

University of Washington
Montlake Landfill
Methane Action Plan
May 5, 2008

Introduction

The Montlake Landfill was operated by the City of Seattle on University property between 1926 and 1971, and lays over one the largest peat bogs in Washington State. When the landfill was closed in 1971 approximately 2-3 feet of earth was used to cap the landfill. Methane gas is produced as a normal decomposition product in landfills and in peat bogs. Methane gas is lighter than air and is explosive within the range of 5% to 15% by volume of methane in air (50,000 to 150,000 PPM).

In the fall of 2004 the University oversaw the installation of multiple methane detection wells on and around the perimeter of the landfill for the purposes of monitoring methane gas from the landfill. In early 2005 the University completed development of a methane gas monitoring plan in accordance with the Department of Ecology's Solid Waste Landfill Design Manual dated June 1987. The monitoring plan is entitled *Revised Landfill Gas Monitoring Plan, University of Washington, Montlake Landfill, dated February 4, 2005*.

Purpose

Methane monitoring activities began in April 2005 and continues today on a quarterly basis. This document is designed to guide University actions taken on University properties and buildings within the boundaries of the former Montlake Landfill, or within 1000 feet of the closed landfill when methane gas is found above regulatory driven action levels. Action levels were derived by state and public health officials to protect the public from the risks of migrating landfill gases.

Regulations

Public Health Seattle & King County has regulatory authority over abandoned landfill sites ([King County Board of Health Solid Waste Regulations, Title 10](#)). The provisions of Washington State Administrative Code WAC 173-304, Minimal Functional Standards for Solid Waste Handling, and WAC 173-351, Criteria for Municipal Solid Waste Landfills, were adopted by Public Health Seattle & King County and referenced where applicable in Title 10.

Seattle Municipal Code 25.09.220 regulates development on abandoned landfills and within 1000' of methane-producing landfills. Seattle Municipal Code 25.09 also regulates development in environmentally critical areas, such as abandoned landfills.

In regulating abandoned landfills, Section 10.09.050 of the Title 10 regulation states:

All landfills...shall, provide for adequate venting, collecting or redirecting of gases generated by solid wastes. No methane is allowed to migrate to or beyond the property boundary above or below the ground in concentrations greater than the lower explosive limit for methane, or in excess of 100 parts per million by volume of methane in offsite structures, or in excess of 25% of the lower explosive limit in onsite structures.... It shall be the responsibility of the landfill operator and/or owner to develop a sampling and testing program to monitor gas production and migration, and to obtain approval from the health officer for such program.

With regard to construction on or within one thousand feet of an abandoned landfill, Section 10.09.060 (B) provides:

All structures on or within 1000 feet of a landfill must be protected from potential methane gas migration. The method for insuring a structure’s protection from methane shall be addressed in a report submitted by a license professional engineer to the Local building department for approval. Such a report shall contain a description of the investigation and recommendation(s) for preventing the accumulation of explosive concentrations of methane gas within or under enclosed portions of the proposed building or structure. At the time of final inspection, the professional engineer shall furnish a signed statement attesting that the building or structure has been constructed in accordance with her/her recommendations for addressing methane gas migration.

In the case of new construction a structural engineer must document the methods used for methane gas protection and submit them for approval to the local building department. Methane barriers or appropriate ventilation may be required as specified in Seattle Municipal Code Title 22, Subtitle VIII, Grading and Drainage Control Ordinance, SMC Title 22, Subtitle I, Building Code, and Seattle King-County Health Department Regulations.”

It is the University’s intention to implement methane mitigation measures whenever methane monitoring results consistently exceeds regulatory action levels. The regulatory action levels are shown in table 1 below.

Table 1- Methane Action Levels

Monitoring Area	Action Level
Perimeter UW well – at boundary of landfill or within 1000 feet of perimeter	5% methane by volume (50,000 PPM)
Off-site UW structures within 1000 feet of the perimeter including Laurel Village, Plant Services Building, Conibear Shell House and the Center for Urban Horticulture	0.01% methane by volume (100 PPM)
On-site UW structures including Ceramic and Metal Arts Building , Environmental Safety Storage Building, Environmental Safety Office Building, Baseball Batting Cage, Golf Driving Range Building, and the Intramural Activities Building	1.25% methane by volume (12,500 PPM)

Landfill Boundaries

The exact boundaries of the Montlake Landfill are not precisely known, but available documentation shows the landfill is bounded on the west by Montlake Boulevard NE, on the north by NE 45th Street, on the east by Mary Gates Memorial Drive, and on the south by Union Bay and the Intramural Activities Building. The approximate landfill boundaries are delineated in attached figure 1. The City of Seattle Critical Area Map, Plate #11 (<http://maps.ci.seattle.wa.us/>) aids in delineation of the 1000 foot landfill buffer zone.

Methane Mitigation Measures

EH&S has notified Public Health Seattle & King County, Seattle Public Utility, and Seattle Department of Planning and Development that the Montlake Landfill is a methane-producing

landfill. EH&S will continue to supply Public Health with sampling results when results show levels above the lower explosive limit.

The attached table 2 is an excerpt from the *Landfill Gas Monitoring Plan, University of Washington, Montlake Landfill, June 2007* and specifies the mitigation measures or actions that will occur when methane action levels are exceeded.

Figure 1 – Approximate Boundary Lines of the Montlake Landfill

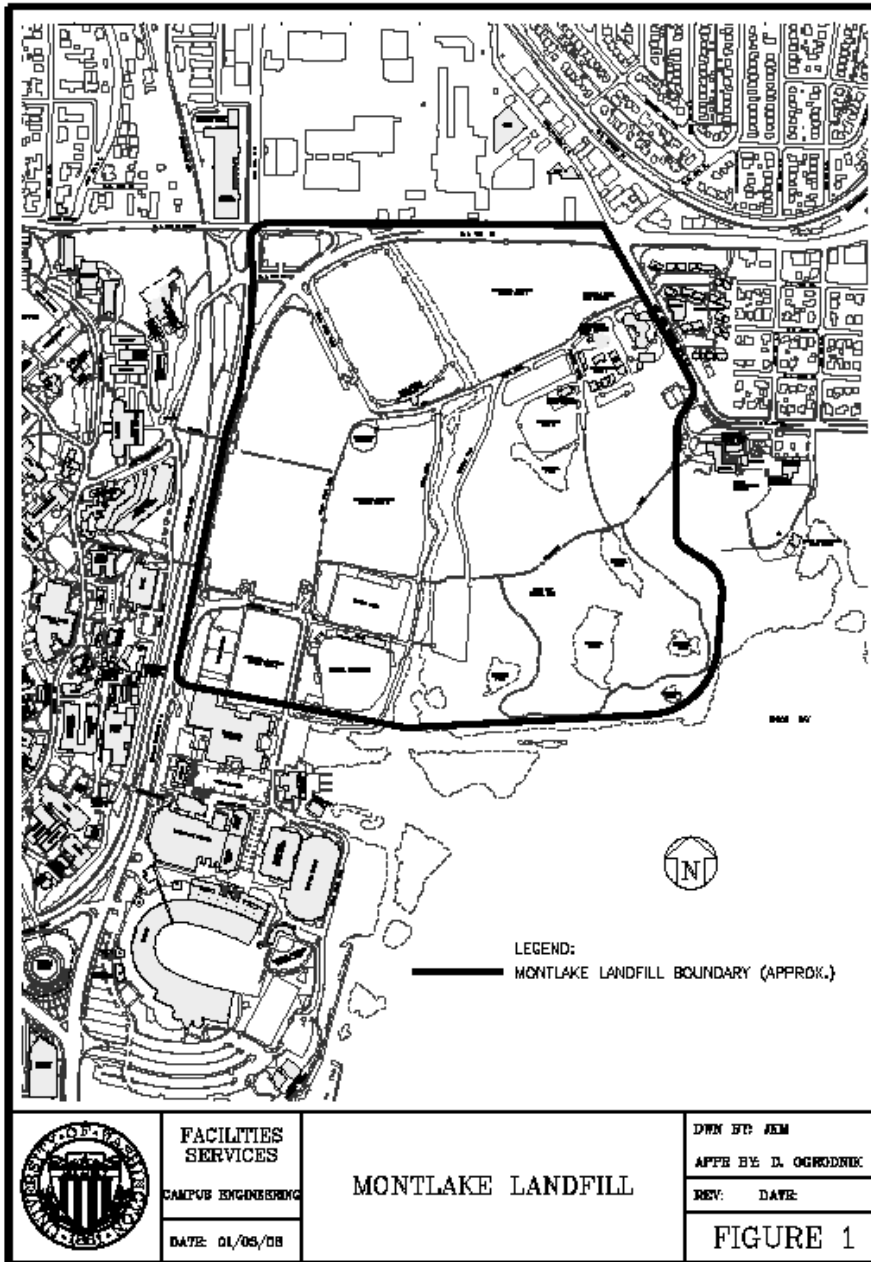


Table 2 Methane Action Levels

Monitoring Area	Action Level*	Action
Perimeter Monitoring Wells (Except Wells 2A and 2B)	50,000 ppm or 5 % by Volume methane (100% of LEL)	<ul style="list-style-type: none"> • If results remain at or above action level for 2 or more quarters in a row notify and consult with Public Health, Seattle & King County. • Monitor the inside of all nearby UW buildings within a day of this finding per monitoring plan guidance. • Notify and consult with Department Administrator or Facility Coordinator as appropriate. • Notify the Risk Management Office. • Conduct environmental assessments to determine the source of the combustible gas and whether landfill gas is migrating away from perimeter of the landfill. • Where necessary, implement mitigation measures on UW property such as the installation of active or passive ventilation systems, extraction wells, or methane burners based on location, geology, depth to groundwater, existence of landfill debris, peat, etc
On-site Buildings: CMA ESSB ESOB Cage GDR IMA	12,500 ppm or 1.25% by Volume Methane (25% of LEL)	<ul style="list-style-type: none"> • Monitor daily for a week to verify results. • Evacuate buildings if methane concentration reaches 5,000 ppm for two or more consecutive days. • Occupants may return if methane concentration falls below 5,000 ppm for 3 consecutive days. • Notify Department Administrator or Facility Coordinator as appropriate. • Notify the Risk Management Office. • Evaluate for sources of combustible gases other than landfill gas. • Where necessary, implement mitigation measures on UW property, such as the installation of active or passive ventilation systems, extraction wells, or methane burners based on location, geology, depth to groundwater, existence of landfill debris, peat, etc.
Off-site Buildings: Laurel Village Plant Services Conibear Shell House CUH	100 ppm or 0.01% by Volume Methane (0.2% of LEL)	<ul style="list-style-type: none"> • Monitor daily for a week to verify results • Evacuate buildings if methane concentration reaches 5000 ppm or more for two or more consecutive days • Occupants may return if methane concentration falls below 5000 ppm for 3 consecutive days • Notify Department Administrators or Facility Coordinators as appropriate • Notify the Risk Management Office • Conduct environmental assessments to determine gas source (landfill or otherwise) • Where necessary implement mitigation measures on UW property such as the installation of active or passive ventilation systems, extraction wells, or methane burners based on location, geology, depth to groundwater, existence of landfill debris, peat, etc...
Parking Lot Cracks	12,500 ppm or 1.25% by Volume Methane (25% of LEL)	<ul style="list-style-type: none"> • Monitor for five consecutive days to confirm. • EH&S notifies Parking Services and Facility Services. • The area is cordoned off. • Identify appropriate administrative or engineering controls such as but not limited to continued evacuation of area, crack repair, enhanced ventilation (gravel or porous pavement installation, passive vent system extension or modifications), etc.
Parking Lot Methane Vents	No Action Level	None
Monitoring wells 2A and 2B	No Action Level	<ul style="list-style-type: none"> • Monitor nearby UW buildings quarterly as stated in the monitoring plan. • Notify and consult with Department Administrators, Facility Services, and Capital Projects as appropriate. • Assess the location further when undertaking future construction or renovation projects at the site. • Ensure that future building designs implement methane mitigation systems appropriate for the location.

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Cage = Baseball Batting Cage
ESOB = Environmental Safety Office Bldg

CMA = Ceramic and Metal Art Building
GDR = Golf Driving Range

CUH = Center for Urban Horticulture
IMA = Intramural Activities Building

ESSB = Environmental Safety Storage Bldg
ppm = parts per million