OPERATION, MAINTENANCE, AND MONITORING PLAN

VOLUME 2

Gas and Subsurface Control Systems

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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 landfill. The effects of the reactions produce 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, minimizing lateral gas migration and fugitive surface emissions.

The existing GCCS consists of a series of active gas extraction wells (GEW) 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 additional 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: perimeter extraction wells (PEWs), leachate collection sumps (LCSs), perimeter sumps (PSs), horizontal collection sumps (HZs), over liner collection (OLs), surface collection points (SCs), grit chambers (GCs), lift stations (LSs) 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.
Gas Conveyance Pipe Network	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.
Dewatering System Conveyance Pipe Network	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 quarterly infrastructure report shows the location of the currently-active GEWs used for gas collection and control. Actual up-to-date as-built drawings and GEWs 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 additional 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 gas extraction from a compromised GEW, but which obstructs physical access when a GEW has been compromised yet leachate and/or gas continues to be collected from the near surface the extraction point which will be relabeled a SEW with corresponding identification number on updated infrastructure drawings.
- Leachate Collection Sumps (LCS) – Currently six deep landfill extraction sumps (designated as LCS- #) each 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 perimeter sumps at the perimeter of the landfill (designated PS- #) with each are connected to the gas collection system for fugitive odor control.
- Horizontal Collection Sumps (HZ) – A leachate collection trench located within waste in the site's "amphitheater" area. Five horizontal collection sumps provide gas collection points from this feature. The designation 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- #),
    - 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. This includes the strip drains and collector berms which 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 NSPS oxygen operational requirements.

- Perimeter Extraction Wells – A series of wells located outside of the refuse limits (excluding PEW-60 located within waste) for controlling landfill gas migration from the waste mass. The designation is PEW - #. These devices are considered outside of the waste for oxygen NSPS operational requirements.
- Gas Migration Interceptor Trenches – A perimeter trench typically located outside of the refuse limits installed and operated to mitigate gas migration. The designation is IT - #. These devices are considered outside of the waste for oxygen NSPS operational requirements.
- Phase Separation Vessel's – Frac tanks or vessel's used to collect hot saturated gas or gas from wells that are ejecting steam and/or liquid. The vessel's allow gravity and condensation separation of the gas and liquid components. The designation is Extraction Point - # (i.e. GEW-59), the ID (alphanumeric) corresponds with the extraction point that is ejecting steam and/or liquid and 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. The designation end 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 are routed to the grit chambers where the vessel allow 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), the ID (alphanumeric) corresponds with the extraction point that is ejecting steam and/or liquid and cannot be safely monitored at the wellhead.
- Lift Stations – Leachate is pumped from the wet well to provide transport of the leachate and condensate through the perimeter force main piping to the leachate pretreatment plant. Lift stations may be connected to the gas collection system for odor control. The designation ends with "LS". These devices are considered outside of the waste for oxygen and temperature NSPS operational requirements.

The above list of remedial active extraction points are temporary gas control points and installed as remediation efforts associated with the SSR to reduce odors or to alleviate lateral subsurface gas migration. These remedial active points are not designed to comply with New Source

Performance Standards (NSPS) and are used as operational controls associated with the remediation efforts. As such these referenced points shall be excluded from NSPS standards.

The NSPS regulation process is, necessarily, considered separate and distinct from the requirements and goals of this OM&M Plan. As such, regulated NSPS extraction points will be reported in accordance with NSPS (temperature, pressure and oxygen) in the semi-annual report. However no further corrective action will be required in areas impacted by the SSR if the corrective action is taken as specified in Section 2.2.1. Supplemental reports, in accordance with the Title V permit, will not continue for remedial active points as these collection points are temporary and are not required to meet NSPS operational and compliance provisions.

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 wells for improving gas collection efficiency, and provides data which provides additional insight to the conditions existing within the landfill waste mass.

Measurements are made in the field at the wellhead sampling port using an Envision^{TM} – 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.

2.2 GENERAL GCCS OPERATION

Gas from the gas extraction points (GEWs, subcap gas collectors, and other gas collection devices, etc.) flow 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 and pressure requirements challenging at many gas extraction wells. 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% (GEW only)
Pressure[3]	<0" wc	<0" wc

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

[2]The temperature goal is only applicable to extraction points outside the SSR delineated area.

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

Bridgeton Landfill will continue to comply with NSPS regulation for the applicable regulation NSPS extraction points in the SSR delineated area 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. 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, regulated NSPS extraction points will be reported in accordance with NSPS (temperature, pressure and oxygen) in the semi-annual report. However no further corrective action per NSPS will be required in areas impacted by the SSR. If monitoring demonstrates that the operational requirements set forth in this OM&M plan are not met, corrective action shall be taken as specified in Appendix E and F. If corrective actions are taken, the monitored exceedance is not a violation of the operation requirements of NSPS. Supplemental reports, in accordance with the Title V permit, will continue, for GEWs only, if there is deviation of the alternative operational standards.

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 and beyond are producing reduced amounts of methane. The SSR's primary byproduct is the production of heat that is well above that produced by normal methanogenesis of methane in MSW landfills. Therefore, the 131° F temperature goal is not currently achievable for many extraction points within the SSR delineated area or temporary controls associated with remedial action efforts in response to the SSR. The technician will strive to maintain 131˚ F where possible; however, in areas impacted by the SSR, 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 elevated temperatures located within the delineated area of the SSR unless it is a measure to control migration of gas or odor above the public nuisance threshold (7:1 dilution) beyond the property boundary.

To assist with the 5% oxygen NSPS operating parameter for regulated NSPS extraction points, 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 per 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. Furthermore, the remedial active extraction points are not air-tight extraction points and will contain oxygen which is unrelated to the oxygen within the waste mass and excluded from NSPS.

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 all 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. The procedures outlined in Appendix E shall be followed during each monitoring event.

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 the procedure contained in Appendix F. If after following the procedures outlined in Appendix F and 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.

Within the SSR impacted area extraction points may be impacted by hot saturated gas or are ejecting steam and/or liquid. To reduce odors at these extraction points the gases and liquid will be connected to a phase separation vessel, included but not limited to grit chamber and frac tanks, 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. 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.

Due to the SSR conditions gas extraction points may not be accessible periodically to conduct surface testing and well field monitoring. Areas deemed dangerous for personnel to access (i.e., raised, high temperature, excess settlement and construction areas) may be excluded from monitoring. Only extraction points and areas of the landfill that can be safely accessed will be monitored. Areas or extraction points not monitored shall be reported to the Environmental

Specialist. 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. Extraction points and surface monitoring areas excluded from monthly monitoring or monitored at an alternative location will be reported in accordance with NSPS in the semi-annual report however no further corrective action will be required in areas impacted by the SSR.

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 unsafe conditions exist. Such changes will be made and updated record documents will be provided during the 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.

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 October 27, 2015 to identify and respond to a suspected SSO.

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 the Environmental Manager or Specialist 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 all the gas being generated by the landfill, and could result in surface emissions, odors, and offsite gas migration,
- 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. 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,
- The monitoring location shall be representative of the vacuum applied to the well field.

Vacuum set-point, once established, will not be changed unless the Environmental Specialist or Environmental Manager 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 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 each tuning event:

- Inlet to control device prime mover (before and after tuning event),

- Point where vacuum is distributed to the well field piping (before and after tuning event), and
- At condensate and leachate sumps (vacuum reading only).

2.4 DATA MANAGEMENT

Proper management of field data is critical. Accurate and complete records of all 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 all 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 Environmental Manager's or appropriate Environmental Specialist's office at the landfill.

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 gas extraction well has a well head 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 11 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 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 which is collected from low points in the gas collection system 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 Environmental Manager's or appropriate Environmental Specialist's office at the landfill.

2.8 BLOWERS AND FLARES

The landfill control devices consists primarily 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 manufacture'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 programed 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

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 remedial active extraction points may be routed to an alternative control device for odor control. These devices may differ depending on emission control demands and system choice will be based upon established engineering principles. Remedial active control points are not designed to comply with NSPS and are used as operational controls associated with the remediation efforts. As such these control devices shall be excluded from 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 Volume 3 – Leachate Management Systems.

2.9.4 Other Appropriate Control Devices

Other devices not mentioned may be found 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, 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 which has a capacity of 250 gpm and is able to temperature treat from 108^{o}F to 85^{o}F at 78^{o}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 which will make the GCCS less efficient than it should be. Appropriate spare part inventories will be maintained at all times. All maintenance activities shall be performed using good housekeeping practices: all 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 remove) if rendered ineffective or unsafe conditions exist.

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, reduce accumulated gas pressure and/or liquids. At the time of temporary decommissioning the extraction points are functional but no longer needed as a gas extraction point 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 well should be properly abandoned using the procedure described in Appendix H, or modified to function as a surface collector. Replacement of the gas well, when necessary, will include the requirements contained in Appendix I.

The site will proceed with the above changes and provide updated record 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 the 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

Inspect pump operation at 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 and check and clean the air filters. Perform the following on maintenance activities:

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

See Appendix L for procedures.

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 decrease in methane content, increase in hydrogen content, increase in 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 manufacturer's 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.

The Environmental Specialist 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:

<u>Control System</u>

- 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.

<u>Collection System</u>

- 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 special condensate sumps and then managed as leachate. The condensate management system includes condensate sumps, flare KOP, pumps, and piping. Procedures for inspecting and maintaining these systems are provided 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.

Additional inspection and maintenance procedures for the collection and conveyance piping systems are provided in Appendix O.

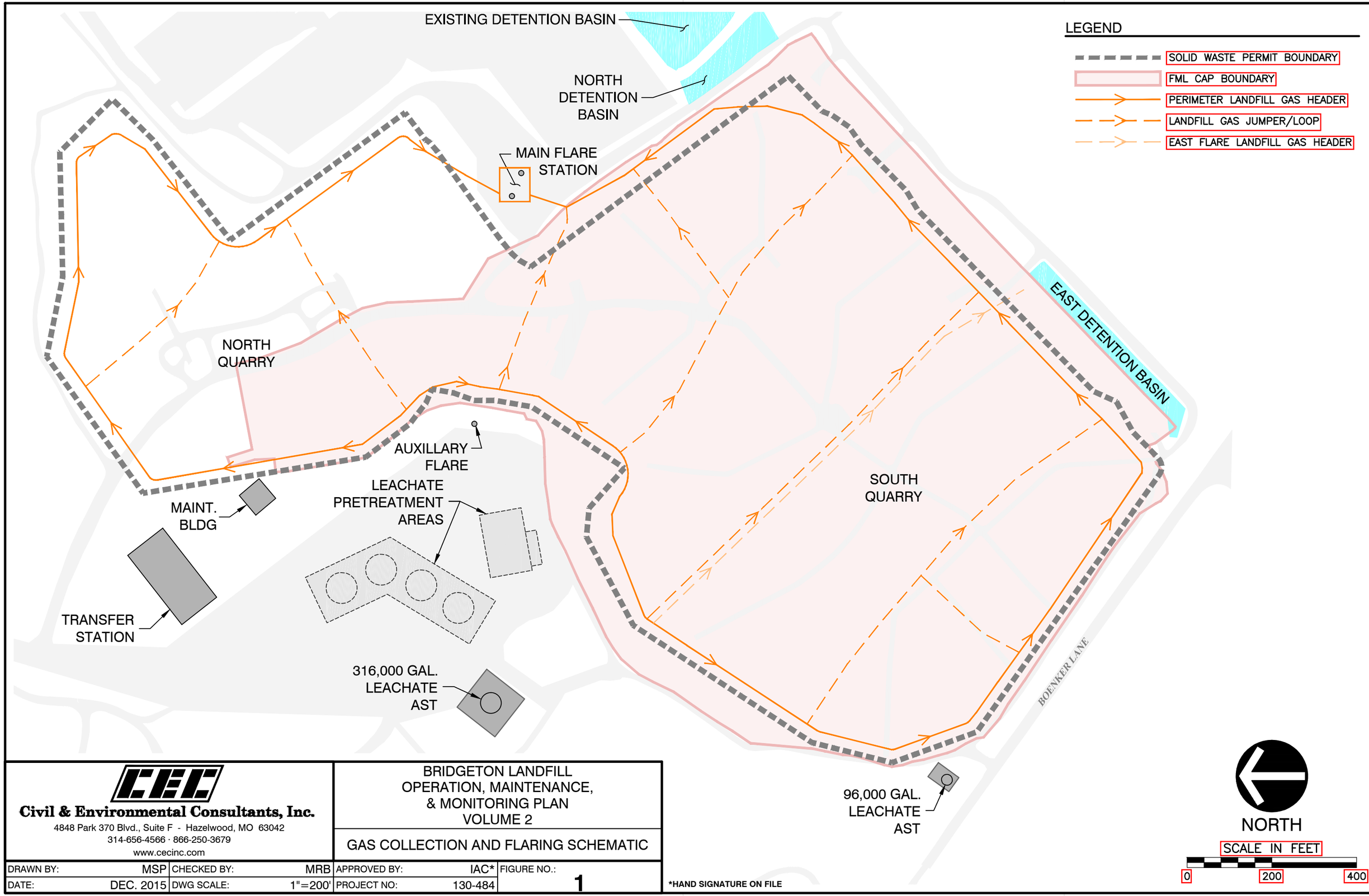
TABLES

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 L
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 M
Air compressors	Each monitoring event*	Inspect oil levels, air filter, and building heat. Follow manufacturer's recommended specs.	Appendix N
Blowers (at Flares)	Each monitoring event*	Bearing temperature, proper lubrication, vibration, and drive belts.	Appendix O
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 O
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 O
Flares	Semi-annually	Check for loose wires in electric controls. Calibrate flow meter. Follow manufacturer's recommended specs.	Appendix O
Flares	Annually	Inspect thermocouples for heat damage. Follow manufacturer's recommended specs.	Appendix O
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 P
Knock-Out Pot (KOP)	Monthly	Verify site glass is intact and unobstructed and drain KOP. Maximum differential pressure 1".	Appendix O
KOP Demister Pad (DP)	Annually	Clean or replace annually. Follow manufacturer's recommended specs.	Appendix O
Collection Piping	Quarterly	Air and force main and GCCS piping inspection.	Appendix Q
Collection Piping	Annually	Collection structures (manholes, condensate traps, etc.)	Appendix Q

*=As per Volume 1 Table 2

FIGURES



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BRIDGETON LANDFILL
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VOLUME 2

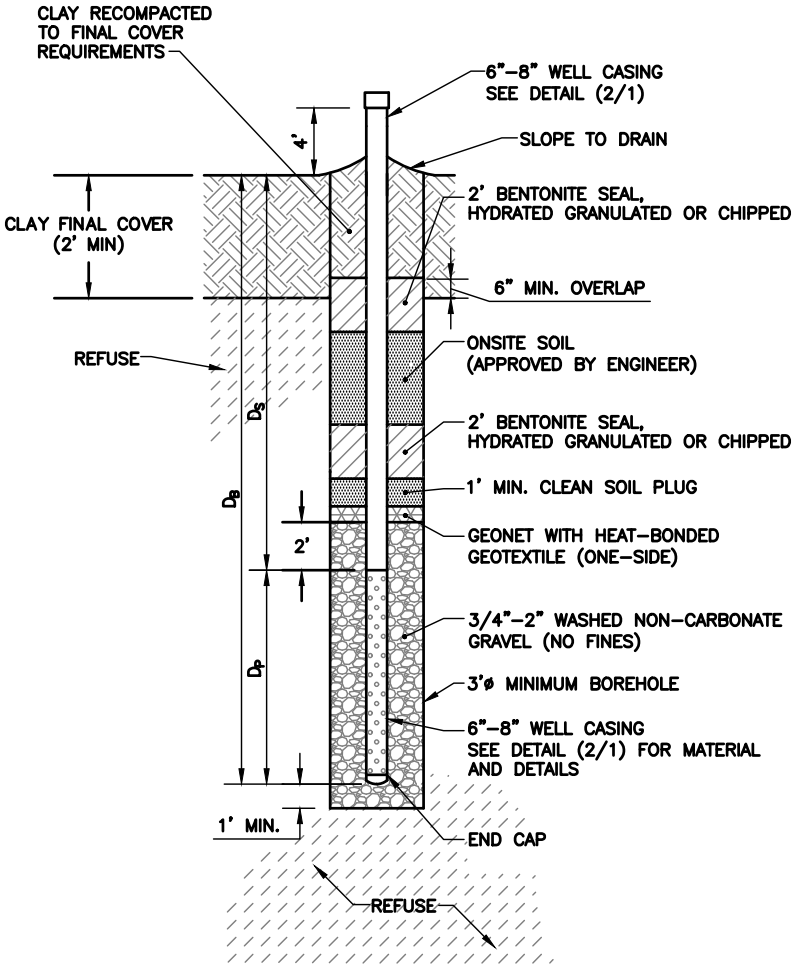
GAS COLLECTION AND FLARING SCHEMATIC

DRAWN BY:	MSP	CHECKED BY:	MRB	APPROVED BY:	IAC*	FIGURE NO.:	1
DATE:	DEC. 2015	DWG SCALE:	1"=200'	PROJECT NO:	130-484		

*HAND SIGNATURE ON FILE

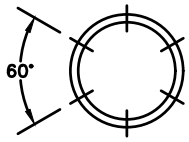
APPENDIX A

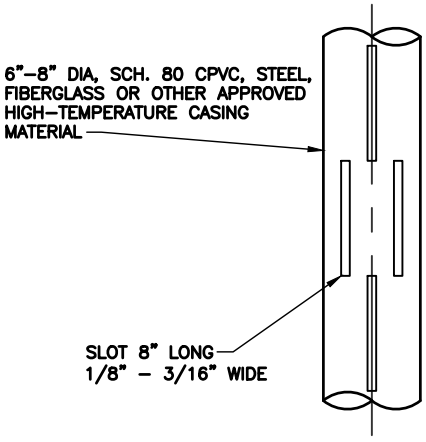
TYPICAL GCCS DETAIL DRAWINGS



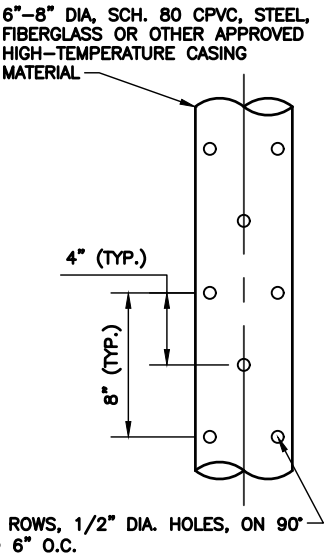
NOTES:
1. D_B = DEPTH OF BORING
   D_S = DEPTH OF SOLID PIPE (BELOW GRADE) –20 FT. MINIMUM
   D_P = LENGTH OF PERFORATED PIPE

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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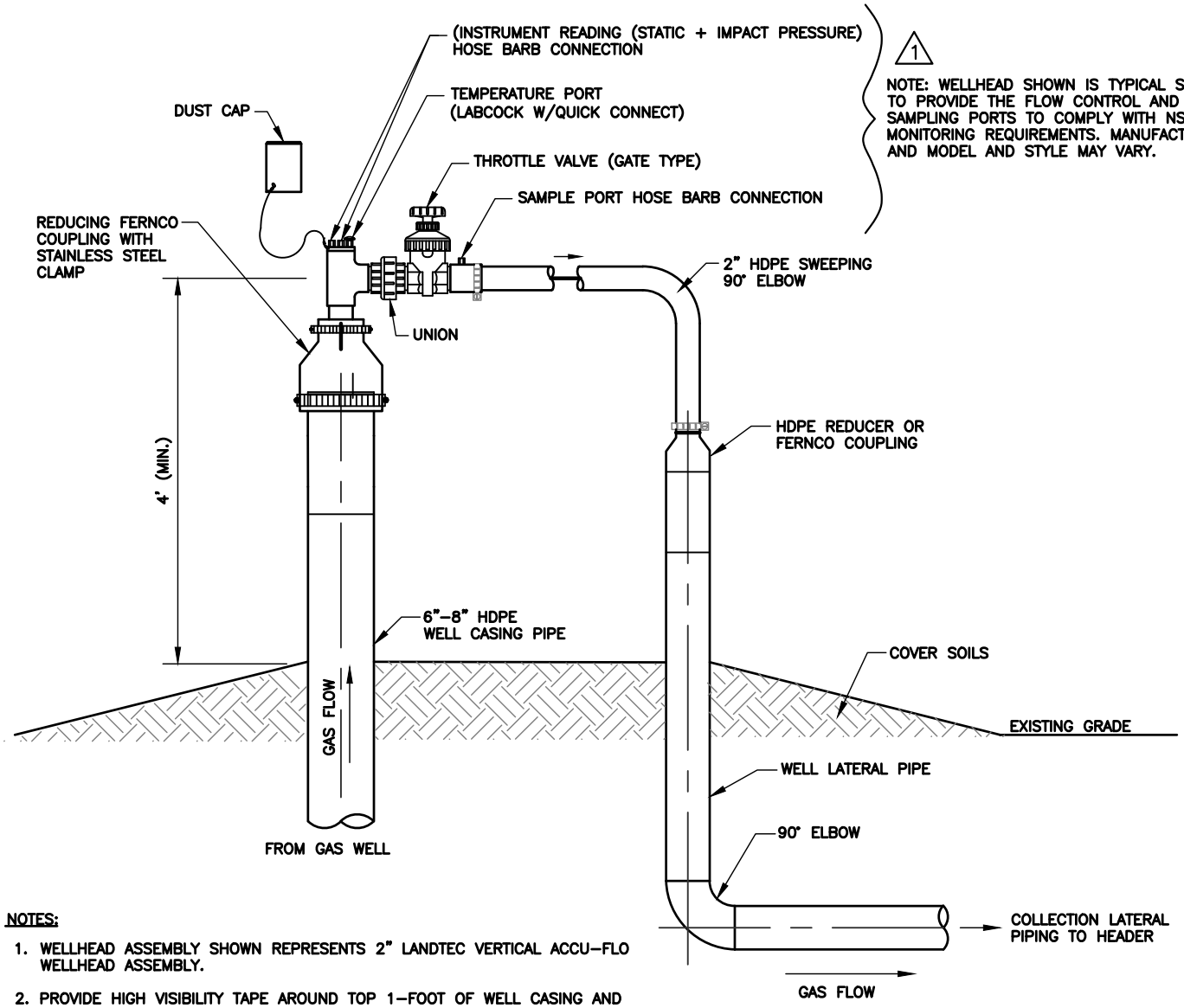
TYPICAL GAS WELL INSTALLATION DETAIL

DRAWN BY:	JM	CHECKED BY:	MB	APPROVED BY:	MB	FIGURE NO.:	1
DATE:	SEPT. 2013	DWG SCALE:	NTS	PROJECT NO:	131-178		



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.

1/2 WELLHEAD
N.T.S.

1	12/18/15	NOTE UPDATE

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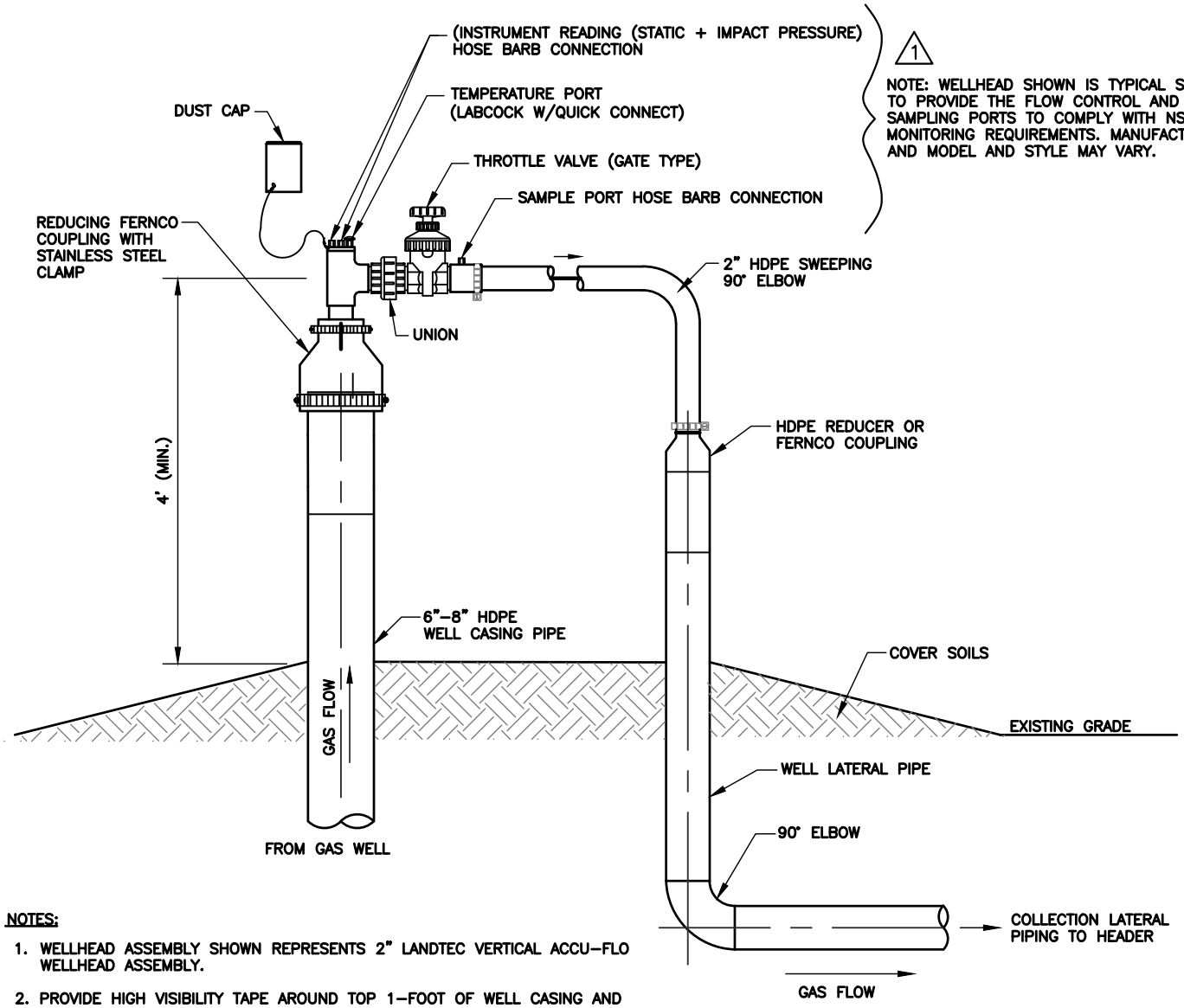
TYPICAL HARD PIPED WELLHEAD

DRAWN BY:	JM	CHECKED BY:	MB	APPROVED BY:	MB	FIGURE NO.:	2
DATE:	SEPT. 2013	DWG SCALE:	NTS	PROJECT NO:	130-484		



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.

1/2 WELLHEAD
N.T.S.

1	12/18/15	NOTE UPDATE

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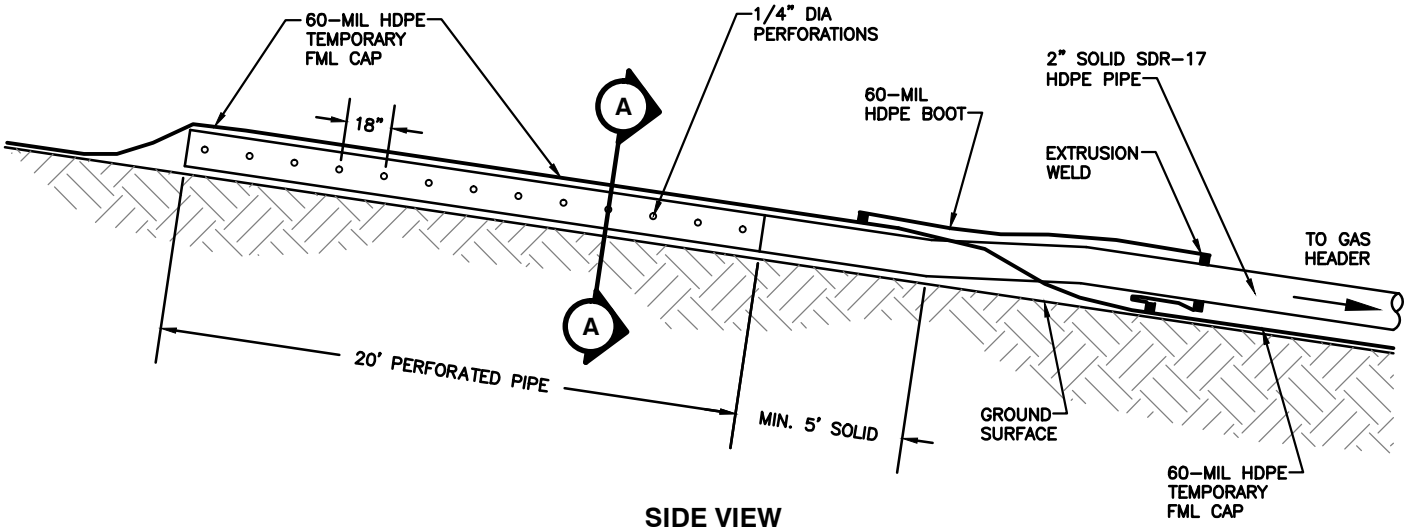
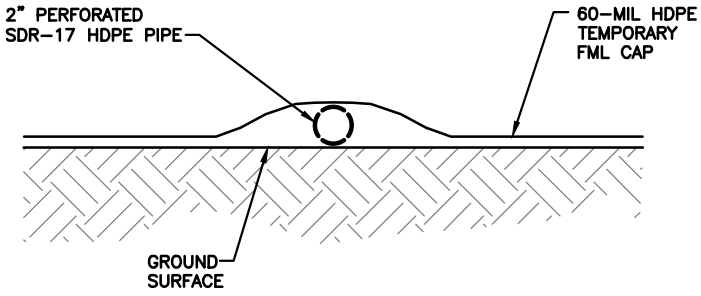
TYPICAL HARD PIPED WELLHEAD

DRAWN BY:	JM	CHECKED BY:	MB	APPROVED BY:	MB	FIGURE NO.:	2
DATE:	SEPT. 2013	DWG SCALE:	NTS	PROJECT NO:	130-484		



SIDE VIEW



SECTION A

1/3 SUB-CAP FML GAS "BUBBLESUCKER" DETAIL

N.T.S.

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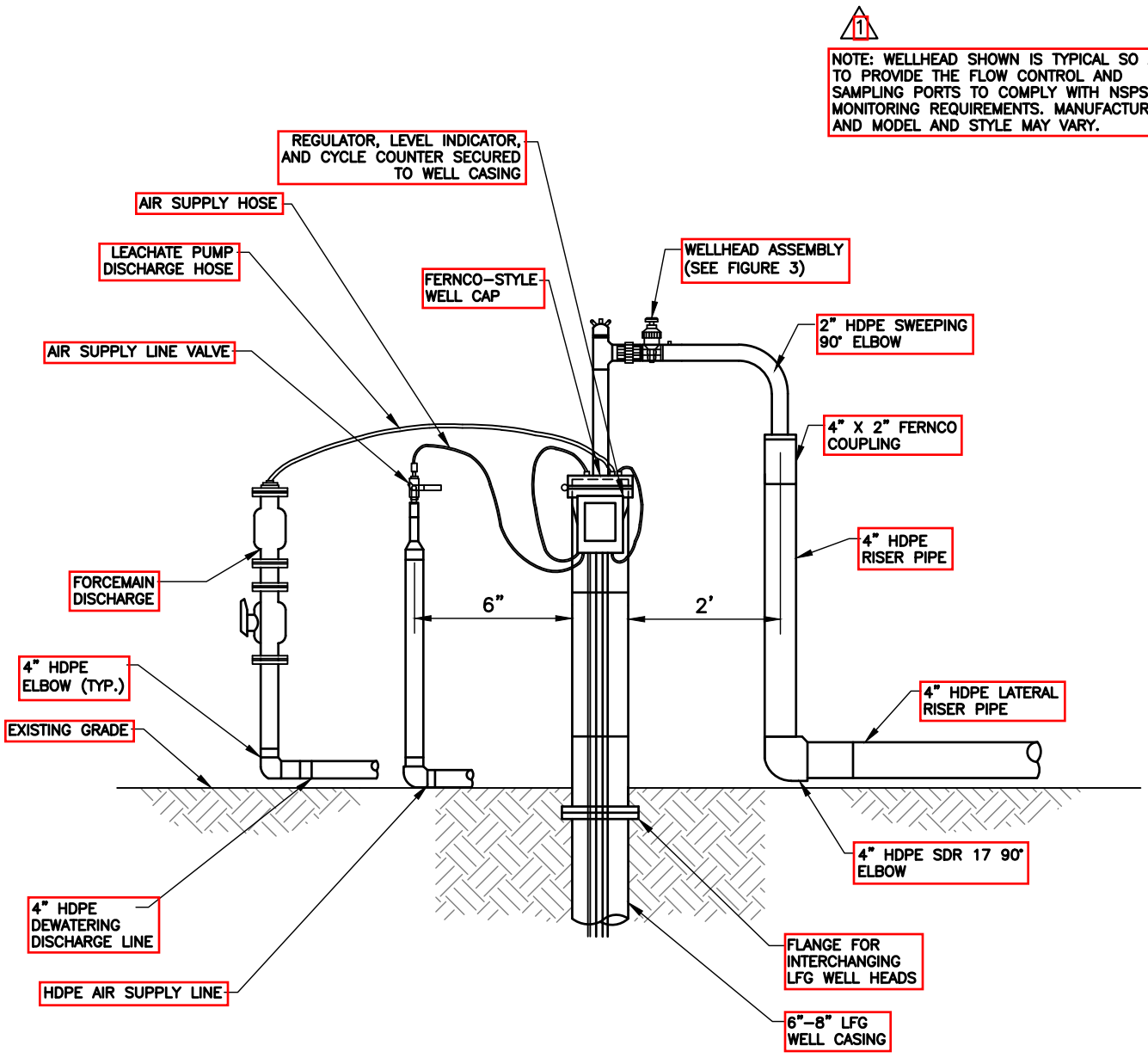
MONITORING PLAN

TYPICAL SUB-CAP FML GAS
"BUBBLESUCKER" DETAIL

DRAWN BY:	JM	CHECKED BY:	MB	APPROVED BY:	MB	FIGURE NO.:	3
DATE:	SEPT. 2013	DWG SCALE:	NTS	PROJECT NO:	131-178		

P:\2013\131-178\-CADD\Dwg\131178_Details.dwg{DETAIL 3} LS:(8/26/2013 - jmccutcheon) - LP: 9/11/2013 3:11 PM



1/4 DUAL-PHASE EXTRACTION WELL

N.T.S.

1	12/18/15	NOTE UPDATE

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TYPICAL DUAL-PHASE EXTRACTION WELL DETAIL

DRAWN BY:	JM	CHECKED BY:	MB	APPROVED BY:	MB	FIGURE NO.:	4
DATE:	SEPT. 2013	DWG SCALE:	NTS	PROJECT NO:	131-178		

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 compete 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.

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.

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,

- 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.

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 3 times per day for monitoring events that last greater than 4 hours Calibrate a minimum of two times 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.

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% CH_4 / 35% CO^2 / 4% O_2 for monitoring the landfill gas collection system, and
    - 15% CH_4 / 15% CO^2 / 4% O_2 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.

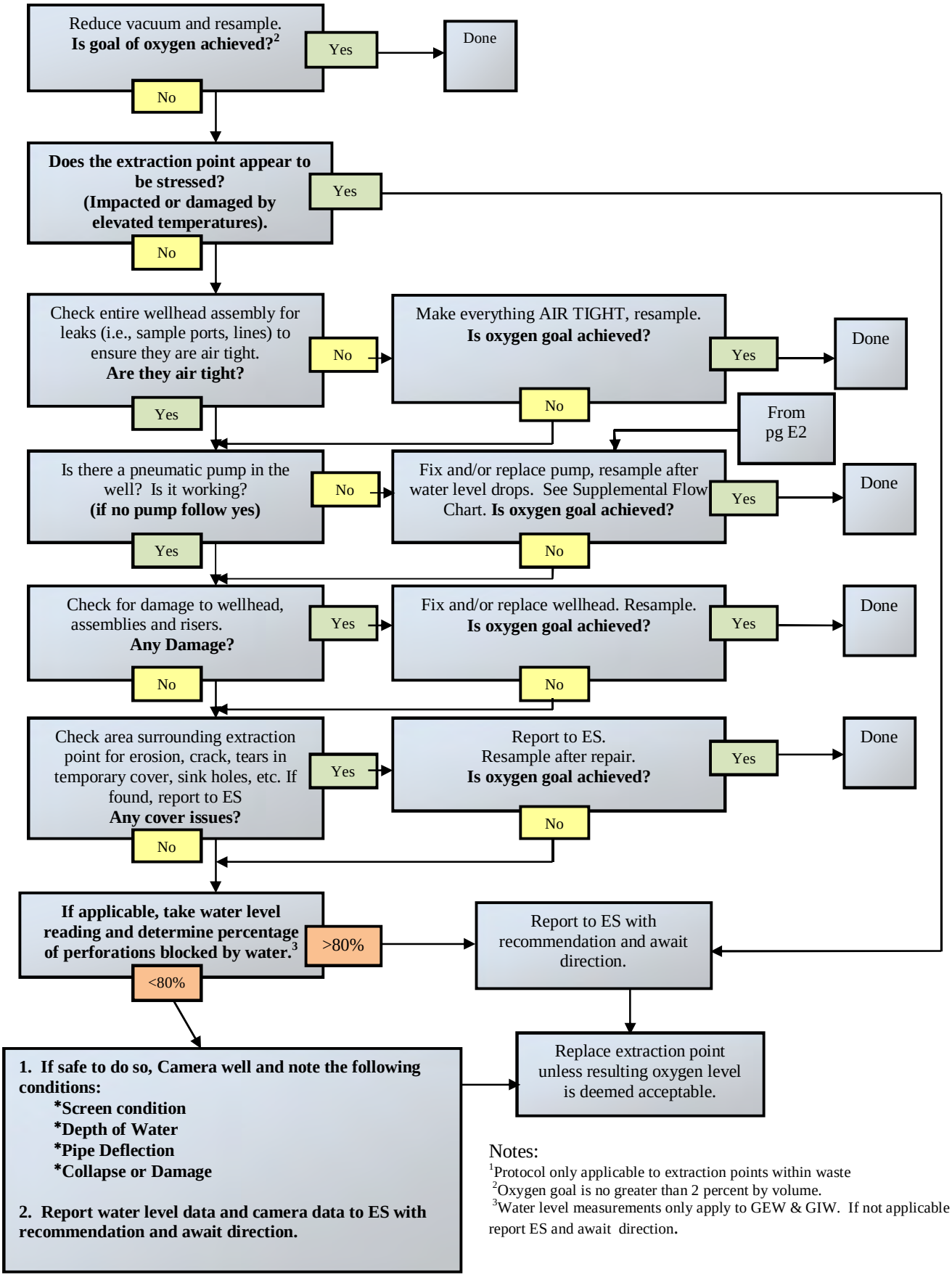
J. Calibrate pressure sensors. Also, zero transducers before each wellhead reading if sensors read anything other than 0.00 when disconnected from the wellhead.

APPENDIX E

EXTRACTION POINT ASSESSMENT PROTOCOL – OXYGEN >2%

Appendix E

Extraction Point Assessment Protocol-Oxygen[1]



Notes:

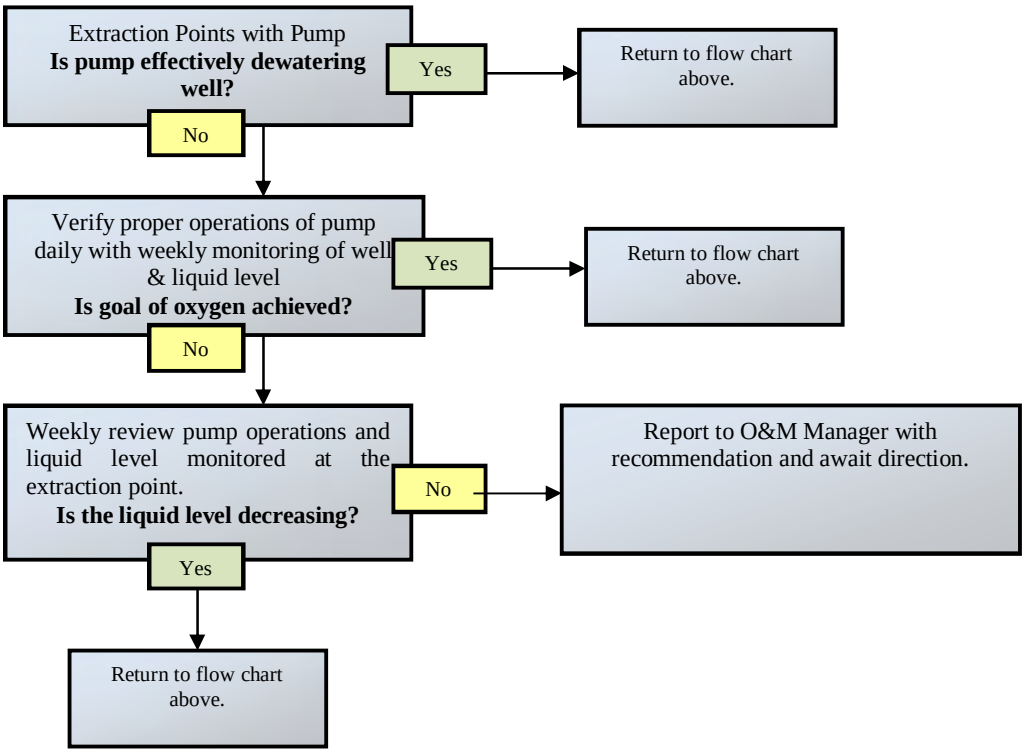
[1]Protocol only applicable to extraction points within waste

[2]Oxygen goal is no greater than 2 percent by volume.

[3]Water level measurements only apply to GEW & GIW. If not applicable report ES and await direction.

Appendix E (page 2)

Extraction Point Assessment Protocol-Oxygen with Pump

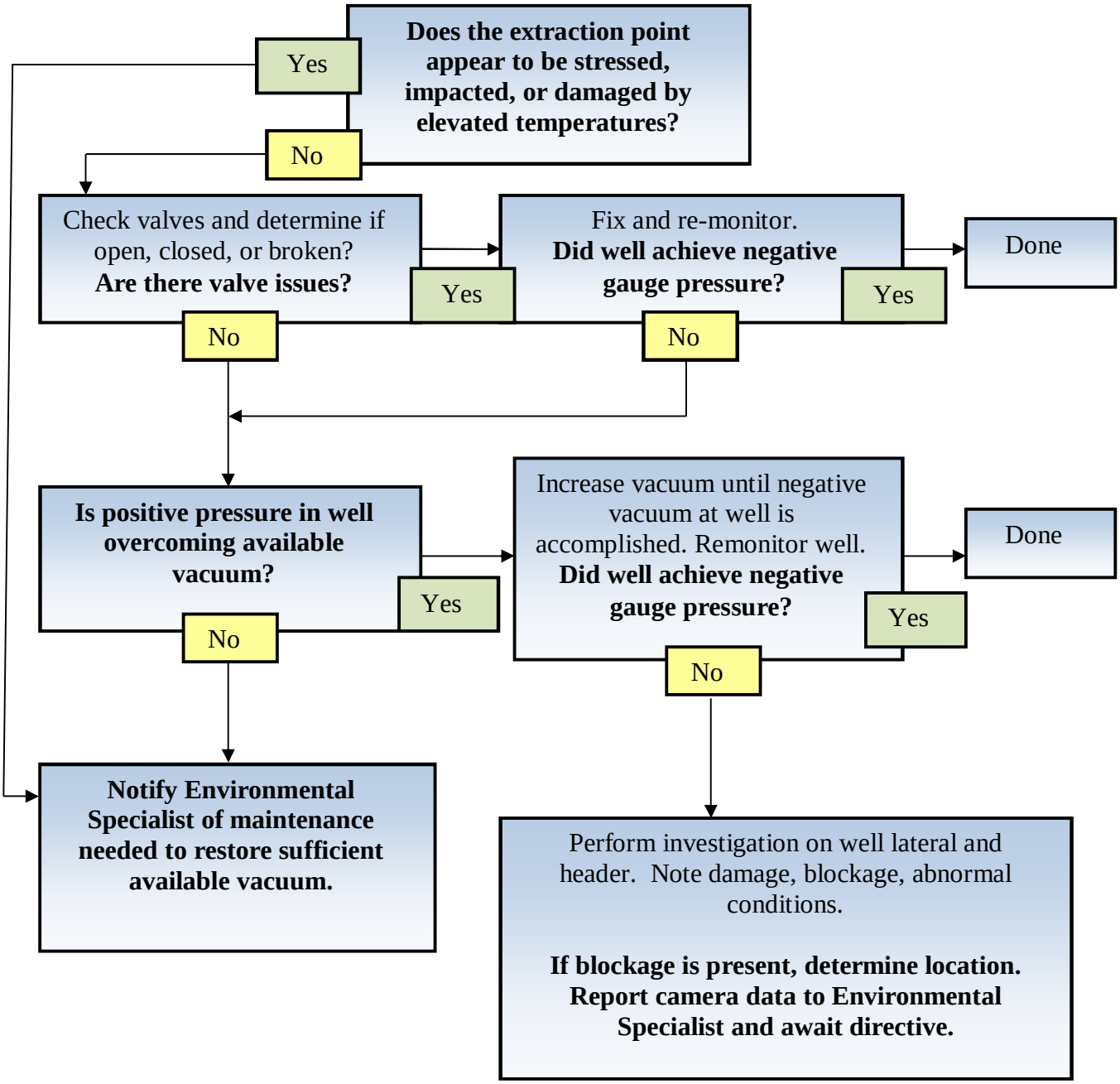


APPENDIX F

GAS WELL ASSESSMENT PROTOCOL – POSITIVE PRESSURE

APPENDIX F

Landfill Gas Extraction Well Assessment Protocol
Positive Pressure



Temperature and Oxygen parameters are discussed in separate protocols.

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 Solinist 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 learning 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.

2) Excavate area around well and fill void with concerete, 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 L
Bridgeton Landfill
Compressor Inspection Sheet

Technician: _____
Date of Monitoring: _____

	Each Wellfield Monitoring Event		Monthly Check
Operational (Y/N)		Bleed liquid from system	
System Alarms?		Inspect Air Dryer	
Oil Level		Inspect and Adjust Belts	
Air Filter (Cleaned/Changed)		General Housekeeping	
Building Air Temp		Parts Inventory	
Tank Pressure			
Outlet Pressure			
Hour Meter			
Visible/Audible Leaks			

Additional Comments:

_____
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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 date 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.

Piping	***Date Discovered***	***Deficiency***	***Date Corrected***	***Tech***