

Littoral Combat Ship (LCS)



Left: Freedom Variant (LCS 1) | Right: Independence Variant (LCS 2)

In March 2023, the Navy declared initial operational capability of the *Independence*-class Littoral Combat Ship (LCS) Mine Countermeasures (MCM) Mission Package (MP); however, IOT&E is not complete. In June 2023, DOT&E released a classified cyber addendum to its published *Freedom*-class LCS Surface Warfare (SUW) MP Increment 3 IOT&E report from July 2020.

SYSTEM DESCRIPTION

The LCS is a small surface combatant designed for littoral operations and capable of executing open ocean missions. The LCS comprises two seaframe variants: the *Freedom* variant (odd-

numbered) and the *Independence* variant (even-numbered). The *Freedom* variant is a monohull design constructed of steel (hull) and aluminum (deckhouse) with two steerable and two fixed-boost waterjets driven by a combined diesel and gas turbine main propulsion system. The *Independence* variant is an

aluminum trimaran with two steerable waterjets driven by diesel engines and two steerable waterjets driven by gas turbine engines. LCS seaframes host and derive mission capability from the SUW and MCM MPs.

The SUW MP is now scheduled to deploy only on the *Freedom*

class and derives its capability from the following components:

- Two Mk 46 30mm guns
- MH-60R or MH-60S helicopter
- MQ-8 Fire Scout Vertical takeoff and landing Tactical Unmanned Aerial Vehicle
- Two 11-meter rigid-hull inflatable boats
- Surface-to-Surface Missile Module with 24 Longbow Hellfire missiles

The MCM MP is now scheduled to deploy only on the *Independence* class and derives its capability from the following baseline components:

- AN/ASQ-235 Airborne Laser Mine Detection System (ALMDS) employed from an MH-60S helicopter
- Airborne Mine Neutralization System (AMNS) employed from an MH-60S helicopter
- MCM Unmanned Surface Vehicle (USV) with Minehunt Payload (MCM USV and Minehunt) and the AN/AQS-20C sonar
- Unmanned Influence Sweep System (UISS)

The MCM MP will incorporate the following systems pending continued system development:

- Knifefish Block I unmanned undersea vehicle
- AN/DVS-1 Coastal Battlefield Reconnaissance and Analysis Block I system employed from an MQ-8C Fire Scout
- Barracuda Mine Neutralization System employed from MCM USV

MISSION

The maritime component commander will employ LCS alone, or within a group of ships, to prepare the environment for joint forces access to littoral regions by conducting MCM or SUW operations, possibly under an air defense umbrella. Because of capabilities inherent to both seaframes, commanders can also employ LCS in a maritime presence role and support deterrence operations. Further, the Maritime Security Module of the SUW MP enables the *Freedom* class to conduct Maritime Security Operations including visit, board, search, and seizure of ships suspected of transporting contraband.

PROGRAM

The LCS seaframes and the combined MPs are each Acquisition Category IC programs. Additionally, several components within the MPs are themselves individual programs of record. In FY23, one *Independence*-class ship and one *Freedom*-class ship were delivered. The Navy expects the remaining two *Independence*-class and three *Freedom*-class ships to deliver between FY24 and FY25. In FY23, 3 MCM MPs and 3 SUW MPs were delivered with the remaining 21 MCM MPs expected between FY24 and FY33 and the remaining 5 SUW MPs expected in FY24.

In March 2023, the Navy declared initial operational capability of the MCM MP and the AN/AQS-20C sonar. The Navy intends to make

a full-rate production decision on AN/AQS-20C in FY24 after the completion of IOT&E and then begin deployment of the MCM MP.

In 2018, DOT&E approved an update to the LCS Test and Evaluation Master Plan (TEMP) that accounted for changes in the test designs for evaluating the MPs on the two seaframe variants. In FY23, the Navy intended to update the LCS TEMP to address additional changes in the test program for the LCS MCM MP and for the Navy's divestment in the LCS Anti-Submarine Warfare (ASW) MP. However, the Navy delayed the update to FY24.

In January 2023, DOT&E approved the MCM USV and Minehunt TEMP. MCM USV and Minehunt are detailed in the AN/AQS-20X Minehunt Sonar and Tow Vehicle article of this Annual Report.

» MAJOR CONTRACTORS

- Lockheed Martin Corporation and Fincantieri Marinette Marine team – Marinette, Wisconsin
- Austal USA – Mobile, Alabama
- Northrop Grumman Corporation – Falls Church, Virginia

TEST ADEQUACY

The Navy conducted no operational testing on the *Freedom* class with the SUW MP Increment 3 in FY23. DOT&E completed analysis of cyber test events reported in the FY22 Annual Report

in June 2023 and submitted a classified cyber addendum to the IOT&E report for the *Freedom* class with the LCS SUW MP Increment 3. Testing was adequate to determine cyber survivability. The Navy has no follow-on testing planned for the *Freedom* class with the LCS SUW MP Increment 3.

The Navy conducted no operational testing on the *Independence* class with the LCS MCM MP in FY23. Testing remains inadequate to determine operational effectiveness because the Navy has yet to provide required data to determine the performance of the AMNS and ALMDS components of the LCS MCM MP. DOT&E cannot provide an IOT&E report without these data as they are primary contributors to the MCM mission.

The Navy scheduled evaluation of the cyber survivability of the *Independence* class with LCS MCM MP for FY24, a one-year delay from what was reported in last year's Annual Report. This test and sufficient data on the AMNS and ALMDS are needed to complete IOT&E.

PERFORMANCE

» EFFECTIVENESS

DOT&E's classified July 2020 LCS with Increment 3 SUW MP IOT&E report contains details on effectiveness of the *Freedom*-class LCS with the SUW MP Increment 3.

No determination of the operational effectiveness of the *Independence* class with the LCS

MCM MP can be made due to the IOT&E not being complete.

» SUITABILITY

DOT&E's classified July 2020 LCS with Increment 3 SUW MP IOT&E report contains details on suitability of the *Freedom*-class LCS with the SUW MP Increment 3.

No determination of the operational suitability of the *Independence* class with the LCS MCM MP can be made due to the IOT&E not being complete. However, analysis of the available data on baseline components suggests that:

- UISS is not operationally suitable, as documented in the UISS IOT&E report dated June 2022. UISS's reliability and availability do not support sustained mine sweeping operations.
- AMNS and ALMDS are unlikely to have sufficient reliability. This assessment is based on limited data available for the classified DOT&E LCS MCM MP Early Fielding Report from June 2016, as no additional data are available.

» SURVIVABILITY

Cyber survivability of the *Freedom* class with LCS SUW MP to a nearsider or insider threat is classified and is detailed in the June 2023 DOT&E cyber addendum to the IOT&E report.

No data are available to determine cyber survivability of the *Independence* class with

LCS MCM MP as the evaluation is scheduled for FY24.

RECOMMENDATIONS

The Navy should:

1. Submit an update to the *Independence*-class LCS MCM MP TEMP for DOT&E approval by 2QFY24 to support the Navy's planned cyber test in 4QFY24.
2. Complete operational testing of the *Independence*-class LCS MCM MP.
3. Provide data from fleet events to characterize performance of ALMDS and AMNS. If data are not available, plan additional test to obtain these data, as data are required to adequately test the LCS MCM MP capability.
4. Improve resilience of the *Freedom* class with the LCS SUW MP to cyberattack by addressing recommendations in the June 2023 DOT&E classified cyber addendum to the July 2020 IOT&E report.