

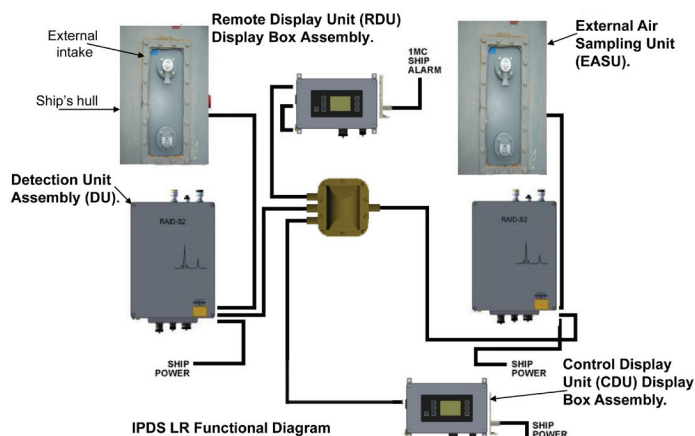
Improved (Chemical Agent) Point Detection System – Lifecycle Replacement (IPDS-LR)

Executive Summary

- The Navy completed FOT&E of the Improved (Chemical Agent) Point Detection System – Lifecycle Replacement (IPDS-LR) in September 2010.
- IPDS-LR was able to detect six of ten tested agents at concentrations associated with the onset of acute symptoms.
- The system meets key requirements for reliability, availability, and false alarms.
- DOT&E intends to publish a Beyond Low-Rate Initial Production (BLRIP) report in early FY11.

System

- The IPDS-LR is a ship-based Chemical Warfare Agent (CWA) detector that will serve as a form/fit/function replacement to the existing IPDS on all U.S. Naval ships. IPDS-LR is projected to be replaced by the Next Generation Chemical Point Detection System, still under development, in FY18.
- The commercially available detector unit is designed to automatically and simultaneously detect and identify CWA vapors by agent class (nerve, blister, and blood) within a specified concentration level and time period.
- The IPDS-LR CWA detection performance is measured against the requirements in the September 1994 IPDS Operational Requirements Document (ORD), the IPDS-LR Performance Specification, and the latest toxicological guidance provided by the U.S. Army Center for Health Promotion and Preventive Medicine (CHPPM).
- The IPDS-LR can be integrated into the Main Circuit (1MC) general shipboard announcing system in order to provide ship-wide alerts. The IPDS-LR shipboard system is composed of several components:
 - Two Detector Units (DUs). Located in the vicinity of each bridge wing, port and starboard side, the DU samples air for the presence of CWA vapors and provides an alert message to the display units.
 - Two External Air Sampling Units (EASU). Located near each DU, it draws in air from outside the ship, filters out particulates, and transfers that air to the DU for analysis. Exhaust from the DU exits the ship through the EASU.
 - One Control Display Unit (CDU). Located in Damage Control Central (DCC), it is the primary user interface



that provides the control functions, selects the state of the system, reports the system status, and provides audible and visual alarms upon detection.

- One Remote Display Unit (RDU). Located inside the bridge, it provides system status and alarm information to the ship's primary control station.

Mission

- The Navy intends to use the IPDS-LR to serve as a fixed-point detector to monitor external air for chemical weapon agents (CWA). The system is required to detect and alert ship personnel to the onset of CWA vapor hazards within one minute.
- Successful detection of a CWA at the required threshold concentration theoretically warns a ship of an imminent chemical attack and should provide sufficient time for the crew to seek shelter inside a collective protected zone or don personal protective equipment, including a filtered mask, before the concentration reaches a critical level.

Major Contractor

Bruker Detection Corporation – Billerica, Massachusetts

Activity

- The Navy completed the following Integrated Testing:
 - Chemical Weapons Agent (CWA) testing October 2009 to June 2010 at Edgewood Chemical and Biological Center, Edgewood, Maryland.

- False alarm testing October 2009 to July 2010 aboard the USS *Dwight D. Eisenhower* (CVN-69), USS *Nassau* (LHA-4), USS *Laboon* (DDG-58) and

NAVY PROGRAMS

USS *Whidbey Island* (LSD-41) in Norfolk, Virginia, and the USS *Princeton* (CG-59) in San Diego, California.

- Operational Service Life testing October 2009 to February 2010 in Key West, Florida.
- The Navy completed FOT&E in mid-September 2010 aboard USS *Oak Hill* (LSD-51) inport and underway from Norfolk against a simulant for Sulfur Mustard. FOT&E was conducted in accordance with the DOT&E approved test plan.
- DOT&E intends to publish a BLRIP report in early FY11.

Assessment

- During FOT&E, IPDS-LR detected all port and starboard simulant challenges. The ship's crew was able to recognize and manage system alarms and was capable of taking appropriate action.
- The system detected one of two whole ship challenges, where the simulant was placed a distance from the system EASU ports.
- IPDS-LR was able to detect and alert personnel in time to take protective measures for six of ten agents tested, with a 95 percent or better Probability of Detection at concentrations associated with the onset of acute symptoms.
 - One of the six agents detected caused IPDS-LR to induce overload protection at concentrations associated with severe health effects when the temperature was in excess

of 49 degrees Celsius. In overload, the system does not alarm.

- IPDS-LR demonstrated good detection probability for three of ten tested agents, with alarm times just above U.S. Army Center for Health Promotion and Preventative Medicine recommendations. The onset of critical health symptoms for these agents can be mitigated by reducing the amount of exposure time for topside personnel.
- The system Mean Time Between Operational Mission Failure was 3,055 hours, Mean Time Between False Alarms was 436 hours, and operational availability was 98 percent. These measures meet operational requirements.

Recommendations

- Status of Previous Recommendations. This is the first annual report for this program.
- FY10 Recommendations:
 1. Follow-on testing should include software updates that permit IPDS-LR to alarm when the system goes into overload protection.
 2. The currently fielded M88 Automatic Chemical Agent Detection Alarm should be considered by the Navy to supplement the IPDS-LR in the detection of the one agent that IPDS-LR has difficulty detecting.