

Threat Agent Science Capability Area CBIS 2007

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Agent Fate enhances predictive tools with data, quantifying the fate of chemical agents within operationally significant climates and surfaces.

International Partners: CZ, POL, NLD, UK, and SGP

Wind Tunnel Testing

Measures evaporation of agent from surface at realistic climactic conditions. Main data input stream for predictive models

Uses combinations of vapor sampling & gravimetric analysis



Outdoor Testing

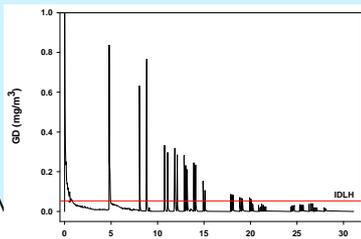
Validates model developed with wind tunnels data

Provides “ground truth” of behavior in environment

Agent/Substrate Interactions

Agent/Substrate interactions are critical component to determinations of fate.

Studies use highest fidelity methods including NMR, SPME, vapor resurgence, extractions quantitative imaging and fundamental property measurements



FM 3-4	
Liquid	Vapor
Not Avail	7 - 20+
Not Avail	20+
Not Avail	18 - 20+

FM 3-9	
Liquid	Vapor
Not Avail	5 - 48
Not Avail	6 - 168
Not Avail	1800 - 3600



Modeling

Improves hazard prediction tool accuracy

Transitions information to warfighter in a usable format.



Physiological Effects

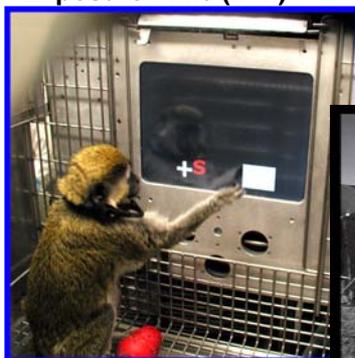
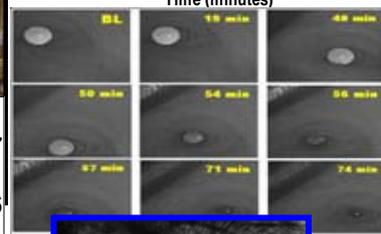
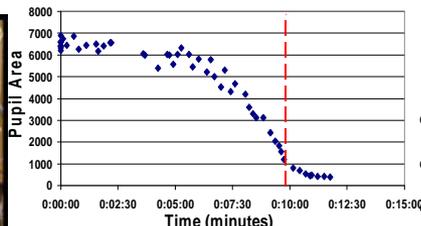
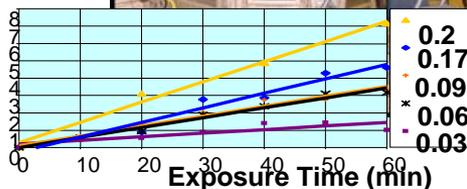
CWA Operational Exposure Hazard Assessment Research



Purpose and Goal: Operationally-relevant health effects of exposure to the class of chemical warfare agents (CWAs) to include those termed “Non-Traditional Agents (NTAs)”.

Exposure Studies

- Inhalation dose-response
- Percutaneous contact



Integration Studies

- Route Extrapolation
- Human effects
- Mission/Hazard Profiling

PAYOFFS

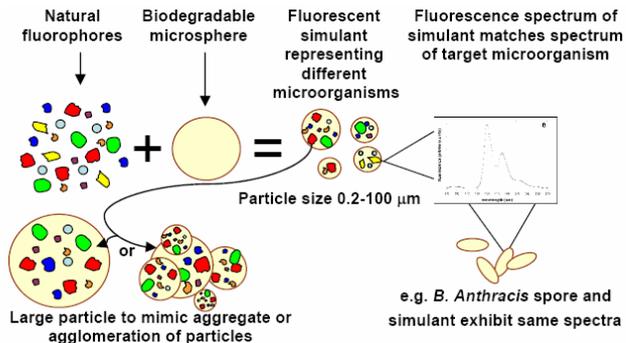
- Operational Requirements and Standards
 - JPID
 - FM 3-11.9
 - AFMAN 1026-02
- Operability Modeling
 - JEM/JOEF
 - Agent Fate Link
- Reachback Expertise

Health Effects

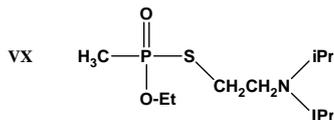
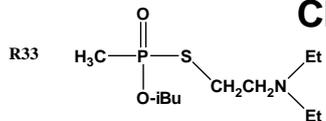
- Sub-Clinical effect
- Delayed/Persistent Toxicity
- Repeated exposures



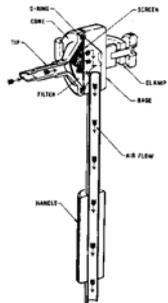
Agent Characterization/ Simulant Development



ECBC



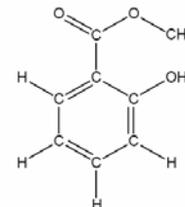
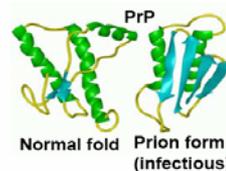
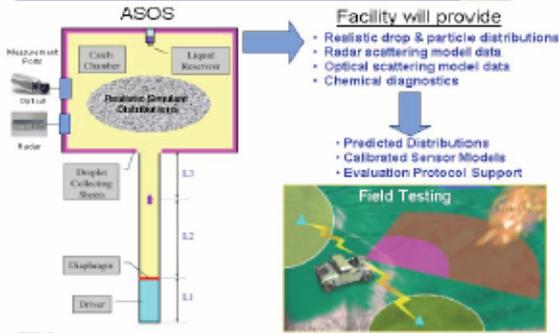
Agent Characterization



Simulant Development

T&E Protocol Development

Our new ASOS facility can provide realistic drop distributions and calibration of sensor models



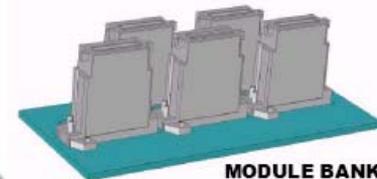
Methyl Salicylate



3.8%PSBMA/TBP, We=10199, d=3.7mm, 29470fps

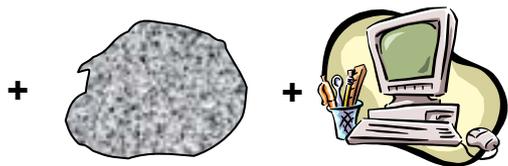


COTS 512-ELEMENT INKJET ARRAY MODULE





Computational Chemistry provides fundamental understanding



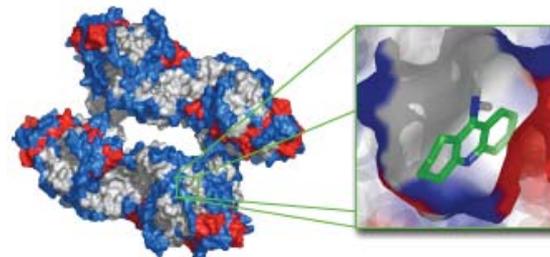
CWA

solid adsorbent

quantum-chemical modeling

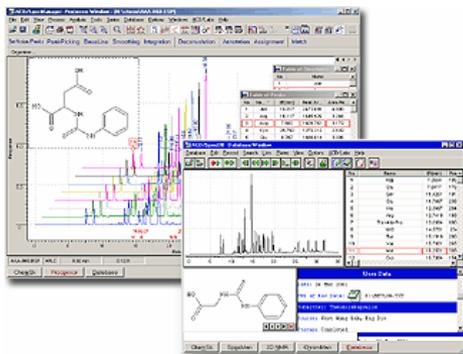
Intelligent Design of Materials & Simulants

- interaction parameters
- chemical properties
- environmental stability

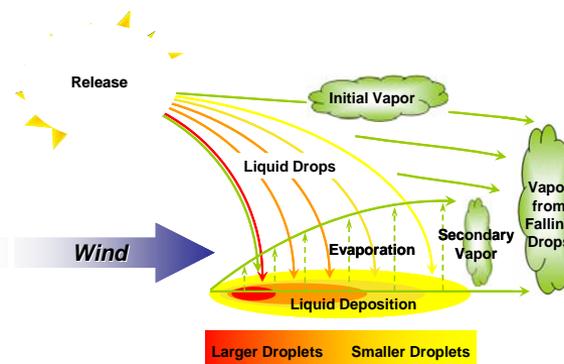


Tetramer of human acetylcholinesterase

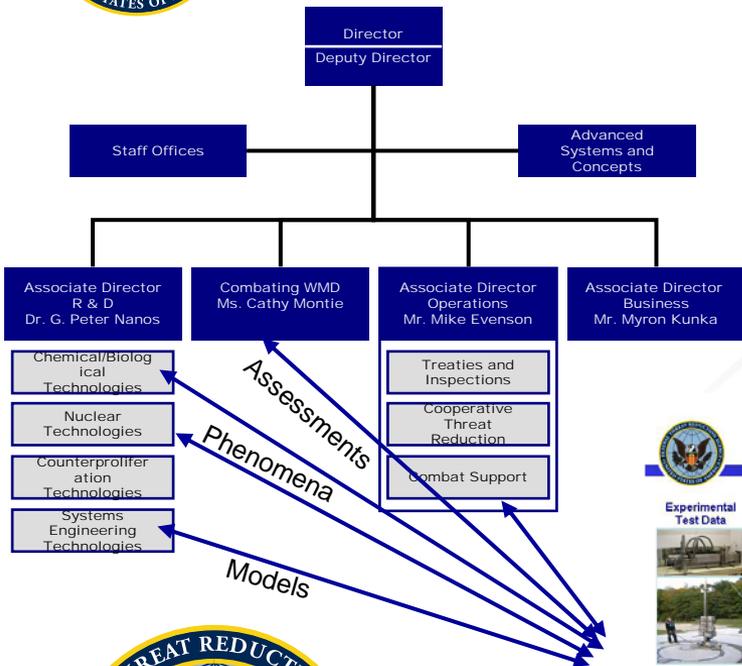
Tacrine bound in one active site of acetylcholinesterase



In-silico simulant selection For CWA T&E



We provide data, models, and reachback expertise coordinated across the community



OSD Policy



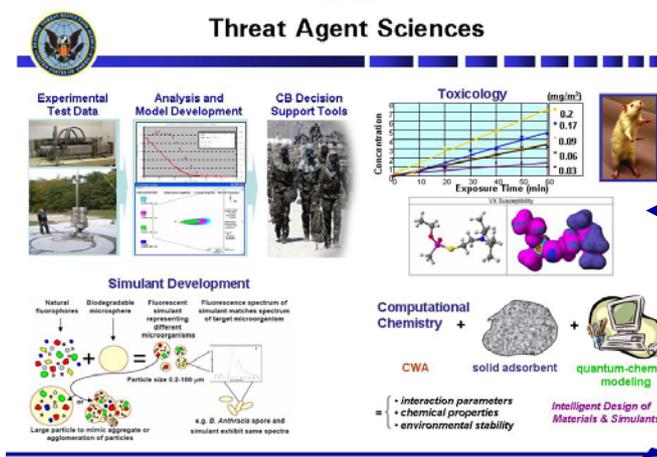
Combatant Commands



Data, Assessments, SME

Data, Assessments, SME

Threat Agent Sciences



UNCLASSIFIED



Data, Assessments, SME

Services

Coordination

DHS

