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Severity Impact of a Vapour Cloud Explosion (VCE) – Liquefied Petroleum Gas (LPG) Road Tanker Accident
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Abstract

An explosion accident from a road tanker while carrying hazardous materials can have a dangerous effect on road users and the surrounding area through which the road tanker passes. Based on the evidence of the accident case involving the road tanker reported, it shows that this accident case can cause death and destruction to the surrounding property. In Malaysia, several cases of accidents involving road tankers have also occurred. Among the methods used to determine the impact of a road tanker explosion is the use of the consequences analysis method. Currently, there is limited number of software that can be used to determine the impact of a road tanker explosion accident that carries explosive chemicals such as butadiene, Liquefied Petroleum Gas (LPG), etc. However, there are weaknesses in the display of the impact results plotted on the map. Where the impact of the explosion is only shown to the 3 main zones, namely building damage, serious injury, and glass breakage. In this paper, the enhanced contour profile method on the impact of an LPG road tanker explosion on human and structural damage is shown. © 2023, ASM Science Journal. All Rights Reserved.

Author Keywords

Grid contour; Road tanker; Severity; Threat zone; VCE

References

- Bubbico, R, Guerieri, C, Mazzarotta, B
Best Routing Criteria for hazardous substances transportation
(2001) *Loss Prevention and Safety Promotion in the Process Industries, 10th International Symposium*, pp. 1029-1044.
Stockholm, Sweden, EFCE and Elsevier Publications
- Carson, P, Mumford, C
Transportation of chemicals
(2003) *Loss Prevention Bull*, 170, pp. 11-17.
- (1996) *Guidelines for Use of Vapor Cloud Dispersion Models*,
2nd edn, AIChE
- (2000) *Guidelines for Chemical Process Quantitative Risk Analysis*,
2nd edn, American Institute of Chemical Engineers
- (2008) *Guidelines for Chemical Transportation Safety, Security, and Risk Management*,
2nd edn, American Institute of Chemical Engineers
- (2010) *Guidelines for Vapor Cloud Explosion, Pressure Vessel Burst, BLEVE and Flash Fire Hazards*,
2nd edn, AIChE
- Erkut, E, Ingolfsson, A
Catastrophe avoidance models for hazardous materials route planning
(2000) *Transportation Science*, 34 (2), pp. 165-179.

- Finney, DL
(1971) *PROBIT analysis*,
Cambridge University Press, London
- Glasstone, S, Dolan, PJ
(1977) *The effects of nuclear weapons*,
3rd edn, U.S
- Huang, B, Cheu, RL
GIS and genetic algorithms for HAZMAT route planning with security considerations
(2004) *International Journal of Geographical Information Science*, 18 (8), pp. 769-787.
- Lisi, R
Risk analysis of the transportation of hazardous material: an application of the TRAT2 software to Messina
(2001) *Loss Prevention and Safety Promotion in the Process Industries, 10th International Symposium*,
European Federation of Chemical Engineering, Stockholm, Sweden, Elsevier Publications
- Lobato, J
A Comparison of Hydrogen Cloud Explosion Models and the Study of the Vulnerability of the Damage Caused by an Explosion of H2 International
(2006) *Journal of Hydrogen Energy*, 31, pp. 1780-1790.
- Rhyne, W
(1994) *Hazardous materials transportation risk analysis: Quantitative approaches for truck and train*,
New York, Van Nostrand Reinhold
- (2003) *The Role of Hazardous Material Placards in Transportation Safety and Security*,
Office of Hazardous Materials Safety and Volpe National Transportation Systems Center,
Washington, D.C
- Sartori, L
(1983) *The effects of nuclear weapons, Physics Today*, pp. 32-41.
March
- (2005) *Methods for determination of possible damage*,
Committee for the Prevention of Disasters, CPR 18E/PGS1, 2nd edition
- (1999) *Guideline for Quantitative Risk Assessment*,
Committee for the Prevention of Disasters, The Netherlands
- (2005) *Methods for the calculation of Physical Effects*,
Committee for the Prevention of Disasters, CPR 14E/PGS2, 2nd rev. print
- Verma, M, Verter, V
Rail transportation of hazardous materials: Population exposure to airborne toxins
(2007) *Computers & Operations Research*, 34 (5), p. 12871303.
- Zulkifli, RA
A Retrospective Study Of Smart Advisory System In The Transportation Of Hazardous Material (Hazmat)
(2007) *3th International Conferences on Chemical and Bioprocess Engineering in conjunction with 23nd Symposium of Malaysian Chemical Engineering (SOMChE)*, pp. 971-978.

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