plan, as presented in Section 8.0, will be possible relatively soon. Then, over the next few years, many of the requirements in this Plan may be eliminated or modified as mutually agreed with MDNR-SWMP.

Nevertheless, this OM&M Plan will be part of the Bridgeton Landfill operations until it is agreed by the SWMP that the thermal event is no longer presenting severe operational challenges and maintenance and monitoring of the landfill can revert to the approved permit, or to a modified permit.

A formal closure letter will be issued by the MDNR after review and approval of a certification from an independent registered professional engineer verifying that closure activities have been completed in accordance with the closure plan.

TABLES

Table 1 – Inspections and Maintenance

	Item or Conditions to Be Inspected	Potential Adverse Impact	Criteria for Acceptance	Corrective Procedures	Target Corrective Timeline*
CLAY FINAL COVER	Non-uniform waste settlement in clay final cover	Ponding	No damage or significant ponding	Fill the area of significant ponding to promote sheet flow, add topsoil and reseed.	1 week
	Crevasses in clay final cover	Infiltration	No cracks(generally wider than three inches and deeper than one foot) or no visible waste exposed	Fill opening with soil compacted to meet final cover specifications, restore topsoil and vegetation. Replace damaged piping if necessary.	1 week (same day if waste is exposed)
	Liquids (leachate) breaking out of clay final cover	Surface water impact	No liquids or staining verified as attributable to leachate observed	Collect and remove liquid as soon as possible. Block liquid from entering stormwater collection channels if necessary. Once liquid is under control, excavate saturated area, install french drain if deemed necessary, and backfill with new clay and topsoil to restore original configuration.	Same Day
FML COVER	Crevasses or voids in the soil directly under the FML	Safety hazard	No significant cracks, stretched (trampoline) FML, separation, etc. observed	Determine the nature and extent of the crack upon discovery, and evaluate safety, extent, and if repair is required. Cordon area with warning tape if unsafe for foot traffic. Follow procedures in Appendix D for repair.	3 months
	Rips, tears, or punctures of the FML cap	Odor	No rips, tears, punctures, or stress observed	Extrusion weld FML repair patch (or bead for small holes) as soon as practical upon discovery. Remove, adjust or protect temporary FML cap from objects causing stress point concentrations.	Same day if causing odor. One week if no odor.
	Degradation of FML Material	Odor/Fragility	No brittleness or delamination	Extrusion weld FML repair patch (or bead for small holes) as soon as practical upon discovery. Remove, adjust or protect temporary FML cap from objects causing stress point concentrations.	Same day if causing odor. One week if no odor.
	FML boots connected to LFG wells or other penetrations	Odor	No stress or damage observed	Repair the FML boot, patch, weld, or seal	Same day if causing odor. One month if no odor.
	Liquids (leachate) below the FML cap	Liquid accumulation at toe, leachate release.	No bulging observed	Clean and jet the toe drain or subcap drain to which the collected liquid was designed to drain. Evaluate subcap drainage piping, and install additional subcap drainage piping or repair existing as necessary. Repair FML.	Same day if release imminent. One week if no release imminent.**
	LFG below the FML cap	Odor	No gas build-up (pillowing) observed	Increase vacuum to subcap LFG collectors in the area of the pillowed FML. Install surface vacuum point (bubblesucker) if necessary.	Same day

*These timelines are target goals only, which may be impacted by weather conditions, contractor availability (if needed), and safety conditions.

***"Imminent" means the event is determined by the inspection to likely or possibly occur before the next regular weekday work shift will begin. Inspections will be conducted by a site technician trained by site management prior to conducting said inspections

Table 1 – Inspections and Maintenance (continued)

	Item or Conditions to Be Inspected	Potential Adverse Impact	Criteria for Acceptance	Corrective Procedures	Target Corrective Timeline*
GAS COLLECTION	Wellhead	Odor	No gas leakage or oxygen infiltration	Repair in accordance with procedures in Volume 2	Same day
	Piping	Reduced gas collection odor	No “bellies” or breaks	Repair in accordance with procedures in Volume 2	Same day
SURFACE WATER MANAGEMENT	Earthen Ditch Vegetation	Erosion	Grass health, good coverage, less than 6” long	Overseed and mulch	3 months
	Earthen Ditch Riprap	Erosion	Pieces in place, no exposed subsoil	Move or add riprap	3 months
	Ditch Clogging	Flooding	Sediment build up or other obstruction	Remove obstruction to original ditch line	Same day if significant obstruction; 3 months if mild obstruction.
	Culvert Structural Integrity	Flooding	Near circular or original shape throughout length	Remove and replace if deformation affecting capacity or collapse is imminent and caution tape should be installed around the structure if safety concern observed	1 month if significant deformation; 3 months if mild deformation.
	Culvert Clogging	Flooding	Top of corrugations visible and/or less than 3” sediment	High-volume water flush until clean	Same day if significant obstruction; 3 months if mild obstruction.
	Clay Cap Slope Erosion	Erosion	No erosion rills greater than 6” deep	Fill rill, reseed, and mulch	3 months
	Clay Cap Vegetation	Erosion	Grass healthy, good coverage, less than 18” long. No shrubs or seedlings	Overseed and mulch as appropriate, remove shrubs or seedlings, irrigate as necessary.	3 months
	Detention Pond Liner	Infiltration	No rips or seam separation	Extrusion weld FML repair patch (or bead for small holes) as soon as practical upon discovery. Document repairs in accordance with FML QA/QC Plan.	1 month
	Detention Pond Valve	Release of impacted water	Valves are not clogged and exercise freely	Jet obstructions from valve closing, lubricate workings, exercise valve.	Same day
	Detention Pond Sediment	Capacity reduction	Less than one foot accumulation	Remove with backhoe or water jet and vac	3 months
	Detention Pond Outlet	Flooding	Smooth transition from outlet pipe to ditch invert, erosion protection in place	Restore and regraded, add new rip rap as necessary.	Same day if significant obstruction; 3 months if mild obstruction.

*These timelines are target goals only, which may be impacted by weather conditions, contractor availability (if needed), and safety conditions.

***“Imminent” means the event is determined by the inspection to likely or possibly occur before the next regular weekday work shift will begin. Inspections will be conducted by a site technician trained by site management prior to conducting said inspections

Table 2 – Proposed Data Collection

Proposed Data Collection	Location	Monitoring Frequency	Reporting Vehicle
Settlement Data	South Quarry and Neck Areas	Monthly	Monthly Report
Settlement Data	North Quarry	Quarterly (Note 2)	Monthly Report
Slope Stability Assessment	North and South Quarries	Quarterly	Monthly Report
Gas Extraction Well Field Parameters (temperature, oxygen, pressure, methane, carbon dioxide)	Gas extraction features (gas extraction wells, subcap collectors, leachate risers, etc.)	Per NSPS Permit Requirements-APCP Monthly-SWMP	Monthly Report
Gas Well Lab Analyzed (D-1946) (Note 1)	South Quarry GEWs (See Table 3)	Quarterly	Monthly Report
Gas Well Lab Analyzed (D-1946) (Note 1)	North Quarry and Neck Area GEWs (See Table 3)	Monthly	Monthly Report
Gas Flow Volume Measurements	Operating Flare(s)	Continuous	Monthly Report
Flare Field Parameters	Operating Flare(s)	Weekly	Monthly Report
Flare Lab Parameters	Operating Flare(s)	Monthly	Monthly Report
Leachate Collection Sump Liquid Levels	Operating LCSs	Weekly	Monthly Report
GEW Liquid Levels	Accessible vertical gas extraction wells	As needed	On-site Records
Leachate Volume	Treated at Pretreatment Plant	Continuous	Monthly Report
Leachate Volume	At each Leachate Collection Sump (LCS)	Continuous	Monthly Report
Vertical Temperature Profile	All functioning TMPs	Weekly	Weekly Report
Work Performed List	Previous week and next week	Weekly	Weekly Report
Infrastructure As-Built Drawings	North and South Quarry	Quarterly	Infrastructure Update

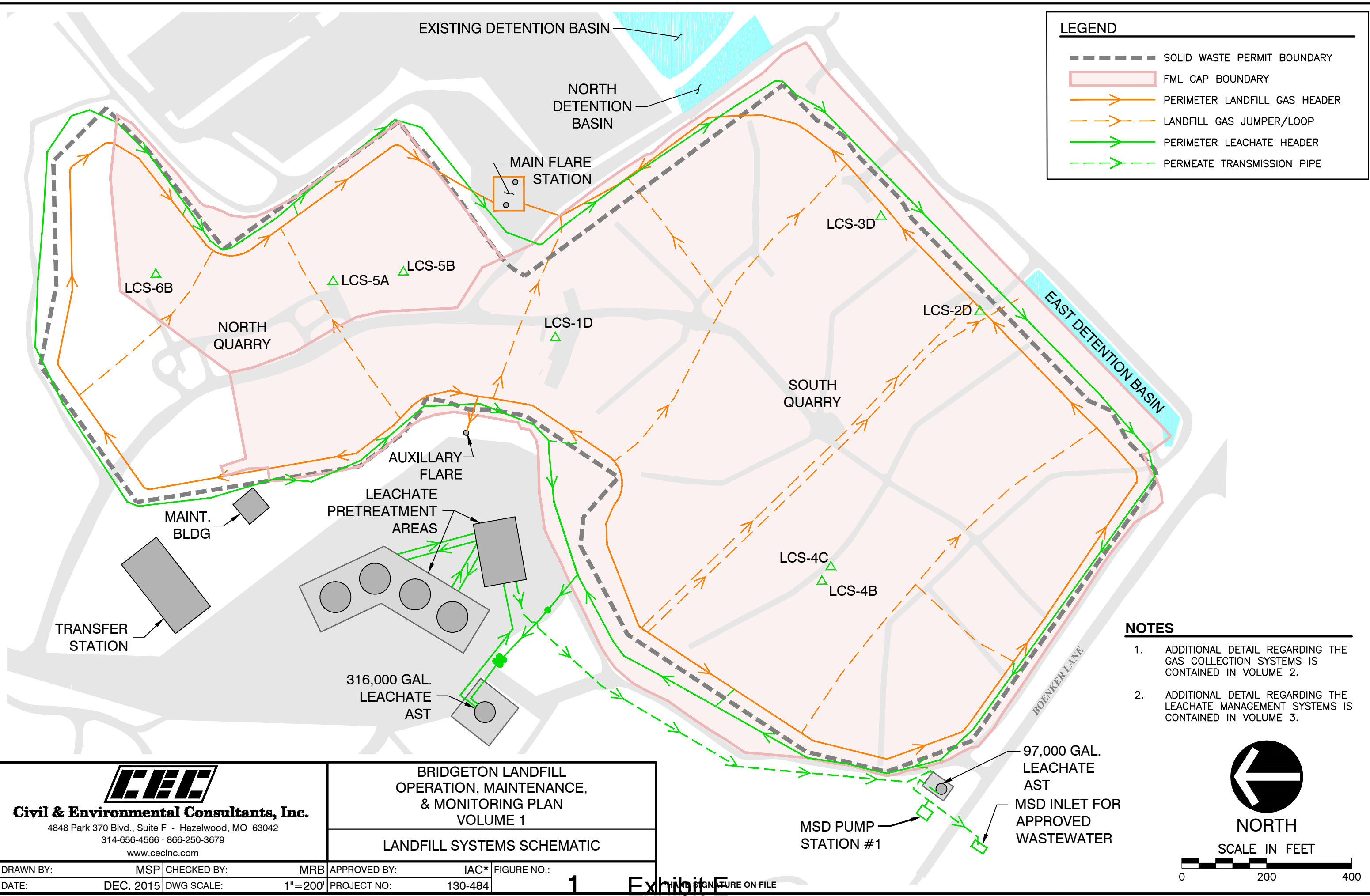
- 1) For wells that exhibit liquid-free gas flow and that are safe for gas sampling.
- 2) Should the rate of settlement at two adjacent points exceed 1.0 feet in a quarterly monitoring event, the survey frequency will be increased to monthly For the points in question and all adjacent points until quarterly differential is confirmed to be less than 1.0 feet.


TABLE 3
BRIDGETON LANDFILL
List of Gas Extraction Wells for Laboratory Testing by Location

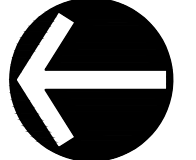
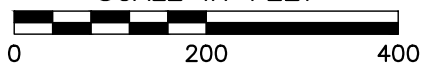
<u>North Quarry</u>	GEW-57R	GEW-142
<i>Monthly</i>	GEW-58	GEW-143
GEW-2	GEW-58A	GEW-144
GEW-3	GEW-59R	GEW-145
GEW-4	GEW-67A	GEW-146
GEW-5	GEW-68A	GEW-147
GEW-42R	GEW-77	GEW-148
GEW-45R	GEW-78R	GEW-149
GEW-46R	GEW-81	GEW-150
GEW-47R	GEW-82R	GEW-151
GEW-48	GEW-86	GEW-152
GEW-49	GEW-87	GEW-153
GEW-53	GEW-88	GEW-154
GEW-54	GEW-90	GEW-155
	GEW-91	GEW-156
<i>Bi-Monthly</i>	GEW-100	GEW-157
GEW-1A	GEW-101	GEW-158
GEW-2S	GEW-102	GEW-159
GEW-6	GEW-104	GEW-160
GEW-7	GEW-105	GEW-161
GEW-41R	GEW-106	GEW-162
GEW-43R	GEW-107	GEW-163
GEW-44	GEW-108	GEW-164
GEW-50	GEW-113	GEW-165
GEW-51	GEW-116	GEW-166
GEW-52	GEW-117	GEW-167
	GEW-118	GEW-168
<u>Neck Area</u>	GEW-120	GEW-169
<i>Monthly</i>	GEW-121	GEW-170
GEW-8	GEW-122	GEW-171
GEW-9	GEW-123	GEW-172
GEW-10	GEW-124	GEW-173
GEW-38	GEW-125	GEW-174
GEW-39	GEW-126	GEW-175
GEW-40	GEW-127	GEW-176
GEW-55	GEW-128	GEW-177
GEW-56R	GEW-129	GEW-178
GEW-109	GEW-130	GEW-179
GEW-110	GEW-131	GEW-180
	GEW-132	GEW-181
	GEW-133	GEW-182
<u>South Quarry</u>	GEW-134	GEW-184
<i>Bi Monthly</i>	GEW-135	GEW-185
GEW-13A	GEW-136	GEW-186
GEW-15	GEW-137	GEW-187
GEW-16R	GEW-138	GEW-188
GEW-18B	GEW-139	
GEW-22R	GEW-140	
GEW-57B	GEW-141	

FIGURES

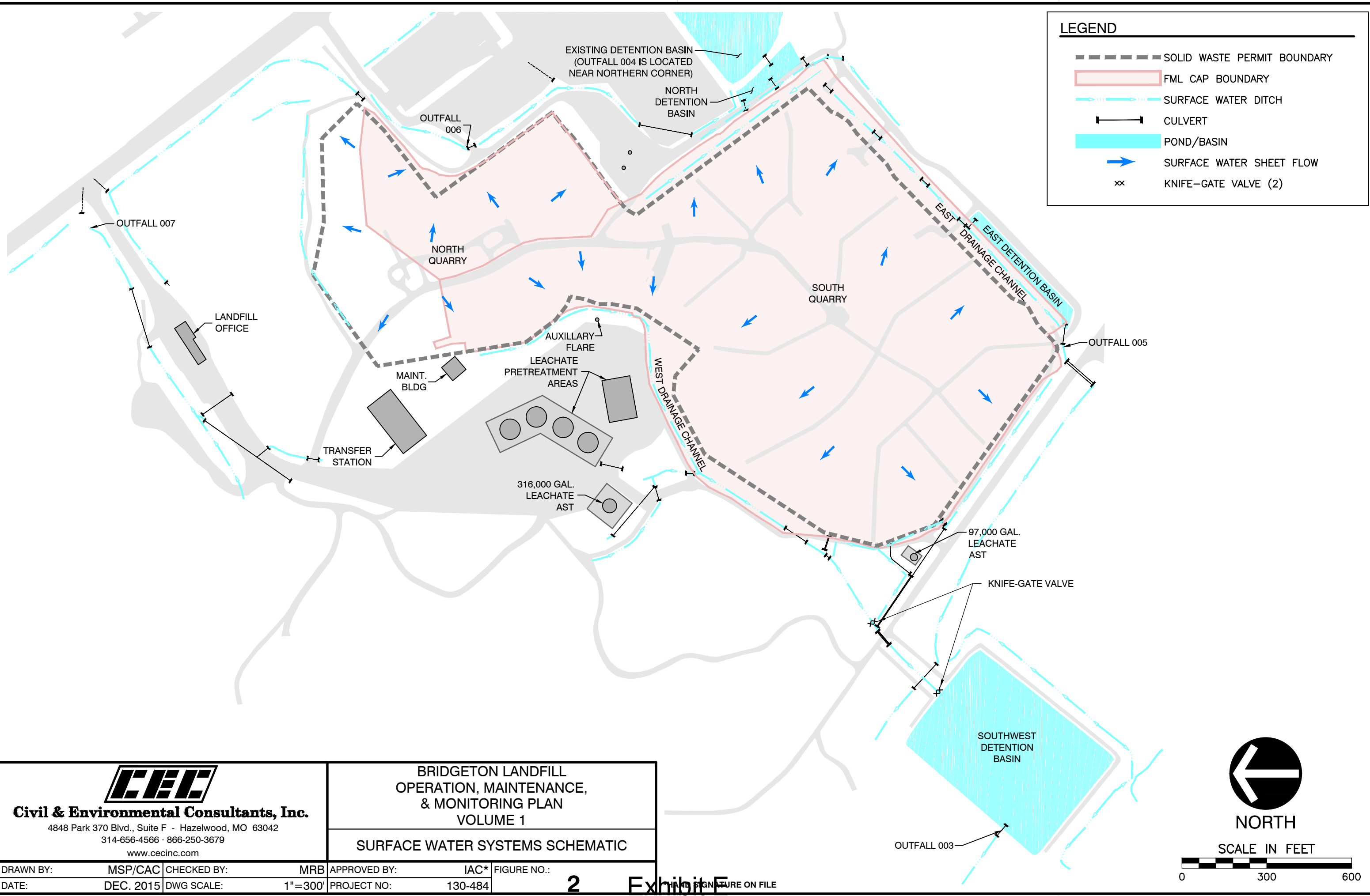
P:\2013\130-484\130-484-CADD\DWG\OM&M\131178-OM&M(V1)_Figures.dwg{1-LANDFILL SYSTEMS SCHEMATIC} LS:(2/5/2018 - matt.knuth) - LP: 2/5/2018 1:34 PM



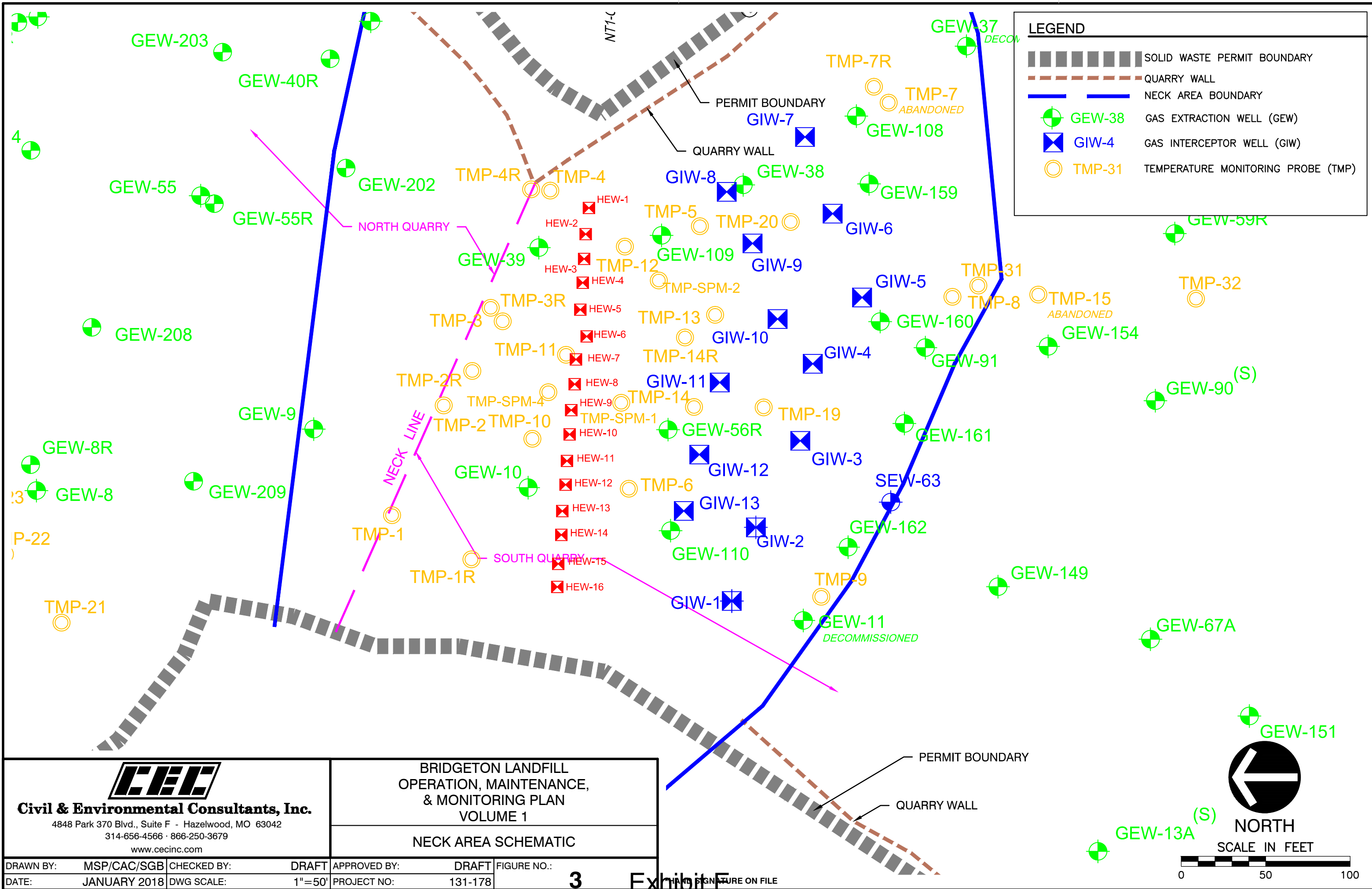
 Civil & Environmental Consultants, Inc. 4848 Park 370 Blvd., Suite F - Hazelwood, MO 63042 314-656-4566 • 866-250-3679 www.cecinc.com		BRIDGETON LANDFILL OPERATION, MAINTENANCE, & MONITORING PLAN VOLUME 1	
LANDFILL SYSTEMS SCHEMATIC			
DRAWN BY: MSP	CHECKED BY: MRB	APPROVED BY: IAC*	FIGURE NO.: 1
DATE: DEC. 2015	DWG SCALE: 1"=200'	PROJECT NO: 130-484	EXHIBIT E


NORTH
SCALE IN FEET

0 200 400

P:\2013\130-484\--CADD\DWG\OM&M\131178-OM&M(V1)_Figures.dwg{2--SURFACE WATER SYS SCHEMATIC} LS(3/22/2018 - matt.knuth) - LP: 3/22/2018 2:07 PM



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APPENDIX A
SITE INSPECTIONS

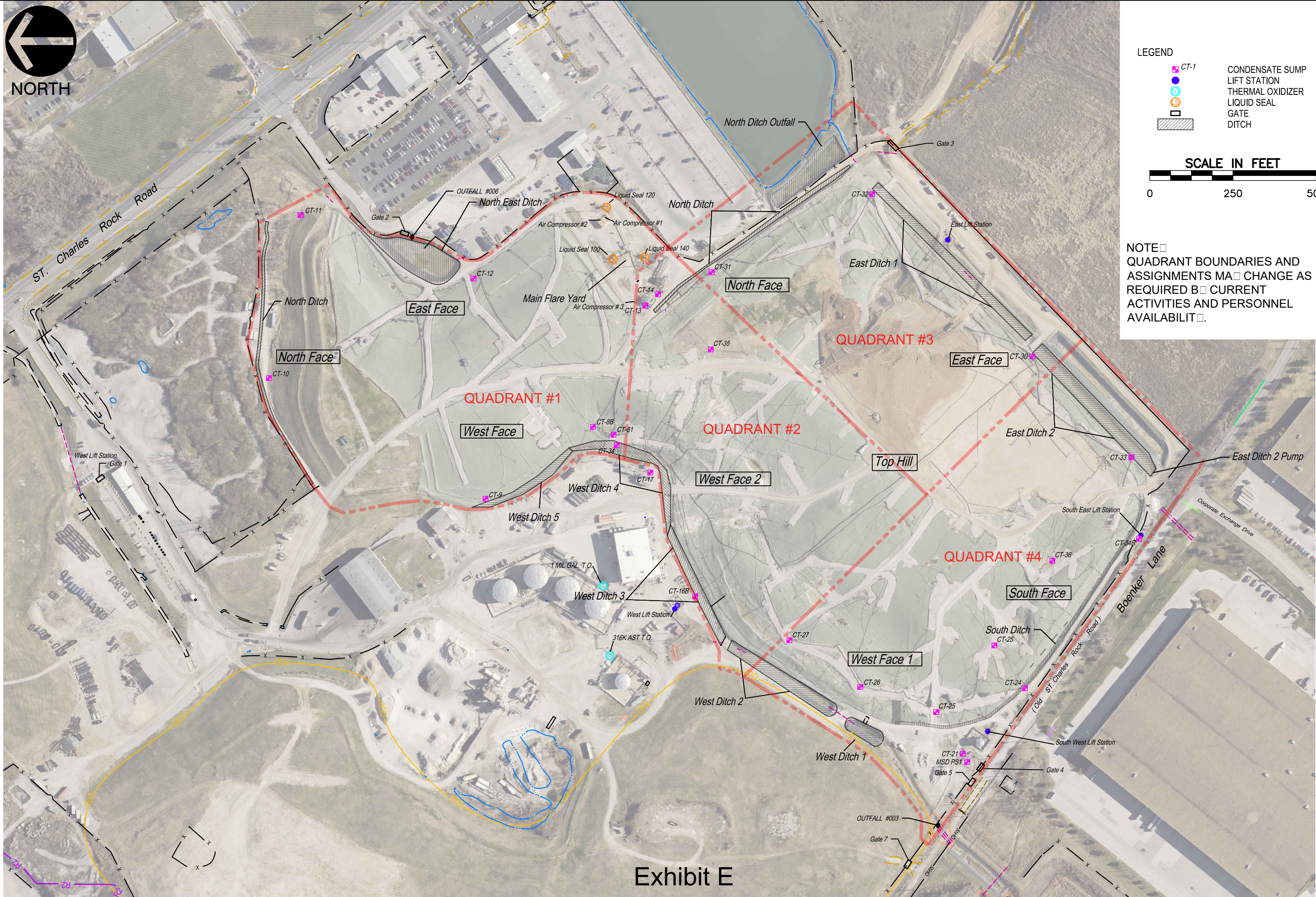
Bridgeton Landfill Inspection Procedures

Week-Day Quad Checks

1. Attend early AM kickoff meeting to receive assignments, have safety briefing, and discuss known issues and overnight events.
 2. Perform quad check using current Forms.
 3. All landfill system features must be observed with up-close on-foot inspection.
 4. At a minimum, those features provided on the quad check illustrations and noted on Table 1 of the Plan must be observed and assessed at each observation point.
 5. Document using the Forms; any minor repairs made during quad checks, any minor repairs to be made later that same day, and any major repairs that require planning.
 6. Refer to field book and/or work orders to identify open issues and follow up on repairs.
 7. Communicate with adjacent quad checkers to assure that territorial overlap is achieved.
 8. If an issue is creating an odor release or environmental release, immediately make appropriate repairs and/or notify Operations Manager or his designee.
 9. At conclusion of quad check, provide Operations Manager or his designee with Form and assure that all unresolved issues are noted.
 10. Operations Manager or his designee is responsible for consolidating quad-check issues and assuring that repairs are made in accordance with Table 1.
 11. File completed Form in Operating Record on site.
-

Daily/Weekend/Holiday Checks

1. Perform perimeter inspection, completing "Perimeter Inspection Form."
2. If an issue is creating an odor release or environmental release, immediately make appropriate repairs and/or notify Operations Manager or his designee.
3. File completed Form in Operating Record on site.



INSPECTOR NAME: _____

PUMPS:

[illegible]

INSPECTOR NAME: _____

PUMPS:

[illegible][illegible][illegible]

INSPECTOR NAME: _____

PUMPS:

[illegible][illegible][illegible]

Bridgeton Landfill Perimeter Visual Inspection Form

TECHNICIAN: _____

DATE: _____

CHECK POINT	TIME	ODORS?	VISUAL INSPECTION	POINT "OK"	COMMENTS
SOUTH QUARRY STORM WATER POINTS					
North Ditch					
North Ditch Outfall 1					
East Ditch 1					
East Ditch 2					
East Ditch 2 Pump					
South Ditch					
SW Outfall Gate 1					
SW Outfall Gate 2					
West Ditch 1					
West Ditch 2					
West Ditch 3					
West Ditch 4					
West Ditch 5					
SOUTH QUARRY FACE CHECKS					
North Face					
East Face					
South Face					
West Face1					
West Face 2					
Top Hill					
NORTH QUARRY STORM WATER POINTS					
North East Ditch					
North Ditch					
NORTH QUARRY FACE CHECKS					
North Face					
East Face					
West Face					
SITE SECURITY CHECKS					
GATE 1					
GATE 2					
GATE 3					
GATE 4					
GATE 5					
GATE 6					
GATE 7					
OU-1 CHECKS					
AREA 1					
AREA 2					

COMMENTS: _____

Bridgeton Landfill Flare Compound & RTO Inspection Form

TECHNICIAN: _____

DATE: _____

MAIN FLARE YARD						
CHECK POINT	TIME	ODORS	VISUAL INSPECTION	VACUUM	TOTAL FLOW	COMMENTS
MAIN FLARE YARD						
LIQUID SEALS						
	TIME	WATER LEVEL	VISUAL INSPECTION	AUTO	OK	COMMENTS
Liquid Seal 100						
Liquid Seal 120						
Liquid Seal 140						
COMPRESSORS						
	TIME	OPERATING	VISUAL INSPECTION	TEMP	PSI	COMMENTS
Compressor #1 (Main)						
Compressor #2 (East)						
Compressor #3 (West)						
THERMAL OXIDIZERS						
	TIME	OPERATING	VISUAL INSPECTION	TEMP	Inlet Pressure	COMMENTS
RTO-1						
RTO-2						
Pretreatment Plant Tank Odor Control						
	TIME	PRESURE	VISUAL INSPECTION	Tank Level	COMMENTS	
TK-200						
TK-307A						
TK-307B						
TK-307C						
TK-307D						

COMMENTS: _____

Bridgeton Landfill GCCS Inspection Form

TECHNICIAN: _____

DATE: _____

**** Check air compressors and flare yard operations before proceeding with any of this****

STRUCTURES						
CHECK POINT	TIME	VACUUM	ODORS	VISUAL INSPECTION	POINT "OK"	COMMENTS
CT - 14						
CT - 13						
CT - 31						
North Trench Sump						
CT -32						
East Grit Chamber						
East Lift Station						
CT-30						
CT - 33						
SE Grit Chamber						
SE Lift Station						
CT - 24						
SW Grit Chamber						
SW Lift Station						
CT-21						
MSD PS-1						
CT-16B						
West Grit Chamber						
West Lift Station						
CT -17						
CT-81						
CT - 8B						
CT -9						
CT - 10						
CT - 11						
CT-12						
CT-18						

COMMENTS: _____

GAS EXTRACTION WELL - TYPICAL ASSEMBLY



TYPICAL QUAD CHECK CHECKLIST

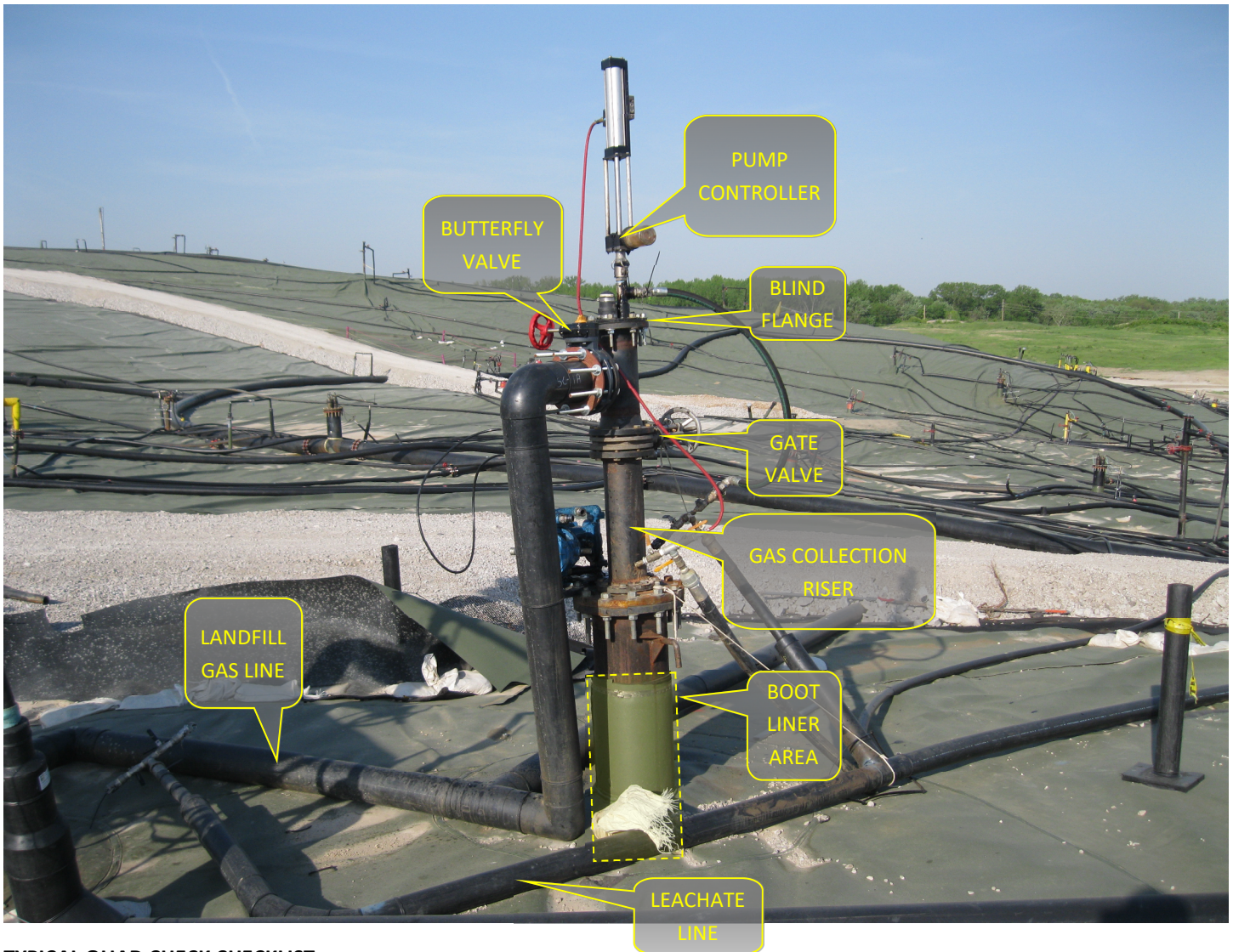
- CONDITION OF PIPE
- ALIGNMENT OF PIPE
- TIGHTNESS OF BOLTS
- INDICATION OF LEAK
- INDICATION OF SPILL
- FUNCTION OF PUMP (IF PRESENT)
- CONDITION OF BOOT LINER/ NEO-PRENE SEAL
- CHECK VACUUM PORTS

CORRECTIVE ACTIONS

- * MAKE MINOR REPAIRS IMMEDIATELY IF POSSIBLE
- * IMMEDIATELY NOTIFY APPROPRIATE PERSONNEL OF ODORS OR MAJOR CONCERNS
- * USE QUADRANT FORM TO RECORD ANY AND ALL ISSUES
- * UPDATE THE MAIN WORK ORDER LIST WITH ALL MAJOR REPAIR ITEMS AND ISSUES THAT CANNOT BE ADDRESSED SAME DAY

Exhibit E

GAS EXTRACTION WELL (WITH PUMP) - TYPICAL ASSEMBLY



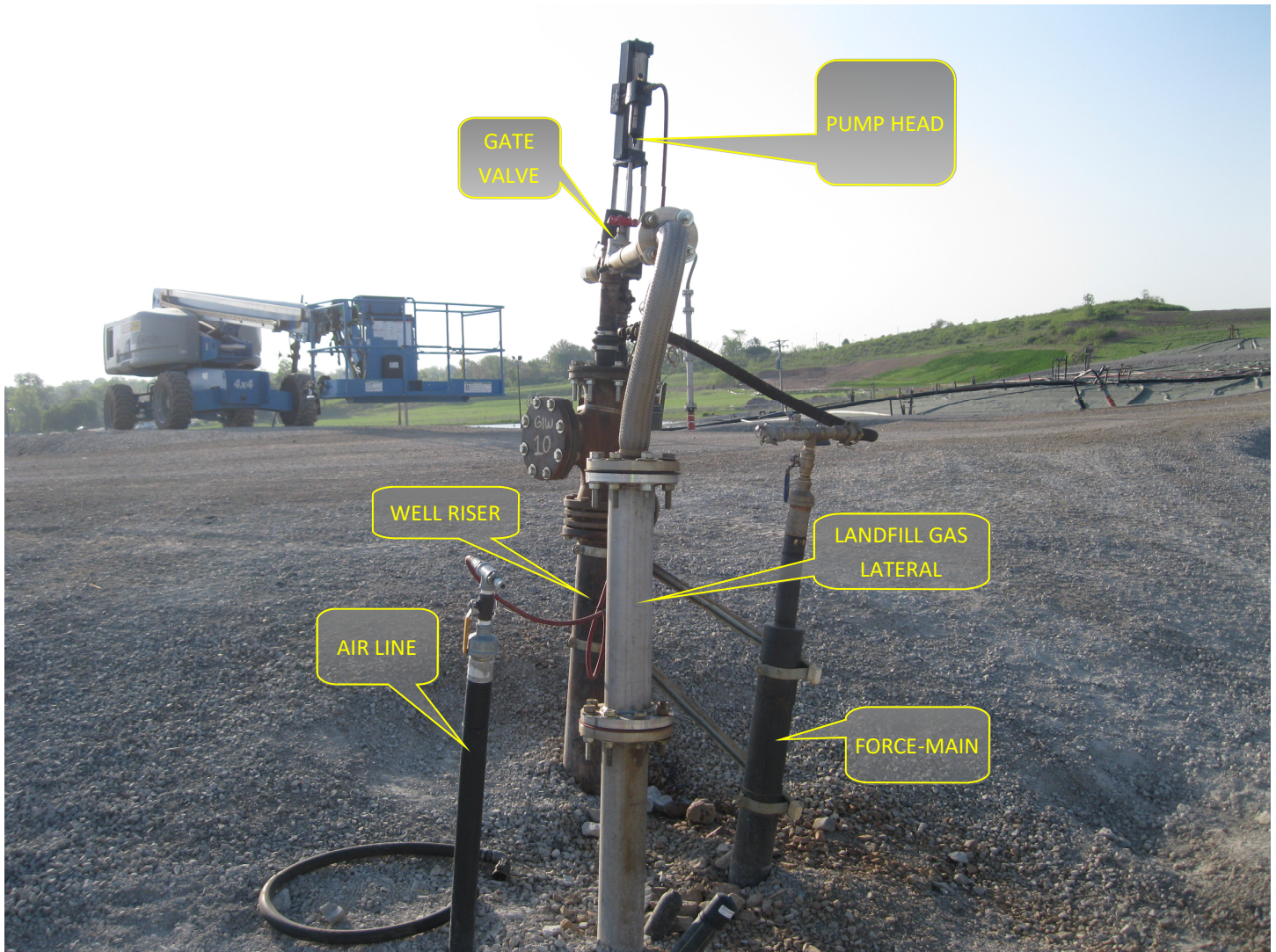
TYPICAL QUAD CHECK CHECKLIST

- CONDITION OF PIPE
- ALIGNMENT OF PIPE
- FLOW OF LEACHATE
- OPERATION OF PUMP
- INDICATION OF LEAK
- INDICATION OF SPILL
- CONDITION OF BOOT LINER/ NEO-PRENE SEALS
- CLAMPS SECURE
- CHECK VACUUM PORTS

CORRECTIVE ACTIONS

- * MAKE MINOR REPAIRS IMMEDIATELY IF POSSIBLE
- * IMMEDIATELY NOTIFY APPROPRIATE PERSONNEL OF ODORS OR MAJOR CONCERNS
- * USE QUADRANT FORM TO RECORD ANY AND ALL ISSUES
- * UPDATE THE MAIN WORK ORDER LIST WITH ALL MAJOR REPAIR ITEMS AND ISSUES THAT CANNOT BE ADDRESSED SAME DAY

GAS INTERCEPTOR WELL - TYPICAL ASSEMBLY



TYPICAL QUAD CHECK CHECKLIST

- CONDITION OF PIPE
- FLOW OF LEACHATE
- OPERATION OF PUMP
- INDICATION OF LEAK
- INDICATION OF SPILL
- CONDITION OF BOOT LINER (IF PRESENT)
- CHECK VACUUM PORTS

CORRECTIVE ACTIONS

- * MAKE MINOR REPAIRS IMMEDIATELY IF POSSIBLE
- * IMMEDIATELY NOTIFY APPROPRIATE PERSONNEL OF ODORS OR MAJOR CONCERNS
- * USE QUADRANT FORM TO RECORD ANY AND ALL ISSUES
- * UPDATE THE MAIN WORK ORDER LIST WITH ALL MAJOR REPAIR ITEMS AND ISSUES THAT CANNOT BE ADDRESSED SAME DAY

(CT-17) - TYPICAL ASSEMBLY



TYPICAL QUAD CHECK CHECKLIST

- CONDITION OF PIPE
- ALIGNMENT OF PIPE
- FLOW OF LEACHATE
- TIGHTNESS OF BOLTS
- OPERATION OF PUMP
- INDICATION OF LEAK
- INDICATION OF SPILL

CORRECTIVE ACTIONS

- * MAKE MINOR REPAIRS IMMEDIATELY IF POSSIBLE
- * IMMEDIATELY NOTIFY APPROPRIATE PERSONNEL OF ODORS OR MAJOR CONCERNS
- * USE QUADRANT FORM TO RECORD ANY AND ALL ISSUES
- * UPDATE THE MAIN WORK ORDER LIST WITH ALL MAJOR REPAIR ITEMS AND ISSUES THAT CANNOT BE ADDRESSED SAME DAY

Exhibit E

LEACHATE SUMP - TYPICAL ASSEMBLY



TYPICAL QUAD CHECK CHECKLIST

- CONDITION OF PIPE
- ALIGNMENT OF PIPE
- TIGHTNESS OF BOLTS
- FLOW OF LEACHATE
- OPERATION OF PUMP
- INDICATION OF LEAK
- INDICATION OF SPILL

CORRECTIVE ACTIONS

- * MAKE MINOR REPAIRS IMMEDIATELY IF POSSIBLE
- * IMMEDIATELY NOTIFY APPROPRIATE PERSONNEL OF ODORS OR MAJOR CONCERNS
- * USE QUADRANT FORM TO RECORD ANY AND ALL ISSUES
- * UPDATE THE MAIN WORK ORDER LIST WITH ALL MAJOR REPAIR ITEMS AND ISSUES THAT CANNOT BE ADDRESSED SAME DAY

TEMPERATURE MONITORING PROBE - TYPICAL ASSEMBLY



TYPICAL TEMPERATURE AND VOLTAGE RESISTANCE CHECK

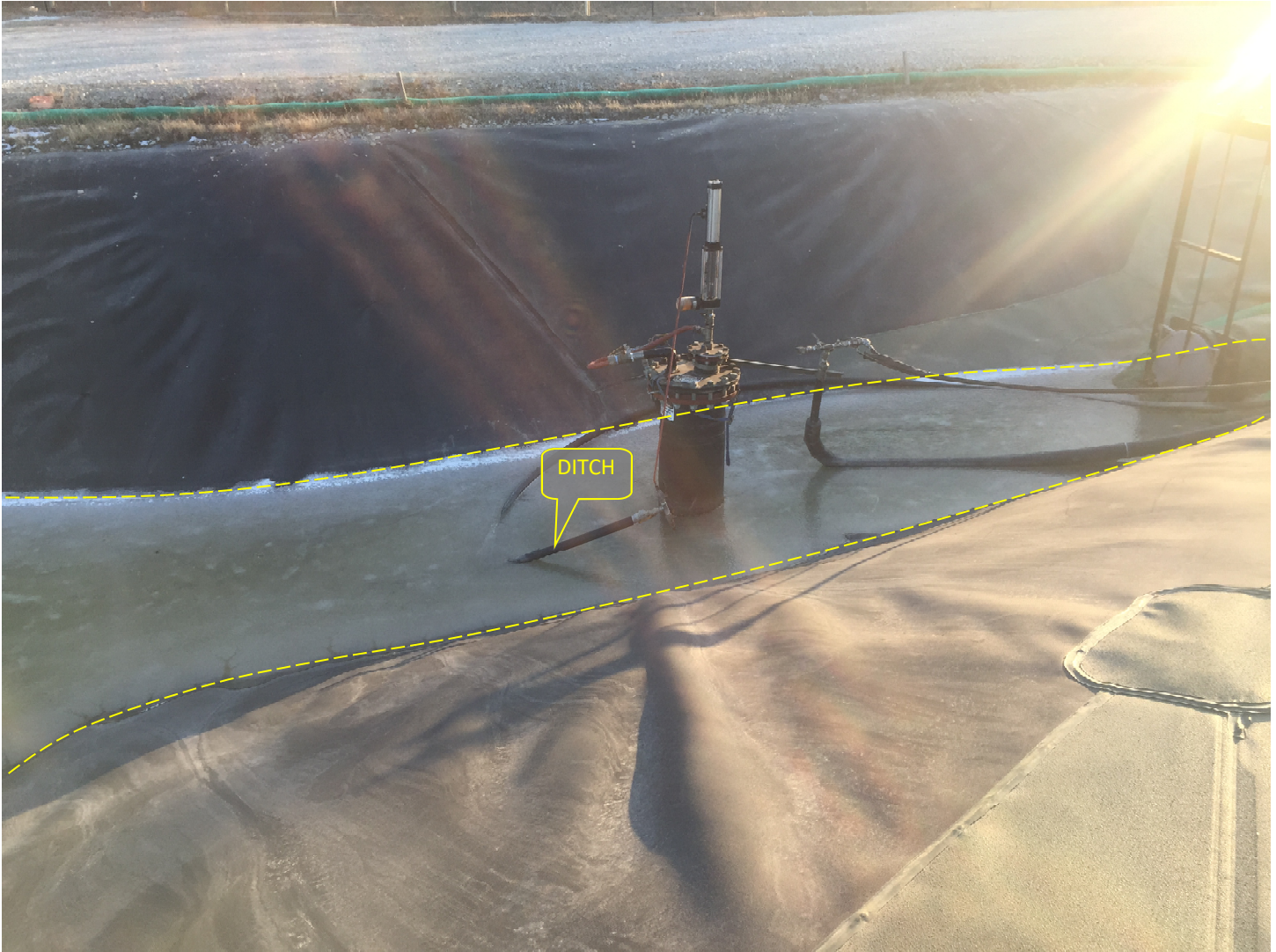
- RECORD TEMPERATURES OF EACH THERMOCOUPLE LINE
- CHECK RESISTANCE (IN OHMS)
- CONDITION OF ACCESS PANEL INTERIOR

CORRECTIVE ACTIONS

- * MAKE MINOR REPAIRS IMMEDIATELY IF POSSIBLE
- * IMMEDIATELY NOTIFY APPROPRIATE PERSONNEL OF ODORS OR MAJOR CONCERNS
- * USE FIELD FORM TO RECORD ANY AND ALL ISSUES
- * UPDATE THE MAIN WORK ORDER LIST WITH ALL MAJOR REPAIR ITEMS AND ISSUES THAT CANNOT BE ADDRESSED SAME DAY

Exhibit E

DITCHES AND LOW SPOTS - TYPICAL AREA



TYPICAL QUAD CHECK CHECKLIST

- INDICATION OF LEAK, OR SPILL
- NOTE IF DISCHARGE REQUIRED

CORRECTIVE ACTIONS

- * IMMEDIATELY NOTIFY APPROPRIATE PERSONNEL OF ODORS OR EVIDENCE OF SPILLAGE
- * UPDATE THE MAIN WORK ORDER LIST WITH ALL MAJOR REPAIR ITEMS AND ISSUES THAT CANNOT BE ADDRESSED SAME DAY

OUTFALLS - TYPICAL AREA



TYPICAL QUAD CHECK CHECKLIST

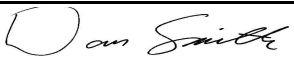
- INDICATION OF LEAK, OR SPILL

CORRECTIVE ACTIONS

- * IMMEDIATELY NOTIFY APPROPRIATE PERSONNEL OF ODORS OR EVIDENCE OF SPILLAGE
- * UPDATE THE MAIN WORK ORDER LIST WITH ALL MAJOR REPAIR ITEMS AND ISSUES THAT CANNOT BE ADDRESSED SAME DAY

APPENDIX B

SDS SHEETS FOR SYNTHETIC CAP MATERIAL

MATERIAL SAFETY DATA SHEET				QUICK IDENTIFIER (In Plant Common Name)			
Manufacturer's Name RAVEN INDUSTRIES INC. Address P.O. Box 5107 Sioux Falls, SD 57117				Absolute Barrier X40BAL X60BAL Emergency Telephone Numbers 800-635-3456 605-335-0174 Other Information 1813 "E" Avenue Sioux Falls, SD 57104			
Signature of Person Responsible for Preparation 				Date Prepared June 29, 2012			
Section 1 - IDENTITY							
Common Name: (Used on Label) (Trade Name & Synonyms) X40BAL X60BAL				CAS Number(s) 25213-02-9 1333-86-4 26221-27-2 9002-88-4			
Chemical Name Ethylene Vinyl Alcohol Copolymer Copolymer of Ethylene and Hexene				Chemical Family Polyolefin EVOH			
Formula (CH2 - CH2) n							
Section 2 - HAZARDOUS INGREDIENTS							
Principal Hazardous Component(s) - Chemical and Common Name(s) None				%		Threshold Limit Value (units)	
Section 3 - PHYSICAL & CHEMICAL CHARACTERISTICS (Fire & Explosion Data)							
Boiling Point		Not Applicable (N/A)		Specific Gravity		.920-.960	
Percent Volatile by Volume (%)		0		Vapor Density		N/A	
Solubility in Water		Insoluble in Water		Evaporation Rate		N/A	
Appearance and Odor		Black, odorless plastic film.		Reactivity in Water		Not Reactive in Water	
Flash Point		N/A		Flammability Limits in Air, by Volume (%)		Lower Upper N/A N/A Auto Ignition Temperature > 650 F (estimated)	
Extinguisher Media		Use water spray, dry chemical, foam or carbon dioxide					
Special Fire Fighting Proced.		Fire fighters should wear a self-contained breathing apparatus when there is a possibility of exposure to smoke, fumes or hazardous decomposition products. If possible, water should be applied as a spray from a fogging nozzle since this material is a surface burning material.					
Unusual Fire and Explosion Hazards		None					
Section 4 - PHYSICAL HAZARDS							
Stability		Unstable Stable		Conditions to Avoid		Temperatures over 560 F will release combustible gases.	
Incompatibility (Materials to Avoid)		None					
Hazardous Decomposition Products		The following combustion products may be generated: Carbon dioxide, carbon monoxide, water vapor, and trace volatile organic compounds.					
Hazardous Polymerization		May Occur Will not Occur		Conditions to Avoid		N/A	

Section 5 - HEALTH HAZARDS

Threshold	N/A
------------------	-----

Limit Value	
--------------------	--

Signs and Symptoms of Exposure

1. Acute	Not Determined	2. Chronic	Not Determined
Overexposure		Overexposure	

Medical Conditions Generally	There are no known medical conditions aggravated by exposure to this product.
-------------------------------------	---

Aggravated by Exposure	
-------------------------------	--

Chemical Listed as Carcinogen or Potential Carcinogen	National Toxicology Program	Not Listed	L.A.R.C. Monographs	Not Listed	OSHA	Not Listed
--	------------------------------------	------------	----------------------------	------------	-------------	------------

OSHA Permissible Exposure Limit	None	ACGIH Threshold Limit Value	None	Other Expos. Limit Used	None
--	------	------------------------------------	------	--------------------------------	------

Emergency and First Aid Procedures	Most problems will result from exposure to molten materials.
---	--

1. Inhalation	Immediately remove victim from area to fresh air. Seek medical attention.
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2. Eyes	If contacted by molten material, immediately flush eyes with plenty of cool water for at least 15 minutes. Do not permit victim to rub eyes. Immediately seek medical attention.
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3. Skin	If contact by molten material, cool immediately with cool water. Do not attempt to remove any solidified material. Immediately seek medical attention.
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4. Ingestion	If material is ingested, contact a physician or Poison Control Center as appropriate whenever any foreign object is swallowed.
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Section 6 - SPECIAL PROTECTION INFORMATION**Respiratory Protection**

(Specify Type)	N/A
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Ventilation	Local Exhaust	Mechanical (General)	Special	Other
N/A	N/A	N/A	N/A	N/A

Protective Gloves	Wear protective gloves during thermal processing.	Eye Protection	Wear eye protection during thermal processing.
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Other Protective Clothing or Equipment	Wear protective sleeves when processing material at elevated temperatures to minimize the possibility of thermal burns.
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Section 7 - SPECIAL PRECAUTIONS AND SPILL / LEAK PROCEDURES**Precautions to be Taken**

in Handling and Storage	This product should be stored in a manner that it is not exposed to heat and sources of ignition. A static charge may be present on finished products.
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Other Precautions	None
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Steps to be Taken in Case

Material is Released or Spilled	Spilled material should be swept up and discarded. Comply with applicable federal, state or local regulations.
--	--

Waste Disposal

Methods	Dispose in accordance with local regulations
----------------	--

IMPORTANT - Do not leave blank spaces. If information is unavailable, unknown or does not apply, so indicate

Section 1 – Product and Company identification

Product Name	WL Plastics Polyethylene Pipe		
MSDS #	WL131		
Product Description	Polyethylene Pipe (various colors, and with and without external color stripes, and with and without internal color layer)		
Product Use	Component for conveying gases, liquids and other fluid media		
Company Identification	WL Plastics Corporation	Product Information:	1-435-867-8908
	3575 Lone Star Cir, Ste 300	Technical Information:	1-435-867-8908
	Fort Worth, TX 76177	General Information:	www.wlplastics.com
24-Hour Emergency Telephone Number	CHEMTREC – 1-800-424-9300		

Section 2 – Composition / Information on Ingredients

INGREDIENT NAME	CAS NUMBER	AMOUNT
Polyethylene	9002-88-4	> 96% by weight
Polyethylene Hexene Copolymer	25213-02-9	> 96% by weight
Polyethylene Butene Copolymer	25807-34-7	> 96% by weight
May include carbon black	1333-86-4	0 - 4% by weight
May include flux calcined diatomaceous earth	68855-54-9	<1% by weight
May include crystalline silica (cristobalite)	14464-46-1	<1% by weight

Section 3 – Hazards Identification

Emergency Overview	Physical Appearance: <ul style="list-style-type: none"> ○ Black polyethylene pipe ○ Black polyethylene pipe with external longitudinal contrasting color stripes ○ Black polyethylene pipe with contrasting internal color layer ○ Polyethylene pipe is supplied in straight lengths or coils
Hazards of Product	<ul style="list-style-type: none"> ○ This product is not a “Hazardous Chemical” as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200. ○ Injury or death can result from product falling from a height or unexpected movement during storage, unloading or handling. Call 1-435-867-8908 for unloading and handling instructions or obtain unloading and handling instructions from www.wlplastics.com. ○ Product surface can be slippery especially if there is water, snow or ice on the surface. Do not walk on product. ○ May contain an ingredient that can cause cancer. See Section 11. Not expected to be harmful if all recommendations in this MSDS are followed. See Section 7 and Section 8. ○ EYE: Not expected to cause prolonged or significant eye irritation. If this material is heated, thermal burns may result from eye contact. ○ SKIN: Contact with the skin is not expected to cause prolonged or significant irritation or cause an allergic skin response. If this material is heated, thermal burns may result from skin contact. ○ INHALATION: Not expected to be harmful if inhaled. If this material is heated, fumes may be unpleasant and produce nausea and irritation of the upper respiratory tract. ○ INGESTION: Not expected to be harmful if swallowed.

Section 4 – First Aid Measures

Eye contact:	Hot material: Flush eyes with plenty of cold water for at least 15 minutes. Do not remove contact lenses if worn. Seek medical assistance for mechanical removal of this material from the eye. The use of flush fluid, other than water, is not recommended. Cold material: Flush eyes with plenty of cold water. Get medical attention if irritation occurs.
Skin contact:	Hot material: If burned by contact with hot material, flush skin immediately with large amounts of cold water. If possible, submerge area in cold water. No attempt should be made to detach polymer adhering to the skin or to remove clothing attached with molten material. Thermal burns require immediate medical attention. Cold material: Wash with soap and water.
Inhalation:	If affected by fumes from heated material, remove from source of exposure and move the affected person into fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.
Ingestion:	Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately.

Section 5 – Fire Fighting Measures

Flammability of the Product:	May be combustible at high temperatures.		
NFPA	Health: 0	Flammability: 1	Instability: 0
HMIS	Health: 0	Flammability: 1	Instability: 0
Auto-ignition temperature:	Greater than 343°C (649°F)		
Flash point:	Above 300°C (572°F) decomposition occurs and flash of fumes may occur.		
Products of combustion:	Products of combustion are carbon oxides (CO, CO ₂). May also contain low levels of aldehydes, ketones, organic acids or hydrocarbons.		
Unusual fire/explosion hazards:	High dust concentrations have a potential for combustion or explosion. This material is not explosive as defined by established regulatory criteria.		
Fire-fighting media and instructions:	In case of fire, use water spray (fog), foam or dry chemicals. Do not use water jet.		
Protective clothing (fire):	Fire-fighters should wear positive pressure self-contained breathing apparatus (SCBA) and full turnout gear.		

Section 6 – Accidental Release Measures

Protective measures:	Eliminate sources of ignition in vicinity of spilled material.
Spill management:	If heated material is spilled, allow it to cool before proceeding with disposal methods. Shavings, chips or segments from cutting and cooled, spilled heated material may cause a slipping hazard. Isolate and contain to prevent entry into sewers and waterways. Sweep or vacuum shavings, chips, segments and cooled heated material and place in appropriate containers for disposal. Recycle where possible. Use appropriate safety equipment.
Reporting:	USA regulations may require reporting spills of this material that could reach any surface waters. Report spills to local authorities and/or the National Response Center at (800) 424-8802 as appropriate or required.

Section 7 – Handling and Storage

Read and observe all precautions published in **WL101 Joining And Field Procedures For Pipe** and **WL111 Unloading Guidelines For WL Plastics Polyethylene Pipe**. Call 1-435-867-8908 to obtain copies of WL101 and WL111 or obtain copies from www.wlplastics.com.

Section 7 – Handling and Storage (continued)

- Precautionary measures:** Avoid heated material contact with eyes, skin and clothing. Avoid breathing vapor or fumes from heated material.
- Unusual handling hazards:** Potentially toxic / irritating fumes may evolve from heated material. At high temperatures, above 177°C (350°F), polyethylene can release vapors and gases that are irritating to mucous membranes of the eyes, mouth, throat and lungs. These substances may include acetaldehyde, acetone, acetic acid, formic acid, formaldehyde and acrolein. Based on animal data and limited epidemiological evidence, NTP, IARC (2A) and OSHA have listed formaldehyde as a probable human carcinogen. Following all recommendations within this MSDS should minimize exposure to thermal processing emissions.

Section 8 – Exposure Controls and Personal Protection

Exposure limits:	Component	Exposure Limits	Form
	Particulates (Insoluble) Not Otherwise Specified (PNOS)	10 mg/m3 TWA8 ACGIH	Inhalable fraction Particulate matter containing no asbestos and crystalline silica <1%
		3 mg/m3 TWA8 ACGIH	Respirable fraction Particulate matter containing no asbestos and crystalline silica <1%
		5 mg/m3 TWA8 OSHA	Respirable fraction
		15 mg/m3 TWA8 OSHA	Total dust
Personal protection:	Respiratory Protection:	Use NIOSH-Approved respirator if unable to control airborne dust, fumes and vapor.	
	Ventilation:	Local exhaust ventilation is recommended for control of airborne dust, fumes and vapor, especially in confined areas.	
	Other Protective Equipment:	Wear gloves and suitable eye protection.	
Engineering controls:	If dust is generated, provide local exhaust ventilation to keep exposure to airborne contaminants below exposure limits.		

Section 9 – Physical and Chemical Properties

Physical state and appearance:	Polyethylene pipe is supplied in straight lengths or coils as black polyethylene pipe, or black polyethylene pipe with external longitudinal contrasting color stripes, or black polyethylene pipe with contrasting internal color layer, or yellow polyethylene pipe, or yellow polyethylene pipe with external longitudinal contrasting color stripes.
Odor:	Negligible
pH:	NA
Vapor pressure:	NA
Vapor density (air = 1)	NA
Boiling point:	NA
Solubility (in water):	Insoluble in water
Melting point:	100 - 135°C (212 - 275°F)
Specific gravity:	0.93 – 0.99
Density:	0.93 – 0.99 g/cm ³

Section 10 – Stability and Reactivity

Chemical stability:	This material is considered stable under ambient temperature and pressure and normally anticipated storage and handling conditions.
Conditions to avoid:	Avoid heating above recommended processing temperature.
Incompatibility with other materials:	None
Hazardous decomposition products:	Carbon oxides
Hazardous polymerization:	Hazardous polymerization will not occur

Section 11 – Toxicological Information

Immediate Health Effects:

Acute oral toxicity:	LD50 / Not known
Acute dermal toxicity:	LD50 / Not known
Acute inhalation toxicity:	LD50 / Not known
Eye irritation:	Not expected to be irritating to the eyes.
Skin irritation:	Not expected to be irritating to the skin.
Sensitization:	Dermal – not a sensitizer / human
Additional toxicological information:	<ul style="list-style-type: none"> ○ This product contains POLYMERIZED OLEFINS. During thermal processing (>177°C; >350°F) polyethylene can release vapors and gases (aldehydes, ketones and organic acids) that are irritating to the mucous membranes of the eyes, mouth, throat, and lungs. Generally these irritant effects are transitory. However, prolonged exposure to irritating off-gases can lead to pulmonary edema. Formaldehyde (an aldehyde) has been classified as a probable human carcinogen by NTP, IARC (2A) and OSHA based on animal data and limited epidemiological evidence. ○ Pigments containing carbon black, lead chromate, nickel, antimony or titanium compounds may have been incorporated into this product. The International Agency for Research on Cancer (IARC) has classified carbon black as a Group B carcinogen (possibly carcinogenic to humans) based on sufficient evidence in animals and inadequate evidence in humans. However, the pigments in this product are bound in a polymer matrix that severely limits its extractability, bioavailability and toxicity. The lead chromate pigment is also silica-encapsulated as well as bound in a polymer matrix. None of these pigments is likely to cause adverse health effects under recommended conditions of use. ○ Product marked “NSF-61” is safe for use with potable water (drinking water for human consumption).

Section 12 – Ecological Information

Ecotoxicity:	This material is not expected to be harmful to aquatic organisms.
Environmental fate:	This material is not expected to be readily biodegradable.
Mobility:	This product has not been found to migrate through soils.
Persistence and degradability:	This product does not readily degrade. Under normal oxidation conditions, >99% of polyethylene will remain intact after exposure to microbial actions. Product will slowly change (embrittle) in the presence of sunlight, but will not fully break down. Product buried in landfill has been found to be stable over time. No toxic degradation products are known to be produced.
Other ecological information:	Wildlife may ingest waste cuttings, shavings, segments or chips. Although not toxic, such materials may physically block the digestive system, causing starvation or death.

Section 13 – Disposal Considerations

**Disposal consideration /
Waste information:**

Recycle to process if possible. Waste cuttings, segments, chips and shavings should be swept up or vacuumed and placed in appropriate containers for disposal and to avoid runoff into waterways. This product as manufactured is a non-hazardous waste but may become contaminated upon use. If this material must be discarded, depending upon use and application, it may meet the criteria as hazardous waste as defined by the US EPA under RCRA (40 CFR 261) or other State or Local regulations. Consult an environmental professional to determine if local, regional or national regulations would classify this material or contaminated material as hazardous waste. Use only approved transporters, recyclers, treatment, storage or disposal facilities. Dispose of in accordance with all applicable National, State, Provincial and Local regulations.

Section 14 – Transport Information

US DOT	Not regulated as hazardous material or dangerous goods for transportation.
ICAO /IATA	Not regulated as hazardous material or dangerous goods for transportation.
IMO / IMDG	Not regulated as hazardous material or dangerous goods for transportation.
RID / ADR	Not regulated as hazardous material or dangerous goods for transportation.
TDG	Not regulated as hazardous material or dangerous goods for transportation.
Other transportation information:	The description shown may not apply to all shipping situations. Consult appropriate Dangerous Goods Regulations for additional description requirements (e.g., technical name) and mode-specific or quantity-specific shipping requirements.

Section 15 – Regulatory Information

SARA 311/312 Categories:	Immediate (acute) health effects	No
	Delayed (chronic) health effects	No
	Fire hazard	No
	Sudden release of pressure hazard	No
	Reactivity hazard	No

Regulatory Status:

Country	Inventory	Status
Australia	AICS	All components are included or otherwise exempt from inclusion on this inventory.
Canada	DSL	All components are included or otherwise exempt from inclusion on this inventory.
Canada	NDSL	
China	IECS	All components are included or otherwise exempt from inclusion on this inventory.
European Union	EINECS	All components are included or otherwise exempt from inclusion on this inventory.
European Union	ELINCS	
European Union	NLP	
Japan	ENCS	All components are included or otherwise exempt from inclusion on this inventory.
Korea	ECL	All components are included or otherwise exempt from inclusion on this inventory.
Philippines	PICCS	All components are included or otherwise exempt from inclusion on this inventory.
United States	TSCA	All components are included or otherwise exempt from inclusion on this inventory.

Regulatory Lists:

01 = CA Prop 65

18 = FDA 179

35 = RCRA Waste P-List

Safety Data Sheet
WL Plastics Polyethylene Pipe
All Grades – All Colors – All Materials
MSDS #: WL131

Regulatory Lists (continued):

02 = LA RTK	19 = FDA 180	36 = RCRA Waste U-List
03 = MA RTK	20 = FDA 181	37 = SARA Section 311/312
04 = MN Hazardous Substance	21 = FDA 182	38 = SARA Section 313
05 = NJ RTK	22 = FDA 184	39 = TSCA 12 (b)
06 = PA RTK	23 = FDA 186	40 = TSCA Section 4
07 = CAA Section 112 HAPs	24 = FDA 189	41 = TSCA Section 5(a)
08 = CWA Section 307	25 = IARC Group 1	42 = TSCA Section 8(a) CAIR
09 = CWA Section 311	26 = IARC Group 2A	43 = TSCA Section 8(a) PAIR
10 = DOT Marine Pollutant	27 = IARC Group 2B	44 = TSCA Section 8(d)
11 = FDA 172	28 = IARC Group 3	45 = WHIMS - IDL
12 = FDA 173	29 = IARC Group 4	46 = Germany D TAL
13 = FDA 174	30 = NTP Carcinogen	47 = Germany WKG
14 = FDA 175	31 = OSHA Carcinogen	48 = DEA List 1
15 = FDA 176	32 = OSHA Highly Hazardous	49 = DEA List 2
16 = FDA 177	33 = RCRA Waste Appendix VIII	
17 = FDA 178	34 = RCRA Waste D-List	

The following components of this material are found on the regulatory lists indicated:

Polyethylene	4
May include: carbon black	1, 3, 4, 5, 6, 27, 45
May include: lead chromate pigment	1, 3, 4, 5, 6, 25, 26, 30, 34, 38, 39, 45, 46

CERCLA reportable quantities (RQ) / SARA 302 threshold planning quantities (TPQ):

Component	Component RQ	Component TPQ	Product RQ
May include: lead chromate pigment	10 lbs	None	1000 lbs

WHMIS Classification:

This product is not considered a controlled product according to the criteria of the Canadian Controlled Products Regulations.

Section 16 – Other Information

Notice to reader:

NOTICE: This Material Safety Data Sheet is based on data considered to be accurate at the time of its preparation, but despite our efforts, it may not be up to date or applicable to the circumstances of any particular case. The information on this MSDS was obtained from sources that we believe are reliable. However, the information is provided without warranty, expressed or implied, regarding its correctness. Some information presented and conclusions drawn herein are from sources other than direct test data on the substance itself. The conditions or methods of handling, storage, use and disposal are beyond our control and may be beyond our knowledge. For this and other reasons, WL Plastics does not assume responsibility and expressly disclaims liability for loss, damage, injury or expense arising out of or in any way connected with handling, storage, use or disposal of this product, or resulting from abnormal use, or resulting from any failure to follow appropriate practices, or from hazards inherent in the nature of the product. If the product is used as a component in another product or system, this MSDS information may not be applicable.

< End of MSDS >

APPENDIX C

CRACK AND VOID REPAIR

Appendix C

Crack and Void Repair

Alternative 1 – Compacted Soil Backfill

1. Construct road and pad(s) on cap to provide dump truck and equipment access to the repair area;
2. Turn off subcap gas collectors in the vicinity of the repair area;
3. Cut cap flexible membrane liner (FML) at least five feet beyond limit of void in a manner what will allow material to be re-folded when complete;
4. If necessary, install a portable odor control unit near the repair site, and install a 1,500 gallon water tank on a suitable pad;
5. Conduct necessary backfilling. A rigid plate may be used with backfill to bridge soft areas;
6. Use odor control neutralizers at a suitable concentration during the backfilling process. The concentration can be adjusted as necessary to achieve acceptable neutralization and to more fully neutralize aggressive odors;
7. Adjust concentrations and nozzle spacing as necessary during the activities to neutralize the odors;
8. During the backfill process, the neutralization process can be discontinued once more permanent landfill gas extraction methods are employed in this area; otherwise maintain neutralization until backfill is completed;
9. Re-fold the FML material to cover the backfilled area; and
10. Using cap strips as necessary, fuse FML together to restore complete cap in the work area.

The dry fill component will consist of materials meeting the clean fill definition in 260.200.1(6) RSMo. The material would be fine with a maximum of medium sand-sized particles, minimizing potential for abrasion damage to the FML.

Alternative 2 – Placement of Flowable Fill Material

The objectives for flowable fill repairs are as follows:

- Fill the cracks/voids so that the synthetic cap is supported at all places;
- Result in a fill that is malleable so that it provides seal during future deformations with a low- to medium-strength clay consistency and an expected permeability in the range of 1×10^{-5} cm/s;
- Allow re-excavation and removal of material if needed in future,
- Create a subcap surface that supports foot and vehicle traffic
- Minimize damage to the FML; and
- Minimize odors during the performance of the repair.

Flowable fill would be used only for small “spot-treatment” applications (approx. 50 CY). A typical crack, as observed during soil filling of previous cracks, may be about 50 feet long and two feet deep requiring about 8 cubic yards (CY) of flowable fill. A typical void around a well casing, like those observed during the February 2014 inspection and documented in Area of Concern 1, would be about six feet diameter and five feet deep requiring about 2 CY of fill.

The contractor’s proposed approach is as follows:

Appendix C

Crack and Void Repair

1. Position small pneumatic tanker with dry fill component on suitable perimeter access road or main corridor landfill access road;
2. Add potable water to the dry fill material to create slurry of desired consistency in the tanker (no air will be deliberately entrained);
3. Position grout pump between the tanker and the target crack/void;
4. Cut a small incision in the FML to allow insertion of grout hose;
5. Position grout hose through incision and as far into crack/void as possible;
6. Pump flowable fill in while retracting grout hose until void is full; and
7. Repair the incision in the FML with extrusion welding techniques, applying patches as necessary.

It may be necessary to create bulkheads to prevent fill from flowing downhill or into undercap drains or other areas where it is not desired. Sand bags or tubes, plywood barriers, and other means will be employed as necessary for this purpose. Locations of use will have to exclude those areas where there is potential to enter collection systems, clog, or negatively impact leachate removal. In addition, voids around well casings will likely require addition of bentonite pellets in the bottom of the void to create seal prior to application of flowable fill. Prior to filling we will identify the screen location of a well so that the repairs will not compromise well operation.

Alternative 2 has many advantages over Alternative 1 including preservation of cap integrity, reduction of the amount of road building, which can be damaging to the FML, and greatly reducing the potential for odors generated during the work due to the ability to avoid exposing the void.

If, at any time, a subsidence feature results in noticeable release of gas or odor, it will be repaired as quickly as practicable. Typically, however, these settlement features and cracks are well-contained by the FML, so Bridgeton Landfill will allow several of these voids to occur, and then schedule a repair contractor so that they can be accomplished together. This works well for smaller voids for which safety hazards can be avoided and which can be controlled to prevent release of gas or liquid, or any potential increase in odor. These bundled repair events allow efficient mobilization of necessary resources and minimization of duration of invasive work. In advance of completing repairs of identified subsidence features, the site team will review the landfill surface generally to identify any additional features that may require repair.

APPENDIX D

FILLING PROCEDURES FOR LARGE SETTLED AREAS

Appendix D

Filling Procedures for Large Settled Areas

The Bridgeton Landfill will complete clean fill projects as needed to promote positive storm water drainage and maintain above-ground piping infrastructure in the South Quarry of the Landfill. Due to the significant amount of differential settlement in the South Quarry of the Bridgeton Landfill, periodic clean fill projects are needed to maintain desirable topographic grades.

The selection of clean fill locations will be determined by the Bridgeton Landfill staff. The initiation of clean fill projects will be based on the differential settlement realized in the South Quarry of the Bridgeton Landfill. This determination will be made based on the ability to manage storm water and above-ground piping infrastructure.

The design for clean fill projects in the South Quarry will be specific, and somewhat unique, to each area needing clean fill. Therefore, a conventional approach to clean fill projects has been included in this section. The conventional approach will allow for general design parameters to be implemented at unique/different locations.

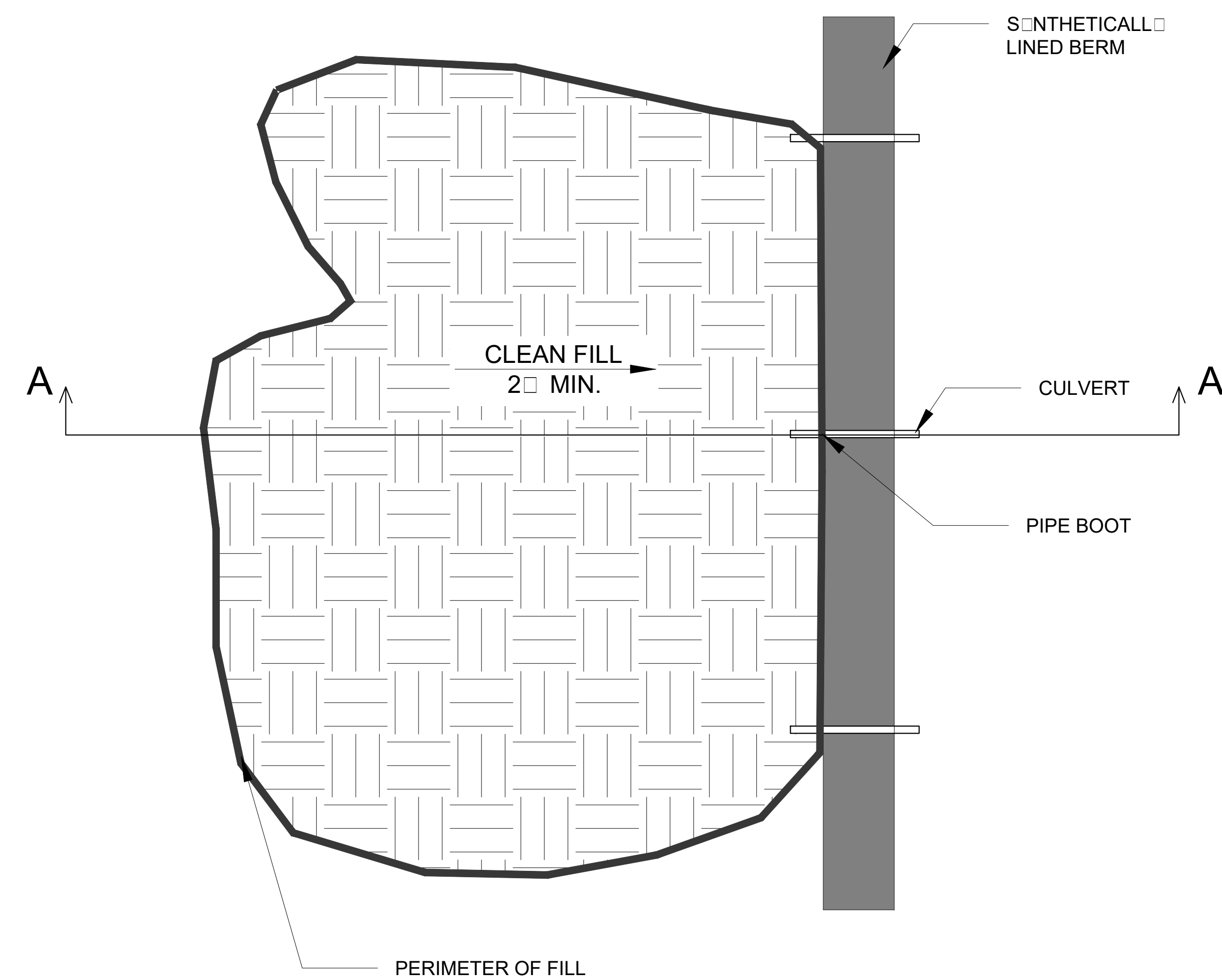
The customary design parameters shall include the following: procurement and placement of soil, sediment management, storm water and sedimentation controls, grading, vertical and horizontal infrastructure management and odor management procedures. The clean fill material will be obtained from a permitted borrow area north east of the South Quarry or from off-site locations. Off-site clean fill material will be secured and placed pursuant to the Clean Fill Permit Modification approved by SWMP on June 19, 2015 and St. Louis County Department of Health on July 22, 2015. A lined berm with booted-culvert pipes or cut sections will be constructed to control sediment. The soil grading will direct drainage to the culverts or cut-sections in the berm which will be protected by siltation control structures. This will allow sediment to be managed within the berm limits. Grading will be completed at a typical 2% grade sloping from the center of the South Quarry down to the outer lined berm. The grading will be completed to promote positive storm water drainage, reduce potential for ponding and support positive condensation drainage within the landfill gas headers in the respective area. The above-ground header piping and vertical infrastructure components will be modified to accommodate the proposed clean fill grades. All work will be completed in a manner to minimize the potential for odor during and post clean fill placement.

In accordance with the conditions for approval of the above referenced Clean Fill Permit Modification Bridgeton Landfill will observe the following conditions:

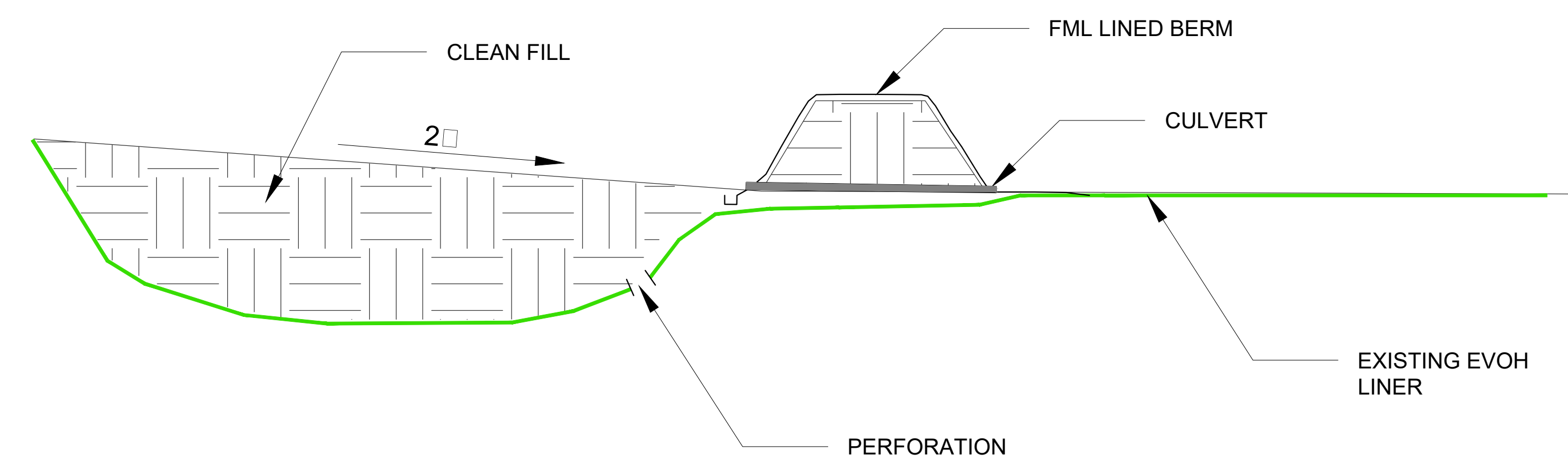
1. Notification is to be provided to the St. Louis County Department of Health at least 14 days prior to initiating any clean fill operations. Missouri Department of Natural Resources Solid Waste Management shall be notified at least 24 hours prior to commencement of large fill projects.
2. The Bridgeton Landfill Odor Management Plan will be followed at all times during clean fill operations.
3. Sufficient amounts of fine-grained soil and EVOH material will be available on-site prior to initiating clean fill operations. In the event that Odor Management Plan mitigation

efforts are insufficient for odor control fine-grained soil may be used as a first mitigation effort, followed by EVOH if necessary to sufficiently control/contain odor.

4. Painted block, brick, concrete, or asphalt shall be tested and determined to be clean fill prior to use.
5. Storm water controls shall be installed on bare soil fill and placement areas and any erosion shall be repaired immediately.
6. At least monthly a report to the department shall list all areas receiving clean fill, the number of cubic yards used in each area to date, whether a gravity drain feature or a sump was used/planned, and a drawing showing locations of current projects. All completed fill areas shall be clearly identified on the quarterly as-built drawings



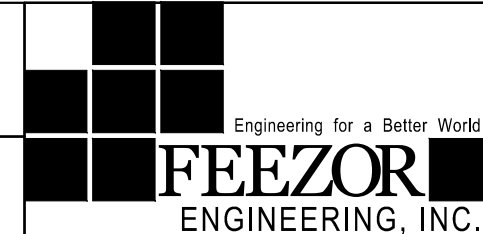
PLAN VIEW



SECTION A-A

NOTE

- 1.) DRAINAGE COLLECTION ON TOP OF EXISTING EVOH TO BE DETERMINED ON EACH PROJECT.

BRIDGETON LANDFILL, LLC 13570 ST. CHARLES ROCK ROAD BRIDGETON, MISSOURI 63044	BRIDGETON LANDFILL		DECEMBER 2015	
			DESIGNED BY: DMK	
			APPROVED BY: ALK	
CLEAN FILL DETAIL				
PROJECT NUMBER: BT-089	FILE PATH:		REVISION	DATE

APPENDIX E

TEMPERATURE MONITORING PROCEDURE

Procedures for Verification of TMP Readings

General

The strings of T type thermocouples at the site are quality controlled strings of thermocouple 20 gauge Copper/Constantan thermocouple wire, with factory fabricated sealed junctions at the ends in the ground. The resistance of the wire, in ohms per foot, is 0.298. The thermocouple wire is coated with Teflon, which provides protection up to 500 °F. The thermocouple itself is rated to 750 °F. At the ground surface the thermocouple wires (two per thermocouple unit within the TMP location) are connected to a rotary switch or dedicated depth internal terminal that is inside a NEMA weatherproof rated enclosure mounted above the ground surface. A readout device, purchased from Omega Engineering of the HH800 series is connected to the rotary switch to take readings. Resistance readings can also be taken for each unit through the appropriate terminal, which is low resistance. Temperature readings are actually voltage differences across the two sides of the thermocouple wire and are read to the nearest microvolt to achieve readings accurate to ± 2 °F

Potential Problem in Obtaining Accurate Readings

The following things can result in poor quality readings

1. Not setting the thermocouple readout device to the correct setting. The device must be set to a type T thermocouple type. Failure to have the correct setting results in very different temperatures being associated with the voltage difference being converted by the readout device to temperature.
2. Not have clean connectors to the leads to the switch. This increases the resistivity at the readout end and can lead to erroneous readings. Make sure the contact surfaces are clean and dry.
3. Condensate or corrosion can occur within the rotary switch. This results in incorrect readings by raising resistance or even providing continuity across multiple thermocouples. The enclosure containing the switch must be well ventilated and dry. If condensate or corrosion is present the switch can be cleaned or replaced. Resistance readings at periodic intervals and whenever questionable readings are obtained can identify these problems.
4. Damage associated with abrasion or stretching or breaking of the thermocouple wire or its insulation can occur. This will result in either resistance that exceeds the nominal values foot of wire due to work hardening of the wire, very high resistance due to wire breakage or very low resistance do to insulation damage at shallower depth than the tips. Resistance readings at periodic intervals and whenever questionable readings are obtained can identify these problems.

Appendix E

Reading Verification

Verify Resistance

Resistance readings should be taken at monthly intervals for each thermocouple probe. A multimeter calibrated with a quality resistor of 50 ohm should be used. Additional readings should be taken whenever readings appear questionable or a large change in readings occurs. Values will be plotted with depth and units exceeding 1.3 times the theoretical resistance are considered marginal. Units with 1.65 times the nominal resistance values, corrected for the switch, will be considered unacceptable for use.

If readings are high, the switch unit should be inspected and the resistance at the thermocouple lead (for one or two units that read high) be checked bypassing the switch. If the switch is seen to be the issue it should be cleaned or replaced to reduce the measured resistance in the switch to a few ohms or less.

Verifying Readings

If the resistance readings are acceptable, the temperature readings should be repeated within 24 hours to identify they are representative. This verification should include double checking the readout is set to the correct thermocouple type.

Identifying Unacceptable Readings

Readings that do not stabilize to within 4 degrees over a period of 30 seconds and show rapid fluctuation are not acceptable and should be indicated as readings failed to stabilize. For existing leads, if issues are noticed with the data including change in temperature or resistance or resistance readings not expected pursuant to thermocouple length, we would remove the wires from the box (rotary switch or plug-in panel) and measure directly on the two wires. This eliminates any source interference above the ground. If the data is still not in the acceptable range, it would be determined that the issue is below ground and the thermocouple is compromised.

APPENDIX F

EXAMPLE WEEKLY DATA SUBMITTAL

Bridgeton Landfill, LLC

Weekly Data Submittals

Contents:

Attachment A – Temperature Monitoring Probe Analytical Charts

Provided Separately:

– Temperature Monitoring Probe Raw Data Excel Spreadsheet

Date: _____

APPENDIX G

EXAMPLE MONTHLY DATA SUBMITTAL

APPENDIX G

This report cover page provided to memorialize the forward-going contents of periodic reports to be submitted to the MDNR

Bridgeton Landfill, LLC

Monthly Data Submittals

Contents:

Commentary on Data (optional)

Attachment A	Daily Flare Monitoring Data (current month, cumulative only)
• A-1	Data Spreadsheet
• A-2	Data Graphs
Attachment B	Carbon Monoxide Data for current month
Attachment C	Hydrogen Data for current month
Attachment D	Settlement Front Data for current month
Attachment E	Gas Wellfield Data (current month)
• E-1	Gas Wellfield Data Spreadsheet
• E-2	Maximum Temperature Spreadsheet
• E-3	Lab Analyses Spreadsheet
Attachment F	Wellhead Temperature Data for current month
Attachment G	Volume of Leachate Processed (current month)
Attachment H	Spill Summary (if necessary)
Attachment I	Large Settled Areas Activity Summary (if necessary)

Provided Separately:

- Flare Raw Data Excel Spreadsheet
- Gas Wellfield Raw Data Excel Spreadsheet

Date: _____

APPENDIX H

RECORD OF DOCUMENT REVISIONS

BRIDGETON LANDFILL

Operation, Maintenance, and Monitoring Plan

[illegible]

APPENDIX I

SETTLEMENT VOLUME

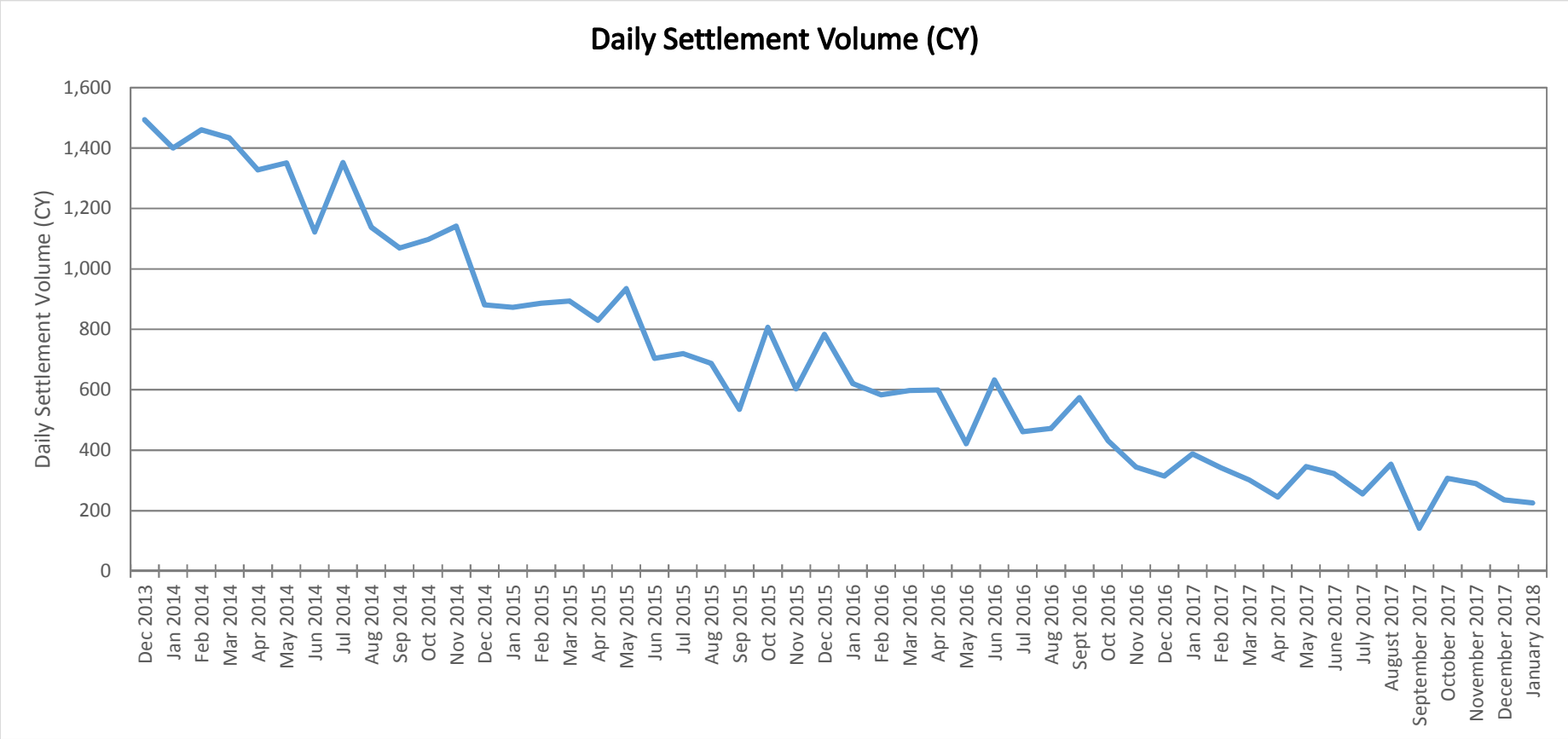


Exhibit E

OPERATION, MAINTENANCE, AND MONITORING PLAN

VOLUME 2

Gas and Subsurface Control Systems

Prepared for:

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Appendix F	Gas Extraction Point Assessment Protocol
Appendix G	Well Liquid Measurement Procedures
Appendix H	Landfill Gas Extraction Point Decommissioning or Abandonment Procedures
Appendix I	Gas Extraction Well Replacement/Drilling Procedures
Appendix J	Wellhead Inspection and Maintenance Procedures
Appendix K	Pump Inspection and Maintenance Procedures
Appendix L	Permanent Air Compressor Inspection and Maintenance Procedures
Appendix M	Blower and Flare Operation and Maintenance Procedures
Appendix N	Condensate Management System Inspection and Maintenance Procedures
Appendix O	Gas Collection Pipe Inspection and Maintenance Procedures

DOCUMENTS INCORPORATED BY REFERENCE

- Gas System Monitoring Equipment Manual
 - Envision – Landfill Gas Analyzer (or equivalent) Operating Manual
 - Water Level Meter User Manuals
 - Four-gas Personnel Monitoring Meters
 - Flame Ionization Detector
 - Fluke Temperature Probes
- Blackhawk Pump Operation Manual(s)
- QED Pump Operation Manual(s)
- Flare(s) Manufacturer’s User Manuals
- Blower(s) Manufacturer’s User Manuals
- Air Compressor(s) Manufacturer’s User Manuals
- Quarterly Infrastructure Report
- Caterpillar 1 Megawatt Backup Generator User Manual
- “Corrective Action Measures - Inert Gas Injection Work Plan for Hot Spot Remediation”- SCS Engineers December 16, 2016

1.0 INTRODUCTION

This document comprises Volume 2 of a three-volume Operation, Maintenance, and Monitoring Plan (OM&M Plan) for the Bridgeton Landfill, LLC (Bridgeton Landfill). The OM&M Plan consists of:

Volume 1 - General Requirements and Cap System

Volume 2 - Gas and Subsurface Control Systems (this volume)

Volume 3 – Leachate Management Systems

Volume 1 describes the history of the landfill as well as the OM&M Plan purpose, management structure, data collection and reporting, and procedures for modifications.

Certain reactions (also called a subsurface smoldering reaction or SSR) are believed to be occurring within portions of the South Quarry. The effects of the reaction produces dynamic, atypical and stressful conditions on the gas collection and control system (GCCS) including:

- Elevated temperatures create a non-typical combination of gases and liquids which require special construction materials;
- Reduction in methane concentrations (due to the SSR) accompanied by production of hydrogen, volatile organics, and carbon monoxide; creating a non-typical blend of gases for the flares and other GCCS components;
- Drying of waste which results in a steam/water vapor front moving out, up, and away from the reaction which then condenses in the cooler surrounding waste mass, and gas extraction wells, resulting in increased leachate generation and obstruction of gas extraction well perforations;
- Higher-than-normal pressure immediately adjacent to the reacting waste mass; and
- Settlement under and/or adjacent to reacting waste mass, with the potential to create pinches, warps, and/or breaks in the gas extraction well casings and conveyance pipe network.

Each of these conditions results in operational and maintenance challenges. It is not known how long the SSR will continue or how long these conditions will exist, but it is believed the elevated temperatures and atypical gas quality could be present for many years. Therefore, special

operating and maintenance procedures are, and will be, necessary for the GCCS until conditions allow for resumption of typical procedures. Operations of the GCCS are focused on preventing odors, lateral gas migration, and fugitive surface emissions.

The existing GCCS consists of a series of active gas extraction wells (GEWs) which are connected via a network of vacuum distribution piping to up to a blower/flare station(s) where the landfill gas (LFG) is combusted. Additional collection points have been installed within and adjacent to the municipal solid waste landfill as remediation efforts at the site and serve as temporary controls points. These extraction points are a necessary component of remedial action to help control the residual impact of the SSR as well as lateral migration of gases from the waste mass and to protect the integrity of the active gas extraction wells. These remediation extraction points are connected via a network of vacuum distribution piping to a blower/flare station(s) or future possible alternative control device(s).

An important GCCS feature is the ability to manage and monitor the gas extraction wells impacted by the SSR as well as the temporary controls installed as remediation efforts associated with the SSR, separate from “normal LFG” in the municipal solid waste landfill (North Quarry), while retaining effective flare operations, and maintain 40 CFR 60.18 flare systems compliance. A schematic illustration of the GCCS is provided as Figure 1.

In addition to the GEWs, either additional active extraction points have been installed or a vacuum has been applied to environmental control points to reduce odors and/or mitigate methane migration. These are referred to as remedial active extraction points and include, but are not limited to the following:

- Leachate collection sumps (LCSs);
- Perimeter sumps (PSs);
- Horizontal collection sumps (HZs);
- Over liner collection (OLs);
- Surface collection points (SCs);
- Grit chambers (GCs); and
- Surface extraction wells (SEWs).

The gas and subsurface control systems at the landfill need to be modified frequently to adjust to the conditions and remediation efforts caused by the SSR. As such specific component quantities, manufacturer models, ID numbers, etc. may not be referenced in this Volume 2 of the OM&M Plan. Instead, a current set of record documents and as-built drawings will be maintained in an

operating record located at the landfill office. In addition, this volume references other documents that will be kept on site including: a Health and Safety Plan (specifically designed for activities related to this OM&M Plan), equipment operating manuals, etc.

2.0 OPERATION

A robust and unique system designed to prevent odors, minimize lateral gas migration, reduce internal temperatures, and minimize oxygen intrusion within the landfill has been installed at the site. This system includes the following components.

COMPONENT	PURPOSE
EVOH Flexible Membrane Liner (FML) Cover	Reduces fugitive emissions, increases gas collection efficiency, and reduces oxygen and liquid infiltration.
Gas Extraction Wells (GEWs)	Collect and remove gas and heat from the waste.
Dual Phase Enhanced Gas Extraction Wells (GEWs)	Collect and remove gas from the waste and leachate from the gas extraction wells.
Condensate Traps (CTs)	Collect liquid that condenses within the gas collection lateral and header pipes. Condensate drains by gravity into the CT structures.
Headers and Laterals	Connects all of the gas extraction and collection devices to the flare stations.
Stationary Air Compressors	Supply compressed air to operate the pneumatic operated dewatering pumps.
Pneumatic Distribution Pipe Network	Distributes the compressed air to the dewatering pumps.
Force Main	Conveys the liquids recovered by the dewatering wells to the leachate collection system.
Other Gas Collection Devices	Collect gas from other structural elements of the landfill operating systems to minimize fugitive emissions.
Blower/Flare Stations	Provide the primary gas moving equipment and the combustion mechanism.

The most recent quarterly infrastructure report as of the date of this submittal shows the location of the currently active GEWs used for gas collection and control. Up-to-date as-built drawings and GEW as-builts will be kept at the landfill office in the operating record and reported as outlined in Volume 1. Appendix A contains typical details for many of those above-described components of the GCCS which may need periodic addition or repair.

In addition to the GEWs, remedial active extraction points have been installed or vacuum has been applied to environmental control points to help control residual impact of the SSR to reduce odors and/or lateral gas migration. These include, but are not limited to the following:

- Gas Interceptor Wells (GIWs)– A series of closely spaced GEWs installed in parallel lines (designated as GIW- #) to intercept reaction gases, remove heat, reduce pressure, and stop advancement of the SSR. The majority of these points have been retrofitted with cooling loops as a means to remove heat from the waste mass in the neck area.
- SEWs – These extraction points are dual extraction surface collectors located at GEW locations that have been impacted by the SSR and are no longer operable as a GEW. Due to the increased pressure and liquids at these points, additional leachate and surface gas collection is needed. This includes GEWs known to have a “stinger”, which is a device used to allow leachate and/or gas extraction from a compromised GEW, but which obstructs physical access when a GEW has been compromised. These extraction points are relabeled as an SEW with corresponding identification number on updated infrastructure drawings.
- Leachate Collection Sumps (LCSs) – Currently seven deep landfill extraction sumps (designated as LCS- #) are connected to the gas collection system for fugitive odor control.
- Perimeter Sumps (PSs) – A series of drains has been installed under the landfill’s EVOH to collect subcap condensation and leachate outbreaks. These convey gas and liquids to a series of sumps at the perimeter of the landfill (designated PS- #); each are connected to the gas collection system for fugitive odor control.
- Horizontal Collection Sumps (HZs) – A leachate collection trench located within waste in the site’s “amphitheater” area. Five horizontal collection sumps provide gas collection points from this feature. Horizontal collection sumps are designated as HZ- #.
- Subcap (near-surface) Collection Points – These gas and leachate control points are installed close to the surface but underneath the EVOH cover. The subcap collection points include the following:
 - Perimeter line collection points (designation PL- #);
 - Over liner collection points (designation OL- #); and
 - Surface collection points (designation SC - #).

These “bubble-suckers” are above the waste mass and typically above the soil cover system but below the EVOH cover. These include the strip drains and collector berms that serve as interceptors for any liquids/gas moving along the soil/EVOH interface between collector berms. The strip berms have riser connections approximately every 500 feet for gas

extraction. These devices are considered outside of the waste for New Source Performance Standards (NSPS) operational requirements for oxygen and temperature.

- Gas Migration Interceptor Trenches – A perimeter trench (designated IT-#) typically located outside of the refuse limits installed and operated to mitigate gas migration. These devices are considered outside of the waste for NSPS operational requirements for oxygen and temperature.
- Phase Separation Vessels – Frac tanks or vessels used to collect hot saturated gas or gas from wells that are ejecting steam and/or liquid. The vessels allow gravity and condensation separation of the gas and liquid components. The designation is Extraction Point - # (i.e. GEW-59), and the ID (alphanumeric) corresponds with the extraction point that is ejecting steam and/or liquid that cannot be safely monitored at the wellhead.
- Grit Chambers – Used to slow down the flow of leachate so that small solids can settle out and be removed, preventing additional wear and tear on pumps and other plant equipment. Each grit chamber may be connected to the gas collection system for fugitive odor control. These are designated with “GC”. These devices are considered outside of the waste for oxygen and temperature NSPS operational requirements. In addition, hot saturated gas or gas from wells that are ejecting steam and/or liquid is routed to the grit chambers where the vessel allows gravity and condensation separation of the gas and liquid components. The designation for the extraction point routed to the grit chamber is Extraction Point - # (i.e. GEW-59), and the ID (alphanumeric) corresponds with the extraction point that is ejecting steam and/or liquid that cannot be safely monitored at the wellhead.

The above list of remedial active extraction points are temporary gas control points installed as remediation efforts associated with the SSR to reduce odors or to alleviate lateral subsurface gas migration. These remedial points are not designed to comply with NSPS standards and are used as operational controls associated with the remediation efforts. As such, an alternative operating procedure, as allowed under NSPS 40 CFR 60.752(b)(2)(i) and Air Pollution Control Rules Specific to the Saint Louis Metropolitan Area 10 CSR 10-5.490(3)(B)2.A., applies for all gas extraction points (GEWs and remedial active extraction points) impacted by the SSR. The table below presents the NSPS operating limits that are allowed to be exceeded for the extraction points impacted by the SSR if corrective action is taken as specified in Section 2.2.1.

Parameter	NSPS Requirement
Gas Temperature	<131° F
Oxygen	<5%
Pressure	<0” wc

Bridgeton Landfill will continue to comply with NSPS regulation for each NSPS extraction point as delegated by the St. Louis County Health Department (SLCHD) and Missouri Department of Natural Resources (MDNR). The NSPS-regulation process is, necessarily, considered separate and distinct from the requirements and goals of this OM&M Plan. However, the OM&M plan is an approved alternative operating standard as allowed under NSPS 40 CFR 60.752(b)(2)(i) and Air Pollution Control Rules Specific to the Saint Louis Metropolitan Area 10 CSR 10-5.490((3)(B)2.A. As such, each NSPS extraction point will be reported in accordance with NSPS (temperature, pressure and oxygen) in the semi-annual NSPS report. However, expansion of the gas collection system is not required for points impacted by the SSR. If procedures outlined in Section 2.2.1 are taken for points impacted by the SSR, the monitored exceedance is not a violation of the operation requirements of NSPS. Supplemental reports, in accordance with the Title V permit, will not be required if these procedures are followed. This information will instead be summarized in the NSPS semi-annual report.

The gas and subsurface control systems at the landfill need to be modified frequently to adjust to the conditions caused by the SSR, including the residual effects of the SSR. As such, specific component quantities, manufacturer models, ID numbers, etc. may not be referenced in this Volume 2 of the OM&M Plan. Instead, a current set of record documents and as-built drawings will be maintained in the operating record at the landfill office and submitted according to Volume 1. In addition, this volume references other documents that will be kept on site including: a Health and Safety Plan (specifically designed for activities related to this OM&M Plan), equipment operating manuals, etc.

2.1 GCCS OPERATION MONITORING EQUIPMENT

Operational measurements will be taken by a trained technician who is directly employed by Bridgeton Landfill or subcontracted to perform these services. Data collected in the field allows the operator to make prompt adjustments to gas extraction points for improving gas collection efficiency, and provides data that provides additional insight to the conditions existing within the landfill waste mass.

Measurements are made in the field at the sampling port using an Envision™ – Landfill Gas Analyzer or equivalent using the procedures provided in Appendix B and C. This instrument provides temperature, pressure/vacuum, flow, methane, oxygen, and carbon dioxide readings. The Envision – Landfill Gas Analyzer, or equivalent, shall be operated in accordance with its product manual including procedures for calibration, maintenance and specifications. The calibration procedures are provided in Appendix D.

At the end of each monitoring day, collected data is downloaded to a computer for storage. The technician that collected these data will review these collected data to look for triggers, unusual trends, or anomalous readings that may not have been detected in the field. Well field data will be stored in a central database, and a copy of the original comma separated variable (csv) file will be maintained in the operating record.

2.2 GENERAL GCCS OPERATION

Gas from the gas extraction points (GEWs, subcap gas collectors, and other gas collection devices, etc.) flows through a network of lateral and header pipes and then to the blower/flare area as shown schematically on Figure 1 and on the typical drawings contained in Appendix A. The following sections describe the general requirements for operating the GCCS, and the limitations and operating alternatives for landfill areas that have been directly and indirectly impacted by the SSR.

2.2.1 Operating Parameters

Bridgeton Landfill strives to achieve the operating limits required by NSPS. However, the SSR makes temperature, pressure, and oxygen requirements challenging at many of the gas extraction points. For purposes of odor control, Bridgeton Landfill uses the operating goals presented in the table below. The table below presents NSPS and the Bridgeton Landfill's operating limit goals to be employed within gas extraction wells and remedial active extraction points located in waste.

Parameter (at the Wellhead)	NSPS Requirement	Bridgeton Goal
Gas Temperature ¹	<131° F	<131° F ²
Oxygen ¹	<5%	≤2% (GEWs only) ²
Pressure ³	<0" wc	<0" wc ²

¹Remedial active extraction points located outside of waste are not subject to the NSPS oxygen and temperature requirements but are subject to NSPS pressure requirements per correspondence with St. Louis County Health Department dated May 29, 2007.

²If the corrective action is taken as specified in this section the goals outlined above may be exceeded within extraction points impacted by the SSR.

³In accordance with 40 CFR 60.753(b)(2) in areas where a geomembrane or synthetic cover is installed positive pressure at wellheads is allowed.

Due to the SSR event, the methanogenic process of degradation of the organics has been compromised due to the elevated temperatures within the landfill. As a result, impacted areas are producing reduced amounts of methane. The SSR's primary byproduct is the production of heat

that is well above temperatures produced by normal methanogenesis of methane in MSW landfills. Therefore, the 131° F temperature goal is not currently achievable for many extraction points impacted by the SSR. The technician will strive to maintain 131° F where possible; however, at extraction points impacted by the SSR, to the extent feasible to not increase oxygen intrusion, sufficient vacuum will be applied to the extraction point to maintain fugitive odor control and to reduce pressure or other heat-causing conditions under the cap and cover systems. No further corrective action for temperature exceedances will be taken for extraction points with known elevated temperatures from SSR impacts.

To assist with meeting the 5% oxygen NSPS operating requirement for each NSPS extraction point, and reduce the risk of ambient air intrusion into the waste mass, Bridgeton Landfill will use a goal of 2% oxygen as an upper limit for GEW and remedial extraction points within waste, as described in the procedures outlined in the Extraction Point Assessment Protocol – Oxygen > 2% protocol (contained in Appendix E). For wells which exceed 2% oxygen levels, personnel will work to keep the oxygen content below 5% when possible. It should be noted that oxygen present in a gas wellhead during monitoring is not necessarily an indication that oxygen is present in the waste mass, but could instead be indicative of a watered-in well with no exposed perforations, silt blocking the well screen, or other similar condition. Furthermore, the remedial active extraction points are not air-tight extraction points and will contain oxygen that is unrelated to the oxygen within the waste mass.

Every effort will be made to minimize air infiltration and the Extraction Point Assessment Protocol – Oxygen > 2% protocol (contained in Appendix E) shall be followed for the extraction points located in waste connected to the GCCS. If after following the procedures outlined in Appendix E, oxygen levels cannot be brought below the 2% threshold, the Bridgeton Landfill will continue to apply vacuum to these points for fugitive odor control above the public nuisance threshold (7:1 dilution) beyond the property boundary. Field personnel will continue to strive to maintain an oxygen level below 5% in extraction points exceeding the 2% threshold for oxygen. The procedures outlined in Appendix E shall be followed during each monitoring event. Efforts taken to reduce the oxygen concentration below the 5% threshold will be summarized in the NSPS semi-annual report.

Sufficient and consistent vacuum must be applied to the well field. Bridgeton Landfill's goal is to maintain each extraction point in the gas collection system under negative gauge pressure. When zero or positive pressure is detected at a wellhead, and this pressure cannot be brought under vacuum with tuning adjustments (i.e. adjustments of the well control valve), investigation must be conducted to determine if an infrastructure problem exists and to identify the appropriate corrective

action to bring the extraction well back to negative gauge pressure. Positive pressure will be investigated and diagnosed using procedures described in Appendix F. If, after following the procedures outlined in Appendix F, the pressure cannot be brought under vacuum, Bridgeton Landfill will continue to apply vacuum to these points and the procedures outlined in Appendix F shall be followed during each monitoring event. Efforts taken to reduce the positive pressure under vacuum will be summarized in the NSPS semi-annual report.

Extraction points impacted by the SSR may be impacted by hot saturated gas or may be ejecting steam and/or liquid. To reduce odors at these extraction points, the gases and liquid will be connected to a phase separation vessel, including but not limited to grit chambers or frac tanks, and connected to the GCCS under negative gauge pressure. The impacted extraction point will be inspected during well field monitoring at the wellhead to determine if hot saturated gas and/or liquid continue to impact the extraction point. If well field monitoring cannot be completed at the extraction point, monitoring will be conducted at the manifold on the phase separation vessel and reported under NSPS as the ID extraction point. Multiple extraction points may be connected to one phase separation vessel. Additionally, extraction points that have surging liquids may be directed to a reservoir (i.e. frac tank or grit chamber). Negative pressure will be applied to the reservoir. As an alternative to monitoring at the wellhead, a sampling port will be installed at the reservoir to measure gauge pressure, oxygen concentration, and temperature. The common collection point will serve as the monitored location for each extraction point routed to the reservoir. Records of the extraction points connected to each phase separation vessel will be determined each monitoring event. Once the extraction point no longer exhibits these conditions it will be disconnected from the phase separation vessel and monitoring at the wellhead will resume. As such an alternative operating procedure, it is allowed under NSPS 40 CFR 60.752(b)(2)(i) and Air Pollution Control Rules Specific to the Saint Louis Metropolitan Area 10 CSR 10-5.490(3)(B)2.A., to sample at an alternative location during such events. Extraction points monitored at an alternative location will be summarized in the NSPS semi-annual report; however no further corrective action will be required in areas impacted by the SSR.

Due to the SSR conditions gas extraction points may not be accessible periodically to conduct surface monitoring and well field monitoring. In areas deemed dangerous for personnel to access, included but not limited to artesian conditions, raised wellheads inaccessible by OM&M staff, high temperature observed on the landfill cap or at the wellhead, or excess settlement and construction areas, monitoring activities may be suspended. Only extraction points and areas of the landfill that can be safely accessed will be monitored. As such an alternative operating procedure, as allowed under NSPS 40 CFR 60.752(b)(2)(i) and Air Pollution Control Rules Specific to the Saint Louis Metropolitan Area 10 CSR 10-5.490(3)(B)2.A., may be used to suspend monthly well field

monitoring or quarterly surface emissions monitoring in areas that are deemed dangerous. These dangerous areas will be summarized in the NSPS semi-annual report, however no further corrective action will be required.

Since the gas and subsurface control systems at the landfill need to be modified frequently to adjust to the conditions caused by the SSR, gas extraction points may be modified, added, temporarily decommissioned or permanently abandoned if rendered ineffective or if dangerous conditions exist. Such changes will be made and updated record documents will be provided during the NSPS semi-annual reporting. The current set of record documents and as-built drawings will be maintained in a dedicated file in the site operating record.

Per 40 CFR 60.755(a)(3) and (5) and Air Pollution Control Rules Specific to the Saint Louis Metropolitan Area 10 CSR 10-5.490(6)(A)3. and 5., gas extraction points impacted by the SSR may be temporarily decommissioned or permanently abandoned without the need to expand the GCCS as long as corrective action measures are taken. These changes will be summarized in the NSPS semi-annual report.

2.2.2 Identification and Response to Potential Subsurface Oxidation (SSO) - North Quarry

The North Quarry does not have an ongoing SSR, so typical identification and response procedures can be utilized to evaluate a potential SSO. Bridgeton Landfill will use the "Subsurface Oxidation (SSO) Procedure" contained in Appendix A of "Corrective Action Measures - Inert Gas Injection Work Plan for Hot Spot Remediation"- SCS Engineers December 16, 2016 (document incorporated by reference) to identify and respond to a suspected SSR.

2.2.3 Establishing Vacuum Set-Point

The vacuum set-point is an important part for maintaining the well field's overall "health." Vacuum should be maintained as low as possible while ensuring minimum acceptable negative pressure is available to the furthest points of the collection system. The vacuum set-point goals shall be determined and evaluated by Bridgeton Landfill personnel using the following guidelines:

- Provide GCCS extraction consistency – vacuum is maintained consistently so balancing and tuning events are consistent;
- Prevent excessive air from entering the landfill – prevent "over pull" which damages anaerobic bacterial populations;
- Prevent "under pull" which does not allow the GCCS to capture the gas being generated by the landfill, and could result in surface emissions, odors, and offsite gas migration and

- Minimize impact if GCCS pipeline, fitting, or joints fails – minimal vacuum prevents large amount of soil, trash, air and debris from entering the GCCS if a failure occurs.

A minimum system vacuum “set-point” and the set-point monitoring location will be established at the inlet to each prime mover, or vacuum source. The vacuum set-point will be set based on the following:

- Input from the Bridgeton Landfill site technician staff;
- Other data, including engineering calculations and equipment performance limits and capacities; and
- The monitoring location shall be representative of the vacuum applied to the well field.

Vacuum set-point, once established, will not be changed unless Bridgeton Landfill personnel proposes to adjust the set-point or a change is necessary for purposes of enhanced or more effective gas control.

2.3 GCCS TUNING EVENTS

Valid and consistent well field data are critical to maintaining compliance, and are essential to making accurate tuning decisions. Without accurate data, improper tuning adjustments can lead to odor issues, migration issues and potentially long term damage to the methane gas producing bacteria population.

Before beginning the monitoring and tuning event, verification that the collection system is operating at the vacuum set-point shall be made. Once the tuning event is started, the technician will strive to complete the monitoring and tuning event for the entire well field in consecutive days unless the prime mover deviates from normal vacuum operating conditions. Initial and adjusted wellhead measurements shall be made in accordance with the procedure provided in Appendix B.

In addition to GEWs, subcap wells, subcap gas collectors, and other primary extraction points, the following points shall also be measured during tuning events:

- Inlet to control device prime mover (before and after tuning event);
- At condensate and leachate sumps in the vicinity of the monitored area (vacuum reading only).

2.4 DATA MANAGEMENT

Proper management of field data is critical. Accurate and complete records of the data collected in the field will be maintained, even when data appear to be anomalous. Detailed field data management procedures are contained in Appendix C.

2.5 LIQUID LEVEL MEASUREMENT

One of the major factors which can limit landfill gas extraction is the presence of liquids within a collection well. Liquid inhibits the collection efficiency of a landfill gas well by limiting the availability of gas to be pulled through the gravel pack and well casing perforations.

Fluid level measurement at a frequency described in Volume 1 of the OM&M Plan will be obtained on accessible vertical GEWs on a routine basis, or whenever a forensic investigation of a poorly-functioning GEW needs to be performed. Wells that are equipped with remote access laterals or have conditions which preclude safe access (excessive pressure or liquid ejection) cannot be measured. Procedures for obtaining liquid level measurements are contained in Appendix G.

Operating, maintenance, and calibration procedures for the water level meter used for these measurements will be maintained in the “Gas System Monitoring Equipment Manual” binder in the landfill office.

2.6 DUAL PHASE GAS EXTRACTION WELLS (DEWATERING)

The heat generated by the reaction causes waste to dry, which results in a steam/water vapor front moving out, up, and away from the reaction. This vapor condenses in cooler surrounding waste mass, GEWs, and under the EVOH cover. As a result, efficiency for many of the GEWs may be reduced because much of the perforated screen interval is chronically watered-in, reducing gas flow.

The term “dewatering” is used to describe the process of removing liquid from a GEW. However, this function is quite different than the typical definition of dewatering where a saturated media is pumped to reduce a phreatic surface.

A GEW should be equipped with a pump if gas flow from the well is severely restricted, or if less than 20% of the available well screen perforations are exposed. However, certain GEWs at Bridgeton Landfill may be, or may become, non-accessible. These wells are designated as such based on the following criteria:

- A dummy (mock up replica of the different types of low flow dewatering pumps) could not be advanced to a sufficient depth, indicating a pump could not be installed in the GEW;
- The GEW is known to have a “stinger”, which is a device used to allow gas extraction from a compromised GEW, but which obstructs physical access. When a gas extraction well has been compromised yet leachate and/or gas continues to be collected from the near surface the extraction point will be relabeled a SEW with corresponding identification number;
- The GEW has a wellhead which prohibits direct access to the well for pump installation;
- Settlement can cause cracking and sinking adjacent to a GEW within the synthetic capped area. This can temporarily hinder physical access; and
- Conditions at the GEW are such that the downhole temperature is over the boiling point (212° F) allowing water to flash to steam and be ejected to the top of the wells. This phenomenon has been observed and described as “artesian” or “geyser.” (While not indicative of high internal gas pressures or water pressures adjacent to the well, the steam production can cause high pressures and unstable conditions *within* the well). This results in an unsafe condition for opening the gas wellhead, and prevents pump installation or operation.

Components of the GEW dewatering system are described in the following sections.

2.6.1 Low-Flow Dewatering Pumps

Pneumatic pumps are standard in the landfill industry, and have been deemed generally more desirable than electric pumps for this specific application, primarily due to their ability to operate at higher liquid temperatures, and the avoidance of an extensive electric distribution system on top of the landfill.

Low-flow pumps capable of delivering between 1 to 10 gallons per minute (gpm) are considered sufficient due to the expanded low sustained yield of liquid that can be extracted from a GEW. In addition, higher yield pumps would allow fines in the waste to move into the well filter pack potentially affecting the liquid and gas yield of the gas extraction well.

Pump specifications and manuals will be maintained in the Landfill office.

2.6.2 HDPE Air Transmission and Liquid Force Mains (Dewatering “Infrastructure”)

Above-grade HDPE pipe is used to transmit compressed air from the compressors to the dewatering pumps. A minimum SDR 17 HDPE pipe will be used to convey the pump discharge liquids to the leachate collection system. The HDPE liquid force mains vary in size depending on

the area served. The liquid transmission lines and pneumatic supply lines form a distribution network that covers the entire affected portion of the landfill.

2.6.3 Permanent Air Compressors

A permanent, skid-mounted, electric-powered air compressor system provides industrial quality compressed air to all of the GEW dewatering pump locations. The location of the compressors and the pneumatic supply line network are shown on the quarterly infrastructure drawings available at the site and submitted per Volume 1.

Operating and maintenance procedures for the compressors will be maintained in the dedicated file at the landfill office.

2.6.4 Operation of Dewatering System

Operation of the pneumatic dewatering well pumps is almost completely automated after the initial set-up has been achieved. However, due to the harsh conditions in which the pumps operate, maintaining the dewatering system requires a dedicated effort and heavy maintenance regimen. On a frequent basis, a certain number of the pumps will require repair or preventative maintenance. As a result, several of the pumps are typically inoperable at any given time. Spare parts are kept in appropriate inventory at the site for expeditious repair and replacement back into service.

2.7 PHASE SEPARATION VESSELS

Grit chambers, large vessels or frac tanks may be used to manage liquid that is collected from low points in the GCCS and condenses or is ejected from the impacted GEWs at the site. In order to alleviate odors, gas is extracted from the upper portion of these vessels and conveyed via the GCCS. Operating manuals for these pumps are maintained in the landfill office.

2.8 BLOWERS AND FLARES

The landfill control devices consist of utility (candlestick/open) flares which provide destruction of the gas by thermal oxidation. The Bridgeton Landfill currently has 3 permanent utility flares and 1 auxiliary flare. The Bridgeton Landfill will operate one or more of these flares in combination, as needed, to achieve the operational goals of NSPS compliance and odor control. A user manual for each flare and its appurtenant components is retained in the dedicated file at the landfill office. General operation procedures for the blowers and flares are provided in Section 3.5. Detailed procedures, parts lists, and troubleshooting guides are included in the manufacturer's user

manuals. The following provides a general description of the components of the flare station assemblies.

Each of the major flare skid components is described in the following sections.

2.8.1 Open Flare Stacks

For detailed operational procedures and parts list, consult the manufacture's user manual, which is incorporated by reference.

2.8.2 Condensate Knock-Out Pot (KOP)

The purpose of the condensate KOP is to remove excessive moisture and large particles from the landfill gas flow stream, which might otherwise impact the blower or other sensitive components on the flare skid. The KOP consists of a sealed vessel that provides a directional change and a decrease in landfill gas velocity, in addition to a stainless steel demister pad with fine filtration capability. A liquid drain is provided at the bottom of the KOP, and is connected to the flare station condensate sump via one-inch HDPE gravity drain line. The KOP has an external sight gauge, to allow monitoring of the condensate level in the KOP. The KOP drain is heat-traced to prevent freezing of liquid in cold temperatures.

2.8.3 Pneumatic Flare Inlet Valve

The purpose of the pneumatic flare inlet valve is to provide a fail-safe shutdown of the landfill gas flow to the flare during a normal shutdown or alarm condition programmed into the flare controls. Under normal operating conditions the pneumatic inlet valve is held open by compressed air/nitrogen, and upon circuit de-energization closes via spring action (fail-closed valve operation). Compressed air/nitrogen shall be set at manufacture's recommended value, as provided in flare station operations manual.

2.8.4 Blower Skid

In the flare compound, the blower skid includes four gas blowers that supply landfill gas to the flare. The purpose of the blowers is to provide the vacuum and pressure required to extract the landfill gas from the landfill and the pressure required to convey it to the flare. A check valve and a manual butterfly valve are located at the blowers and outlets for control of the landfill gas flow rate and isolation. The blowers' power supplies and controls are located at each end of the blower skid and labeled appropriately.

2.8.5 Air Compressors

The air compressor provides the pressure needed to operate the pneumatic pumps in the pneumatic condensate pump stations and down well pumps. In the event of a power outage or system malfunction, the air compressor will shut down. Upon power restoration, the compressor will automatically restart.

2.8.6 Pilot Flare Control

The purpose of the pilot flare control is to confirm the pilot has ignited, as proved by the pilot thermocouple. Upon pilot prove, the landfill gas blower is activated and the pneumatic flare inlet valve is opened allowing the pilot to ignite the LFG waste gas. The pilot gas flame will remain on until the main flame proves and the pilot gas is turned off. If the pilot, or sequentially the main flame does not prove, the system resets itself and repeats the startup sequence. Upon the third failure the system remains in the shutdown condition, and the flare system failure is reported via the auto dialer notification system.

2.8.7 Operation During Power Failure

The facility has two emergency generators which automatically activate in event of a power grid failure. In some cases, a delay causes a brief flare shutdown causing a pneumatically actuated landfill gas valve to close. Upon the restoration of electrical power, the flare will make three (3) attempts to restart automatically.

2.8.8 Landfill Gas Flow Meters

Each individual flare is equipped with a flow meter to allow gas flow measurement, indication, totalizing, and recording of data. The flow meters' output is integrated over time, and both continuous flow rate and total flow is recorded on a digital continuous data recorder enclosed on the flare skid control rack.

A KURZ flow meter, or equivalent, is installed at the blower outlet, tracking the total flow of LFG through the blower skid, as delivered to the individual flares in the flare compound. Each of the flare's flow meters are summed and compared to the KURZ flow meter to ensure the sum of the total individual flares in the flare compound is similar to the KURZ flow meter.

2.9 ALTERNATIVE CONTROL DEVICE

Off gases from leachate collection, conveyance and treatment may be routed to an alternative control device to control odor. These devices may differ depending on collection control demands and system choice will be based upon established engineering principles. Collection points and control devices of off gases from leachate collection are not subject to NSPS standards.

2.9.1 Activated Carbon System

Activated carbon is the most widely used adsorbent for recovering volatile organic compounds. The self-contained system will be maintained by monitoring the pressure drop across the unit to ensure that the captured contaminants have not saturated the adsorption media. Depending on the application, regular intervals will be established for replacing the carbon media to ensure optimum performance. The carbon media replacement intervals will be established through monitoring and/or manufacturers' specifications.

2.9.2 Pure Air System

This system is similar in design and operation as the activated carbon adsorption system, but uses a different media for enhanced adsorption and the selection is based upon the physical properties of the gases such as organic/inorganic concentrations and off-gas flowrates. The media replacement intervals will be established through monitoring and/or manufacturers' specifications.

2.9.3 Thermal Oxidizers

While generally low maintenance, outlet temperature and residence time will be monitored to ensure optimum performance. These monitoring parameters will be in accordance with the manufacturer specifications. Operations and maintenance of the thermal oxidizer are addressed in the operation and maintenance procedures of the Leachate Pretreatment Plant facility.

2.9.4 Other Appropriate Control Devices

Other devices not mentioned in the OM&M Plan may be found to be more appropriate for controlling emissions and odors for the specific application as it arises. As with all of the alternate control devices discussed in Section 2.9, a construction permit applicability determination will be formally made before installing and utilizing the control device.

2.10 HEAT REMOVAL SYSTEM

The Bridgeton Landfill has installed an enhanced closed-loop circulation system to remove heat from the landfill. Approved as a pilot study, and subsequently expanded, the system operates continuously and steadily removing heat from the waste mass serving as a heat extraction barrier (HEB). The current system includes:

- A 20,000 gallon equalization tank,
- A 23 horsepower Flygt Submersible pump with a variable frequency drive. Based on the performance curve for the pump and the maximum head calculation, the system pump would be able to supply approximately 6 gallons per minute (gpm) to up to 40 heat removal points, and
- The current closed loop cooling tower that has a capacity of 250 gpm and is able to temperature treat from 108°F to 85°F at 78°F wet-bulb temperature.

System performance monitoring is conducted to verify that the heat removal system is achieving a target temperature in the neck area north of the HEB and to assess the presence and trend of heat input from south of the HEB. System performance monitoring is conducted through routine monitoring of select TMPs.

3.0 MAINTENANCE

Regular inspection and maintenance of GCCS components is necessary to consistently and reliably operate the system. Maintenance procedures are intended to be preventive in nature and to identify problems before they impact the performance of the GCCS or its components. Failure to perform proper inspections and maintenance may result in failure of system components that will make the GCCS less efficient. Appropriate spare part inventories will be maintained at all times. All maintenance activities shall be performed using good housekeeping practices: parts, debris, scrap, and tools should be promptly removed to prevent damage to the EVOH cover surface.

3.1 WELL DECOMMISSIONING OR ABANDONMENT

Since the gas and subsurface control systems at the landfill need to be modified frequently to adjust to the conditions caused by the SSR, gas extraction points may be temporarily decommissioned (temporarily disconnected) or abandoned (permanently removed) if rendered ineffective or if unsafe conditions exist. Per NSPS 40 CFR 60.752(b)(2)(i) and Air Pollution Control Rules Specific to the Saint Louis Metropolitan Area 10 CSR 10-5.490(3)(B)2.A., this alternative operating procedure allows the expansion, modification, temporary decommission or permanent abandonment of gas extraction points impacted by the SSR to occur. These changes will be summarized in the NSPS semi-annual report.

Gas extraction points, including GEWs and remedial active points, may be temporarily decommissioned from the system due to declining landfill gas production or gas quality. These extraction points will be reconnected, as needed, to alleviate odors, reduce surface emissions, and reduce accumulated gas pressure and/or liquids. At the time of temporary decommissioning the extraction points are considered functional but are no longer needed as gas extraction points to control surface emissions and odors. When this occurs, the compromised extraction point will be properly temporarily decommissioned using the procedure described in Appendix H.

If a gas extraction point has been compromised and is no longer effective for gas collection the extraction point will be permanently abandoned. When this occurs, the compromised gas extraction point should be properly abandoned using the procedure described in Appendix H, or should be modified to function as a surface collector. Replacement of the gas extraction well, when necessary, will include the requirements contained in Appendix I. The site will proceed with the appropriate changes and provide necessary updated documents during the NSPS semi-annual report. The current set of quarterly infrastructure drawings will be maintained in the landfill office and submitted as outlined in Volume 1.

3.2 GAS EXTRACTION WELLHEADS

The landfill gas collection wellhead is a focal point for GCCS maintenance, as it is the point where flow is regulated and performance is monitored and demonstrated. Improper maintenance can result in non-compliant readings and/or improper balancing and tuning. Each wellhead will be inspected during a tuning and monitoring event. Detailed procedures for inspecting and maintaining the gas extraction wellheads are included in Appendix J.

3.3 GAS EXTRACTION WELL DEWATERING PUMPS

Gas extraction well dewatering pumps will be inspected during each well tuning in accordance with the procedures contain in Appendix K. Inoperable pumps will be pulled and repaired on location, or shipped to manufacturer for overhaul. An inventory of spare parts will be maintained on site.

3.4 AIR COMPRESSORS

During each monitoring event, check and top off the oil level in the air compressors and check and clean the air filters. Perform the following maintenance activities:

- Inspect and adjust belts (quarterly);
- Record hour meter information, if equipped;
- Inspect air dryer, if equipped; and
- Manually bleed liquid from system components.

See Appendix L for an example inspection procedure. Items listed on the inspection sheet will be documented in the site records and/or on the inspection sheet.

3.5 BLOWERS AND FLARES

Major components of the flare systems include:

- Blowers to provide vacuum to the well field and move gas to the flare flame;
- Flow meter for providing continuous monitoring of landfill gas delivered to the flare;
- Instrument controls which automate and control the flare operation;
- Demister pads which minimize the amount of liquid droplets delivered to the flare; and
- Autodialer system that notifies site personnel if a system error has occurred.

The SSR provides special operation and maintenance challenges to a flare system including decreased methane content, increased hydrogen content, increased gas moisture content, and the formation of a tar-like substance on components designed to filter particulates within the gas. Procedures for inspecting and maintaining these systems are provided in Appendix M.

Landfill gas blowers require regular inspection and maintenance to extend life and reliable operation. This equipment operates on a 24/7 basis under harsh conditions and requires a great number of precisely moving and calibrated parts. Detailed manufacturers' operation and maintenance manuals for the blower and flare systems are found at the facility and are incorporated into this OM&M Plan by reference. Routine requirements of the OM&M personnel are described in Appendix M.

Bridgeton Landfill personnel shall keep an appropriate inventory of spare parts on-site for the GCCS. Consult the site-specific OM&M manual(s) for each system component to guide the recommended spare parts inventory. When parts are used from the inventory, replacement spares shall be ordered promptly.

At a minimum the spare parts inventory shall include, but is not limited to the following:

Control System

- Drive belts;
- Two thermocouples of each type/size present on control device;
- Fuel for pilot system;
- Compressed Gas (nitrogen or compressed air) for pneumatic valve operation;
- Two flexible shaft couplers;
- Blower bearing set (front and back) for each blower on-site;
- Indicator light bulbs; and
- Media for recording device.

Collection System

- Flex hoses;
- Flex hose powerlock clamps;
- Sample ports (brass hose barbs or plastic quick connect fittings);
- Sample port stoppers (silicone plugs) if using hose barb-equipped wellheads;
- Wellheads;
- Rubber (Fernco) couplers;
- Band clamps, Gaskets;

- Spool pieces (6-inch SDR11 HDPE and other site-specific material); and
- Bolt kits.

3.6 CONDENSATE MANAGEMENT SYSTEM INSPECTION AND MAINTENANCE

Condensate forms when moist, warm landfill gases cool within the gas collection piping. This condensed liquid (condensate) is conveyed and trapped in condensate sumps and then managed as leachate. The condensate management system includes condensate sumps, flare KOP, pumps, and piping. Example procedures for inspecting and maintaining these systems are provided in Appendix N. Items listed on the inspection sheets will be documented in the site records and/or on the forms included in Appendix N.

3.7 COLLECTION AND CONVEYANCE PIPING

Extracted landfill gas is conveyed to control devices (flares) by a network of lateral and header piping. Some of this piping is below ground and some is above ground. Flow through the pipe network is controlled by a series of valves. In areas where an elevated level of settlement or where temporary EVOH cover is installed, piping should be located above ground.

Maintaining a sufficient and consistent vacuum throughout the collection and conveyance piping is fundamental for effective gas collection. Landfill settlement, aggravated by the SSR, can result in low spots (“bellies”) that trap condensate and impede gas extraction, or result in an increased frequency of structural compromises.

Template inspection and maintenance procedures for the collection and conveyance piping systems are provided in Appendix O. Items listed on the inspection sheet will be documented in the site records and/or on the inspection sheet.

TABLES

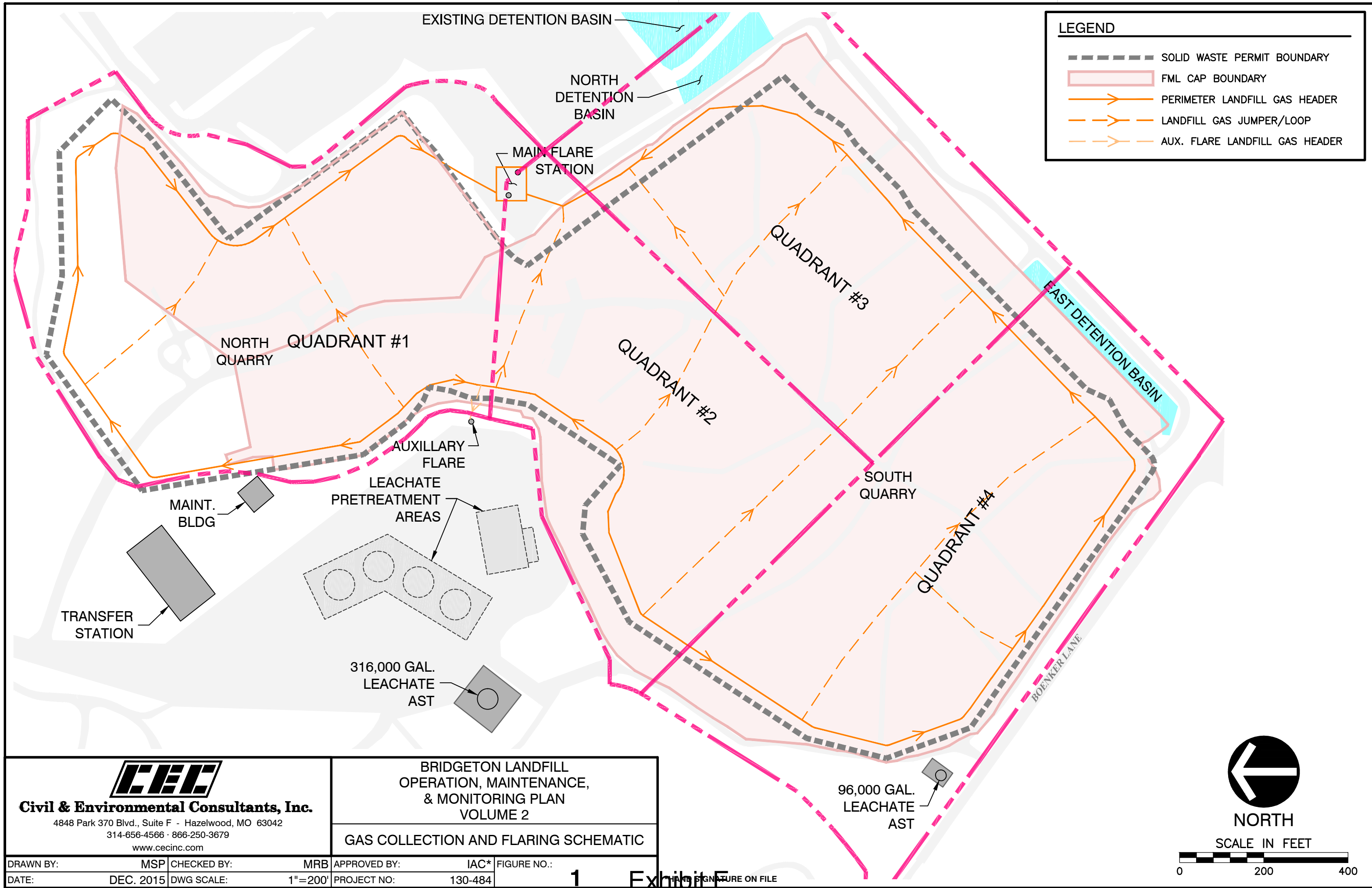
**Table 1 – Inspections and Maintenance for the Gas
Collection and Control System**

Item or Conditions to Be Inspected	Approximate Inspection Frequency	Inspection and Correction Procedure	Location of Inspection Form or Procedure
Gas Extraction Wellheads	Each monitoring event*	Inspect and maintain wellhead components to ensure consistent and reliable operation, including; Joints, Sample ports, Flex hose valves, Well casing and surrounding area.	Appendix J
Gas Extraction Well Pumps	Each monitoring event*	Check air supply to pumps, feel for liquid flow, and on the pneumatic pumps observe a full piston stroke.	Appendix K
Air compressors	Each monitoring event*	Inspect oil levels, air filter, and building heat. Follow manufacturer's recommended specs.	Appendix L
Blowers (at Flares)	Each monitoring event*	Bearing temperature, proper lubrication, vibration, and drive belts.	Appendix M
Blowers (at Flares)	Quarterly	Ensure proper fail-safe operation during forced system shutdown and inspect flexible and document wear. Follow manufacturer's recommended specs.	Appendix M
Flares	Each monitoring event*	Inspect control panel lights, gauges, flame arrestor, thermocouples, valves, flow meter, auto dialer, and pilot system. Follow manufacturer's recommended specs.	Appendix M
Flares	Semi-annually	Check for loose wires in electric controls. Calibrate flow meter. Follow manufacturer's recommended specs.	Appendix M
Flares	Annually	Inspect thermocouples for heat damage. Follow manufacturer's recommended specs.	Appendix M
Condensate Pump Stations	Monthly (pump counts weekly)	Inspect pumps for damage or wear, record pump counts or hour meter readings. Follow manufacturer's recommended specs.	Appendix N
Knock-Out Pot (KOP)	Monthly	Verify site glass is intact and unobstructed and drain KOP. Maximum differential pressure 1".	Appendix N
KOP Demister Pad (DP)	Annually	Clean or replace annually. Follow manufacturer's recommended specs.	Appendix N
Collection Piping	Quarterly	Air and force main and GCCS piping inspection.	Appendix O
Collection Piping	Annually	Collection structures (manholes, condensate traps, etc.)	Appendix O

*=As per Volume 1 Table 2

FIGURES

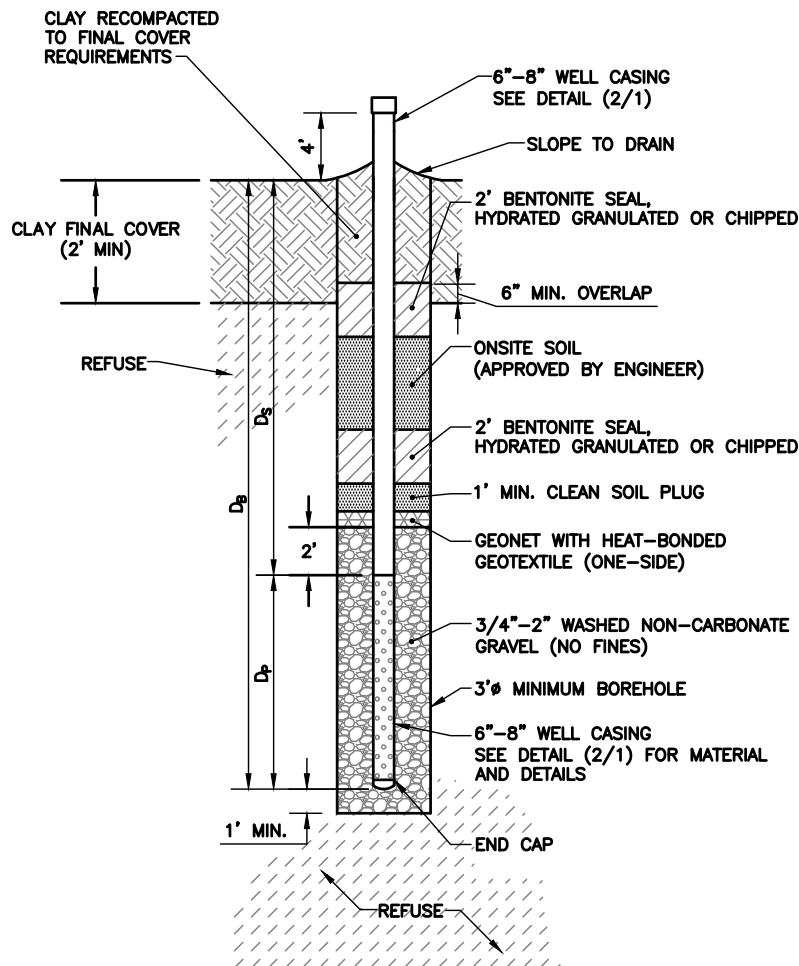
P:\2013\130-484\--CADD\DWG\OM&M\131178-OM&M(V2)_GasCollectionFigures.dwg{1-FLARING SCHEMATIC} LS:(2/7/2018 -- matt.knuth) -- LP: 2/7/2018 4:48 PM



APPENDIX A

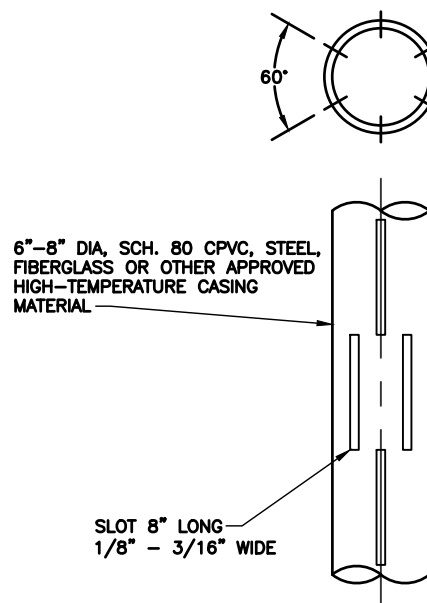
TYPICAL GCCS DETAIL DRAWINGS

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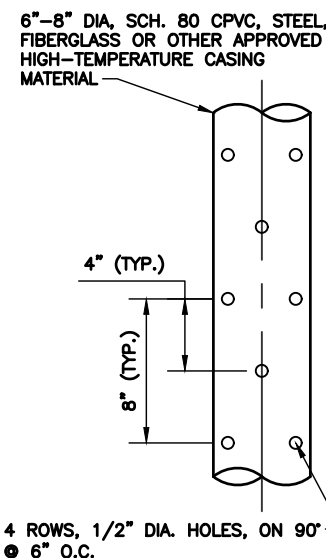


- NOTES:
1. D_b = DEPTH OF BORING
 D_s = DEPTH OF SOLID PIPE (BELOW GRADE)
-20 FT. MINIMUM
 D_p = LENGTH OF PERFORATED PIPE

1
1 **VERTICAL LFG WELL**
N.T.S.



2A
1 **SLOTTED WELL CASING**
N.T.S.



2B
1 **PERFORATED WELL CASING**
N.T.S.



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BRIDGETON LANDFILL
OPERATION, MAINTENANCE, AND
MONITORING PLAN

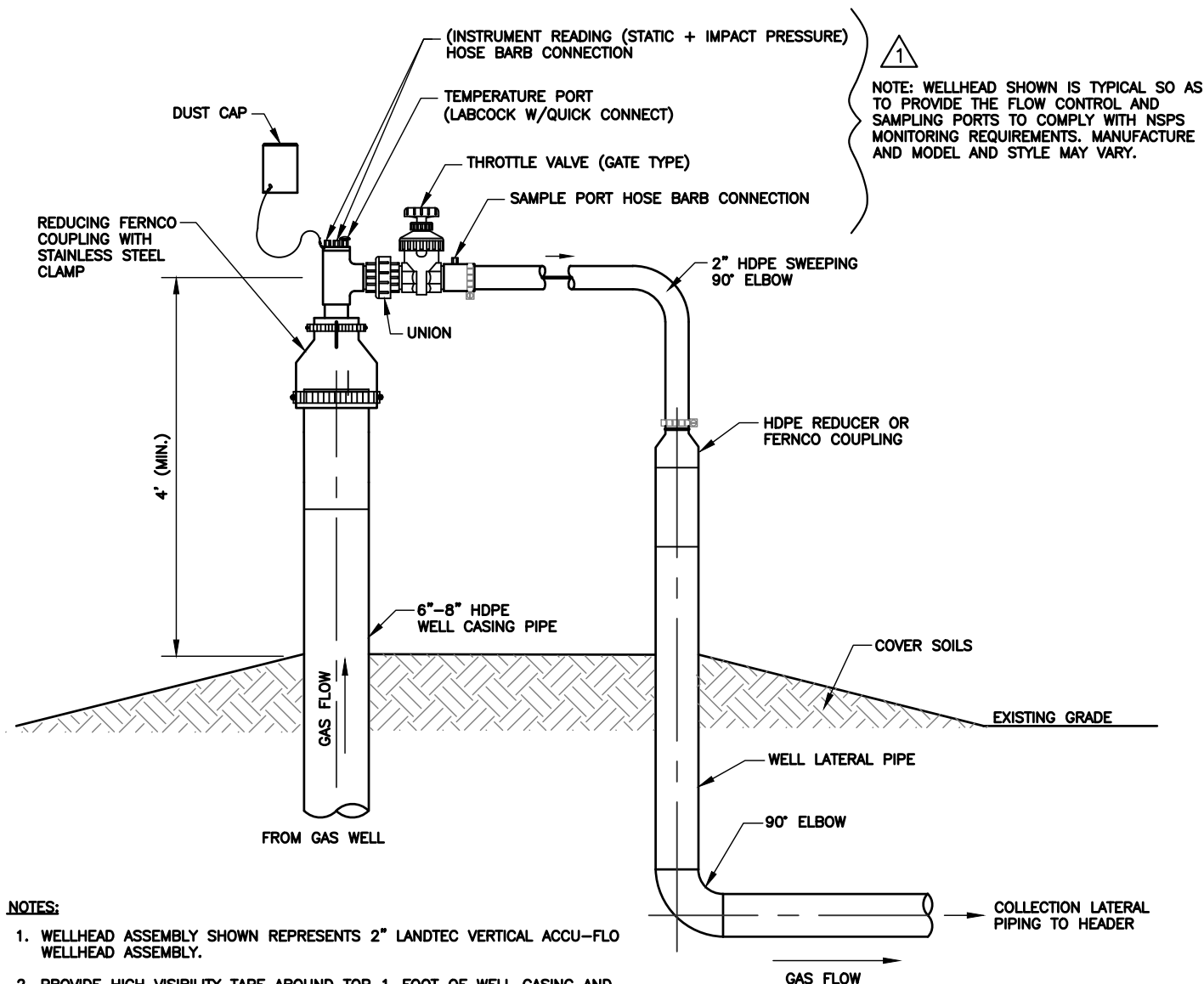
TYPICAL GAS WELL INSTALLATION DETAIL

DRAWN BY:	JM	CHECKED BY:	MB	APPROVED BY:	MB	FIGURE NO.:
DATE:	SEPT. 2013	DWG SCALE:		PROJECT NO:	131-178	

Exhibit E

1

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NOTES:

1. WELLHEAD ASSEMBLY SHOWN REPRESENTS 2" LANDTEC VERTICAL ACCU-FLO WELLHEAD ASSEMBLY.
2. PROVIDE HIGH VISIBILITY TAPE AROUND TOP 1-FOOT OF WELL CASING AND LATERAL PIPE.




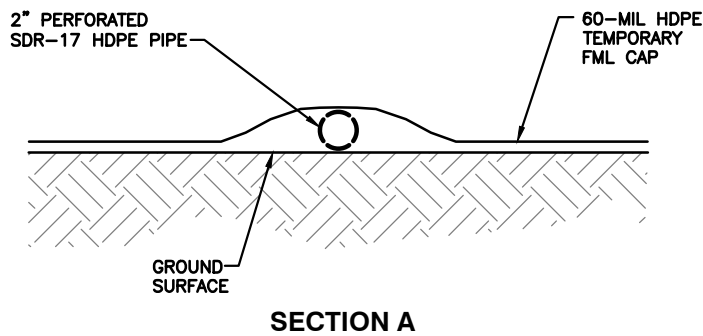
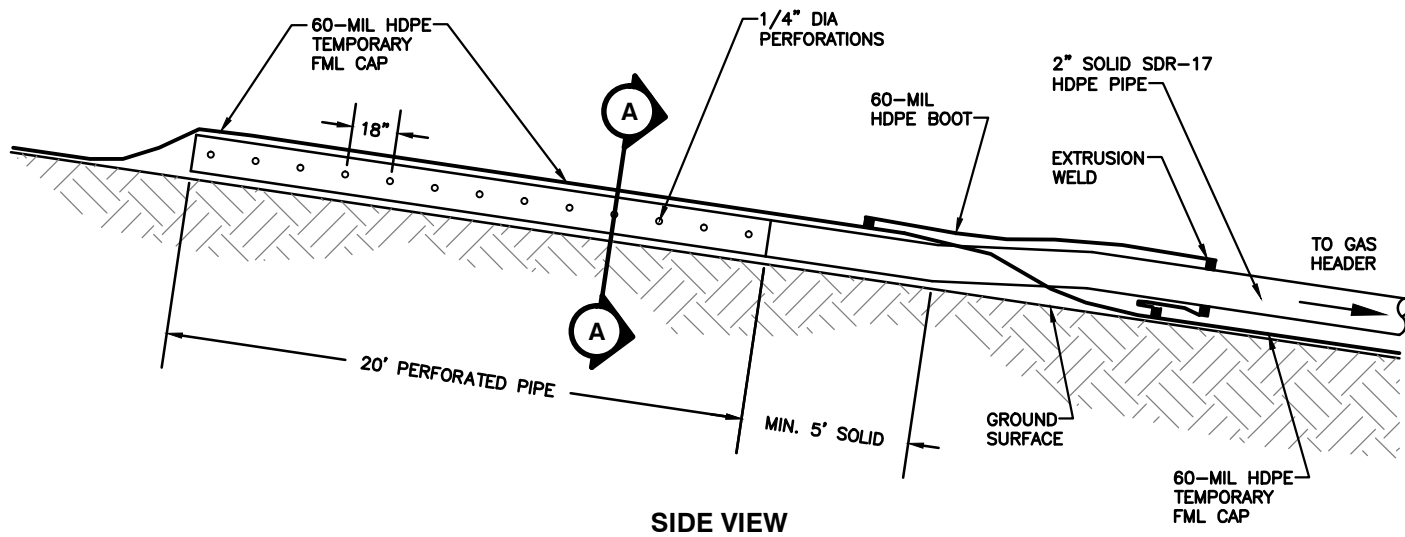
1	12/18/15	NOTE UPDATE			
 <p>Civil & Environmental Consultants, Inc. 4848 Park 370 Blvd., Suite F - Hazelwood, MO 63042 314-656-4566 · 866-250-3679 www.cecinc.com</p>			BRIDGETON LANDFILL OPERATION, MAINTENANCE, AND MONITORING PLAN		
			TYPICAL HARD PIPED WELLHEAD		
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DATE:	SEPT. 2013	DWG SCALE:	PROJECT NO:	130-484	FIGURE NO.: 2

Exhibit E

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1
3 SUB-CAP FML GAS "BUBBLESUCKER" DETAIL
N.T.S.



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BRIDGETON LANDFILL
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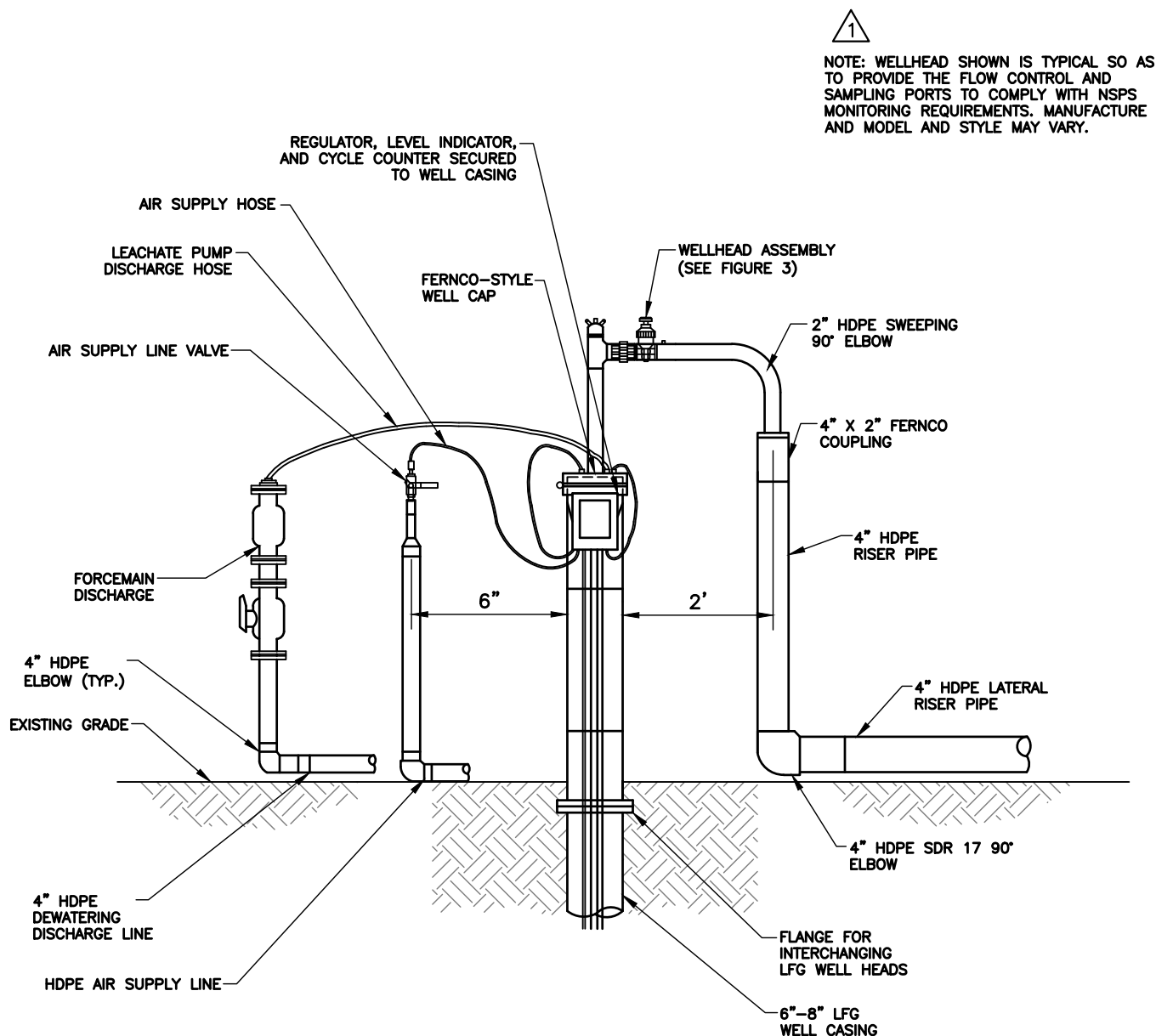
TYPICAL SUB-CAP FML GAS
"BUBBLESUCKER" DETAIL

DRAWN BY:	JM	CHECKED BY:	MB	APPROVED BY:	MB	FIGURE NO.:
DATE:	SEPT. 2013	DWG SCALE:		PROJECT NO:	131-178	

Exhibit E

3


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1
4

DUAL-PHASE EXTRACTION WELL

N.T.S.

1	12/18/15	NOTE UPDATE			
 Civil & Environmental Consultants, Inc. 405 Duke Drive, Suite 270 - Franklin, TN 37067 615-333-7797 · 800-763-2326 www.cecinc.com			BRIDGETON LANDFILL OPERATION, MAINTENANCE, AND MONITORING PLAN		
			TYPICAL DUAL-PHASE EXTRACTION WELL DETAIL		
DRAWN BY:	JM	CHECKED BY:	MB	APPROVED BY:	MB
DATE:	SEPT. 2013	DWG SCALE:	PROJECT NO:	FIGURE NO.:	4

APPENDIX B

WELLHEAD MEASUREMENT AND ADJUSTMENT PROCEDURES

APPENDIX B

Landfill Gas Extraction Wellhead Measurement and Adjustment Procedures

Well field Available Vacuum

A. Excessive Vacuum Variation

- In reviewing the data, field conditions, and trends the environmental manager or specialist determines that the vacuum is inadequate or inconsistent, trouble shoot the vacuum inconsistency prior to well field tuning.

B. Prime Mover Shutdown

- If the prime mover(s) is down, the prime mover technician will restart the system and notify the Environmental Specialist,
- Start primary or back-up device (if present) and adjust vacuum to set-point,
- Complete Startup, Shutdown or Malfunction (SSM) form and include in the site operating record, and
- Continue to monitor the well field once vacuum has stabilized from the back-up device.

C. Malfunction

- Postpone monitoring and adjustments until the malfunction is resolved.
- Notify Environmental Specialist of the delay in monitoring and/or adjustments.
- Initiate Startup, Shutdown or Malfunction (SSM) form
- Perform postponed monitoring and adjustment as soon as practical after the resolution of the malfunction, but in no circumstance shall the postponement result in an exceedance of the applicable monitoring or adjustment standard timeline.

Complete Startup, Shutdown or Malfunction (SSM) form and include in the site operating record.

D. Design or Equipment Limitation

The Environmental Specialist may initiate an investigation into system design or equipment limitations that may be preventing the application of a consistent vacuum. This may include:

- Analysis of cause of inconsistent vacuum,
- Evaluation of existing equipment,
- Pricing to repair existing equipment or purchase new equipment,
- Feasibility of achieving consistent vacuum, in a cost effective manner, using best industry practices.

If design or equipment modifications are not possible, the operator of the prime mover shall make periodic adjustments of the vacuum to maintain the set-point, and adjustments should be made as necessary.

APPENDIX B

Wellheads

- A. Make no wellhead adjustments during the initial reading.
- B. Acquire valid wellhead measurements.
- Select appropriate well ID on meter,
 - With the sample train and pressure sensor hoses disconnected, activate the meter's internal sample pump so that the entire sample train is purged and the results are indicative of ambient air (approximately 20% to 21% oxygen and 79% to 80% balance gas).
 - Perform transducer zero function to ambient air conditions. Be sure to minimize wind effects during the procedure by shielding the hose ends,
 - Do not block hoses ends,
 - Check wellhead sample fittings for cracks, bad o-rings and blockage by liquid, ice, spider webs or other substances, and
 - Record temperature by inserting Fluke temperature probe or dial thermometer into wellhead temperature sample port.
 - Insertion thermometers must be long enough to reach gas stream inside wellhead.
- C. Connect all applicable sample train hoses.
- Verify that all connections are snug and air tight, and
 - Verify sample train hoses are not pinched or kinked.
- D. Acquire gas concentrations and differential pressure.
- Activate sample pump,
 - Allow gas measurements to stabilize, and
 - Allow meter to stabilize for a minimum of 60 seconds with pump activated.
Note: stabilization may take longer than this.
 - Verify that measurements are acceptable.
- E. A complete data set is critically important to Bridgeton. Incomplete datasets, corrupted data, missing data are unacceptable.

The following are examples of measurements that are not acceptable.

- Gas concentrations totaling more than 100% by volume,
- Methane concentrations higher than 70% by volume,
- Oxygen concentrations greater than 21% by volume,
- Balance gas concentrations greater than 81% by volume, and
- Balance gas to oxygen ratios less than 4:1.

If measurements exhibit any of the examples above, recalibrate monitoring instrument before continuing monitoring event.

APPENDIX B

Verify the following when monitoring wellhead pressures.

- The static well vacuum has stabilized.

F. Differential pressure (for gas wells that are not in the SSR-affected area)

Positive values – acceptable.

Negative differential pressures – Troubleshoot.

- Look for reason for an error in measurement, and
- Well ID is not set-up properly in the meter.

If a negative differential pressure is read, take the following steps:

- Check sample train for kinked hoses,
- Check sample train filters and hoses for water,
- Recalibrate (zero) pressure sensors in the field,
- Reconnect and observe pressures,
- If issue persists, pull and clean pitot tube or orifice plate within wellhead or send meter back to manufacturer for recalibration, and
- <<<or>>> symbols for differential pressure are questionable, usually an indication that the sensor is out of its measuring range.

G. Verify flow is properly displayed (for gas wells that are not in the SSR-affected area)

If flow range is higher than normal at the monitoring point, this is usually a result of high differential pressures.

- Make sure both hoses that measure differential pressure are connected to the meter and the wellhead,
- Check sample train for kinked hoses,
- Check sample train filters and hoses for water,
- Verify sample ports on wellhead are not plugged with debris, water or ice,
- Verify ID setup is correct for the monitoring device,
- Recalibrate (zero) pressure sensors, and
- Reconnect and observe pressures.

H. Flow measurements with error symbols (i.e. <<<, >>> or blank) may be an indication that:

- Temperature of the gas has not been entered into the monitoring unit or the unit is missing required pressures for calculation, or
- Meter may be out of range.

I. Verify temperature is stored correctly.

- Temperature is to be stored in degrees Fahrenheit.

APPENDIX B

J. Ensure well ID is properly set up in the meter.

K. Select correct comment.

- Ensure each reading has a stored comment (except temperature probe reading if taken).

L. Utilize only site approved comments. Store measurements.

- ***Make no adjustment during the initial reading*** and store the initial reading with initial reading,
- Utilize only site approved comments, and
- Ensure each reading has a stored comment (except temperature probe reading if taken).

M. Store the measurements.

N. Determine if adjusted wellhead readings are necessary.

If an adjustment to the extraction well is required:

- Turn wellhead control valve to new setting.
- Once the adjustment has stabilized, store reading with one of the allowable comments listed below.

Allowable Comments for Valve Adjustments

Create the following standard list of operation comments to use in the meter if a valve adjustment is made. Note: Environmental Manager reserves the right to modify the comment lists as needed.

- No change,
- Opened Valve ½ turn or less,
- Opened Valve ½ to 1 turn,
- Opened Valve > 1 turn,
- Valve 100% open,
- Closed Valve ½ turn or less,
- Closed Valve ½ to 1 turn,
- Closed Valve > 1 turn, and
- Valve 100% closed.

Allowable comments for Operation Issues

Create a standard list of operation comments to utilize in the meter if an operation issue is observed. Suggested comments are as follows, but are not limited to:

- Surging in header,
- Bad sample sorts,
- Valve needs replacement,

APPENDIX B

- Pump not operation,
- Flex hose needs replacement,
- Header vacuum loss,
- Repair well bore seal,
- Well needs to be extended / lowered.
- Static pressure surging,
- Available pressure surging, valve damaged, and
- User defined – See field notes.

Make well adjustments only after initial measurements have been stored to the meter.

Measure same parameters as recorded for initial routine event.

Document corrective action or well adjustments.

Store a comment in the meter to document type of adjustment made. If no change was made, store the reading with the comment “NO CHANGE.”

APPENDIX C

FIELD DATA RECORDING PROCEDURES

APPENDIX C

Field Data Recording Procedures

Upon downloading data from the meter, use the following procedures to manage the electronic and written field information. This procedure has been written so that it can be implemented by a third-party technician if desired.

1.1.1 Electronic Data

- A. Do not alter the raw data file.
- B. When naming the raw data file (meter download file), uses the site name, date of the event, and technician's initials (e.g., BL tuned on July 21, 2007 by John Tech BL072107JT.cvs).
- C. Download the electronic data and e-mail to the specified data manager, **within 24 hours** of completing the monitoring event.
- D. Retain copies of unaltered data files.
- E. All data files shall be uploaded to the appropriate storage database.
- F. If data from certain wells is corrupted, lost, or unusable, immediately re-monitor those wells.

1.1.2 Written Log Book Data

In an effort to record conditions that cannot be stored electronically within the monitoring instruments, field technicians are required to keep a site-specific logbook. This logbook is the property of Bridgeton Landfill, and will be relinquished to the site upon request.

A. Logbook requirements:

- Rite in the Rain brand field book, Model 310 or equivalent, and
- Record entries in log book using waterproof ink, if available.

B. Requirements for recording data in log book:

- Do not remove pages or portion of pages,
 - Date each page in the top right hand corner,
 - If a correction is made, cross out the mistake with a single line. Do not black out the mistake,
 - Technician recording data shall initial each cross-out,
 - Cross out blank lines on a page when the page is completed, and
 - Do not go back to previous pages and insert comments or additional measurements.
- Always use a new page for each event.

APPENDIX C

7. Record the following, at a minimum:

- If maintenance is performed, write a description of maintenance performed.
- Record non-tuning efforts. Examples include: tighten flex hose, replace sample port, call contractor to regrade header, increase flare vacuum to field, etc.,
- Date, time-on and time-off site,
- Unusual conditions,
- Erosion areas,
- Surface depressions,
- Document damage to wellheads and/or surrounding surface area discovered during monitoring event or repairs completed during event, describe damage,
- Well liquid levels, if measured,
- Pump counters, if equipped, and
- Hand drawings that identify specific locations or distances from wellfield components.

8. When the book is full, submit it to The Bridgeton Landfill Environmental Specialist and start a new log book.

APPENDIX D

PORTABLE LANDFILL GAS ANALYZER – CALIBRATION PROCEEDURES

APPENDIX D

Portable Landfill Gas Analyzer - Calibration Procedures

The technician will be responsible for assuring that the instrument is functioning properly at the end of each day or shift. At the start of the day or shift, the technician shall verify that the monitoring unit is functioning properly, up to date with manufacturers recommended factory calibration, and then use the following procedure for field calibration.

- A. Inspect in-line filters for moisture and fine particles – replace if necessary.
- B. Inspect the integrity of the sample train, and replace if necessary.
 - Test the sample train for leaks. Tubing should seal tight onto the hose barbs,
 - Note condition of the tubing,
 - Note sample fitting O-ring(s) condition, and
 - If using a carbon filter – replace filter daily, or as needed
 - Inspect the water trap for signs of blockage and replace at least monthly, or as needed.
- C. Perform field calibrations per manufacturer's specifications, including allowing the instrument to initialize and equilibrate to sampling conditions prior to calibration.
- D. Field calibrate meter a minimum of 3 times per day for monitoring events that last greater than 4 hours.
 - Prior to beginning monitoring for the day,
 - Midway through the daily monitoring event, and
 - Prior to final inlet sample.
- E. Field calibrate meter a minimum of 2 times per day for monitoring events that last less than 4 hours:
 - Prior to beginning monitoring for the day, and
 - Prior to final inlet sample.
- F. Perform additional field calibrations if the following circumstances occur:
 - 1. Suspect or questionable readings are obtained.
 - 2. Extreme ambient air temperature changes (20 degrees F increase or decrease).
 - 3. Significant increase or decrease in atmospheric pressures.
 - 4. Unable to stabilize gas quality.
 - 5. Erroneous measurements on meter screen, such as those indicated by chevrons (i.e., >>>>) by some instruments.
 - 6. Gas concentrations totaling more than 100% by volume.
 - 7. Methane concentrations higher than 70% by volume.
 - 8. Oxygen concentrations in ambient air less than 19% or greater than 21% by volume.
 - 9. Oxygen concentration is greater than the balance gas concentration.
 - 10. Balance gas concentrations in ambient air greater than 81% by volume.

APPENDIX D

G. Log Data and upload to SCSe Tools:

- Complete all entries – if the line does not apply, write “NA”,
- Calibration shall fall within acceptable range – if not, utilize another meter,
- Ensure meter date and times are accurate before starting the monitoring event,
- Uses the appropriate calibration gas for the monitoring event
 - 50% CH₄ / 35% CO₂ / 4% O₂ for monitoring the landfill gas collection system, and
 - 15% CH₄ / 15% CO₂ / 4% O₂ for migration probe monitoring, unless otherwise specified, in state, federal or sit-specific regulation.

H. Zero the meter pressure sensors (transducers) during each calibration event.

H. Minimize the impact of wind by cupping hoses in the palm of the hand.

I. Do not block hose ends.

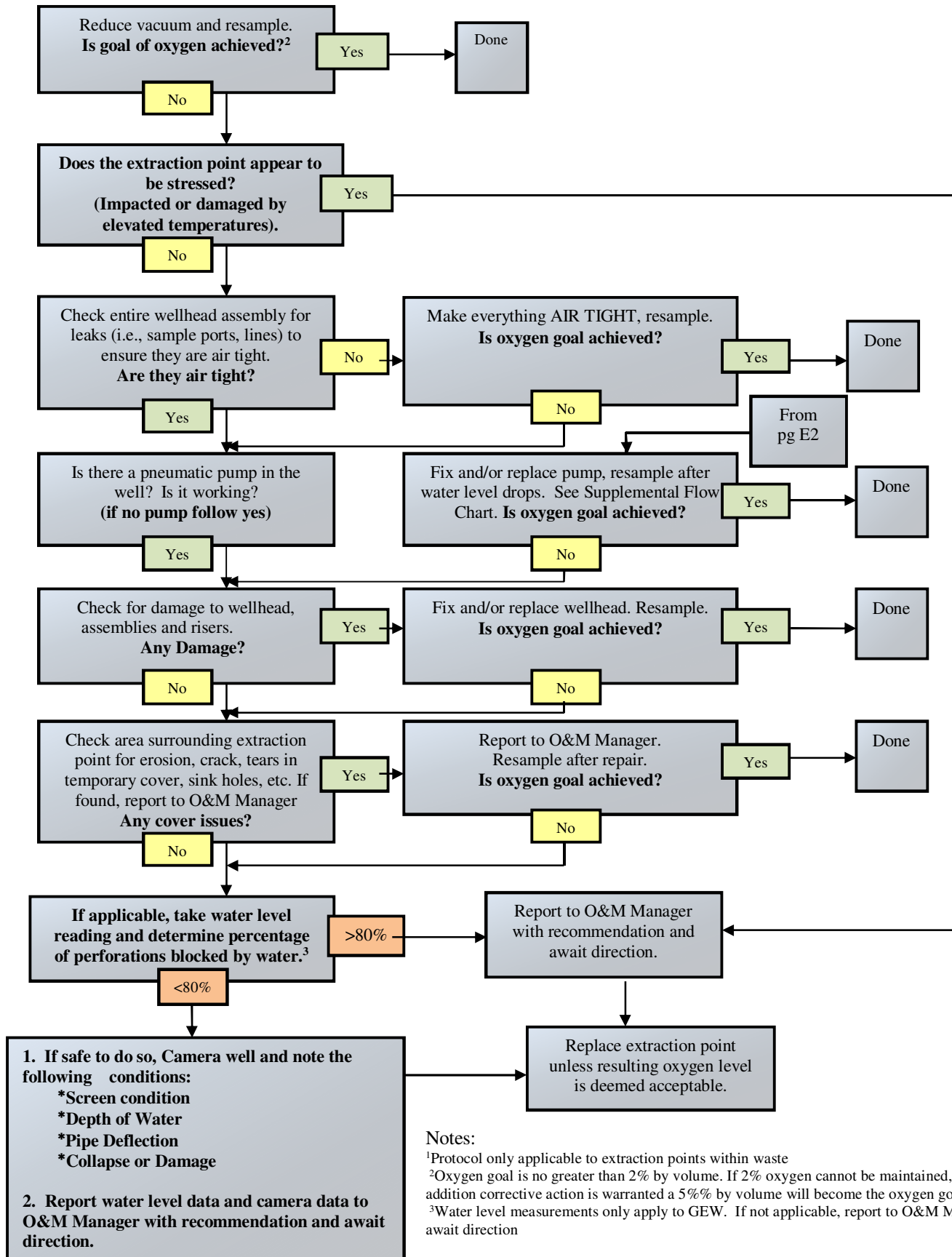
J. Calibrate pressure sensors. Also, zero transducers before each wellhead reading if sensors read anything other than 0.00 when disconnected from the wellhead.

APPENDIX E

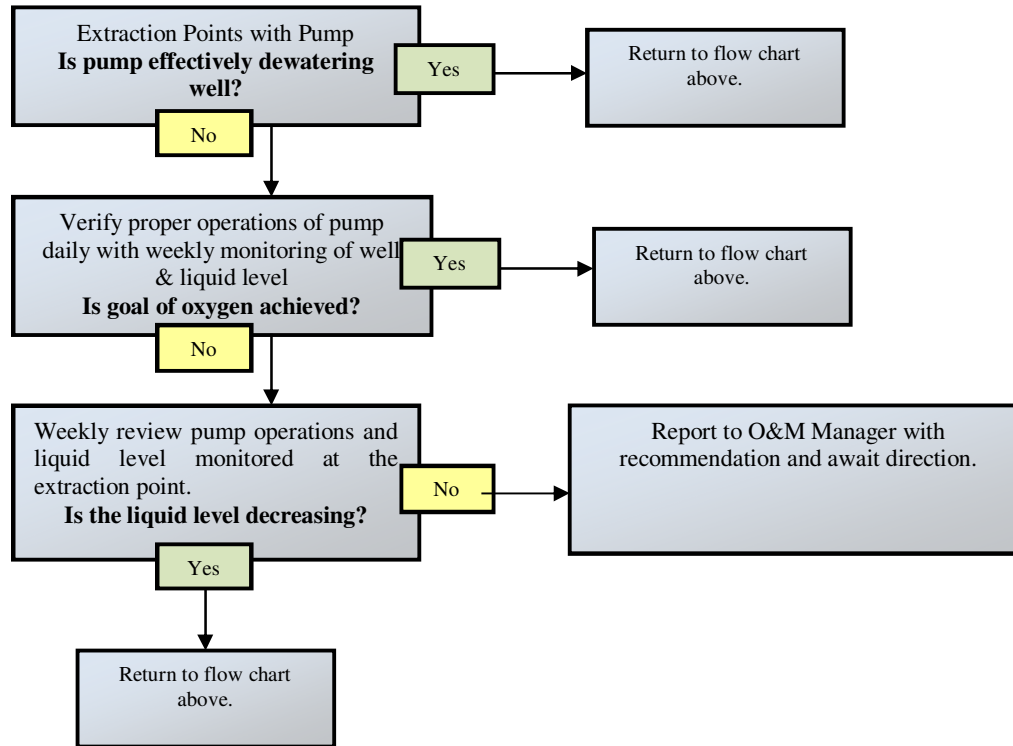
EXTRACTION POINT ASSESSMENT PROTOCOL

Appendix E

Extraction Point Assessment Protocol-Oxygen¹



Extraction Point Assessment Protocol-Oxygen with Pump

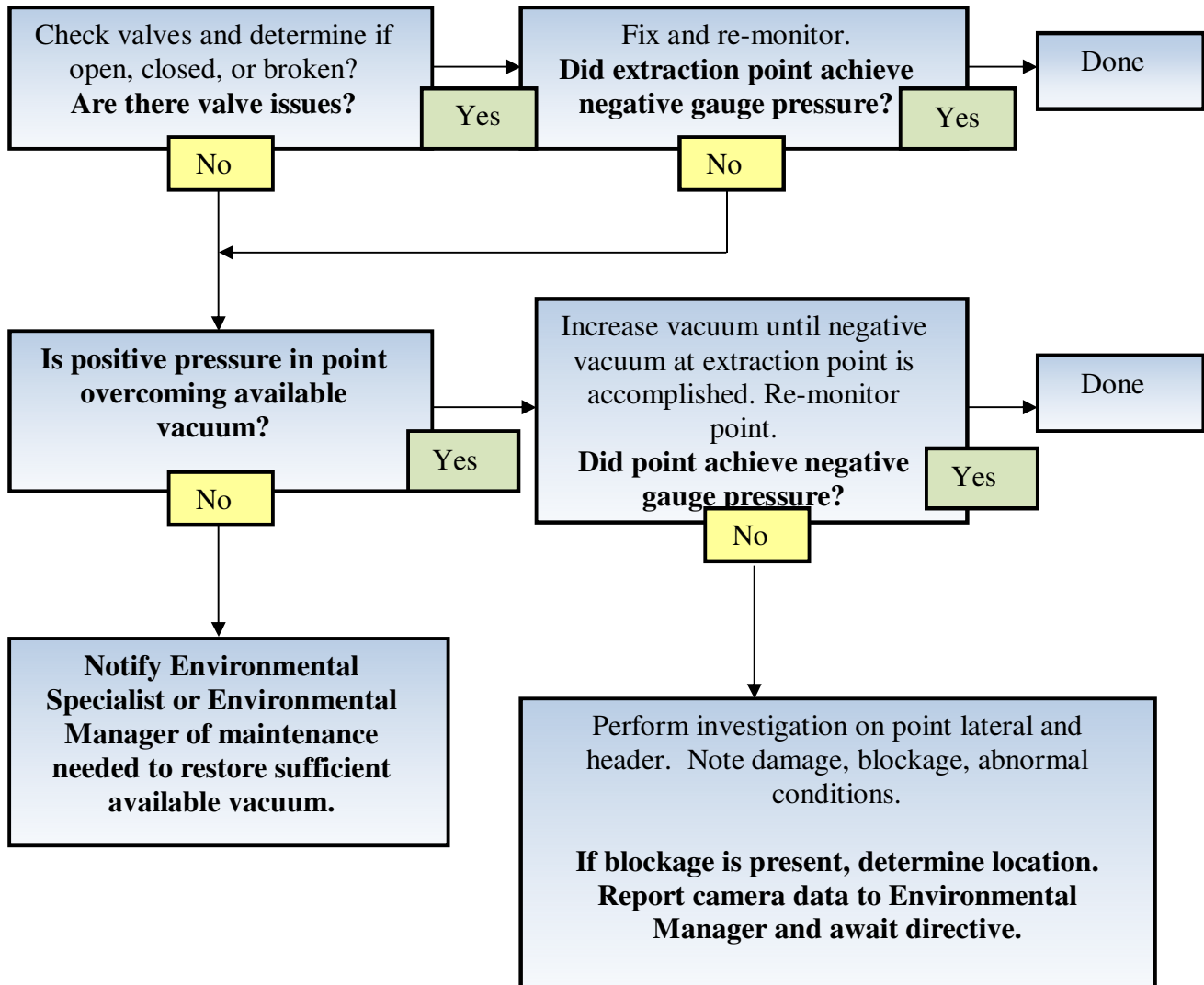


APPENDIX F

GAS WELL ASSESSMENT PROTOCOL

APPENDIX F

Landfill Gas Extraction Point Assessment Protocol Positive Pressure



Notes:

¹ Pressure goal is less than 0 inches of water column.

² Protocol shall be conducted at least monthly if Pressure goal not achieved.

APPENDIX G

WELL LIQUID MEASUREMENT PROCEDURES

APPENDIX G

Well Liquid Measurement Procedures

Equipment Specifications

A. Conductance probe meter – electronic liquid level indicator tape.

- Uses a probe attached to a permanently marked tape, fitted on a reel.
- The probe incorporates an insulating gap between electrodes. When contact is made with liquid, the circuit is complete, activating a loud buzzer and a light. The water level is then determined by taking a reading directly from the tape.
- To maintain measurement consistency, measure liquid levels from the same point of the well every time (i.e. probe sample port on wellhead, north side of casing with wellhead removed, etc.)
- Accurate records of well field modifications shall be updated in the depth to liquid and depth to bottom summary.

B. Examples of this instrument are the Solinst Model 101, Heron Skinny Dipper or equivalent.

C. Restrictions

- Instrument is to be dedicated to leachate and/or gas extraction well monitoring, and
- Never use the instrument on groundwater due to cross contamination concerns.

Liquid Measurement Procedure

A. Preparation

- Obtain well drill logs or a table that summarizes the anticipated well depths and screen intervals for field reference. This information is currently summarized on a monthly basis, and
- Record data in log book

B. Obtaining Liquid Levels

- Measure applied vacuum (static pressure) of well using landfill gas meter,
- Remove wellhead or open access port,
- Obtain liquid level measurement:
 - Measure from the top of well casing (TOC) or access port,
 - Measure TOC to ground surface,
 - Determine depth to liquid (DTW) using liquid level indicator,
 - Subtract height of well casing above ground elevation, and
 - The result is the liquid level below ground level (BGL).

APPENDIX G

Problems that may be encountered:

- Well leaning too far to allow indicator probe to progress down well casing.
 - Record in log book “Well leaning past measurement point”.
- Well is deflected underground and causes probe to hang on welds or couplers,
 - Record in log book “Probe gets hung up in well, liquid level will have to be verified using other method” (down well camera, chalk tape, water indicating paste, etc.).

Record observed depth to liquid levels in log book.

- Obtain depth to bottom of well (DTB) measurement.

Measurements are to be measured from top of well casing (TOC) or access port.

- Find level at which indicator probe will not progress,
- Subtract height of well casing above ground elevation, and
- The result is the depth to bottom, or total depth of the well.

Problems that may be encountered:

Well has soft bottom due to silt or other material,

- Record in field book “soft or silty bottom, depth cannot be verified and is estimated”,
- A down well camera can be used to attempt to verify well bottom.
- Note: Temperature may become an issue with operation of the down hole camera. Refer to manufacturer’s recommendations for range of operation in high temperature conditions.

Probe may not extend to anticipated well casing depth.

- Well may be deflected underground so much that indicator probe cannot reach bottom of well casing.
- Well may be pinched.
- Probe may be hung-up on weld or couple.
- Probe may be snagged on a pump component.
- A down well camera can be used to identify what is holding up the indicator probe.

If removed, reinstall wellhead and record stabilized static well vacuum in log book.

APPENDIX G

C. Liquid Level Data Management

Maintain historical information in a liquid level log electronic spreadsheet. Include the following:

- Well ID,
- Date of well installation,
- Well's GPS coordinates (northing and easting), if available,
- Original ground elevation when well was drilled,
- Length of constructed solid pipe including distance from ground surface to point on well pipe where liquid level measurement is taken,
- Length of original screen, and
- Original depth to bottom.

Update the following information after a liquid level is obtained:

- The current well elevation (msl) either from recent survey or field handheld GPS unit,
- Date of activity,
- Measured depth to liquid,
- Measured depth to bottom,
- Calculation of percentage of screen available, and
- Calculation of loss in well depth.

Update the liquid level log spreadsheet when new liquid levels are obtained.

APPENDIX H

LANDFILL GAS EXTRACTION POINT DECOMMISSIONING OR ABANDONMENT
PROCEDURES

APPENDIX H

Landfill Gas Extraction Point Decommissioning or Abandonment Procedures

Since the gas and subsurface control systems at the landfill need to be modified frequently to adjust to the conditions caused by the SSR the following is an example of a procedure that can be employed for the abandonment or decommissioning of the extraction points.

The following decommissioning procedures shall be followed for extraction points temporarily disconnected:

1. All work must be performed in accordance with the Health and Safety Plan specific to activities in the potential thermal event area.
2. Install a lockable valve to cut off landfill gas flow into the conveyance piping which may include air and forcemain.
3. Locks shall be placed on each valve with a tag with the corresponding identification number and date the extraction was decommissioned.
4. If the extraction point is reconnected to the GCCS, the lock with tag will be removed and the extraction point will be brought into operations. The tag will be provided to the Environmental Specialist with date, time and reason the extraction point was brought into service.
5. The Environmental Specialist will maintain an inactive list of the extraction points that have been temporarily decommissioned.

The following is an example of abandonment procedures that can be followed for compromised extraction points:

1. All work must be performed in accordance with the Health and Safety Plan specific to activities in the potential thermal event area.
2. Remove wellhead and appurtenant piping and features.
3. Using tremie technique, backfill well casing to top of casing with lean cement-bentonite grout (5 gallons per sack concrete with 2% by weight bentonite).
4. Allow grout to settle at least 24 hours.
5. Re-fill to top of casing using bentonite chips placed and hydrated in 1-foot thick layers.
6. Using high-vis orange paint mark casing with "Abandoned. Gas Well _____, Date:_____."
7. To prevent the casing from becoming a trip hazard or possibly pushing up through future temporary FML cap, do not cut the casing down.

Depending on the condition of the compromised well other options for abandonment may be performed such as:

- 1) Installation of a stinger or cap.

APPENDIX H

- 2) Excavate area around well and fill void with concrete, soil cap and reinstall the FML cap.

APPENDIX I

GAS WELL INSTALLATION PROCEDURES

APPENDIX I

Landfill Gas Extraction Well Replacement/Drilling Procedure

These procedures are specific to gas extraction wells which are being installed in areas which are affected by the potential thermal event, or may reasonably be expected to be affected by the thermal event.

1. All work must be performed in accordance with the Health and Safety Plan specific to activities in the potential thermal event area.
2. Dimension, depth, and perforation interval will be approved by and provided to drilling contractor only by the Environmental Manager.
3. Maintain 5 CY stockpile of clean soil near borehole in case the hole needs to be smothered.
4. For well casing material use only CPVC, fiberglass, steel, or other approved high-temperature material.
5. For backfill around well perforations, use only rounded non-calcareous material.
6. Turn off vacuum at all immediately adjacent (within 150 feet) gas extraction wells, horizontal collectors, or other extraction points at least 4 hours prior to drilling to minimize air intrusion. Vacuum at the adjacent extraction points should be resumed upon completion of the backfill for new gas extraction well. Additionally, an odor neutralizing devices should be placed near the drilling activity to reduce migrant odors.
7. Equip well with wellhead and vacuum source within 24 hours of gas well completion (do not cap well for extended period).

APPENDIX J

WELLHEAD INSPECTION AND MAINTENANCE PROCEDURES

APPENDIX J

Wellhead Inspection and Maintenance Procedures

Inspect and Maintain

Inspect and maintain wellhead components to ensure consistent and reliable operation.

Document and Repair

Document major damage and schedule needed repairs. If typical wear and tear is noted by the inspector, repair components to function as intended.

Inspection Frequency

Inspect as part of each monitoring events. Minor repairs to GCCS components shall be completed within 48 hours.

Joints

- A. Inspect mechanical joints (flexible coupler, flange, electrofusion collar, etc.) on the wellhead and casing for leaks during each monitoring event.
- B. Immediately document and repair indications of vacuum leak. Potential leak indication includes, but is not limited to:
 - Hissing sound coming from a joint,
 - Staining or accumulation of liquid on well casing or wellhead, or
 - 4:1 balance to oxygen ratio.
- C. Inspect all clamps and mechanical fasteners. Ensure they are tight and operating properly.
- D. The application of electrical tape and/or silicone to malfunctioning joints is considered a short term (15 days or less) “quick fix” and is not an acceptable long-term repair option. Once a joint malfunction is identified, install a permanent replacement as soon as practicable.
- E. Fix broken valve components immediately.

Sample Ports

- Inspect sample port(s) and o-rings for cracks and damage and replace as necessary, Check for tightness and tighten as necessary,
- Ensure sample ports are free of debris and clean as necessary, and
- Inspect sample port caps for damage or deterioration. Replace if damaged or deteriorated.

- It is important that caps are in place on sample ports to prevent deterioration of port and dirt accumulation.

Flex Hose

A. Inspect for:

- Cracks, brittleness and deterioration,
- Kinks and constrictions,
- Appropriate length to promote condensate drainage,
- Adequate length. Hose is not to be in tension and should be long enough to accommodate slight differential movement of well pipe and lateral riser, and
- Replace if hose does not pass inspection.

Well Casing

- A. Visually inspect above grade well casings and surrounding areas for sign of damage, deterioration, or potential problems.
- B. Use below grade inspection techniques when GCCS monitoring data warrants Geosynthetic cap penetrations.
- C. Inspect geosynthetic boots during each monitoring event or as GCCS monitoring data warrants.
 - Verify that seal between boot and well casing, valve extension, sump, etc. is intact.
 - Verify that the integrity of the geosynthetic material is intact, and has not torn, stretched, or otherwise failed.

Surrounding Area

- A. Visually inspect the surrounding cover surface integrity.
 - Pay special attention to the cover located directly around each well casing, noting signs that the soil is desiccating or pulling away from the well casing,
 - Note surface water erosion, ponding, leachate breakouts or staining.

Report Findings

- A. Report findings immediately following the event to the Environmental Specialist so that the appropriate repairs can be performed.
- B. Provide an accurate description and location of the repair needed.
- C. Make note of the repairs needed.

APPENDIX K

PUMP INSPECTION AND MAINTENANCE PROCEDURES

APPENDIX K

Pump Inspection and Maintenance Procedures

Several types of pneumatic pumps are currently utilized at Bridgeton QED and Blackhawk Vector 101 and low drawdown series pumps. Blackhawk pumps are utilized in hard piped wells where temperatures may exceed 160° F. Pump inspections will be performed on a routine basis while well field tuning is being conducted at each well. Descriptions of a complete preventative maintenance plan on both pump designs are defined by the pump manufacturers Operations and Maintenance Manuals which are available on site.

A. For wells in which a QED pump has been installed the following inspection procedure will be used:

- Determine if the liquid is being pumped. Check the pump stroke counter, if so equipped and compare the value to the previous stroke counter reading. The site technician may either hear the liquid being pumped, or may touch the discharge line to detect heat, which would indicate the pump is discharging fluid,
- Check for sufficient air pressure supply to the pump,
- Drain the air supply line to be sure it is free of liquid,
- Check for leakage in and around the pump discharge line,
- Inspect the air line, regulator, and all connections, look for ice or blockage, and
- Note pump inspection in the site technician log book.

B. For hard piped wellheads where a Blackhawk pump has been installed, the following inspection will be conducted:

- Check for proper operation of the pump motor to include a full piston stroke as well as sufficient air pressure supply to the pump,
- Drain the air supply line to be sure it is free of liquid,
- Determine if liquid is being pumped. The site technician may either hear the liquid being pumped, or may touch the discharge line to detect heat, which would indicate the pump is discharging fluid,
- Check for leaks on the discharge line piping and around the pump motor stuffing box seals,
- Inspect air line, regulator, and all connections, look for ice or blockage, and
- Note pump inspection in the site technician log book.

If it is determined that the pump requires maintenance, the site technician will follow the manufacturer's manual troubleshooting and maintenance procedures. If the pump cannot be made operational in a timely manner, the pump will be replaced. Bridgeton maintains a full spare part inventory for each pump type. In addition, spare and/or rebuilt pumps are maintained in order to facilitate a complete pump change out if necessary. Unclogging or thawing or removal of ice can be accomplished by the technician as necessary.

APPENDIX L

PERMANENT AIR COMPRESSOR INSPECTION AND MAINTENANCE PROCEDURES

APPENDIX M

BLOWER AND FLARE OPERATION AND MAINTENANCE PROCEDURES

APPENDIX M

Blower and Flare Operation and Maintenance Procedures

Flare and Blower Operation Procedures

Prestart-up

Prestart up checks consist of:

1. Check the condensate drain valve at the base of the KOP. Inspect the KOP sight gauge for any liquids present and drain if necessary.
2. Verify air pressure on the fail close valve regulator setting is 90 psi. Verify that compressed gas is supplied to the pneumatic valve.
3. Check propane tank valve is open, propane line valve is open, and propane tanks are not empty.
4. Verify that the flow control or vacuum control set point is set to the desired position.
5. Verify the selected blower inlet and outlet manual values are open.
6. Ensure the selected blower housing drain is empty.

Start-up Procedure

Normal flare system start-up is summarized below. For the detailed Start-up Procedures please consult the manufacture's user manual.

1. Check all circuit breakers to ensure that they are in the "on" position.
2. Turn the operation mode switch in the flame controller to "Auto" and press the reset button. The controller will then automatically start the system and proceed through the start-up sequence. See the manufacturer's user manual for the start-up sequence steps.

Start-up and Operation after Failure Shutdown

If the flare system was automatically shut down for an unknown reason, the entire system should be inspected before repeating the start-up procedure to determine the reason for the shutdown.

1. Inspect the flare station equipment and piping for any obvious physical failure (i.e., leaks, pipeline breaks, low pilot fuel).
2. Check the flare controls Human-Machine Interface (HMI) screen for information about the operating status of the flare, of LFG delivery, and user operation (Check the manufacturer's manual for general HMI screen descriptions). Typical information the alarm screen provides is:
 - a) System status;

- b) Faults;
 - c) Warnings;
 - d) User Logon / Logoff;
 - e) Alarm history and reasons;
 - f) Page navigation; and
 - g) Set point adjustment(s).
3. Inspect the blower housing and shaft for binding or excessive looseness.
 4. Investigate the possibility of power interruption, if no other cause is indicated.
 5. Consult the troubleshooting guidance in manufacture's manual.

To prevent repeated failure alarms, repair any deficient conditions before attempting to restart system. If none of the above appears to have caused the shutdown, contact the manufacturer's representative for troubleshooting and service.

Blower Maintenance Procedures

System Operation

Ensure proper fail-safe operation during forced system shutdown.

- Perform forced shutdown quarterly, and
- Observe all fail-safe components, document and repair components that do not perform as designed.

Blower Bearing Temperature

During each monitoring event, inspect for excessive bearing temperature (relative to design or manufacturer's suggested operating temperature).

- During every GCCS monitoring event, collect a temperature reading using an infrared laser thermometer at a consistent location on the bearing cap, and
- Record the temperature and plot temperature trends to identify wear or potential bearing failure.

Blower / Motor

- Inspect for proper operation,
- Ensure all moving parts are properly lubricated, per manufacturer's recommendations,
- Inspect for excessive vibrations in blower / motor relative to normal operating conditions,
- Inspect during every GCCS monitoring event,
- Inspect and adjust drive belts,

- Bridgeton maintains a spare blower for each operating flare. The technician will operationally rotate, and
- Inspect flexible couplers quarterly, document wear and replace as necessary.

Flare Maintenance Procedures

System Operation

Ensure proper fail-safe operation during forced system shutdown.

- Observe all fail-safe components, document and repair components that do not perform as intended.

Control Panel

- Verify all indicator lights, gauges, and other components are operational during weekly monitoring,
- Check for loose wires – semi-annually, and
- Check for and remove debris, rodents, and insects that may have entered the panel.

Flame Arrestor

- Check differential pressure monthly, and
- Remove and clean flame arrester monthly, or when DP is above manufacturer's specification.

Thermocouples

- Inspect for indication of thermocouple failure monthly,
- Check for heat damage annually, and
- Replace as necessary.

Valves

- Exercise all valves monthly, and during each forced shutdown, and
- Exercise valves across the complete operational range of the valve.

Pilot System

- Verify supply of pilot gas during each monitoring event, and
- Verify operation of pilot system during each forced shutdown.

Flow Meter Maintenance Procedures

Flow meters are maintenance items that need to be serviced and calibrated on regular frequencies. Flow meters provide data so Bridgeton can properly, document compliant flow for regulatory agencies, and provide accurate data for wellfield evaluation. Without proper maintenance, flow measurement accuracy begins to decline over time.

Calibrate instrumentation

- Per manufacturer's recommendations, semi-annually at a minimum,
- Calibration requires removal of the flow measuring device from the header line,
- The unit will be shipped back to the manufacturer for calibration and maintenance, and
- A spare or loaner flow device will be inserted into the header pipe while the primary device is being serviced.

Insertion Type Meters (heat probe)

- Pull and clean probe as needed, monthly at a minimum,
- Verify proper position and orientation prior to removal and following replacement, and
- Verify meter is property zeroed by forcing shutdown and observing the recorded flow. Flow should be zero during a forced shutdown.

Chart Recording Device (Paper / Digital)

- Digital Recorder – download digital recorders during each monitoring event,
- Convert digital data to a graphical representation, where possible,
- If conversion into graphical representation is not possible, print data, and
- File graphical representation or printed data in site operating record if equipped; ensure battery back-up functions as designed.

Auto-Dialer

- Inspect auto-dialer operation daily and during all shutdowns and forced shutdowns for proper operation,
- Verify phone service exists and is operational to auto-dialer monthly,
- Inspect auto-dialer to determine proper programming, quarterly, and
- Record in the log book the personnel and phone numbers contained in the device, and ensure they match the call-out tree.

APPENDIX N

CONDENSATE MANAGEMENT SYSTEM INSPECTION AND MAINTENANCE
PROCEDURES

APPENDIX N

CONDENSATE MANAGEMENT SUMP INSPECTION ITEM TRACKING FORM

Date of Inspection: _____

Name of Inspector: _____

Inspection Item	Item Tracking Number(s)
Monthly	
Fittings	
Joints	
Corrosion	
Riser Vertically	
Absence of Flow	
Flow Meter Performance	

Note: See attached Condensate Management Sump Inspection Item Tracking Form (one per item indicated on the above form).

Inspection Items		
Sump I.D.	Date	Time

APPENDIX N

BRIDGETON LANDFILL

**CONDENSATE MANAGEMENT SUMP INSPECTION ITEM
TRACKING FORM**

Tracking No. _____ (e.g. MMDDYY-____)

Inspector's Name: _____

Inspection Item Noted:

Description: _____

Location: _____

Other: _____

Follow-up Technician's Name: _____

Incident Resolution Description: _____

Date of Resolution: _____

Follow-Up Technician's Signature

APPENDIX O

GAS COLLECTION PIPE INSPECTION AND MAINTENANCE PROCEDURES

APPENDIX O
Bridgeton Landfill
Transmission Piping Visual Inspection

Technician(s): _____

Date of Monitoring: _____

During the inspection frequency listed below, the following items should be inspected as part of the GCCS piping integrity program. Completion of this form will indicate that the systems were inspected according to the below:

Quarterly

Air and Force Main – Walk the length of each line Quarterly. Observe and document evidence of leakage and excessive strain.

GCCS Piping –Walk the length of each line Quarterly. Observe and document evidence of leakage and excessive strain.

Annually

Inspect all GCCS piping access points (manholes, access risers, sumps, etc.) for integrity (gaskets, flanges, piping).

Inspect all leachate access points (cleanout risers, manholes, tanks, etc.) for gas leaks, or air intrusion. Check integrity of gaskets, flanges, piping, etc.

For this monitoring period, the following areas exhibited a deficiency, as noted below and shown on the attached map.

<i>Piping</i>	<i>Date Discovered</i>	<i>Deficiency</i>	<i>Date Corrected</i>	<i>Tech</i>

OPERATION, MAINTENANCE, AND MONITORING PLAN

VOLUME 3

Leachate Management Systems

Prepared for:

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CEC Project 130-484

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Civil & Environmental Consultants, Inc.

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Appendix C	– Leachate Collection Sump Inspection Form
Appendix D	– Transmission Pipe Maintenance Procedures
Appendix E	– Lift Station Inspection Form
Appendix F	– Waste Department Decision with Filter Cake Characterization

DOCUMENTS INCORPORATED BY REFERENCE
(MAINTAINED IN LANDFILL OFFICE)

- Leachate Pretreatment Operation and Maintenance Manual by Civil & Environmental Consultants, Inc.
- Bridgeton Landfill Health and Safety Plan
- Common Operations and Maintenance Standard Operating Procedures MSD/Bridgeton Landfill
- Quarterly Infrastructure Update
- Leachate Management Plan by Civil and Environmental Consultants, Inc.
- Leachate Pre-Treatment Plant Solids Sampling Plan September 19, 2014 by Barr Engineering
- Other documents are listed in the body of this OM&M Plan

1.0 INTRODUCTION

1.1 BACKGROUND

This document comprises Volume 3 of a three-volume Operation, Maintenance, and Monitoring Plan (OM&M Plan) for the Bridgeton Landfill, LLC (Bridgeton Landfill). The OM&M Plan (Plan) consists of:

Volume 1 - General Requirements and Surface Systems

Volume 2 - Gas and Subsurface Control Systems

Volume 3 – Leachate Management Systems (this volume)

The history of the landfill as well as the OM&M Plan's purpose, management structure, data collection and reporting, and procedures for Plan modifications are described in Volume 1.

A reaction called a subsurface reaction or SSR has continued to occur within a portion of the landfill known as the South Quarry. The SSR produces atypical effects on the waste mass, potentially impacting the leachate management system, including:

- Elevated temperatures that may require special construction materials;
- Thermal decomposition (pyrolysis) of waste resulting in much higher than typical levels of certain constituents such as biochemical oxygen demand (BOD), chemical oxygen demand (COD), volatile organic compounds (VOCs), and certain dissolved metals in the leachate;
- Drying of waste which results in a steam/water vapor front moving out, up, and away from the reaction that then condenses in the cooler surrounding waste mass and gas extraction wells, resulting in more than typical liquid generation and potential obstruction of gas extraction well perforations;
- Higher-than-normal temperature of the waste body adjacent to the reacting waste mass, causing conversion of liquid into steam, thus adding pressure and the potential for forceful ejection of liquid in some locations; and,
- Settlement under and/or adjacent to the reacting waste mass creating pinches, warps, and or breaks in the leachate management features.

Each of these conditions can result in operational and maintenance challenges. Therefore, special operating and maintenance procedures are, and will be, necessary for the leachate management systems to function effectively until conditions allow for resumption of typical procedures.

1.2 STATUS OF THE LEACHATE MANAGEMENT SYSTEM

Operation and maintenance procedures currently in use are primarily those presented in the following documents:

- Volume 1 of this OM&M Plan.
- Volume 2 of this OM&M Plan.
- Leachate Management Plan, by Civil & Environmental Consultants, Inc.
- Operations and Maintenance Manual - Leachate Pre-Treatment Plant (LPTP) for the Bridgeton Landfill, by Civil & Environmental Consultants, Inc.

The LPTP has been constructed to meet the conditions of the leachate pre-treatment procedures outlined in the following documents:

- Leachate Pre-Treatment System Plan, August 30, 2013 (Revised September 9, 2013) by Civil & Environmental Consultants, Inc.
- Treatment Building Construction Plans for Bridgeton Landfill, August 30, 2013 by Civil & Environmental Consultants, Inc.

1.3 COMPONENTS OF THE LEACHATE MANAGEMENT SYSTEM

The major components of the leachate management system include:

Liquid Collection System

- Leachate Collection Sumps – Deep landfill extraction sumps are designated as LCS- #.
- Gas Extraction Wells- Gas extraction wells (GEW) are required by the facility’s operating permit. To remove and collect liquid from the GEWs many of them have been augmented with pumps. These are designated as GEW- #.
- Condensate Traps – Liquid that condenses from gas in the collection piping system is collected in condensate traps. These are designated as CT- #.
- Leachate Trench – A trench installed in the “amphitheater” area in 2012 to intercept leachate flow. These Horizontal collection sumps are designated as HZ- #.
- Leachate Sumps – Leachate sumps are connected to the leachate trench and provide points for collecting leachate from the leachate trench. These are designated as LS- #.
- Perimeter Sumps - Subcap Collection – A series of drains has been installed under the flexible membrane liner (FML) cap at the landfill to collect subcap condensation and leachate outbreaks. These convey liquids to a series of perimeter sumps at the perimeter of the South Quarry area. These are designated as PS- #.

Liquid Conveyance System

- Lateral Conveyance Piping – Pressurized or gravity pipes that transmit liquid from a collection feature to a perimeter header force main or pump station.
- Pump Stations – Provide for local collection of liquid and introduction into the perimeter force main. These may be CT, LS, PS, or dedicated lift station features.
- Perimeter Force Main – Pressurized pipe that conveys collected liquid to the leachate pretreatment system.

Leachate Pretreatment and Discharge System

- Storage Tanks – Large steel tanks used for equalization, storage, and discharge control.
- Treatment Tanks – Large steel tanks used as an active component of the pretreatment system.
- Pretreatment Building and Equipment – Process equipment, used together with the storage tanks and pretreatment tanks, to pretreat liquid to standards acceptable to the Metropolitan St. Louis Sewer District (MSD).

A schematic drawing showing these components is provided in the Leachate Management Plan and other reference documents. Systems utilize heat tracing or other weatherizing means as necessary to keep the systems operable during colder seasons.

Leachate management systems often require modification to adjust to the changing conditions over time. The changes caused by the SSR may include specific component quantities, ID numbers, etc. These changes may not all be referenced in this Volume 3 of the OM&M Plan. Instead, a current set of record documents and as-built drawings are maintained in the Landfill office.

In addition, this volume references other documents including the Health and Safety Plan (specifically designed for activities related to this OM&M Plan). Other referenced documents, such as the equipment operating manuals, and other equipment manufacturer information are located in the Manufacturers' Operations Guides and Data and these will be updated as needed with process changes.

2.0 OPERATION

2.1 LIQUID COLLECTION SYSTEM

2.1.1 Leachate Collection Sumps

Leachate Collection Sumps (LCS) are the primary leachate removal feature at the Bridgeton Landfill. Leachate levels in wells not impacted by the SSR shall be maintained as required by operating permit #118912. Sumps which are impacted by the SSR, shall be operated according to best management practices. Every attempt shall be made to operate those well that are impacted in accordance with permit #118912; however, failure to comply with the permit conditions at these sumps due to SSR impacts shall not be considered a violation. Procedures for operating the LCSs are provided in Appendix A.

2.1.2 Gas Extraction Well Dewatering

Gas extraction removal efficiency for some GEWs has been enhanced by adding dual phase gas/leachate extraction pumps. Liquid pumped from these GEWs is directed to the leachate collection system via a network of liquid transmission lines that are connected to the perimeter leachate collection system. The dual phase GEWs provides broad aerial coverage for liquid extraction from the waste mass. Operation details regarding the gas extraction system are provided in Volume 2 of this OM&M Plan.

2.1.3 Condensate Removal

For purposes of this document, condensate will be considered liquid that forms in the Gas Collection and Control System (GCCS) lateral and header pipes due to temperature drop and condensation of liquid out of the gas stream. Condensate drains thorough the gas conveyance pipes by gravity and is collected near the perimeter of the landfill in condensate traps or sumps. From there it is pumped into the perimeter force main and comingled with leachate.

2.1.4 Leachate Trench

The leachate trench is a passive feature to be monitored for its function.

2.1.5 Leachate Sumps

The leachate sump operates as flow is conveyed and accumulates from the leachate trench. Liquid collected in the LS is introduced into the liquid collection system with pumps.

2.1.6 Subcap Collection

The subcap drains are a series of liquid infiltration drains installed beneath the FML cap areas. The drains convey collected liquid to the leachate collection system, including liquids that might be expressed onto the ground surface as well as condensation that may occur below the FML cap. Liquids collected by the subcap collection drains are passively conveyed by gravity to a series of perimeter sumps installed near the perimeter or toe of slope (designated with PS- prefix on Infrastructure Drawings). Liquid collected in the PS features is introduced into the liquid collection system with pneumatic pumps.

2.2 LIQUID CONVEYANCE SYSTEM

2.2.1 Lateral Conveyance Piping

Below-grade and above-grade leachate transmission pipes are used to convey leachate from sumps, dewatering wells, and subcap drains to a larger-diameter perimeter leachate collection pipe. The conveyance piping systems are passive and as such require no specific operating procedures.

2.2.2 Lift Stations

Lift stations have been installed together with a perimeter force main. In addition, any location in which a pump is placed to lift liquid out of a vessel and into the perimeter force main is included in this category (e.g. leachate sumps, perimeter sumps, and condensate traps).

2.2.3 Perimeter Force Main

Below-grade and above-grade leachate perimeter force mains are used to convey leachate from the lift stations to the leachate pretreatment area. Force mains are passive features that do not require specific operating procedures.

2.3 LEACHATE PRETREATMENT SYSTEM

The leachate treatment operation and maintenance plan of the leachate pretreatment system is described in the Operations and Maintenance Manual - Leachate Pre-Treatment Plant (LPTP) Process Operations Section and Equipment Documentation Volumes 1-4 for the Bridgeton Landfill, December 2015 by Civil & Environmental Consultants, Inc., and is included by reference.

The processing of the landfill leachate is accomplished by a pretreatment facility permitted through MSD to meet their standards for discharge. The current MSD permit for the Bridgeton Landfill as of the date of this submittal is provided in Appendix B for reference. This plant is continuously operated and Bridgeton Landfill to maintain the required standards for the discharged liquid.

3.0 INSPECTION & MAINTENANCE

The leachate management system was designed and constructed to meet state-of-the-practice operation and durability thresholds, while providing for environmental protection and security. This treatment facility is a complex mechanical and electrical system having many components subject to severe environmental and chemical stresses in normal circumstances and that are exacerbated by the conditions caused by the SSR. These stresses include:

- Harsh weather conditions;
- Continuous operation;
- Volumetric variability;
- High liquid temperatures;
- Corrosive liquids;
- Chemical compounds in leachate unfavorable to some metals, concrete, seals, and gaskets;
- Periodic power outages;
- Potentially explosive gas vapors;
- High dissolved organic solids and biological anaerobes; and
- High dissolved mineral content.

Even the most robust systems operating in these conditions require consistent maintenance to provide satisfactory operation and performance. The nature of some of the conditions noted is unique to the SSR in the South Quarry area, and as such, Bridgeton Landfill has evolved maintenance regimens beyond those normally required at typical municipal solid waste (MSW) landfills.

Infrastructure items related to the leachate management system including the cap, wells and other apparatus will be maintained. Procedures for this effort are provided in Volume 1. Schedules of items or conditions to be inspected relative to the Leachate Management Systems are outlined in Table 1.

3.1 LIQUID COLLECTION SYSTEM

3.1.1 Leachate Collection Sumps

Inspections conducted per the schedule on Table 1 will be utilized and documented using the Leachate Collection Sump Inspection form provided as Appendix C.

3.1.2 Gas Extraction Well Dewatering

Inspection and maintenance details regarding this system are provided in Volume 2 of this OM&M Plan.

3.1.3 Subcap Collection

Inspections are covered in the Quad Checks outlined in Volume 1 and maintenance procedures for the subcap drains consist of line jetting as needed.

3.1.4 Condensate Removal

Inspections and maintenance for the condensate traps (CT- #) are covered in the Quad Checks outlined in Volume 1. A form to be completed for the inspections is provided in Volume 2.

3.1.5 Leachate Trench

The leachate trench is to be observed for its function.

3.1.6 Leachate Sumps

The schedule for Leachate Sump inspections is in Table 1. The details for the inspection are outlined in the quad checks described in Volume 1.

3.2 LIQUID CONVEYANCE SYSTEM

3.2.1 Lateral Conveyance Piping

Maintenance procedures for solid single-wall and double-walled leachate transmission pipes are provided in Appendix D.

3.2.2 Lift Stations

Inspections conducted per the schedule in Table 1 should be utilized and documented using the Lift Station Inspection form provided as Appendix E.

3.2.3 Perimeter Force Main

Maintenance procedures for solid single-wall and double-walled perimeter force main pipes are provided in Appendix D.

3.3 LEACHATE PRETREATMENT SYSTEM

The inspection and maintenance procedures for the operation and maintenance of the leachate pretreatment system is described in the Leachate Pretreatment Operation and Maintenance Manual, Process Operations Section and Equipment Documentation Volumes 1-4, dated December 2015 by Civil & Environmental Consultants, Inc.

The Operation and Maintenance manual for the Leachate Pretreatment Plant is maintained at the Treatment Plant, and is incorporated by reference.

4.0 PROCESS DISCHARGE

4.1 ON SITE DISCHARGE

The Bridgeton Landfill operations team will maintain communications with MSD to satisfy the Discharge permit. The primary liquid discharge from the facility is into the MSD collection system. This system will direct the liquid waste discharged into the collection system to a POTW Facility (Bissell Point facility, Cold Water Creek facility, or Missouri River facility). Effluent will be discharged to one of the approved facilities at MSD's discretion. Bridgeton Landfill or their designee will maintain discharge in accordance with Common Operations and Maintenance Standard Operating Procedures MSD/Bridgeton Landfill incorporated by reference.

4.1.1 Waste Disposal Facilities

Alternate contingent waste disposal options are currently provided by MSD and the American Bottoms Regional Wastewater Treatment Facility. The leachate pretreatment process has multiple redundancies built into the system that allow for numerous haul-out options if they are required for any emergency or other situation as mentioned previously.

MSD Bissell Point Wastewater Treatment Plant
10 East Grand Avenue
St. Louis, MO 63147

American Bottoms
1 American Bottoms Road
Sauget, IL 62201

4.2 PROCESSED LEACHATE MANIFESTING PROCEDURES

Each load of hauled processed leachate that leaves the facility is accompanied by a manifest completed by the generator (Bridgeton Landfill, LLC) and the transporting company. Manifests document information about the generator of the waste, the transporter of the waste, and the designated disposal facility for the waste. A generator's representative and a representative of the transportation company sign each manifest upon departure from the facility. A copy is kept on site. Once the transportation company delivers the load to the disposal facility, the disposal facility signs to accept the waste and keeps a copy of the manifest.

Data associated with the Leachate Management System are recorded and stored to facilitate daily decisions in the operations of the plant. Information is stored in a database that includes, but is not limited to, the following information:

- Dates of loading, transport, and disposal;
- Volumes of leachate processed;
- Batch identifiers;
- Analytical testing results for each batch as needed;
- Driver, vehicle, and load information; and,
- Manifest information.

The Division Manager will designate the responsibility for coordinating and scheduling tasks associated with the collection, storage, processing, sampling/analysis, transportation, and disposal of the leachate. These tasks include, but are not limited to:

- Communicating with hauling companies and disposal facilities each day with information regarding number of loads, volume expected, and leachate quality;
- Reviewing of completed manifests/loading tickets for completeness and accuracy;
- Collecting operational and/or confirmation samples and coordinating delivery to the laboratories;
- Reviewing and distribution of analytical results;
- Optimizing component processes; and,
- Summarizing the day's issues/results and the planned efforts for the following day.

5.0 FILTER CAKE DISPOSAL

5.1 DEWATERED SOLIDS DISCHARGE

The screw presses deposit dewatered solids into transport trailers. When the trailers are full, they will transport the solids to Roxana Landfill for disposal as special waste. The dewatered solids will be monitored to confirm that they comply with the special waste acceptance requirements of the Roxana Landfill. The Bridgeton Landfill operations team will maintain communications with the Roxana Landfill to satisfy the permit requirements and solid waste disposal regulations.

5.1.1 Waste Disposal Facilities

The dewatered solids are being disposed of at the Roxana Landfill. Periodic testing of the dewatered solids to confirm they are non-hazardous and meet the Roxana Landfill Special Waste Requirements were initially confirmed and are repeated as needed to maintain current profiling including resampling for significant process changes. See Appendix F for the Waste Department Decision with Filter Cake Characterization. The landfill location is:

Roxana Landfill
Republic Services
Address: 4601 Cahokia Rd,
Edwardsville, IL 62025
Phone: (618) 656-6912

5.2 FILTER CAKE MANIFESTING PROCEDURES

Each load of hauled dewatered solids that leaves the facility is accompanied by a manifest completed by the generator (Bridgeton Landfill) or an approved representative and the transporting company. The transporting company must be an approved waste hauler by all state and local regulations. Manifests document information about the generator of the waste, the transporter of the waste, and the designated disposal facility for the waste. A generator's representative and a representative of the transportation company sign each manifest upon departure from the facility. A copy is kept on site. Once the transportation company delivers the load to the disposal facility, the disposal facility signs to accept the waste and keeps a copy of the manifest.

Data associated with the Leachate Management System must be recorded and stored to facilitate daily decisions in the operations of the plant. Information is stored in a database that includes, but is not limited to, the following information:

- Dates of loading, transport, and disposal;
- Periodic analytical testing results for the dewatered solids;
- Driver, vehicle, and load information; and,
- Manifest information.

The Leachate Treatment Plant staff coordinates and schedules tasks associated with the collection, storage, processing, sampling/analysis, transporting, and disposal of the dewatered solids. These tasks include, but are not limited to:

- Communicating with hauling companies and disposal facilities each day with information regarding number of loads, and volume expected;
- Reviewing of completed manifests/loading tickets for completeness and accuracy;
- Optimizing component processes; and
- Summarizing the day's issues/results and the planned efforts for the following day.

Please refer to the Documents Incorporated by Reference (maintained in the Landfill Office) for a copy of the Leachate Pre-Treatment Plant Solids Sampling Plan dated September 19, 2014 by Barr Engineering.

TABLES

**Table 1 – Schedule of Inspections and Maintenance for the
Leachate Management Systems**

Item or Conditions to Be Inspected	Approximate Inspection Frequency	Inspection and Correction Procedure	Location of Inspection Form
Leachate Collection Sump (LCS) Wellheads	Weekly	Inspect and maintain wellheads to ensure consistent and reliable operation including, fittings, joints, corrosion, riser pipe.	Appendix C
Leachate Collection Sump (LCS) Flow Meters	Weekly	Check flow meter reading, and transducer reading. Check total flow vs. historic average. If inconsistent, and evidence that pump is running, repair or replace flow meter.	Appendix C
Perimeter Leachate Transmission Pipes	As Needed	Jet clean accessible subcap leachate collectors.	Appendix D
Lift Stations	Monthly	Inspect and exercise valves, inspect and make sure floats operate freely, observe pumping cycle to verify correct off/on cycling.	Appendix E
Leachate Sumps (LS) and Perimeter Sumps (PS)	Weekdays	(Per procedures outlined in Quad Checks Volume 1 Appendix A)	-

Note: Additional features will be added as design and installations are necessary.

APPENDIX A

LEACHATE COLLECTION SUMP OPERATING PROCEDURES

APPENDIX A

Leachate Collection Sump Operation Procedures

The six (6) permitted Leachate Collection Sumps (LCS) are each programmed to operate using dedicated 3-phase electrical pumps, level transducers and variable frequency drives (VFDs).

- Individual pumps are sized based on sump depth and historical leachate volume. Pump manufacturer information and LCS as-built documentation will be retained in the site file system in a binder “Leachate Collection Sumps.”
- VFDs shall be programmed to pump liquid to a specified set-point, and hold that level by regulating pump speed and operation as the sump recharges.
- Operate LCS pumps 24 hours per day, with automated temporary shutdown periods when pumping rate exceeds liquid recharge.
- Use Volume 3 Appendix C form for documenting operational problems or issues.

APPENDIX B

MSD PERMIT# 1003803000-1.4



Metropolitan St. Louis Sewer District

Division of Environmental Compliance
10 East Grand Avenue
St. Louis, MO 63147-2913
Phone: 314.768.6200 www.stlmsd.com

August 3, 2017

Erin Fanning
Division Manager
BRIDGETON LANDFILL LLC
13570 St. Charles Rock Road
Bridgeton, MO 63044

Re: Discharge Permit No: 1003803000 - 1.4
For premise at: 13570 St. Charles Rock Road, Bridgeton, MO 63044

Dear Ms. Fanning:

Your Metropolitan St. Louis Sewer District Industrial Wastewater Discharge Permit issued on December 01, 2016, for the above premise, is hereby revised as per the attached revised permit.

The following revisions were made to the permit:

- Removed the special condition for the maintenance and operation of the Westlake Pump Station.
- Added a special condition for the restriction of the discharge rate from Bridgeton Landfill. The flow restrictions are from the MSD's Operation and Maintenance SOP that was agreed upon by MSD and Bridgeton Landfill. There will be an instantaneous flow rate restriction of 500 gallons per minute.

We have reissued the entire permit for your convenience. Please replace your prior permit with this letter and the revised permit. The terms of the revised permit supersede your prior permit.

You must submit monitoring reports on a quarterly basis, as required by the conditions of this permit. The necessary report form is appended to the permit. It includes the specific certifications required by your permit. Please use this form for your report submittals.

This revision does not affect any monitoring or analysis of your discharge that may be necessary to comply with other requirements of your permit and in no way relieves you of your obligations to achieve the discharge limitations as provided in the permit.

We appreciate your cooperation and support in helping us to comply with federal regulations. Please contact me at 314.436.8721, if you have any questions.

Sincerely,
METROPOLITAN ST. LOUIS SEWER DISTRICT

Chris Bulmahn

Chris Bulmahn
Associate Engineer

Enclosures: Industrial Wastewater Discharge Permit, Self-monitoring Report Form

cc: Doug Mendoza

Exhibit E

METROPOLITAN ST. LOUIS SEWER DISTRICT
DIVISION OF ENVIRONMENTAL COMPLIANCE
INDUSTRIAL WASTEWATER DISCHARGE PERMIT

PERMIT NO: 1003803000 - 1.4

EFFECTIVE DATE: August 01, 2017

EXPIRATION DATE: August 31, 2019

ISSUED TO: BRIDGETON LANDFILL LLC
13570 St. Charles Rock Road
Bridgeton, MO 63044

SIC NUMBER(S): 4953

TOTAL NUMBER OF PERMITTED DISCHARGE POINTS: 2

SAMPLING PT. REF NUMBER(S): 013, 014


In accordance with the provisions of the Federal Pretreatment Regulations (40 CFR 403) and Metropolitan St. Louis Sewer District Ordinance No. 12559, the permittee is hereby authorized to discharge wastewater into the Metropolitan St. Louis Sewer District's sanitary or combined sewer system. All discharges so authorized shall be limited and controlled pursuant to the terms and conditions of this permit.

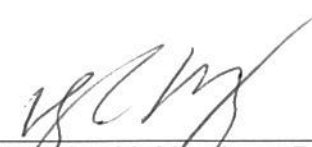
Noncompliance with any term or condition of this permit shall constitute an ordinance violation. If formal enforcement action is required to gain compliance, the permittee who is found guilty of a violation shall be subject to fine or imprisonment, or both such fine and imprisonment, for each violation. Each day in which any such violation shall continue shall be deemed a separate offense.

Compliance with the terms and conditions of this permit does not relieve the permittee of the obligation to comply with all other applicable pretreatment regulations, standards, or requirements under local, State and Federal laws, including any such regulation, standard, legal requirement, or law that may become effective during the life of this permit.

This permit only authorizes wastewater discharges identified herein. It does not apply to any other discharge.

METROPOLITAN ST. LOUIS SEWER DISTRICT


Chris Bulmahn
Associate Engineer


Douglas M. Mendoza, P.E.
Mgr. of Industrial Pretreatment

DISCHARGE LIMITATIONS

SAMPLING POINT REFERENCE NUMBER: 013

SAMPLING POINT LOCATION: MH 15' NW, 27' SW of the N corner of concrete containment wall for effluent tank along Boenker Lane

AVERAGE WASTEWATER FLOW (GPD): 314,769

WASTEWATER SOURCE AND CATEGORY: Cooling Tower Blowdown + Plant & Equipment Washdown (Transfer station & jetter trucks) + Storm Water (Contaminated from leachate spills) + Condensate (Methane burnoff condensate) + Landfill Leachate (Including byproducts from underground thermal event)

DISCHARGE LIMITATIONS AND SELF-MONITORING REQUIREMENTS

Parameter	Limit *	Limit Type **	Sampling Frequency
Flow [GPD]	***	Daily Avg	Once/3 mo
Biochemical Oxygen Demand (5 Day) [mg/L]	****	Daily Avg	Once/3 mo
Chemical Oxygen Demand [mg/L]	****	Daily Avg	Once/3 mo
Total Suspended Solids [mg/L]	****	Daily Avg	Once/3 mo
Oil and Grease (Total) [mg/L]	200	Instant	Once/3 mo
Temperature [Deg C]	60	Instant	Once/3 mo
pH [SU]	11.5	Instant	Once/3 mo
pH [SU]	5.5	Instant	Once/3 mo
Transmittance Unfiltered	*****	Daily Avg	Once/3 mo
Ammonia (as N) [mg/L]	*****	Daily Avg	Once/3 mo
Gross Alpha [pci/L]	*****	Daily Avg	Once/3 mo
Gross Beta [pci/L]	*****	Daily Avg	Once/3 mo
Gross Gamma [pci/L]	*****	Daily Avg	Once/3 mo
Hydrogen-3 (Tritium) [pci/L]	10000000	Monthly Avg	Once/3 mo
Radium-226 [pci/L]	600	Monthly Avg	Once/3 mo
Radium-228 [pci/L]	600	Monthly Avg	Once/3 mo
Uranium-natural [pci/L]	3000	Monthly Avg	Once/3 mo
Uranium (Total) [mg/L]	*****	Daily Avg	Once/3 mo
Arsenic (Total) [mg/L]	0.77	Daily Avg	Once/3 mo
Benzene [mg/L]	0.14	Instant	Once/3 mo
Cadmium (Total) [mg/L]	0.7	Daily Avg	Once/3 mo
Chromium (Total) [mg/L]	5.0	Daily Avg	Once/3 mo
Copper (Total) [mg/L]	2.7	Daily Avg	Once/3 mo
Iron (Total) [mg/L]	150	Daily Avg	Once/3 mo
Lead (Total) [mg/L]	0.4	Daily Avg	Once/3 mo
Magnesium (Total) [mg/L]	*****	Daily Avg	Once/3 mo
Mercury (Total) [mg/L]	0.01	Daily Avg	Once/3 mo
Nickel (Total) [mg/L]	2.3	Daily Avg	Once/3 mo
Silver (Total) [mg/L]	0.5	Daily Avg	Once/3 mo
Zinc (Total) [mg/L]	3.0	Daily Avg	Once/3 mo
Total Phenols [mg/L]	21.0	Instant	Once/3 mo
Total Toxic Organics [mg/L]	5.844	Instant	Once/3 mo

- * Limits are based on MSD Ordinance 12559 and applicable federal categorical standards. See Section II of the permit conditions for explanation of any adjustments to the published limits made pursuant to Article V, Section 2.B of the Ordinance.
- ** See Section I.A.2 of the permit conditions.
- *** Report a measured or estimated average daily flow for at least one representative operating day per quarter. If additional flow measurements or estimates are made, all must be reported.
- **** See Section I.A.11 of the permit conditions.
- ***** Monitoring requirement only

DISCHARGE LIMITATIONS

SAMPLING POINT REFERENCE NUMBER: 014

SAMPLING POINT LOCATION: Truck loading stations at 316K gallon equalization tank or 1 M gallon biological treatment tanks

AVERAGE WASTEWATER FLOW (GPD): 0

WASTEWATER SOURCE AND CATEGORY: Plant & Equipment Washdown (Transfer station & jetter trucks) + Landfill Leachate (Including byproducts from underground thermal event) + Condensate (Methane burnoff condensate)

DISCHARGE LIMITATIONS AND SELF-MONITORING REQUIREMENTS

Parameter	Limit *	Limit Type **	Sampling Frequency
Flow [GPD]	***	Daily Avg	Once/3 mo
Biochemical Oxygen Demand (5 Day)	****	Daily Avg	Once/3 mo
Chemical Oxygen Demand	****	Daily Avg	Once/3 mo
Total Suspended Solids	****	Daily Avg	Once/3 mo
Oil and Grease (Total) [mg/L]	****	Instant	Once/3 mo
Temperature [Deg C]	****	Instant	Once/3 mo
pH [SU]	****	Instant	Once/3 mo
Ammonia (as N)	****	Daily Avg	Once/3 mo
Gross Alpha	****	Daily Avg	Once/3 mo
Gross Beta	****	Daily Avg	Once/3 mo
Gross Gamma	****	Daily Avg	Once/3 mo
Hydrogen-3 (Tritium) [pci/L]	10000000	Monthly Avg	Once/3 mo
Radium-226 [pci/L]	600	Monthly Avg	Once/3 mo
Radium-228 [pci/L]	600	Monthly Avg	Once/3 mo
Uranium-natural [pci/L]	3000	Monthly Avg	Once/3 mo
Uranium (Total)	****	Daily Avg	Once/3 mo
Arsenic (Total) [mg/L]	****	Daily Avg	Once/3 mo
Benzene	0.14	Instant	Once/3 mo
Cadmium (Total) [mg/L]	****	Daily Avg	Once/3 mo
Chromium (Total) [mg/L]	****	Daily Avg	Once/3 mo
Copper (Total) [mg/L]	****	Daily Avg	Once/3 mo
Iron (Total) [mg/L]	****	Daily Avg	Once/3 mo
Lead (Total) [mg/L]	****	Daily Avg	Once/3 mo
Magnesium (Total)	****	Daily Avg	Once/3 mo
Mercury (Total) [mg/L]	****	Daily Avg	Once/3 mo
Nickel (Total) [mg/L]	****	Daily Avg	Once/3 mo
Silver (Total) [mg/L]	****	Daily Avg	Once/3 mo
Zinc (Total) [mg/L]	****	Daily Avg	Once/3 mo
Total Phenols [mg/L]	****	Instant	Once/3 mo
Total Toxic Organics [mg/L]	****	Instant	Once/3 mo

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Effective Date:	<u>August 01, 2017</u>

- * Limits are based on MSD Ordinance 12559 and applicable federal categorical standards. See Section II of the permit conditions for explanation of any adjustments to the published limits made pursuant to Article V, Section 2.B of the Ordinance.
- ** See Section I.A.2 of the permit conditions.
- *** Report a measured or estimated average daily flow for at least one representative operating day per quarter. If additional flow measurements or estimates are made, all must be reported.
- **** Monitoring requirement only

PERMIT CONDITIONS

SECTION I - GENERAL CONDITIONS:

A. MONITORING AND REPORTING REQUIREMENTS:

1. From the effective date of this permit, the permittee shall sample and analyze the discharge, at each of the identified sampling points. The pollutants to be monitored, the limitations, limitation types and minimum sampling frequencies are specified individually for each sampling point. The results of sample analyses and the results of all other self-monitoring activities specified in this permit shall be reported to the District as per paragraph A.9 below.

2. The limitation types, which may be specified in this permit, are defined as follows:

An **INSTANT** limitation is the maximum allowable concentration or mass of the pollutant in a grab sample for all pollutants except pH and temperature. For pH, the INSTANT limitations are the minimum and maximum allowable instantaneous pH values in standard units. For temperature, the INSTANT limitation is the maximum allowable instantaneous temperature in degrees Celsius (centigrade).

A **DAILY AVG** limitation is the maximum allowable concentration or mass of the pollutant in a composite sample collected within a 24-hour period.

A **DAILY MAX** limitation is the maximum allowable concentration or mass of the pollutant in any sample collected within a 24-hour period.

A **MONTHLY AVG** limitation is the maximum allowable average concentration or mass of the pollutant determined by calculating the arithmetic average of the concentrations or masses found in all daily samples collected within a calendar month.

A **4-DAY AVG** limitation is the maximum allowable average concentration or mass of the pollutant determined by calculating the arithmetic average of the concentrations or masses found in the daily samples collected on four consecutive sampling days. Sampling days are not necessarily consecutive calendar days.

Note: A daily sample is any sample collected within a 24-hour period.

3. Unless specified otherwise in Section II of these conditions all samples, collected to satisfy the monitoring and reporting requirements of this permit, shall be of the following types:

a. Temperature, pH and chlorine residual measurements, when required, **shall be made on-site at the points of discharge** and those measurements reported as grab sample results except, if continuous monitoring is employed for pH and/or temperature, reporting shall be as per paragraph A.7 below.

b. For oil and grease, total phenols, cyanide, sulfide and volatile organics, when required, samples shall be **Grab Samples**.

c. For all other pollutants, samples shall be **COMPOSITE SAMPLES** made up by combining a minimum of four individual grab samples within a 24-hour period. The individual grabs must be adequately flow or time proportioned to ensure a composite sample that is representative of that day's discharge.

4. When monitoring is required for Total Toxic Organics (TTO), the TTO result shall be determined by summing all quantifiable values greater than 0.01 mg/l for the applicable toxic organics.

a. For a discharge subject to a categorical pretreatment standard, the applicable toxic organics are listed in the standard. The standards are contained in 40 CFR 405 through 40 CFR 471.

b. For all other discharges the applicable toxic organics are all of those, from the list in 40 CFR 401.15, which are or may be present in the discharge.

In addition to reporting the summed TTO result, the permittee shall include, with the self-monitoring report, the analytical value obtained for each toxic organic analyzed.

5. Sampling of all discharges shall be conducted in such a manner as to ensure that the results of individual samples (whether grab or composite) are representative of normal operations and that the results of all samples during the reporting period are representative of the conditions during the reporting period.

6. All sampling and analyses performed to satisfy the monitoring and reporting requirements of this permit shall be performed in accordance with the techniques prescribed in 40 CFR 136 and amendments thereto unless other techniques are prescribed, within this permit, for specific parameters.

7. If the permittee employs continuous monitoring techniques for pH, temperature, and/or lower explosive limit at any sampling point identified in this permit, unintentional and temporary excursions outside the limitations are allowed subject to the provisions of Article X, Subsection Two-D of District Ordinance 12559. The permittee shall include, with each self-monitoring report, a summary of the continuous monitoring data. For each month, the summary shall show all excursions outside the permitted limitations, the elapsed time for each excursion, and the total time for all excursions for temperature, pH, and/or lower explosive limit.

8. If the permittee monitors any of the listed pollutants, using the methods specified in this permit, more often than required by this permit, the results of all such additional monitoring and any additional flow measurements shall be included in the self-monitoring reports.

9. A self-monitoring report (on forms supplied or approved by the District) shall be submitted to the District's Division of Environmental Compliance for each calendar quarter. Each report shall include:

a. All facility and sample description information required on the District's reporting form.

b. Analytical results, with dates and times, for all analyzed samples collected within the quarter.

c. Daily flows, with dates, for all measurements or estimates made within the quarter.

d. Any certification statements required pursuant to the Special Conditions in Section II.

e. Any other data or attachments required pursuant to the Special Conditions in Section II.

Each self-monitoring report shall be certified and signed by an individual authorized in accordance with the provisions of Article X, Section Three of District Ordinance 12559. The reports shall be submitted to the District as soon as possible after all required data are available, but no later than 28 days after the end of each quarter.

For the calendar quarter of:

January 1 through March 31

April 1 through June 30

July 1 through September 30

October 1 through December 31

The report must be postmarked no later than:

April 28

July 28

October 28

January 28

A report must be submitted for each calendar quarter even if, for any reason, sampling was not required or was not performed during the quarter. **The first report under this permit is due by October 28, 2017.**

10. If any sampling performed by the permittee, using the methods specified in this permit, indicates a violation of any permit limitation, the permittee shall notify the District's Division of Environmental Compliance within one business day of becoming aware of the violation. The permittee shall resample the discharge and shall submit the results of the resampling within thirty (30) days of becoming aware of the violation.

11. Unless specified elsewhere in this permit, discharges of Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD) and Total Suspended Solids (TSS) are not limited under the terms of this permit. However, the monitoring values reported will be used by the District to assess the applicability of extra-strength surcharges under the provisions of the District's Wastewater User Charge Ordinances. Extra-strength surcharges may be applicable when measured values exceed 300 mg/l for BOD, 600 mg/l for COD and/or 300 mg/l for TSS. If the permittee is currently subject to extra-strength surcharge, the BOD, COD and TSS values used for billing, as of the permit effective date, are listed in Section II of the permit conditions. These values are updated periodically and may change during the life of this permit.

B. CHANGE IN DISCHARGE:

1. The permittee shall not significantly increase the average daily volume, or flow rate of discharge or add any significant new pollutants or significantly increase the discharge of existing pollutants set forth in this permit without first having secured an amendment to the permit unless the permit conditions authorize such increase or additions without an amendment.

2. The permittee shall notify the District's Division of Environmental Compliance of any proposed significant new or increased discharge. The permittee shall make the notification at least ten (10) business days prior to the date of the planned increase or addition.

3. As defined in Article II of District Ordinance 12559, significant new or increased discharge means:
- Any discharge from a new process or facility or a new source.
 - Any increase in volume or rate of discharge from an existing process or facility when the new long term average daily volume or rate of discharge will exceed the previous long term average by 20% or more.
 - Any addition of a priority pollutant or toxic pollutant not previously present or suspected present in the permittee's discharge.
 - Any addition of a hazardous waste subject to, but not previously reported under the reporting requirements in Article VIII, Section Nine of District Ordinance 12559.
 - Any increase in mass of an existing regulated pollutant when the new long term average daily mass discharge of that pollutant will exceed the previous long term average by 20% or more.
 - Any addition of a new pollutant or any increase in mass of an existing pollutant when the discharge of such pollutant may cause or contribute to interference or pass-through as these terms are defined in Article II of District Ordinance 12559.
 - Any new batch discharges when previous discharges from an existing source at the permitted facility occurred on a continuous basis.

C. PROBLEM DISCHARGE:

1. Problem discharge means any upset, slug discharge, bypass, spill or accident which does or may result in a discharge into the District's system of a prohibited substance; or of a regulated substance in excess of limitations established in this permit and which may: (a) cause interference or pass through; or (b) contribute to a violation of any requirement of the District's NPDES permit; or (c) cause violation of any State or Federal water quality standard.

2. In the event of any problem discharge into the District's system, the permittee shall immediately notify the District, by telephone, of the incident and shall provide such information as may be required at that time in order to assess the impact of the incident on the District's system or on water quality. Within five (5) business days following any such incident, the permittee shall submit to the District's Division of Environmental Compliance a detailed written report which contains a description of the incident and its cause, location within the permittee's facility, exact dates and times of the period of problem discharge and, if not yet corrected, the anticipated time the incident is expected to

continue, and steps taken or planned to correct the current incident and to reduce, eliminate and prevent occurrences of future such incidents.

3. Slug discharge control: The permittee shall develop and implement procedures to control slug discharges, as required by the District, and shall notify the District immediately of any changes at the permittee's facilities, not already addressed in the permittee's slug control requirements, which may affect the potential for a slug discharge.

D. BYPASSING PROHIBITED:

The permittee may not bypass any portion of its pretreatment facilities except when necessary to perform essential maintenance and then only if the bypass will not result in a violation of applicable pretreatment standards or requirements. Any other pretreatment facility bypass is prohibited unless:

- a. The bypass is unavoidable to prevent loss of life, personal injury or severe property damage;
- b. There are no feasible alternatives to the bypass; and
- c. In the event of an anticipated bypass, advance notice is provided to the District's Division of Environmental Compliance.

E. PERMIT REVOCATION:

This permit may be revoked after thirty (30) days notice to the permittee for cause including, but not limited to, the following causes:

- a. A violation of any term or condition of this permit.
- b. A misrepresentation or failure to fully disclose all relevant facts in obtaining this permit.

F. PERMIT TERMINATION OR MODIFICATION:

1. This permit may be modified, after thirty (30) days notice to the permittee following promulgation of new State, Federal or local regulations to ensure compliance with the effective dates contained in any such new regulations.

2. Whenever any discharge covered by this permit is permanently eliminated, or when the circumstances upon which the permit was based pursuant to MSD Ordinance 12559, Article VI, Subsection 3.A, change, this permit will be terminated or modified upon verification of the changes by the District's Division of Environmental Compliance.

G. PERMIT RENEWAL:

The permittee shall apply for renewal of this permit at least one hundred eighty (180) days prior to the expiration date contained herein.

H. PERMIT TRANSFER:

This permit may not be transferred or reassigned. If the premise covered by this permit is sold or otherwise transferred to a new owner, the new owner shall apply for a new permit at least ten (10) days prior to the transfer and shall abide by all of the provisions of District Ordinance 12559 until the District issues a new permit or denies the application.

I. RIGHT OF ENTRY:

In order to ensure compliance with the provisions of this permit, District Ordinances and applicable State and Federal regulations, District representatives may inspect a permittee's treatment, pretreatment or discharge control facilities, or any process or any area of the permittee's premise which may be a source of any discharge or a source of any pollutants contained in any discharge into the District's wastewater system; conduct sampling of such facilities, processes or areas; and examine or copy any permittee's records related to such discharges. Any duly authorized representative of the District, upon presentation of proper credentials and after execution of appropriate confidentiality agreements, shall be permitted access to appropriate areas of the permittee's premises without prior notice for these purposes. A representative of the permittee shall, if appropriate, accompany the District representative while the work is being performed and shall assure that all applicable safety rules are being observed by the District's representative.

J. RECORDS RETENTION:

The permittee shall retain and preserve, for not less than five (5) years, all records, books, documents, memoranda, reports, sample analysis results, correspondence and any and all summaries thereof relating to the monitoring, sampling and chemical analyses of the permittee's discharge made by or on the permittee's behalf.

K. DEFINITIONS:

Unless the context specifically indicates otherwise, the meaning of terms used in this permit shall be as defined in Article II of District Ordinance 12559.

L. SEWER USE ORDINANCE:

Unless the context specifically indicates otherwise, the permittee is subject to all provisions of District Sewer Use Ordinance 12559.

M. NOTIFICATION AND REPORTING:

1. All notifications and reports required by this permit shall be directed to:

Metropolitan St. Louis Sewer District
Division of Environmental Compliance
10 East Grand Avenue
St. Louis, Missouri 63147-2913

2. Emergency notifications may be made 24-hours a day, 7 days a week by calling the District's dispatcher at (314) 768-6260.

3. During normal business hours, notifications may be made by calling the District's Division of Environmental Compliance at (314) 436-8710.

SECTION II- SPECIAL CONDITIONS:

These Special Conditions may supplement and/or amend the standard terms of this permit or the General Conditions in Section I. Where there is any perceived conflict between a Special Condition and either the standard permit terms or the General Conditions of Section I, the Special Condition shall govern.

A. PROHIBITED DISCHARGES

A.1. On Site Discharge Prohibited Prior to District Approval of Pretreatment Plant

Discharge of wastewater through the onsite sewer (sampling point **013**) shall be prohibited prior to the District's declaration of acceptance of the permittee's pretreatment plant operational conditions.

A.2. Untreated or Partially-treated Hauled Discharge

Prior to the District's declaration of the permittee's pretreatment plant operational acceptance, only wastewater that has received normal pretreatment to prevent discharge prohibitions and has been discharged through sampling point 014 (that is, hauled directly to District treatment plants and discharged there), is approved by this permit for hauling to District treatment plants and discharge. All other wastewater from the permitted facility that the permittee wishes to discharge through sampling point **014** (or otherwise haul to the District) must be approved for discharge separately by the District prior to hauling to District treatment plants and discharging.

Subsequent to the District's declaration of the permittee's pretreatment plant operational acceptance, for all wastewater that has not received full treatment through the permittee's pretreatment plant and that the permittee wishes to discharge through sampling point **014** (or otherwise haul to the District), the permittee shall give prior notification to the District and shall follow the applicable requirements for the District's April 24, 2013 approval and subsequent modifications.

A.3. Special Biochemical Oxygen Demand Limitation

In addition to complying with all permit and applicable District ordinance prohibitions against the discharge of any pollutant released at a concentration which will cause interference with the operation of the wastewater system, the permittee shall not discharge through sampling point 013, at any time:

- For wastewater directed to the District's Missouri River wastewater treatment plant or Coldwater Creek wastewater treatment plant,
 - o Daily mass of greater than 4,300 lb/day biochemical oxygen demand
- For wastewater directed to the District's Bissell Point wastewater treatment plant,
 - o Hourly mass of greater than 1,650 lb/hour biochemical oxygen demand, and
 - o Daily mass of greater than 20,000 lb/day biochemical oxygen demand.

These limitations in no way gives separate approval to or reservation for permittee of wastewater discharges with a biochemical oxygen demand above its long term average discharge levels.

A.4. Discharge Prohibited or Restricted to Protect District

Discharge of wastewater to particular District treatment plants shall be prohibited when the District so declares those plants as prohibited from receiving the permittee's wastewater. Alternately, discharge of wastewater to particular District treatment plants may be restricted by the District to certain volume or loading restrictions. Such declarations shall not be made by the District without cause, such as to prevent violations by the permittee of District Ordinance 12559 or other applicable ordinances.

Of particular note:

1. Discharge of wastewater to the District's Missouri River treatment plant shall be prohibited or limited when the permittee's wastewater has an ultraviolet transmittance percentage at a level that would interfere with proper ultraviolet disinfection at the treatment plant. At a minimum, from the first day of March through the last day of October in a calendar year, discharge to the treatment plant will be prohibited or limited.

2. Discharge of wastewater to any of the District's treatment plants shall be prohibited or limited when the permittee's wastewater has a biochemical oxygen demand concentration at a level that would interfere with proper biological treatment at the treatment plants.

A.5. Hazardous Hauled Wastes

Pursuant to District Ordinance 13701, Section 2.B, under no circumstance may hauled waste which is hazardous waste, as defined in 40 CFR 261 or 10 CSR 25-4.261, be discharged to District facilities. The permittee shall certify on each quarterly self-monitoring report that the permittee has not discharged any hazardous hauled waste.

B. SPECIAL SAMPLING AND ANALYTICAL PROCEDURES

B.1. Sampling/Reporting Requirement for Ordinance Total Phenols

Analysis for Total Phenols is to be performed using EPA Method 625. The result to be reported is the arithmetic sum of the concentrations found for the following individual phenolic compounds:

4-chloro-3-methylphenol	4,6-dinitro-2-methylphenol	pentachlorophenol
2-chlorophenol	2,4-dinitrophenol	phenol
2,4-dichlorophenol	2-nitrophenol	2,4,6-trichlorophenol
2,4-dimethylphenol	4-nitrophenol	

As an option, prior to performing the Method 625 analysis, an initial screening may be performed using EPA Method 420.1. If this option is chosen, two separate samples must be collected, one preserved for the method 420.1 analysis and one unpreserved for a method 625 analysis, if necessary. If the screening produces a result which is less than the permit limitation for Total Phenols, the result should be reported as "less than (numerical result)", and the Method 625 analysis need not be performed. If Method 420.1 produces a result which is greater than the permit limitation, the unpreserved sample must be analyzed using Method 625 and the Method 625 result must be reported. Note: The screening analysis must be completed and a result obtained within sufficient time to ensure the Method 625 analysis, if required, can begin within the 7 day holding time of the unpreserved sample.

B.2. Sampling/Reporting Requirement for Total Toxic Organics

The permittee shall sample and report Total Toxic Organics using at a minimum EPA Methods 624 and 625, or equivalent. Other EPA Methods may be necessary to analyze for toxic organics which are or may be present in the discharge. As part of the Total Toxic Organics report, the permittee shall report all volatile and semi-volatile organics which EPA methods 624 and 625, or equivalent, scan for, as well as all organics which other methods used scan for, and the sum of all quantifiable values greater than 0.01 mg/l.

B.3. Sampling and Reporting Frequencies

Prior to the District's declaration of the permittee's pretreatment plant operational acceptance, the sampling frequency and acceptance procedure for the treated leachate discharge will follow the sampling parameters, frequency, and reporting requirements contained in the District's April 24, 2013 approval and subsequent modifications.

Following the District's declaration of plant acceptance, the permittee's discharge will be sampled for the parameters listed under sampling point 013 as follows:

Exhibit E

1. Once/day for the first 30 calendar days. This sample of fully treated leachate may be collected from an internal sampling point prior to entry into the approved storage tank; however at least the final three samples must be collected from an approved tank.
2. At the end of the 30 day period, if analytical results are obtained for at least the final 7 consecutive days at or below the limits contained in the permit for onsite discharge, or in District Ordinance 12559 if not contained in the permit, sampling will continue on a once/week schedule for the next three months.
3. Should analytical results from once/week sampling meet the discharge limits for three consecutive months, sampling will continue at a once/month frequency for the following six months.
4. Should analytical results from once/month sampling meet the discharge limits for six consecutive months, sampling will continue at the frequencies defined in the permit.

Should a sample fail to meet the discharge limit for any parameter, the sampling frequency will revert to the next more frequent sampling interval listed above. Reversion to next more frequent sampling interval shall only apply to the parameter failing to meet its discharge limit. Reversion shall continue for the period specified for the initial sampling frequency reductions.

At least one of the initial once/day samples shall be analyzed for Gross Alpha, Gross Beta, Gross Gamma, Radium-226, Radium-228, and Uranium.

The sampling intervals listed above shall apply to the permittee's discharge regardless of discharge location to the District, whether on site or hauled.

Sample type and reporting frequency shall be as follows:

Sampling Frequency	Sample Type	Reporting Frequency
Once/day (12:00 am to 12:00 am)	Grab or 24-hr composite	Once/week. Reports shall be submitted by noon on each Wednesday and include all operational and laboratory reports received for activity through the previous Saturday.
Once/week (Sunday to Saturday)	24-hr composite	Once/week. Reports shall be submitted within 2 weeks (14 calendar days) of sampling.
Once/calendar month	24-hr composite	Once/month. Reports shall be submitted within 3 weeks (21 calendar days) of sampling.

All grab samples shall be collected in such a manner as to be as representative as possible of the full daily discharge.

This special condition does not relieve the permittee from any violations of the industrial wastewater discharge permit, nor District Ordinance 12559, nor any other applicable District ordinances. Neither does this special condition relieve the permittee from any other obligations of the industrial wastewater discharge permit, District Ordinance 12559, or any other applicable District ordinances.

B.4. Discharge of Contaminated Storm Water

Permittee is authorized to discharge storm water storm water contaminated with leachate to the District's sanitary sewer system, subject to the requirements contained in the District-approved April 14, 2014 version of the Protocol for Discharge of Contaminated Stormwater, and subsequent modifications.

B.5. Additional Hauled Waste Requirements

The District retains the authority to add other analytical and discharge control requirements for hauled waste loads, as deemed necessary, without making a formal modification to the discharge permit.

C. SPECIAL CERTIFICATION AND REPORTING REQUIREMENTS

C.1. Notification of Change Between On Site and Hauled Discharge

Whenever the permittee becomes aware of its need or desire to change discharge method between sampling point **013** (onsite) or sampling point **014** (hauled), or to change distribution between the two methods if both methods are being utilized simultaneously, permittee must immediately notify the District of such need or desire.

C.2. NPDES Discharge Point

This permit does not regulate discharges at MSD sampling points 004 (NPDES 003), 009 (NPDES 004), 010 (NPDES 005), 011 (NPDES 006), or 012 (NPDES 007). These discharges are subject to State regulation under NPDES permit number MO-0112771. Permittee is authorized to discharge storm water contaminated with leachate to the District's sanitary sewer system, subject to special condition B.4. For storm water that is contaminated with material other than leachate, permittee is authorized to route it to the permittee's pretreatment plant, however should the permittee plan to route it directly to District sewers, the permittee shall notify the District's Division of Environmental Compliance at least ten (10) days prior to the date of the planned change.

C.3. Radioactive Discharge Reporting Requirements

Permittee is authorized to discharge not more than the following amount of radioactive material per year to the District's sanitary sewers:

- (1) For materials subject to licensing by the Nuclear Regulatory Commission:
 - 5 curies Hydrogen-3
 - 1 curie Carbon-14
 - 1 curie for all other radioactive materials combined
- (2) For all other materials:
 - 1 curie for all radioactive materials combined

Excreta from individuals undergoing medical diagnosis or treatment with radiological materials shall be exempt from this prohibition. Any radioactive material discharged to the wastewater system must be readily soluble (or readily dispersible biological material) in water. This authorized level may be modified at any time should the District determine that permittee's discharge of radioactive materials, either alone or in conjunction with other user's discharges of radioactive materials, causes interference as defined in MSD Ordinance 12559.

The permittee shall include with each quarterly self-monitoring report, on forms supplied by the District, a radioactive materials discharge report. The report shall specify the activity discharged to the sewer system by radionuclide during the reporting period. The permittee shall also certify compliance with state and federal regulations for disposal of radioactive material by release into sanitary sewage.

C.4. Materials exempt from Radioactive Discharge Reporting Requirements (non-NRC licensed materials only)

As specified in Missouri State Regulation 19 CSR 20-10.020, discharges from timepieces, instruments, novelties or devices containing self-luminous elements themselves are exempt from inclusion in the summation under the Radioactive Discharge Reporting Requirements, so long as all other conditions of 19 CSR 20-10 regarding these materials are met.

C.5. Radioactive Uranium Reporting Requirements

For the purposes of this permit, measurement and reporting of Uranium-natural for radioactivity levels shall consist of the summation of Uranium-234, Uranium-235, and Uranium-238 isotopes.

C.6. Repeated Submittal of Already-Submitted Analytical

For any sampling analytical results submitted prior to the required quarterly self-monitoring report, permittee need not repeat those results on the quarterly self-monitoring report.

D. SPECIAL BILLING REPORTING REQUIREMENTS

D.1. Hauled Waste Discharge Fees

Following the District's declaration of the permittee's pretreatment plant operational acceptance, for wastewater that has received approved pretreatment and is discharged through sampling point **014** (that is, hauled directly to District treatment plants and discharged there), the permittee will be billed at a rate of \$0.02/gallon.

For wastewater that has received partial treatment pursuant to Alternative 3 of the Revised Leachate SOP approved August 22, 2014, and any subsequent modifications, MSD will calculate volume and surcharge rates under Ordinance 13758, Appendix 1 using monthly average levels for BOD and TSS. The permittee will be billed this rate except that in no case will the permittee be charged more than provided for in Ordinance 13701 or its successors, presently \$0.08/gallon, or less than \$0.02/gallon.

In addition, the permittee also will be billed all additional fees and charges incurred by the District (including, wages, salaries, benefits, and operational costs) in receiving wastewater from the permittee discharged through sampling **014** (or otherwise hauled to the District) at times other than during normal business hours as defined in District Ordinance 13701.

D.2. Reporting Wastewater Discharged On Site

For billing purposes, the permittee shall submit monthly reports of the volume of wastewater discharged through sampling point **013**. These reports shall be sent to:

Metropolitan St. Louis Sewer District
Division of Environmental Compliance
10 East Grand Ave.
St. Louis, MO 63147

Alternately, the reports may be submitted electronically via mutually-agreed method. The reports shall be sent within 15 days of the end of each month. For each month in which no discharge occurs, the permittee shall submit a report stating that no discharge occurred. Permittee may also be required to submit additional information or reports, to ensure compliance with MSD ordinances or with applicable State and Federal regulations. Copies of the monthly volume reports shall also be included with the routine quarterly self-monitoring reports required pursuant to General Condition I.A.

D.3. Reporting Hauled Wastewater Discharge

For billing purposes, the permittee shall submit monthly reports of the volume of wastewater discharged through sampling point **014** (that is, hauled directly to District treatment plants and discharged there). These reports shall be sent to:

Metropolitan St. Louis Sewer District
Division of Environmental Compliance
10 East Grand Ave.
St. Louis, MO 63147

Alternately, the reports may be submitted electronically via mutually-agreed method. The reports shall be sent within 15 days of the end of each month. For each month in which no discharge occurs, the permittee shall submit a report stating that no discharge occurred. Permittee may also be required to submit additional information or reports, to ensure compliance with MSD ordinances or with applicable State and Federal regulations. Copies of the monthly volume reports shall also be included with the routine quarterly self-monitoring reports required pursuant to General Condition I.A.

D.4. BOD in Lieu of COD for Extra-Strength Surcharges

Upon submittal by the permittee, and acceptance by the District, of data indicating that although the BOD/COD (biochemical oxygen demand / chemical oxygen demand) ratio of the permittee's wastewater is less than 0.35, BOD is more representative of the user's actual wastewater strength and the COD in the wastewater discharge does not receive further treatment and reduction by the District beyond that commensurate with the associated BOD in the wastewater discharge, the District will calculate applicable extra-strength surcharges using BOD values in lieu of COD values.

E. DISCHARGE DAMAGES

E.1. Revocation of Hauled Waste Permit

This permit has been issued based upon the information and sample analysis provided by the permittee. The permit may be revoked by the District at any time if any submitted information is found to be incorrect, the discharges cause any operational or maintenance problems with the District's treatment system, or if the conditions and requirements of the permit are violated.

E.2. Responsibility of Damages from Hauled Waste

If any discharge by the permittee causes any operational or maintenance problems within the District's collection or treatment systems or results in violations of any conditions of the District's NPDES permit, the permittee will be responsible for damages, in accordance with applicable District ordinances or other applicable laws.

F. DERIVATION OF LIMITATIONS

F.1. Variance Limits

Pursuant to the provisions of District Sewer Use Ordinance 12559, Article VI, Section Two, the permittee has been granted a variance to the Ordinance limitations for total arsenic at sampling point 013. The permittee shall comply with the alternative limits specified. The alternative limits are effective for the life of this permit but may be revoked at any time if it is determined that discharge at the variance levels is causing or contributing to interference or pass through as defined in Article II of the Ordinance. The variance will expire upon expiration of this permit unless justification for continuance of the alternative limits is provided by the permittee at the time of application for permit renewal.

F.2. Volumetric Flow Rate Discharge Restrictions

The flow that is discharged from Bridgeton Landfill into the District Collection System at sample point 013 shall not:

- Exceed a 24 hour rolling average flow rate of 260 gallons per minute,
- Exceed a 4 hour rolling average flow rate of 290 gallons per minute,
- Exceed a maximum instantaneous flow rate of 500 gallons per minute

unless otherwise approved by the District.

THIS IS THE LAST PAGE OF THIS PERMIT

PART III: SPECIAL CERTIFICATION STATEMENTS

Based on the special conditions contained in your discharge permit you may be required to certify the following. Please review your permit and **PLACE YOUR INITIALS ON THE LINES NEXT TO THE CERTIFICATIONS.**

PART IV: GENERAL CERTIFICATION STATEMENTS

B. Certify discharge monitoring report & attachments

All permittees must sign and complete the information below:

I certify under penalty of Law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Print or type name of signing official: _____

Title: _____ Telephone: _____

Signature: _____ Date: _____

METROPOLITAN ST. LOUIS SEWER DISTRICT
DIVISION OF ENVIRONMENTAL COMPLIANCE
10 EAST GRAND AVENUE
ST. LOUIS, MISSOURI 63147

PRESORTED
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Erin Fanning
BRIDGETON LANDFILL LLC
13570 St. Charles Rock Road
Bridgeton, MO 63044

APPENDIX C

LEACHATE COLLECTION SUMP INSPECTION FORM

APPENDIX C

BRIDGETON LANDFILL

LEACHATE COLLECTION SUMP INSPECTION FORM

Date of Inspection: _____

Name of Inspector: _____

Inspection Item	Item Tracking Number(s)
Weekly	
Fittings	
Joints	
Corrosion	
Riser Vertically	
Absence of Flow	
Flow Meter Performance	
Flow Meter Reading	
Transducer Reading	
Control Room Climate Control System	

Note: See attached Leachate Collection Sump Inspection Item Tracking Form (one per item indicated on the above form).

Inspection Items		
Sump ID	Date	Time

BRIDGETON LANDFILL

LEACHATE COLLECTION SUMP INSPECTION ITEM TRACKING FORM

Tracking No. _____ (e.g. MMDDYY-____)

Inspector's Name: _____

Inspection Item Noted:

Description: _____

Location: _____

Other: _____

Follow-up Technician's Name: _____

Incident Resolution Description: _____

Date of Resolution: _____

Follow-Up Technician's Signature

APPENDIX D

TRANSMISSION PIPE MAINTENANCE PROCEDURES

APPENDIX D

Leachate Transmission Pipe Maintenance Procedures

The intent of pipe cleaning is to remove foreign materials from the lines and restore the pipe to near the original carrying capacity. It is recognized that there are some conditions such as broken or damaged pipe and major blockages that prevent cleaning from being accomplished or where additional damage would result if cleaning were attempted or continued. Should such conditions occur, the operator will contact the Operations or Environmental Manager before proceeding.

Choose the right nozzle for the job. This decision is based on several different factors such as amount of flow, pipe type, pipe size, and condition of the lines. The operator must also pick the appropriate fins to mount the nozzle onto. The operator, or helper, will prop down enough rodder hose slack to be able to place the nozzle in the mouth of the pipe with the tiger tail at the top of the pipe to keep from tearing the rodder hose. Turn the water pressure on efficient enough to shoot the nozzle in until the end of the leader hose is showing in the mouth of the pipe. At this time, clear the footage counter and set it to zero so the footage can be measured properly.

In general, a 15 degree nozzle is used for high grade, long lines and when penetrating blockages. A 30 degree nozzle is best for cleaning due to the jets of water hitting the wall more directly and closer to the nozzle.

Allow hose to feed itself through the line at a moderate pace. It may be best to feed hose about 30 feet and return, then 50 feet and return and 25 feet and return until end of run, if line is tightly packed. Continue to jet the line until nothing but clear water comes through the line while bringing the nozzle back to the starting position.

When reaching the end of the run, pull the hose back by reversing direction of the control valve lever. If the line is clean, minimum water pressure is needed. When the nozzle returns to the point of entry, lower pressure completely by reducing engine RPM using the throttle control on reel frame. Disengage the auxiliary motor and return the tubes to the racks and place the boom back into transport position.

Recommended jet-rodging frequency shall be as follows:

Perimeter Collection Pipes.....	Annually
Leachate Collection Sump Pipes	Semi-Annually
Subcap Drains	Annually
Gas Extraction Well Transmission Pipes.....	N/A (replace sections of pipe if believed to be obstructed)

During construction, upgrade, or modification periods, it may not be possible to strictly meet the recommended schedule. Pressure will be monitored to evaluate the performance of the lines and frequency will be adjusted based on these results.

APPENDIX D

Specific precautions are provided below:

Precaution	Procedure
1	Provide containment by constructing temporary berms and deploying plastic sheeting if back flow is expected.
2	When jetting down gradient, verify receiving structure and control valves are in ready position to receive jet flow.
3	Vacuum the expressed liquids as they discharge.
4	Vacuum up remaining liquid expressed from cleanout.
5	Excavate impacted soil and dispose of properly.

In addition to keeping the pipes open, an important function of the jet-rodding process is to verify the pipes are open throughout their entire length. The operator will note the maximum distance attained and record it in the form next to the known, constructed length. An example of the records to be kept is attached (form that has been used historically for jet-rodding the cell floor leachate collection lines at the site). If a large disparity between attained length and constructed length is observed, the Environmental Manager will be notified for further direction.

APPENDIX E

LIFT STATION INSPECTION FORM

APPENDIX E

BRIDGETON LANDFILL

LIFT STATION INSPECTION FORM

Date of Inspection: _____

Name of Inspector: _____

Inspection Item	Item Tracking Number(s)
Weekly	
Fittings	
Joints	
Corrosion	
Riser Vertically	
Absence of Flow	
Flow Meter Performance	
Flow Meter Reading	
Transducer Reading	
Control Room Climate Control System	

Note: See attached Lift Station Inspection Item Tracking Form (one per item indicated on the above form).

Inspection Items		
Sump ID	Date	Time

BRIDGETON LANDFILL

LIFT STATION INSPECTION ITEM TRACKING FORM

Tracking No. _____ (e.g. MMDDYY-____)

Inspector's Name: _____

Inspection Item Noted:

Description: _____

Location: _____

Other: _____

Follow-up Technician's Name: _____

Incident Resolution Description: _____

Date of Resolution: _____

Follow-Up Technician's Signature

APPENDIX F

WASTE DEPARTMENT DECISION WITH FILTER CAKE CHARACTERIZATION



Special Waste Summary Report

Contract Number: <u>43381416383</u>	
<u>4338 13 13166</u>	
Landfill :	<u>Roxana</u>
Sales Rep	<u>Cory Evans</u>
Bill To:	<u>Bridgeton Landfill</u>
Acct #:	<u>#910106</u>
Generator Name:	<u>Bridgeton Landfill</u>
Origin:	<u>MO</u>
Waste Name:	<u>Filter Cake</u>
Trux Waste Code	<u>Filter Cake-WV</u>
Inbound Rate:	<u>\$ 15.36</u> UOM: <u>Tons</u>
Minimum:	<u>Fee/Taxes (This should be set up at the Account level w/ Division)</u> (ERF/FRF/Admin/Local)
Manifest Required?	<u>Other Charges:</u> (Trans, Backfill, App, etc.)
ENTERED BY: <u>[Signature]</u> DATE: <u>8-16-17</u>	
ADDITIONALLY APPROVED BY: <u>[Signature]</u> DATE: <u>8-15-17</u>	



Republic Services, Inc.

18500 N. Allied Way, Phoenix, AZ 85054

SPECIAL WASTE DEPARTMENT DECISION

Waste Profile #
43381416383

Expiration Date
9/19/2020

I. Decision Request:

☐ Initial ☒ Recertification ☐ Change

Disposal Facility: 4338 - Roxana L/F

Generator Name: Bridgeton Landfill LLC

Generator Site Address: 13570 St Charles Rock Rd

City: Bridgeton

County:

State: MO

Zip:

Name of Waste: Leachate Filter Cake

Estimated Annual Volume: 40000 Tons

II. Special Waste Department Decision: ☒ Approved ☐ Rejected

Management Method(s): ☒ Landfill ☐ Solidification ☐ Bioremediation ☐ Transfer Facility

Problematic Special Waste according to Republic? ☐ Yes ☒ No

If yes, which one?

Approved by Special Waste Review Committee? ☐ Yes ☐ No ☒ Not Applicable

Precautions, Conditions or Limitations on Approval

This material has been approved as Non-Special/Declassified IL waste in accordance with §40 CFR 261 and the Illinois Environmental Protection Act Section 3.45, and Section 22.48. Free liquids cannot be accepted for landfill disposal §40 CFR 258.28. A Republic Services manifest is required to be used when hauling this Waste.

Special Waste Analyst Signature: 

Date: 8/10/2017

Name (Printed): Suzanne Glass

III. Facility Decision:

☒ Approved ☐ Rejected

Precautions, Conditions or Limitations on Approval

By signing below, the General Manager or Designee agrees that a fully executed Special Waste Service Agreement is on file for this profile and that the special waste file is complete.

General Manager or Designee: 

Date: 8/10/2017

Name (Printed): Roger Cochran



Republic Services, Inc.

18500 N. Allied Way, Phoenix, AZ 85054

SPECIAL WASTE DEPARTMENT DECISION

Waste Profile #
43381416383

Expiration Date
9/19/2020

I. Decision Request:

☐ Initial ☒ Recertification ☐ Change

Disposal Facility: 4338 - Roxana L/F

Generator Name: Bridgeton Landfill LLC

Generator Site Address: 13570 St Charles Rock Rd

City: Bridgeton

County:

State: MO

Zip:

Name of Waste: Leachate Filter Cake

Estimated Annual Volume: 40000 Tons

II. Special Waste Department Decision:

☒ Approved ☐ Rejected

Management Method(s): ☒ Landfill ☐ Solidification ☐ Bioremediation ☐ Transfer Facility

Problematic Special Waste according to Republic? ☐ Yes ☒ No

If yes, which one?

Approved by Special Waste Review Committee? ☐ Yes ☐ No ☒ Not Applicable

Precautions, Conditions or Limitations on Approval

This material has been approved as Non-Special/Declassified IL waste in accordance with §40 CFR 261 and the Illinois Environmental Protection Act Section 3.45, and Section 22.48.
Free liquids cannot be accepted for landfill disposal §40 CFR 258.28. A Republic Services manifest is required to be used when hauling this Waste.

Special Waste Analyst Signature: 

Date: 8/10/2017

Name (Printed): Suzanne Glass

III. Facility Decision:

☐ Approved ☐ Rejected

Precautions, Conditions or Limitations on Approval

By signing below, the General Manager or Designee agrees that a fully executed Special Waste Service Agreement is on file for this profile and that the special waste file is complete.

General Manager or Designee: _____

Name (Printed): _____

Date: 8/10/2017

SPECIAL WASTE PROFILE - RECERTIFICATION

Saveable fill-in form. Restricted printing until all required (yellow) fields are completed.

Waste Profile #
43381416383

Disposal Facility: 4338 Roxana LF IL

I. Generator Information

Generator Name: Bridgeton Landfill, LLC			
Generator Site Address: 13570 St Charles Rock Road			
City: Bridgeton	County: St Louis	State: Missouri	Zip: 63044
State ID/Reg No:	State Approval/Waste Code:		NAICS #:
Generator Mailing Address (if different): <input type="checkbox"/> 13570 St Charles Rock Road			
City: Bridgeton	County: St Louis	State: Missouri	Zip: 63044
Generator Contact Name: Dana Sincox, Environmental Manager			Email: dsincox@republicservices.com
Phone Number: (314) 313-0838		Fax Number:	

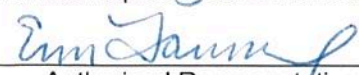
II. Waste Stream Information

Name of Waste: Leachate Filter Cake	
Check Section 1 OR Section 2 below:	
1. <input type="checkbox"/>	<p><u>There has been a change</u> in the characteristics of the waste stream due to the following:</p> <ul style="list-style-type: none"> a. Change of a raw material used in the waste generating process. b. Change in the waste generating process itself. c. Change in a physical characteristic of the waste. d. New information has been documented concerning the human health effects of exposure to the waste. <p>If any of these changes have occurred, a new laboratory analysis and profile sheet must be completed. Attach copies of the new chemical analysis and new Special Waste Profile with the appropriate signatures.</p>
2. <input checked="" type="checkbox"/>	<p><u>There have been no changes</u> that would alter the physical characteristics of the special waste stream. Updated analytical may be required.</p>

III. Representative Sample Certification

<input checked="" type="checkbox"/> No Sample Taken	
Is the representative sample collected to prepare this profile and laboratory analysis, collected in accordance with U.S. EPA 40 CFR 261.20(c) guidelines or equivalent rules?	<input type="checkbox"/> YES or <input type="checkbox"/> NO
Type of Sample: <input type="checkbox"/> COMPOSITE SAMPLE <input type="checkbox"/> GRAB SAMPLE	
Sample Date:	
Sample ID Numbers:	

IV. Certification

I hereby certify that to the best of my knowledge and belief, the information contained in the Special Waste Profile - Recertification and the information in the Original Special Waste Profile is true, complete and accurate.	
<div style="background-color: yellow; padding: 5px; margin-bottom: 5px;"> Erin Fanning / Division Manager </div> <p style="text-align: center;">Authorized Representative Name And Title (Printed)</p> <div style="background-color: yellow; padding: 5px; margin-bottom: 5px;">  </div> <p style="text-align: center;">Authorized Representative Signature</p>	<div style="background-color: yellow; padding: 5px; margin-bottom: 5px;"> Bridgeton Landfill LLC </div> <p style="text-align: center;">Company Name</p> <div style="background-color: yellow; padding: 5px; margin-bottom: 5px;"> 8/9/2017 </div> <p style="text-align: center;">Date</p>



Date: _____

Time: _____

SPECIAL WASTE INSPECTION SHEET☐ Initial ☐ Random ☐ Suspicious ☒ RecertificationDisposal Facility: Roxana Waste Profile # 43381416383Generator Name: Bridgeton LFName of Waste: Leachage Filter CakeTransporter Name: I/C

Transporter Phone Number: _____

Driver Name: _____

Vehicle License Plate Number and State: _____

Physical ScreeningINDICATE **YES** OR **NO** FOR EACH OF THE FOLLOWING TESTS AND NOTE ANY DESCREPARNCIES. DO THE CHARACTERISTICS OF THE WASTE MATCH THE PROVIDED INFORMATION ON THE SPECIAL WASTE PROFILE?

<u>Characteristics</u>	<u>Profile</u>	<u>Yes</u>	<u>No</u>	<u>Comments and/or Observations:</u>
Color	<u>dark</u>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Odor	<u>none</u>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Physical State	<u>solid</u>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Free Liquids	<u>no</u>	<input type="checkbox"/>	<input type="checkbox"/>	_____

Is a Photograph Attached? ☐☐

Initial Load Must Include Photograph

IF WASTE FAILS ONE OR MORE OF THE PHYSICAL SCREENING TESTS, THE WASTE IS DEEMED UNACCEPTABLE FOR DISPOSAL AND SHOULD BE REJECTED.

Waste Accepted

Inspector Signature _____

Date _____

Waste Rejected (If Rejected then a Photograph MUST be attached.)**Reasons for Rejection**☐ Extraneous and/or Unauthorized Material☐ Suspected Hazardous Waste☐ Suspected PCB Waste☐ Suspected PCB Waste☐ Free Liquids☐ Does Not Match Profile**Comments**

Inspector Signature _____

Date _____

General Manager or Designee _____

Date _____