

LANDFILL GAS MONITORING PLAN

**LANDFILL NO. 6
CANTON, NORTH CAROLINA**

Prepared for

**BLUE RIDGE PAPER PRODUCTS INC. –
CANTON MILL**

**DIVISION OF EVERGREEN PACKAGING
CANTON, NORTH CAROLINA**

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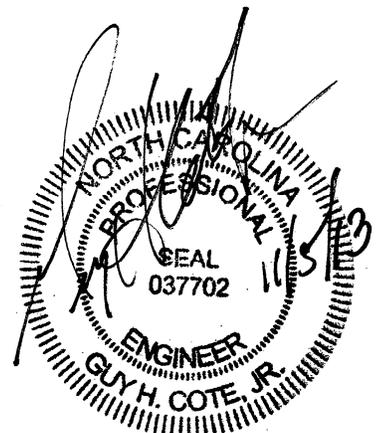


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1.0 INTRODUCTION

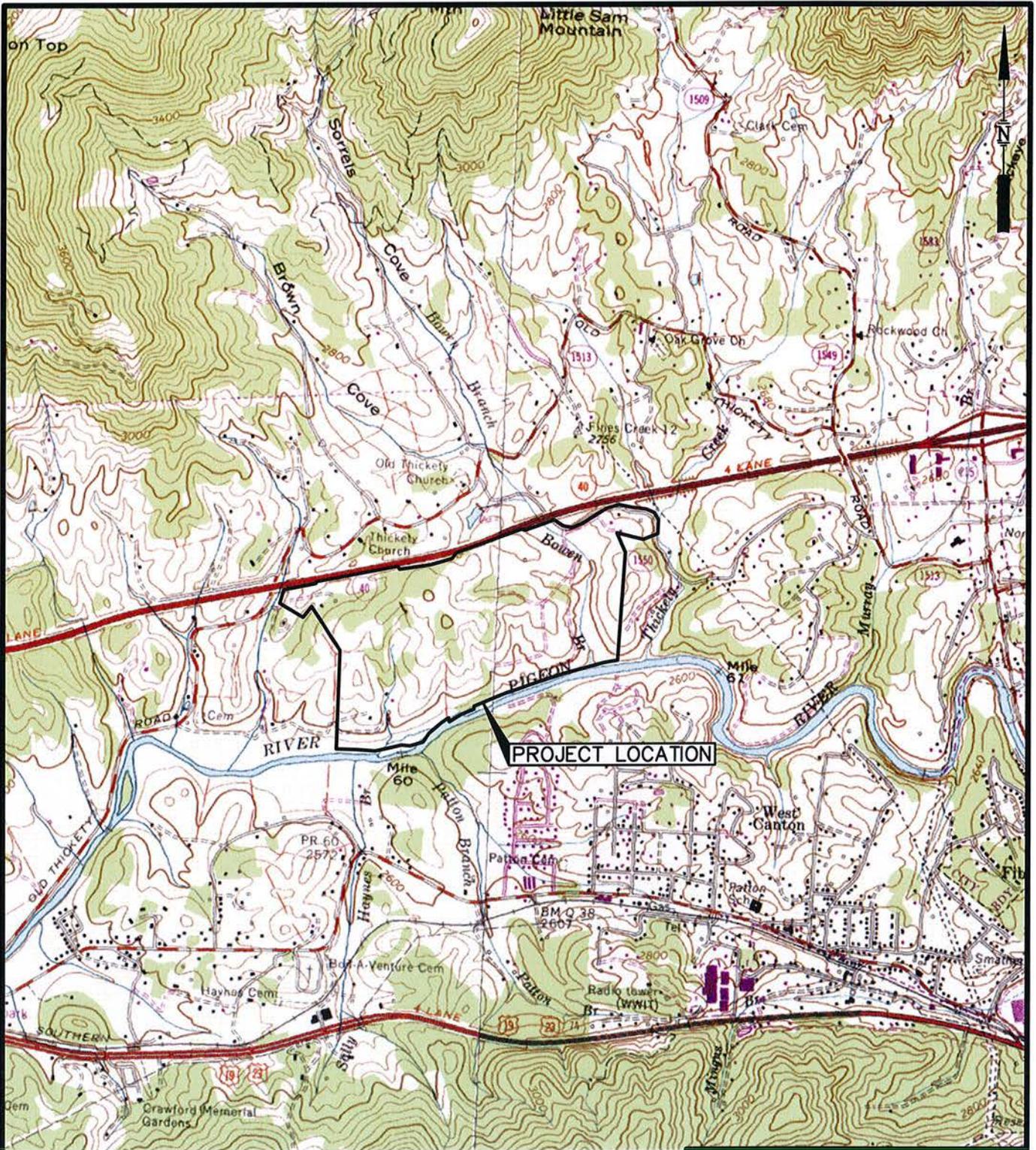
This Landfill Gas Monitoring Plan (LFGMP) summarizes the landfill gas (LFG) procedures used for monitoring at the Blue Ridge Paper Products Inc.'s (BRPP) Landfill No. 6 site in Canton, North Carolina (See Figure 1). Also included in this LFGMP is a discussion of the characteristics of LFG and general safety considerations associated with LFG monitoring. The procedures, protocols, methods, and monitoring locations in this LFGMP shall not be changed or altered without approval from the North Carolina Department of Environment and Natural Resources (NCDENR).

1.1 Landfill Gas Characteristics

Landfill gas (LFG) is a mixture of several gases that are produced through anaerobic (oxygen less) decomposition of organic wastes. Typically, LFG is composed of mainly methane and carbon dioxide with smaller amounts of nitrogen and water vapor. LFG is also composed of trace amounts of hydrogen sulfide, other sulfur compounds, and volatile organic compounds (VOCs). Typical components of LFG are shown below in Table 1-1.

**TABLE 1-1
TYPICAL COMPONENTS OF LANDFILL GAS**

Component	Percent (dry volume basis except moisture)
Methane	45 – 60
Carbon Dioxide	40 – 60
Nitrogen	2 – 5
Oxygen	0.1 – 1
Hydrogen sulfides, disulfides and other sulfur compounds	0 – 1
Ammonia	0.1 – 1
Hydrogen	0 – 0.2
Carbon Monoxide	0 – 0.2
Moisture	2 – 12
Volatile Organic Compounds (VOCs)	0.01 – 0.6



BASE MAP ADAPTED FROM 7.5 MIN
 USGS TOPOGRAPHIC QUADRANGLES:
 CLYDE, NC-1978 & CANTON, NC-1990



FIGURE 1
 SITE LOCATION MAP
 BLUE RIDGE PAPER PRODUCTS, INC.
 LANDFILL NO. 6
 CANTON, NORTH CAROLINA

SME
 Sevee & Maher Engineers, Inc.

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General LFG characteristics which a field technician should be aware of include:

- LFG production undergoes changes over the life of the waste placed. Initially air entrained in the waste stimulates aerobic decomposition and produces mainly carbon dioxide. As the oxygen is depleted, large amounts of carbon dioxide are produced with some hydrogen. During complete anaerobic conditions, methane production begins and as the waste ages, the methane, carbon dioxide, and nitrogen production becomes fairly steady.
- LFG is primarily composed of methane (typically 50%) and carbon dioxide (typically 45%) both colorless and odorless gases. The odor associated with LFG is due to the lesser and trace gases, such as hydrogen sulfide, that are part of the LFG mixture.
- LFG is flammable and potentially explosive. Methane has a flammability range of 5 to 15 percent by volume in air. Five percent being the lower explosive limit (LEL) and 15 percent being the upper explosive limit (UEL). Between these limits, the LFG-air mixture is readily flammable. Just because LFG contains methane above the UEL does not mean that somewhere away from the source the conditions for flammability are not met.
- Methane and carbon dioxide have specific gravities of 0.55 and 1.52, respectively. However, the mixture that comprises LFG has a specific gravity closer to that of air (i.e., 1.0); it should not be assumed that LFG will rise.
- LFG can migrate within open conduits and through trench backfill or through the vadose zone (unsaturated soil or bedrock above the water table). This migration can allow it to accumulate to flammable or lethal levels in manholes, buildings and other structures designed for human occupancy. This migration through the vadose zone may also cause the LFG to separate into its component gases. LFG migration below the landfill is limited by the presence of a geosynthetic liner system.

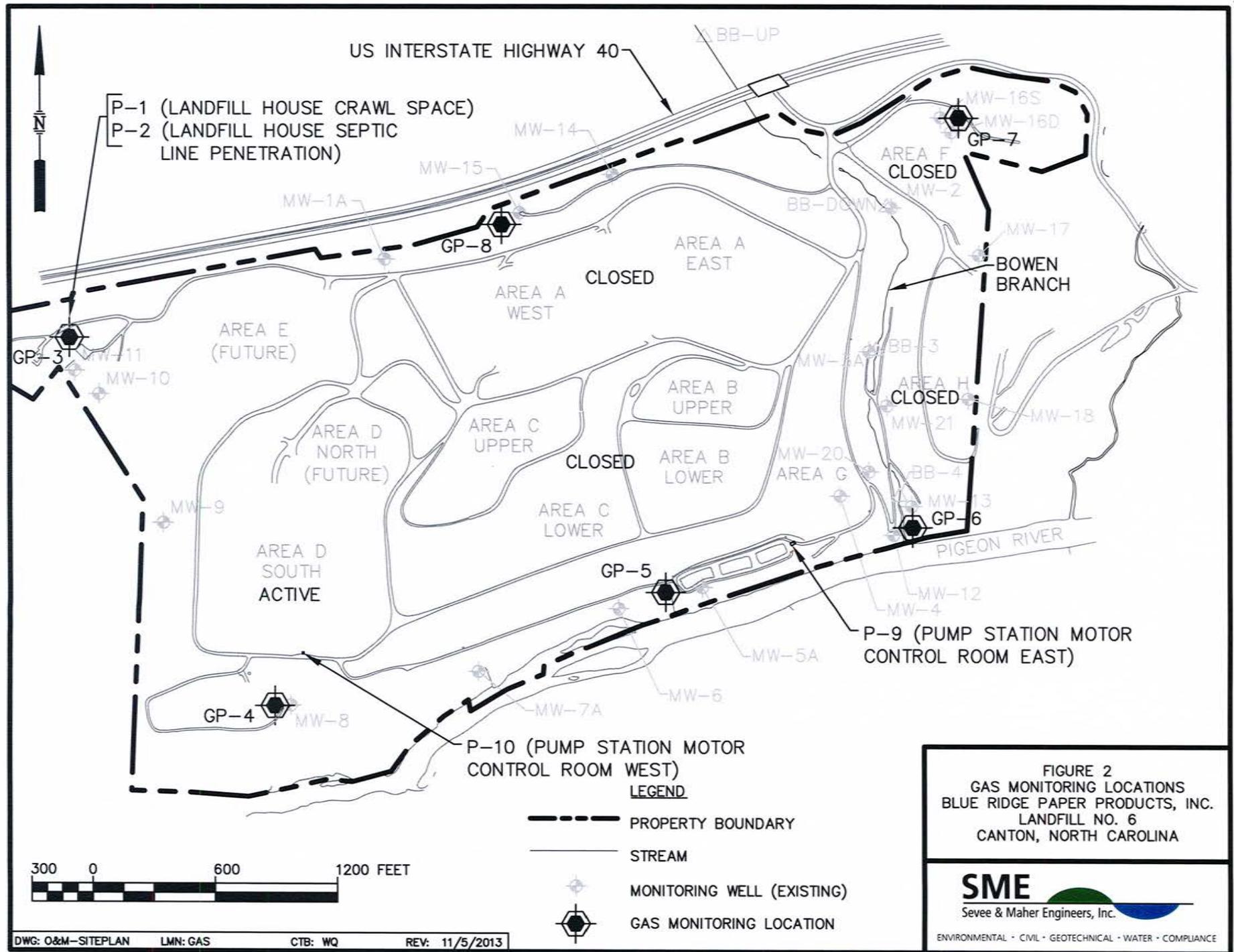
2.0 LANDFILL GAS MONITORING LOCATIONS AND FREQUENCY

During the operation of the facility, gas monitoring will be conducted quarterly at six gas probes and the ambient air of the Landfill House and the Pump Station Motor Control Rooms (see Figure 2). These gas monitoring locations are listed in Table 2-1. The gas monitoring locations have been selected between the waste boundary and the landfill property boundary to monitor the vadose zone for potential LFG intrusion.

**TABLE 2-1
LANDFILL GAS MONITORING LOCATIONS**

Location	Gas Probe Installation Date	Gas Probe Bottom Depth (FBG)	Gas Probe Screen Length (ft)
GP-3	1/23-24/ 2013	8	5
GP-4	1/23-24/ 2013	7	4
GP-5	1/23-24/ 2013	8	5
GP-6	1/23-24/ 2013	8	5
GP-7	1/23-24/ 2013	8	5
GP-8	1/23-24/ 2013	8	5
P-1 (Landfill House crawl space)	NA	NA	NA
P-2 (Landfill House septic line penetration)	NA	NA	NA
P-9 (Pump Station Motor Control Room East)	NA	NA	NA
P-10 (Pump Station Motor Control Room West)	NA	NA	NA
<u>Abbreviations</u> FBG – feet below ground NA – Not applicable			

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3.0 SAMPLING PROCEDURES

The following section describes the procedures to be followed for collecting LFG measurements at the BRPP site. LFG measurement recordkeeping forms to be completed for each monitoring event are presented in Appendix A.

3.1 Landfill Gas Measurement Procedure

Upon arrival at each sampling location, the sampling personnel will observe the physical condition of the gas probe. The inspection will include observation of the condition of the ground surface seal and the probe guard pipe to evaluate if any evidence of frost heaving, cracks, or vandalism are present. The condition of the gas probe will be recorded on the recordkeeping form. Periodically, the area around the probe may have to be cleared of weeds, brush, or other materials prior to beginning the water sampling activity.

Following inspection of the sampling location, a background set of gas readings will be measured and recorded on the recordkeeping form. The gas probe casing will then be unlocked. The inlet tubing from each meter is attached to the valve on top of the gas probe and the gas readings are recorded. Each meter is detached from the probe and allowed to continue operating at a distance away from the gas probe head until background levels are obtained prior to moving to the next monitoring location.

4.0 LANDFILL GAS SAFETY PROCEDURES

If landfill gases are detected above 100 percent of the LEL at the property line monitoring locations or exceed 25 percent of the LEL at the Landfill House or Motor Control Rooms, the EHS Department will notify NCDENR.

In the event the gas levels rise to the point where there is a hazard to health, safety, or property, the following steps shall be taken:

- Evacuate all personnel immediately to a safe distance upwind from the landfill;
- Ventilate any structures;
- Notify NCDENR;
- Investigate to determine the source of the gas release; and
- Remediate the problem.

5.0 EQUIPMENT SPECIFICATIONS AND QUALITY CONTROL

The equipment to monitor the gas concentrations include:

- CES-Lantec GEM 2000 Landfill Gas Monitor or equivalent.

The meter will be calibrated daily and operated according to the equipment manufacturer's specifications. Calibration results will be recorded on the instrument calibration log contained in Appendix A.

6.0 REPORTING

Upon completion of each quarterly monitoring event, a copy of the LFG readings will be maintained on file with the EHS Department. However, the LFG readings will be reported to NCDENR if the gas readings:

- Exceed 100 percent of the LEL at the property line; or
- Are above 25 percent of the LEL in any of the enclosed spaces or buildings.

APPENDIX A

STANDARD RECORDKEEPING FORMS

