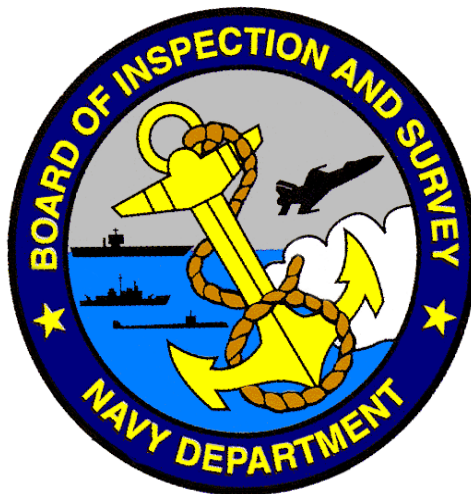


INSURV ANNUAL REPORT

1 March 2020



DISTRIBUTION STATEMENT A. Approved for public release.

Preface

The following is a report of INSURV's findings from fiscal year 2019, as well as comparisons to previous years and is provided in accordance with U.S. Code Title 10 Section 8674.

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The estimated cost of this report for the Department of Defense (DoD) is approximately \$3,200 for the Fiscal Year (FY) 2019. This includes \$0 in expenses, and \$3,200 in DoD labor.

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1.0 Requirements

Title 10 USC Section 8674 requires an annual report not later than March 1 each year setting forth an overall narrative summary of material readiness of Navy ships, overall number and types of vessels and for in-service vessels, material readiness trends.

SEC. 8674. EXAMINATION OF NAVY VESSELS; STRIKING OF VESSELS FROM THE NAVAL VESSEL REGISTER

(a) Boards of Officers To Examine Naval Vessels.-

(1) The Secretary of the Navy shall designate boards of naval officers to examine naval vessels, including unfinished vessels, for the purpose of making a recommendation to the Secretary as to which vessels, if any, should be stricken from the Naval Vessel Register. Each vessel shall be examined at least once every three years if practicable.

(2)(A) Except as provided in subparagraph (B), any naval vessel examined under this section on or after January 1, 2020, shall be examined with minimal notice provided to the crew of the vessel.

(B) Subparagraph (A) shall not apply to a vessel undergoing necessary trials before acceptance into the fleet.

(b) Actions by Board.-A board designated under subsection (a) shall submit to the Secretary in writing its recommendations as to which vessels, if any, among those it examined should be stricken from the Naval Vessel Register.

(c) Action by Secretary.-If the Secretary concurs with a recommendation by a board that a vessel should be stricken from the Naval Vessel Register, the Secretary shall strike the name of that vessel from the Naval Vessel Register.

(d) Annual Report.-

(1) Not later than March 1 each year, the board designated under subsection (a) shall submit to the congressional defense committees a report setting forth the following:

(A) An overall narrative summary of the material readiness of Navy ships as compared to established material requirements standards.

(B) The overall number and types of vessels inspected during the preceding fiscal year.

(C) For in-service vessels, material readiness trends by inspected functional area as compared to the previous five years.

(2) Each report under this subsection shall be submitted in an unclassified form that is releasable to the public without further redaction.

(3) No report shall be required under this subsection after October 1, 2021.

2.0 Executive Summary

The overall Fleet material condition shows a negative trend over the last two years. Surface ships along with the single CVN inspection executed this year drove this trend. Submarine MI results remain relatively steady. The FY19 Fleet average is within a standard deviation of the 6-year average (see Figure 2.1). Overall, some functional areas and subsystems remain degraded or show declining trends, indicative of areas where material readiness is stressed.

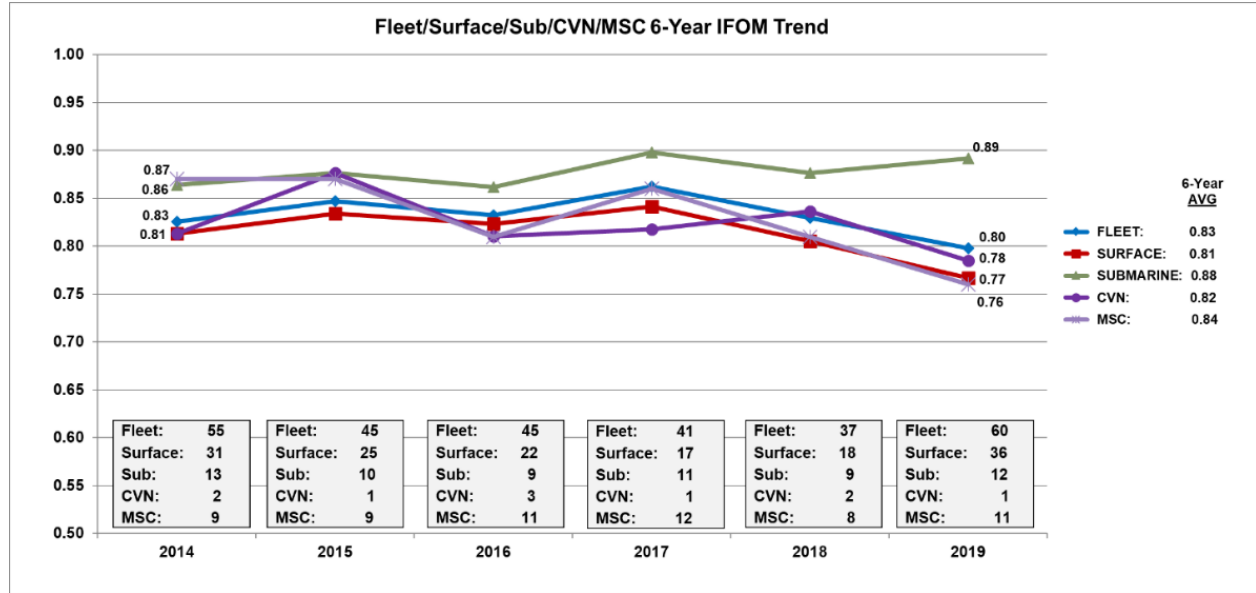


Figure 2.1 Fleet 6-Year IFOM Trends

New construction DDG, SSN, EPF, and LCS programs are mature programs. The LCS build programs showed significant improvement in FY19, however additional focus is required for both FREEDOM and INDEPENDENCE variants with respect to the MK 110 gun system, aviation, and platform lift deficiencies at Final Contract Trial.

3.0 Responsibilities and Authorities

The Board of Inspection and Survey (INSURV) conducts a range of inspections to meet its Title 10 responsibilities. These inspections provide assurance to Congress, the Secretary of the Navy (SECNAV), the Chief of Naval Operations (CNO), Fleet Commanders, Systems Commanders (SYSCOM), Type Commanders (TYCOM), and Commanding Officers that ships being introduced to the Fleet will be ready to meet their missions, that Fleet material readiness issues are being identified and addressed and, when required, that the material condition of ships scheduled for inactivation is documented. These inspections include new construction trials that occur at the beginning of ships' lives, MIs that occur periodically while ships are in service, and surveys that occur at the end of ships' lives, when required.

3.1 INSURV Process

INSURV uses only technically approved procedures to conduct these inspections. Currently, Planned Maintenance System (PMS) cards are the principal documentation used to conduct inspections.

3.2 Scoring

In 2013, INSURV developed the INSURV Figure of Merit (IFOM) to score MIs and trials. IFOM is derived through an algorithm that takes the weighted average of Functional Area Equipment Operational Capability (EOC) and demonstration scores and produces a single score from 0 – 1.00. Data was retrofitted back to 2007 for trending purposes.

3.3 The Schedule Process

Title 10 requires INSURV to inspect in-service ships once every three years, if practicable. On 01 October 2019, INSURV, per CNO direction, established inspection periodicity at three years for all vessels. Previously, under OPNAV policy guidance, Surface ships and CVNs were inspected by INSURV every six years. In-service submarine inspections occurred at least once every seven years, linked to the maintenance process. Ultimately, submarine inspection periodicity occurred on average about five to six year intervals.

In July 2019, Fleet Commanders removed options for waivers and codified requirements for schedule changes. Ships either will be within 3-year periodicity or considered overdue. As of 01 Oct 2019, there were 180 of 356 (50.6%) vessels, subject to inspection, that exceeded a 3-year inspection periodicity. Schedule changes requested within 90 days of the scheduled inspection date only occur with Fleet Commander authorization, and are predicated on operational requirements, maintenance delays, or INSURV capacity limitations.

4.0 Fiscal Year 2019 Inspections

INSURV conducted 76 inspections in fiscal year 2019 (a 117% increase over the 6-year average), broken down as follows:

- (1) Material Inspections (49): Seven TICONDEROGA-class guided missile cruisers (CG), one NIMITZ-class multipurpose aircraft carriers (CVN), 17 ARLEIGH BURKE-class guided missile destroyers (DDG), one FREEDOM-class littoral combat ship (LCS 1), one INDEPENDENCE-class littoral combat ship (LCS 2), one WASP-class amphibious assault ship, one SAN ANTONIO-class amphibious transport dock (LPD), two WHIDBEY ISLAND-class dock landing ships (LSD), one BLUE RIDGE-class command ship (LCC), three AVENGER-class mine countermeasures ships (MCM), two CYCLONE-class patrol coastal ships (PC), three OHIO-class ballistic missile submarines (SSBN), six LOS ANGELES-class submarines (SSN 688), one SEAWOLF-class submarine (SSN 21), and two VIRGINIA-class submarines (SSN 774).
- (2) Ship's Material Assessment and Readiness Test (SMART) (11): Two LEWIS AND CLARK-class cargo ships (T-AKE), three HENRY J. KAISER-class fleet replenishment oilers (T-AO), two SUPPLY-class fast combat support ships (T-AOE), one ZEUS-class cable repairing ship (T-ARC), one SAFEGUARD-class salvage ship (T-ARS), and two SPEARHEAD-class expeditionary fast transport ships (T-EPF).
- (3) Trials (16): Two ARLEIGH BURKE-class guided missile destroyers (DDG), one SAN ANTONIO-class amphibious transport dock (LPD), one SPEARHEAD-class expeditionary fast transports (EPF), five FREEDOM-class littoral combat ships (LCS 1), five INDEPENDENCE-class littoral combat ships (LCS 2), and two VIRGINIA-class submarines (SSN 774).

Additionally, 129 service craft, 20 combatant craft, and 7 boats (> 85') were inspected.

4.1 Material Inspections

To ensure that Fleet material readiness issues are being identified and addressed, INSURV assesses the end-to-end material readiness of all ships on the Naval Vessel Register. These MIs:

- (1) Determine and report upon an individual ship's fitness for further service,
- (2) Identify areas of degraded material readiness that impact a ship's ability to carry out assigned missions,
- (3) Provide feedback to the Fleet Commanders, Systems Commanders, Type Commanders, ISICs, and ship COs on recommendations for improving material readiness.

4.2 Ships Material Assessment and Readiness Test (SMART)

Under a Memorandum of Understanding between INSURV and the Military Sealift Command (MSC), MSC conducts Material Inspections, called SMARTs, of ships under their purview. INSURV audits these inspections to ensure that they are carried out consistently, following standardized procedures.

4.3 Trials

There are three types of trials: Acceptance Trials (AT), Final Contract Trials (FCT), and Special Trials (ST). INSURV performs ATs to independently verify the readiness of ships and service craft built in private shipyards for acceptance and fleet introduction. All contractual responsibilities must be resolved prior to the delivery date except for requirements that cannot be met until after the delivery date. PRESINSURV makes a formal recommendation to the CNO for preliminary acceptance and fleet introduction following AT. After the ship is commissioned and completes post-delivery testing, INSURV conducts a FCT or ST prior to the end of the guarantee period to ensure there are no defects, failures or deterioration other than those due to normal wear and tear:

5.0 Material Readiness Trends

5.1 Surface Ships

The surface force makes up the bulk of Fleet ships inspected each year. The surface force showed a declining trend in average IFOM, but is within a standard deviation of the 6-year average.

Overall, for surface ships, nine functional areas were evaluated as DEGRADED (an increase of one from 2018 and an increase of three over the six year average): Main Propulsion (MP), Electrical (EL), Damage Control (DC), Deck (DK), Weapons Systems (WP), Aegis Weapon Systems (AW), Aviation (AV), Ventilation (VT), and Environmental Protection (EP).

SURFACE						
Functional Areas (Ships Inspected)	2014 (31)	2015 (25)	2016 (22)	2017 (17)	2018 (18)	2019 (36)
Main Propulsion	0.80	0.81	0.76	0.78	0.76	0.64
Auxiliaries	0.88	0.82	0.82	0.83	0.83	0.81
Electrical	0.87	0.86	0.79	0.73	0.69	0.70
Damage Control	0.74	0.75	0.78	0.80	0.79	0.78
Deck	0.82	0.76	0.80	0.83	0.78	0.76
Mine Warfare	0.88	0.93	NA	0.98	0.85	0.83
Anti-Sub Warfare	0.80	0.91	0.88	0.92	0.81	0.84
Operations	0.82	0.87	0.86	0.88	0.83	0.80
Navigation	0.88	0.91	0.92	0.92	0.92	0.92
Weapons Systems	0.81	0.89	0.85	0.85	0.78	0.74
Aegis Weapon Systems	0.79	0.83	0.86	0.88	0.81	0.77
Communications	0.82	0.87	0.85	0.87	0.84	0.80
Information Systems	0.61	0.69	0.90	0.89	0.91	0.83
Aviation	0.77	0.74	0.72	0.75	0.78	0.68
Supply	0.82	0.83	0.78	0.77	0.78	0.80
Habitability	0.79	0.85	0.81	0.80	0.80	0.80
NAVOSH	0.93	0.92	0.88	0.88	0.81	0.81
Ventilation	0.81	0.78	0.79	0.78	0.78	0.78
Environmental Protection	0.82	0.85	0.84	0.84	0.81	0.76
Medical	0.95	0.98	0.97	0.97	0.96	0.95
Preservation	0.85	0.83	0.83	0.82	0.80	0.83

Figure 5.1 6-Year Surface Ship Functional Area Scores

Figure 5.1 shows the six-year trend for surface functional area scores and the total number of ships inspected each year. Statistically, scores did not deviate significantly this past fiscal year.

5.2 Submarines

The submarine IFOM trend is stable. All submarine functional areas averaged SAT for the fifth consecutive year.

SUBMARINE						
Functional Areas (Boats Inspected)	2014 (13)	2015 (10)	2016 (9)	2017 (11)	2018 (9)	2019 (12)
Main Propulsion	0.91	0.91	0.90	0.94	0.90	0.94
Auxiliaries	0.85	0.84	0.84	0.88	0.82	0.85
Electrical	0.87	0.87	0.83	0.88	0.87	0.90
Damage Control	0.86	0.87	0.87	0.88	0.89	0.89
Combat Systems	0.79	0.83	0.80	0.88	0.85	0.84
Navigation	0.88	0.90	0.90	0.90	0.89	0.89
Operations	0.86	0.86	0.84	0.89	0.92	0.91
Information Systems	0.71	0.83	0.89	0.92	0.95	0.92
Deck	0.93	0.87	0.88	0.90	0.87	0.90
Supply	0.86	0.93	0.92	0.91	0.87	0.89
Habitability	0.92	0.93	0.93	0.93	0.89	0.89
NAVOSH	0.91	0.90	0.91	0.88	0.88	0.80
Environmental Protection	0.93	0.91	0.94	0.91	0.91	0.85
Survivability/Escape	0.86	0.80	0.85	0.85	0.84	0.90
Medical	0.94	0.96	0.94	0.95	0.94	0.92
Preservation	0.90	0.91	0.87	0.91	0.88	0.92
Strategic Systems	NA	0.97	0.97	0.96	0.96	0.97

Figure 5.2 Submarine Functional Area Scores

As shown in Figure 5.2, submarine Functional Area scores did not deviate significantly this past fiscal year.

5.3 CVNs

Aircraft carrier data has been historically difficult to trend due the small sample sizes that result when a population of ten to eleven CVNs is inspected an average of once every five to six years. In order to expand that sample to make the trends more relevant, we have expanded the overall time period of the trend and grouped the CVNs into multi-year periods. This yields a sample of 40-60% of the total force in each period. Using this dynamic, it is evident that CVN material condition has improved over the previous ten-year period.

As Figure 5.3 illustrates, the number of CVN DEGRADED areas has declined steadily since 2008 from eight in 2008-2011, to the current five in 2016-2019. The five areas that scored as DEGRADED: Damage Control (DC), Electrical (EL), NAVOSH (OH), Ventilation (VT), and Supply (SP).

CVN			
Functional Area (Ships Inspected)	2008-2011 (7)	2012-2015 (4)	2016-2019 (7)
Damage Control	0.67	0.69	0.69
Deck	0.68	0.83	0.81
Auxiliaries	0.75	0.84	0.81
Electrical	0.81	0.80	0.68
Propulsion	0.78	0.86	0.82
Communications	0.75	0.84	0.82
Information Systems	0.86	0.66	0.86
Navigation	0.84	0.90	0.91
Operations	0.82	0.81	0.83
Weapons	0.84	0.82	0.84
Aviation	0.87	0.87	0.83
NAVOSH	0.80	0.85	0.66
Ventilation	0.73	0.82	0.79
Environmental Protection	0.74	0.90	0.83
Supply	0.80	0.70	0.71
Habitability	0.82	0.82	0.80
Medical	0.89	0.93	0.96
Preservation	0.79	0.84	0.80

Figure 5.3 12-Year CVN Functional Area Scores

5.4 Military Sealift Command (MSC) ships

Eleven Military Sealift Command (MSC) ships received Ships Material Assessment Readiness Test (SMART) inspections this year.

MSC (All Classes)						
Functional Areas (Ships inspected)	2014 (10)	2015 (9)	2016 (11)	2017 (13)	2018 (8)	2019 (11)
Main Propulsion	0.85	0.89	0.84	0.89	0.81	0.72
Auxiliaries	0.84	0.83	0.86	0.88	0.80	0.81
Electrical	0.83	0.82	0.83	0.86	0.84	0.84
Damage Control	0.84	0.76	0.78	0.83	0.69	0.74
Communications	0.91	0.90	0.92	0.92	0.92	0.94
Deck/UNREP/Structural	0.87	0.83	0.86	0.83	0.76	0.77
Medical	0.92	0.90	0.89	0.94	0.91	0.95
Aviation	0.89	0.86	0.79	0.81	0.69	0.84
Habitability/Supply	0.86	0.87	0.87	0.86	0.84	0.89
Environmental Protection	0.86	0.92	0.91	0.92	0.85	0.90
Safety/NAVOSH				0.87	0.80	0.80

Figure 5.4. MSC Functional Area Scores

Figure 5.4 shows three MSC ship Functional Areas assessed as DEGRADED in FY19: Main Propulsion, Damage Control, and Deck/UNREP/Structural. Main Propulsion was SATISFACTORY in FY18, Damage Control and Deck/UNREP/Structural assessed as DEGRADED in FY18. INSURV assesses that these results are due to the induction of Government-owned, Contractor-operated (GOCO) vessels into the SMART inspection program that beginning in FY18.

5.5 Trials

In support of the requirements noted in paragraph 4.3, INSURV assesses the maturity of shipbuilding programs. INSURV defines a mature program as one that produces ships that have no systemic, repetitive, and unresolved mission-limiting deficiencies at AT and FCT.

INSURV conducted 16 trials in FY19: 6 ATs and 10 FCTs on 14 surface ships and 2 submarines. Based on these trials, INSURV assessed the Submarine (SSN), Guided Missile Destroyer (DDG 51), Expeditionary Fast Transport (EPF), and Littoral Combat Ship (LCS) programs as mature. INSURV inspected no CVN 78, DDG 1000, ESB, and LHA 6 class ships at trial in FY19.

5.5.1 ARLEIGH BURKE Guided Missile Destroyer (DDG) Program

DDG 51 class ships are built by Huntington Ingalls Industries (HII) in Pascagoula, Mississippi and Bath Iron Works (BIW) in Bath, Maine. The program completed two trials in FY19: an AT on the PCU PAUL IGNATIUS (DDG 117) and an FCT on USS THOMAS HUDNER (DDG 116).

The program's AT performance at HII declined from prior years. DDG 117 was constructed at HII and had the lowest IFOM score out of five ships delivered since the program's restart in 2016. The ship completed AT with four starred deficiencies affecting her command and control, aviation, and intelligence systems. Additionally, DDG 117 had significant deficiencies affecting her steering systems, engine intakes, generators, and a high-pressure air system.

FCT performance improved in FY19. DDG 116 was constructed at BIW and had the highest IFOM score in the program's history. She had significant deficiencies affecting her undersea warfare system and helicopter landing system.

5.5.2 Expeditionary Fast Transport (EPF) Program

EPF class ships are built by Austal USA in Mobile, Alabama. The program completed one trial in FY19, an Integrated Trial (IT) on USNS PUERTO RICO (T-EPF 11).

PEO SHIPS assessed the maturity of the EPF build program and made the decision, by OPNAVINST 4700.8 policy, to combine both Builder's Trial and Acceptance Trial into one Integrated Trial (IT) for T-EPF 11. This was a significant programmatic achievement. The ship performed well during the IT, earning a solid IFOM score (0.91), and completing the trial with no starred deficiencies.

No EPFs were presented for FCT in FY19.

5.5.3 Littoral Combat Ship (LCS) Program – FREEDOM (LCS 1) Variant

LCS 1 variant ships are built by Fincantieri Marinette Marine in Marinette, Wisconsin. The program completed five trials in FY19: ATs on PCU BILLINGS (LCS 15) and PCU INDIANAPOLIS (LCS 17); and FCTs on USS LITTLE ROCK (LCS 9), USS SIOUX CITY (LCS 11), and USS WICHITA (LCS 13).

The program's AT performance improved compared to prior years. LCS 15 and 17 completed the trial with only one starred deficiency between them (on LCS 15). The ships also shared the second highest IFOM score in program history. LCS 15 had significant deficiencies affecting her flight deck nets, diesel generators, and engine intakes. LCS 17 had a significant deficiency affecting its MK 110 gun weapon system.

The program's FCT performance also improved in FY19 with the ships earning the three highest IFOM scores in program history. LCS 9 and 13 had significant deficiencies affecting the MK 110 gun system. LCS 9 also had significant deficiencies affecting main propulsion engines and aviation systems. LCS 11 had significant deficiencies affecting ordnance and cargo handling systems and a diesel generator. LCS 13 had a significant deficiency affecting a main propulsion diesel engine.

5.5.4 Littoral Combat Ship (LCS) Program – INDEPENDENCE (LCS 2) Variant

LCS 2 variant ships are built by Austal USA in Mobile, Alabama. The program completed five trials in FY18: ATs on PCU CINCINNATI (LCS 20) and PCU KANSAS CITY (LCS 22); and FCTs on USS MANCHESTER (LCS 14), USS TULSA (LCS 16), and USS CHARLESTON (LCS 18).

The program's AT performance improved compared to prior years. Both LCS 20 and 22 performed well during AT. Both completed the trial with one starred deficiency. The ships also shared the highest IFOM score in program history. LCS 20's deficiency affected her main propulsion engine exhaust systems. LCS 22's deficiency affected her air defense system.

The program's FCT performance also improved in FY19, especially with LCS 16 and 18 (the two most recent) receiving the highest two FCT IFOM scores in LCS 2 variant program history. However all

three ships had significant deficiencies affecting the MK 110 gun system, the ordnance handling lift platform, aviation systems and ordnance handling equipment. Additionally, LCS 14 had significant deficiencies affecting engine intakes and mission package consoles. LCS 16 had significant deficiencies affecting her ordnance handling equipment and hydraulic power systems. LCS 18 had significant deficiencies affecting her ordnance and boat handling systems, ship control systems, and hydraulic power systems.

5.5.5 SAN ANTONIO Class LPD Program

LPD 27 class ships are built by Huntington Ingalls Industries in Pascagoula, Mississippi. The program completed one trial in FY19: an FCT on USS PORTLAND (LPD 27), final Flight I LPD.

The program's FCT performance declined compared to prior years. LPD 27 had the lowest IFOM out of four ships inspected in the previous five years. The ship had deficiencies affecting her main engines, generators, anchor handling system, air search radar, aviation facilities, and boat handling system.

5.5.6 GERALD R. FORD Aircraft Carrier (CVN) Program

CVN 78 class ships are built by Newport News Shipbuilding in Newport News, Virginia. USS GERALD R FORD (CVN 78) completed AT in May 2017. The ship was unfinished and had significant deficiencies affecting many important systems. PEO CARRIERS intends to present the ship for special trial (ST) in FY21 or FY22.

5.5.7 ZUMWALT Guided Missile Destroyer (DDG) Program

DDG 1000 class ships are built by Bath Iron Works (BIW) in Bath Maine. USS ZUMWALT (DDG 1000) and USS MICHAEL MONSOOR (DDG 1001) completed AT in April 2016 and February 2018, respectively. Both ships were procured under a special delivery strategy permitting installation of the ship's combat systems after AT away from BIW. PEO SHIPS plans to present DDG 1000 for a combat system AT in late FY20.

5.5.8 AMERICA Amphibious Assault Ship (LHA) Program

LHA 6 class ships are built by Huntington Ingalls Industries in Pascagoula, Mississippi. PCU TRIPOLI (LHA 7) was scheduled to conduct AT in October 2018, but production delays and testing failures associated with propulsion and anchoring systems precluded going to trial in FY19. PEO SHIPS plans to present LHA 7 for AT in early FY20 after addressing these deficiencies.

5.5.9 HERSHEL WOODY WILLIAMS Expeditionary Support Base (ESB) Program

ESB class ships are built by General Dynamics/NASSCO in San Diego, California. USNS MIGUEL KIETH (ESB 5) was scheduled to conduct AT in FY19. However, GD/NASSCO suffered a dry dock accident in July 2018 that flooded the ship during construction. PEO SHIPS plans to present ESB 5 for AT in early FY20 after repairing the ship.

5.5.10 VIRGINIA Class SSN Program

SSN 774 Class submarines are built by General Dynamics (GD) and Huntington Ingalls Industries (HII). USS SOUTH DAKOTA (SSN 790) was built by GD, USS INDIANA (SSN 789) was built by HII. Both vessels completed Guarantee Material Inspections with no significant discrepancies. The VIRGINIA-class SSN program continues to perform.

6.0 INSURV Way-Ahead

6.1 Title 10 Requirements

As noted in Section 1.0, Title 10 USC Section 8674 also states, **“Except as provided in subparagraph (B), any naval vessel examined under this section on or after January 1, 2020, shall be examined with minimal notice provided to the crew of the vessel”**.

To comply with this requirement, INSURV executed a pilot inspection program that exercised multiple courses of action to determine the best methodology to define and perform “minimal notice” inspections, while maintaining an accurate assessment of material readiness. Based on pilot inspection results, 4-week notice was determined to be the optimal notification timeframe to support inspection execution and minimize disruption to ship’s operational and training schedules. The 4-week notification time will be implemented for most vessel types. LCS-class vessels will initially receive 90-day notification to support contracting requirements, however; the Navy will work to drive this to comply with the 4-week notification process.

Additionally, INSURV will strive to inspect all vessels on the Naval Vessel Register (NVR) within the Title 10 mandated three years. In the past, the Navy used the “if practicable” clause in Title 10 to examine ships at up to seven year increments. Commencing in FY20, all ships on the NVR will be scheduled within three years from the previous inspection with very limited exceptions.

6.2 Lethality and Survivability Assessment

INSURV will collaborate with Center for Naval Analysis and Naval Surface Warfare Center Corona to develop and implement processes and procedures that use INSURV-discovered and/or INSURV-validated material condition discrepancies to highlight combat readiness impacts to US Navy ships’ lethality and survivability.