Chemical Security Analysis Center Chemical Consequence and Threat Desktop Tool

Homeland Security
Science and Technology

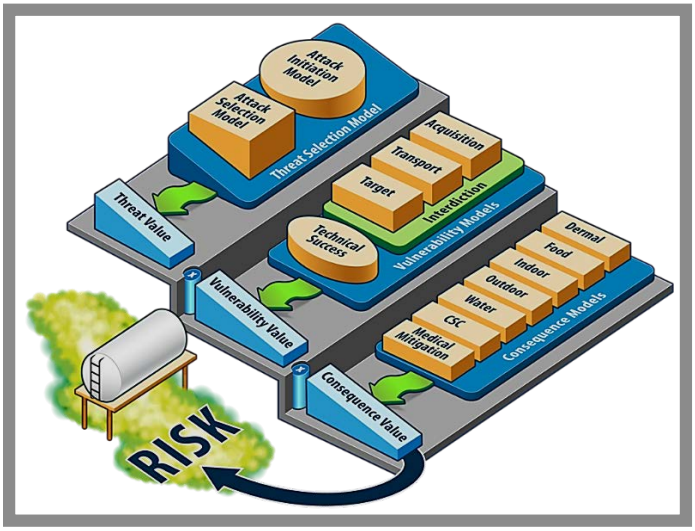
The Homeland Security Presidential Directive-22 (HSPD-22), Domestic Chemical Defense, requires an analysis of Chemical Terrorism as a critical element of the nation's domestic chemical defense policy. The Department of Homeland Security Science and Technology Directorate Chemical Security Analysis Center (CSAC) developed a suite of models to identify, assess and prioritize the threat, vulnerability and consequences of a chemical attack against the U.S. homeland. As part of this program, the consequence and medical mitigation modules have been incorporated into a fast-running classified desktop tool (The Tool), which allows the user to evaluate the severity of an event and the impact of various response and mitigation strategies. The Tool allows the user to select from a library of 184 chemicals for release in 37 representative targets from six main categories (indoor, outdoor and chemical supply chain, food and water contamination and dermal contact hazards). These chemicals include:

- toxic industrial chemicals
- pharmaceuticals
- pesticides
- chemical warfare agents
- emerging threats.

The Tool will calculate life-threatening, severe and mild injuries from the event. The current response capability is also included through a stock-and-flow medical mitigation model, which calculates the ability to respond and considers material and personnel resource limitations and time delays from the point of exposure throughout the delivery of care. The models will also include the impact of detection and response strategies such as evacuation, shelter-in-place or food recall orders.

The Tool modules are based on established software and datasets such as Hazard Prediction and Analysis Capability (HPAC), Homeland Security Infrastructure Program (HSIP Gold), National Climactic Data Center Integrated Surface Hourly dataset as well as custom models for indoor inhalation exposures, food, water, dermal contamination and the medical response model.

The Chemical Consequence and Threat (CCAT) module is now part of an all-Hazards CAPT WEB program, which offers a consistent modeling platform to assess the impact from chemical, biological or radiological materials.



Chemical Hazard Characterization

The consequence modules are written in C++ and hosted on a virtual server from a stand-alone computer.

The CCAT desktop Tool provides:

- Models for Consequence in Chemical Hazard Characterization
- Flexible and fast analysis tool; millisecond run time per simulation
- Probabilistic approach; Monte-Carlo sampling from key parameter distributions
- Embedded statistics and drag-and-drop graphics
- Advanced analytics and time-resolved output for single simulations to explore details of an outlier
- Evaluates sensitivity of key variables to focus follow-up studies on impactful parameters
- Results exportable to Excel

Future Plans:

- Build additional tools to address the Threat Value and Vulnerability Value in Chemical Hazard Characterization

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