

LPD-17 *San Antonio* Class Amphibious Transport Dock

Executive Summary

- The Navy declared IOT&E complete in December 2008, almost two years after start of the first test period. The Navy deferred remaining IOT&E events to FOT&E because of ship and test resource availability.
- LPD-17 is capable of completing its principal primary mission of Amphibious Warfare, but will have difficulty defending itself against a variety of highly proliferated threats in multiple warfare areas.
- Chronic reliability problems associated with critical ship systems across the spectrum of mission areas reduces overall ship suitability and jeopardizes mission accomplishment. The Navy's Board of Inspection and Survey identified similar problems in all of the first four ships of the class.
- The LFT&E analyses of data to assess vulnerability and survivability of the LPD-17 class will continue into FY10. Emerging results from these trials indicate the ships could not demonstrate the required levels of survivability, largely because of critical ship system failures after weapons effects.
- DOT&E's Beyond Low-Rate Initial Production (BLRIP) report will recommend FOT&E to complete outstanding test events and address an extensive list of deficiencies.

System

LPD-17 is a diesel engine powered ship designed to embark, transport, and deploy ground troops and equipment. Ship-to-shore movement is provided by Landing Craft Air Cushion (LCAC), Landing Craft Utility (LCU), Amphibious Assault Vehicles (AAVs), MV-22 tiltrotor aircraft, or helicopters. Key ship features and systems include the following:

- A floodable well deck for LCAC, LCU, and AAV operations
- A flight deck and hangar to support various Navy and Marine Corps aircraft
- Command, Control, Communications, Computers, and Intelligence facilities and equipment to support Marine Corps Landing Force operations
- A Ship Self-Defense System (SSDS) Mark 2 Mod 2 with Cooperative Engagement Capability equipped with Rolling Airframe Missiles (RAM), the SLQ-32B (V)2 (with Mk 53 NULKA electronic decoys) passive electronic warfare system, and radars (SPQ-9B horizon search radar and SPS-48E long-range air search radar) to provide air warfare ship self-defense

Activity

- The Navy declared IOT&E complete in December 2008, despite seven outstanding events. Completed testing was in



- Two Mk 46 30 mm gun systems and smaller caliber weapons to provide defense against small surface threats
- The Shipboard Wide Area Network (SWAN) serves as the data backbone for all electronic systems. LPD-17 is one of the first ships built with a fully integrated data network system.

Mission

A Fleet Commander will employ LPD-17 class ships to conduct Amphibious Warfare. The ship will normally deploy with a notional three-ship Expeditionary Strike Group (ESG) but can operate independently. In this role, the ship will:

- Transport combat and support elements of a Marine Expeditionary Unit or Brigade
- Embark, launch, and recover LCAC, LCUs, and AAVs for amphibious assault missions
- Support aerial assaults by embarking, launching, and recovering Marine Corps aircraft
- Carry and discharge cargo to sustain the landing force
- Conduct non-combatant evacuation operations and other crisis response missions

Prime Contractor

- Northrop Grumman Ship Systems, Pascagoula, Mississippi

accordance with the DOT&E-approved Test and Evaluation Master Plan and test plan. The Navy deferred the remaining

NAVY PROGRAMS

- IOT&E events to FOT&E because of ship and test resource availability. The Navy's Operational Test Agency (OTA), Commander, Operational Test and Evaluation Force, has not yet released their final report.
- The OTA completed two IOT&E events in FY09, including Surface Warfare engagements on LPD-18 in October 2008 and a Rolling Airframe Missile engagement on the Self-Defense Test Ship in December 2008.
- The third ship of the class to deploy prior to completion of IOT&E, LPD-18, returned in August 2009. DOT&E submitted an Early Fielding Report to Congress in May 2008.
- FOT&E to assess the ships Probability of Raid Annihilation using a modeling and simulation test bed commenced in July 2009 and is expected to complete in October 2009. This effort will predict the ship's capability to defend itself against a raid of Anti-Ship Cruise Missiles.
- The Navy completed two major LFT&E tests, the Full Ship Shock Trial and the Total Ship Survivability Trial, in September 2008. The Navy and DOT&E completed analysis this year; final reports are expected in FY10.

Assessment

The following are DOT&E's observations and assessments based on testing completed to date:

- LPD-17 is able to meet its amphibious lift requirements for landing force vehicles, cargo, personnel, fuel, hangar space, well-deck capacity, and flight-deck landing areas.
- Reliability problems related to well deck ramps, ventilation, bridge crane, and Cargo Ammunition Magazine (CAM) elevators detracts from mission accomplishment and reduces amphibious warfare suitability.
- The engineering plant, as designed, is effective and met its mobility (speed, endurance) requirements.
- Reliability problems associated with the Engineering Control System (ECS), including frequent failures and high false alarm rates, and the electrical distribution system, including unexplained loss of service generators and the uncommanded opening of breakers, revealed shortfalls in manning and training to support sustained manual operation of the plant.
- The Navy's Board of Inspection and Survey (INSURV) identified similar deficiencies in identical areas (propulsion, auxiliaries, electrical, damage control, deck) during both acceptance and final contract trials across all four of the first ships of the class. Catastrophic casualties recorded prior to the Full Ship Shock Trial in LPD-19 and during LPD-17's deployment revealed serious fabrication and production deficiencies in the main lube oil service system.
- The ship is capable of supporting Command, Control, Communications, Computers, and Intelligence requirements in an ESG environment; however, reliability problems with the SWAN and the Interior Voice Communications System degrade command and control and are single points of failure during operations.

- The Navy still needs to validate critical Information Exchange Requirements and pursue a formal Information Support Plan to support a Joint Interoperability Certification.
- The LPD-17 exhibited difficulty defending itself against several widely proliferated threats, primarily due to:
 - Persistent SSDS Mk 2-based system engineering deficiencies
 - The ship's RAM system provided the only hard kill capability, preventing layered air defense
 - Problems associated with SPS-48E and SPQ-9B radar performance against certain Anti-Ship Cruise Missile attack profiles
 - Degraded situational awareness due to Mk 46 Gun Weapon System console configuration
- LPD-17 failed to satisfy its reliability requirement during the first five hours of an amphibious assault and its total ship availability requirement during IOT&E.
- The survivability of the *San Antonio* class ships appear to be improved over the LPD class ships they will replace. However, problems encountered with critical systems during testing (particularly with the electrical distribution, chilled water, SWAN, and ECS) and difficulty recovering mission capability may offset some of the survivability improvements and have highlighted serious reliability shortcomings.

Recommendations

- Status of Previous Recommendations. All recommendations made in FY07 and FY08 remain valid.
- FY09 Recommendations. The Navy should:
 - Formally address chronic reliability problems associated with amphibious warfare support equipment, propulsion and electrical systems, critical control systems to include the SWAN and ECS, and demonstrate the efficacy of fixes during FOT&E.
 - Review and investigate reoccurring INSURV deficiencies and lube oil system failures, identify related design, quality control, or training problems, and develop corrective action plans for each.
 - Complete validation of critical Information Exchange Requirements and pursue completion of a Joint Interoperability Certification.
 - Pursue mitigations to the identified weaknesses and long-standing system engineering problems associated with the ships ability to defend itself against threats in multiple warfare areas.
 - Demonstrate the ships ability to satisfy both its reliability and total ship availability requirements during FOT&E.
 - Revise the Test and Evaluation Master Plan to reflect incomplete events and recommended FOT&E from the IOT&E to include a timeline for completion.
 - Correct deficiencies identified in the Naval Sea Systems Command Total Ship Survivability Trial and Full Ship Shock Trial reports.