Computational Fluid Dynamics (CFD) and Stochastic Lagrangian Particle Dispersion Models (LPDM) applied to the modeling of transport and dispersion of accidental or malevolent releases of ammonia to the atmosphere.

Jacques Moussafir and Armand Albergel

ARIA Technologies SA

8-10 Rue de la Ferme, Boulogne-Billancourt, France
(Office: +33 (0)1 46 08 68 60 - Cell: +33 (0)6 07 75 71 25 - jmoussafir@aria.fr)

Atmospheric Transport and Dispersion (ATD) models applied to the simulation of accidental or malevolent releases of ammonia to the atmosphere include a variety of solutions, ranging from simple and very quick integral or Gaussian models, up to complete Computational Fluid Dynamics (CFD) tools, which may require larger computer resources and more detailed input data. However, the range of application cases for CFD models and Stochastic Lagrangian Particle Dispersion models (LPDM) is now broadening with the exponential increase of computing power available at a given cost, and the more general use of High Performance Computer (HPC) platforms available in the Cloud.

The present paper shows the application of advanced 3D models (CFD and LPDM) to the simulation of atmospheric dispersion of ammonia releases, with a specific focus on the effect of containment devices, buildings, topography which these advanced tools allow to model, in combination with the basic physical effects (buoyancy, chemical reactions, evaporation and condensation, deposition) which have been presented in other papers in this conference.

This paper presents examples of application of advanced CFD (Code_Saturne, EDF) and LPDM (PMSS, ARIA Technologies & CEA) modeling to some ammonia field experiment data (e.g. FLADIS) as well as to a recent simulation of potential releases from a large ammonia tank located in the harbor of Haifa, providing estimation for areas of damage.