



**21th International Conference on
Harmonisation within Atmospheric Dispersion Modelling
for Regulatory Purposes
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SHORT ABSTRACT

Phast modelling of the Desert Tortoise and FLADIS ammonia trials for the Jack Rabbit III model inter-comparison exercise

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Abstract text (*maximum 350 words.*)

As part of the Jack Rabbit III project, an international model inter-comparison exercise is currently being conducted where a number of dispersion modelling groups around the world are all simulating the Desert Tortoise and FLADIS ammonia trials. The objective of this work is to understand the strengths and weaknesses of models that may be used to design the forthcoming JR III ammonia experiments, scheduled for 2023 – 2024.

This paper presents the dispersion modelling undertaken by three groups for the exercise: HSE, DNV and Syngenta, who are all using the DNV Phast dispersion model.

The initial results presented from each of the groups are all based on the same experimental input data, but the methods used to derive the dispersion results are all developed independently. This exercise aims to highlight the different ways in which modellers can apply Phast to the same scenarios and the subsequent impact the choice of method has on the overall dispersion results. All three sets of results are then plotted against the experimental data to see how each method performs. This includes a discussion of uncertainties in the experimental data and the model input conditions.

The next step involves collaboration to determine if aspects of the methods, inputs and perhaps Phast default values can be refined in an appropriate way to produce a better comparison against the experimental results. Following this, the group has examined some of the sensitivities in the experimental set-up that can affect the modelling results such as atmospheric stability and humidity.

The overall aim is to develop the optimal way in which Phast can be used to model ammonia releases for future JR III work.



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Motivation*

The scope of this conference is harmonization of atmospheric dispersion modelling for regulatory purposes. PHAST is widely used in the process safety industry for regulatory risk assessments, where it is used to predict the hazard ranges resulting from atmospheric releases of toxic and flammable substances. The first motivation for presenting this paper at the conference is to examine how the three expert groups at HSE, DNV and Syngenta, working independently of each other, approached the PHAST simulations for the Desert Tortoise and FLADIS trials. After the three groups produced their initial (independent) results, they worked together to understand the differences and harmonize the model predictions. It therefore provides a useful case study. A second reason for presenting this paper is that ammonia is seen as a promising future energy vector, which in years to come could be shipped across the world in much the same way that Liquefied Natural Gas (LNG) is currently transported. It is important therefore to understand the risks associated with atmospheric dispersion of ammonia and hence the interest in understanding how a widely-used model like PHAST performs against field-scale experimental data from the Desert Tortoise and FLADIS trials.

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