

Aerosol and Vapor Chemical Agent Detector (AVCAD)

Executive Summary

- Due to the coronavirus (COVID-19) pandemic-related supply chain disruptions, the two Aerosol and Vapor Chemical Agent Detector (AVCAD) vendors were not able to conduct much of the planned shakeout testing prior to the contractual delivery dates for systems to support government testing. One of the two vendors was not able to deliver a sufficient number of systems to begin planned test events.
- Government testing to assess sensor detection performance, false alarm rate, the ability to operate in various environmental conditions, and cybersecurity began in August 2020.
- The AVCAD systems experienced reliability failures during false alarm testing that caused the program manager to stop testing and allow the vendors to fix reliability failures and design issues.
- Emerging results from detection performance testing indicate that both vendors' systems require additional development of their detection algorithms to meet detection requirements.

System

- AVCAD is a chemical warfare agent (CWA) and non-traditional agent (NTA) sensor that detects and identifies aerosol and vapor threats. AVCAD is designed to be man-portable or mounted aboard manned vehicles, rotary- and fixed-wing aircraft, and Navy ships. AVCAD was the Next Generation Chemical Detector Increment 1 program.
- AVCAD is designed to operate on battery or platform power and communicate with a remote alarm on closed restricted local area networks provided by the Services or the National Guard Bureau.
- The program is developing and testing two different systems during the engineering and manufacturing development phase of the program. The two systems are the Smiths



Chemring Sensors and Electronic Systems



Smiths Detection Incorporated

Detection Incorporated system, which uses high pressure mass spectrometry, and the Chemring Sensors and Electronic Systems, which uses differential mobility spectrometry.

Mission

Joint warfighters equipped with the AVCAD will employ the system to detect CWA and NTA in aerosol and vapor physical states, alert personnel in the event of a chemical attack, and support post attack reconnaissance, surveillance, and decontamination across the full range of military operations.

Major Contractors

- Smiths Detection Incorporated – Edgewood, Maryland
- Chemring Sensors and Electronic Systems – Charlotte, North Carolina

Activity

- Due to COVID-19-related supply chain disruptions, the two AVCAD vendors were not able to conduct planned shakeout testing prior to the contractual delivery dates for systems to support government testing. This led to the discovery of system deficiencies during government testing that may have been identified and addressed prior to the delivery of systems to the government. One of the two vendors was not able to deliver a sufficient number of systems to begin planned test events.
- The Combat Capabilities Development Command (CCDC) Chemical and Biological Center began developmental/operational Chemical Agent Chamber testing in mid-August at Aberdeen Proving Ground South in Edgewood, Maryland. Testing is scheduled to continue through May 2021.
- The CCDC Data and Analysis Center conducted a cooperative vulnerability and penetration assessment (CVPA) from August 3 – 14, 2020, at the Aberdeen Proving Ground South in accordance with the DOT&E-approved test plan.
- The Aberdeen Test Center conducted pilot testing for the developmental False Alarm Test in July 2020, in Baltimore, Maryland. Based on failures of both vendors' systems, the Program Office delayed the test to allow the vendors to fix reliability issues.
- Military Standard 810G and Electro-magnetic Environmental Effects developmental testing began at Dugway Proving Ground, Utah, and White Sands Missile Range, New Mexico, for one of the two vendors' systems in September 2020. The second vendor's systems will be inserted into the tests

upon delivery to the test sites and complete the remainder of the planned testing.

Assessment

- Agent Chamber testing identified performance shortcomings in both vendor systems that should be corrected and demonstrated prior to proceeding to the production and deployment phase of acquisition to meet the Service detection requirements.
- Reliability failures experienced by both vendors' systems during False Alarm Testing will require system design changes to meet the requirement to operate in world-wide environmental conditions.
- The CVPA identified cyber vulnerabilities in both vendor systems.

Recommendations

The AVCAD Program Manager should:

1. Consider shifting the test strategy for this phase of the program to a test-fix-test approach so that identified deficiencies are addressed to enable the test and evaluation of system performance in the full range of expected operational environments prior to progressing to the production and deployment acquisition phase.
2. Consider fully transitioning from the Common Chemical Biological Radiological Nuclear Sensor Interface (CCSI) protocol to the Integrated Sensor Architecture networking protocol to assist with resolution of vulnerabilities identified during the CVPA.