



**MARY KAY O'CONNOR  
PROCESS SAFETY CENTER**  
TEXAS A&M ENGINEERING EXPERIMENT STATION

---

20<sup>th</sup> Annual International Symposium  
October 24-26, 2017 • College Station, Texas

---

**Transient Large-Scale Chlorine Releases in the Jack Rabbit II Field Tests:  
Rainout Source Data Analysis from Video Records**

Tom Spicer (1) and Audrey Feuvrier  
*Ralph E. Martin Department of Chemical Engineering  
University of Arkansas, Fayetteville, AR*

Shannon B. Fox  
*Department of Homeland Security, Science & Technology  
Chemical Security Analysis Center, Aberdeen Proving Ground, MD*

**Abstract**

Sponsored by the Chemical Security Analysis Center (CSAC) of the U.S. Department of Homeland Security, the Defense Threat Reduction Agency (DTRA) of the U.S. Department of Defense, Transport Canada, and Defence Research and Development Canada (DRDC), the Jack Rabbit II tests were designed to release liquid chlorine at ambient temperature in quantities of 5 to 20 T for the purpose of quantifying the behavior and hazards of catastrophic chlorine releases at scales represented by rail and truck transport vessels. In 2015, five successful field trials were conducted in which chlorine was released in quantities of 5 to 10 tons through a 6-inch circular breach in the tank and directed vertically downward at 1 m elevation over a concrete pad. In 2016, three additional trials were conducted with releases of 10 tons also through 6-inch circular breaches at different release orientations. A final 20 ton test was conducted in 2016. Data from the test program is being made available. This paper summarizes an analysis of the available data from the concrete pad including analysis of the temperature measurements below and above grade in the concrete pad. Assessment of the chlorine rainout is estimated based on temperature measurements and available video data analysis.

(1) Corresponding author: [tos@uark.edu](mailto:tos@uark.edu); +1.479.575.6516