

BACKGROUND

Established in 2006, the Department of Homeland Security (DHS) Science and Technology Directorate (S&T) Chemical Security Analysis Center (CSAC) is the nation's only federal studies, analysis, and knowledge management center for assessing the threats and hazards associated with an accidental or intentional large-scale chemical event or chemical terrorism event in the United States. In December 2022, President Biden signed the National Defense Authorization Act (NDAA) for Fiscal Year 2023 into law, marking a significant milestone in the nation's commitment to comprehensively address chemical security threats. The NDAA included provisions granting full legislative authorization to CSAC by amending the Homeland Security Act of 2002 to add SEC. 323.

Located on the Edgewood Area of Aberdeen Proving Ground (APG), Maryland, CSAC fosters research collaborations with the U.S. Army Combat Capabilities Development Command Chemical Biological Center (DEVCOM CBC); Department of Defense Joint Program Executive Office for Chemical, Biological, Radiological, and Nuclear Defense; the U.S. Army Medical Research Institute for Chemical Defense; and the U.S. Army Public Health Center.

MISSION

CSAC assesses and addresses chemical threats to the homeland by:

- Collecting, consolidating, curating, storing, and sharing chemical data.
- Generating meaningful assessments, recommendations, and forecasts based on vetted data.
- Identifying, prioritizing, and addressing data gaps through high quality chemical research, development, test, and evaluation.

EXPERTISE

CSAC provides an enduring, science-based threat and hazard analysis capability, with a core focus on six areas of expertise.

- **Risk and Consequence Modeling:** The Chemical Consequence and Threat (CCAT) Tool, which is part of S&T's All Hazards Countermeasure Assessment and Planning Tool (CAPT Web), calculates the lethal and sub-

lethal consequences of a chemical release in indoor and outdoor spaces, in food and water, and due to surface contamination. It also identifies bottlenecks and resource constraints that impact first responders' ability to deliver care and save lives during a chemical event.

- **Chemical Sensors and Detection:** Chemical detection experts conduct analysis and assessment of chemical warfare agents and toxic industrial chemicals for development and deployment of chemical detection and surveillance capabilities. They assess existing, modifiable, or developmental technology solutions and, in collaboration with other government agencies, assist S&T in developing new and advanced chemical detection approaches.
- **Analytical Chemistry:** CSAC employed world-renowned expertise to develop a Synthetic Opioid Data Repository for fentanyl and 200 synthetic analogs and to observe trends over time to determine how chemical defense-related areas of concern increase and decrease.



In July 2022, CSAC stood up the Chemical Security Laboratory (CSL) in partnership with the U.S. Army DEVCOM CBC at APG, MD. The CSL partnership leverages Army expertise in the areas of chemical defense, chemical threat agents, and toxic industrial chemicals. This vital capability is used to validate scientific data and produce findings that are essential to national readiness.

- **Chemical Toxicology:** Experts investigate, analyze, and determine toxicity parameters to characterize short- and long-term health effects from acute lethal and sub-lethal exposures to toxic chemicals, including chemical warfare agents, toxic industrial chemicals, and pharmaceutical-based agents. CSAC partners with the Army, American College of Toxicology, Centers for Disease Control and

Prevention, National Institute for Occupational Safety and Health, and industry in these efforts.

- **Synthetic Chemistry and Reaction Characterization:** CSAC updates the Chemical Agents Reactions Database (CARD) semi-annually. The CARD contains extensive toxic chemical synthesis and properties data sets, including emerging threat compounds. Featuring more than 2,000 chemical reactions, it provides accurate, comprehensive, and actionable data for chemical threat forensics and attribution.
- **Non-Traditional Agents (NTA) and Emerging Chemical Threats:** CSAC maintains and operates the U.S. government's largest NTA library, featuring 121 information fields for more than 700 references related to the toxicity, chemical, and physical properties, and countermeasures for these toxic chemicals. This library informs CSAC products and capabilities, including the CAPT Web/CCAT, CARD, 24/7 technical assistance program, and chemical release studies.

IMPACT

CSAC serves the Homeland Security Enterprise and its stakeholders by staffing and operating a technical assistance program that provides operational support and subject matter expertise 24/7. CSAC's impact in this program includes designing and executing laboratory and field tests and providing a comprehensive knowledge repository of chemical threat information that is synthesized and updated with data from scientific, intelligence, operational, and private-sector sources.

CSAC empowers relevant DHS components, federal agencies, state and local partners, academia, and private entities with actionable risk assessments, threat characterizations, and scientific insights. CSAC's partners use these analyses to shape their planning and decision-making, strengthening the overall security of the homeland.

- **Chemical Current Events:** CSAC is the chemical S&T advisor to DHS for Chemical Current Events providing timely information to Department leadership, including the train derailment and vinyl chloride fire in East Palestine, Ohio in February 2023.

- **Strategic International Engagements:** CSAC supports bilateral work with the UK through the Counter-terrorism Technical Oversight Group (CTTOG), focusing on aviation security, specifically the detection of toxic industrial chemicals in aviation environments. In 2023, CSAC hosted two UK scientists from the Defence Science and Technology Laboratory to continue this collaboration.
- **Strategic Analysis of Opioids for the Intelligence Community:** In addition to playing a leading technical role in an international mail facility analysis with CBP in the DHS Synthetic Opioid Detection at Speed (SODAS) program, CSAC developed several knowledge products to serve as resources for detection and interdiction of illicit opioids:
 - Fentanyl Synthesis Quick Reference Guide
 - Nitazene Benzimidazole Opioid Synthesis Quick Reference Guide
 - Memorandum for Record 2.0: Illicit Drug Threats
 - Nitazene Synthesis and Reagents Bulletin
 - Master Question List for Synthetic Opioids
 - Memorandum for Record 2.1: Illicit Drug Threats
- **Providing Chemical Facility Risk Analysis During the 2023 Atlantic Hurricane Season:** CSAC provides local and regional chemical hazard and vulnerability information to inform federal, state, territorial, tribal, and local responders during every hurricane season. The 2023 Atlantic Hurricane Season included 19 named storms, six of which became hurricanes. Hurricane Idalia made landfall in the big bed region of Florida and three other storms also made landfall, tropical storm (TS) Harold in southern Texas, TS Lee in Maine, and extratropical cyclone Ophelia in North Carolina. CSAC identified the chemical facilities and infrastructure in the storms projected paths that store, produce, or transport large quantities of hazardous chemicals.

