

### Summary of results from the Jack Rabbit III international model inter-comparison exercise on Desert Tortoise and FLADIS

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**Abstract:** DHS S&T CSAC and DTRA are currently planning a series of experiments involving large-scale releases of anhydrous ammonia in 2024 and 2025, known as the Jack Rabbit III trials (JRIII). The aim of the project is to address gaps in modeling methodologies and emergency response procedures. To support the project, an international model inter-comparison exercise was initiated in 2021 to evaluate the performance of atmospheric dispersion models using data from the Desert Tortoise and FLADIS trials. The objective of the collaborative modeling exercise was to understand the capabilities and limitations of models that could be used to design the new JRIII trials (e.g., suitable sensor placement). Dispersion modeling teams from around the world were invited to participate on a voluntary basis. The exercise followed a similar successful model inter-comparison exercise conducted in 2019-20 on the Jack Rabbit II chlorine dispersion dataset. The coordinators of the JRIII inter-comparison exercise provided a set of model inputs for the participants to use and requested model predictions to be provided to them in a standardized format. Twenty independent modeling teams from North America and Europe provided results using a range of different models (i.e., empirically-based nomograms, integral, Gaussian puff, and computational fluid dynamics models). The agreement between model predictions and measurements varied considerably between different models. Given appropriate inputs, most models generally predicted concentrations that agreed well with the data. Useful insights were gained through discussions between participants involved in the exercise.