

THREAT AGENT DEFEAT MODELING AND TESTING

Ensemble Behavior Of Passive, Time-limited, Area Source Releases In A Wind Tunnel Study

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A series of experiments were conducted at the Chemical Hazards Research Center ultra-low speed wind tunnel facility to study the ensemble behavior of time-limited, area source releases of a passive gas. Concentration time histories were measured at multiple downwind distances in repeated experiments of sufficient number to produce ensemble behavior. The time histories were averaged as a function of time across repeated releases to study the transient time history of the ensemble. Experiments of different release duration were compared to better understand how time limited releases disperse in the atmosphere, particularly considering how the time-limited releases approach the steady behavior of a continuous plume (long duration) or an instantaneous puff (short duration). This comparison highlighted how traditional approaches to interpreting field experiments of puff releases could be misleading, particularly with regard to near-field behavior. Constant release rates were used in the experiments, and the process of promptly starting and stopping releases produced repeatable experiments that enabled the ensemble behavior to be studied. This work has application to the understanding of field experiments as well as guidance on the dispersion modeling of time-limited releases and cloud concentration intermittency.

This project was partially supported by DNV GL Software and the National Institute for Public Health and the Environment in The Netherlands (RIVM), and their support and guidance is appreciated. Dr. Audrey Feuvier, Dr. James Arthur, and Dr. Chad Smith provided assistance throughout the project. Paulo Victor De Freitas Lopes implemented the 3D LDV measurement system. Also, many undergraduate students were important in the conduct of the wind tunnel testing.