Workplace Risks from Bacterially Derived Toxic Gases

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Science Division Health and Safety Laboratory, Health and Safety Executive, Buxton SK17 9JN, United Kingdom

7cffYgdcbX]b['Uih\cf. Brian Crook, Microbiology Team, Health and Safety Executive, Buxton SK17 9JN, UK, E-mail: brian.crook@hsl.gsi.gov.uk

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Introduction

Risks to human and animal health from bacteria are not only associated with infection, but can be a consequence of exposure to toxic by-products. Natural fermentation of organic materials is likely to involve a complex mixture of bacteria, and if this includes sulphate reducing bacteria (SRB) there is the possibility that hydrogen sulphide (H_2S) will be generated [1].

In the workplace, if this occurs in confined spaces it can lead to oxygen depletion and an asphysiation hazard for workers, as well as the high toxicity of H_2S . Depending on exposure level, symptoms range from an irritant e ect through arrest of cellular respiration to immediate unconsciousness H_2S has a poisonous e ect on all organs, but in particular on the central nervous and pulmonary systems [2]. Health e ects, dependent on concentration and duration of exposure, are

1. At a concentration as low as 0.0047 ppm 50% of humans can detect the characteristic 'rotten egg' odour of H_2S .

2 e UK Workplace Exposure Limit for H_2S is 5 ppm for longterm exposure (8 h Time Weighted Average reference period), or a short-term exposure limit (STEL) of 10 ppm for a 15 min reference period.

3 At 150-250 ppm the olfactory nerve is paralysed U er a few inhalations so that the sense of smell disappears, o en together with awareness of danger:

4 Exposure to 530 1000 ppm can cause strong stimulation of the central nervous system and rapid breathing, progressing to loss of breathing,

5.800 ppm is the generally accepted LD_{50e} D I q0 W € • W 0 U 0)DeO L R R R HUQHURI D)RI