Joint Chemical Agent Detector (JCAD)

Executive Summary
- Initial developmental testing completed in FY05 indicates that the device may have adequate detection capabilities and tolerable false alarm rates. The device's false alarm rate in shipboard operations is not acceptable. Alternate detection schemes for the shipboard environment are being explored.
- The Joint Chemical Agent Detector's (JCAD) Test and Evaluation Master Plan has not yet been submitted to OSD for approval.

System
- JCAD is a device that automatically detects, identifies, and warns warfighters of the presence of nerve, blister, and blood chemical agents.
- The Increment 1 commercial off-the-shelf (COTS) hand-held device will operate as a stand-alone detector.
- The Increment 2 device is designed to detect extremely low levels of chemical agents, and will have a networking capability.
- The total quantity of Increment 1 systems is 60,000 detectors, with 6,000 low-rate initial production. The Joint Acquisition Objective for JCAD is 274,887 detectors.

Mission
- The warfighter equipped with JCAD will be alerted to the presence of chemical agent vapor hazards so that the operator and his chain of command can take protective measures to operate in a chemically-contaminated environment.
- JCAD will be issued to:
  - Army squads and Marine platoons
  - Air Force aircraft, base reconnaissance, and ground-service personnel
  - Navy ships and ashore installations
- JCAD will be employed in a wide variety of tasks, including personal detector, survey instrument, shipboard detector, aircraft interior detector, and fixed installation monitor.

Activity
- This program was rebaselined in 2003. The Single Acquisition Master Plan was approved in September 2005. Since this program was placed on oversight in 2000, the program has not submitted a Test and Evaluation Master Plan (TEMP) for OSD approval.
- Agent detection trials supported a downselect from four potential COTS candidates in FY05. Each system was exposed to a non-persistent nerve agent, a blister agent at room temperature, and moderate humidity in a specially-sealed chamber at Dugway Proving Ground, Utah.
- The tolerance of the selected COTS device to rigorous environmental conditions was determined during extensive developmental testing.

Assessment

Operational evaluation will rely on combined development and operational testing for determination of the device's ability to detect chemical agents. Combined development and operational testing will also relate detection performance against chemical agents to that of simulants, which will be used in field tests. Source selection developmental testing indicates the following:
- Based on 30 detection opportunities for each detector type at two different ambient relative humidities, the candidate device selected by the program manager detected the two challenge agents 100 percent of the time.
- In six different environments, the selected device averaged 105 hours between false alarms. This is below the requirement of 168 hours.
- The selected device demonstrated three hours between false alarms in a shipboard environment compared to the requirement of 168 hours.
- During developmental testing, the devices subjected to blowing rain failed the test. Initial engineering analysis suggests defective case seals.

Recommendations

1. JCAD testing should use weapons-grade, rather than chemically-pure, agents.
2. Investigate whether JCAD's detection capability degrades over time, as well as whether there is variability of detection performance among detectors.
3. Develop appropriate chemical agent simulants and correlate specific properties of these simulants to those of actual agents.
4. Use these simulants in field testing of the device to evaluate the response of the JCAD, its operators, and the operators' associated units to simulated chemical agent challenges.