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# Landfill Gas

# Objectives

- Identify regulatory limits for landfill gas in on-site structures as well as off-site migration.
- Identify reasons for noting a violation for landfill gas.
- Describe the basic requirements for landfill gas monitoring probes that are specified in regulation and statute.
- Describe the main steps of the process for the review and approval of landfill gas plans, including alternatives and implementation time extensions.
- Identify the actions to be taken by an operator if landfill gas limits are exceeded.
- Find LFG information on the Board's web site.

# Title 27 – Section 20921 – Gas Monitoring & Control

- Shall not exceed 1.25 percent by volume in air within any portion of any on-site structures.
- Methane Gas migrating from the disposal site not to exceed 5 percent by volume in air at the disposal site permitted facility boundary or an alternative boundary approved in accordance with Title 27, Section 20925.

# Landfill Gas (LFG)

- The concentration at which gas has the potential to explode is called the explosive limit. The potential to explode is determined by its lower explosive limit (LEL) and upper explosive limit (UEL).
- The LEL and UEL are measures of the percent of a gas in the air by volume. At concentrations below its LEL and above its UEL, a gas is not explosive. However, an explosion hazard may exist if a gas is present in the air between the LEL and UEL and an ignition source is present.

# Methane Explosive Limits

- Lower Explosive Limit (LEL) – 5 percent  
(50,000 ppm)
- Upper Explosive Limit (UEL) – 15 percent  
(150,000 ppm)

# LFG Issues

- Explosion Hazard
  - LF must be producing gas.
  - Migration pathways: underground conduits/ natural subsurface geology.
  - Gas collection and treatment systems, if operating properly, reduce the amount of LFG that is able to migrate .
  - Collection in confined space to a concentration at which it could potentially explode. (manhole, subsurface space, low-lying area, utility room/basements).
- Asphyxiation Hazards
  - Displaces oxygen



- 1999 An 8-year-old girl was burned on her arms and legs when playing in an Atlanta playground. The area was reportedly used as an illegal dumping ground many years ago. (Atlanta Journal-Constitution 1999)
- 1994 While playing soccer in a park built over an old landfill in Charlotte, North Carolina, a woman was seriously burned by a methane explosion. (Charlotte Observer 1994)
- 1991 In Northern CA, a worker used an electric impact wrench to remove a bolt on a LFG collection line and caused an explosion and serious injury. (CIWMB)
- 1987 Off-site gas migration is suspected to have caused a house to explode in Pittsburgh, Pennsylvania. (EPA 1991)
- 1984 LFG migrated to and destroyed one house near a LF in Akron, Ohio. Ten houses were temporarily evacuated. (EPA 1991)

- 1983 An explosion destroyed a residence across the street from a LF in Cincinnati, Ohio. Minor injuries were reported. (EPA 1991)
- 1980's During a concert at a CA outdoor Amphitheater built on a closed LF, concert-goers had extra special effects due to the combination of many ignition sources and methane in the air. (CIWMB)
- 1975 In Sheridan, Colorado, LFG accumulated in a storm drain pipe that ran through a LF. An explosion occurred when several children playing in the pipe lit a candle, resulting in serious injury to all the children. (USACE 1984)
- 1969 - LFG gas migrated from an adjacent LF into the basement of an armory in Winston-Salem, North Carolina. A lit cigarette caused the gas to explode, killing three men and seriously injuring five others. (USACE 1984)

# How To Identify A Violation Of 20921?

A violation should be noted if any of the following are found during the inspection:

- Concentration of LFG exceeds 5 percent by volume in air at the disposal site permitted facility boundary.
- Concentrations of LFG exceeds 1.25 percent by volume in air in on-site structures.
- Discussion: Is it a violation if the LFG level at a probe at the disposal site permitted facility boundary is 5.25 percent?

# Inspection Guidance

- Keep equipment calibrated
- Read the quarterly monitoring reports
- Monitor all “hot probes” each month
- Sample all probes at least one a year
- Rotate monitoring
- Ensure operator is notifying the LEA
- Jointly monitor with operator and/or consultant

# CIWMB Equipment Loan Program

- There is no charge to LEAs to take advantage of this CIWMB's Equipment Loan Program. In addition to providing calibration services, the program provides instrument consultation and repair, technical support and training, maintenance, servicing for LEA-owned instruments under specific conditions. Additional information on any or all of the features discussed here is available through the CIWMB's Health and Safety (H&S) Program website at :  
<http://www.ciwmb.ca.gov/LEACentral/EquipLoan/> or contacting Diane Kihara, the CIWMB H&S officer, at 916-341-6392.

## Title 27- Section 20925 – Perimeter Monitoring Network

Location: At or near the disposal site permitted  
facility boundary

Spacing: Every 1,000 feet

Depth: 3 probes

Shallow – 5-10 ft. below surface

Intermediate – at or near half the depth of waste

Deep – at or near the depth of waste

If depth of waste less than 30 ft. – 2 probes

# LFG Plan Review Process

- *Revised Regulations* – Title 27 – Section 20921 - Gas Monitoring & Control
- Operator submits LF Gas Control Plan to LEA.
- Alternatives to spacing & depth – geology based.
- LEA has 60 days to approve, deny or request additional info.
- CIWMB has 60 days after LEA approves to concur, deny or request additional info.
- Plans need to be fully implemented by **Oct. 18. 2009.**





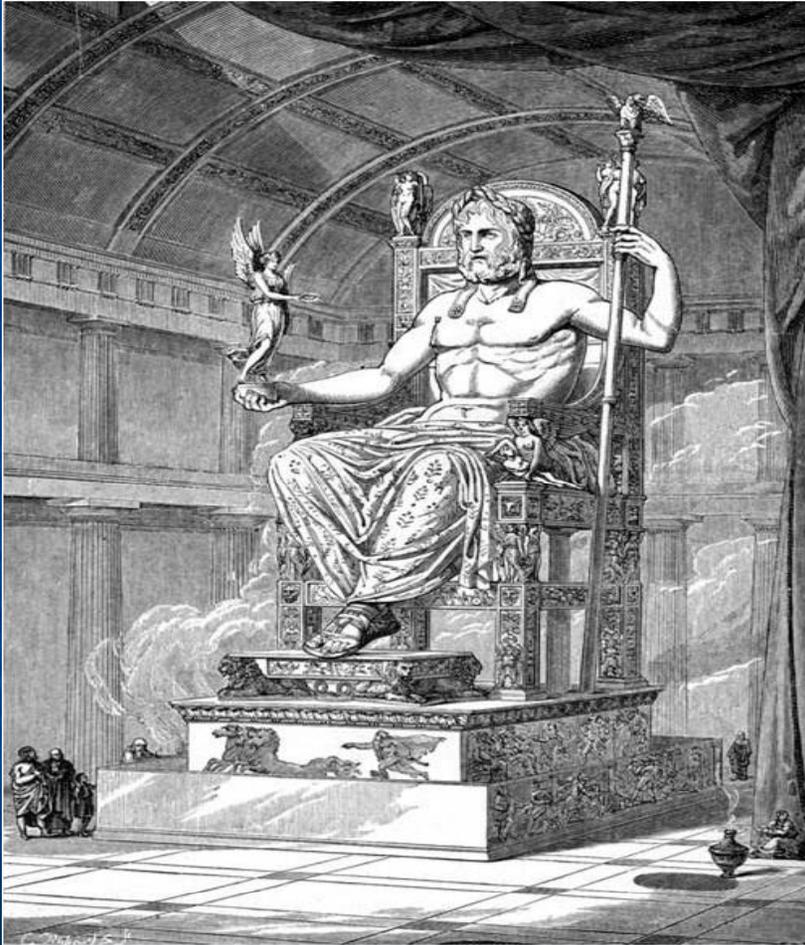








# LFG Plan Review Status



- As of 5/01/09 all but two Plans have been received by the LEAs.
- Of those a total of 75 have been LEA approved.
- A total of 46 have been approved by the LEA and concurred with by the CIWMB.

## Extension Requests - 20921(b)(3)(A)(iii)

- Written request submitted to the PLEAS Contact with a complete justification for the extension including a proposed schedule for achieving full implementation.
- Extension requests may be submitted with Plan or after the Plan has been concurred with by the CIWMB.
- Requests will not be acted upon until there is an approved Plan upon which the CIWMB has concurred.
- Determinations regarding extensions are separate from CIWMB concurrence with the enforcement agency (EA) approval of the Plans.

# Extension Justification

Reasons that the CIWMB staff **may consider** beyond the operator's control include:

- Length of a public procurement process following approval of a Plan. The operator would need to demonstrate that they were diligently following their procurement process, but that the bidding, review, or awarding of the contract would take more time.
- Operator received no bids or contractors are unavailable. The operator would need to demonstrate the lack of actual bids.

# Reporting and Control of Excessive Gas Concentrations – Section 20937

For active and closed sites

- If regulatory levels are exceeded, operator must notify LEA immediately and take steps necessary to protect public health and safety and the environment.
- Within 7 days notify LEA in writing of steps to address exceedance.
- Within 60 days implement an LEA and CIWMB approved plan to address exceedance.

# CIWMB LFG Related Web Info

[www.ciwmb.ca.gov/LEACentral/LandfillGas/default.htm](http://www.ciwmb.ca.gov/LEACentral/LandfillGas/default.htm)

Best Business Practices for Monitoring Well/ Probe  
Construction.

LFG Plan Processing.



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**QUESTIONS?**