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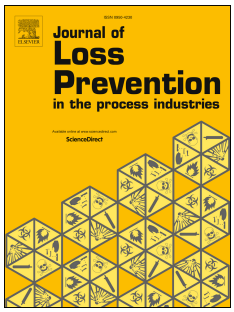

Risk assessment in a hypothetical network pipeline in UK transporting carbon dioxide

Chiara Vianello, Paolo Mocellin, Sandro Macchietto, Giuseppe Maschio

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Risk assessment in a hypothetical network pipeline in UK transporting Carbon Dioxide

Authors :

Chiara Vianello[a], Paolo Mocellin[a], Sandro Macchietto[b], Giuseppe Maschio[a *]

[a] Dipartimento di Ingegneria Industriale, University of Padova, Via F. Marzolo, 9 - 35131 Padova, Italy

[b] Department of Chemical Engineering, Imperial College London, South Kensington Campus, London SW 7 2AZ, UK

*Corresponding author: giuseppe.maschio@unipd.it

Abstract

With the advent of Carbon Capture and Storage technology (CCS) the scale and extent of its handling is set to increase. Carbon dioxide (CO_2) capture plants are expected to be situated near to power plants and other large industrial sources. Afterward CO_2 is to be transported to storage site using one or a combination of transport media: truck, train, ship or pipeline. Transport by pipeline is considered the preferred option for large quantities of CO_2 over long distances. The hazard connected with this kind of transportation can be considered an emerging risk and is the subject of this paper.

The paper describes the Quantitative Risk Assessment of a hypothetical network pipeline located in UK, in particular the study of consequences due to a CO_2 release from pipeline.

The risk analysis highlighted that some sections of pipeline network cross densely populated areas. For this reason, some changes in the original path of the network have been proposed in order to achieve a significant reduction in the societal risk.

1. Introduction

The Carbon Capture and Storage (CCS) of CO_2 in geological reservoirs is now considered to be on the most promising solutions to control greenhouse gas emissions (Gough et al., 2014) with a commercial deployment during the 2020s.

The CCS chain involves three stages: the capture of the CO_2 from large stationary sources, its transmission to the storage site and finally the injection into the geological reservoir.

Currently there are over 6,500 km of CCS pipelines mainly located in North – America, Australia, Europe and Africa (Kadnar, 2008; Noothout et al., 2014; Sweatman et al., 2009) and are actually used to transport the CO_2 (in dense or gaseous phase) from power and large industrial plants to storage sites both on- and off- shore. However extensive networks of CO_2 pipelines, especially in