

## Jack Rabbit II Program—Chemical Security Analysis Center

### A team of partners will conduct a series of large-scale release trials to address information gaps

The Department of Homeland Security (DHS) Chemical Security Analysis Center (CSAC) is leading the Jack Rabbit II project, a 4-year program that began in late 2013 for which a series of large-scale outdoor chlorine release trials will be conducted with a collaborative team of partners from government, industry and academia. Field trials and follow-on studies will fill critical knowledge, data and capability gaps for toxic inhalation hazard (TIH) chemical release modeling and emergency response procedures, which have never been experimentally tested or validated at scales represented by rail car, tanker truck, barge or storage tank release scenarios.

### Trial results will provide an understanding of behavior and consequences of large-scale chemical releases

DHS and other agencies must better understand behavior and consequences of large-scale TIH chemical releases.

- Chlorine other TIHs are essential to modern life
- Hundreds of millions of tons are transported every year by road, water, rail
- TIHs are heavily transported in bulk through High-Threat Urban Areas
- A chemical in transport is at risk of being released via accident or intentionally, especially for pressurized, liquefied toxic gases such as chlorine and ammonia

### Project goals support improvements to how DHS and its partners address the TIH risk

Building on the success of the 2010 Jack Rabbit I chlorine and ammonia trials, project goals will enable:

- Improved chemical hazard modeling
- Better planning and resilience for release incidents
- More efficient and effective emergency response
- Improved mitigation measures to reduce the impact to affected populations and infrastructure
- Improved HazMat training and safety

### The project will follow an experimental approach

- Outdoor chlorine release trials ranging from 5 to 16 tons, utilizing relevant release mechanisms and rates
- Mock urban test bed to investigate chlorine behavior with buildings, infrastructure, infiltration and shelter-in-place procedures
- Deployment of stand-off and point sensors and instrumentation from the release site to 7+ miles for concentration



Chlorine release, 2010 Jack Rabbit I Program

Key Customers: DHS, DOD, DOT, EPA, FBI, HHS and private-sector stakeholders in the chemical, rail, highway, and shipping industries

and behavior measurement

- Deployed equipment, materials and surfaces (i.e. soil, vegetation, electronics) for exposure assessments

### Project objectives were established to maximize achievement of project goals.

- Conduct chlorine release trials up to 16 tons, with a release mechanism engineered to mimic accidental and intentional release conditions
- Collect data on chemical release source terms to characterize mass flux, pooling, rainout and impingement effects
- Experimentally determine downwind concentrations to 7+ miles for atmospheric transport and dispersion (AT&D) studies and validation of emergency response procedures
- Conduct experimental studies of chlorine reactivity and deposition as a cloud removal mechanism, to include reactions with soil, vegetation, photolysis and other surfaces

### Impacts to the project will include the following:

- Experimentally defined and validated large-quantity source terms
- Quantitatively developed downwind protective action distances
- Definitive, validated input for AT&D model revisions
- Invaluable data and information for improved HazMat training and safety

### Opportunities exist for partners and collaborators

CSAC is currently seeking additional partners and collaborators for the Jack Rabbit II project. Please contact CSAC for further information.

