

# Government Gazette Staatskoerant

REPUBLIC OF SOUTH AFRICA  
REPUBLIEK VAN SUID-AFRIKA

Vol. 553

Pretoria, 1 July  
Julie 2011

No. 34416

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## GENERAL NOTICE

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### NOTICE 434 OF 2011

#### DEPARTMENT OF ENVIRONMENTAL AFFAIRS

#### NATIONAL ENVIRONMENTAL MANAGEMENT: WASTE ACT, 2008 (ACT NO. 59 OF 2008)

#### DRAFT NATIONAL STANDARDS FOR THE EXTRACTION, FLARING OR RECOVERY OF LANDFILL GAS IN SOUTH AFRICA

I, Bomo Edith Edna Molewa, Minister of Water and Environmental Affairs, hereby give notice of intention to, under section 19(3)(a) read with section 73 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008), declare the extraction, flaring or recovery of landfill gas as a waste management activity that does not require a waste management licence and to set the national standards for the extraction, flaring or recovery of landfill gas as set out in the Schedule hereto.

Members of the public are invited to submit to the Minister, within sixty (60) days of publication of this notice in the *Gazette*, written representations or objections to any of the following addresses:

By post to:           The Director-General: Environmental Affairs  
                          Attention: Mr. Mpho Tshitangoni  
                          Private Bag x447  
                          Pretoria, 0001

By fax to: (012) 310 3753, and e-mail to: [mtshitangoni@environment.gov.za](mailto:mtshitangoni@environment.gov.za)

Hand delivered at: 315 Pretorius Street, Pretoria, Fedsure Forum Building, North Tower, 2<sup>nd</sup> Floor (Reception).

The full document can also be accessed at [www.sawic.org.za](http://www.sawic.org.za), under the link "draft documents for comment".

Any inquiries in connection with the draft national standards can be directed to Mr. Mpho Tshitangoni at (012) 310 3380.

Comments received after the closing date may not be considered.



**BOMO EDITH EDNA MOLEWA**  
**MINISTER OF WATER AND ENVIRONMENTAL AFFAIRS**

**SCHEDULE**  
**DRAFT STANDARDS FOR THE EXTRACTION, FLARING OR RECOVERY OF LANDFILL GAS**

**APRIL 2011**



**environmental affairs**

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Department:  
Environmental Affairs  
**REPUBLIC OF SOUTH AFRICA**

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## DEFINITION OF TERMS AND ACRONYMS

### DEFINITIONS

In these Standards, any word or expression to which a meaning has been assigned in the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) and associated Regulations shall have the meaning so assigned and, unless the context otherwise indicates.

“**Basic Assessment**” has the meaning assigned in the Environmental Impact Assessment Regulations;

“**Burner**” means a device inside the flaring unit to ignite / combust the gas;

“**Condensate**” means liquid that forms as gas cools down in a landfill gas collection system;

“**Extraction**” means the removal of gas from a landfill site by means of a network of pipes connected to a header and the gas sucking system;

“**Flame arrester**” means a crimped ribbon aluminum or stainless steel flame cell to protect against rapid burn backs in low-pressure situations to prevent flame fronts from propagating back through lines, destroying facilities, and causing injuries;

“**Flame detector**” means a device inside the flaring unit to minimise potential explosions especially on start ups and to check that ignition has been successful and combustion is indeed taking place;

“**Flare System**” means a system that safely disposes of waste gases through the use of combustion;

“**Flare Unit**” means a combustion device that uses a flame (in these standards an enclosed flame) to burn combustible gases in a landfill site;

“**Flaring**” means the burning of landfill gas in a flare;

“**Knockout Drum**” means a drum installed near the flare base, and serves to recover liquid hydrocarbons, prevent liquid slugs, and remove large liquid particles from the gas stream released from relief system;

“**Knock off points**” means specific sections in a LFG extraction system where condensate formed is allowed to settle and from which such condensate can be pumped out of the system;

“**Landfill Gas**” means a combination of gases that form as a result of the anaerobic decomposition of organic waste in a landfill site;

“**Spark Ignition Engine**” means an internal combustion engine for electricity generation in a landfill site, in which an electrical discharge ignites the explosive mixture of fuel and air.

### ACRONYMS

CDM- Clean Development Mechanism

CH<sub>4</sub>-Methane gas

CO<sub>2</sub>- Carbon dioxide

CO-Carbon Monoxide

EA- Environmental Agency

ERP- Emergency Response Procedure

GHG-Greenhouse gases

HDPE- High Density Polyethylene

LFG- Landfill Gas

NOx-Oxides of Nitrogen

SABS – South African Bureau of Standards

SEMAs- Specific Environmental Management Acts

VOCs- Volatile Organic Compounds

## **1. PURPOSE**

The standards aim at controlling the extraction, flaring or recovery of landfill gas at facilities as described in paragraph 3 of these Standards in order to prevent or minimise potential negative impacts on the bio-physical and socio-economic environments. These facilities are required to comply with these standards without a need to conduct a basic assessment and obtain a waste management licence as per the provisions in the Government Notice No. 718 of July 2009.

## **2. LEGISLATIVE FRAMEWORK**

The Bill of Rights contained in Chapter 2 of the Constitution of the Republic of South Africa, 1996 places a positive obligation on the State to (through reasonable legislative and other measures) give effect to rights to an environment that is not harmful to health or well-being of its citizens, and to have the environment protected for the benefit of present and future generations. South African legislators responded to this provision of the Constitution by developing and promulgating the National Environmental Management Act, 1998 (Act No. 107 of 1998) which sets principles for environmental management in the country. This Act was followed by a number of Specific Environmental Management Acts (SEMAs), including amongst others the National Environmental Management: Waste Act, 2008 (Act No.59 of 2008), which makes provisions for the development of standards set in this document. Section 19 of this Act provides for the Minister to publish by notice in the Gazette a list of waste management activities that have, or are likely to have a detrimental effect on the environment and to indicate whether a waste management license is required to conduct the activity, or if a waste management license is not required, the requirements or standards that must be adhered to when conducting the activity. This list was first published in July 2009, in the Government Notice No. 718, with the extraction, flaring or recovery of landfill gas included as an activity that required a license. The standards set in this document hence replace this previous requirement, and the activity of extracting, flaring or recovering of landfill gas thus now need to be managed in terms of the provisions of these standards.

## **3. APPLICATION OF THESE STANDARDS**

These standards apply in the following contexts:

- a) All landfill gas extraction, flaring or recovery facilities which were initiated, constructed or upgraded after the coming into effect of these standards;
- b) A person, category of persons or industry who lawfully initiated and conducted the activity of extracting, flaring or recovering of landfill gas prior to and on the date of coming into effect of these standards may continue with the activity for the duration as stipulated in the approval, authorisation or licence held until such time that the Minister directs that person, category of persons or industry to comply with the provisions stipulated in these Standards.

#### **4. REQUIREMENTS DURING THE PREPARATION / PLANNING PHASE**

Since the landfill sites where LFG projects are to be constructed, may differ in terms of design characteristics and in terms of sensitivity of local bio-physical and socio-economic environments, meteorological conditions, geo-hydrological conditions and proximity of the project to human, flora and fauna; the owners or management of the project must as part of project planning and preparation, undertake amongst others the following actions:

- a) Identify and list all environmental aspects / hazards of the proposed project and associated potential negative impacts / risks on the bio-logical and socio-economic environments;
- b) Evaluate the level of significance of such impacts/ risks;
- c) Develop an environmental management plan (EMP), specifying actions or measures, timeframes and responsibilities for mitigating potential negative impacts / risks on air, water, ground water, land, fauna, flora and on humans during the construction, operation and decommissioning phases of the project. The EMP must as a minimum, address all the requirements stipulated in these standards;
- d) Conduct studies or develop models to determine the depth of the landfill site and the landfill lining system prior to the digging of wells;
- e) Develop a safety, health and environment (SHE) induction programme covering aspects detailed in paragraph 7 of these standards;
- f) Prepare an Emergency Response Procedure (ERP) which as a minimum should cover aspects as described in paragraph 8 of these standards.

#### **5. REQUIREMENTS DURING THE CONSTRUCTION PHASE**

##### **5.1. LFG EXTRACTION SYSTEM**

- 5.1.1. Vertical wells must be drilled in such a way that no damage will be caused to the underlying landfill lining system.
- 5.1.2. The design and installation of all underground gas pipelines, including vertical and horizontal pipes must be in accordance with applicable SABS codes.



- 5.1.3. The wells and associated vertical piping must be designed in a manner that will discourage excessive sucking in of leachate and dirty material into the system, which in turn may cause system clogging.
- 5.1.4. The wells and the piping system must be sealed in a manner that will prevent or minimise unnatural migration of the gas through the wells and the pipes.
- 5.1.5. All landfill gas transmission pipe work should be pressure-tested to demonstrate its integrity.
- 5.1.6. Gas pipelines must be laid in a way that will encourage easy draining of condensate from one pipe to the other until condensate settles at the condensate collection points.
- 5.1.7. Where natural stones or crush aggregates are used in the construction of gas extraction wells, these must have a low calcareous content to reduce fugitive emissions from exhaust pipes.
- 5.1.8. Condensate knockoff points must be installed at lower level points of the gas collection system.
- 5.1.9. Condensate treatment system must be installed or condensate collection lines must be connected to the existing leachate treatment system and condensate must not be pumped back into the landfill site.

## **5.2. LFG FLARING SYSTEM**

- 5.2.1. The type of the flare required for a particular site must be determined based on a site specific survey or modeling of the key elements of the landfill gas in question. In order to minimize potential adverse impacts on the bio-physical and socio-economic environments, all the requirements in this section on the design of the flare unit, must be complied with.
- 5.2.2. To prevent unauthorized entry and potential tampering with the system, the flaring plant or unit must be fenced off with only operational staff allowed to enter the premises unaccompanied.
- 5.2.3. Any other person, including visitors and temporary contractors working on the site must on entry to the facility be accompanied by operational staff.
- 5.2.4. An emergency diesel generator must be installed to provide alternative power source for the unit in case, unexpected electricity power shuts take place.
- 5.2.5. To minimize the generation of back fires, noise emission, light pollution and to provide high combustion temperatures and specific residence periods to destroy unwanted constituents, the flare unit must be enclosed.
- 5.2.6. The unit must be equipped with gas analyzer to monitor the composition and amount of gas extracted from the wells and that is coming into the flare unit.

- 5.2.7. To be able to destroy unwanted gas impurities and to minimise emissions to the atmosphere, the flaring unit must be designed and operated in accordance with the manufacture's specifications with regards to the level of gas combustion temperatures, destruction efficiencies and retention time in the burner.
- 5.2.8. The flare unit must be designed with the following features:
- (a) A flame arrester in the landfill gas feed line to prevent flash-back of the flame down the pipe;
  - (b) A burner designed in such a way that it maintains turbulent mixing of air and fuel and that the velocity of the gas is high enough to reduce the risk of flash-back of the flame down the feed pipe without blowing off the flame;
  - (c) A flame detector *to minimise potential explosions especially on start ups and* to check that ignition has been successful and combustion is indeed taking place;
  - (d) A method of *controlling* over the flow rate of landfill gas to the burner and the supply of combustion air;
  - (e) A method of *cleaning / conditioning the gas* before the flare to remove moisture and possibly impurities, such as airborne debris, from the landfill gas;
  - (f) A condensate knock-out drum to collect condensate as well as a pumping system to divert condensate to the condensate treatment or collection system.
- 5.2.9. On delivery to the site, the unit must be issued with a manufactures' certification, which confirms that the unit is indeed able to meet the above specifications.

### 5.3. LFG TO ENERGY SYSTEM

- 5.3.1. To prevent unauthorized entry and potential tempering with the system, the electricity generating plant must be fenced off with only operational staff allowed to enter the premises unaccompanied.
- 5.3.2. Any other person, including visitors and temporary contractors working on the site must on entry to the facility be accompanied by operational staff.
- 5.3.3. Where spark ignition engine/generators are used, these must be enclosed in units/containers acoustically designed for noise reduction.
- 5.3.4. The gas combustion and power generating systems must be designed with the following features in place:
- (a) Generator/s with exhausts / stacks fitted with silencers to minimise noise emission. These stacks must be designed to point at an upward direction in order to encourage easy dispersion of emissions from the generator;

- (b) A chamber capable of combusting the gas at temperatures high enough to effectively destroy potential pollutants;
- (c) A leachate / condensate collection and pumping system;
- (d) A gas filtration (treatment) system to remove impurities.

5.3.5. The transformer/s must be located in an impermeable concrete bunded area capable of holding up to 110% of the total volume of transformer oil in case of accidental spillages, overflows or leaks in the transformer.

5.3.6. Install lightning conductors to prevent / minimize potential damage of the facility by lightning.

#### **5.4. GENERAL CONSTRUCTION REQUIREMENTS**

5.4.1. Construction within the site must be carried out under the supervision of a registered professional engineer appointed by the site owner/ site management and according to the approved engineering site plans.

5.4.2. The construction area must be defined, fenced off and limited to authorised persons only. All activities must be confined to this area.

5.4.3. To minimize the impact of noise on the neighboring areas, construction equipment must only operate between the hours of 08h00 and 17h00.

5.4.4. Fugitive emissions of dust from the movement of vehicles should be minimised by road wetting and by implementing speed limits.

5.4.5. Onsite fueling and servicing of construction equipment and vehicles must only occur in a designated area. Should a vehicle require maintenance, it must be removed from site and repaired at a service workshop/ garage.

5.4.6. Toilet facilities must be maintained well to prevent odour emission, water or any other forms of pollution. The contents of chemical toilets must not be buried or discharged direct into the environment. These must be removed for disposal to an approved disposal site.

5.4.7. During the digging of vertical gas collection wells and horizontal trenches, dug up waste material must not be stockpiled for a period exceeding one day. To minimise odour emission, this material must be put back into the landfill or removed for disposal to another authorised or licensed landfill site.

#### **6. REQUIREMENTS DURING THE OPERATIONAL PHASE**

##### **6.1. LFG EXTRACTION AND FLARING SYSTEMS**

6.1.1. A scheduled maintenance plan must be prepared and the flaring unit maintained / serviced in accordance with the manufacture's specifications and in a manner that prevents or minimises the generation of pollution.

- 6.1.2. During the shutting down of the flaring system for scheduled maintenance, LFG must be sealed off and only allowed to escape the system through the natural migration process.
- 6.1.3. The emergency generator required in terms of paragraph 5.2 of these standards must be serviced according to the manufacture's specifications. The area where the generator will be stored must be made of impermeable surfaces and must be bunded, with capability to hold up to 110% of the engine oil, and fuel in case of accidental spillages or leaks.
- 6.1.4. The generator must be operated in a manner that prevents or minimizes the generation of noise pollution and emission of pollutants to the atmosphere.
- 6.1.5. Any liquid or solid waste generated during the servicing of the emergency generator and during the servicing of the flaring unit must be handled in a manner that does not cause pollution to the environment.
- 6.1.6. Since smoking or fire making may pose risks of explosion, smoking or fire making must not be allowed in and near the vicinity of the LFG extraction and flaring facility and the signs indicating such must be erected on entrance to the facility.
- 6.1.7. Bins or receptacles for the storage of waste must be made available at all times and placed at designated areas on an impermeable surface. The contents of these receptacles must be removed from the site on a regular basis for disposal at a registered or licensed disposal facility.
- 6.1.8. No leachate or condensate extracted from the system should be disposed direct into the sewer lines unless it meets the requirements of the local authority in terms of quantity and quality. Whether these requirements exist or do not exist, the local authority concerned must first be consulted to determine a suitable method of disposal.
- 6.1.9. Leachate or condensate extracted from the system must not be disposed of direct into the environment or to suppress road dust or for irrigation, unless it meets the requirements of the Department of Water Affairs in terms of quantity and quality. Approval from this department must first be obtained prior to disposal in this manner.
- 6.1.10. Washing of machinery or equipment, vehicles, materials, clothes or bathing is prohibited unless it is done in a contained area that has suitable impervious flooring designed for this purpose.
- 6.1.11. No discharge of pollutants such as contaminated water, cement, fuels or oils will be allowed into any water resource or sewage channel.
- 6.1.12. Bunded areas must be regularly inspected to ensure no leakages, overflows or spillages occur. Any spillages and leaks must be cleaned-up immediately.
- 6.1.13. Soils that may be contaminated must be removed to prevent surface and groundwater contamination and disposed off in authorized or licensed landfill sites.

## **6.2. LFG TO ENERGY PLANT**

- 6.2.1. During scheduled maintenance shutdowns of the engines or during any emergency shutdowns or process upsets of the engines, all LFG should be flared off.
- 6.2.2. Where both the engine/s and the flaring unit are shut down for whatever reasons, the LFG must be sealed off completely and only allowed to escape the system through the natural migration process.
- 6.2.3. Any liquid and solid waste (including used oil, cooling system liquids, air and oil filters and any other waste emanating from the engines during servicing) must be handled and stored in a manner that does not cause pollution to the environment prior to them being reused, recycled or disposed of.
- 6.2.4. To ensure adherence to the manufacture's efficiency specifications, engine performance must be measured and monitored throughout the duration of the project.
- 6.2.5. To run the electricity generating engine/s, gas extracted from the landfill must be used.
- 6.2.6. All engine exhausts must be fitted with silences to minimise noise emissions.

## **7. TRAINING AND CAPACITY BUILDING**

- 7.1. All personnel on site, including visitors, temporary and permanent contractors as well as full time employees must undergo a safety; health and environmental (SHE) induction which must as a minimum capacitate them to be able to identify, prevent, minimise or manage actions or behaviors that are likely to cause adverse impacts on air, water, land, fauna and flora as a result of construction, operation and decommissioning of a LFG project.
- 7.2. Only suitably qualified and trained personnel must maintain and service (in accordance with the manufacture's specifications) the flaring unit, the energy generating engines and associated infrastructure as well as the emergency generator.

## **8. MANAGEMENT OF EMERGENCY SITUATIONS**

- 8.1. Managers or owners of the LFG facility must manage emergency situations in accordance with the ERP prepared in terms of paragraph 4 of these Standards.
- 8.2. This ERP must provide details of actions that must be taken in the case of occurrence of emergency incidences such as landfill gas explosion, gas fires, spillage of hazardous chemicals outside bunded areas into the environment, excessive noise or complaints on any of the incidences, during all phases of the project. The ERP must also provide information on the following:
  - (a) measures to prevent similar incidents from occurring in the future;

- (b) measures to contain and minimise the impacts of the incident; including the procedure for cleaning-up and evacuating the scene;
  - (c) measures that will be taken to notify all persons whose health may be affected by the incidents.
- 8.3. This procedure must on annual basis be tested through emergency simulation / mockup drills and also evaluated following the occurrence of incidences that had potential to cause harm to the bio-physical and / or socio-economic environments and on human health.
- 8.4. Emergency incidences should be investigated, addressed and recorded in a register and kept on file. Records of any emergency incidences should be made available to the authorities on request and should include as a minimum the following information:
- (a) Date, time and nature of the incidence;
  - (b) The investigation conducted and findings;
  - (c) Preventative and corrective actions taken and by whom;
  - (d) All incidents should be closed-out within 7-14 days of the occurrence of the incidence.
- 8.5. Fire fighting measures, such as fire extinguishers, must be located on-site and the workforce must be made aware of fire prevention and fire fighting measures.
- 8.6. In all areas that store material or waste that has potential to cause environmental harm in the case of accidental spillages, leaks or overflows, appropriate spill kits must be in place in accessible areas.

## **9. MONITORING AND REPORTING REQUIREMENTS**

- 9.1. For the purpose of compliance monitoring, all facilities that fall within the scope as described in paragraph 3 of these standards must prior to commencement with the construction of this activity inform the Department for a once off registration of the activity in the departmental database.
- 9.2. The authorities must be given access to audit and/or inspect the site at any time and at such frequency as they may decide, or to have the site audited or inspected at any time and at such frequency as they may decide.
- 9.3. During such audits / inspections, the site must make any records or documentation available to the inspection team as may be required.
- 9.4. Gas extraction must be monitored for the duration of the project lifetime and this should include a gas well monitoring programme to monitor potential deterioration in gas well performance.

- 9.5. Records of all hazardous waste removed on site must be recorded and kept on file for future reference and these must be submitted to the authorities on request.
- 9.6. The environmental performance of the LFG extraction, flaring or recovery project should be reported and discussed in the landfill site steering committee meetings.
- 9.7. The annual environmental performance audit must be conducted at the site and results of the audit kept on record: This audit should include, but not limited to the following:
  - (a) Confirmation of compliance of the operation to these standards;
  - (b) Confirmation of compliance with any specific requirements issued by authorities (at local, provincial or national levels);
  - (c) Confirmation of any environmental incidences that occurred and detail of the manner the incidences were handled;
  - (d) Confirmation of conformance with Environmental Management Plan of the project;
  - (e) Confirmation of conformance with the Air Quality Plan of the project;
  - (f) Confirmation of the inclusion of the project in the agenda for the landfill site steering committee.

## 10. GENERAL REQUIREMENTS

- 10.1. Compliance with these standards does not exempt the facility from complying with the requirements stipulated in any other legislation.
- 10.2. These requirements are binding to the contractors and sub-contractors working on site and should be included in tender documentation for the construction contract.
- 10.3. Ambient level of gaseous emissions from the flaring and electricity generation process must not exceed the limits as set in the National Ambient Air Quality Standards.
- 10.4. The requirements set in these standards including any other requirements by the authorities must be complied with in full and failure to do so constitute an offence in terms of the Act; and may lead to compliance investigations and punitive measures instigated against offenders.
- 10.5. A material safety data sheet (MSDS) for each of the chemical products purchased from a manufacturer or vendor must be obtained, kept on site, maintained and updated regularly. A hard copy of these sheets must be kept in an easily accessible location to employees.
- 10.6. Waste stored temporarily, must be kept on bins or receptacles which are labeled / color coded.

- 10.7. Waste bins should be placed on an impermeable surface to avoid soil, groundwater and surface water contamination.
- 10.8. No burning of waste or anything should be allowed on the site. Smoking should only be allowed in areas designated for such.
- 10.9. It is the responsibility of the project owner/ management to ensure that noise levels do not exceed those stipulated in relevant noise legislation applicable in that particular locality/ province.

#### **11. REQUIREMENTS DURING THE DECOMMISSIONING PHASE**

- 11.1. A rehabilitation plan for the site, including the indication of possible future use must be developed and kept on file within the facility. The type of rehabilitation adopted would be dependent on the planned future of the area. The following requirements however apply where the future use is no longer the LFG project:
- (a) When the amount of gas in the landfill site is no longer able to generate electricity, the gas engines/ generators and all associated infrastructure must be removed on site. These may be reused in other landfill gas to energy projects elsewhere or recycled as scrap material;
  - (b) When no more gas is extractable from the landfill site to justify the need for the flaring operation, the flaring unit and associated infrastructure must be removed. These may be reused in other LFG projects elsewhere or recycled as scrap material;
  - (c) When no more flaring is taking place, all valves (including inlet valves to the flaring unit, valves at the monitoring points at the manifolds) must be shut off in order to prevent the remaining minor gas from escaping the landfill site unnaturally. The pipes buried inside the landfill may however be left buried provided that no subsequent gas generated in the landfill will migrate through them;
  - (d) All containers that were used to store waste and/ or raw materials must be removed from the site for reuse, recycling or disposal to authorised or licensed disposal facilities;
  - (e) The owner of the facility at any given point in time, including the subsequent owner of the facility will remain responsible for any adverse impacts on the environment, even after operations have ceased;
  - (f) All remaining construction infrastructure, building rubble and waste are to be removed from the site;
  - (g) Use of topsoil for rehabilitation, that contains the seeds of alien vegetation, will not be permitted unless a program to germinate indigenous seed and eradicate alien seedlings is implemented;
  - (h) A grass mix should be selected for rehabilitation of disturbed open areas.
-