CHEMICAL, BIOLOGICAL, RADIOLOGICAL AND NUCLEAR (CBRN) SERVICES

Supporting warfighters with **technical services, operational models, databases and risk assessment tools** to combat CBRN threats

SRC is helping to keep warfighters safe from chemical, biological, radiological and nuclear (CBRN) threats, leveraging years of experience developing models, databases and performing environmental fate determinations to assess potential threats to our nation's warfighters and first responders.

Since the 1990s, SRC has been performing chemical, biological, and radiological threat assessments for many U.S. government organizations including the Defense Threat Reduction Agency (DTRA), Department of Homeland Security (DHS), National Center for Medical Intelligence (NCMI), Federal Bureau of Investigation (FBI) and the intelligence community (IC). SRC's modeling and simulation, agent fate threat assessments, cheminformatics, QSAR/QSPR development, and software development and integration capabilities are helping our customers analyze and counter the threat posed by weapons of mass destruction.

Our combined staff has an extensive understanding of CBRN behavior in the environment, strong software engineering/information technology expertise, and a great appreciation for our customers' needs. We apply our understanding of chemical behavior to develop, refine, validate, deploy, and use predictive computational tools to help prepare for and mitigate the risks of CBRN threats.

The models, predictions, data and tools we create assist battlefield planners, consequence management and warfighters as they address challenging problems in CBRN defense.

FOCUS AREAS

SRC provides support services on a wide range of activities associated with combating CBRN threats:

- Modeling and simulation
- Agent fate assessment
- Cheminformatics
- QSAR and QSPR development
- Software development and integration

SRC'S SCIENTISTS AND ENGINEERS DEVELOP AND DEPLOY CBRN MODELS AND DATA TO HELP KEEP OUR WARFIGHTERS SAFE

RECENT PROJECT HIGHLIGHTS

CLEARR

SRC is working with DTRA to develop the Combined Logical Estimation Application for Rapid Results software application (CLEARR). CLEARR is an insilico Quantitative Structure Activity Relationship/Quantitative Structure Property Relationship (QSAR/QSPR) predictive tool that provides rapid and comprehensive risk, exposure and hazard assessments using only the chemical structure of an substance.

DREAM

SRC also collaborated with DTRA to help develop, validate, and deploy the Droplet Reaction and Evaporation of Agents Model (DREAM). DREAM is a software component that predicts secondary evaporation

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and environmental fate of sessile, multicomponent chemical droplets dispersed onto a substrate in an outdoor environment over time. The model is integrated into the Hazard Prediction and Assessment Capability (HPAC) and Joint Effects Model (JEM) operational tools.

CTL

SRC has developed, in collaboration with the NCMI, a chemical and radiological threat database and hazard assessment web application known as the Chemical Threat Library (CTL). The database contains over 97,000 unique chemicals (toxic industrial chemicals (TICs), pesticides, drugs, chemical warfare agents (CWAs) and radionuclides) and provides a scoring system to communicate health effects and exposure potential for each threat.

CHIPs

SRC developed the Chemical Hazards of Industrial Processes (CHIPs) tool for the NCMI. The CHIPs tool provides a large repository of Wiki pages assessing health hazards and exposure risks to military personnel operating in the vicinity of industrial facilities.

CARD

SRC serves as a subcontractor to Battelle Memorial Institute in the performance of Contract No. FA8075-14-D-0003, DO No. FA807517F1402 with the Department of Homeland Security. Under that contract, SRC played a role in developing a Chemical Agents Reactions Database (CARD), which is a searchable database of chemical structures/substructures that contains key reaction pathways of selected chemicals, including their toxicological endpoints and physicochemical properties.

SERVICES

- Modeling and Simulation
  - HPAC plume modeling
  - Chemical transport and fate analysis
- Agent Fate
  - Atmospheric chemistry
  - Surface chemistry
  - Mass transport and persistence
- Cheminformatics
  - Chemical threat databases
  - Chemical synthesis databases
  - Toxicological and chemical knowledge tools
- QSAR and QSPR Development
  - Agent property estimation
  - Algorithm development
  - Artificial intelligence/machine learning (AI/ML) algorithms
- Software Development and Integration
  - Algorithm design and programming
  - Application programming interface (API), graphical user interface (GUI) and app development
  - Common CBRN modeling interface (CCMI) developent and implementation

800-724-0451 • inquiries@srcinc.com • www.srcinc.com

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