



International Best Practices Guide
for Landfill Gas Energy Projects

Appendix B
Health
and Safety
Considerations

2012

As with other industrial projects, there are risks to personnel and surrounding neighbors from construction and operation of an LFGE project. Following proper considerations for health and safety issues can greatly reduce these risks. An SWD site owner or project developer should thoroughly evaluate the health and safety aspects related to the project, ensure compliance with local and state health and safety regulations and develop site-specific plans to address these issues and promote safe and productive operation. These considerations include knowledge of hazard types, plans and procedures, equipment training and site security.

Types of Hazards

A variety of hazards are present at SWD sites and LFGE projects. Examples of common hazards include:

- **LFG** – LFG contains methane, which is explosive under certain conditions. Methane may also be an asphyxiant as it can displace oxygen in confined spaces. Smoking and other sources of ignition should be prohibited in areas with potential LFG emissions, and warning signs should be prominently posted. LFG may also contain hydrogen sulfide (H₂S), which may create a significant respiratory hazard for personnel.
- **Construction/Drilling** – Drilling and construction of a gas collection and control system (GCCS) can generate potential hazards ranging from falls, impacts, dust and hazards related to LFG and severe winds or weather.
- **Chemical/Biological** – Chemicals used at the site or the waste itself may present hazards. It is necessary to carefully follow instructions on chemicals, observe proper work rules and use personal protective equipment (PPE) when in contact with the waste.
- **Natural** – Personnel should be trained to recognize hazards posed by insects, animals and poisonous plants. A project hazard assessment should include these natural hazards. Note that natural hazards can vary greatly depending on geographic location.
- **Confined Spaces** – A confined space is either a completely enclosed or a partially enclosed space not primarily intended for personnel that has a restrictive entry or exit and can potentially contain hazards. Many hazards may be present, including a lack of oxygen as well as fire, extreme temperatures, chemical hazards, trip hazards, uncontrolled energy and potential methane travel (because it is lighter than air). Effort should be made to identify confined spaces at the site and develop the means to control confined space hazards and establish proper PPE requirements when personnel must work in them.

Plans and Procedures

Carefully developed plans and procedures can help ensure that health and safety considerations are addressed and well-positioned for improvement efforts. Clearly written and concise plans are important and enable personnel to avoid crisis situations by providing well-developed steps that promote a safety conscious approach to their jobs. In a crisis, decisions and actions must be made quickly and often on the basis of imperfect information. In these situations, clearly written and concise plans and procedures are of critical importance in allowing personnel to react quickly in a manner that promotes safety. Typical health and safety plans and procedures include the following:

1. **Nearest Hospital** – All project employees and officials should know where the nearest capable hospital is located and how to get there quickly. Receiving rapid medical attention is a significant factor in minimizing injury and recovery from serious accidents.

2. **Emergency Procedures** – Procedures that address emergencies must be clearly written, concise and easily accessible by all personnel. A key attribute of effective emergency procedures is prior knowledge. (Personnel should be thoroughly familiar and well-trained on the use of such procedures before ever using them.)
3. **Site Hazards** – SWD sites should perform a hazard assessment to identify the type and severity of hazards existing at a project site. Hazards may include sources of explosive methane, electric sources, sharp objects, machines or processes in motion, high temperatures, chemical exposure, falling objects and trip hazards. After a thorough and documented site assessment, risks associated with hazards should be mitigated through a variety of means — for example, revised plans and procedures, installation of special equipment and the selection of appropriate PPE.
4. **Personal Protective Equipment** – Although preventing a hazard or controlling it at the source is the most effective way to protect personnel, hazards can still exist and controls can fail. In these cases, PPE can protect personnel. Examples of PPE include hard hats, ear plugs, gloves and safety glasses.

Equipment Training

A typical LFG project may include equipment such as mobile machinery, blowers, compressors, flares, piping and aerial lifts. Each of these contains its own specific and different hazards (such as electric shock, kinetic energy, explosiveness or high noise). Improper or untrained use of this equipment can result in serious injury or death. To be operated safely, this equipment requires training on operation, potential hazards and knowledge of equipment-specific emergency procedures. Depending on the type of equipment, manufacturers may offer training programs.

Site Security

Site security involves protecting the SWD site from unauthorized entry and the safety of those seeking unauthorized entry. In addition to protecting site equipment from tampering by unauthorized personnel, site security can discourage public health risk and injuries from scavenging and prevent dumping of unwanted waste. Providing appropriate site security may involve installing and maintaining a durable and impervious perimeter fence and gates, stationing properly trained security guards, maintaining a visitor logbook, and displaying prominent signage to discourage unauthorized access.