THE SECRETARY OF THE NAVY
WASHINGTON DC 20350-1000

August 31, 2016

MEMORANDUM FOR THE UNDER SECRETARY OF DEFENSE
(ACQUISITION, TECHNOLOGY, AND LOGISTICS)

SUBJECT: CVN 78 GERALD R. FORD Class Aircraft Carrier Program

I have received your recent memorandum chartering an independent review of CVN 78 subsystems. In general, the Navy welcomes oversight insofar as it may contribute to our success in delivering the capability required by our Sailors and Marines. In the particular case of the CVN 78 GERALD R. FORD, the program has in fact been subject to continuous oversight by Office of the Secretary of Defense (OSD), Congress, and outside agencies for more than the seven years I have been the Secretary of the Navy (this, in addition to the rigorous system and program reviews conducted by the Navy with participation by your staff and other offices within OSD). The added measure you propose with this independent review, however, raises concerns due to its untimely nature and the added burden it imposes upon an already fully-engaged workforce currently preparing for CVN 78 sea trials.

As you have noted, the systems you have assigned for review were directed for introduction in a single step on CVN 78 - versus the Navy's recommended three-hull incremental modernization strategy - by then-Secretary of Defense Rumsfeld in conjunction with the Department of Defense's (DoD) "Transformation" initiative. Since that decision, the Navy has successfully retired the long list of technical risks that have emerged throughout the design and construction of the lead ship, many of which trace directly to the concurrent development of the systems you've cited. These technical risks, however, have seriously compounded the lead ship's cost. More than five years ago, when the ship was less than 20 percent complete, I reported the true cost of the CVN 78 and since that time have taken extraordinary measures to ensure that we execute the program below the congressional cost cap that was applied to that cost estimate. Every step that we take on CVN 78 and follow ships must account for cost impacts alongside schedule and technical risk.

Currently, CVN 78 construction is effectively complete, testing is greater than 90 percent complete (with the last 5 percent to be accomplished on sea trials), and we remain below the cost cap. A summary status of the systems of interest is attached with the bottom line being that as we prepare for the first of class sea trials, we are steadily resolving remaining issues with what has proven to be the most extensive ship test program in our history. (In certain cases, there are no remaining issues; the system has satisfactorily completed shipboard testing and is awaiting demonstration per-plan in Post-Delivery.)

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The systems you have identified for the independent review are vital, but I am concerned by the timing of this review. At this late stage, it appears time-late in that the opportunity for such a review to contribute to the resolution of the technical issues for the lead ship has passed. More importantly, it will be untimely in that it will impose added burden to the fully engaged system experts who are currently focused on completing the testing required to support CVN 78 sea trials. In either case, rather than contributing to the correction of the known issues or otherwise contributing to the completion of the test program, it is destined to serve as an ex-post facto report of first of class lessons learned, which the Navy has documented and continues to document on this program.

Therefore, while I acknowledge your intent for this review, as the Secretary responsible for delivering CVN 78 subject to all of the cost and schedule implications associated with the congressional cap, I cannot at this time support the proposed independent review, but rather urge that it be scheduled on a not-to-interfere basis after completion of CVN 78 sea trials.

Attachments:
As stated

1. Power Generation – Propulsion and electrical system components that could be associated with the recent issues discovered with the Main Turbine Generators

a. The CVN 78 power generation system is a completely new design, as required to support the significant increases to electrical loads and future growth projected for the FORD Class over the next century of its service life. The design, modeling and land based testing of the system and system components were accomplished to the extent possible leading up to the shipboard test program. Shipboard testing demonstrated high power operation of these power generation components using reactor steam, including support of large electric loads (e.g., Electromagnetic Aircraft Launch System (EMALS)) earlier this year. During recent shipboard system level testing, we encountered an electrical component failure, likely due to a manufacturing defect. Analysis of this issue revealed design vulnerabilities that must be addressed prior to ship delivery. These first-of-class discoveries could not otherwise have been identified in the course of sub-system testing and modeling and simulation. The nation's leading experts on shipboard power generation systems are working resolution of these issues with a priority on safe, reliable system performance while balancing cost and schedule considerations. In view of the real-time nature of these 'test-and-fix' issues, we will not be prepared to address the way ahead until we have completed root cause analysis of the known issues and determined the associated corrective action which we are currently completing.

b. EMALS – The lack of sufficient reliability growth demonstrated to date and the ability to support both surge and sustained aircraft operations.

c. The EMALS is designed to significantly improve the performance and reliability beyond that of legacy aircraft carrier launch equipment. The design has been proven, to the extent practical, through exhaustive land-based testing, including High Cycle Fatigue Testing and Highly Accelerated Life Testing, and it has completed all shipboard testing pending the commencement of shipboard aircraft operations during the planned underway periods during FORD's extensive Shakedown and Post-Delivery Test and Trials (PDT&T) period. The Navy is confident that EMALS is on track to support CVN 78 system performance requirements and we look forward to demonstrating continued reliability growth of this system through the course of PDT&T.

2. Advanced Arresting Gear (AAG) – The technical challenges identified in system hardware and software, achievement of design performance criteria for the operational envelope, reliability growth, and the ability to support both surge and sustained aircraft operations.

a. The AAG has had significant delays in completing its land-based test program due to the technical challenges encountered in transitioning from design through modeling and simulation, component testing, subsystem testing at the Jet Car Track Site, and finally, system testing at the Runway Aircraft Landing Site (RALS). We are currently completing RALS testing, installing related field change work packages onboard CVN 78, and on track to issue an Aircraft Recovery Bulletin for the F/A-18E/F in support of aircraft recovery during planned Post-Delivery underway aircraft recovery tests. Similar to EMALS, operation of the system during PDT&T will demonstrate continued reliability growth. While the Navy is satisfied that the system will

meet its requirements for the current air wing, further control system work will be required to expand the recovery envelope to support the air wing of the future.

b. As you are aware, the Navy initiated a review early this year to evaluate the cost versus benefit of AAG to determine whether future aircraft carriers should stay the course with this system or potentially pursue an alternative, upgraded version of the legacy Mk 7 aircraft recovery system. This review is taking into account system performance, procurement cost, life cycle cost, and shipboard impacts. The fundamental question is whether the higher procurement cost for AAG is warranted by performance improvements and the significant life cycle cost savings AAG provides compared to the Mk 7 system. For CVN 79 in particular, this question must also consider the significant increased cost and schedule impacts associated with re-designing the ship at this late stage of construction and the risk associated with any assumptions regarding the availability of a Mk 7 system able to support the ship schedule (since the system is out of production). We will be reporting the results of this review to you and to the Congress upon completion later this year.

3. Dual Band Radar (DBR) – Ship integration issues discovered on CVN 78 that need to be avoided with the Enterprise Air Surveillance Radar on CVN 79 and later.

a. The DBR is an integrated S-Band Volume Search Radar (VSR) and X-Band Multi-Function Radar (MFR) system. As a result of decisions made by DoD in 2010 to de-scope DBR from the DDG 1000 in conjunction with truncating the DDG 1000 program, CVN 78 will be the only ship with the full DBR system thus increasing CVN 78 test requirements. DDG 1000 retained a modified MFR portion of DBR, however the resultant design is significantly different than the CVN 78 DBR. The DBR is currently completing its CVN 78 shipboard test program in preparation for underway sea trials. The unique technical requirements associated with integrating this new radar system with CVN 78's new power distribution system were finalized approximately five years ago. While the associated systems' design features were incorporated in the construction of CVN 78, the total integrated testing of DBR with ship's power is not possible until systems are lit off in conjunction with the shipboard test program. We are completing this testing on a not-to-interfere basis with power system testing and we are confident in our ability to successfully demonstrate the functionality required for successful sea trials and subsequently, for Operational Testing in Post-Delivery. Regarding your concern that we avoid similar ship integration issues with the introduction of the Enterprise Air Surveillance Radar (EASR) on CVN 79 and follow ships, unlike DBR on CVN 78, both the power distribution system and EASR will be characterized prior to ship installation. The power demands for EASR are notably less than for DBR and pulsed power loading was considered early in EASR's design.

4. Advanced Weapons Elevators (AWE) – System

a. The AWEs are designed to support the increase in sortie generation rate and strike capacity of the FORD class. These new-design weapons elevators have experienced delays in late-stage integrated shipboard testing mainly due to correction of software discrepancies. The Navy, HII, and their vendor(s) have been dissecting the problems through continuous, intense, and repeated test, analyze, fix cycles. Navy's plan is to employ the completed AWEs for crew training and operations pending completion of all eleven AWEs to support start of Post Delivery Test &

Trials. Based on testing completed to date, the Navy is confident we will get through these first-of-class issues with AWE and ensure that lessons learned on CVN 78 are directly applied to CVN 79.