

T-AKE *Lewis & Clark* Class of Auxiliary Dry Cargo Ships

The Dry Cargo and Ammunition Ship (T-AKE) is operationally effective and suitable under peacetime, benign conditions, but performance in a hostile environment and ability to withstand attempted intrusion or cope with actual intrusion into platform information technology systems is undetermined. Initial Operational Test and Evaluation (IOT&E) planning was adequate; IOT&E execution was not adequate because information assurance testing described in the DOT&E-approved IOT&E plan to determine vulnerability to network intrusion was not conducted. Live Fire Test and Evaluation (LFT&E) planning was adequate; LFT&E execution was also adequate but was limited in its ability to affect the ship's design.

System Overview

The primary mission of the Dry Cargo and Ammunition Ship (T-AKE) is to transfer ammunition, food, repair parts, ship store items, limited quantities of fuel, potable water, and other expendable supplies to fleet ships. A total of 11 ships of the class are being built for the U.S. Navy combat logistics force to replace the current ammunition and dry cargo replenishment capability of the T-AE (Ammunition) and T-AFS (Combat Stores) ship classes. T-AKE is a commercially designed and constructed U.S. Naval Fleet Auxiliary replenishment ship that meets American Bureau of Shipping standards and is certified by the U.S. Coast Guard. The ships are being built by the General Dynamics National Steel and Shipbuilding Company, and are designed to maintain a speed of 20 knots, to have an unrefueled range of 14,000 nm, and to be capable of transiting the Panama Canal. The operational concept for T-AKE is to serve as a shuttle ship or as a station ship and provide underway replenishment, both connected replenishment (CONREP) and vertical replenishment (VERTREP), to U.S. Navy and NATO forces at sea.

Test Adequacy

Operational testing of T-AKE was directed by an IOT&E test plan that included an integrated test approach and was approved by DOT&E for adequacy. Although the test planning was adequate, execution of the test was not adequate because the Navy did not conduct the planned operational testing of information assurance. As a result, the ship deployed with undetermined vulnerabilities to network intrusion that will remain unknown until information assurance testing is conducted and corrective measures, if required, are implemented. The integrated test approach was introduced in response to a fleet desire to reduce the duration of Post-Delivery Tests and Trials, and a desire to reduce projected testing costs. Although the approach streamlined T-AKE's schedule considerably, it may have been at the expense of information about the ship's capability to execute its mission.

Operational Effectiveness

T-AKE is operationally effective in conducting its primary mission under peacetime, benign conditions, but performance in a hostile environment and ability to withstand attempted intrusion into platform information technology systems is undetermined. T-AKE demonstrated capability to execute its primary mission of transferring supplies to the fleet. Operating in concert with an oiler (T-AO class ship), T-AKE should be capable of acting as a substitute station ship. The ship demonstrated replenishment rates that exceeded threshold rates for both connected and vertical replenishment. Cargo staging areas are of ample space and well designed for effective cargo handling and transfer. Other aspects of mission performance that were tested in accordance with the approved test plan demonstrated the required capability.

Operational Suitability

T-AKE is operationally suitable. A few areas of suitability were found to be deficient, including interoperability and documentation. The major deficiency in interoperability was the vibration and excessive flexing of the hangar doors caused by helicopter rotor downwash. This deficiency was corrected during the post shakedown availability period following the IOT&E. The documentation deficiencies should be correctable.

Survivability

Although issues of susceptibility to torpedoes and mines have not been resolved and despite the limitations expected as a result of using principally commercial construction techniques, the *Lewis and Clark* is a modern efficient supply ship with limited survivability attributes that exceed commercial requirements. Operating the ship with combatant escort in hostile environments will mitigate the risk associated with the absence of self-defense weapon systems. There remains an elevated

risk associated with an asymmetric threat while berthed or when entering and leaving port as a result of the ship's reduced survivability characteristics.

Recommendations

The Navy should:

- Promptly conduct follow-on OT&E to complete the test events required to evaluate information assurance as contained in the DOT&E-approved IOT&E plan. In particular, the Navy's operational test agency, Commander, Operational Test and Evaluation Force (COMOPTEVFOR) should operationally test and evaluate the information assurance controls for providing capabilities to protect, detect, react, and restore the Information Technology systems in the event of attempted or actual intrusion.
- Conduct follow-on OT&E to demonstrate correction of deficiencies found during IOT&E. For survivability determination, the ability of the AN/SLQ-25A (NIXIE) torpedo countermeasure system to reduce the ship's susceptibility to torpedoes should be tested and evaluated.
- Conduct follow-on OT&E to demonstrate effectiveness and suitability of the Shipboard Warehouse Management System.
- Promptly complete the infrastructure upgrade necessary for Advanced Degaussing System testing so that COMOPTEVFOR can conduct the deferred phase of that testing. Conduct this testing during follow-on OT&E.
- Complete research and development of an improved Heat Sensing Detector capable of meeting the Navy's functional requirements for protecting exposed cargo holds.
- Consider modifying the requirements for future ships constructed to commercial specifications by adding relatively minor requirements from Naval Vessel Rules to include improved Firemain System design, isolation and separation, improved Chilled Water System isolation, and improved compartmentalization.
- Reduce loss of electrical power vulnerability by increasing the load center separation and adding alternate power sources through Manual Bus Transfers for vital equipment loads.
- Incorporate lessons learned from this T-AKE program into future designs of the T-AKE such as the Maritime Prepositioning Force (Future) squadron.
- In collaboration with DOT&E, identify and implement the changes in scheduling and policy required to ensure that required operational testing is completed before ships are made available for deployment.