

MITIGATION - SCIENCE AND TECHNOLOGY ADVANCES FOR CHEMICAL AND BIOLOGICAL HAZARD MITIGATION

Proximate Chemical Agent Detector (pcad) Testing At Desert Tempest 2024 For Vehicle Decontamination Assessment

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The Proximate Chemical Agent Detector (PCAD) is a standoff chemical detector capable of detecting chemicals from bulk amounts down to approximately 10 μg or 10 μL levels for solids and liquids. The system uses tunable quantum cascade lasers to illuminate a surface, and detects chemicals based on the infrared reflectance spectrum from that surface. The system can be operated at a distance of 0.5 to 5 m from the surface, at angles up to 45 degrees from perpendicular to the surface. At a distance of 1 m, a single spot covering an area of 2 cm^2 can be measured in 4 seconds, and the beam can be rastered to cover an area of 12 cm^2 in 30 seconds. An imaging detector is used, with a spatial resolution of 0.2 mm when measuring at 1 m distance. The PCAD has potential missions in contamination mapping for either decontamination or avoidance, reconnaissance, and hazardous materials assessment. Because it is based off of infrared spectroscopy, it is able to distinguish between a wide variety of chemicals, including chemical warfare agents, narcotics, and explosives. Additionally, the process of adding chemicals to the library is relatively straightforward, allowing new threats to be added quickly.

At the Desert Tempest 2024 event, a PCAD was used to scan vehicle surfaces. Painted metal, painted armor, painted canvas, plastic, glass, rubber, and other surfaces were scanned. Surfaces were scanned both unadulterated, after adulterating with a urea simulant, after coverage with CIDAS (Chemical Indicator Decontamination Assurance System), and after being cleaned off. Standoff distances from 1 – 4 meters were used for the measurements. The performance of the system and ability to distinguish between adulterated and unadulterated surfaces will be presented. The talk will end with lessons learned from the exercise and some ideas on how PCAD could be used for decontamination assurance.

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