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DESIGN REPORT-
LANDFILL GAS SYSTEM MODIFICATIONS

REFUSE HIDEAWAY LANDFILL
BRRTS NO. 02-13-000849
CONSTRUCTION PROJECT NO. RRSP
7562 U.S. HIGHWAY 14
MIDDLETON, WISCONSIN 53562

Prepared for:

The Wisconsin Department of Natural Resources
Madison, Wisconsin

March 27, 2014

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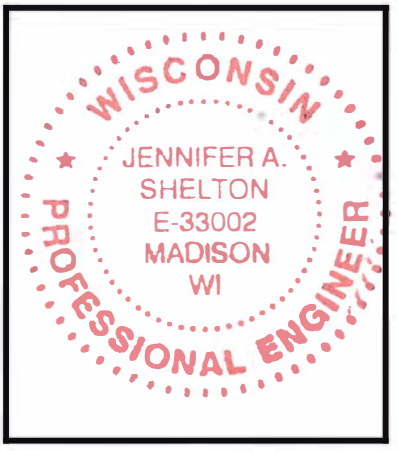
SUBMITTAL CERTIFICATION

I, Jennifer A. Shelton, hereby certify that I am a registered professional engineer in the State of Wisconsin, registered in accordance with the requirements of ch. A-E4, Wis. Adm. Code; that this document has been prepared in accordance with the Rules of Professional Conduct in ch. A-E8, Wis. Adm. Code; and that, to the best of my knowledge, all information contained in this document is correct and the document was prepared in compliance with all applicable requirements in chs. NR 700 to 726, Wis. Adm. Code.



Jennifer Shelton

Jennifer A. Shelton, P.E.
Associate

3-27-14

Date

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1 INTRODUCTION

Leggette, Brashears & Graham, Inc. (LBG) was awarded a contract by the Wisconsin Department of Natural Resources (WDNR) to provide remedial design services for upgrading the landfill gas extraction and combustion system at the Refuse Hideaway Landfill (Site). This design report was prepared in order to document the design rationale for the system modifications in accordance with Wisconsin Administrative Code s. NR 724.09.

1.1 Site Location

The Site is located at 7562 U.S. Highway 14 in the Town of Middleton, Dane County, Wisconsin. The landfill is within the southwest quarter of the northwest quarter of Section 8 of Township 7 North, Range 8 East in the Town of Middleton. A Site location map is included as **Figure 1**. The latitude and longitude of the property are as follows:

Latitude: 43.0981992; Longitude: -89.5783898

1.2 Project Contacts

Current ownership of the Site property is undefined. In the 1980's, the Site owner was Refuse Hideaway, Inc. Mr. John DeBeck was either the sole stockholder or one of the stockholders of this corporation. The corporation was dissolved in 1990 and Mr. DeBeck passed away in 1998. Due to the on-going remedial actions at the Site, the WDNR serves as the lead regulatory agency and controls Site security and access.

Contact information for the WDNR project manager is as follows:

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101 S Webster Street - RR/5
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Contact information for the Site operation and maintenance (O&M) consultant and the environmental design firm project manager is as follows:

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1.3 Brief Facility History

The 23-acre landfill was filled with approximately 1.2 million cubic yards of municipal, commercial, and industrial waste during the period of 1974 to 1988. In 1986, the volume of waste deposited was nearing the landfill's design capacity and preparatory work was initiated to cease landfill operations. The presence of landfill seeps in 1986 and other operational issues prompted the WDNR to begin regulatory actions against the owner. The site was closed under court order in 1988 when volatile organic compounds (VOCs) were detected in private wells southwest of the Site. In addition, methane gas was migrating from the waste. The landfill was covered in October 1988 with a minimum of 2 feet of clay, 18 inches of general soil, and 6 inches of topsoil. The WDNR, through the Environmental Repair Program, constructed an active gas extraction and combustion system and a leachate recovery system, which became operational on September 1, 1991. The location of extraction wells and the general configuration of the piping network are depicted on **Figure 2**. System O&M activities and landfill surface inspections continue to be conducted.

1.4 Project Scope of Work

The WDNR's Scope of Work (SOW) for this project includes the design of a replacement gas combustion flare and control system, a remedy to restore the collection of landfill gas (LFG) from the South branch, a plan for the removal of existing equipment, and revisions to the Site O&M Manual. During a subsequent meeting with the WDNR project manager, the task of removing equipment that was no longer in use from the Site was eliminated from the SOW. The project includes system design tasks and the preparation of bid documents. System construction oversight and system O&M are beyond the scope of this project.

The purpose of the design report is to document the design rationale for the gas extraction and combustion system modifications and to provide a summary of design activities (i.e. pilot tests). To fulfill its purpose, the design report includes the following:

- A summary of historical remedial action objectives and a synopsis of implemented remedial actions;
- Background information regarding the O&M of the LFG extraction and combustion system;
- Objectives of the gas system repair project;
- Design rationale including calculations and references;
- Required permits, licenses and approvals;
- Pilot test data;
- Regulatory requirements;
- Plans for sampling and monitoring the remedial action;
- An O&M plan;
- A preliminary construction schedule;
- A preliminary construction cost estimate; and,
- Plans for waste characterization, storage, handling and disposal.

2 HISTORICAL LANDFILL REMEDIAL ACTION OBJECTIVES

At the onset of the project, remedial action objectives were developed in order to minimize the exposure of Site contaminants to human health and the environment. As documented in the 1995 Record of Decision, the remedial action objectives included the following:

- Prevent direct contact with landfill contents;
- Minimize contaminants leaching to groundwater;
- Prevent the migration of LFG;
- Control surface water run-off and erosion;
- Attain compliance with federal and state requirements;
- Attain NR 140 Preventive Action Limits for groundwater impacted by the landfill at and beyond the landfill boundary;
- Reduce the potential for exposure to contaminants in groundwater; and
- Provide potable water to residences with contaminated water.

In order to achieve the remedial action objectives, the WDNR ensures that the following activities are conducted and the necessary restrictions are in place:

- Maintain the landfill cap and prohibit interference with the cap;
- Operate a LFG collection and combustion system;
- Operate a leachate extraction system;
- Restrict Site access;
- Limit land use;
- Maintain point-of-entry water treatment systems for private water supplies;
- Restrict the use of groundwater until cleanup standards are achieved; and,
- Conduct long-term groundwater monitoring.

3 BACKGROUND INFORMATION ON LANDFILL GAS SYSTEM

Prior to the implementation of remedial actions, LFG was detected at potentially explosive levels in the commercial storage building adjacent to the landfill. Other toxic substances, such as VOCs, have the potential to co-migrate with LFG. In order to prevent the migration of LFG and minimize contaminants leaching to groundwater, a system was designed and installed to extract and combust LFG.

3.1 Gas Extraction System Installation

In 1989, a partial gas extraction system (Partial System) was designed. The Partial System consisted of a pedestal flare (VAREC 239A Series Waste Gas Burner), a blower station, two gas extraction wells (GW1 and GW2), and a 6-inch diameter gas header pipe and a 6-inch diameter leachate conveyance pipe installed between GW2 and the blower station. The leachate conveyance pipe installed as a component of the Partial System was intended for future use with an expanded leachate recovery system; it was not utilized to convey leachate during the operation of the Partial System.

The gas extraction system was designed so that condensate travels to designated low points in the pipe network. From these designated low points, condensate is conveyed from the gas extraction system to the leachate extraction system through a dripleg. A dripleg is a "U" shaped pipe where liquid is constantly present in the bottom of the "U". This maintains the vacuum in the gas extraction system but allows liquid to pass through the dripleg. The condensate is removed from the system through drip legs to maintain unimpeded gas flow.

The pedestal flare was installed as an interim measure for burning saturated, low BTU gas at a flowrate up to 350 cubic feet per minute (cfm). Data gathered from the operation of the Partial System was utilized to design an expanded gas extraction system. The Partial System was shut down on May 7, 1991 to allow for full system construction.

The operation of the full system began during July 1991. The complete LFG collection network consists of 13 extraction wells, 4 drip legs, and associated gas header piping. The general layout of the system is illustrated on **Figure 2**. The blower/flare station includes one centrifugal blower, a fully enclosed ground flare, and associated controls and appurtenances. The enclosed ground flare was installed to meet the combustion requirements of NR 445. The ground flare was designed to destroy VOCs by maintaining a temperature of 1,500 degrees Fahrenheit for a retention time of 0.6 seconds at a flowrate of 650 cfm. The pedestal flare previously used with the Partial System was kept as a backup combustion unit for the full gas extraction system.

3.2 Gas Collection System Operational Issues

The gas header collection network is divided into three branches: North, Central, and South. The branches are also connected by header segments at their extremities to provide redundancy. The South branch gas header connects the LFG extraction blower to the collection wells on the southern slope of the landfill (GW1, GW2, GW3, GW4, and GW5). The South branch gas header also serves as a leachate collection header from GW5 to dripleg DL-1, where the dripleg removes the leachate and condensate from the gas header and conveys it to the leachate tank via a different pipe segment.

While the gas extraction system has been in operation, issues have been encountered with stressed vegetation and LFG emanating through the landfill cover in the GW5 area. Activities have been conducted in an attempt to capture additional LFG and maintain a sufficient vacuum at the South branch extraction wells. For example, two lateral wells were installed and connected to the GW5 wellhead during 1993. Based on conversations with the previous WDNR project manager, the lateral piping within a segment of the South branch was repositioned at some point to address low points that had developed due to settlement within the landfill.

A review of a small subset of monthly O&M reports revealed that the South branch lost vacuum again between 2002 and 2004. Furthermore, the redundancy line connecting GW5 to GW9 through Control Valve 1 (CV1) was unable to provide vacuum to the South branch from the Central branch.

In August 2010, a vacuum truck evacuated the line and suction was restored to the South branch wells. The successful restoration of vacuum to the South branch utilizing a vacuum truck suggested that leachate or condensate was likely accumulating in low spots in the piping and blocking off vacuum from the blower. The low spots were likely caused by settlement within the landfill as the waste decays. The collapse of piping within the branch was ruled out as a potential issue. As leachate levels rose following the vacuum truck event, leachate pumps were brought back on-line in wells GW4 and GW5 in October 2010. Leachate subsequently filled low spots in the South branch and cut off vacuum to the wells once again. Since vacuum was also cut off from all the wells once the leachate pumps were brought back on-line, it is assumed there is a low spot(s) between the blower and GW1 in addition to other potential low spots along the South branch. Lateral wells (GW5-LE and GW5-LW) did not regain suction during the vacuum truck extraction event suggesting additional problems/low spots within the lateral wells.

Despite previous efforts, sufficient vacuum has not been maintained through either the South branch header or the redundant pipe segment that connects the extremities of the Central and South branches while leachate recovery pumps are operational in GW4 and GW5. Low points within the South branch and within the redundant connection between the South branch and the Central branch extremities accumulate liquids which prevents LFG recovery from the South branch wells. Elevated methane concentrations remain in the GW5 area and pressure is observed on a consistent basis within the GW5 lateral extraction wells indicating the build-up of LFG under the landfill cover.

3.3 Combustion System Operational Issues

LBG was retained by the WDNR in July 2009 to provide Site O&M services. An evaluation of system components indicated that the enclosed flare was approaching the end of its useful life cycle. Operational issues with the enclosed flare included, but were not limited to, the following:

- The telemetry system and flare controls were taken off-line or bypassed by a previous operator due to low flare operational temperatures and malfunctioning sensors/controls. Under this operating scenario, the landfill extraction blower was allowed to directly discharge LFG to the atmosphere if the flare went out until a Site visit was conducted to restart the flare or take the system off-line.
- The LFG isolation valve on the influent line to the flare was bypassed by a previous operator. If the flame went out, LFG would be emitted to the flare/blower area either by the extraction blower or by positive pressure created in the landfill as gas was generated. There was the potential for elevated methane concentrations at the blower/flare station, which could result in a dangerous situation if an ignition spark was present.

- The enclosed flare was designed to combust LFG at a flow rate of 650 cfm. This flow rate was based on recovering approximately 50 cfm from each extraction well. Due to declining methane generation rates, only a limited number of wells are currently cycled on-line at a given time. The enclosed flare did not operate consistently at the diminished flow rates and fluctuating methane concentrations. Operational flexibility of the enclosed flare was negated over the years as control features (e.g. automatic adjusting air damper) were taken off-line.
- The pilot light would not function on occasion because the spark rod would become misaligned due to vibration of the flare resulting in an ineffective spark gap. This required the pilot light assembly to be dismantled, cleaned, and repositioned as accurately as possible.

Numerous repairs would have been necessary to bring the enclosed flare back to an acceptable level of performance. These repairs would have included, but are not limited to, installing an additional ultraviolet sensor, replacing a thermocouple, modifying the position of cooling dampers, adjusting the combustion air shutters, installing a temperature monitor, replacing the pilot light assembly, and reconnecting the LFG isolation valve on the influent line. Although these repairs would have assisted in operating the enclosed flare, they were not expected to significantly increase the life of the flare. Therefore, alternatives to repairing the enclosed flare were proposed for evaluation.

4 OBJECTIVES OF GAS SYSTEM MODIFICATIONS PROJECT

In order to prevent the migration of LFG and to provide an adequate combustion system, the WDNR prepared a remedial design SOW to address several components of the system that are no longer functional. The objectives of the project are as follows:

1. Design a replacement gas combustion flare and control system that will meet applicable emission requirements, limit methane migration, and be able to maintain gas combustion to the extent feasible considering the existing and expected gas production rate at the landfill;
    a. The system should be designed to limit the amount of operational oversight needed to maintain the system.
    b. The replacement control system should include an automated system for notifying LBG and the WDNR in the event of system failure;
2. Restore the ability to collect LFG in the southern portion of the landfill near gas wells GW4 and GW5;
3. Plan for the removal of the existing enclosed ground flare, candlestick flare, and other equipment no longer needed for the gas extraction and combustion system; and,
4. Revise the April 1997 O&M Manual to reflect the system modifications.

5 DESIGN RATIONALE – SOUTH BRANCH COLLECTION SYSTEM

5.1 Design Considerations

Numerous design parameters of the South branch LFG collection system were evaluated at the on-set of this project. In order to develop various remedial alternatives and as a means to minimize project costs, both conventional and unconventional design considerations were evaluated. These design parameters included, but were not limited to, the following: the South branch alignment, extraction well LFG quality, materials of construction, wellhead connections, and the burial depth of the header pipe.

5.1.1 South Branch Alignment

The South branch connects wells GW1, GW2, GW3, GW4 and GW5 to the LFG extraction blower system. The general alignment of the South branch is illustrated on **Figure 2**. The length of the South branch from GW5 to the blower enclosure is approximately 1,310 feet. The original design drawings indicate that the slope of the LFG collection pipe was approximately 2.3 percent between GW5 and GW2, and 2 percent between GW2 and the blower enclosure (**Appendix I**). From GW5 to GW2, there is one 6-inch high density polyethylene pipe (HDPE) pipe that is utilized as a dual LFG and leachate conveyance system. Between GW2 and the blower station/drip leg DL-1 area, the South branch consists of a LFG conveyance line and a separate leachate conveyance line. To date, the leachate conveyance line has not been put into service. Leachate recovered from pumps in GW4 and GW5 is conveyed through the gas header pipe to drip leg DL-1. The location of the drip leg is depicted in **Appendix I**. At the drip leg, leachate and condensate drain from the gas header pipe into a leachate conveyance pipe routed to the leachate tank.

To restore vacuum to the GW4 and GW5 area via the existing South branch, it is anticipated that the majority of the 1,310 feet of the South branch would need to be excavated in order for low spots to be located and for a sufficient slope to be restored. Another potential alignment is to utilize the Central branch as the gas header for select South branch wells. In this scenario, leachate pumped from GW4 and GW5 would continue to gravity drain to dripleg DL-1 via the South branch gas header. Utilizing a connection to the Central branch in order to re-establish vacuum to the GW4 and GW5 area would reduce the required length of an excavation and increase slope within the header.

5.1.2 Extraction Well LFG Quality

The objective of the project is to restore the ability to collect LFG from the southern portion of the landfill near gas wells GW4 and GW5. Stressed vegetation and odors due to LFG emanating through the landfill cover have been apparent in the GW5 area. Furthermore, methane has been detected in gas monitoring probes installed near the southwest corner of the landfill. As depicted on **Figure 3**, methane has been detected at gas probes located along the southwestern perimeter of the landfill (G-2, G-5 and GP-11) during a 2011 site-wide gas probe monitoring event. Elevated methane concentrations were not been detected in other perimeter gas probes located along the southern boundary of the landfill.

LFG concentrations measured at the wellheads located within the South branch are provided for the past five years on **Table 1**. The LFG quality data clearly demonstrate that elevated methane concentrations exist in the GW4 and GW5 area. The 2013 average methane concentrations detected in the vicinity of GW5 were as follows: GW5 east lateral-73 percent, GW5 west lateral-70 percent, GW5 wellhead-54 percent, and GW4 wellhead-67 percent. Average 2013 methane concentrations for were significantly less for GW2 (16 percent) and GW3 (18 percent). GW1 concentrations have fluctuated to a large degree over time (from less than 5 percent to concentrations similar to the GW5 area). The average concentration for GW1 for the past five years was 42 percent.

Due to the well documented signs of methane migration in the GW5 area, it is imperative to re-establish vacuum to this area of the landfill. Current methane concentrations in GW2 and GW3 suggest that these wells would not be operated on a consistent basis even if vacuum was re-established to the wells. If vacuum was restored to GW1, operation of the well would be sporadic based on fluctuating methane concentrations. As documented in the SOW, potential South branch remedial options will prioritize the restoration of vacuum to GW4 and GW5. The necessity of restoring vacuum to GW2 and GW3 is deemed minimal. Due to no apparent signs of methane migration in the GW1 area, the restoration of vacuum to GW1 is not imperative at this time. If deemed necessary in the future, an alternate method of addressing methane at GW1could be pursued, such as the installation of a solar vacuum flare at the GW1 wellhead.

5.1.3 Materials of Construction

The existing gas header piping consists of 6-inch diameter standard dimension ratio (SDR) 17 HDPE pipe. The HDPE pipe and fittings were joined by heat fusion (butt fusion). When the

system was initially designed, many of the design parameters were conservatively estimated in order to provide an increased factor of safety in system performance and to better accommodate landfill settlement and condensate flow. Benefits of a conservative pipe size are that it allows for greater settlement in the header without liquids blocking off the gas flow and it reduces the headloss within the system.

Materials for the gas system project will be kept consistent with pipe materials previously specified for use at the landfill.

5.1.4 Wellhead Connections

The current wellhead design consists of the gas header connecting to the extraction wells above grade via flexible piping. Segments of the above-grade piping were insulated to reduce the likelihood of LFG condensate freezing within the wellhead piping. The insulation is currently in a deteriorated state at many wellheads. Heat trace was reportedly installed on the above-grade piping but evidence was not found that the heat tape is still functional. Photographs of the wellheads along the South branch are included in **Appendix II**. Benefits of the above-grade wellhead connections include easy access to valves and sample ports and the ability to utilize flexible piping to accommodate landfill settlement issues. Gas header piping along the South branch slopes from each wellhead down to DL-1 for the gravity drainage of condensate and leachate. The slope of the gas header is depicted on the plan sheet included in **Appendix I**.

An unconventional approach for wellhead connections is the utilization of below-grade connection. Drawbacks of a below-grade connection include the need to install a valve below grade to control flow from the well and more difficulty accommodating stress at the connection to the well caused by landfill settlement. The landfill has not accepted waste for approximately 28 years; therefore, the degree of settlement has likely diminished over that time period. A potential advantage of a below-grade connection is the ability to slope the header pipe so that condensate drains back into the wellhead. The ability to drain condensate back to the wellhead would allow alternate pipe alignments within the landfill. Header piping could be routed over the ridge that exists between the GW5 area and the blower station. A below-grade connection would eliminate the need to protect the above-grade piping from UV exposure and could reduce impacts of freezing ambient air conditions.

5.1.5 Burial Depth of LFG Header

A historical report indicates that the landfill cover was constructed with a minimum of 2 feet of clay, 18 inches of general soil, and 6 inches of topsoil. Design documents indicate that the trench for the South branch gas header pipe was constructed through the landfill cover and into the uppermost layer of refuse. The minimum depth to the top of the header pipe was specified as 4 feet (below the approximate frost depth). The 1994 construction observation report states that the lateral wells extending from GW5 are located between 5 and 15 feet below grade (bg).

Potential options for the depth to the gas header pipe include installing the pipe invert: 1.) below the typical frost depth (approximately 54 inches bg); 2.) at base of clay cover layer (approximately 48 inches bg); and, 3.) at base of general fill layer (approximately 24 inches bg). Installing a header line completely above-grade was not deemed a feasible option due to landfill mowing and other maintenance activities. There are pros and cons are associated with each potential burial depth. Trenching costs for the project will increase in accordance with the specified depth of excavation activities, clay cover compaction requirements, and the amount of work conducted within refuse.

Installing the header pipe at the base of the general fill layer would minimize project costs by reducing the depth of the excavation, minimizing repairs needed to the clay cover layer, and minimizing the amount of work conducted within the refuse. The potential exists that areas within the landfill may currently have less than the specified 24 inches of general soil and topsoil remaining in place. Installing the header pipe above the frost depth would be a feasible alternative if seasonal operation is deemed acceptable. While in the landfill, LFG is usually warm (on the order of 100 to 120 degrees Fahrenheit) and saturated with moisture. As it enters the gas extraction system, the gas cools and liquids condensate out of the gas. Within relatively short pipe segments installed above the frost depth, the continuous flow of warm LFG may prevent condensate from freezing during colder periods of the year. However, when soil temperatures are at their lowest during the winter, the recovery of LFG from South branch wells may be impeded due to condensate freezing within a shallow header segment.

Installing a new gas header pipe segment within the existing clay cover is not deemed an optimal alternative. In this scenario, the clay cover would be reduced from the previously specified 2 feet thickness by the diameter of the pipe header (6-inches). A sufficient clay cover is deemed necessary in order to minimize leachate generation.

Repairing the existing gas header or installing a new header below the frost depth would provide maximum protection from condensate freezing. However, trenching and site restoration costs would be substantially higher for this option.

5.2 Remedial Alternatives

Potential remedial alternatives were identified for re-establishing vacuum to the GW4 and GW5 area. In an attempt to reduce costs of the project, the feasibility of unconventional construction and operational scenarios was evaluated. A stated above, unconventional options that were evaluated included connecting the LFG header to the wells below grade, installing pipe segments above the frost depth, and operating select South branch wells on a seasonal basis. Other factors taken into consideration were incorporating greater slopes within the system to negate some of the impacts of future landfill settlement and implementing alternate pipe alignments to reduce the linear length of excavation activities. The alternatives were evaluated based on short term and long term effectiveness, capital cost, implementability, and O&M requirements. The remedial alternatives that were evaluated included:

1. Alleviating low spots within the existing South branch LFG/leachate header;
2. Replacing the existing South branch LFG/leachate header;
3. Addressing issues with the existing redundant LFG header connecting the South and Central branches; and,
4. Replacing the redundant LFG header connecting the South and Central branches.

A brief synopsis and the pros and cons associated with each alternative are described in the following paragraphs.

5.2.1 Alleviate Low Spots in the Existing South Branch Header

This alternative would include excavating the South branch in order to locate low spots. Low spots would be alleviated by elevating the pipe, placing additional bedding material under the pipe, and re-establishing a constant slope.

Pros: The integrity of the entire South branch would be evaluated and addressed. Vacuum would be restored to all of the South branch wells. Pipe material costs would be minimized with this alternative since the existing pipe would remain in service to the extent possible.

Cons: Areas along the South branch appear to be more susceptible to settling than other areas of the landfill. Given the history of settlement issues along the South branch, future settling may once again block vacuum to the branch due to the overall minimal slope along the South

branch. High labor costs would be incurred with this alternative due to the need to excavate the entire length of the South branch (approximately 1,310 feet) and the need to sufficiently compact and test the density of the clay cover layer along the excavation. Fill may be required in order to restore the necessary pipe slope.

5.2.2 Reconstruct the South Branch along a Similar Route

This alternative would consist of replacing the South branch with a new pipe along a similar route.

Pros: Vacuum would be restored to all of the South branch wells. This alternative would have reasonable labor and installation costs if the new piping was placed in the landfill cover soils rather than the refuse. The existing piping would be left in place. The slope of the South branch could be controlled.

Cons: Future settling along the South branch may once again block vacuum to the South branch. Elevated labor and material costs would be incurred due to the need to excavate and install new pipe along the entire length of the South branch. Costs would also be influenced by the depth that the new pipe is installed.

5.2.3 Address Issues with the Redundant Header between the South and Central Branches

This alternative would include excavating the redundant header connecting the South branch to the Central branch between GW5 and GW9. Low spots along the line would be identified and addressed. The connection to the GW5 wellhead would likely be reconfigured/replaced.

Pros: This alternative would incur minimal material costs since the existing pipe would remain in-service. The length of excavation would be significantly less than excavating the entire South branch.

Cons: If there are low spots between the South branch wells, this alternative would restore vacuum to possibly only one well (GW5). Additional work (i.e. conduct portion of Alternative 1 for line between GW4 and GW5) would likely be required to restore vacuum to well(s) further from the redundant line (depending on the number of low spots). The potential for elevated costs is high given the fact that low spots are likely present within both the redundant line and the South branch.

5.2.4 Replace the Redundant Header between the South and Central Branches

This option would consist of replacing the redundant line that connects the South branch to the Central branch. An alternative alignment for the gas header could include individual legs to each

of the desired wells (e.g. GW4 and GW5). To eliminate the need to excavate through the clay cover and place the header within the refuse, a new redundant line would likely be constructed within the landfill cover soils.

Pros: This option would incur less in labor costs if the replacement pipe is installed within the landfill cover soils instead of the refuse. The existing pipe would be left in place. By installing the pipe within the landfill cover soils, the slope within the redundancy line would be steeper than the existing South branch, which could, to a certain degree, alleviate pipe drainage issues caused by settling. Maintaining a minimum slope of 3 to 5 percent may facilitate condensate drainage even if some pipe settlement occurs.

Cons: This option would have higher material costs than excavating the existing redundant line. Vacuum would not be restored to the entire South Branch, as the new redundancy piping would likely only be connected to GW4 and GW5. South branch wells may be operated on a seasonal basis if issues of condensate freezing within the header line occur. Due to the ridge between the Central branch and South branch, the wellhead connections would be made below grade to allow condensate to drain back to the well.

5.3 Recommended Alternative

Even though it is unconventional, the most straightforward option is to ***replace the redundant line between the South branch and the Central branch***. This option has the best opportunity for sustained vacuum to the South branch, while minimizing project costs. Vacuum would not be restored to GW1 through GW3; however, methane levels in GW2 and GW3 are typically low and the wells would not be on-line for a significant amount of time. General design drawings are included as **Figure 4** through **Figure 7.**

6 DESIGN RATIONALE – GAS COMBUSTION SYSTEM MODIFICATIONS

6.1 Landfill Gas Potential to Emit

Prior to identifying potential options for combusting the LFG more effectively and efficiently, LBG conducted LFG sampling activities in order to calculate the landfill's potential to emit (PTE) benzene and vinyl chloride. Landfill gas samples were collected from sample port A on the common header inlet pipe to the flare on February 1, 2012 and February 8, 2012 by LBG personnel. Samples were collected as grab samples using 6-liter Summa canisters and analyzed for non-methane organic compounds, benzene, and vinyl chloride.

PTE values were compared to NR 445 thresholds to determine if air treatment is required based on these constituents. NR 445 table thresholds are applicable if emissions are vented through vertical, unobstructed stacks. Alternatively, sources not meeting these stack requirements can demonstrate that emissions do not require treatment if the PTE values multiplied by a factor of four remain less than the table thresholds. Based on the analytical data and maximum observed flow rate from July 2009 through December 2012, the uncontrolled PTE for benzene and vinyl chloride is 7.5 pounds per year (lbs/year) and 5.6 lbs/year, respectively. Four times these rates results in PTEs of 30 lbs/yr for benzene and 22.4 lbs/year for vinyl chloride. These emission rates are still below NR 445 threshold values of 228 lbs/year for benzene and 202 lbs/year for vinyl chloride; therefore, an enclosed flare is no longer deemed necessary to achieve specified destruction requirements. Analytical data, a summarized data table, and PTE calculations are in **Appendix III**.

6.2 Remedial Alternatives

Potential LFG treatment options were evaluated based on capital cost, long term O&M requirements, effectiveness at reducing greenhouse gas emissions, and implementability. Based on the results of the initial evaluation, LBG recommended conducting a pilot test to determine if the utilization of the existing pedestal flare is a viable combustion option for the full extraction system at this time. The pilot test would divert the recovered LFG from the existing enclosed flare to the standby pedestal flare. If the results of the pilot test are deemed favorable, the benefits of this proposed process conversion would include the following:

- Minimal capital costs: The pedestal flare inlet piping remains intact and could be placed back in service by opening an abovegrade butterfly valve. Wiring between the existing control panel and the pedestal flare would need to be replaced. System cleaning (e.g. flame arrestor cleaning) and start-up services would be required.
- Reduced O&M requirements: The pedestal flare is equipped with a timer to instigate a spark at a desired frequency. If the flame would blow out at some point and LFG is still being delivered to the flare, a spark would automatically be triggered at the set frequency and re-establish a flame. The simplistic operation of the pedestal flare would eliminate the numerous site visits that are needed to ensure a flame is present in the enclosed flare. A telemetry system and sophisticated controls are not a component of the pedestal flare's operation, which minimizes future component replacement and troubleshooting costs.

- Emissions control: Based on current LFG flowrates and gas concentrations, air treatment equipment is not needed to achieve NR 445 requirements. Because the pedestal flare is better suited for the current flow conditions and will re-light if necessary, it is anticipated that greenhouse gas emissions would be minimized significantly in comparison to the current operating conditions of the enclosed flare.

6.3 Recommended Alternative: Conduct Pilot Test on Conversion to Pedestal Flare

On May 23, 2013, an electrician was on-Site to replace the wiring from the control panel to the pedestal flare ignitor. The electrician could not pull the underground wiring from the existing conduit, which indicated that the conduit was compromised and needed to be replaced. Fuses for the pedestal flare were replaced. The electrician then connected (spliced) and tested the ignitor, which worked in both hand and auto mode. Remaining electrical components of the pedestal flare were also tested and found to be operational.

On May 29, 2013, R^3 Contracting, Inc. inspected the pedestal flare, pressure washed components off-site including the flame arrestor, and removed scale and debris from landfill gas pipe and flare. The pedestal flare was reassembled. As a temporary measure, a splice was used to operate the ignitor and test the flare. Adjustments were made to the air and gas influent ratio. The flare operated for an uninterrupted period of time but was then turned off until a new electrical conduit was installed and nearby trees and brush were trimmed.

LBG personnel met with the WDNR Project Manager to discuss the scope of brush removal and tree trimming required in the vicinity of the pedestal flare. Barnes, Inc. completed the brush removal activities on June 24, 2013. LBG personnel met with personnel from Hill Electric, Inc. on July 11, 2013 in regards to replacing the electrical conduit between the control panel and pedestal flare. The conduit was compromised at the elbow where the underground conduit transitioned from vertical to horizontal in the vicinity of the control panel. The material of construction also transitioned from steel for the vertical segment to PVC for the horizontal segment at this location. The vertical conduit and elbow were replaced. The existing horizontal section of the conduit was intact and was not replaced. The pedestal flare was brought on-line on July 11, 2013 following the completion of the electrical work. An evaluation of pedestal flare operations is included in **Section 7.0-Pilot Tests**.

7 PILOT TESTS

In order to evaluate if the existing pedestal flare was a viable combustion option for the full extraction system, LBG personnel conducted an analysis of system operations after the flare rehabilitation activities were complete on July 11, 2013. The assessment was conducted in order to evaluate the operation of the pedestal flare given the current LFG quality and flow rate variations of the full system. Data obtained during the pedestal flare pilot test are included in **Appendix IV**.

Upon start-up of the pedestal flare, the LFG extraction system was initially cycled on and off in the same manner as was done with the deteriorating enclosed flare. The pedestal flare operated between 37 and 47 percent of the July reporting period and flame-out conditions were not observed (**Table IV-1**). Following an evaluation of the July data, the pedestal flare was allowed to operate continuously until a flame out condition occurred. A flame out condition occurred on September 24, 2013 when the methane concentration had decreased to approximately 15.5 percent by volume.

Measurements of methane, oxygen, and carbon dioxide were recorded from the outlet sample port A during each Site visit conducted between pedestal flare startup and the occurrence of the flame out condition on September 24, 2013. Following the flame out condition, gas quality measurements were recorded weekly through November 2013 for this evaluation. Methane concentrations at the blower outlet ranged from approximately 15 to 49.5 percent by volume during this time. Oxygen concentrations ranged from 3.7 to 9.7 percent by volume. Based on the data obtained, the operations protocol will be to take the LFG extraction system off-line or make adjustments at various wellheads when methane concentrations decrease to approximately 15 percent by volume or oxygen concentrations exceed 5 percent by volume.

During November 2013, an analysis was conducted in order to determine the number of wells that need to be on-line in order to sustain a flame at the pedestal flare. The evaluation indicated that the flame can be sustained by operating one LFG extraction well that is producing sufficient methane concentrations. The lower limit of the allowable LFG flowrate could not be determined with any accuracy. Elevated flow rates were recorded within the system while only one well was on-line. System flow rates recorded at the branch headers within the blower station were an order of magnitude greater than the anticipated flowrate from one well (the LFG system was originally designed based on an anticipated flowrate of approximately 50 cfm per well). The accuracy of gas flowrates determined within the large diameter branch pipes diminishes as the flow

rate is reduced. However, the elevated flow rates could also indicate that there is significant in-flow into the collection system at points (i.e. leaks) in addition to the on-line extraction well.

8 PERMITS AND REGULATORY REQUIREMENTS

Regulated activities for which permits are issued by regulatory agencies include air emissions, building and electrical work, excavations, and stormwater discharge. In order to implement the modifications to the gas extraction system, the applicability of certain permits and regulatory requirements was evaluated.

Section 13.48(13), Wisconsin Statutes, states, "Where any building, structure or facility is constructed for the benefit of or use of the State or any State Agency, board, commission or department, such construction shall be in compliance with all applicable state laws, codes and regulations but such construction shall not be subject to the ordinances or regulations of the municipality in which the construction takes place except zoning, including without limitation because of enumeration, ordinances, or regulations relating to material used, permits, supervision of construction or installation, payment of permit fees, or other restrictions of any nature whatsoever. This subsection shall apply to any construction hereafter commenced".

8.1 Air Permit (NR 440 and NR 445)

In order to determine if an enclosed flare was still deemed necessary to achieve specified destruction requirements, the PTE benzene and vinyl chloride was determined (see **Section 6.1** and **Appendix III** for PTE calculations). The PTE estimate was submitted to Ms. Kristin Hart, of the WDNR South Central Region Air Program, for review. Ms. Hart verified that the requirements for industrial flares in s. NR 440.18 do not apply because emissions from the landfill no longer exceed ch. NR 445 thresholds. Ms. Hart indicated the Air Program does not have any specifications that a new flare would need to meet at this time. The use of a flare to reduce emissions of methane and VOCs in general is still recommended by the Air Program.

The WDNR has not indicated to LBG that the Site is required to report greenhouse gas emissions under the federal greenhouse gas emission reporting regulation.

8.2 Erosion Control

Dane County requires an Erosion Control Permit for the following:

- Land disturbing activity in excess of 4,000 square feet of land;

- Land disturbing activity on a slope of greater than 12 percent;
- Land disturbing activity that involves excavation, filling, or a combination of excavation and filling, in excess of 400 cubic yards of material; and,
- Any other land disturbing activity (even if less than 4,000 square feet) that the local approval authority determines to have a high risk of soil erosion or water pollution, or that may significantly impact a lake, stream, or wetland area.

The proposed remedial action does not involve disturbing over 4,000 square feet of land. Furthermore, the excavation activities are not expected to take place on a slope greater than 12 percent. The slope between CV-1 and GW-5 appears to be slightly less than 12 percent.

8.3 Building and Electrical Permits

The scope of this project does not meet requirements for a building/electrial permit.

8.4 Stormwater Permit (NR 216)

Construction projects, requiring permit coverage under the Construction Site Storm Water Runoff General Permit No. WI-S067831, include activities that disturb one acre or more of land. Less than one acre of land will be disturbed under the given SOW so permit coverage under NR 216 is not required.

8.5 Landfill Cover Restoration (NR 504)

Areas of the landfill cover that will be disturbed during excavation activities will be restored with clay materials in accordance with s. NR 504.07(4).

8.6 Access

Due to the on-going remedial actions at the Site, the State of Wisconsin controls Site security and access.

8.7 Waste Disposal

If off-Site disposal of any hazardous or non-hazardous materials is deemed necessary by the WDNR, disposal costs will be covered under a separate SOW and contract. Hazardous wastes must be handled through Onyz, the State's hazardous waste contractor.

8.8 Miscellaneous Permits and Licenses

Based on the scope and location of this project, the following permits are not required: street opening permit, plumbing permit, or water discharge permit.

LBG is not aware of any patents that are in effect on the process to be implemented at the Site. Therefore, no licenses are required for this project.

9 SAMPLING, ANALYSIS, AND MONITORING PLAN

System monitoring requirements for the modified system will be similar to past sampling and monitoring activities. Monitoring activities for the LFG extraction system will be conducted primarily at the wellheads, the perimeter gas probes, and the blower station.

The LFG extraction wells will continue to be monitored on a routine basis for LFG composition, pressure, flow, and temperature. Upon the completion of South branch modifications, monitoring of extraction wells along the South branch will occur on a weekly basis in order to evaluate system performance. The remaining extraction wells within the system will continue to be monitored on a monthly basis. After eight weeks of full system operation, the monitoring frequency for the South branch extraction wells is projected to return to monthly. Based on the LFG composition, necessary adjustments will be made to the operation of the wells in order to maximize methane concentrations and reduce oxygen concentrations in the recovered LFG.

The leachate level within the extraction wells will continue to be measured on a monthly basis in order to monitor the performance of the leachate extraction system. Measurements of leachate level will be taken with an electronic water-level indicator. During leachate monitoring, cycle counter readings and pressure readings will be recorded from the control panel for each leachate extraction well.

Prior to bringing the South branch on-line, base-line gas probe monitoring will be conducted to assess the migration of LFG. Gas probes G-1 (shallow and deep), G-2 (shallow and deep), G-5, G-6, G-8, G-9, G-10, GP-8, GP-11 (shallow and deep), GP-12 (shallow and deep), and GP-13 (shallow and deep) will be monitored for gas composition and pressure. After the South branch is on-line, gas probe monitoring will continue on a monthly basis, except gas probes G2, G-5, and GP-11 will be monitored twice a month for four months to assess LFG concentrations emanating from the GW5 area.

Monitoring of the LFG header system will continue to be conducted on a weekly basis within the blower building. Measurement of gas composition, pressure, flow, and temperature is conducted for the North, Central and South branches, a blower inlet sample port, and blower outlet sample port A. There are no sample ports located at the pedestal flare for monitoring purposes.

Emission testing for the flare is no longer deemed applicable. Due to the low PTE, testing of emission controls is not required and is not deemed feasible from the pedestal flare. Revised field data forms for the modified system are included in **Appendix V**.

Sampling of leachate, groundwater and other Site media will not be impacted by this SOW; therefore, sampling requirements for these media are not stipulated within this report.

10 OPERATION AND MAINTENANCE PLAN

As a component of the SOW, the O&M Manual for the Site will be revised to incorporate information in regards to the system modifications. The O&M Manual will include information on the South branch modifications, the pedestal flare rehabilitation, and revised O&M forms. Information that is no longer relevant to the project will be removed from the Manual (e.g. telemetry system, enclosed flare, electric leachate recovery pumps).

A component of the O&M Manual is a monitoring and maintenance schedule summary. An updated monitoring and maintenance schedule summary is attached as **Appendix VI** in order to provide an indication of planned O&M provisions per NR 724.09(9).

11 PRELIMINARY SOUTH BRANCH CONSTRUCTION SCHEDULE

A preliminary construction schedule for the South branch modifications is attached as **Appendix VII**. The construction schedule includes bidding, contracting, and construction activities. It is anticipated that the construction contract will be awarded approximately 1.5 months after the design has been approved. The bidding process, which includes bid advertisement, pre-bid meeting, and bid preparation, will take approximately one month. The bid evaluation process may take up to two weeks followed by another week for the notice of award to be sent. It is anticipated that the award for construction services will be announced in May 2014. Based on this timeline, construction activities should be complete by the end of July 2014. The preliminary construction schedule does not account for all delays that may postpone work such as equipment availability and abnormal weather conditions. A revised construction schedule will be prepared by the Contractor after the effective date of the Agreement.

12 PRELIMINARY CONSTRUCTION COST ESTIMATE

Appendix VIII includes a preliminary construction cost estimate. The costs are based on the remediation system design documents. The unit costs were obtained from a variety of sources

including, but not limited to, vendor quotations, a preliminary cost estimate from a construction contractor and perspective material suppliers, and prior project experiences.

The preliminary construction cost estimate includes capital costs for materials and equipment, installation costs including labor, equipment, overhead and profit, permit fees, costs for temporary facilities, and construction management fees for contractor supervision and quality control/quality assurance testing.

The capital cost estimate for the proposed system modification project is $64,000, but actual construction costs will be determined from bids received from contractors. This cost estimate does not include construction oversight services that may be provided by LBG under a separate contract.

13 WASTE CHARACTERIZATION, STORAGE, HANDLING AND DISPOSAL

Excavated soil materials will be temporarily stored on-site in an acceptable location. Excavated materials will be segregated into top soil, general fill, landfill cover, and refuse. Stormwater will be directed away from the stockpiles to prevent erosion and impacts to stormwater. Waste materials will be placed on and covered with plastic sheeting to prevent waste materials from mixing with landfill cover vegetation. It is anticipated that excavated materials will be used as fill materials in the excavations and that off-Site disposal of materials will not be required. If excess fill remains following the backfilling of trenches, select low spots on the landfill cover will be filled in. Vegetation and top soil will be removed from the low spots, the excess soil materials will be placed in the low spot, and the topsoil will be placed and seeded.

Other waste generated during the construction process will stored in a manner and location acceptable to the WDNR. The Contractor will transport and dispose of construction waste on a routine basis at location acceptable to WDNR.

14 HEALTH AND SAFETY PLAN

A site-specific HASP has been prepared by LBG. The HASP will be on-site during all Site activities. The plan details health and safety issues associated with the activities to be conducted. Information in the plan includes personal protective equipment, safe working practices, air quality monitoring, and emergency procedures. It is anticipated that work will be conducted in Level D protection. The safety plan will be distributed and reviewed by LBG field personnel prior to the initiation of work. A copy of the HASP will be provided to the WDNR upon request. The

Contractor will supply a Contractor-specific HASP to his employees and subcontractors and must adhere to that HASP.

15 REFERENCES

Leggette, Brashears & Graham, Inc., *Operation and Maintenance Annual Report, July 2009 through June 2010, Refuse Hideaway Landfill, 7562 U.S. Highway 14, Middleton, Wisconsin, 53562*; September 2010.

Leggette, Brashears & Graham, Inc., *Operation and Maintenance Annual Report, July 2010 through June 2011, Refuse Hideaway Landfill, 7562 U.S. Highway 14, Middleton, Wisconsin, 53562*; September 2011.

Leggette, Brashears & Graham, Inc., *Operation and Maintenance Annual Report, July 2011 through June 2012, Refuse Hideaway Landfill, 7562 U.S. Highway 14, Middleton, Wisconsin, 53562*; August 2012.

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Terra Engineering and Construction Corp., *Leachate Head Reduction System Upgrade*, August 1996.

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Warzyn Engineering Inc., *Engineering Design 13928.48, Gas and Leachate Extraction System, Refuse Hideaway Landfill, Town of Middleton, Dane County, Wisconsin,* September1990.

Warzyn Inc., *Construction Documentation Report 15292.03, Landfill Gas and Leachate Extraction System, Refuse Hideaway Landfill, Town of Middleton, Dane County, Wisconsin,* November 1991.

Warzyn Inc., *Operation and Maintenance Manual, Refuse Hideaway Landfill, Town of Middleton, Dane County, Wisconsin,* November 1991.

TABLES

TABLE 1

WISCONSIN DEPARTMENT OF NATURAL RESOURCES
REFUSE HIDEAWAY LANDFILL
MIDDLETON, WISCONSIN

SOUTH BRANCH GAS EXTRACTION WELL MONITORING RESULTS

Location	Date	CH_4 (%)	O_2 (%)	CO_2 (%)	Balance Gas* (%)
GW1	7/31/2009	0.0	20.6	0.0	79.4
GW1	8/3/2009	--	--	--	--
GW1	8/25/2009	39.0	0.0	28.0	33.0
GW1	9/2/2009	--	--	--	--
GW1	9/8/2009	--	--	--	--
GW1	9/14/2009	--	--	--	--
GW1	9/18/2009	--	--	--	--
GW1	9/25/2009	50.0	0.3	36.8	12.9
GW1	10/30/2009	28.0	0.0	30.2	41.8
GW1	11/24/2009	50.5	0.0	34.2	15.3
GW1	12/30/2009	50.5	1.8	30.8	16.9
GW1	1/29/2010	44.5	4.0	25.8	25.7
GW1	2/26/2010	55.0	1.9	40.8	2.3
GW1	3/29/2010	59.0	0.8	42.6	-2.4
GW1	4/27/2010	39.0	6.2	24.8	30.0
GW1	5/28/2010	--	--	--	--
GW1	6/25/2010	55.5	1.8	42.6	0.1
GW1	7/21/2010	--	--	--	--
GW1	7/29/2010	13.4	1.3	26.9	58.4
GW1	8/13/2010	74.0	6.2	14.6	5.2
GW1	8/23/2010	28.0	1.1	30.4	40.5
GW1	8/27/2010	24.5	1.6	27.0	46.9
GW1	9/3/2010	26.5	3.5	24.8	45.2
GW1	9/21/2010	57.0	1.5	45.0	-3.5
GW1	9/22/2010	10.5	3.0	28.6	57.9
GW1	10/4/2010	37.5	0.0	43.8	18.7
GW1	10/8/2010	2.4	8.4	13.8	75.5
GW1	10/15/2010	24.5	0.1	22.4	53.0
GW1	10/29/2010	12.0	15.9	10.2	61.9
GW1	11/19/2010	48.5	0.0	51.6	-0.1
GW1	12/21/2010	43.5	4.0	33.2	19.3
GW1	1/27/2011	49.5	2.7	20.0	27.8
GW1	2/28/2011	12.5	15.0	11.0	61.5
GW1	3/29/2011	4.6	20.9	1.2	73.3
GW1	4/27/2011	59.5	0.5	37.6	2.4
GW1	5/24/2011	*95.0*	0.1	49.8	-44.9
GW1	6/28/2011	70.5	0.0	48.8	-19.3
GW1	8/1/2011	37.5	2.2	28.2	32.1
GW1	8/26/2011	7.0	17.7	5.6	69.7
GW1	10/3/2011	7.5	19.6	3.2	69.7
GW1	10/24/2011	66.0	0.0	56.2	-22.2

TABLE 1

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MIDDLETON, WISCONSIN

SOUTH BRANCH GAS EXTRACTION WELL MONITORING RESULTS

Location	Date	CH_4 (%)	O_2 (%)	CO_2 (%)	Balance Gas* (%)
GW1	11/30/2011	16.5	10.1	18.8	54.6
GW1	12/30/2011	58.5	0.0	45.6	-4.1
GW1	1/25/2012	54.5	2.6	35.4	7.5
GW1	2/22/2012	45.0	4.8	24.6	25.6
GW1	3/30/2012	40.5	6.7	30.2	22.6
GW1	4/25/2012	43.0	5.8	35.2	16.0
GW1	5/29/2012	38.5	8.1	31.2	22.2
GW1	6/20/2012	5.0	18.0	4.8	72.2
GW1	7/23/2012	63.5	4.6	49.0	-17.1
GW1	8/28/2012	56.0	4.4	35.0	4.6
GW1	9/25/2012	56.0	4.8	39.4	-0.2
GW1	10/30/2012	58.0	2.0	34.8	5.2
GW1	11/30/2012	30.2	5.0	24.1	40.7
GW1	12/31/2012	58.5	0.9	41.6	-1.0
GW1	1/31/2013	48.0	3.7	33.6	14.7
GW1	2/21/2013	55.0	2.5	41.6	0.9
GW1	3/27/2013	39.5	6.5	23.0	31.0
GW1	4/26/2013	35.0	10.0	24.0	31.0
GW1	5/31/2013	77.0	0.3	31.2	-8.5
GW1	6/11/2013	57.0	1.0	32.0	10.0
GW1	7/11/2013	65.0	1.6	39.8	-6.4
GW1	8/28/2013	39.5	2.1	26.6	31.8
GW1	9/23/2013	37.5	6.4	26.8	29.3
GW1	10/25/2013	60.0	0.3	36.4	3.3
GW1	11/26/2013	33.0	1.0	27.4	38.6
GW1	12/23/2013	70.5	2.2	36.6	-9.3
2009 Average		**36.3**	**3.8**	**26.7**	**33.2**
2010 Average		**36.4**	**3.4**	**30.5**	**29.7**
2011 Average		**40.4**	**7.4**	**27.2**	**25.1**
2012 Average		**45.7**	**5.6**	**32.1**	**16.5**
2013 Average		**51.4**	**3.1**	**31.6**	**13.9**
GW1 Average (2009-2013)		**42.1**	**4.6**	**30.0**	**23.3**
GW2	7/31/2009	0.0	19.8	0.2	80.0
GW2	8/3/2009	--	--	--	--
GW2	8/25/2009	14.5	8.0	12.0	65.5
GW2	9/2/2009	--	--	--	--
GW2	9/8/2009	--	--	--	--
GW2	9/14/2009	--	--	--	--
GW2	9/18/2009	--	--	--	--
GW2	9/25/2009	17.0	1.0	22.4	59.6
GW2	10/30/2009	4.2	3.9	19.2	72.8

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REFUSE HIDEAWAY LANDFILL
MIDDLETON, WISCONSIN

SOUTH BRANCH GAS EXTRACTION WELL MONITORING RESULTS

Location	Date	CH_4 (%)	O_2 (%)	CO_2 (%)	Balance Gas* (%)
GW2	11/24/2009	12.0	5.3	18.4	64.3
GW2	12/30/2009	15.5	6.3	19.0	59.2
GW2	1/29/2010	25.0	5.4	25.8	43.8
GW2	2/26/2010	36.5	6.9	19.6	37.0
GW2	3/29/2010	25.0	9.5	18.6	46.9
GW2	4/27/2010	0.2	20.9	0.0	79.0
GW2	5/28/2010	--	--	--	--
GW2	6/25/2010	26.5	7.7	20.6	45.2
GW2	7/21/2010	--	--	--	--
GW2	7/29/2010	46.0	1.3	39.4	13.3
GW2	8/13/2010	0.8	1.4	25.4	72.5
GW2	8/23/2010	23.0	3.2	27.2	46.6
GW2	8/27/2010	48.0	1.9	39.6	10.5
GW2	9/3/2010	32.0	5.3	27.4	35.3
GW2	9/21/2010	57.5	2.0	42.0	-1.5
GW2	9/22/2010	51.0	2.0	38.4	8.6
GW2	10/4/2010	29.0	0.7	37.8	32.5
GW2	10/8/2010	15.0	2.0	30.4	52.6
GW2	10/15/2010	42.5	0.9	44.8	11.8
GW2	10/29/2010	44.5	3.6	40.0	11.9
GW2	11/19/2010	31.5	4.8	25.4	38.3
GW2	12/21/2010	17.5	13.0	15.8	53.7
GW2	1/27/2011	47.0	0.0	20.0	33.0
GW2	2/28/2011	36.0	4.5	36.6	22.9
GW2	3/29/2011	0.2	20.9	0.0	79.0
GW2	4/27/2011	8.0	17.2	6.6	68.2
GW2	5/24/2011	*0.0*	18.4	0.0	81.6
GW2	6/28/2011	43.0	4.3	34.0	18.7
GW2	8/1/2011	0.0	20.9	0.0	79.1
GW2	8/26/2011	0.0	20.9	0.0	79.1
GW2	10/3/2011	2.1	21.1	6.2	70.6
GW2	10/24/2011	55.5	0.5	46.2	-2.2
GW2	11/30/2011	0.0	20.9	0.0	79.1
GW2	12/30/2011	49.0	1.1	43.6	6.3
GW2	1/25/2012	0.0	20.9	0.0	79.1
GW2	2/22/2012	0.3	20.9	0.4	78.5
GW2	3/30/2012	0.0	20.9	0.0	79.1
GW2	4/25/2012	0.0	20.9	0.0	79.1
GW2	5/29/2012	0.0	20.9	0.0	79.1
GW2	6/20/2012	0.6	20.9	0.6	78.0
GW2	7/23/2012	2.2	18.8	3.6	75.5

TABLE 1

WISCONSIN DEPARTMENT OF NATURAL RESOURCES
REFUSE HIDEAWAY LANDFILL
MIDDLETON, WISCONSIN

SOUTH BRANCH GAS EXTRACTION WELL MONITORING RESULTS

Location	Date	CH_4 (%)	O_2 (%)	CO_2 (%)	Balance Gas* (%)
GW2	8/28/2012	31.5	6.4	22.2	39.9
GW2	9/25/2012	7.0	17.3	5.6	70.1
GW2	10/30/2012	2.4	19.9	1.8	75.9
GW2	11/30/2012	3.5	19.9	5.2	71.4
GW2	12/31/2012	22.5	8.6	24.6	44.3
GW2	1/31/2013	9.0	13.8	11.0	66.2
GW2	2/21/2013	17.5	6.5	23.6	52.4
GW2	3/27/2013	0.0	20.9	0.0	79.1
GW2	4/26/2013	49.5	4.3	36.6	9.6
GW2	5/31/2013	5.0	20.0	0.0	75.0
GW2	6/11/2013	30.5	5.9	21.2	42.4
GW2	7/11/2013	32.0	4.1	19.4	44.5
GW2	8/28/2013	--	--	--	--
GW2	9/23/2013	0.0	20.9	0.0	79.1
GW2	10/25/2013	13.0	1.9	15.0	70.1
GW2	11/26/2013	14.5	0.8	17.0	67.7
GW2	12/23/2013	11.5	7.9	12.4	68.2
2009 Average		**10.5**	**7.4**	**15.2**	**66.9**
2010 Average		**30.6**	**5.1**	**28.8**	**35.4**
2011 Average		**20.1**	**12.6**	**16.1**	**51.3**
2012 Average		**5.8**	**18.0**	**5.3**	**70.8**
2013 Average		**16.6**	**9.7**	**14.2**	**59.5**
GW2 Average (2009-2013)		**18.8**	**10.4**	**17.3**	**53.5**
GW3	7/31/2009	22.5	16.4	11.3	49.8
GW3	8/3/2009	--	--	--	--
GW3	8/25/2009	0.0	20.9	0.0	79.1
GW3	9/2/2009	--	--	--	--
GW3	9/8/2009	--	--	--	--
GW3	9/14/2009	--	--	--	--
GW3	9/18/2009	--	--	--	--
GW3	9/25/2009	0.5	20.5	0.2	78.9
GW3	10/30/2009	1.7	17.6	4.4	76.4
GW3	11/24/2009	36.0	4.2	25.2	34.6
GW3	12/30/2009	64.0	0.2	35.6	0.2
GW3	1/29/2010	36.0	6.6	22.8	34.6
GW3	2/26/2010	17.5	15.0	9.6	57.9
GW3	3/29/2010	67.5	0.2	38.0	-5.7
GW3	4/27/2010	2.9	19.7	2.4	75.1
GW3	5/28/2010	--	--	--	--
GW3	6/25/2010	45.0	7.8	20.6	26.6
GW3	7/21/2010	--	--	--	--

TABLE 1

WISCONSIN DEPARTMENT OF NATURAL RESOURCES
REFUSE HIDEAWAY LANDFILL
MIDDLETON, WISCONSIN

SOUTH BRANCH GAS EXTRACTION WELL MONITORING RESULTS

Location	Date	CH_4 (%)	O_2 (%)	CO_2 (%)	Balance Gas* (%)
GW3	7/29/2010	54.6	0.6	39.4	5.4
GW3	8/13/2010	25.0	1.4	20.3	53.3
GW3	8/23/2010	23.5	1.8	28.4	46.3
GW3	8/27/2010	35.0	1.8	31.8	31.4
GW3	9/3/2010	37.0	3.2	29.4	30.4
GW3	9/21/2010	64.5	1.5	43.0	-9.0
GW3	9/22/2010	46.5	2.1	38.4	13.0
GW3	10/4/2010	35.0	0.4	37.0	27.6
GW3	10/8/2010	20.5	1.7	30.0	47.8
GW3	10/15/2010	55.0	0.0	35.4	9.6
GW3	10/29/2010	42.0	2.0	33.4	22.6
GW3	11/19/2010	44.5	1.7	36.0	17.8
GW3	12/21/2010	1.5	20.9	1.2	76.4
GW3	1/27/2011	45.5	1.9	20.0	32.6
GW3	2/28/2011	--	--	--	--
GW3	3/29/2011	2.5	20.9	0.8	75.8
GW3	4/27/2011	19.0	12.0	16.4	52.6
GW3	5/24/2011	12.5	16.8	6.6	64.1
GW3	6/28/2011	64.5	2.8	31.2	1.5
GW3	8/1/2011	10.5	17.5	4.8	67.2
GW3	8/26/2011	1.1	20.9	1.0	77.1
GW3	10/3/2011	3.6	20.5	2.0	74.0
GW3	10/24/2011	75.0	0.4	40.8	-16.2
GW3	11/30/2011	19.0	13.9	11.6	55.5
GW3	12/30/2011	64.0	1.4	35.4	-0.8
GW3	1/25/2012	12.2	19.0	3.6	65.2
GW3	2/22/2012	65.0	19.4	2.4	13.2
GW3	3/30/2012	4.9	18.1	3.0	74.1
GW3	4/25/2012	3.3	18.7	2.8	75.3
GW3	5/29/2012	32.5	9.4	25.2	32.9
GW3	6/20/2012	0.0	20.9	0.0	79.1
GW3	7/23/2012	66.5	4.8	33.0	-4.3
GW3	8/28/2012	24.0	13.4	12.2	50.4
GW3	9/25/2012	16.0	14.5	8.8	60.7
GW3	10/30/2012	12.0	15.1	7.4	65.5
GW3	11/30/2012	5.0	17.2	7.6	70.2
GW3	12/31/2012	61.5	0.8	39.2	-1.5
GW3	1/31/2013	--[b]	--	--	--
GW3	2/21/2013	12.0	16.8	8.2	63.0
GW3	3/27/2013	5.5	18.6	3.2	72.7
GW3	4/26/2013	20.5	13.3	14.0	52.2

TABLE 1

WISCONSIN DEPARTMENT OF NATURAL RESOURCES
REFUSE HIDEAWAY LANDFILL
MIDDLETON, WISCONSIN

SOUTH BRANCH GAS EXTRACTION WELL MONITORING RESULTS

Location	Date	CH_4 (%)	O_2 (%)	CO_2 (%)	Balance Gas* (%)
GW3	5/31/2013	38.0	10.1	17.8	34.1
GW3	6/11/2013	18.0	15.0	9.6	57.4
GW3	7/11/2013	43.0	7.7	21.6	27.7
GW3	8/28/2013	1.8	20.7	1.4	76.1
GW3	9/23/2013	0.3	18.1	3.6	78.0
GW3	10/25/2013	59.5	0.9	29.8	9.8
GW3	11/26/2013	0.6	20.9	0.2	78.4
GW3	12/23/2013	6.0	18.6	3.0	72.4
2009 Average		**20.8**	**13.3**	**12.8**	**53.2**
2010 Average		**36.3**	**4.9**	**27.6**	**31.2**
2011 Average		**28.8**	**11.7**	**15.5**	**43.9**
2012 Average		**25.2**	**14.3**	**12.1**	**48.4**
2013 Average		**18.7**	**14.6**	**10.2**	**56.5**
GW3 Average (2009-2013)		**27.6**	**10.8**	**17.3**	**44.2**
GW4	7/31/2009	64.0	0.8	28.2	7.0
GW4	8/3/2009	--	--	--	--
GW4	8/25/2009	79.0	0.0	27.2	-6.2
GW4	9/2/2009	--	--	--	--
GW4	9/8/2009	--	--	--	--
GW4	9/14/2009	--	--	--	--
GW4	9/18/2009	--	--	--	--
GW4	9/25/2009	74.5	0.1	28.4	**-3.0**
GW4	10/12/2009	68.0	0.5	27.0	4.5
GW4	10/16/2009	69.5	0.1	26.8	3.6
GW4	10/30/2009	36.5	0.0	31.4	32.1
GW4	11/6/2009	63.0	0.0	31.4	5.6
GW4	11/13/2009	66.0	0.0	29.8	4.2
GW4	11/19/2009	68.0	0.0	30.0	2.0
GW4	11/24/2009	64.5	0.0	27.6	7.9
GW4	12/17/2009	68.5	0.1	31.8	-0.4
GW4	12/23/2009	68.0	0.0	31.8	0.2
GW4	12/30/2009	66.5	0.5	31.8	1.2
GW4	1/22/2010	68.5	0.0	29.8	1.7
GW4	1/29/2010	65.5	0.0	30.8	3.7
GW4	2/5/2010	64.5	0.0	28.2	7.3
GW4	2/12/2010	64.0	0.0	28.4	7.6
GW4	2/19/2010	64.5	0.0	27.6	7.9
GW4	2/26/2010	69.5	0.0	28.2	2.3
GW4	3/5/2010	72.5	0.1	33.0	**-5.6**
GW4	3/19/2010	69.5	0.0	33.6	**-3.1**
GW4	3/29/2010	73.5	0.0	32.4	**-5.9**

TABLE 1

WISCONSIN DEPARTMENT OF NATURAL RESOURCES
REFUSE HIDEAWAY LANDFILL
MIDDLETON, WISCONSIN

SOUTH BRANCH GAS EXTRACTION WELL MONITORING RESULTS

Location	Date	CH_4 (%)	O_2 (%)	CO_2 (%)	Balance Gas* (%)
GW4	4/9/2010	73.0	0.0	34.2	-7.2
GW4	4/15/2010	69.5	0.1	33.4	-3.0
GW4	4/23/2010	79.0	0.1	30.8	-9.9
GW4	4/27/2010	75.0	0.1	31.0	-6.1
GW4	5/28/2010	--	--	--	--
GW4	6/25/2010	58.5	3.8	34.0	3.7
GW4	6/29/2010	79.0	0.0	39.2	-18.2
GW4	7/21/2010	--	--	--	--
GW4	7/29/2010	8.7	6.0	14.0	71.3
GW4	8/13/2010	51.0	3.7	24.3	21.0
GW4	8/20/2010	6.5	11.3	11.8	70.4
GW4	8/23/2010	44.0	2.2	25.8	28.0
GW4	8/27/2010	19.0	10.1	14.6	56.3
GW4	9/3/2010	14.0	13.4	9.8	62.8
GW4	9/21/2010	56.0	4.5	27.6	11.9
GW4	9/22/2010	51.5	1.8	24.2	22.5
GW4	10/4/2010	24.5	6.7	22.4	46.4
GW4	10/8/2010	31.5	5.3	24.2	39.0
GW4	10/15/2010	3.3	15.3	6.8	74.7
GW4	10/29/2010	23.5	5.9	29.6	41.0
GW4	11/19/2010	62.0	0.0	31.4	6.6
GW4	12/21/2010	71.5	0.4	32.0	-3.9
GW4	1/27/2011	61.0	0.0	20.0	19.0
GW4	2/28/2011	59.5	0.7	36.0	3.8
GW4	3/29/2011	60.5	0.0	33.0	6.5
GW4	4/27/2011	68.5	0.0	39.4	-7.9
GW4	5/24/2011	*100.0*	1.1	32.8	-33.9
GW4	6/28/2011	74.0	0.0	38.0	-12.0
GW4	8/1/2011	10.5	11.5	17.2	60.8
GW4	8/26/2011	81.5	0.0	33.6	-15.1
GW4	10/3/2011	84.0	0.0	34.8	-18.8
GW4	10/24/2011	53.5	7.0	25.6	13.9
GW4	11/30/2011	76.5	0.0	34.2	-10.7
GW4	12/30/2011	69.5	0.0	36.4	-5.9
GW4	1/25/2012	78.0	0.4	38.2	-16.6
GW4	2/22/2012	76.5	0.0	36.2	-12.7
GW4	3/30/2012	75.5	1.8	42.0	-19.3
GW4	4/25/2012	69.5	3.1	38.4	-11.0
GW4	5/29/2012	78.0	3.2	37.8	-19.0
GW4	6/20/2012	78.5	3.2	36.6	-18.3
GW4	7/23/2012	78.0	3.7	35.2	-16.9

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WISCONSIN DEPARTMENT OF NATURAL RESOURCES
REFUSE HIDEAWAY LANDFILL
MIDDLETON, WISCONSIN

SOUTH BRANCH GAS EXTRACTION WELL MONITORING RESULTS

Location	Date	CH_4 (%)	O_2 (%)	CO_2 (%)	Balance Gas* (%)
GW4	8/28/2012	92.0	0.3	35.0	-27.3
GW4	9/25/2012	89.5	1.8	36.0	-27.3
GW4	10/30/2012	74.0	1.8	32.4	-8.2
GW4	11/30/2012	30.0	0.5	36.6	32.9
GW4	12/31/2012	74.5	0.5	40.0	-15.0
GW4	1/31/2013	26.5	12.5	15.6	45.4
GW4	2/21/2013	43.0	8.0	23.6	25.4
GW4	3/27/2013	75.0	0.4	39.0	-14.4
GW4	4/26/2013	79.5	1.9	36.6	-18.0
GW4	5/31/2013	77.5	0.3	29.4	-7.2
GW4	6/11/2013	69.5	0.3	27.8	2.4
GW4	7/11/2013	79.0	1.7	30.2	-10.9
GW4	8/28/2013	39.5	3.2	25.0	32.3
GW4	9/23/2013	74.5	1.0	28.0	-3.5
GW4	10/25/2013	73.0	0.6	25.6	0.8
GW4	11/26/2013	77.0	0.7	25.8	-3.5
GW4	12/23/2013	89.0	1.6	24.0	-14.6
2009 Average		**65.8**	**0.2**	**29.5**	**4.5**
2010 Average		**52.2**	**3.1**	**26.7**	**18.0**
2011 Average		**66.6**	**1.7**	**31.8**	**0.0**
2012 Average		**74.5**	**1.7**	**37.0**	**-13.2**
2013 Average		**66.9**	**2.7**	**27.6**	**2.9**
GW4 Average (2009-2013)		**62.4**	**2.1**	**29.6**	**5.9**
GW5	7/31/2009	62.0	0.0	35.6	2.4
GW5	8/3/2009	--	--	--	--
GW5	8/25/2009	74.0	0.0	34.8	-8.8
GW5	9/2/2009	--	--	--	--
GW5	9/8/2009	--	--	--	--
GW5	9/14/2009	--	--	--	--
GW5	9/18/2009	--	--	--	--
GW5	9/25/2009	51.5	4.5	26.0	18.0
GW5	10/16/2009	63.5	0.0	33.4	3.1
GW5	10/30/2009	35.5	0.0	35.6	28.9
GW5	11/6/2009	61.0	0.0	34.6	4.4
GW5	11/13/2009	64.5	0.1	33.2	2.2
GW5	11/19/2009	65.0	0.0	33.6	1.4
GW5	11/24/2009	63.5	0.0	34.2	2.3
GW5	12/17/2009	67.5	0.0	34.2	-1.7
GW5	12/23/2009	66.5	0.0	34.2	-0.7
GW5	12/30/2009	66.5	0.2	34.0	-0.7
GW5	1/22/2010	65.0	0.0	35.0	0.0

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WISCONSIN DEPARTMENT OF NATURAL RESOURCES
REFUSE HIDEAWAY LANDFILL
MIDDLETON, WISCONSIN

SOUTH BRANCH GAS EXTRACTION WELL MONITORING RESULTS

Location	Date	CH_4 (%)	O_2 (%)	CO_2 (%)	Balance Gas* (%)
GW5	1/29/2010	63.5	0.0	33.0	3.5
GW5	2/5/2010	60.5	0.0	33.2	6.3
GW5	2/12/2010	60.0	0.0	34.4	5.6
GW5	2/19/2010	60.5	0.0	34.6	4.9
GW5	2/26/2010	65.0	0.0	34.4	0.6
GW5	3/5/2010	69.0	0.1	37.2	**-6.3**
GW5	3/19/2010	65.0	0.0	39.2	**-4.2**
GW5	3/29/2010	67.0	0.0	39.8	**-6.8**
GW5	4/9/2010	69.5	0.0	39.2	-8.7
GW5	4/15/2010	65.0	0.2	39.8	-5.0
GW5	4/23/2010	72.5	0.4	38.4	-11.3
GW5	4/27/2010	70.0	0.1	36.6	-6.7
GW5	5/28/2010	--	--	--	--
GW5	6/25/2010	76.5	0.0	44.6	-21.1
GW5	6/29/2010	76.0	0.0	43.4	-19.4
GW5	7/21/2010	--	--	--	--
GW5	7/29/2010	20.6	14.0	8.9	56.5
GW5	8/13/2010	55.9	3.8	29.2	11.1
GW5	8/20/2010	9.0	16.8	5.0	69.2
GW5	8/23/2010	50.5	5.3	27.4	16.8
GW5	8/27/2010	34.0	9.2	19.2	37.6
GW5	9/3/2010	10.5	16.6	6.4	66.5
GW5	9/7/2010[t]	11.5	16.5	6.0	66.0
GW5	9/21/2010	15.0	15.1	8.0	61.9
GW5	9/22/2010	23.0	13.5	11.8	51.7
GW5	10/4/2010	52.0	1.7	36.0	10.3
GW5	10/8/2010	12.5	14.6	8.4	64.5
GW5	10/15/2010	31.0	11.0	22.2	35.8
GW5	10/29/2010	35.5	5.8	37.2	21.5
GW5	11/19/2010	55.5	0.0	41.8	2.7
GW5	12/21/2010	64.0	2.3	42.4	-8.7
GW5	1/27/2011	56.0	0.5	20.0	23.5
GW5	2/28/2011	57.0	0.6	39.4	3.0
GW5	3/29/2011	59.0	0.8	33.2	7.0
GW5	4/27/2011	66.0	0.0	43.4	-9.4
GW5	5/24/2011	*100.0*	0.1	41.6	-41.7
GW5	6/28/2011	71.5	2.2	35.2	-8.9
GW5	8/1/2011	71.5	0.0	28.4	0.1
GW5	8/26/2011	0.5	20.9	1.0	77.7
GW5	10/3/2011	80.0	0.0	40.4	-20.4
GW5	10/24/2011	78.5	0.8	48.4	-27.7

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WISCONSIN DEPARTMENT OF NATURAL RESOURCES
REFUSE HIDEAWAY LANDFILL
MIDDLETON, WISCONSIN

SOUTH BRANCH GAS EXTRACTION WELL MONITORING RESULTS

Location	Date	CH_4 (%)	O_2 (%)	CO_2 (%)	Balance Gas* (%)
GW5	11/30/2011	73.0	0.0	38.0	-11.0
GW5	12/30/2011	69.5	0.0	37.2	-6.7
GW5	1/25/2012	55.0	4.1	29.4	11.5
GW5	2/22/2012	64.0	2.3	37.8	-4.1
GW5	3/30/2012	74.5	1.9	42.4	-18.8
GW5	4/25/2012	64.5	5.3	37.4	-7.2
GW5	5/29/2012	38.0	8.6	34.4	19.0
GW5	6/20/2012	55.0	7.3	28.2	9.5
GW5	7/23/2012	47.0	8.3	23.6	21.1
GW5	8/28/2012	89.0	0.3	39.4	-28.7
GW5	9/25/2012	80.0	1.3	37.6	-18.9
GW5	10/30/2012	76.0	1.8	35.0	-12.8
GW5	11/30/2012	16.5	8.5	23.8	51.2
GW5	12/31/2012	--	--	--	--
GW5	1/31/2013	61.5	0.5	38.0	0.0
GW5	2/21/2013	71.0	0.3	42.0	-13.3
GW5	3/27/2013	72.0	0.3	44.4	-16.7
GW5	4/26/2013	58.5	3.8	36.2	1.5
GW5	5/31/2013	69.5	0.3	32.8	-2.6
GW5	6/11/2013	67.0	0.3	31.4	1.3
GW5	7/11/2013	1.6	15.6	9.2	73.6
GW5	8/28/2013	*9.5*	*14.5*	*7.4*	68.6
GW5	9/23/2013	59.0	4.2	24.6	12.2
GW5	10/25/2013	46.0	6.6	20.8	26.6
GW5	11/26/2013	73.0	0.2	30.2	-3.4
GW5	12/23/2013	58.0	6.9	20.4	14.7
2009 Average		**61.8**	**0.4**	**33.6**	**4.2**
2010 Average		**49.5**	**4.9**	**29.1**	**16.5**
2011 Average		**65.2**	**2.2**	**33.9**	**-1.2**
2012 Average		**60.0**	**4.5**	**33.5**	**2.0**
2013 Average		**53.9**	**4.5**	**28.1**	**13.5**
GW5 Average (2009-2013)		**56.0**	**3.6**	**31.0**	**9.3**
GW5 - Lat East	8/25/2009	73.0	0.0	35.4	**-8.4**
GW5 - Lat East	9/2/2009	--	--	--	--
GW5 - Lat East	9/8/2009	--	--	--	--
GW5 - Lat East	9/14/2009	--	--	--	--
GW5 - Lat East	9/18/2009	--	--	--	--
GW5 - Lat East	9/25/2009	64.5	0.0	39.6	**-4.1**
GW5 - Lat East	10/30/2009	37.0	0.0	34.8	28.2
GW5 - Lat East	11/24/2009	64.0	0.0	33.4	2.6
GW5 - Lat East	12/30/2009	67.5	0.4	32.4	-0.3

TABLE 1

WISCONSIN DEPARTMENT OF NATURAL RESOURCES
REFUSE HIDEAWAY LANDFILL
MIDDLETON, WISCONSIN

SOUTH BRANCH GAS EXTRACTION WELL MONITORING RESULTS

Location	Date	CH_4 (%)	O_2 (%)	CO_2 (%)	Balance Gas* (%)
GW5 - Lat East	1/29/2010	65.0	0.0	31.4	3.6
GW5 - Lat East	2/26/2010	67.0	0.0	30.4	2.6
GW5 - Lat East	3/29/2010	72.5	0.0	33.4	**-5.9**
GW5 - Lat East	4/27/2010	75.5	0.0	31.2	**-6.7**
GW5 - Lat East	5/28/2010	--	--	--	--
GW5 - Lat East	6/25/2010	80.0	0.0	38.8	-18.8
GW5 - Lat East	7/21/2010	--	--	--	--
GW5 - Lat East	7/29/2010	63.7	0.0	36.3	0.0
GW5 - Lat East	8/27/2010	68.5	0.6	38.2	-7.3
GW5 - Lat East	9/7/2010[t]	59.0	2.6	33.2	5.2
GW5 - Lat East	9/22/2010	72.5	0.4	43.0	-15.9
GW5 - Lat East	10/4/2010	--	--	--	--
GW5 - Lat East	10/8/2010	--	--	--	--
GW5 - Lat East	10/15/2010	--	--	--	--
GW5 - Lat East	10/29/2010	67.5	0.0	40.4	-7.9
GW5 - Lat East	11/19/2010	56.5	0.0	40.0	3.5
GW5 - Lat East	12/21/2010	65.0	1.0	40.2	-6.2
GW5 - Lat East	1/27/2011	58.0	0.0	20.0	22.0
GW5 - Lat East	2/28/2011	56.0	1.3	38.0	4.7
GW5 - Lat East	3/29/2011	58.5	0.2	30.8	10.5
GW5 - Lat East	4/27/2011	74.5	0.1	35.0	-9.6
GW5 - Lat East	5/24/2011	96.5	0.9	40.0	-37.4
GW5 - Lat East	6/28/2011	84.0	0.0	37.0	-21.0
GW5 - Lat East	8/1/2011	78.5	0.0	28.0	-6.5
GW5 - Lat East	8/26/2011	78.0	0.5	38.8	-17.3
GW5 - Lat East	10/3/2011	76.5	0.0	42.0	-18.5
GW5 - Lat East	10/24/2011	83.0	0.7	45.6	-29.3
GW5 - Lat East	11/30/2011	74.0	0.0	40.0	-14.0
GW5 - Lat East	12/30/2011	68.5	0.0	37.2	-5.7
GW5 - Lat East	1/25/2012	79.5	0.1	38.8	-18.4
GW5 - Lat East	2/22/2012	74.0	0.0	35.2	-9.2
GW5 - Lat East	3/30/2012	80.0	0.8	38.0	-18.8
GW5 - Lat East	4/25/2012	72.5	4.2	35.8	-12.5
GW5 - Lat East	5/29/2012	79.5	3.7	36.6	-19.8
GW5 - Lat East	6/20/2012	47.0	9.4	21.4	22.2
GW5 - Lat East	7/23/2012	79.0	5.3	39.4	-23.7
GW5 - Lat East	8/28/2012	86.0	1.7	41.2	-28.9
GW5 - Lat East	9/25/2012	63.5	5.4	33.4	-2.3
GW5 - Lat East	10/30/2012	73.5	2.3	37.0	-12.8
GW5 - Lat East	11/30/2012	36.5	8.5	23.8	31.2
GW5 - Lat East	12/31/2012	--	--	--	--

TABLE 1

WISCONSIN DEPARTMENT OF NATURAL RESOURCES
REFUSE HIDEAWAY LANDFILL
MIDDLETON, WISCONSIN

SOUTH BRANCH GAS EXTRACTION WELL MONITORING RESULTS

Location	Date	CH_4 (%)	O_2 (%)	CO_2 (%)	Balance Gas* (%)
GW5 - Lat East	1/31/2013	63.0	0.5	36.0	0.5
GW5 - Lat East	2/21/2013	73.5	0.4	38.4	-12.3
GW5 - Lat East	3/27/2013	77.0	0.4	38.8	-16.2
GW5 - Lat East	4/26/2013	78.0	0.4	39.4	-17.8
GW5 - Lat East	5/31/2013	75.0	0.4	29.4	-4.8
GW5 - Lat East	6/11/2013	68.5	0.4	28.8	2.3
GW5 - Lat East	7/11/2013	79.0	0.9	30.1	-10.0
GW5 - Lat East	8/28/2013	78.0	0.3	31.4	-9.7
GW5 - Lat East	9/23/2013	74.5	1.3	33.8	-9.6
GW5 - Lat East	10/25/2013	67.5	1.0	28.0	3.5
GW5 - Lat East	11/26/2013	70.5	0.2	31.6	-2.3
GW5 - Lat East	12/23/2013	--	--	--	--
2009 Average		**61.2**	**0.1**	**35.1**	**3.6**
2010 Average		**67.7**	**0.4**	**36.4**	**-4.5**
2011 Average		**73.8**	**0.3**	**36.0**	**-10.2**
2012 Average		**70.1**	**3.8**	**34.6**	**-8.5**
2013 Average		**73.1**	**0.6**	**33.2**	**-6.9**
Lat East Ave. (2009-2013)		**70.2**	**1.1**	**35.1**	**-6.4**
GW5 - Lat West	8/3/2009	--	--	--	--
GW5 - Lat West	8/25/2009	68.5	0.0	40.2	-8.7
GW5 - Lat West	9/2/2009	--	--	--	--
GW5 - Lat West	9/8/2009	--	--	--	--
GW5 - Lat West	9/14/2009	--	--	--	--
GW5 - Lat West	9/18/2009	--	--	--	--
GW5 - Lat West	9/25/2009	68.0	0.0	36.2	-4.2
GW5 - Lat West	10/30/2009	36.0	0.0	35.8	28.2
GW5 - Lat West	11/24/2009	62.5	0.0	34.8	2.7
GW5 - Lat West	12/30/2009	67.0	0.4	31.6	1.0
GW5 - Lat West	1/29/2010	64.5	0.0	31.2	4.3
GW5 - Lat West	2/26/2010	66.0	0.0	30.8	3.2
GW5 - Lat West	3/29/2010	71.0	0.0	34.4	-5.4
GW5 - Lat West	4/27/2010	72.5	0.1	32.4	-5.0
GW5 - Lat West	5/28/2010	--	--	--	--
GW5 - Lat West	6/25/2010	76.5	0.0	43.6	-20.1
GW5 - Lat West	7/21/2010	--	--	--	--
GW5 - Lat West	7/29/2010	60.7	0.0	39.3	0.0
GW5 - Lat West	8/27/2010	64.5	0.6	42.6	-7.7
GW5 - Lat West	9/7/2010[t]	61.5	0.5	40.6	-2.6
GW5 - Lat West	9/22/2010	69.0	0.5	47.2	-16.7
GW5 - Lat West	10/4/2010	--	--	--	--
GW5 - Lat West	10/8/2010	--	--	--	--

TABLE 1

WISCONSIN DEPARTMENT OF NATURAL RESOURCES
REFUSE HIDEAWAY LANDFILL
MIDDLETON, WISCONSIN

SOUTH BRANCH GAS EXTRACTION WELL MONITORING RESULTS

Location	Date	CH_4 (%)	O_2 (%)	CO_2 (%)	Balance Gas* (%)
GW5 - Lat West	10/15/2010	--	--	--	--
GW5 - Lat West	10/29/2010	65.0	0.0	44.4	-9.4
GW5 - Lat West	11/19/2010	55.0	0.0	42.6	2.4
GW5 - Lat West	12/21/2010	66.5	1.6	39.2	-7.3
GW5 - Lat West	1/27/2011	57.5	0.0	20.0	22.5
GW5 - Lat West	2/28/2011	57.5	0.8	39.2	2.5
GW5 - Lat West	3/29/2011	58.0	0.2	30.8	11.0
GW5 - Lat West	4/27/2011	71.5	0.1	37.4	-9.0
GW5 - Lat West	5/24/2011	*100.0*	0.4	40.4	-40.8
GW5 - Lat West	6/24/2011	79.0	0.0	41.6	-20.6
GW5 - Lat West	8/1/2011	70.5	0.4	35.0	-5.9
GW5 - Lat West	8/26/2011	71.5	0.8	45.8	-18.1
GW5 - Lat West	10/3/2011	76.5	0.0	45.8	-22.3
GW5 - Lat West	10/24/2011	80.0	1.0	49.0	-30.0
GW5 - Lat West	11/30/2011	72.5	1.6	41.4	-15.5
GW5 - Lat West	12/30/2011	68.0	0.5	38.8	-7.3
GW5 - Lat West	1/25/2012	72.0	0.7	38.8	-11.5
GW5 - Lat West	2/22/2012	73.0	0.0	36.2	-9.2
GW5 - Lat West	3/30/2012	74.5	0.5	39.8	-14.8
GW5 - Lat West	4/25/2012	70.5	4.0	38.4	-12.9
GW5 - Lat West	5/29/2012	74.0	4.6	43.0	-21.6
GW5 - Lat West	6/20/2012	66.0	5.6	38.8	-10.4
GW5 - Lat West	7/23/2012	73.0	4.9	47.2	-25.1
GW5 - Lat West	8/28/2012	81.0	2.5	47.0	-30.5
GW5 - Lat West	9/25/2012	71.5	2.2	44.4	-18.1
GW5 - Lat West	10/30/2012	70.5	2.9	39.2	-12.6
GW5 - Lat West	11/30/2012	27.0	1.6	40.6	30.8
GW5 - Lat West	12/31/2012	--	--	--	--
GW5 - Lat West	1/31/2013	62.5	0.5	36.6	0.4
GW5 - Lat West	2/21/2013	70.0	0.5	38.0	-8.5
GW5 - Lat West	3/27/2013	65.0	3.0	33.6	-1.6
GW5 - Lat West	4/26/2013	75.5	0.4	40.6	-16.5
GW5 - Lat West	5/31/2013	74.5	0.7	33.0	-8.2
GW5 - Lat West	6/11/2013	71.0	0.3	32.2	-3.5
GW5 - Lat West	7/11/2013	73.5	1.3	35.4	-10.2
GW5 - Lat West	8/28/2013	74.0	0.3	36.6	-10.9
GW5 - Lat West	9/23/2013	68.0	0.7	38.4	-7.1
GW5 - Lat West	10/25/2013	64.5	0.3	30.4	4.8
GW5 - Lat West	11/26/2013	71.0	0.3	32.4	-3.7
GW5 - Lat West	12/23/2013	--	--	--	--

TABLE 1

WISCONSIN DEPARTMENT OF NATURAL RESOURCES
REFUSE HIDEAWAY LANDFILL
MIDDLETON, WISCONSIN

SOUTH BRANCH GAS EXTRACTION WELL MONITORING RESULTS

Location	Date	CH_4 (%)	O_2 (%)	CO_2 (%)	Balance Gas* (%)
2009 Average		**60.4**	**0.1**	**35.7**	**3.8**
2010 Average		**66.1**	**0.3**	**39.0**	**-5.4**
2011 Average		**71.9**	**0.5**	**38.8**	**-11.1**
2012 Average		**68.5**	**2.7**	**41.2**	**-12.4**
2013 Average		**70.0**	**0.8**	**35.2**	**-5.9**
Lat West Ave. (2009-2013)		**68.2**	**0.9**	**38.3**	**-7.4**

* ; Balance gas calculated as 100% - (%CH_4+%CO_2+%O_2).
** : Gas Flow (cfm) calculated by multiplying gas velocity (fpm) by pipe area 0.045 (3" diameter).
*** : Only wells that are open following inspection on given date are included in the total flow calculation.
-- : Not measured.
fpm : Feet per minute.
cfm : Cubic feet per minute.
in WC : Inches of water column.
deg F : Degrees Fahrenheit.

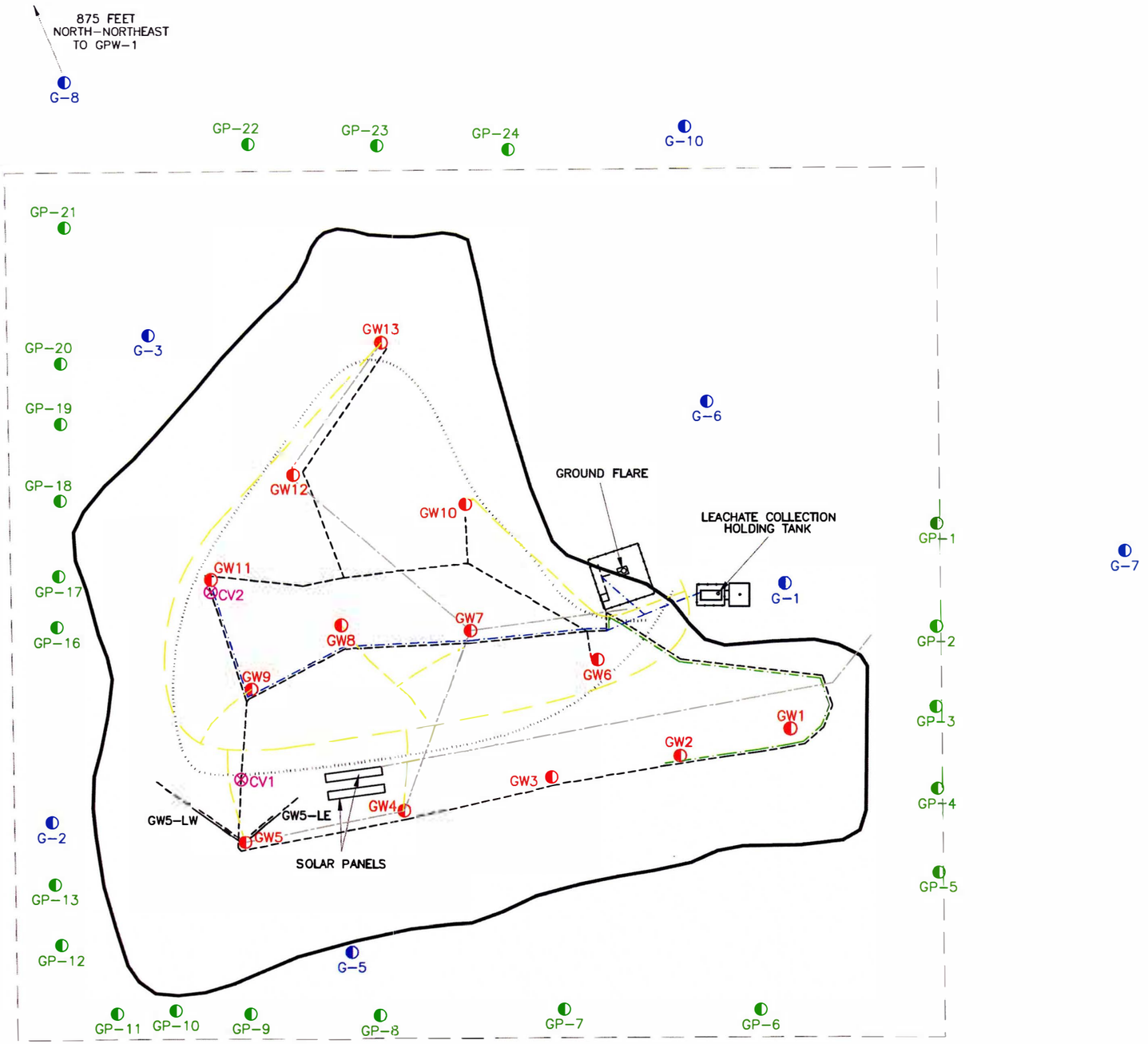
FIGURES

U.S.G.S TOPOGRAPHIC
7.5 MINUTE QUADRANGLE

DATE: 01/30/14	***PREPARED BY:***	WISCONSIN DEPARTMENT OF NATURAL RESOURCES REFUSE HIDEAWAY LANDFILL 7562 U.S. HIGHWAY 14 MIDDLETON, WISCONSIN 53562	***FIGURE:***
REVISION: 0	LEGGETTE, BRASHEARS & GRAHAM, INC. Professional Groundwater and Environmental Engineering Services 6409 Odana Road, Suite 11 Madison, WI 53719 (608) 441-5544	AREA LOCATION MAP	
DISK: j:\\RefuseHideaway\Figures			
FILE: Area Location.dwg			
DRAWN: ALB / ***CHECKED:*** JAS			

LEGEND

- GW9 — EXISTING LEACHATE/GAS EXTRACTION WELL LOCATION
- G–8 — GAS PROBE LOCATION ("G" SERIES)
- GP–16 — GAS PROBE LOCATION ("GP" SERIES)
- CV1 — CONTROL VALVE LOCATION
- PROPERTY BOUNDARY
- FILL LIMITS
- GAS HEADER PIPE
- LEACHATE CONVEYANCE PIPE
- LEACHATE CONVEYANCE PIPE (NEVER PUT IN SERVICE)
- FENCE LINE
- ACCESS ROAD
- ELECTRICAL
- AIR LINE



N

0 180

SCALE IN FEET

NOTE: ALL LOCATIONS ARE APPROXIMATE

WISCONSIN DEPARTMENT OF NATURAL RESOURCES
REFUSE HIDEAWAY LANDFILL
MIDDLETON, WI

SITE MAP

FILE: SITEMAP.DWG | DATE: SEPTEMBER 2009 | FIGURE: 2

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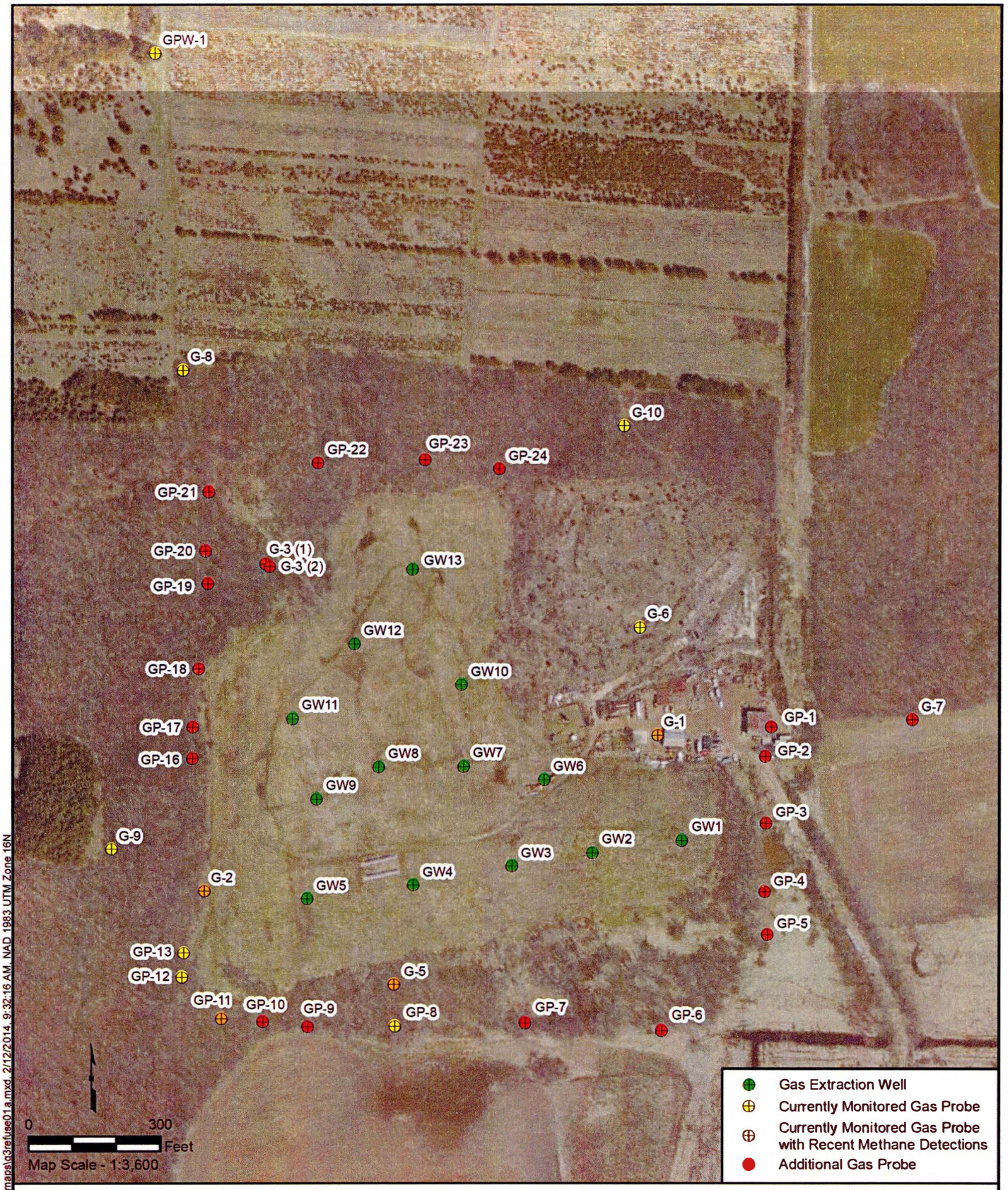
608.441.5544

REVISED 5/02



Service Layer Credits: Source: Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, and the GIS User Community

Z:\GIS\Refuse_Hideaway\maps\v3\refuse01a.mxd, 2/12/2014, 9:32:16 AM, NAD 1983 UTM Zone 16N

Prepared By:
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REFUSE HIDEAWAY LANDFILL

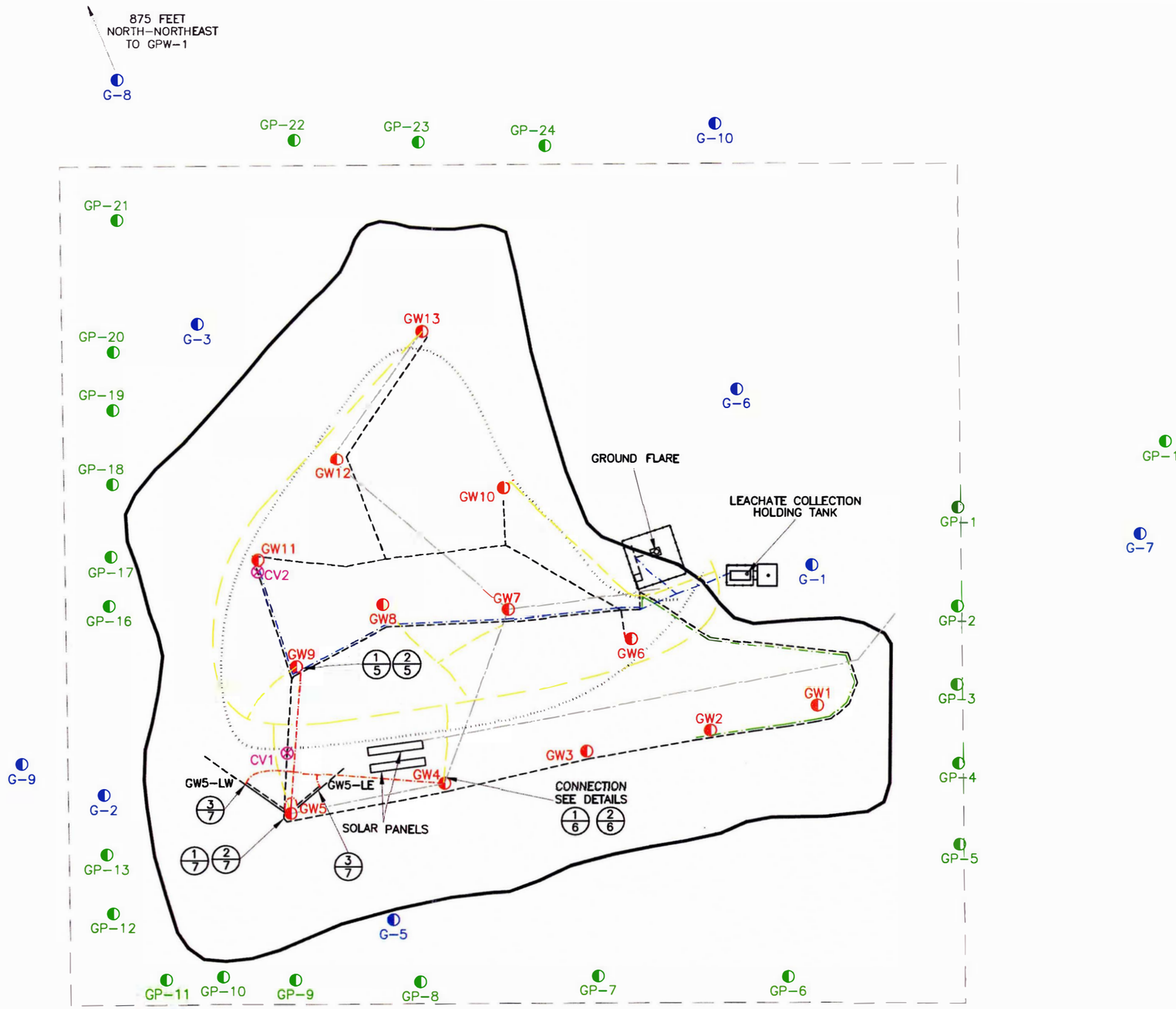
MIDDLETON, WISCONSIN

GAS PROBE AND GAS EXTRACTION WELL LOCATIONS

FILE: g3refuse01a.MXD	DATE: 2/12/2014	FIGURE: 3

LEGEND

- GW9 — EXISTING LEACHATE/GAS EXTRACTION WELL LOCATION
- G-8 — GAS PROBE LOCATION ("G" SERIES)
- GP-16 — GAS PROBE LOCATION ("GP" SERIES)
- CV1 — CONTROL VALVE LOCATION
- PROPERTY BOUNDARY
- FILL LIMITS
- GAS HEADER PIPE
- LEACHATE CONVEYANCE PIPE
- LEACHATE CONVEYANCE PIPE (NEVER PUT IN SERVICE)
- FENCE LINE
- ACCESS ROAD
- ELECTRICAL
- AIR LINE
- NEW GAS HEADER PIPING



N

0 180

SCALE IN FEET

NOTE: ALL LOCATIONS ARE APPROXIMATE

WISCONSIN DEPARTMENT OF NATURAL RESOURCES
REFUSE HIDEAWAY LANDFILL
MIDDLETON, WI

SOUTH BRANCH MODIFICATIONS - OVERVIEW

FILE: SOUTH BRANCH.DWG | DATE: FEBRUARY 2014 | FIGURE: 4

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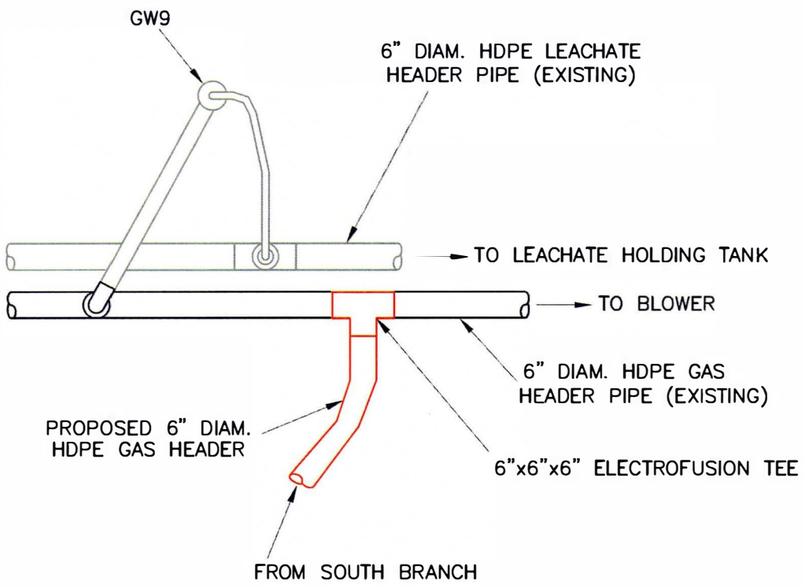
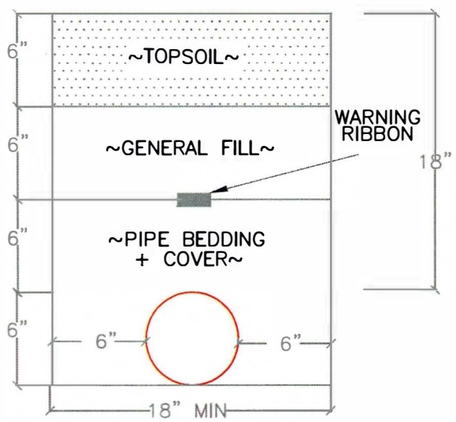
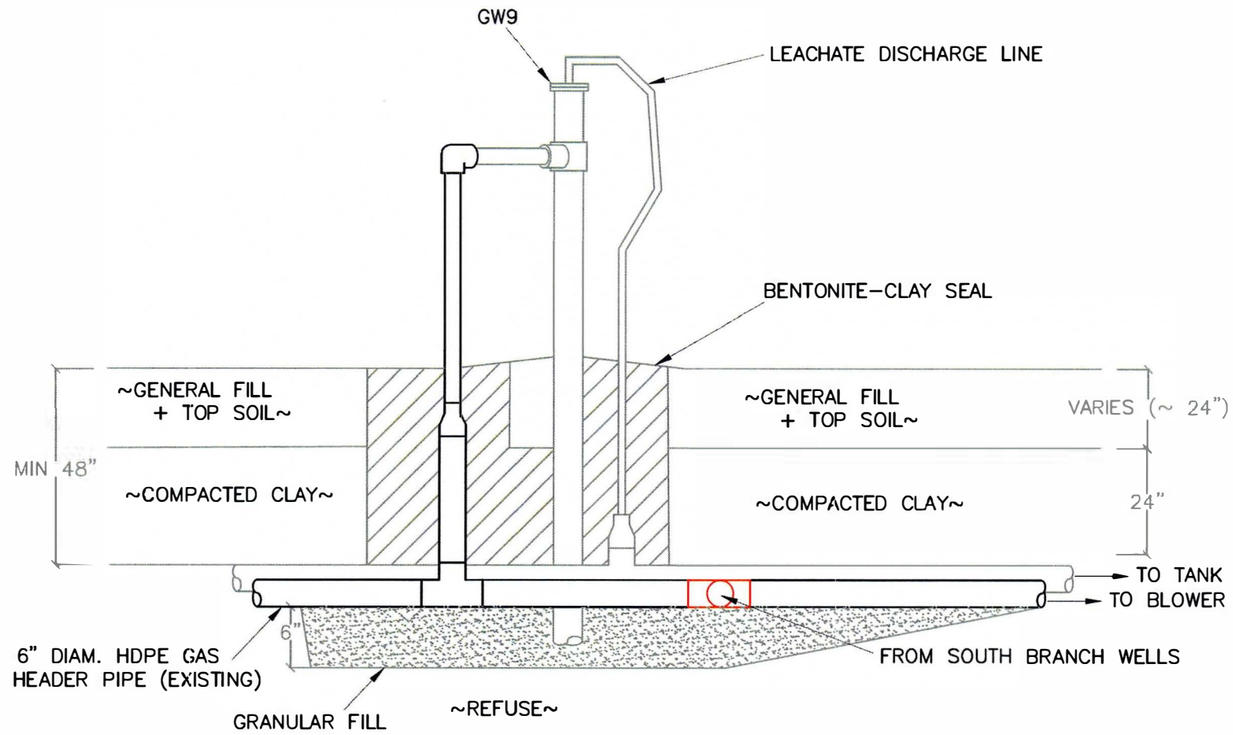
PROPOSED EQUIPMENT
SHOWN IN RED



1/5 REDUNDANCY LINE CONNECTION AT GW9 – PLAN
NOT TO SCALE



3/5 TYPICAL TRENCH CROSS SECTION
NOT TO SCALE



2/5 REDUNDANCY LINE CONNECTION AT GW9 – PROFILE
NOT TO SCALE

WISCONSIN DEPARTMENT OF NATURAL RESOURCES
REFUSE HIDEAWAY LANDFILL
MIDDLETON, WI

GW9 MODIFICATIONS

FILE: MODIFICATIONS.DWG | DATE: FEBRUARY 2014 | FIGURE: 5

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PROPOSED EQUIPMENT
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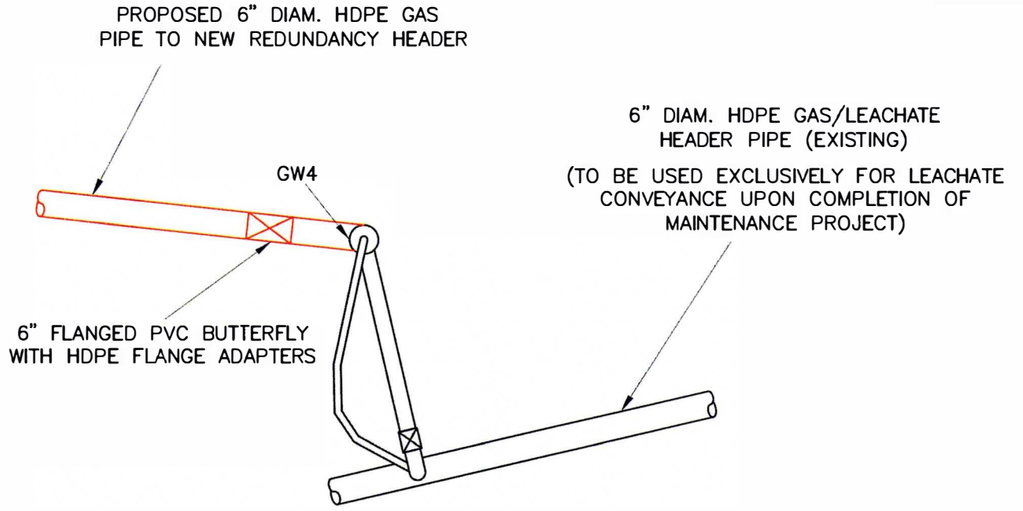
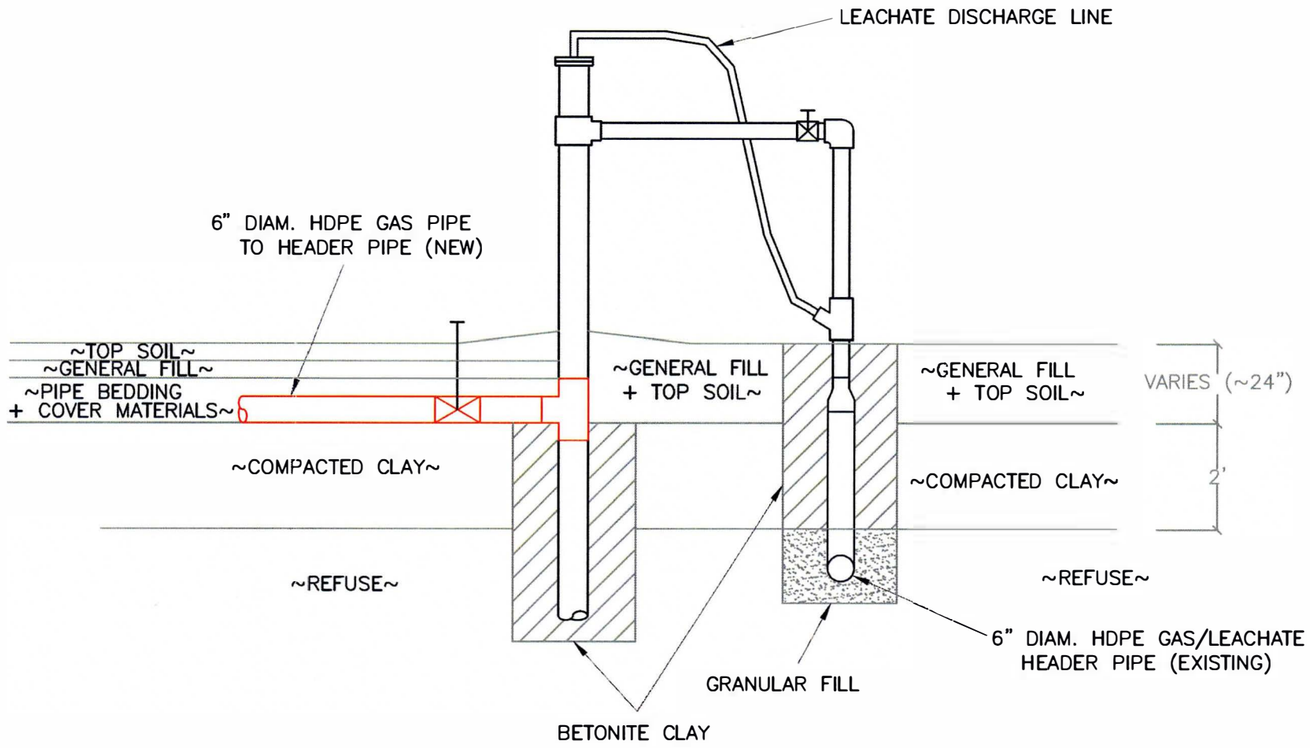


1/6 GW4 CONNECTION – PLAN
NOT TO SCALE



2/6 GW4 CONNECTION – PROFILE
NOT TO SCALE

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REFUSE HIDEAWAY LANDFILL
MIDDLETON, WI

GW4 MODIFICATIONS

FILE: MODIFICATIONS.DWG | DATE: FEBRUARY 2014 | FIGURE: 6

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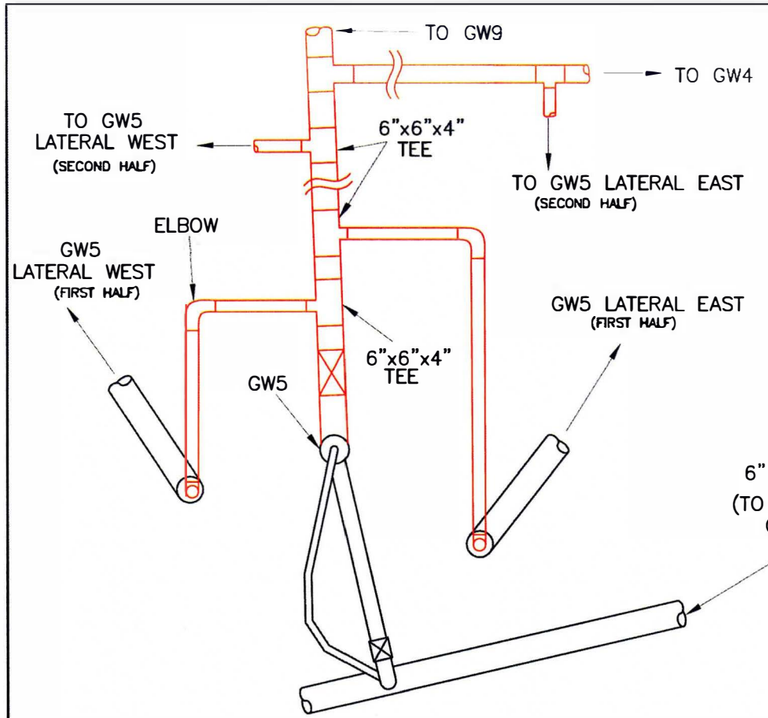
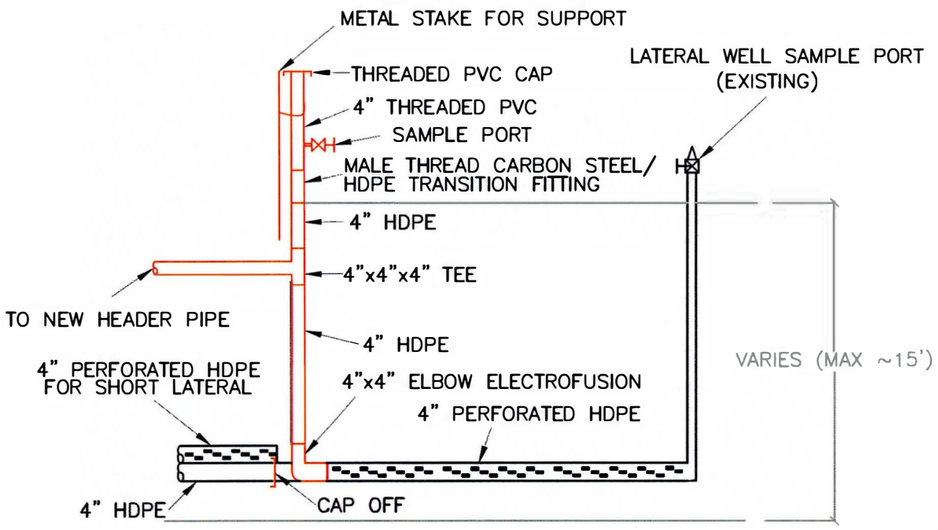
PROPOSED EQUIPMENT
SHOWN IN RED

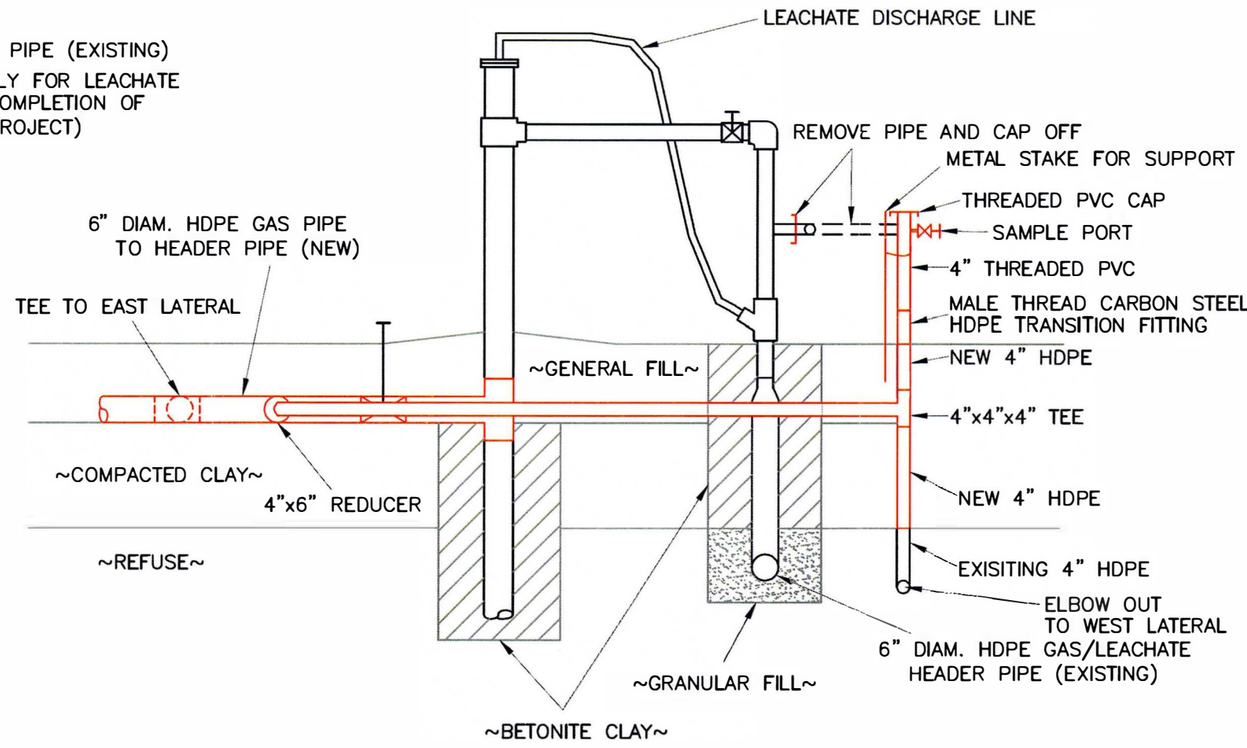


1/7 GW5 CONNECTION – PLAN
NOT TO SCALE



3/7 GW5 SECOND HALF LATERAL CONNECTION – PROFILE
NOT TO SCALE

NOTE: GW5 EAST LATERAL NOT SHOWN ON THIS DETAIL (CONNECTION TO EAST LATERAL WILL BE A MIRROR OF THE WEST LATERAL CONNECTION)



2/7 GW5 FIRST HALF LATERAL CONNECTION – PROFILE
NOT TO SCALE

WISCONSIN DEPARTMENT OF NATURAL RESOURCES
REFUSE HIDEAWAY LANDFILL
MIDDLETON, WI

GW5 MODIFICATIONS

FILE: MODIFICATIONS.DWG | DATE: FEBRUARY 2014 | FIGURE: 7

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APPENDIX I

GAS AND LEACHATE EXTRACTION SYSTEM LAYOUT PLAN SHEET

LEGEND (EXISTING)

- ACCESS ROAD
- BUILDING
- FENCE LINE
- POLE
- LH1 — LEACHATE HEADWELL LOCATION AND NUMBER
- GW2 — GAS WELL LOCATION AND NUMBER
- DL1 — DRIPLEG LOCATION AND NUMBER
- CO2 — CLEANOUT RISER LOCATION AND NUMBER
- 100' / 2.0% — GAS HEADER PIPE-6" DIAMETER, LENGTH & SLOPE
- 50' / 2.0% — GRAVITY LEACHATE CONVEYANCE PIPE-6" DIAMETER, LENGTH & SLOPE
- EXISTING EROSION CONTROL RIPRAP
- APPROXIMATE LIMITS OF LANDFILL

LEGEND (RECORD)

- GW6 — GAS WELL LOCATION AND NUMBER
- GW8P — GAS WELL LOCATION AND NUMBER WITH LEACHATE EXTRACTION PUMP
- DL4 — DRIPLEG LOCATION AND NUMBER
- CO6 — CLEANOUT RISER LOCATION, NUMBER AND DIRECTION
- CV2 — CONTROL VALVE
- 6"G 140' 2.54% — GAS HEADER PIPE-DIAMETER, LENGTH & SLOPE
- 6"L — GRAVITY LEACHATE CONVEYANCE PIPE-6" DIAMETER, IDENTICAL LENGTH & SLOPE AS GAS HEADER PIPE
- FENCE LINE
- R — INTERMEDIATE HEADER PIPE LOCATION
- VS3 — VACUUM SWITCH LOCATION AND NUMBER
- E — BURIED ELECTRICAL
- T — BURIED TELEPHONE SERVICE
- JB — ELECTRIC JUNCTION BOX ENCLOSURE
- TB — ELECTRIC TERMINAL BOX

NOTES

1. BASE MAP DEVELOPED FROM AERIAL PHOTOGRAPHY PROVIDED BY KBM, INC., GRAND FORKS, ND, DATED AUGUST 27, 1989.
2. CONTOUR INTERVAL IS TWO FEET.
3. PROJECT BENCHMARK IS CHISEL MARK ON TOP STEEL PLATE AT NORTH END OF LOADING DOCK LOCATED ON THE SOUTH SIDE OF BUILDING (966.31 U.S.G.S. DATUM). ELEVATIONS BASED ON U.S.G.S. DATUM.
4. GRID SYSTEM SHOWN IS STATE PLANE COORDINATE SYSTEM.
5. APPROXIMATE LIMITS OF LANDFILL BASED ON RMT, INC. DRAWING 1181.02-2, DATED NOVEMBER 18, 1986. THESE LIMITS DO NOT REFLECT LIMITS OF REFUSE.
6. TELEPHONE SERVICE IS BURIED APPROXIMATELY 18" BELOW GRADE. MID-PLAINS TELEPHONE JUNE 24, 1991. TELEPHONE SERVICE IS INSTALLED TO THE ELECTRIC CONTROL PANEL AT THE LEACHATE HOLDING TANK FROM UTILITY POLE STR. NO. 249 (LOCATED SOUTHEAST OF THE ELECTRIC SERVICE ENTRANCE PANEL). TELEPHONE SERVICE EXTENDED TO SYSTEM ELECTRICAL CONTROL ENCLOSURE BY STAFF ELECTRIC, INC.
7. ALL BURIED UTILITY LINE LOCATIONS ARE SHOWN APPROXIMATELY AND MUST BE FIELD VERIFIED BEFORE ANY EXCAVATING OR CONSTRUCTION IS PERFORMED.

ELECTRICAL SYSTEM LAYOUT

CONSTRUCTION OBSERVATION REPORT
GAS AND LEACHATE EXTRACTION SYSTEM
REFUSE HIDEAWAY LANDFILL
TOWN OF MIDDLETON
DANE COUNTY, WISCONSIN

WARZYN
WARZYN INC.

Designed By: DRF | Drawn By: JSM/TPB | Checked By: JCK
Approved By: [signature] | Date: 11-4-91
Reference: \15292\15292-D1
File Path: \15292\15292-D9

Revisions | Date • By • App'd

Printed

Sheet Number: 9 OF 9

Drawing Number: 15292 D9

WARZYN

QUALITY CONTROL

Audit | Overlay | Screen

APPENDIX II

SOUTH BRANCH WELLHEAD PHOTOGRAPHS

PHOTO:	SUBJECT:
1	GW1

PHOTO:	SUBJECT:
2	GW2

PHOTO:	SUBJECT:
3	GW3

PHOTO:	SUBJECT:
4	GW4

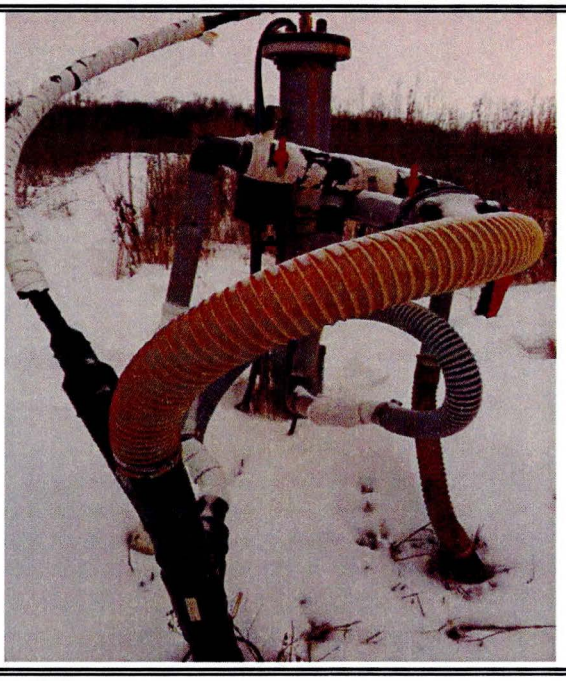


PHOTO:	*SUBJECT:*
5	**GW5**

APPENDIX III

POTENTIAL TO EMIT CALCULATIONS

TABLE 1

WISCONSIN DEPARTMENT OF NATURAL RESOURCES
REFUSE HIDEAWAY LANDFILL
MIDDLETON, WISCONSIN

LANDFILL GAS ANALYTICAL RESULTS

Sampling Location	Date	TO-15		EPA 25C	EPA 3C				
		Benzene (ppb v/v)	Vinyl Chloride (ppb v/v)	NMOC as Carbon (ppm-C)	Carbon Dioxide (% v/v)	Methane (% v/v)	Nitrogen (% v/v)	Oxygen (% v/v)	Wells On-Line
Sample Port A	2/1/2012	150	140	490	26	37	31	3.8	6, 7, 8, 9, 10, 11, 12, 13
Sample Port A	2/8/2012	120	100	300	17	21	48	9.6	6, 7, 8, 9, 10, 11, 12, 13

Sample collected in a 6L Summa Canister

ppb v/v: parts per billion by volume

ppm-C: parts per million as Carbon

% v/v: percent by volume

NMOC: Nonmethane Organic Compounds

TO-15: Method for analysis of Volatile Organic Compounds in Ambient Air

EPA 25C: Method for analysis of NMOC

EPA 3C: Method for analysis of Fixed Gases from Stationary Sources

WISCONSIN DEPARTMENT OF NATURAL RESOURCES
REFUSE HIDEAWAY LANDFILL
MIDDLETON, WISCONSIN

CALCULATION OF LANDFILL POTENTIAL TO EMIT

Calculated by: Jennifer Shelton
Checked by: Richard Stoor

STATEMENT OF PROBLEM:

Calculate the landfill's potential to emit (PTE) benzene and vinyl chloride. Multiply PTE values by factor of 4 to correct for not venting through a vertical, unobstructed stack. Compare PTE values multiplied by 4 to NR 445 thresholds to determine if air treatment is required based on these constituents.

PROJECT CONSTRAINTS:

Pressure, P =	1	atm
Temperature, T =	60	degrees F
	289	degrees Kelvin
Contaminant concentration, C (ppb v/v)=		Maximum concentration reported in table below.
Ideal Gas Constant =	0.08206	$\frac{l*atm}{gmol*K}$
Maximum Observerd Flowrate, Q (cfm) =	463	Max flowrate for period of July 2009 through December 2011 Value recorded on January 11, 2011. (May 24, 2011 flowrate of 648 cfm appears anamolous)

Sampling Location	Date	Concentration, C	
		Benzene (ppb v/v)	Vinyl Chloride (ppb v/v)
Molecular Weight (MW) (g/mol)		**78.1**	**62.494**
Sample Port A	2/1/2012	150	140
Sample Port A	2/8/2012	120	100

CALCULATION:

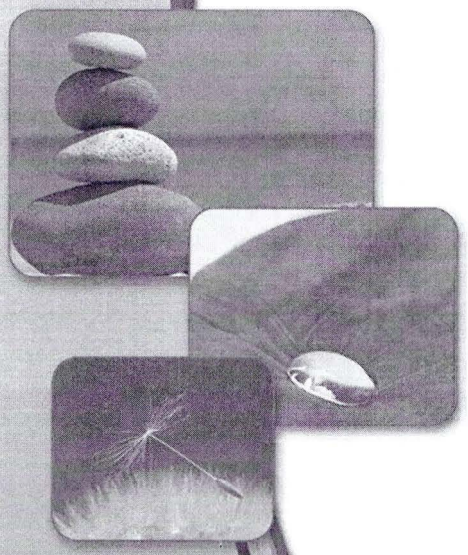
$$C\left(\frac{mg}{m^3}\right) = \frac{P(atm)}{R\left(\frac{l \cdot atm}{gmol \cdot K}\right) \cdot T(K)} \cdot C\left(\frac{ppb \cdot v}{v}\right) \cdot MW\left(\frac{g}{gmol}\right) \cdot \frac{1000 \cdot l}{m^3} \cdot \frac{1000 \cdot mg}{g} \cdot \frac{1}{1x10^9}$$

$$PTE\left(\frac{lb}{yr}\right) = C\left(\frac{mg}{m^3}\right) \cdot Q\left(\frac{ft^3}{\min}\right) \cdot \frac{1440 \cdot \min}{day} \cdot \frac{365 \cdot day}{yr} \cdot \frac{m^3}{35.31 \cdot ft^3} \cdot \frac{1 \cdot lb}{453600 \cdot mg}$$

Compound	Atomic Weight, MW (g/mol)	Maximum Concentration, C (ppb v/v)	Concentration, C (mg/m^3)	Max Observed Flowrate, Q (cfm)	PTE Uncontrolled (lb/yr)	PTE Uncontrolled x 4 (lb/yr)	NR 455 Threshold (lb/yr)
Benzene	78.1	150	0.494	463	7.5	30.1	228
Vinyl Chloride	62.494	140	0.369	463	5.6	22.4	202

CONCLUSION:

The landfill's PTE x 4 for benzene and vinyl chloride are less than NR 445 threshold values.



LINKS

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TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Watertown
1101 Industrial Drive
Watertown, WI 53094
Tel: (920)261-1660

TestAmerica Job ID: 610-1491-1
Client Project/Site: Refuse Hideaway Landfill

For:
Leggette, Brashears & Graham, Inc.
6409 Odana Road
Suite C
Madison, Wisconsin 53719

Attn: Jennifer Shelton

Sandie Fredrick

Authorized for release by:
2/15/2012 5:59:43 PM
Sandie Fredrick
Project Manager I
sandie.fredrick@testamericainc.com

Designee for

Dan Milewsky
Project Manager II
dan.milewsky@testamericainc.com

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Definitions/Glossary

Client: Leggette, Brashears & Graham, Inc.
Project/Site: Refuse Hideaway Landfill

TestAmerica Job ID: 610-1491-1

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DL, RA, RE, IN	Indicates a Dilution, Reanalysis, Re-extraction, or additional Initial metals/anion analysis of the sample
EDL	Estimated Detection Limit
EPA	United States Environmental Protection Agency
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference, a measure of the relative difference between t o points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Job ID: 610-1491-1

Laboratory: TestAmerica Watertown

Narrative

Job Narrative
610-1491-1

Comments
No additional comments.

Receipt
All samples were received in good condition within temperature requirements.

Air Toxics
Method(s) TO-15: The following sample(s) was diluted due to the abundance of non-target analytes: LFG - Sample Port A (610-1491-1). Elevated reporting limits (RLs) are provided.

No other analytical or quality issues were noted.

Detection Summary

Client: Leggette, Brashears & Graham, Inc.
Project/Site: Refuse Hideaway Landfill

TestAmerica Job ID: 610-1491-1

Client Sample ID: LFG - Sample Port A

Lab Sample ID: 610-1491-1

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
Benzene	150		5.0	5.0	ppb v/v	25.1		TO-15	Total/NA
Vinyl chloride	140		5.0	5.0	ppb v/v	25.1		TO-15	Total/NA
NMOC as Carbon	490		9.2	9.2	ppm-C	1.54		EPA 25C	Total/NA
Carbon dioxide	26		0.077	0.077	% v/v	1.54		EPA 3C	Total/NA
Methane	37		0.062	0.062	% v/v	1.54		EPA 3C	Total/NA
Nitrogen	31		0.77	0.77	% v/v	1.54		EPA 3C	Total/NA
Oxygen	3.8		0.062	0.062	% v/v	1.54		EPA 3C	Total/NA

Client Sample Results

Client: Leggette, Brashears & Graham, Inc.
Project/Site: Refuse Hideaway Landfill

TestAmerica Job ID: 610-1491-1

Client Sample ID: LFG - Sample Port A
Date Collected: 02/01/12 11:05
Date Received: 02/01/12 12:00
Sample Container: Summa Canister 6L

Lab Sample ID: 610-1491-1
Matrix: Air

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	150		5.0	5.0	ppb v/v			02/14/12 04:16	25.1
Vinyl chloride	140		5.0	5.0	ppb v/v			02/14/12 04:16	25.1

Method: EPA 25C - Nonmethane Organic Compounds (NMOC)

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
NMOC as Carbon	490		9.2	9.2	ppm-C			02/09/12 16:33	1.54

Method: EPA 3C - Fixed Gases from Stationary Sources

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon dioxide	26		0.077	0.077	% v/v			02/09/12 16:33	1.54
Methane	37		0.062	0.062	% v/v			02/09/12 16:33	1.54
Nitrogen	31		0.77	0.77	% v/v			02/09/12 16:33	1.54
Oxygen	3.8		0.062	0.062	% v/v			02/09/12 16:33	1.54

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Lab Sample ID: MB 200-33599/4
Matrix: Air
Analysis Batch: 33599

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	<0.20		0.20	0.20	ppb v/v			02/13/12 16:34	1
Vinyl chloride	<0.20		0.20	0.20	ppb v/v			02/13/12 16:34	1

Lab Sample ID: LCS 200-33599/3
Matrix: Air
Analysis Batch: 33599

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	10.0	8.03		ppb v/v		80	70 - 130
Vinyl chloride	10.0	8.30		ppb v/v		83	70 - 130

Method: EPA 25C - Nonmethane Organic Compounds (NMOC)

Lab Sample ID: MB 200-33449/3
Matrix: Air
Analysis Batch: 33449

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
NMOC as Carbon	<6.0		6.0	6.0	ppm-C			02/09/12 12:11	1

Lab Sample ID: LCS 200-33449/2
Matrix: Air
Analysis Batch: 33449

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
NMOC as Carbon	750	796		ppm-C		106	70 - 130

Method: EPA 3C - Fixed Gases from Stationary Sources

Lab Sample ID: MB 200-33450/3
Matrix: Air
Analysis Batch: 33450

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon dioxide	<0.050		0.050	0.050	% v/v			02/09/12 12:11	1
Methane	<0.040		0.040	0.040	% v/v			02/09/12 12:11	1
Nitrogen	<0.50		0.50	0.50	% v/v			02/09/12 12:11	1
Oxygen	<0.040		0.040	0.040	% v/v			02/09/12 12:11	1

Lab Sample ID: LCS 200-33450/2
Matrix: Air
Analysis Batch: 33450

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Carbon dioxide	5.00	4.91		% v/v		98	70 - 130
Methane	4.00	3.68		% v/v		92	70 - 130
Nitrogen	5.00	4.66		% v/v		93	70 - 130
Oxygen	4.00	3.48		% v/v		87	70 - 130

QC Association Summary

Client: Leggette, Brashears & Graham, Inc.
Project/Site: Refuse Hideaway Landfill

TestAmerica Job ID: 610-1491-1

Air - GC/MS VOA

Analysis Batch: 33599

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
610-1491-1	LFG - Sample Port A	Total/NA	Air	TO-15	
LCS 200-33599/3	Lab Control Sample	Total/NA	Air	TO-15	
MB 200-33599/4	Method Blank	Total/NA	Air	TO-15	

Air - GC VOA

Analysis Batch: 33449

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
610-1491-1	LFG - Sample Port A	Total/NA	Air	EPA 25C	
LCS 200-33449/2	Lab Control Sample	Total/NA	Air	EPA 25C	
MB 200-33449/3	Method Blank	Total/NA	Air	EPA 25C	

Analysis Batch: 33450

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
610-1491-1	LFG - Sample Port A	Total/NA	Air	EPA 3C	
LCS 200-33450/2	Lab Control Sample	Total/NA	Air	EPA 3C	
MB 200-33450/3	Method Blank	Total/NA	Air	EPA 3C	

Lab Chronicle

Client: Leggette, Brashears & Graham, Inc.
Project/Site: Refuse Hideaway Landfill

TestAmerica Job ID: 610-1491-1

Client Sample ID: LFG - Sample Port A
Date Collected: 02/01/12 11:05
Date Received: 02/01/12 12:00

Lab Sample ID: 610-1491-1
Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO-15		25.1	33599	02/14/12 04:16	WRD	TAL BUR
Total/NA	Analysis	EPA 25C		1.54	33449	02/09/12 16:33	MRV	TAL BUR
Total/NA	Analysis	EPA 3C		1.54	33450	02/09/12 16:33	MRV	TAL BUR

Laboratory References:

TAL BUR = TestAmerica Burlington, 30 Community Drive, Suite 11, South Burlington, VT 05403, TEL (802)660-1990

Certification Summary

Client: Leggette, Brashears & Graham, Inc.
Project/Site: Refuse Hideaway Landfill

TestAmerica Job ID: 610-1491-1

Laboratory	Authority	Program	EPA Region	Certification ID
TestAmerica Watertown		WI Dept of Agriculture (Micro)		105-266
TestAmerica Watertown	Illinois	NELAC	5	100453
TestAmerica Watertown	Wisconsin	State Program	5	128053530
TestAmerica Burlington	ACLASS	DoD ELAP		ADE-1492
TestAmerica Burlington	Connecticut	State Program	1	PH-0751
TestAmerica Burlington	Delaware	Delaware DNREC	3	NA
TestAmerica Burlington	Florida	NELAC Secondary AB	4	E87467
TestAmerica Burlington	Louisiana	NELAC Secondary AB	6	176292
TestAmerica Burlington	Maine	State Program	1	VT00008
TestAmerica Burlington	Minnesota	State Program	5	050-999-436
TestAmerica Burlington	New Hampshire	NELAC	1	200610
TestAmerica Burlington	New Jersey	NELAC	2	VT972
TestAmerica Burlington	New York	NELAC	2	10391
TestAmerica Burlington	Pennsylvania	NELAC	3	68-00489
TestAmerica Burlington	Rhode Island	State Program	1	LAO00298
TestAmerica Burlington	USDA	USDA		P330-11-00093
TestAmerica Burlington	Vermont	State Program	1	VT-4000
TestAmerica Burlington	Virginia	NELAC Secondary AB	3	460209

Accreditation may not be offered or required for all methods and analytes reported in this package. Please contact your project manager for the laboratory's current list of certified methods and analytes.

Method Summary

Client: Leggette, Brashears & Graham, Inc.
Project/Site: Refuse Hideaway Landfill

TestAmerica Job ID: 610-1491-1

Method	Method Description	Protocol	Laboratory
TO-15	Volatile Organic Compounds in Ambient Air	EPA	TAL BUR
EPA 25C	Nonmethane Organic Compounds (NMOC)	EPA	TAL BUR
EPA 3C	Fixed Gases from Stationary Sources	EPA	TAL BUR

Protocol References:

EPA = US Environmental Protection Agency

Laboratory References:

TAL BUR = TestAmerica Burlington, 30 Community Drive, Suite 11, South Burlington, VT 05403, TEL (802)660-1990

Sample Summary

Client: Leggette, Brashears & Graham, Inc.
Project/Site: Refuse Hideaway Landfill

TestAmerica Job ID: 610-1491-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
610-1491-1	LFG - Sample Port A	Air	02/01/12 11:05	02/01/12 12:00

610-1491

TestAmerica Burlington
30 Community Drive
Suite 11
South Burlington, VT 05403
phone 802-660-1990 fax 802-660-1919

Canister Samples Chain of Custody Record

TestAmerica Analytical Testing Corp. assumes no liability with respect to the collection and shipment of these samples.

Client Contact Information	Project Manager: Jennifer Shelton	Samples Collected By: AFB	1 of 1 COCs
Company: LBG, Inc	Phone: 608-441-5544		
Address: 6409 Odana Rd Ste 11	Email: jshelton@lbgmad.com		
City/State/Zip Madison WI 53719			
Phone: 608-441-5544	Site Contact: Adam Both		
FAX: 608-441-5545	TA Contact: Kathryn Kelly		
Project Name: DNR-RHL	Analysis Turnaround Time		
Site: Refuse Hideaway Landfill	Standard (Specify)		
PO #	Rush (Specify)		

	Sample Identification	Sample Date(s)	Time Start	Time Stop	Canister Vacuum in Field, "Hg (Start)	Canister Vacuum in Field, "Hg (Stop)	Flow Controller ID	Canister ID	TO-15	TO-14A	EPA 3C	EPA 25C	ASTM D-1946	Other (Please specify in notes section)	Sample Type	Indoor Air	Ambient Air	Soil Gas	Landfill Gas	Other (Please specify in notes section)
01	LFG - Sample Port A	2/1/12	1105	1105	-29.0	-5.0	4904	3866	X		X	X								

Temperature (Fahrenheit)			
	Interior	Ambient	
Start			
Stop			

Pressure (inches of Hg)			
	Interior	Ambient	
Start			
Stop			

Special Instructions/QC Requirements & Comments:

Samples Shipped by: Fed Ex	Date/Time: 2/1/12 1200	Samples Received by: [signature] 2/2/12 1000
Samples Relinquished by: [signature]	Date/Time: 2/1/12 1200	Received by:
Relinquished by:	Date/Time:	Received by:

Lab Use Only: Shipper Name: Opened by: Condition:

Login Sample Receipt Checklist

Client: Leggette, Brashears & Graham, Inc.

Job Number: 610-1491-1

Login Number: 1491
List Number: 1
Creator: Kelly, Kathryn A

List Source: TestAmerica Watertown

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background		
The cooler's custody seal, if present, is intact.		
The cooler or samples do not appear to have been compromised or tampered with.		
Samples were received on ice.		
Cooler Temperature is acceptable.		
Cooler Temperature is recorded.		
COC is present.		
COC is filled out in ink and legible.		
COC is filled out with all pertinent information.		
Is the Field Sampler's name present on COC?		
There are no discrepancies between the sample IDs on the containers and the COC.		
Samples are received within Holding Time.		
Sample containers have legible labels.		
Containers are not broken or leaking.		
Sample collection date/times are provided.		
Appropriate sample containers are used.		
Sample bottles are completely filled.		
Sample Preservation Verified.		
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs		
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.		
Multiphasic samples are not present.		
Samples do not require splitting or compositing.		
Residual Chlorine Checked.		

Login Sample Receipt Checklist

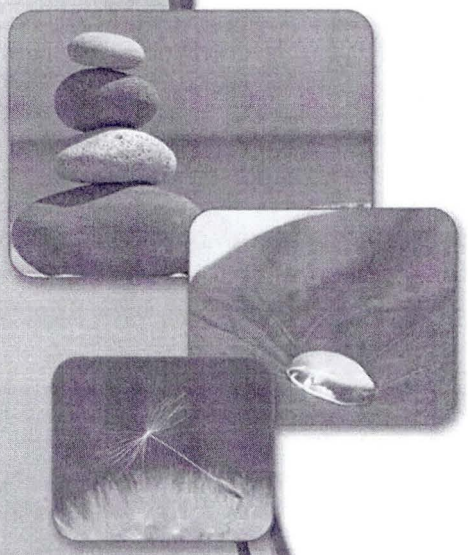
Client: Leggette, Brashears & Graham, Inc.

Job Number: 610-1491-1

Login Number: 1491
List Number: 1
Creator: Holt, Jamie

List Source: TestAmerica Burlington
List Creation: 02/06/12 10:44 AM

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	N/A	Lab does not accept radioactive samples.
The cooler's custody seal, if present, is intact.	N/A	Not present
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	Thermal preservation not required.
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	AMBIENT
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



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THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Watertown
1101 Industrial Drive
Watertown, WI 53094
Tel: (920)261-1660

TestAmerica Job ID: 610-1678-1
Client Project/Site: Refuse Hideaway Landfill

For:
Leggette, Brashears & Graham, Inc.
6409 Odana Road
Suite C
Madison, Wisconsin 53719

Attn: Jennifer Shelton

Authorized for release by:
2/20/2012 1:41:48 PM
Brian DeJong
Project Manager I
brian.dejong@testamericainc.com

Designee for

Dan Milewsky
Project Manager II
dan.milewsky@testamericainc.com

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EPA	United States Environmental Protection Agency
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Case Narrative

Client: Leggette, Brashears & Graham, Inc.
Project/Site: Refuse Hideaway Landfill

TestAmerica Job ID: 610-1678-1

Job ID: 610-1678-1

Laboratory: TestAmerica Watertown

Narrative

Job Narrative
610-1678-1

Comments
No additional comments.

Receipt
All samples were received in good condition within temperature requirements.

Air Toxics
Method(s) TO-15: The following sample(s) was diluted due to the abundance of non-target analytes. Elevated reporting limits (RLs) are provided.

No other analytical or quality issues were noted.

Detection Summary

Client: Leggette, Brashears & Graham, Inc.
Project/Site: Refuse Hideaway Landfill

TestAmerica Job ID: 610-1678-1

Client Sample ID: LFG Sample Port A

Lab Sample ID: 610-1678-1

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
Benzene	120		2.0	2.0	ppb v/v	10		TO-15	Total/NA
Vinyl chloride	100		2.0	2.0	ppb v/v	10		TO-15	Total/NA
NMOC as Carbon	300		8.5	8.5	ppm-C	1.42		EPA 25C	Total/NA
Carbon dioxide	17		0.071	0.071	% v/v	1.42		EPA 3C	Total/NA
Methane	21		0.057	0.057	% v/v	1.42		EPA 3C	Total/NA
Nitrogen	48		0.71	0.71	% v/v	1.42		EPA 3C	Total/NA
Oxygen	9.6		0.057	0.057	% v/v	1.42		EPA 3C	Total/NA

Client Sample Results

Client: Leggette, Brashears & Graham, Inc.
Project/Site: Refuse Hideaway Landfill

TestAmerica Job ID: 610-1678-1

Client Sample ID: LFG Sample Port A
Date Collected: 02/08/12 12:20
Date Received: 02/13/12 14:50
Sample Container: Summa Canister 6L

Lab Sample ID: 610-1678-1
Matrix: Air

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	120		2.0	2.0	ppb v/v			02/15/12 20:22	10
Vinyl chloride	100		2.0	2.0	ppb v/v			02/15/12 20:22	10

Method: EPA 25C - Nonmethane Organic Compounds (NMOC)

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
NMOC as Carbon	300		8.5	8.5	ppm-C			02/16/12 12:15	1.42

Method: EPA 3C - Fixed Gases from Stationary Sources

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon dioxide	17		0.071	0.071	% v/v			02/16/12 12:15	1.42
Methane	21		0.057	0.057	% v/v			02/16/12 12:15	1.42
Nitrogen	48		0.71	0.71	% v/v			02/16/12 12:15	1.42
Oxygen	9.6		0.057	0.057	% v/v			02/16/12 12:15	1.42

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Lab Sample ID: MB 200-33705/5
Matrix: Air
Analysis Batch: 33705

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	<0.20		0.20	0.20	ppb v/v			02/15/12 15:00	1
Vinyl chloride	<0.20		0.20	0.20	ppb v/v			02/15/12 15:00	1

Lab Sample ID: LCS 200-33705/4
Matrix: Air
Analysis Batch: 33705

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	10.0	12.4		ppb v/v		124	70 - 130
Vinyl chloride	10.0	10.3		ppb v/v		103	70 - 130

Method: EPA 25C - Nonmethane Organic Compounds (NMOC)

Lab Sample ID: MB 200-33794/3
Matrix: Air
Analysis Batch: 33794

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
NMOC as Carbon	<6.0		6.0	6.0	ppm-C			02/16/12 11:10	1

Lab Sample ID: LCS 200-33794/2
Matrix: Air
Analysis Batch: 33794

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
NMOC as Carbon	750	766		ppm-C		102	70 - 130

Method: EPA 3C - Fixed Gases from Stationary Sources

Lab Sample ID: MB 200-33795/3
Matrix: Air
Analysis Batch: 33795

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon dioxide	<0.050		0.050	0.050	% v/v			02/16/12 11:10	1
Methane	<0.040		0.040	0.040	% v/v			02/16/12 11:10	1
Nitrogen	<0.50		0.50	0.50	% v/v			02/16/12 11:10	1
Oxygen	<0.040		0.040	0.040	% v/v			02/16/12 11:10	1

Lab Sample ID: LCS 200-33795/2
Matrix: Air
Analysis Batch: 33795

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Carbon dioxide	5.00	4.96		% v/v		99	70 - 130
Methane	4.00	3.75		% v/v		94	70 - 130
Nitrogen	5.00	4.69		% v/v		94	70 - 130
Oxygen	4.00	3.51		% v/v		88	70 - 130

QC Association Summary

Client: Leggette, Brashears & Graham, Inc.
Project/Site: Refuse Hideaway Landfill

TestAmerica Job ID: 610-1678-1

Air - GC/MS VOA

Analysis Batch: 33705

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
610-1678-1	LFG Sample Port A	Total/NA	Air	TO-15	
LCS 200-33705/4	Lab Control Sample	Total/NA	Air	TO-15	
MB 200-33705/5	Method Blank	Total/NA	Air	TO-15	

Air - GC VOA

Analysis Batch: 33794

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
610-1678-1	LFG Sample Port A	Total/NA	Air	EPA 25C	
LCS 200-33794/2	Lab Control Sample	Total/NA	Air	EPA 25C	
MB 200-33794/3	Method Blank	Total/NA	Air	EPA 25C	

Analysis Batch: 33795

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
610-1678-1	LFG Sample Port A	Total/NA	Air	EPA 3C	
LCS 200-33795/2	Lab Control Sample	Total/NA	Air	EPA 3C	
MB 200-33795/3	Method Blank	Total/NA	Air	EPA 3C	

Lab Chronicle

Client: Leggette, Brashears & Graham, Inc.
Project/Site: Refuse Hideaway Landfill

TestAmerica Job ID: 610-1678-1

Client Sample ID: LFG Sample Port A
Date Collected: 02/08/12 12:20
Date Received: 02/13/12 14:50

Lab Sample ID: 610-1678-1
Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO-15		10	33705	02/15/12 20:22	PAD	TAL BUR
Total/NA	Analysis	EPA 25C		1.42	33794	02/16/12 12:15	MRV	TAL BUR
Total/NA	Analysis	EPA 3C		1.42	33795	02/16/12 12:15	MRV	TAL BUR

Laboratory References:

TAL BUR = TestAmerica Burlington, 30 Community Drive, Suite 11, South Burlington, VT 05403, TEL (802)660-1990

Certification Summary

Client: Leggette, Brashears & Graham, Inc.
Project/Site: Refuse Hideaway Landfill

TestAmerica Job ID: 610-1678-1

Laboratory	Authority	Program	EPA Region	Certification ID
TestAmerica Watertown		WI Dept of Agriculture (Micro)		105-266
TestAmerica Watertown	Illinois	NELAC	5	100453
TestAmerica Watertown	Wisconsin	State Program	5	128053530
TestAmerica Burlington	ACLASS	DoD ELAP		ADE-1492
TestAmerica Burlington	Connecticut	State Program	1	PH-0751
TestAmerica Burlington	Delaware	Delaware DNREC	3	NA
TestAmerica Burlington	Florida	NELAC Secondary AB	4	E87467
TestAmerica Burlington	Louisiana	NELAC Secondary AB	6	176292
TestAmerica Burlington	Maine	State Program	1	VT00008
TestAmerica Burlington	Minnesota	State Program	5	050-999-436
TestAmerica Burlington	New Hampshire	NELAC	1	200610
TestAmerica Burlington	New Jersey	NELAC	2	VT972
TestAmerica Burlington	New York	NELAC	2	10391
TestAmerica Burlington	Pennsylvania	NELAC	3	68-00489
TestAmerica Burlington	Rhode Island	State Program	1	LAO00298
TestAmerica Burlington	USDA	USDA		P330-11-00093
TestAmerica Burlington	Vermont	State Program	1	VT-4000
TestAmerica Burlington	Virginia	NELAC Secondary AB	3	460209

Accreditation may not be offered or required for all methods and analytes reported in this package. Please contact your project manager for the laboratory's current list of certified methods and analytes.

Method Summary

Client: Leggette, Brashears & Graham, Inc.
Project/Site: Refuse Hideaway Landfill

TestAmerica Job ID: 610-1678-1

Method	Method Description	Protocol	Laboratory
TO-15	Volatile Organic Compounds in Ambient Air	EPA	TAL BUR
EPA 25C	Nonmethane Organic Compounds (NMOC)	EPA	TAL BUR
EPA 3C	Fixed Gases from Stationary Sources	EPA	TAL BUR

Protocol References:

EPA = US Environmental Protection Agency

Laboratory References:

TAL BUR = TestAmerica Burlington, 30 Community Drive, Suite 11, South Burlington, VT 05403, TEL (802)660-1990

Sample Summary

Client: Leggette, Brashears & Graham, Inc.
Project/Site: Refuse Hideaway Landfill

TestAmerica Job ID: 610-1678-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
610-1678-1	LFG Sample Port A	Air	02/08/12 12:20	02/13/12 14:50

610-1678

TestAmerica Burlington
30 Community Drive
Suite 11
South Burlington, VT 05403
phone 802-660-1990 fax 802-660-1919

Canister Samples Chain of Custody Record

TestAmerica Analytical Testing Corp. assumes no liability with respect to the collection and shipment of these samples.

Client Contact Information	Project Manager: Jennifer Skelton	Samples Collected By: AFB	1 of 1 COCs
Company: LBG, Inc	Phone: 608-441-5544		
Address: 6409 Odana Rd Ste 11	Email: jskelton@lbgmad.com		
City/State/Zip Madison WI 53719	Site Contact: Adam Both		
Phone: 608-441-5544	TA Contact: Kathryn Keller		
FAX: 608-441-5545	Analysis Turnaround Time		
Project Name: DNR-RHL	Standard (Specify) X		
Site: Refuse Hideaway Landfill	Rush (Specify)		
PO #			

Sample Identification	Sample Date(s)	Time Start	Time Stop	Canister Vacuum In Field, "Hg (Start)	Canister Vacuum In Field, "Hg (Stop)	Flow Controller ID	Canister ID	TO-15	TO-14A	EPA3C	EPA 25C	ASTM D-1946	Other (Please specify in notes section)	Sample Type	Indoor Air	Ambient Air	Soil Gas	Landfill Gas	Other (Please specify in notes section)
1 LFG Sample PortA	2/8/12	1220	1220	-29	-2	4904	4361	X		X	X							X	

Temperature (Fahrenheit)	Interior	Ambient	
Start			
Stop			

Pressure (Inches of Hg)	Interior	Ambient	
Start			
Stop			

Special Instructions/QC Requirements & Comments:

Samples Shipped by: Adam Both	Date/Time: 2/8/12 1400	Samples Received by:	
Samples Relinquished by: Adam Both	Date/Time: 2/8/12 1400	Received by: TA BUK 2/10/12 1010	
Relinquished by:	Date/Time:	Received by:	

Lab Use Only: Shipper Name: Opened by: Condition:

2/20/2012

Login Sample Receipt Checklist

Client: Leggette, Brashears & Graham, Inc.

Job Number: 610-1678-1

Login Number: 1678
List Number: 1
Creator: Stark, Adam

List Source: TestAmerica Watertown

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	True	
The cooler's custody seal, if present, is intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	False	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	True	

Login Sample Receipt Checklist

Client: Leggette, Brashears & Graham, Inc.

Job Number: 610-1678-1

Login Number: 1678
List Number: 1
Creator: Matot, Wade M

List Source: TestAmerica Burlington
List Creation: 02/14/12 09:54 AM

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	N/A	Lab does not accept radioactive samples.
The cooler's custody seal, if present, is intact.	N/A	Not present
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	Thermal preservation not required.
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	N/A	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	Check done at department level as required.

APPENDIX IV

PEDESTAL FLARE PILOT TEST RESULTS

APPENDIX IV-TABLE 1

WISCONSIN DEPARTMENT OF NATURAL RESOURCES
REFUSE HIDEAWAY LANDFILL
MIDDLETON, WISCONSIN

BLOWER AND FLARE STATION OPERATIONAL DURATION

Date	Date				Flare			Comments
	Hour Counter (hours)	Operational Hours Per Period (hours)	Percent Operational (%)	Motor Current (amps)	Hours Per Period (hours)	Operational Hours Per Period (hours)	Percent Operational (%)	
7/1/13 5:17 PM	53,405.0	78	100%	7.0	78	0 *	0%	Blower operational upon arrival. Flare down upon arrival. System shutdown due to high oxygen.
7/8/13 1:55 PM	53,405.0	0	0%	--	165	0	0%	Blower and flare down upon arrival. System restarted and operational upon departure.
7/11/13 3:42 PM	53,474.5	70	94%	7.0	74	70	94%	Blower and flare operational upon arrival and departure. Pedestal flare brought online.
7/12/13 3:54 PM	53,498.7	24	100%	--	24	24	100%	Blower and flare operational upon arrival. System shut down as a precaution for the weekend.
7/15/13 11:45 AM	53,498.7	0	0%	--	68	0	0%	Blower and flare down upon arrival. System restarted and operational upon departure.
7/16/13 12:40 PM	53,523.7	25	100%	--	25	25	100%	Blower and flare operational upon arrival.
7/17/13 12:40 PM	53,523.7	0	0%	--	24	0	0%	Blower and flare down upon arrival. System restarted and operational upon departure.
7/18/13 12:00 PM	53,547.1	23	100%	7.0	23	23	100%	Blower and flare operational upon arrival and departure.
7/19/13 11:35 AM	53,570.7	24	100%	--	24	24	100%	Blower and flare operational upon arrival. System shut down as a precaution for the weekend.
7/22/13 9:45 AM	53,570.7	0	0%	--	70	0	0%	Blower and flare down upon arrival. System restarted and operational upon departure.
7/24/13 2:24 PM	53,623.4	53	100%	--	53	53	100%	Blower and flare operational upon arrival and departure.
7/26/13 11:55AM	53,668.9	46	100%	--	46	46	100%	Blower and flare operational upon arrival. System shut down as a precaution for the weekend.
7/30/13 8:55AM	53,669.0	0	0%	--	93	0	0%	Blower and flare down upon arrival. System restarted and operational upon departure.
7/31/13 3:55 PM	53,700.0	31	100%	7.0	31	31	100%	Blower and flare operational upon arrival and departure.
Monthly Summary		**373**	**47%**		**796**	**295**	**37%**	
8/2/13 11:15 AM	53,743.3	43	100%	--	43	43	100%	Blower and flare operational upon arrival and departure.
8/5/13 1:52 PM	53,817.9	75	100%	7.0	75	75	100%	Blower and flare operational upon arrival and departure.
8/7/13 3:26 PM	53,867.5	50	100%	--	50	50	100%	Blower and flare operational upon arrival and departure.
8/9/13 2:20 PM	53,914.2	47	100%	--	47	47	100%	Blower and flare operational upon arrival and departure.
8/13/13 11:05 AM	54,006.7	93	100%	--	93	93	100%	Blower and flare operational upon arrival and departure.
8/15/13 12:55 PM	54,056.3	50	100%	7.0	50	50	100%	Blower and flare operational upon arrival and departure.

APPENDIX IV-TABLE 1

WISCONSIN DEPARTMENT OF NATURAL RESOURCES
REFUSE HIDEAWAY LANDFILL
MIDDLETON, WISCONSIN

BLOWER AND FLARE STATION OPERATIONAL DURATION

Date	Date				Flare			Comments
	Hour Counter (hours)	Operational Hours Per Period (hours)	Percent Operational (%)	Motor Current (amps)	Hours Per Period (hours)	Operational Hours Per Period (hours)	Percent Operational (%)	
8/18/13 1:30 PM	54,081.0	25	100%	--	25	25	100%	Blower and flare operational upon arrival and departure.
8/19/13 2:00 PM	54,153.8	73	100%	--	73	73	100%	Blower and flare operational upon arrival and departure.
8/21/13 10:48 AM	54,198.4	45	100%	7.0	45	45	100%	Blower and flare operational upon arrival and departure.
8/23/13 2:43 PM	54,250.3	52	100%	--	52	52	100%	Blower and flare operational upon arrival and departure.
8/26/13 3:28 PM	54,323.1	73	100%	7.0	73	73	100%	Blower and flare operational upon arrival and departure.
8/30/13 1:02 PM	54,416.6	94	100%	--	94	94	100%	Blower and flare operational upon arrival and departure.
Monthly Summary		**717**	**100%**		**717**	**717**	**100%**	
9/3/13 9:26 AM	54,509.0	92	100%	7.0	92	92	100%	Blower and flare operational upon arrival and departure.
9/10/13 9:50 AM	54,677.4	168	100%	--	168	168	100%	Blower and flare operational upon arrival and departure.
9/13/13 1:17 PM	54,752.9	76	100%	7.0	75	76	100%	Blower and flare operational upon arrival and departure.
9/17/13 4:05 PM	54,851.7	99	100%	--	99	99	100%	Blower and flare operational upon arrival and departure.
9/20/13 9:00 AM	54,916.6	65	100%	7.0	65	65	100%	Blower and flare operational upon arrival and departure.
9/23/13 4:00 PM	54,995.6	79	100%	--	79	79	100%	Blower and flare operational upon arrival and departure.
9/24/13 2:25 PM	55,018.0	22	100%	7.0	22	0*	0%	Blower operational upon arrival. Flare down upon arrival. System shutdown due to high oxygen.
9/26/13 1:45 PM	55,018.0	0	0%	--	47	0	0%	System restarted and operational upon departure.
Monthly Summary		**601**	**93%**		**649**	**579**	**89%**	
10/1/13 12:30 PM	55,136.6	119	100%	--	119	119	100%	Blower and flare operational upon arrival and departure.
10/4/13 11:50 AM	55,207.8	71	100%	7.0	71	71	100%	Blower and flare operational upon arrival and departure.
10/9/13 9:07 AM	55,325.3	118	100%	--	117	118	100%	Blower and flare operational upon arrival and departure.
10/11/13 10:38 AM	55,374.8	50	100%	7.0	50	50	100%	Blower and flare operational upon arrival and departure.
10/16/13 4:00 PM	55,500.0	125	100%	7.0	125	125	100%	Blower and flare operational upon arrival and departure.

APPENDIX IV-TABLE 1

WISCONSIN DEPARTMENT OF NATURAL RESOURCES
REFUSE HIDEAWAY LANDFILL
MIDDLETON, WISCONSIN

BLOWER AND FLARE STATION OPERATIONAL DURATION

Date	Date				Flare			Comments
	Hour Counter (hours)	Operational Hours Per Period (hours)	Percent Operational (%)	Motor Current (amps)	Hours Per Period (hours)	Operational Hours Per Period (hours)	Percent Operational (%)	
10/22/13 4:10 PM	55,644.3	144	100%	--	144	144	100%	Blower and flare operational upon arrival and departure.
10/29/13 2:45 PM	55,810.0	166	99%	7.0	167	166	99%	Blower and flare operational upon arrival and departure.
Monthly Summary		**792**	**100%**		**793**	**792**	**100%**	
11/1/13 3:15 PM	55,883.4	73	101%	--	72	73	101%	Blower and flare operational upon arrival and departure.
11/5/13 7:42 AM	55,971.9	89	100%	--	88	89	100%	Blower and flare operational upon arrival and departure.
11/8/13 1:52 PM	56,051.0	79	101%	7.0	78	79	101%	Blower and flare operational upon arrival and departure.
11/15/13 3:50 PM	56,221.2	170	100%	7.0	170	170	100%	Blower and flare operational upon arrival and departure.
11/20/13 9:17 AM	56,334.4	113	100%	7.0	113	113	100%	Blower and flare operational upon arrival and departure.
11/22/13 1:50 PM	56,387.0	53	100%	--	53	53	100%	Blower and flare operational upon arrival and departure.
11/26/13 11:41 AM	56,480.8	94	100%	7.0	94	94	100%	Blower and flare operational upon arrival and departure.
Monthly Summary		**671**	**100%**		**669**	**671**	**100%**	
Summary (since 7/31/13)		**2812**	**99%**		**2859**	**2789**	**98%**	

-- Not measured

* System configuration does not allow for notification when the flare goes down. Worst case scenario calculated assuming flare went down immediately following departure from site.

APPENDIX IV-TABLE 2

WISCONSIN DEPARTMENT OF NATURAL RESOURCES
REFUSE HIDEAWAY LANDFILL
MIDDLETON, WISCONSIN

BLOWER OUTLET SAMPLE PORT GAS MONITORING

Date	CH_4 (% Vol)	O_2 (% Vol)	CO_2 (% Vol)	Balance Gas* (% Vol)	Gas Velocity (fpm)	Gas Flow** (scfm)
7/11/2013	25.0	9.7	15.6	49.7	3,960	733
7/18/2013	20.5	8.3	17.6	53.6	3,358	621
7/20/2013	27.0	8.0	18.8	46.2	280	518
7/22/2013	49.5	4.8	25.2	20.5	--	--
7/24/2013	26.0	8.9	18.4	46.7	--	--
7/26/2013	27.0	8.0	18.8	46.2	--	--
7/30/2013	43.5	4.7	25.0	26.8	--	--
7/31/2013	30.5	7.8	19.0	42.7	2,590	479
July Monthly Average	**31.1**	**7.5**				
8/2/2013	31.0	8.3	18.4	42.3	--	--
8/5/2013	20.5	8.1	19.6	51.8	3,810	705
8/7/2013	18.2	8.2	19.5	54.1	--	--
8/9/2013	16.0	8.2	18.2	57.6	--	--
8/15/2013	27.0	7.6	19.2	46.2	3,030	561
8/19/2013	24.0	7.1	19.2	49.7	--	--
8/21/2013	16.5	6.7	19.4	57.4	3,420	633
8/23/2013	17.0	7.2	18.2	57.6	--	--
8/26/2013	21.5	6.8	20.2	51.5	3,630	672
August Monthly Average	**21.3**	**7.6**				
9/3/2013	33.5	4.4	21.6	40.5	2,710	501
9/10/2013	27.5	4.0	21.8	46.7	--	--
9/13/2013	20.0	8.6	21.0	50.4	1,559	288
9/17/2013	20.5	4.1	21.8	53.6	--	--
9/20/2013	21.5	3.7	22.4	52.4	3,253	602
9/24/2013	15.5	7.3	16.8	60.4	3,620	670
September Monthly Average	**23.1**	**5.4**				
10/4/2013	15.0	6.2	17.2	61.6	3155	584
10/11/2013	21.5	6.4	16.8	55.3	3245	600
10/16/2013	23.5	7.1	16.4	53.0	3110	575
10/22/2013	18.5	6.3	16.8	58.4	3020	559
10/29/2013	38.0	3.9	24.8	33.3	2935	543
October Monthly Average	**23.3**	**6.0**				
11/8/2013	26.5	4.1	22.2	47.2	3140	581
11/15/2013	25.0	3.9	21.6	49.5	2780	514
11/20/2013	20.5	4.5	21.2	53.8	3070	568
11/26/2013	31.5	5.1	22.4	41.0	3840	710
November Monthly Average	**25.9**	**4.4**				

* : Balance gas calculated as 100% - (%CH_4+%CO_2+%O_2).

** : Gas flow (cfm) calculated by multiplying gas velocity (fpm) by 0.045 (3" diameter), 0.078 (4" blower inlet), or 0.185 (6" flare inlet).

% Vol : Percent volume.
-- : Not measured.
fpm : Feet per minute.
scfm : Standard cubic feet per minute.
CH_4 : Methane.
O_2 : Oxygen.
CO_2 : Carbon Dioxide.
Red : Flame out condition occurred.

APPENDIX V

REVISED FIELD DATA FORMS

DATE: TIME START: END:

PERSONNEL: WEATHER CONDITIONS:

WISCONSIN DEPARTMENT OF NATURAL RESOURCES

REFUSE HIDEAWAY LANDFILL

MIDDLETON, WISCONSIN

BLOWER AND FLARE STATION MONITORING (WEEKLY)

LOCATION	Pressure ("WC)	CH_4 (% LEL)	CH_4 (%Vol)	O_2 (%Vol)	CO_2 (%Vol)	Balance Gas (%Vol)	Valve Position (%)	Gas Velocity (fpm)	Gas Flow (cfm)	Gas Temp (deg F)	Comments
BACKGROUND AIR											
Next to Propane Tank											
BLOWER											
North Branch											
Central Branch											
South Branch											
Inlet Sample Port A											
Inlet Sample Port B											
Outlet Sample Port A											

Blower Motor Amps _____ Blower Motor Hours _____ Time: _____

Leachate Depth _____ inches Air Dryer Pressure _____ psi

COMPRESSOR MAINTENANCE

Cleaned Air Filters Y / N Drained Condensate Y / N Checked Safety Valve Y / N

Checked Oil Y / N Checked Belt Tension Y / N

BLOWER MAINTENANCE

Greased Ports Y / N Checked Belt Tension Y / N

QUARTERLY

Leachate Sample Y / N Compressor Oil Change Y/N

Notes: Balance gas calculated as 100% - (%CH_4-%CO_2-%O_2)

Gas Detector Model: _____

Last Calibrated: _____

Gas Flow (cfm) calculated by multiplying Gas velocity (fpm) by 0.045 (2" diameter), 0.078 (4" blower inlet), or 0.185 (6" flare inlet)

DATE:	TIME START:	END:
PERSONNEL:	WEATHER CONDITIONS:	

WISCONSIN DEPARTMENT OF NATURAL RESOURCES

REFUSE HIDEAWAY LANDFILL

MIDDLETON, WISCONSIN

GAS WELL AND LEACHATE COLLECTION SYSTEM: GAS PROBE MONITORING (MONTHLY)

LOCATION	Pressure ("WC)	CH_4 (%LEL)	CH_4 (%Vol)	O_2 (%Vol)	CO_2 (%Vol)	Comments
G-1S						
G-1D						
G-2S						
G-2D						
G-5						
G-6						
G-8						
G-9						
G-10						
GP-8						
GP-11S						
GP-11D						
GP-12S						
GP-12D						
GP-13S						
GP-13D						
GPW-1S						
GPW-1M						
GPW-1D						
Speedway Buildings						

Notes: Balance gas calculated as 100% - ($\%CH_4$-$\%CO_2$-$\%O_2$)

Gas Detector Model:	
Last Calibrated:	

DATE: END:

PERSONNEL:

WISCONSIN DEPARTMENT OF NATURAL RESOURCES

REFUSE HIDEAWAY LANDFILL

MIDDLETON, WISCONSIN

LEACHATE HEAD MONITORING (MONTHLY)

WELL RISER	Depth to Bottom from Riser (ft)	Depth to Leachate (ft)	Pressure (psi)	Primary Pump Cycle Counter Reading	Secondary Pump Cycle Counter Reading	Pumping (y/n)	Comments
GW1							
GW2							
GW3							
GW4*							
GW5*							
GW6							
GW7*							
GW8*							
GW9*							
GW10*							
GW11*							
GW12*							
GW13*							

General Comments:

Notes: * Pneumatic pump installed in well

Gas Detector Model:

Last Calibrated:

DATE: TIME START: END:

PERSONNEL: WEATHER CONDITIONS:

WISCONSIN DEPARTMENT OF NATURAL RESOURCES

REFUSE HIDEAWAY LANDFILL

MIDDLETON, WISCONSIN

GAS WELL MONITORING (MONTHLY)

WELL	CH4 (%LEL)	CH4 (%Vol)	O2 (%Vol)	CO2 (%Vol)	Balance Gas (%Vol)	Well Pressure (" WC)	Header Pressure (" WC)	Gas Velocity (fpm)	Gas Flow (cfm)	Gas Temp (°F)	Valve Position (% open)	Comments
GW1												
GW2												
GW3												
GW4*												
GW5*												
GW5 (lateral east)												open valve for readings
GW5 (lateral west)												open valve for readings
GW6												
GW7*												
GW8*												
GW9*												
GW10*												
GW11*												
GW12*												
GW13*												

General Comments:

Erosion/Stressed Vegitation observed:

Notes: Balance gas calculated as 100% - (%CH_4-%CO_2-%O_2)

* Pneumatic pump installed in well

Gas Flow (cfm) calculated by multiplying Gas velocity (fpm) by 0.045 (2" diameter), 0.078 (4" blower inlet), or 0.185 (6" flare inlet)

APPENDIX VI

MONITORING AND MAINTENANCE SCHEDULE SUMMARY

6.0 MONITORING AND MAINTENANCE SCHEDULE SUMMARY

COMPONENT	ACTIVITY
WEEKLY	
• Flare	• Visually check flare to ensure there is a flame
• Blower Station	• Visually check blower building vents • General inspection
• Leachate Tank	• Check liquid level • Leak detection check • Schedule loadout
• Branch Monitoring Station ▪ North Branch ▪ Central Branch ▪ South Branch	• Valve Setting • Pressure • Gas Composition including %Methane, $\%CO_2$ and %Oxygen • Gas flow • Gas temperature
• Blower Outlet ▪ Sample Port A	• Pressure • Gas Composition including %Methane, $\%CO_2$ and %Oxygen
• Blower Inlet Pipe ▪ Sample Port A ▪ Sample Port B	• Pressure • Gas Composition including %Methane, $\%CO_2$ and %Oxygen
• Air Compressor	• Clean air filters • Clean external parts of compressor/driver • Check safety valve manually • Check/Maintain oil level • Drain condensate
MONTHLY	
• Extraction Wells	• Gas Temperature • Gas Flow • Pressure • Gas Composition including %Methane, $\%CO_2$, %Oxygen and %Balance • Valve Setting • Leachate Head • Integrity Inspection

COMPONENT	ACTIVITY
• Off-site Gas Probes	• Pressure • %Methane & Methane LEL • %Oxygen and %CO_2 • Integrity Inspection
• Well Pumps/Controls	• Record Pump Cycles • Verify Pump Operation • Pressure Readings
• Buried Control Valve (CV2)	• Verify valve closed
• Air Compressor	• Inspect entire air system for leaks • Inspect condition of oil/change if necessary • Check Drive Belt tension/tighten if necessary
QUARTERLY* • CV1, CV2, Branch Valves, Well Valves, Manual Valve (Pedestal Flare)	• Exercise Valve • Integrity Inspection
• Blower	• Lubricate 2 grease ports
• Air Compressor ▪ Soft Starter	• Change oil (every 3 months) • Inspect valves & clean valves & head • Check & tighten all bolts, nuts, etc. • Check unloader operation • Check fans, relays, all connections, etc. • Test overload trip function • Clean external components
ANNUALLY • Well Pumps	• Inspect, clean • Replace filter element, if necessary
• Leachate Lines, Driplegs, Cleanouts	• Clean out
• Tank Loadout Station	• Inspect Interstitial Space for Fluid Accumulation
• Padlocks	• Lubricate with grease and verify working condition
• Air Compressor ▪ Air Dryer	• Replace Pilot Air Filter Cartridge • Check desiccant/Replace if necessary

COMPONENT	ACTIVITY
▪ Compressed Air Filter	• Check Pressure/Replace Filter Cartridge if necessary

*Quarterly: Update Summary Tables for each extraction well, the flare, leachate head, and leachate pumping data. Summary Tables are included in the Annual Report.

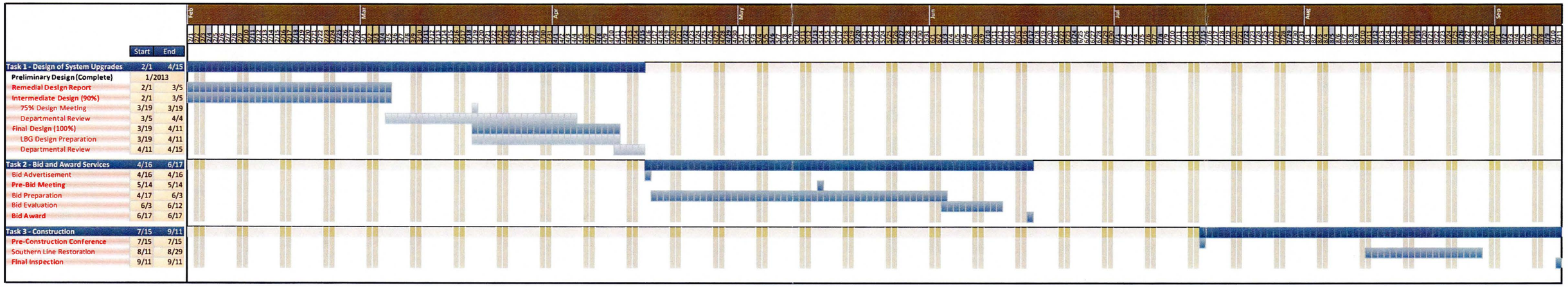
APPENDIX VII

PRELIMINARY SOUTH BRANCH CONSTRUCTION SCHEDULE

APPENDIX VII

WISCONSIN DEPARTMENT OF NATURAL RESOURCES
REFUSE HIDEAWAY LANDFILL
TOWN OF MIDDLETON, DANE COUNTY, WISCONSIN

PRELIMINARY SOUTH BRANCH CONSTRUCTION SCHEDULE



	Start	End
Task 1 - Design of System Upgrades	2/1	4/15
Preliminary Design (Complete)	1/2013	
Remedial Design Report	2/1	3/5
Intermediate Design (90%)	2/1	3/5
75% Design Meeting	3/19	3/19
Departmental Review	3/5	4/4
Final Design (100%)	3/19	4/11
LBG Design Preparation	3/19	4/11
Departmental Review	4/11	4/15
Task 2 - Bid and Award Services	4/16	6/17
Bid Advertisement	4/16	4/16
Pre-Bid Meeting	5/14	5/14
Bid Preparation	4/17	6/3
Bid Evaluation	6/3	6/12
Bid Award	6/17	6/17
Task 3 - Construction	7/15	9/11
Pre-Construction Conference	7/15	7/15
Southern Line Restoration	8/11	8/29
Final Inspection	9/11	9/11

APPENDIX VIII

PRELIMINARY CONSTRUCTION COST ESTIMATE

WISCONSIN DEPARTMENT OF NATURAL RESOURCES
SOUTH BRANCH GAS EXTRACTION HEADER MODIFICATIONS
REFUSE HIDEAWAY LANDFILL
MIDDLETON, WISCONSIN

PRELIMINARY CONSTRUCTION COST ESTIMATE

Cost Element	Quantity	Unit	Unit Cost ($/Unit)	Total Cost ($)	Assumptions/Basis
I. Contract Administration					
Performance Bond	1	Each	$1,500	$1,500	1.75-Percent of Construction Cost.
Meetings	1	Each	$250	$250	
Quality Control, permits	1	Week	$500	$500	
Invoicing/Scheduling/Contracting, Submittals, Project Sign, Material Storage, Contract Closeout	1	Lump Sum	$10,000	$10,000	
II. Temporary Facilities					
Mobilization	1	Lump Sum	$2,000	$2,000	Estimate.
Erosion Control, Construction Facilities	1	LS	$2,000	$2,000	
III. Health and Safety					
Health and Safety Plan	1	Lump Sum	$500	$500	Estimate.
Monitoring	15	Per Day	$200	$3,000	
Decontamination-Personnel & Equip.	15	Per Day	$125	$1,875	From work in trench. Estimate.
Level B Protection (Not Anticipated)		Day			
Level C Protection (Not Anticipated)		Day			
IV. Site Work					
Utility Locate	1	Lump Sum	$400	$400	
Site Preparation	1	Lump Sum	$2,500	$2,500	
Below Grade Piping					
Fill Material		Cubic Yard			Assumed native soil will be used.
Electrofusion Connections	5	Each	$1,500	$7,500	Estimate.
6" Trenching, Piping, Compaction, Fusion	470	Linear Foot	$45	$21,150	Estimate.
4" Trenching, Piping, Compaction, Fusion	150	Linear Foot	$45	$6,750	Estimate.
Warning Tape	1	1000' Roll	$125	$125	Material Supplier.

Cost Element	Quantity	Unit	Unit Cost ($/Unit)	Total Cost ($)	Assumptions/Basis
Buried Valves and Flange Adapters	2	Each	$1,200	$2,400	Material Supplier.
Compaction Testing	1	Lump Sum	$1,000	$1,000	Estimate.
Excavated Material/Clay Handling and Storage	1	Lump Sum	$1,700	$1,700	Estimate.
Miscellaneous Fittings	1	Lump Sum	$2,000	$2,000	Estimate.
Spare Parts	1	Lump Sum	$1,000	$1,000	Estimate.
Equipment Delivery Costs	1	Lump Sum	$1,500	$1,500	Estimate.
Construction Debris Disposal	1	Lump Sum	$250	$250	Estimate.
Seeding, Mulching, Fertilizing, Site Restoration	1	Lump Sum	$1,500	$1,500	Estimate.
Fence Installation and Repair	1	Lump Sum	$7,500	$7,500	Estimate.
Provide and Install Control Boxes at Wellheads	3	Each	$175	$525	Estimate.
Preliminary Construction Cost Estimate				**$79,400**	