

**CHAPTER 3.13**  
**GAS VENTING/COLLECTION**

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### CHAPTER 3.13 GAS VENTING/COLLECTION

3.13-1. GENERAL. Landfill gas production results from vaporization, chemical reactions, and biological decomposition. Biological decomposition of organic materials results in the production of carbon dioxide and methane. Other gases may also be generated depending on the composition of the waste material. The following is a list of potential impacts of landfill gas.

- Explosion hazard. Methane can migrate through the subsurface and collect in adjacent structures creating a potential explosion hazard.
- Vegetation distress. Landfill gases can distress the vegetation on a landfill cover.
- Odor. Odor control becomes a potential concern if the landfill is located adjacent inhabited areas.
- Physical disruption of cover components. Gas buildup beneath the geomembrane can force the geomembrane to protrude or "bubble out" from the cover. Landfill gases can also cause desiccation cracking on the underside of the clay layer resulting in an increase in permeability.
- Toxic gases. Gases produced by landfills can be toxic or may not comply with regulatory emission criteria.

Gas control systems consist of collection, conveyance and outlet components and are designed to vent either passively or actively. A passive system allows the landfill gas to exit the collection system without mechanical assistance whereas an active system utilizes blowers to extract the gas. The gas is then either dispersed into the atmosphere, flared, or collected and treated. This chapter briefly discusses collection and conveyance systems and QA aspects for each type of system.

Additional information which may be applicable to landfill gas collection systems can be found in the following chapters:

- Chapter 2 - Ground Water Extraction Systems;
- Chapter 3 - Drainage Layer;
- Chapter 3 - Geotextile;
- Chapter 3 - Pipe and Appurtenances; and
- Chapter 4 - Soil Vapor Extraction Systems.

3.13-2. COLLECTION SYSTEMS. The following paragraphs discuss different types of landfill gas collection systems. If intrusive drilling or trenching is performed within or near the landfill to construct the gas collection system, check that the safety plan addresses fire hazards associated with the possible presence of methane gas. At a minimum, air should be monitored for flammable gases and oxygen level.

- a. Continuous Blanket Systems.

(1) General. A continuous blanket system consists of a layer of granular fill or a geonet located below the impermeable barrier layer. Perforated horizontal collection pipes are sometimes incorporated into the blanket to aid in the withdrawal of landfill gas. Geotextile materials are sometimes used to prevent clogging of the blanket system by fine grained soils. Vertical vent pipes are used to vent the gas directly to the atmosphere or to transfer the gas to a treatment system.

(2) Quality Assurance.

(a) Check granular soils to assure that gradations meet the specified requirements.

(b) Verify granular soils are placed to the specified thickness. No density criteria is normally specified.

(c) Verify that pipes and geosynthetic materials conform to the specifications.

(d) Geosynthetic materials should be kept clean prior to use.

b. Well Systems.

(1) General. Well systems consist of a series of gas extraction wells (perforated or slotted pipes) that penetrate into the waste materials. The components of the wells are similar to that of soil vapor extraction wells (i.e. riser, screen, gravel pack). Gases collected in the well system are either passively vented to the atmosphere or collected by an active system for treatment.

(2) Quality Assurance.

(a) Check that drill cuttings are disposed of as required by the specifications.

(b) Check that the materials used for the casing, screen, filter pack, and bentonite seal are as specified.

(c) Check that the well is set straight and true to line.

(d) Check that the surface completion of the well is as shown on the drawings.

(e) Assure that the completed well is visibly marked and protected to prevent damage during future construction of the cover system.

(f) Verify that an as-built installation diagram is submitted for each well. The specific information to be included in the installation diagram should be described in the specifications.

c. Collection Trenches.

(1) General. Gas collection trenches consist of granular materials placed in a trench installed either in the waste material or along the perimeter of the waste. Sometimes geomembranes are incorporated to provide an additional barrier to gas migration. Gases collected in the trench are either passively vented to the atmosphere or collected with an active system for treatment.

(2) Quality Assurance.

(a) Check that the trench is constructed at the proper depth and alignment.

(b) Assure that granular backfill, geosynthetics, and pipes meet specified requirements.

(c) Check that any collection pipes in the trench are placed at the proper lines and grades.

(d) If geosynthetics are included in the trench, ensure that subgrade/sidewall protrusions or backfill placement does not puncture or damage the geosynthetics.

d. Piping and Conveyance Systems.

(1) General. Piping and conveyance systems for landfill gas removal consist of well heads and non-perforated header piping. Generally, all piping will converge to a single header pipe which goes to the gas treatment facility.

(2) Quality Assurance.

(a) Assure that the collection piping materials are as specified. Pipes are usually made of either HDPE or PVC.

(b) Check that pipe connections are tight and non-perforated header pipes have been leak tested.

(c) Check that the proper burial depths and pipe slopes are maintained.

(d) Verify that the pipes slope towards condensate collection tanks and do not have any dips or low spots where condensate can collect and clog the pipe.

(e) Check that the specified valves, gages, gas monitoring ports, and flexible couplings are installed at the well head.

e. Gas Monitoring Probes.

(1) General. In order to assure that the gas collection and removal system is operating properly, a series of gas monitoring probes are sometimes located around the perimeter of the landfill to detect landfill gases that may be migrating off site. The monitoring probes are small diameter wells which allow soil gas samples to be collected.

(2) Quality Assurance.

(a) Generally, gas monitoring probes should be installed prior to the installation of the landfill cover system. This allows the probes to be monitored for off-site migration of landfill gases during construction of the landfill cover system.

(b) Check that the materials used for the casing, screen, filter pack, and bentonite seal are as specified.

(c) Check that the probe is set straight and true to line.

(d) Check that the surface completion of the probe is as shown

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on the drawings.

(e) Assure that the completed probe is visibly marked and protected to prevent damage from the future construction of the cover system.

(f) Assure that an as-built installation diagram is submitted for each probe. The information to be included on the installation diagram should be described in the specifications.