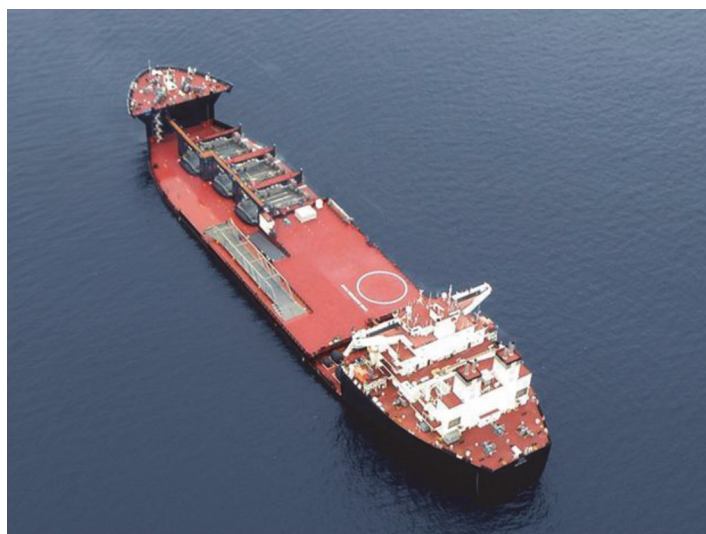


Expeditionary Transfer Dock (T-ESD) and Expeditionary Sea Base (T-ESB)

Executive Summary

- From June 2015 through August 2016, the Navy conducted the Expeditionary Sea Base's (T-ESB) Post-Delivery Test and Trials (PDT&T). DOT&E and the Navy's Commander, Operational Test and Evaluation Force (COTF) observed PDT&T events and collected data to be used in the T-ESB's operational assessment.
- In August 2016, the Navy conducted the T-ESB IOT&E, followed immediately by the Total Ship Survivability Trial (TSST).
- DOT&E will publish a combined IOT&E and LFT&E report assessing T-ESB in 2QFY17. The following preliminary assessment is based on observations during IOT&E and PDT&T. The T-ESB:
 - Is capable of hosting a helicopter squadron with four MH-53Es
 - Is capable of hosting all airborne mine countermeasure (AMCM) equipment, including the 7-meter rigid hull inflatable boats (RHIBs) required in the launch and recovery of all waterborne AMCM equipment
 - Is capable of launching, recovering, and maintaining MH-53E helicopters
 - Is capable of deploying all legacy AMCM equipment
 - Is capable of transiting the required 9,500 nautical miles at 15 knots while fully loaded with an AMCM helicopter squadron including all mine-sweeping equipment
 - Lacks enough space to concurrently accommodate personnel and embarked systems of an explosive ordnance disposal detachment and the MCM coordination staff while hosting an AMCM helicopter squadron (not included in the Joint Chiefs of Staff's requirement document)
 - Lacks Chemical, Biological, and Radiological (CBR) defense (not included in the Joint Chief of Staff's requirement document)
 - Has limited self-defense capability against any threat. Its self-defense capability against small boat attacks consists of 12 50-caliber gun stations capable of 360-degree coverage
- The T-ESB was designed to operate in a benign environment where there is low/negligible threat to the ship. However, MCM operations will require the ship to move closer to the MCM threat area. The lack of self-defense capability renders the ship totally dependent upon protection from other naval combatants and joint forces to be survivable in the intended operating environment.
- The Navy conducted the TSST aboard USNS *Lewis B. Puller* (T-ESB 3) August 8 – 9, 2016, in the Virginia Capes operating area. DOT&E's preliminary findings are related to limitations with the internal communication system, emergency lighting,



Expeditionary Transfer Dock (T-ESD)



Expeditionary Sea Base (T-ESB)

ship egress, and watertight and non-watertight doors. DOT&E will finalize and publish the findings and recommendations in the combined IOT&E and LFT&E report.

System

- Expeditionary Transfer Dock (T-ESD) and T-ESB are both modified heavy-lift ships, based on the British Petroleum *Alaska*-class oil tanker that the Navy procured to use as logistics interfaces and mobile landing fields, respectively.
- The Navy developed the T-ESD to have the ability to operate from international waters in non-hostile areas, and persist for extended periods of time on station – providing a prepositioning force capability. The T-ESB was developed to provide AMCM support capability both unencumbered by geopolitical constraints to meet strategic goals.
- Military Sealift Command (MSC) serves as the ships' Life Cycle Manager.
- The Navy delivered two T-ESD ships (hulls 1 and 2), one T-ESB ship (hull 3, June 2015), and plans to deliver two more

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T-ESB ships. Hull 4 will be delivered in February 2018, and hull 5 will be delivered in September 2019.

- The T-ESD:
 - Includes a vehicle-staging area (raised vehicle deck), vehicle transfer ramp, large mooring fenders, an emergency-only commercial helicopter operating spot, and three Landing Craft Air Cushion (LCAC) lanes/operating spots with wash-down and fueling services
 - Is equipped with a crane and work boat for the placing of fenders used for skin-to-skin operations with the Large Medium Speed Roll-on/Roll-off (LMSR) or Expeditionary Fast Transport (T-EPF) (formerly Joint High Speed Vessel)
 - Requires 34 MSC contracted mariners to operate and maintain the vessel
 - Is built to commercial standards
 - Is classified as a non-combatant
- The T-ESB:
 - Is built similar to the T-ESD to commercial standards. It includes a forward section called the forward house and an aft section called the aft house. The forward house includes military aviation facilities such as a hangar facility; workstations for operation planning; a command, control, communications, computers, and intelligence suite; ammunition magazines for ordnance stowage; and berthing for a total of 250 personnel.
 - During non-hostile periods when the ship is designated as a USNS, it carries 100 permanent military crew and 150 personnel from an embarked detachment. During hostile periods when the ship is designated a USS, it carries 101 permanent military crew and 149 personnel from an embarked detachment. The vessel also has a four-spot flight deck, helicopter fueling capability, and a fueling at-sea station. It houses 34 MSC civilian mariners in the aft house of the ship.
 - Has a mission deck below the flight deck with a man-rated crane for launch and recovery of manned boats, and legacy mine-hunting and mine-clearing equipment, which are used with the MH-53E helicopters during AMCM operations.
 - Has an aft knuckle boom crane rated for 10 metric tons in Sea State 3 (0.50 – 1.25 meters significant wave height) to transfer cargo from the pier to mission deck and/or to the flight deck. This crane is rated up to 8 metric tons to transfer ordnance from mission deck to flight deck or flight deck to mission deck.
 - Has fueling at-sea capability for diesel and JP-5 (jet propellant 5) fuel.

- Has vertical replenishment capability.
- Is classified as a non-combatant.
- The T-ESD and T-ESB designs inherently incorporate survivability features evaluated through the LFT&E program, to include:
 - Distributed firefighting equipment in the form of a fire main and aqueous film-forming foam and distributed damage control lockers/repair stations (containing fire hoses, firefighting ensembles, self-contained breathing apparatus, and flood repair kits).
 - Retractable bow thruster for station-keeping.
 - Emergency electrical power to selective ship loads by way of the Emergency Diesel Generator (EDG).
 - A carbon dioxide gaseous flooding system in the main engineering, EDG spaces, and spaces with high risk of fuel induced fires.
 - As a result of its more aviation focused mission, the T-ESB is equipped with an Aviation Crash Locker to handle shipboard aviation casualties and a seawater sprinkling system for protection to magazines and other high-risk spaces in the forward portion of the ship.

Mission

- Combatant Commanders will use the T-ESD to support Mobile Prepositioning Force (future) operations by facilitating at-sea transfer and delivery of prepositioned assets to units ashore. The T-ESD will act as a vessel interface between LMSR or T-EPF and LCAC vehicles and, in the future, Ship-to-Shore Connectors.
- Combatant Commanders will use the T-ESB to support AMCM operations, which includes hosting a squadron of four legacy MH-53E helicopters together with their mine-clearing equipment, or explosive ordnance demolition teams with their equipment.
- Special Operations Force (SOF) will use the T-ESB to support Helicopter Assault Force and Boat Assault Force operations, not concurrently with AMCM operations.

Major Contractors

- Base ship for both variants and T-ESB mission package: General Dynamics' National Steel and Shipbuilding Company (NASSCO) – San Diego, California
- T-ESD mission package: Vigor Marine LLC Shipbuilding – Portland, Oregon

Activity

T-ESD

- There were no T-ESD test events in FY16.

T-ESB

- On December 8, 2015, DOT&E approved the T-ESB IOT&E test plan. The test plan adopted an integrated test approach where the Navy conducted developmental and

operational testing concurrently, with each having its own set of metrics and data collection. All operational tests were conducted in accordance with the DOT&E-approved test plan.

- The first ship of the class, USNS *Lewis B. Puller* (T-ESB 3), launched in November 2014, completed builder trials in

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April 2015, and acceptance trials in May 2015; and was delivered to the Navy in June 2015.

- T-ESB 3 transited from San Diego, California, to Norfolk, Virginia, from August to October 2015. COTF collected material availability data from the ship's crew during the transit.
- Personnel from the Naval Surface Warfare Center, Port Hueneme, California, conducted an Underway Replenishment Ship Qualification Trial in January 2016, off the coast of Norfolk, Virginia.
- Combat Direction Systems Activity personnel observed by COTF completed two phases of cybersecurity developmental testing: the first phase in November/December 2015, and the second phase in January/February 2016.
- Combatant Craft Division of Naval Surface Warfare Center Carderock Division completed two phases of craft launch and recovery testing, first in February 2016, and then again in May 2016.
- The Board of Inspection and Survey conducted a Final Contract Trial in April 2016.
- Naval Air Systems Command with aircraft and maintenance detachment provided by Helicopter Mine Countermeasure Squadron-15 (HM-15), conducted Aircraft Dynamic Interface Testing, including Vertical Replenishment operations, during April and June 2016.
- The Program Office, assisted by HM-15, conducted AMCM deployment test during PDT&T in June 2016.
- The Program Office, assisted by MSC's Afloat Training Team, completed the TSST aboard USNS *Lewis B. Puller* (T-ESB 3) August 8 – 9, 2016, off the coast of Norfolk, Virginia, in the Virginia Capes operating area. This event was preceded by pre-test system checks to verify system components and line-ups in November 2015 and January and May 2016.
- COTF personnel:
 - Observed a ship self-defense test contending crew-served weapons against high-speed maneuvering surface targets in May 2016 on USS *San Antonio* (LPD 17)
 - Conducted the cybersecurity Cooperative Vulnerability and Penetration Assessment during May and June 2016, and the cybersecurity Adversarial Assessment during July 2016
 - Conducted the IOT&E End-to-End Event in accordance with the DOT&E-approved test plan in August 2016, while underway in the Virginia Capes operating area
 - Conducted a critical systems maintenance review, consisting of targeted interviews with senior military and civilian crewmembers, onboard the ship while in port at Naval Station Norfolk during August 2016
 - Conducted a walk-through SOF review with the subject matter experts to assess the ship's ability to host light-package SOF missions onboard the ship, while in port at Naval Station Norfolk during August 2016
- The 1-year post-delivery guarantee period ended on June 11, 2016.

Assessment

T-ESD

- The results from earlier testing were reported in the July 6, 2015, DOT&E combined IOT&E and LFT&E report on Mobile Landing Platform with Core Capability Set (MLP (CCS)).

T-ESB

- T-ESB's preliminary findings are based on observations on USNS *Lewis B Puller* (T-ESB 3) during the PDT&T and IOT&E periods. DOT&E will provide the final assessment in the 2QFY17 combined IOT&E and LFT&E report.
 - Based on a 24-hour fuel endurance trial, DOT&E estimates T-ESB to have an un-refueled range of greater than 11,000 nautical miles, exceeding the 9,500-nautical mile requirement.
 - Out of the four helicopter operating spots on the flight deck, three are functional for landing and launching MH-53E helicopters while performing the AMCM mission. The fourth spot served as a parking space only, since it was fouled by a triple wide container used for AMCM equipment. Without this container, the fourth spot is fully functional.
 - The helicopter hanger is large enough to accommodate two folded or one spread MH-53E helicopters.
 - The ammunition magazines can accommodate AMCM ordnance such as the SeaFox mine disposal vehicle.
 - The mission deck size and tie down arrangement are sufficient to accommodate all supplies and equipment required for a four-helicopter MH-53E Squadron including all legacy mine-sweeping equipment.
 - The mission deck crane is effective for launching and recovering all AMCM equipment along with launching the 7-meter RHIBs used for deploying the AMCM equipment. The mission deck crane is also effective for launching and recovering the 11-meter RHIBs and 41-foot Combatant Craft Assault boats.
 - Cybersecurity test results and analysis will be provided in the classified annex to the 2QFY17 DOT&E combined IOT&E and LFT&E report.
 - The lack of air conditioning in the aircraft maintenance shops surrounding the hanger bay will limit work days for maintainers in high heat stress areas of the world.
 - Lacks enough space to concurrently accommodate personnel and equipment of an explosive ordnance detachment, the MCM staff required to coordinate the operations, and an AMCM helicopter squadron during the MCM operations. This may affect the MCM mission.
- The T-ESD and T-ESB are built to commercial standards and have survivability features to protect against typical commercial ship hazards such as groundings, collisions, raking, and fires. However, for missions that the ships will execute in the littorals close to threat areas, not having military survivability requirements introduce the following shortfalls:

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- Lack of a CBR defense capability, including countermeasure wash-down capability
- Lack of anti-ship missile, torpedo, and naval mine defense capability
- Self-defense capability is limited to crew-served weapons only
- The T-ESB was designed to operate in a benign environment where there is low/negligible threat to the ship. However, MCM operations will require the ship to move closer to the MCM threat area. The lack of self-defense capability renders the ship totally dependent upon protection from other naval combatants and joint forces to be survivable in the intended operating environment.
- T-ESB has very limited self-defense capability, which will force the Combatant Commander to place T-ESB outside the threat area. Alternately, the Combatant Commander will need to devote defensive units to support the mission. T-ESB is not outfitted to accommodate explosive ordnance teams or mine clearing coordination staffs while supporting AMCM.
- The T-ESB TSST identified limitations with the ships' communications systems that challenged the damage control effectiveness of both the Navy and MSC crew. Additionally, the trial revealed ship design deficiencies associated with emergency lighting, personnel egress, and the ships' watertight and interior joiner doors. The Navy is assessing the TSST data and will provide additional findings in their report due in FY17. DOT&E will finalize and publish findings and recommendations in the combined IOT&E and LFT&E report.
- If T-ESB is upgraded to add full SOF capability, an FOT&E event will be required to evaluate the added SOF capability. The final DOT&E IOT&E and LFT&E report will provide assessment based on the walk-through review that COTF conducted with existing SOF capability during the end-to-end test event.

Recommendations

- Status of Previous Recommendations: The Navy still needs to address the FY14 recommendation to re-evaluate the need for at-sea skin-to-skin operations between T-ESD and T-EPP. The Navy also still needs to address the following FY15 recommendations:
 1. Install a separate Ship Service Diesel Generator to minimize periods of under-loading of the Main Diesel Generators.
 2. Address the live fire issues identified in the classified annex to the July 2015 DOT&E combined IOT&E and LFT&E report on the T-ESD.
 3. Conduct a robust, self-defense test utilizing live ammunition and realistic targets in support of the T-ESB IOT&E.
- FY16 Recommendation.
 1. DOT&E will provide recommendations regarding test adequacy, effectiveness, suitability, and survivability of the T-ESB in the combined IOT&E and LFT&E report in FY17 after a more comprehensive analysis of all operational and live fire test data.