SECTION 2

PROPOSED GAS COLLECTION AND CONTROL SYSTEM

2.1 GENERAL

This section presents a description of the existing GCCS and planned future expansions. The existing system design incorporates vertical extraction wells and two trench collectors for LFG collection. Future GCCS expansions will use a similar approach, with a primary focus on using vertical extraction wells. The existing header system was constructed so that future expansion of the system can be accommodated. This includes sizing the header to be compatible with the future flow rates expected during the life of the system components and the installation of blind flanges along portions of the header to allow for future tie-ins. Future headers will also be constructed in this manner.

Landfill gas collected from the Class III, Class I/III, and Class I Phase 1 landfills is routed to a compressor station where the LFG is treated prior to being sent to the boiler at the Ridge Generating Facility Station or combusted in the candlestick flare. The candlestick flare is designed to provide the LFG destruction efficiency required by §60.752(b)(2)(iii) of the NSPS.

2.2 LANDFILL GAS EXTRACTION

Current landfill gas extraction is provided by vertical and horizontal extraction trenches. While Polk County intends to install vertical extraction wells to the maximum extent practical, depending on fill operations, additional horizontal collectors may be employed when installation of vertical wells is not appropriate due to site geometry or sequence of filling. In areas where horizontal collectors are installed, additional vertical wells may be required at final buildout depending on the performance of the collectors. If horizontal collectors are used, they will be designed to provide coverage over the landfill that is at least as comprehensive as the vertical wells shown on the attached drawings.

2.2.1 Vertical Extraction Wells

In general, extraction wells at the site extend to a depth equal to approximately three-quarters of the landfill depth at each well location and they have an effective radius of influence that ranges from approximately 2.0 to 2.25 times the well depth. The well spacing at North Central Landfill varies generally from 100 to 200 feet, depending on the estimated radii of influence.

Wells installed at the site were constructed of Schedule (SCH) 80 PVC pipe installed in 30-inch or 36-inch diameter boreholes. Future LFG extraction wells will be constructed in a similar manner, with either HDPE SDR 17 or SCH 80 PVC pipe. Typically, approximately the lower two-thirds of the well pipe will be perforated. However, perforations will not be closer than 15 feet from the landfill surface unless the wells are being installed in an active area and additional refuse will be filled around the wells within a reasonable period of time. Perforations typically will be either 1/2-inch diameter holes spaced at 16 holes per foot, or 3/8-inch wide by 8-inch

long slots spaced at approximately four slots per foot. However, alternative slot or perforation designs which provide comparable performance may be considered.

Note that the drawings included with this design plan are conceptual in nature. The exact locations of new wells will be determined during future design phases and may be subject to relocation due to site conditions or filling operations.

2.2.2 Horizontal Collectors

While Wheelabrator and Polk County do not anticipate using horizontal collectors, they may be utilized for the interior areas of the landfill if it becomes necessary to accommodate ongoing filling activities and keep gas extraction components such as wellheads away from the active area. This option may be explored during subsequent design and construction phases.

Typically these types of collectors have a horizontal zone of influence of approximately 75 feet to either side of the collector trench. To maintain full collection system coverage over the landfill surface, if horizontal collectors were used, they likely would be spaced approximately 150 feet apart, which requires a zone of influence of approximately 75 feet. Collector length would vary depending on site conditions at the time of system expansion, but they generally would be less than 1,000 feet long.

If horizontal collectors are utilized, they will be constructed to include the following features:

- Collector pipe will be 6- or 8-inch diameter HDPE with a standard dimension ratio (SDR) of 17 or corrugated HDPE pipe with a smooth interior with sufficient strength to resist crushing force due to the overburden of the landfill.

- The perforated collector pipe will be installed in a trench filled with appropriate aggregate material such as rock or chipped tires. The aggregate will be sized so as to not pose significant risk of clogging the pipe perforations.

- Perforated pipe will cease at least 100 feet inward from the end of the collector. The remaining length of collector will be solid-wall pipe. This will reduce the potential for air infiltration into the collectors.

- Perforations in the pipe will be sufficiently large to not cause excessive head loss detrimental to LFG collection. Typical perforations will be 1/2 inch in diameter.

2.2.3 Wellheads

Each extraction well and horizontal collector includes a wellhead constructed of appropriate materials, such as SCH 80 PVC. Wellheads include a valve for flow control and monitoring ports for measuring gas quality, temperature, and flow rate. Future wells and collectors will have a similar wellhead configuration.

2.3 HEADER AND LATERAL COLLECTION PIPING

The header and lateral collection piping is constructed of fusion-welded HDPE SDR 17 pipe. Header and lateral piping may be installed either below or above grade. In locations where above grade header and laterals are used, the piping will be appropriately anchored, if necessary.

The header system is sized to handle the maximum projected current and future flow rates over the useable life of the system. The existing header consists of 8 and 10 inches diameter pipe, with 4 and 6-inch diameter laterals. Future laterals typically will be 4 or 6-inch diameter, with header sizes determined based on the expected flow patterns of the gas and the projected LFG flow rate. Criteria considered in sizing header piping include:

- **Unit Header Loss** - Head losses in any given section of piping are standardized to 100-foot sections with a maximum allowable head loss of 1 inch of water column (in-w.c.).

- **Gas Velocity** - In general, design gas velocities will not exceed 2,400 feet per minute (fpm).

- **Worst Case Analysis** - The existing loop configuration in the Class I Phase 1 landfill area and the proposed final system build-out will allow gas to flow in multiple directions. Header sizing calculations were prepared assuming a worst-case condition for flow in one direction that could be caused by closed valves to isolate a section for repair or obstructions in the header.

- **Future Expansion** – Future header piping will include blind flanges for system expansion into future landfill phases or will be buried to a depth shallow enough to allow for tie ins using electrofusion couplings. The tie-ins for future new laterals to the existing laterals or header will be accomplished by connecting to existing vertical risers.

As shown on the enclosed drawings, a new header in the Class III landfill will be 8-inch diameter. In the Class I Phase 2 landfill, SCS has proposed 16-inch diameter header in order to account for the expected high LFG generation in the bioreactor cells. In addition, laterals will be a minimum of 6 inches in diameter. Similar design considerations will be incorporated into the Class I Phase 3 landfill.

2.4 HEADER ISOLATION VALVES

In order to allow for isolation of certain sections of header in case of the need to perform repairs without shutting down the entire system, header isolation valves have been installed throughout the system. These valves are constructed of corrosion resistant materials such as PVC, and all metal parts potentially exposed to LFG are coated with enamel or similar coatings to increase corrosion resistance. Both the seals and valve bodies are appropriate for the specified

application. Additional header isolation valves may be installed as the LFG collection system is expanded.

2.5 CONDENSATE PRODUCTION AND MANAGEMENT

Condensate is formed as LFG that is extracted from the landfill cools in the header piping. The rate at which it is generated is dependant on the LFG flow rates and the temperature differential between the warmer gas and the cooler surrounding soil or air. For the GCCS at North Central Landfill, condensate generation rates were estimated based on a gas temperature of 100 degrees Fahrenheit (°F) and an ambient air temperature of 50 °F.

Based on estimated future maximum flow rates of 1,200 scfm from the existing Class I (Phase 1), Class I/III, and Class III landfill areas, 3,100 scfm for Phase 2, and 5,600 scfm in Phase 3, the maximum estimated daily condensate generation rates based on a 50 °F temperature differential are shown below:

- Class I Phase 1, Class I/III, Class III: 520 gallons per day (gpd)
- Class I Phase 2: 1,330 gpd
- Class I Phase 3: 2,390 gpd

These values represent the anticipated maximum daily amount of condensate that would be generated during cool days in winter months when temperature differentials between collected LFG and ambient air are at least 50 °F. This is not expected to be the typical daily condensate generation rate. The current GCCS includes five condensate sumps within the footprint of waste to collect condensate generated in the GCCS. As shown on the drawings included in Appendix A, an additional five condensate traps or sumps will be required for the Phase 2 area. Phase 3 is expected to have six condensate traps/sumps. In addition, a minimum of four condensate sumps with pumps will be installed along the header running westward from Phase 3 along the north side of Phase 2 to convey the LFG from Phase 3 to the blower/flare station.

Existing condensate management features include condensate knockouts with pumps. Condensate collected in sumps will continue to be discharged to the existing leachate management system

2.6 BLIND FLANGES FOR FUTURE EXPANSION

To accommodate future system expansion, blind flanges are currently installed in portions of the existing header system and will also be included in future header system construction. These blind flanges will be buried to prevent potential damage from landfill operations. Buried flanges and bolts will be coated with corrosion-resistant coatings.

2.7 BLOWER/FLARE STATION

The blower/flare station requirements and existing equipment are described in the following sections.

2.7.1 Blower Station

The specifications for the existing blower station are as follows:

- There are currently two 135 horsepower blowers (model 1009 RGS-J) on site, each capable of handling 1,300 scfm of LFG at a discharge pressure of 26 pounds per square inch absolute (psia).
- The vacuum exerted on the header system is in excess of 80 in-w.c.
- A moisture separator/filter to maximize condensate removal upstream of the blower to minimize corrosion.
- An actuator valve to shut off flow of LFG to the blowers during shutdown.

As shown in Section 4 of this design plan, the LFG recovery rate will increase significantly with the installation of a GCCS for Phases 2 and 3. This will require Wheelabrator to install a new blower station and increased flare capacity.

2.7.2 LFG Treatment Equipment

Landfill gas that is sold to Wheelabrator and combusted in the boiler is processed in a treatment system prior to the collected gas being conveyed to the Wheelabrator boiler as follows:

- Filtration: The LFG is filtered through a mesh demister filter located upstream of each blower mounted in 24-inch diameter vertical scrubbers.
- Dewatering: Moisture is removed using a series of vertical scrubbers (24-inch diameter), a fin fan cooler manufactured by Air-X-Changers, and a refrigerated dryer manufactured by API Ketema.
- Compression: The LFG is compressed in two 150-hp Roots blowers (model nos. 1009RGS).

The compressor station meets the requirements for a LFG treatment system as defined by U.S. EPA. Specifically, the system filters, de-waters, and compresses LFG. In accordance with existing U.S. EPA guidance and rule applicability determinations, an owner or operator of a combustion device that uses or purchases treated landfill gas shall be exempt from further compliance with 40 CFR 60.752(b)(2)(iii)(C). Because the LFG is treated prior to sale to Wheelabrator, Wheelabrator's boiler is exempt from further compliance with 40 CFR 60 Subpart WWW.

2.7.3 Flare

The existing candlestick flare is designed to provide a minimum non-methane organic compound (NMOC) destruction efficiency of 98 percent. The candlestick flare was designed and operates in accordance with §60.18 and has a flow capacity of 2,390 scfm. Wheelabrator and Polk County expect to install an additional flare to accommodate the LFG collected from Phases 2 and 3.

As stated above and described in Section 4, the existing flare will not have adequate capacity to handle LFG collected from the Phase 2 and 3 landfills once the GCCS is expanded into those areas. Therefore, Wheelabrator will install additional flare capacity to ensure that all of the recovered LFG can be combusted if the LFG energy project is offline. Any new flare(s) will be design, installed, and operated to ensure compliance with the control provisions of the NSPS.

2.7.4 Blower/Flare Controls

The controls at the blower/flare station include:

- Programmable logic controller (PLC).
- Landfill gas flow meter.
- Blower and flare controls interface for automatic motor starting following pilot ignition.
- Alarm indicators for high temperature, low temperature, flame failure, pilot failure, inlet valve failure, and blower failure.

SECTION 5

REQUESTED ALTERNATIVE MONITORING/RECORD KEEPING/ RECORDING PROCEDURES

Per 40 CFR 60.752(b)(2)(i)(B), the design plan shall include proposed alternatives to the prescriptive monitoring, record keeping, and reporting requirements outlined in the NSPS. This section addresses exemptions/alternatives proposed in this submittal. Polk County requests alternatives for complying with the operations standards as described below.

5.1 OXYGEN MONITORING

The NSPS states that "oxygen shall be determined by an oxygen meter using Method 3A." Polk County proposes to utilize the Landtec GEM-500 or GEM-2000 gas meter, or equal, to provide field measurements of oxygen. These meters meet the equipment requirements set forth in §60.753(c)(2), and previously has been approved by U.S. EPA for oxygen monitoring in compliance with the NSPS.

5.2 SURFACE EMISSIONS MONITORING

As allowed by §60.753(d), Polk County will avoid dangerous areas such as roads, active landfill areas, steep or dangerous sideslopes, and truck traffic areas when conducting surface emissions monitoring.

5.3 WELLHEAD MONITORING AND OPERATION

The NSPS requires that at each wellhead, oxygen concentration must be less than five percent (§60.753(c)), and each well must be under vacuum (§60.753(b)). The only time that a well is allowed to not have vacuum is in the case of a landfill fire or increased well temperature, use of a geomembrane or synthetic cap, or for a decommissioned well.

SCS and Polk County recognize at least one scenario when these two criteria may be incompatible with each other. In the case where a well is inadvertently "overpulled", either as a result of aggressive LFG system operation or declining LFG production in a portion of the landfill, oxygen may be present in concentrations greater than five percent. This condition occurs when LFG is extracted at a rate that is faster than it is being generated by the decomposing refuse. To remediate this situation, the most immediate course of action is to decrease the vacuum that is applied to the well or to shut off the well.

If wellhead valve adjustments are not effective in decreasing the oxygen concentration, even at vacuum readings on the order of 0.1 in-w.c., it may be necessary to temporarily shut the wellhead valve until the well is able to "recharge" and allow the methane concentration to increase and oxygen to decrease. Otherwise, to continue to exert vacuum on the well, even at low levels, could contribute to conditions conducive for a landfill fire.

If temporarily closing a wellhead valve is necessary to remediate overpulling of a well, Polk County will continue to monitor the well on a monthly basis for oxygen concentration and pressure. However, non-negative vacuum readings or oxygen concentrations greater than or equal to five percent by volume recorded during this period will not be considered an exceedance of the NSPS wellhead operating criteria.

During this temporary period, the well will be maintained such that positive pressure does not occur. If positive pressure occurs, the wellhead valve will be opened to relieve the pressure. If the oxygen concentration has decreased to less than five percent by volume, the well will remain online. However, if the oxygen concentration remains above five percent, the wellhead valve will be shut off again after the pressure is relieved. Once oxygen concentration returns to less than five percent, the wellhead valve will be opened and the well returned to service.

U.S. EPA approved similar flexibility in wellhead operations for the Orange County Solid Waste Management Facility in Orlando, Florida. A copy of that approval letter and request is included in Appendix C.

5.4 WELLFIELD EXPANSION

The drawings included with this submittal show the existing GCCS and the conceptual design of the GCCS proposed upon reaching final grade based on current waste filling plans. As filling progresses, and as dictated by the final design of the various GCCS expansion phases expected in the future, the locations of the vertical extraction wells, header, laterals, and condensate traps/sumps may vary from the locations shown on the attached drawings. While vertical wells and horizontal collectors may be substituted for each other, subsequent LFG designs will result in similar overall wellfield coverage. Record drawings will be maintained on site to document the as-built conditions and surface emissions monitoring will demonstrate the adequacy of the GCCS wellfield to control LFG emissions.

5.5 ALTERNATIVE SURFACE EMISSIONS REMEDIAL ACTIONS

Section 60.755(c)(4)(v) of the NSPS requires that for any location where monitored methane concentrations exceed 500 parts per million by volume (ppmv) above background three times in a quarter, a new well or collector shall be installed within 120 days of the initial exceedance. An alternative to installing additional wells or collectors, such as upgrading the blower, header pipes, or control device must be approved by the Administrator for approval.

While alternatives are permitted if approved by the Administrator, Polk County recognizes that requesting and receiving approval within 120 days may not always be possible, depending on the review schedule of FDEP or U.S. EPA. Therefore, in order to streamline implementation of alternative remedial actions that may be appropriate for correcting surface emissions monitoring exceedances and minimizing fugitive LFG emissions, Polk County proposes that the following remedial actions be accepted as alternatives to installing additional wells:

- Installation of shallow subsurface LFG collectors immediately adjacent to the well or collectors closest to the surface emissions exceedance. The shallow collectors would be installed with valves and monitoring ports to control LFG extraction and provide monitoring data, similar to a standard LFG extraction wellhead. Each shallow collector will be assigned a unique identification number and be included in future monthly monitoring events. Record documentation for the installation and location of the collectors will be included in future semiannual NSPS reports. If future monitoring shows that the shallow collectors are no longer needed, they will be abandoned in place by shutting off the valve or capping the collector.

- Installation of leachate dewatering pumps in wells at which a significant portion of the slotted well pipe is submerged in liquid. Dewatering of wells often increases LFG extraction rates, which can both improve the quality of the LFG extracted from a particular well and reduce the likelihood of surface emissions.

- Upgrades to the blower system. This may include installing larger or additional blowers, making improvements to the blower station piping system, including valves, etc., or upgrading the condensate knockout system at the blower station. A description of the constructed improvements will be included in the semiannual NSPS report following the remediation.

- Troubleshooting and upgrades or repairs to header and lateral pipes, condensate sumps, or header isolation valves, which may be the cause of decreased vacuum or gas collection capacity in the vicinity of the exceedance. A description of the improvements will be included in the semiannual NSPS report following the remediation.

5.6 EXCLUSION OF ACTIVE AREAS FROM WELLHEAD MONITORING

As stated in Section 5.2, surface emissions monitoring will be conducted so as to avoid dangerous areas such as roads, active landfill areas, etc., as allowed by §60.753(d) of the NSPS. Polk County feels that a similar alternative is occasionally appropriate for monthly monitoring of the wells that are located within the limits of, or immediately adjacent to, the landfill's active face. Safety concerns include field personnel attempting to monitor wells in the midst of the operation of heavy equipment and waste disposal vehicles, and the need for personnel to tune wellheads that are a significant height above ground surface.

In order to provide for the safety of field personnel, Polk County recognizes that in some instances it may be excessively dangerous to monitor certain LFG extraction wells or collectors within or near the active face of the landfill. Polk County proposes that if unsafe conditions exist due to waste filling activities, monthly monitoring of the affected wells pursuant to §60.756(a) may not be possible. Two examples of potential situations in which monthly monitoring may be omitted for affected wells are described below.

5.6.1 LFG Wells and Collectors at the Active Face

Personnel in the vicinity of the active face of the landfill encounter numerous hazards that render wellhead monitoring dangerous. This includes traffic from waste hauling vehicles and heavy equipment (i.e., from dozers, compactors, and off-road dump trucks) and spreading and compacting the waste. In addition, walking over exposed waste presents trip/fall and puncture hazards.

Therefore, because these hazards are consistent with the hazards described in §60.753(d) related to surface emissions monitoring, Polk County requests a similar variance with respect to monitoring wellheads within and immediately adjacent to the active face of the landfill if unsafe conditions exist. If this situation arises and prevents the monthly monitoring of a wellhead, Polk County will document that such conditions exist and will resume monthly monitoring when filling activities have moved away from the affected wells. However, failure to obtain a monthly wellhead reading as a result of dangerous conditions at a well will not constitute a violation of §60.756(a).

5.6.2 Raised Wells and Collectors at the Active Face

In order to accommodate waste disposal activities, certain wells, lateral risers, and wellheads may be raised up to 10 to 20 feet into the air as waste is placed around the wells. This may be an ongoing process for periods exceeding one month at a time, and affected wells may not be accessible for all or a portion of this time.

From a construction standpoint, a specific challenge with raising wells 10 to 20 feet into the air is that it may not be possible to connect the wellhead to both the well casing and the lateral riser pipe. Typically, the wellhead cannot be attached to both of these pipes until the ground surface is within 7 to 10 feet of the top of the pipes. In addition, wellhead adjustments are not possible for wells that have been raised 10 to 20 feet into the air.

If this situation arises and prevents the monthly monitoring of a wellhead, Polk County will document that such conditions exist, and will resume monthly monitoring when filling activities have moved away from the affected wells and the wellheads are within 5 to 7 feet of ground surface. The required monthly monitoring will resume at that time. Failure to obtain a monthly wellhead reading as a result of dangerous conditions at a well will not constitute a violation of §60.756(a).

5.7 EXCEEDANCE CORRECTION WITHOUT EXPANSION OF GCCS

Per §60.755(a)(3) and (5), if exceedances of the pressure, temperature, or oxygen criteria are not remediated within 15 days of the initial exceedance, the GCCS must be expanded within 120 days of the initial exceedance unless an alternative timeline is approved. However, expansion of the GCCS is not always required in order to remediate pressure, temperature, or oxygen exceedances. Therefore, Polk County requests approval for alternative actions to remediate an exceedance in lieu of expanding the GCCS.

Examples of potentially appropriate remedial actions include:

- Installation of dewatering pumps to reduce the liquid level in a well in order to remediate an oxygen exceedance.
- Repair of extraction well piping or wellheads that may be causing air infiltration that causes an oxygen exceedance.
- Header or blower station piping modifications or repairs to remediate pressure exceedances.
- Repair of condensate management features to remediate pressure and/or oxygen exceedances.
- Repair of header valves to remediate pressure and/or oxygen exceedances.
- Additional troubleshooting and wellfield tuning to remediate pressure, temperature, and oxygen exceedances.
- Repair of the landfill cap to reduce ambient air infiltration into a well and remediate an oxygen exceedance.

These examples are meant to be representative of typical operations and maintenance activities that may be appropriate for remediating pressure, temperature, and oxygen exceedances in lieu of expanding the GCCS. Other actions that result in the remediation of an exceedance within the 120-day timeline would also be covered under this alternative.