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CFD simulation of ammonia dispersion from a vapour box: Secondary containment for handling ammonia spills
(ORAL PRESENTATION)

Alina LARIN[1], Anat TZUR[2], Alexander A. COHEN[3],

ABSTRACT

This paper demonstrates the beneficial use of vapour boxes as a secondary containment for handling liquefied ammonia spills. The effectiveness of such barriers have been investigated by Peterson (1993) in a series of wind tunnel experiments. Peterson concluded that vapour boxes volume to be approximately 2 times larger than the volume of the expected release. CFD simulation of ammonia dispersion from vapour box was performed for various volumes and shapes of vapour boxes and it was found that even smaller boxes may provide significant risk reduction. The geometry of the box, its faces and the height of the walls has been refined to yield best reduction of the risk as expressed in terms of downwind concentration of ammonia. It is argued that a key factor in the risk reduction is probably due to providing the released ammonia cloud the time required to absorb sufficient heat and letting buoyancy be the dominant factor that controls the dispersion of the plume.
Since vapour boxes are passive safeguards and are simple-to-apply in comparison to other secondary containment means, and as they found to be effective as well, it seems that vapour boxes could be useful for mitigation of ammonia spills and reduce the potential footprint of major ammonia incidents.

Keywords: ammonia, computerized fluid dynamics (CFD), secondary containment, mitigation factors, , gaseous dispersion

[1]MSc (Energy Eng), Energy and Simulation Dept. Manager, Hazmat LTD, 23rd Hamelacha St. Rosh Haayin, 48091, Israel
Email: alina@hazmat.co.il
[2] B.Sc, (Chemistry), Engineering VP, Hazmat LTD, 23rd Hamelacha St. Rosh Haayin, 48091, Israel
Email: anat_t@hazmat.co.il
[3] PhD (Chemistry), CEO, Hazmat LTD, 23rd Hamelacha St. Rosh Haayin 48091,Israel
Email: alex_cohen@hazmat.co.il