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FOR: UNDER SECRETARY OF DEFENSE (AT&L)

FROM: Mr. Gary R. Bliss, Director, Performance Assessments and Root Cause Analyses
(D, PARCA) 28 May 2014

SUBJECT: Root Cause Analysis of the Joint Precision Approach and Landing System Increment 1A (JPALS Inc 1A) Program

Purpose. This memorandum summarizes PARCA's root cause analysis of the JPALS Inc 1A program's cost growth which triggered a critical Nunn-McCurdy breach as described in the program's December, 2013 Selected Acquisition Report (SAR). That SAR reported a 104.3 percent increase in program acquisition unit cost (PAUC) and a 129.0 percent increase in average procurement unit cost (APUC) compared to the original and current baselines (which are identical).

- The SAR attributed the cost growth to "a reduction in total planned quantities due to the elimination of previously required shore-based training systems, an extension of the development program to include capability improvements, a lower and longer procurement profile, and increases in material costs."

Modest cost growth occurred on the baseline program. PARCA's methodology for all root cause analyses includes determining the extent and causes of cost growth of the program as it currently exists and assessing whether such a program would have triggered a Nunn-McCurdy breach if it were completed according to its current plan. PARCA assesses that existing PAUC and APUC growth of the JPALS Inc 1A program was on the order of 10%, divided primarily among three factors, including (1) underestimation of government and contractor SEPM personnel; (2) schedule slips resulting from shifts in test asset availability; and (3) extension of procurement and install profile by two years from the original baseline. A small amount of cost growth also results from past and on-going efforts to plan and propose a restructured program.

JPALS Inc 1A program compared to multi-increment JPALS capability. In assessing this program, it is important to understand the distinction between the JPALS Inc 1A Major Defense Acquisition Program (MDAP) and the full JPALS capability.[1] The approach in the original Acquisition Strategy was to acquire full JPALS capability via seven increments. Prior to program initiation, Inc 1 of this seven-increment program was further separated into two phases, 1A and 1B. Inc 1A was to field a JPALS ship based system onto sea-based platforms,

[1] As defined in original and revised Acquisition Strategies, approved July 17, 2007 and July 14, 2008, respectively.

while Inc 1B was to integrate JPALS onto operational sea-based aircraft. On July 14, 2008, JPALS Inc 1A was initiated as an Acquisition Category 1D MDAP. According to the revised Acquisition Strategy, follow-on Increments 1B and 2-7 were to have separate MS B decisions to allow the JROC and MDA the flexibility to "approve one increment of JPALS at a time as future capabilities and associated cost estimates are better understood."

Navy's proposed restructured program would change both capability and quantities compared to baseline program, but largely due to a common root cause. The Navy proposes to reduce JPALS Inc 1A quantities by eliminating procurement of previously required shore-based training systems. This quantity reduction accounts for a PAUC increase of ~30% and an APUC increase of 18%. The Navy also proposes to shift some development efforts originally associated with future Increments 3 and 4 into the restructured program's baseline. This added content accounts for a PAUC increase of ~60%, but only marginally contributes to the APUC cost growth.[2] However, the Navy's proposals to change quantity and shift content both result from a common root cause: the changing environment associated with civil and military precision approach and landing systems. Specifically, delays and ultimately suspension of the Federal Aviation Administration's (FAA) plan to transition from Instrument Landing System (ILS) to GPS-based landing systems led to a cascading series of decisions by the Navy, Air Force and Army that account for the preponderance (~90%) of the cost growth of the proposed restructured program.[3]

JPALS Framing Assumption.[4] For many years prior to initiating the JPALS Inc 1A program, Navy and Air Force officials closely coordinated with FAA officials on plans for developing and fielding GPS-based landing systems, including JPALS, to replace ground-based navigation aids. In hindsight, evidence indicates that a key Framing Assumption of the JPALS program was that GPS-based landing systems would replace ILS and that military aircraft would require such systems to ensure interoperability with civilian landing systems. As of November, 2005 when the JPALS Analysis of Alternatives (AoA) Update was approved, the FAA planned to begin phasing-down Category (CAT) I ILS in 2015, in favor of GPS-based systems. This is documented in the 2005 Federal Radionavigation Plan (FRP), which is a statutorily required document prepared jointly by the Departments of Transportation, Defense and Homeland Security. However, due to funding and technical issues, development of GPS-based systems progressed more slowly than anticipated, and in the 2008, 2010 and 2012 FRPs, no dates were provided for commencement of CAT I ILS phase-down. Most recently, the FAA's FY13-17 Capital Investment Plan states that the "FAA plans to make an initial decision in 2014 whether to begin a drawdown of Category I ILS…" This changing environment, combined with fiscal

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[2] A related issue is the consolidation of funding from planned future JPALS Increments (1B, 2, 3 and 4) into JPALS Inc 1A to support required government in-house systems engineering and program management (SEPM) personnel. This accounts for PAUC growth of ~10-20% and APUC growth of ~60%.

[3] Two other issues are cited as proximate causes of cost and schedule growth in the December, 2013 SAR. PARCA assesses that the lower and longer procurement profile and the increases in material costs had only small effects on PAUC and APUC growth.

[4] PARCA has observed from previous root cause analyses that cost and schedule growth often result when one or more postulates believed to be true at program initiation turn out to be invalid. We refer to these as "Framing Assumptions."

constraints, appear to be the key reasons that the Navy, Air Force and Army have decided to terminate their efforts to integrate JPALS onto legacy aircraft.[5]

Performance. There appear to be no technical or fiscal issues associated with procuring and fielding the JPALS Inc 1A sea-based systems. Test results have exceeded expectations and the contractor has been awarded incentives for achieving Objective level capabilities. Evidence indicates that the delay in production and fielding of the JPALS Inc 1A sea-based system is not the result of system ineffectiveness. Instead it results from a timing gap between availability of the sea-based system and integration of JPALS onto the lead aircraft (F-35B/C), which in turn, results from the Navy's plan to terminate Inc 1B, which was originally intended to equip the lead aircraft.

Risks for future Cost Growth. While unanticipated technical issues can never be discounted, PARCA believes the greatest risk for future cost and schedule growth of the Navy's proposed restructured JPALS program is its programmatic interdependency with the F-35 program. Whereas the baselined program was scheduled to achieve Initial Operating Capability (IOC) in 2016 using an F-18E/F surrogate aircraft equipped with an Avionics Test Kit, the Navy's proposed restructured program requires that JPALS capability be incorporated in F-35 software drop Block 5, and IOC is not scheduled to be achieved until 2026. The Navy has attempted to mitigate risk by defining an EOC — Early Operational Capability, which is scheduled for 2020. Delays in F-35 software development will almost certainly translate into delays in integrating JPALS into the F-35, which would lead to cost and schedule growth of the JPALS program.

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[5] Specifically, the Navy proposes terminating Inc 1B and adding development efforts originally planned for follow-on Increments 3 and 4 into the restructured Inc 1A program, including design improvements to provide manned and unmanned aircraft with autoland capabilities and to support F-35B/C and Unmanned Carrier-Launched Airborne Surveillance and Strike (UCLASS) shipboard testing.