Tacoma | Pierce County
Health Department
Healthier. Safer. Smarter.

Closed Landfill Study

Published April 1993
Revised September 2002 & March 2006

Prepared by:

TACOMA-PIERCE COUNTY HEALTH DEPARTMENT

ENVIRONMENTAL HEALTH PROGRAM
WASTE MANAGEMENT SECTION

CLOSED LANDFILL STUDY
PIERCE COUNTY, WASHINGTON

APRIL, 2006

FEDERICO CRUZ-URIBE, M.D., M.P.H.
DIRECTOR OF HEALTH

Project Manager

John Sherman
Environmental Health Liaison

Editor

John Wright

Project Staff

Sharon Bell
David Bosch
Andy Comstock
Keith Johnston
John Wright

Table of Contents

EXECUTIVE SUMMARY

Purpose of Report: Following numerous requests for information about closed dumpsites and landfills in Pierce County the Tacoma-Pierce County Health Department (TPCHD) began to develop an inventory of these sites. Work on the study began in January 1990 and was completed in January 1993. A second edition of the Closed Landfill Report was completed in September 2002. This version, the third edition, includes updated environmental monitoring data where available and also describes numerous sites not previously included. The objectives of the study were to establish an inventory, identify public health risks associated with the closed dumpsites and landfills, and (where possible) to determine the need for further site investigation.

Scope of the Report: This report describes an inventory and limited environmental data collection by the TPCHD. It is not intended to serve as a detailed environmental site assessment, and should not be used as such. The TPCHD encourages property owners, prospective buyers, or other interested parties to rely upon detailed site assessments performed by qualified professionals. Although this report is complete to be best of our ability, the absence of a site from this inventory is not conclusive evidence that it was never a dumpsite or landfill.

The terms *dump*, *dumpsite*, *disposal site*, and *landfill* are used interchangeably. In general, *dump* and *dumpsite* are used for the historical open-pit and hillside disposal sites where the sanitary practice of routinely covering the refuse with soil was employed. *Disposal site* is used generically to identify all sites.

Scope of Problem: During the past 30 years the handling and disposal of solid waste has become increasingly complex. Modern landfills are now constructed with engineered liners, leachate collection systems, and elaborate gas control systems designed to minimize the public health impacts of buried refuse. By contract, almost all of the old disposal sites in this report were operated under the standard practices for the time, including burning or disposal into gravel pits, wetlands, ravines, or hillsides. As a result, many of these older landfills have contaminated groundwater and caused methane gas migration onto neighboring properties. Counties and municipalities are commonly burdened with expensive remedial measures for contaminated landfills and dumpsites. Even absent contamination issues, development or re-use of these sites can be complicated by the presence of solid wastes.

Public Health Concerns: The potential public health concerns associated with closed dumpsites include both health and safety factors. Health factors include groundwater contamination (formed by rainwater percolating through the garbage and producing leachate), and the potential breeding and harborage of disease vectors (such as mosquitoes, flies, and rodents). Also, there is the potential for hazardous or toxic wastes in old dumpsites, as current standards regarding hazardous waste were not in effect when most of these sites were in operation.

The first potential safety factor is the production, migration, and accumulation of methane gas. Methane gas is not toxic but when it is allowed to accumulate in confined spaces it can be flammable and explosive.[1] The second is the potential for injuries when a site is not properly fenced or properly covered, thereby exposing the public to refuse, sharp objects, or other physical hazards.

[1] See Appendix A

1.0 INTRODUCTION

The object of solid waste disposal in the past was simply to collect and dispose of the waste as quickly, efficiently, and inexpensively as possible. A common result was garbage disposal in rural hillside dumps and gravel pits just outside individual communities. Most early dumps consisted of a dumping floor and an open face. The garbage was rarely covered and often burned. Occasionally, a tractor was brought in to push the garbage over the face and create additional dumping area. Such dumps became breeding grounds for large numbers of rodents. Historical records indicate that it was not uncommon for TPCHD staff to report kills of over 1000 rodents at a single site during annual rodent exterminations.

Odor and rodent complaints eventually led to solid waste disposal laws preventing open disposal and burning. Trench-type disposal sites were then employed. Waste was placed in a trench and routinely covered with soil until the trench was filled. By contrast, modern landfills employ the area method, or sanitary landfilling. With this system, refuse is compacted and covered with soil daily, reducing litter, rodents, and odor problems.

This report includes 24 municipal dumpsites and landfills and seven private demolition waste sites. Most of the 31 sites were closed before the enactment in 1985 of modern solid waste regulations (Chapter 173-304 WAC, also known as *Minimum Functional Standards* or MFS). Of the 31 sites, 24 were identified as needing further investigation, whether in the form of surface and ground water sampling, periodic methane gas monitoring, or routine inspections to monitor for illegal dumping. No immediate health concerns were detected at any of the sites. Although located in Lewis County, the Elbe dumpsite is also included in this report because it served Pierce County residents. All of the dumpsites studied are listed in Table 1.

In addition to these 31 sites, this report also contains summary descriptions of 60 additional sites in Piece County. These additional sites (typically illegal fill sites or illegal dump sites) tend to be less-completely documented. Each listing includes the location and (to the extent possible) dates of operation, type of wastes, volume of wastes, and a summary of available information.

As of the writing of this report there were two active municipal waste landfills (the LRI Landfill and the City of Tacoma Landfill) and four active inert landfills in Pierce County.

The sites listed in this report were identified via historical solid waste records from the TPCHD and from Pierce County Public Works, as well as other miscellaneous sources. This inventory represents most of the known dumpsites and landfills closed after 1950 (no records were found of sites closed prior to 1950). The discussion of each site covers five categories: Past and Present Use, Waste Disposal Practices, Suspected Problems, Field Results, and Recommendations. A map is provided for each site, and any previous monitoring events or inspections by the TPCHD are noted.

Sites described in this report were evaluated through:

1) Soil gas survey for the presence of methane (at most sites, where practical)[2];

2) Documentation of nearby water sources;

3) Identification and location of nearby homes and structures;

4) Physical description of the site, including types and amounts of vegetation;

5) Assessment of landfill cover material; and

6) A walking survey to note the presence of leachate, illegal dumping, and other nuisance or hazardous issues.

[2] Methane monitoring was performed using a combustible gas meter calibrated specifically for methane. A 36" steel barhole punch was used to penetrate the ground surface. In addition to the soil gas survey, water meter vaults and electrical conduits were sampled, where possible, for methane.

Table 1. List of Closed Dumpsites and Landfills in Pierce County

1. Anderson Island
2. Ashford/National
3. Buck Creek
4. Buckley
5. Carbonado
6. Cascade Demolition
7. City Fill (35th St. [Tacoma] Landfill
8. Coski
9. Dupont
10. Eatonville
11. Elbe
12. Fort Lewis
13. Fox Island
14. Grice
15. Hidden Valley
16. Key Center
17. LaGrande
18. Lime Waste
19. McChord Demolition
20. McMillin Reservoir
21. McNeil Island
22. Orting
23. Purdy
24. Puyallup / Sumner
25. Rhine Demolition
26. Roy
27. Ruston
28. South Prairie
29. Spanaway
30. Starvation Valley
31. Tacoma Tideflats

2.7 CITY FILL (35TH ST. LANDFILL)

The City Fill is located near 35th Street on the east side of Pacific Avenue in Sec 9, T 20N, and R 3E. The site was approximately 5 acres and was in operation from about 1960 to 1992.

2.7.1 PAST AND PRESENT USE

Most of this dumpsite was owned by the City of Tacoma (City). A large natural gulch that extended parallel to Pacific Avenue south of South 38th Street northward toward Interstate 5 is the area that was filled. Most of the filling consisted of inert wastes and street sweepings, which consisted of sand, leaves, tree needles, and other organic wastes that had been swept from along roadsides. The site was used by the City's Street Maintenance and Sewer Utility Divisions, as well as the Dickson Company (who performed several City projects, and also owned property at the site).

In 1992, the City regraded the site in order to provide slope stability. The site was also hydroseeded to control erosion. The site is no longer being used as a City dumpsite. Currently, some of the perimeter of the site consists of residential uses and small businesses.

2.7.2 WASTE DISPOSAL PRACTICES

The City Fill was first used during the construction of Interstate 5 and nearby roads in the early 1960's. Most of the filling at that time consisted of waste concrete, asphalt, and other debris considered to be inert. In the 1970's, a portion of the site that had been purchased by the Dickson Company was used for disposal of inert wastes. The Dickson Company was performing hauling activities for the City of Tacoma and other parties. The City instructed Dickson to discontinue dumping in 1987 when it was discovered that some of Dickson's debris had been disposed of on City-owned property. The fill site did not require a solid waste permit from the TPCHD because the wastes being disposed of were considered inert or clean and a significant portion of the site was filled before these types of wastes came under the regulatory purview of the TPCHD.

From 1985 to 1992, the City dumped wastes into the fill area that were generated from the City's Street Maintenance Division and Sewer Utility Division. The materials dumped at that time were street sweepings, which being more organic, lead to the production of methane gas. Also, oil from vehicles leads to the presence of metals and petroleum hydrocarbons in the street sweepings. These disposal activities were performed without a solid waste permit.

2.7.3 SUSPECTED PROBLEMS

Because of the organic nature of some of the wastes landfilled at the site, methane gas generation is occurring. Surface water contamination is a potential problem in the area, due to the unknown nature of some of the wastes dumped at the site.

2.7.4 FIELD RESULTS

In 1990 the TPCHD monitored for landfill gas at the 35th Street site. High concentrations of combustible gas were detected along the northern face of the ravine.

The City of Tacoma conducted an environmental site assessment in April 1991 (final report dated April 1992) for the Tacoma Public Works Department's Street Maintenance Division. Soil samples and surface water samples were collected and analyzed for a variety of chemical constituents. Elevated total petroleum hydrocarbons were detected in some soil samples. Elevated arsenic was also discovered in some soil samples (228 ppm). Arsenic and xylene were also detected in surface water samples.

A methane monitoring investigation was also conducted in 1992 at an area south of the 35th Street site near a City Light substation. No combustible gas was detected.

In 1998, the City Fill site was placed on a periodic methane monitoring schedule due to previous high concentrations of methane gas having been detected. A methane survey was conducted on March 3, 1999 jointly by the City of Tacoma Solid Waste Utility (TSWU) and the TPCHD. Only trace levels of methane gas were detected. The TSWU has since taken over responsibility for gas monitoring of the site and has conducted methane monitoring at the site twice per year. No combustible gas above 2% of the LEL (Lower Explosive Limit) were detected in those monitoring events. The last methane monitoring event prior to the writing of this report was conducted by the TSWU on October 27, 2005. Perimeter barhole gas monitoring was conducted at four locations. A single gas probe on-site was also monitored. Results of the methane survey are shown in Table 5 and Figure 7.

Table 5. Methane monitoring results for the City Fill (35th St. Landfill) on October 27, 2005.

Sample	Methane reading	Depth of Measurement
1	ND	30”
2	120 ppm	24”
3	20 ppm	12”
4	120 ppm	30”
5	ND	12”
6	320 ppm	24”

ND = No Detection
ppm = parts per million

The bank and the toe of the slope were inspected for signs of leaching during the April 2001site inspection. No visible signs of leaching were noted. A large puddle of water was noted at the toe of the slope. From 1999 to 2004 the City of Tacoma Public Works Department (TPW) performed sampling of soil and surface water at the landfill site on an annual basis. Analysis of the samples showed no petroleum contamination present. A spring was noted north of the landfill during the last sampling event. The spring flows north into a storm drain. The spring was sampled on May 8, 2001. No contamination above state cleanup standards was detected. In July 2005 the TPCHD, on behalf of Ecology's Toxics Cleanup Program, received an request to conduct an initial investigation of this site to determine possible contamination. After a review of the facility's files, it was determined that sampling at the site performed by city agencies was inadequate. An initial investigation, including further sampling was conducted in August 2005. The sampling results confirmed petroleum hydrocarbon, heavy metals, arsenic, and lead contamination at varying degrees. The extent of the contamination had not been confirmed as of the writing of this report.

2.7.5 RECOMMENDATIONS

Due to the close proximity of residential and business buildings to the landfill, the potential for methane migration into the buildings exists. Therefore, the TPCHD recommends that semi-annual methane monitoring, including barhole monitoring, continue to be conducted. TSWU will conduct the methane monitoring and forward all results to the TPCHD for review. Future methane monitoring frequency at the site may be altered based upon the results obtained.

The soil and water sampling activities recommended in the 1992 report that had been conducted by TPW are not useful and can at this point be discontinued. Ecology, in accordance with the TPCHD's Site Hazard Assessment Program will work with the property owner to resolve contamination issues at the site. In the future, Ecology may conduct a Site Hazard Assessment of the site. At that time, Ecology will assess whether action will be needed and if necessary establish a priority for the work.

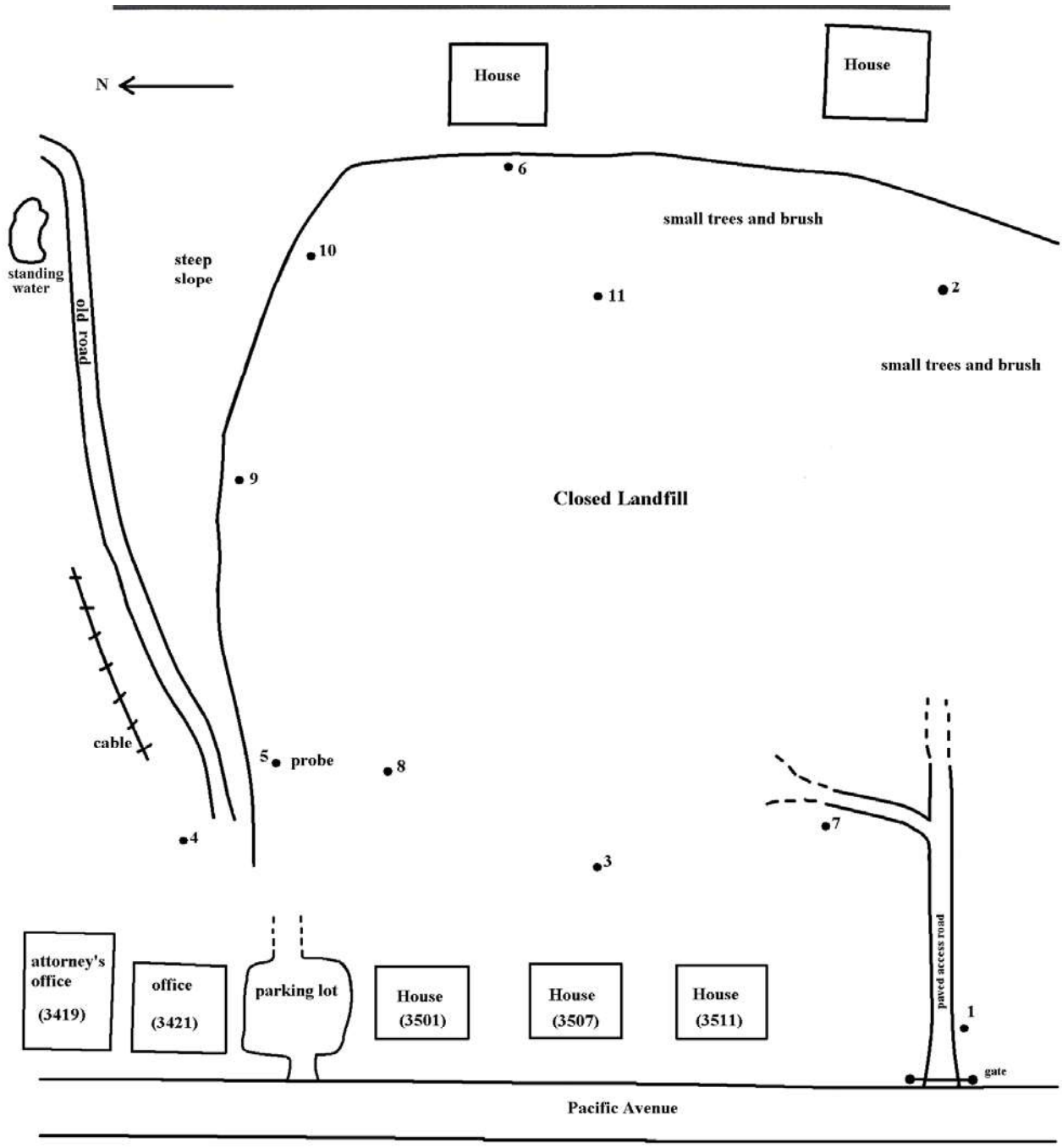

Figure 7. City Fill (35th St. Landfill)

4.0 SITES LISTED BY AREA

Range 1W

T 20N Longbranch Open Dump

T 21N Key Center Dump

Range 1E

T 19N Anderson Island Dump
Fort Lewis Landfill
Dupont Dump

T 20N McNeil Island Landfill

T 22N Purdy Landfill

Range 2E

T 17N Roy Dump
Wood, Ken

T 19N Lakes Drywall Dump
McChord Demolition Landfill

T 20N Fox Island Dump
Northwest Aggregates
Mountain View Funeral Home
Todd Nursery Disposal Site
Chambers Vista

T 21N Ruston Dump
Miller, Edward

Range 3E

T 17N Rogich, Gary

T 19N Cascade Demolition Landfill
Prebilsky
Rogich, Gary
Spanaway Dump

T 20N Occidental Chemical - Site VI (Dauphin Site)
Occidental Chemical - Site II (Petarcik Site)
Tacoma Tideflats Landfill
Windstar Landfill
Tacoma Spur Projects (Site I, II, III)
City Fill (35th Street Landfill)
Masella, Fred/Mileski, Walter
Leingang, George
Reese and Salscheider Fill
Canyon Sand & Gravel
Lidford Dump
Milender, Dennis
Tacoma Place
Rhine Demolition Landfill
Brett, Vern

T21N Lime Waste Fill
O'Connor Demolition Fill
Grice Landfill
Occidental Chemical - Site I
Oline, Don (Site #1) - Occidental Site IV
Occidental Chemical - Site III (Don Oline or General Metals Landfill)
Oline, Don (Site #2)
Coski Landfill

Range 4E

T 16N	Pack Forest - University of Washington
	LaGrande Dump
	Eatonville Dump
T 18N	Ferguson-Mathias Road
T 19N	American Topsoils
	McMillin Reservoir
	Starvation Valley Landfill
	Hidden Valley Landfill
T 20N	Jerry Apple Dumpsite/Apple Dumpsites ("Apple site")
	Jerry Apple Dumpsite/Apple Dumpsites ("Olson site")
	B&L Woodwaste
	Jerry Apple Dumpsite/Apple Dumpsites (Milton Park site)
	Oline, Brad
	US Gypsum (Site 2)
	Hopper, William
	Jackson, Charles Fill Site
	Jordan Brothers
	Johnson, Robert/Oline, Brad fill site
	Roseberry
	Jerry Apple Dumpsite/Apple Dumpsites ("Swanson Site")
	Barry Excavating Landfill
	Corliss Wood Waste Fill
	US Gypsum (Site 1)
	Puyallup/Sumner Landfill

Range 5E

T 15N	Elbe Dump
T 17N	Puget Sound Power and Light
	Kapowsin Lake Log Sort Dump
	Camp One Dump
T 18N	Old Soldiers Home Dump
	Orting Dump
T 19N	South Prairie Dump
T 20N	AA Asphalting
	Kiblinger
	Stowe Construction
	Boster, Robert E.
	Puget Power (Canal Lining)
	Bachmann, Michael
	Alderton Sportsmen's Club

Range 6E

T 15N	Ashford/National Dump
	Tahoma Woods Dump
T 18N	Carbonado Dump
T 19N	Shear, Ronald
	Champion International Corporation
T 20N	Buckley Dump

Range 10E

T 18N	Buck Creek Dump

GLOSSARY
LIST OF ACRONYMS

ASARCO	American Smelting And Refining Company
CH_4	Methane (See Appendix)
DNR	Department of Natural Resources
EPA	Environmental Protection Agency
H_2S	Hydrogen Sulfide
LEL	Lower Explosive Limit
LRI	Land Recovery, Inc.
MFS	Minimum Functional Standards
NPS	National Park Service
PAH	Polynuclear Aromatic Hydrocarbons
PPM	Parts Per Million
PSAPCA	Puget Sound Air Pollution Control Agency
PVC	Polyvinyl Chloride
RCW	Revised Code of Washington
TPCHD	Tacoma-Pierce County Health Department
UEL	Upper Explosive Limit
VOC	Volatile Organic Compound
WAC	Washington Administrative Code
WNG	Washington Natural Gas

GLOSSARY
DEFINITIONS OF TERMS

CH_4 Methane Gas A colorless, odorless, and tasteless gas that is a by-product of anaerobic decomposition and a component of landfill gas. Typically, methane constitutes almost 50% of landfill decomposition gas (carbon dioxide constitutes another almost 50% - see below). For more information on methane gas see the appendix.

CO_2 Carbon Dioxide A colorless, odorless, noncombustible gas that constitutes almost 50% of landfill decomposition gas. Carbon Dioxide is heavier than air and will move toward the bottom of a landfill.

H_2S Hydrogen Sulfide A colorless gas with a strong odor of rotten eggs. Hydrogen Sulfide is found as a component of landfill gas at some landfills.

LEL Lower Explosive Limit Stated as a percentage, 100% LEL equals 5% methane (CH_4) gas by volume. Methane gas is explosive from 5% to 15% CH_4 gas.

MFS Minimum Functional Standards for Solid Waste Handling Chapter 173-304 WAC (also called the MFS) became policy in 1988. The MFS set minimum functional performance standards for the proper handling of solid wastes. At the time of the writing of this report, the MFS was being revised into Chapter 173-350 WAC.

PPM Parts Per Million Example: 500 ppm methane gas = 500/1,000,000 or .05% methane

PVC Polyvinyl Chloride A white water-insoluble thermoplastic resin with many uses including the making of landfill liners.

UEL Upper Explosive Limit The Upper Explosive Limit for CH_4 gas is 15%. Methane gas is explosive from 5% to 15% CH_4 gas.

APPENDIX-Methane Gas

Methane gas is produced by anaerobic digestion of organic acids in a landfill. Methane is a colorless, odorless, nontoxic gas. It is known to be lighter than air and rise from a landfill. This gas will take the path of least resistance to the surface.

Methane gas is not a threat to public health, other than being a simple asphyxiant. However, methane gas is known to be a safety hazard. Methane gas is explosive when in the concentrations of 5-15% gas by volume in air.

The rate and amount of methane produced depends on several factors. One factor is the capacity of the landfill. A larger volume increases methane gas potential. Another factor is the material used as a cap for the landfill. An impermeable cap traps the methane and increases the probability that the methane will migrate through the soils. In addition, the rate and amount of methane produced depends on the volume of water that is able to penetrate the landfill. An increase in water volume increases the production of methane. Finally, the rate and amount of methane migration from the landfill depends on the barometric pressure. A lower barometric pressure increases the rate of methane being emitted from the landfill.

Table 26 includes the various units used by instruments to measure methane gas concentrations and the conversions between the units.

Table 26. Conversion Factors for Methane gas.

% CH_4		**ppm**		**% LEL**
0.01%	=	100		0.2%
0.05%	=	500	=	1.0%
0.10%	=	1,000	=	2.0%
0.50%	=	5,000	=	10.0%
1.00%	=	10,000	=	20.0%
1.25%	=	12,500	=	25.0%
2.00%	=	20,000	=	40.0%
2.50%	=	25,000	=	50.0%
5.00%	=	50,000	=	100.0%

$\%CH_4$ = % methane by volume in air (flammable range 5-15%)
ppm = parts per million
%LEL = Lower Explosive Limit (5% volume in air = 100% LEL)
Ratio of LEL: CH_4 is equal to 20:1 (20% LEL = 1% CH_4)