

COAL SEAM FLAMMABLE / TOXIC GASES INFORMATION TABLE

Gas	Chemical Formula	Location Found	Characteristics	Human side effects	LEL %	UEL %	Comments
Methane	CH₄	Most coal and shale deposits.	<ul style="list-style-type: none"> -Colourless -Flammable -Non Toxic -Odourless in pure state -Lighter than air, density of 0.55. -Flammable & Toxic. 	-Asphyxiant – causes headaches, nausea, dizziness and death.	5.0	15.4	<ul style="list-style-type: none"> -Methane displaces air, and can cause death if oxygen levels fall below 6%. -Non specific odour provides no warning of presence in potentially dangerous concentrations. -Most explosive at 9.46%. -Most easily ignited at 7.5%.
Hydrogen Sulphide	H₂S	Some coal and shale deposits.	<ul style="list-style-type: none"> -Colourless -Sweet taste -Pungent odour like rotten eggs. -Heavier than air, density of 1.19 therefore tends to pool in poorly ventilated areas. -Highly toxic. -Flammable. 	<ul style="list-style-type: none"> -Highly toxic – irritates mucous membranes and eyes and has a narcotic effect on the nervous system. Acts on the nervous system causing headaches, dizziness, excitement, and staggering gait. -Massive acute exposure causes death through anoxia. 	4.5	45	<ul style="list-style-type: none"> -Can be detected by smell at small concentrations as low as 1ppm, but nasal sensitivity decreases with exposure and increased concentration levels. -Exposure to concentrations greater than 500 ppm can be fatal. -Excessive exposure is often characterized by depression at lower concentrations, then stimulation, followed by paralysis of the respiratory system at higher levels (1000 ppm).
Carbon Monoxide	CO	Always present in proximity to coal fires	<ul style="list-style-type: none"> -Colourless -Odourless -Tasteless -Density relative to air of 0.97 -Flammable & explosive. 	<ul style="list-style-type: none"> -Extremely toxic - poisons the body by being absorbed into the bloodstream preventing red blood cells from transporting necessary oxygen to the body 	12.5	74	<ul style="list-style-type: none"> -Recognized as most dangerous toxic gas found in coal mines, impossible to detect by smell or taste. -CO poisoning in cumulative, repeated short exposures render victim more susceptible to its effect. Occurs because the half life of carboxyhemoglobin is 4-5hrs. -Most explosive at 29%

Carbon Dioxide	CO₂	In some mines as seam gas. Also in diesel engine exhaust, mine fires, explosions, and blasting operations.	<ul style="list-style-type: none"> -Colourless -Slight pungent or acrid smell -Leaves a soda water taste in mouth. -Density relative to normal air of 1.53 	-Highly toxic. At low concentrations it acts as a respiratory and central nervous system stimulant. At high concentrations (>1%) it depresses central nervous system causing unconsciousness and narcosis.	0	0	-Carbon dioxide is heavier than air and will accumulate in low lying and unventilated areas.
Sulphur Dioxide	SO₂	In vicinity of heating's in coal containing Sulphur.	<ul style="list-style-type: none"> -Colourless -Strong pungent smell at 3ppm -Heavier than air, density of 2.26 -Non flammable & incombustible. 	-Extremely toxic. Highly irritating to mucous membranes of eyes and respiratory tract. Low concentrations produce tearing, sneezing and coughing.	0	0	-Sulphur Dioxide is extremely toxic but poisoning rarely occurs because it is intolerable to breath for any length of time at high concentrations. Concentrations greater than 500 ppm are dangerous to life and health after short exposures.
Nitrogen Dioxide	NO₂	Produced as a component of diesel equipment exhaust, or as a result of the detonation or burning of explosive	<ul style="list-style-type: none"> -Reddish Brown in colour -Acrid smell -Acrid taste -Density relative to air of 1.6 -Non flammable & incombustible. 	-Extremely poisonous. Highly irritating to respiratory system. More severe symptoms may occur several hours after exposure has ceased.	0	0	-Nitrogen Dioxide is non flammable and incombustible, but it will support combustion. NO ₂ usually found in working areas immediately after shot firing, amount of gas increases during incomplete detonation, or from poorly maintained engines. -Concentration of 100 ppm may seriously irritate respiratory system, and 200 ppm is dangerous to life and health if respired for only a few minutes.