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

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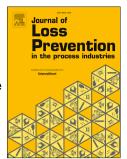
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ACCEPTED MANUSCRIPT

1 Risk assessment in a hypothetical network pipeline in UK

2 transporting Carbon Dioxide

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11 Abstract

- With the advent of Carbon Capture and Storage technology (CCS) the scale and extent of its
- handling is set to increase. Carbon dioxide (CO₂) capture plants are expected to be situated near to
- power plants and other large industrial sources. Afterward CO₂ is to be transported to storage site
- using one or a combination of transport media: truck, train, ship or pipeline. Transport by pipeline is
- 16 considered the preferred option for large quantities of CO₂ over long distances. The hazard
- 17 connected with this kind of transportation can be considered an emerging risk and is the subject of
- this paper.
- 19 The paper describes the Quantitative Risk Assessment of a hypothetical network pipeline located in
- 20 UK, in particular the study of consequences due to a CO₂ release from pipeline.
- 21 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.

24 1. Introduction

- 25 The Carbon Capture and Storage (CCS) of CO₂ in geological reservoirs is now considered to be on
- 26 the most promising solutions to control greenhouse gas emissions (Gough et al., 2014) with a
- 27 commercial deployment during the 2020s.
- 28 The CCS chain involves three stages: the capture of the CO₂ from large stationary sources, its
- transmission to the storage site and finally the injection into the geological reservoir.
- 30 Currently there are over 6,500 km of CCS pipelines mainly located in North America, Australia,
- 31 Europe and Africa (Kadnar, 2008; Noothout et al., 2014; Sweatman et al., 2009) and are actually
- 32 used to transport the CO₂ (in dense or gaseous phase) from power and large industrial plants to
- 33 storage sites both on- and off- shore. However extensive networks of CO₂ pipelines, especially in

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