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Process Safety and Environmental Protection

Volume 88, Issue 2, March 2010, Pages 97-108

Semi-quantitative risk assessment of commercial scale supply chain of hydrogen fuel and implications for industry and society

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<https://doi.org/10.1016/j.psep.2009.11.006>

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Abstract

This paper is derived from a study on the safety of bulk transport and storage of hydrogen as a fuel, carried out by the Health and Safety Laboratory (HSL) for the Department for Transport (DfT). The aim of the study was to identify the knowledge and data required to develop fully a risk assessment for a hydrogen delivery and storage infrastructure. The methodology used was to begin to carry out a risk assessment for a representative delivery and storage supply chain, using a risk assessment methodology commensurate with the availability of necessary data. Semi-quantitative risk assessment was carried out through top-down HAZID brainstorming, consequence modelling using commercially available software, and use of a risk matrix.

Finally through the risk assessment carried out and relevant literature review, the gaps in

hazard identification, consequence modelling and frequency assessment, which should be filled to develop a quantified methodology, were compiled.

Using data for current UK LPG consumption, comparisons were made between hydrogen and LPG for mode of failures and number of trips required to supply equivalent energy demand. The implications of using ammonia as a hydrogen carrier (hydrogen is within the ammonia molecule) and regulatory implications on hydrogen fuelling or storage sites are also discussed.



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Keywords

Hydrogen; Risk assessment; LPG; COMAH; Gaps; Consequence assessment

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Application of quantitative risk assessment for performance-based permitting of hydrogen fueling stations, procedural change increases sustainable Nadir.

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