Battle Control System – Fixed (BCS-F)

Executive Summary
- The Air Force is completing operational testing on the Battle Control System – Fixed (BCS-F) Increment 3, Release 3.1 (referred to as "Increment 3.1") at all U.S. air defense sites.
- Results from Increment 3.1, to include Release 3.1.2 (R3.1.2), testing to date found Increment 3.1 supports North American Aerospace Defense Command (NORAD) air defense operations with shortfalls in training and technical system documentation, system security management, and system combat identification operations.
- Increment 3.1 testing also has highlighted significant deficiencies in information assurance. The Air Force has implemented some corrections but a complete assessment of Increment 3.1 performance will not be available until the information assurance and penetration T&E is completed at the end of 2011.

System
- The BCS-F is a tactical air battle management command and control system that provides the two continental U.S. NORAD air defense sectors, as well as the Hawaii and Alaska Regional Air Operation Centers, with common commercial off-the-shelf hardware based on an open architecture software configuration. The system operates within the NORAD air defense architecture.
- The Increment 3.1 upgrade includes the following:
  - Transitions the system to a Linux operating system and integrates an improved human-machine interface through the Raytheon-Solipsys Tactical Display Framework.
  - Improves the system data and track processing and management and enables the BCS-F to receive plot and track data from an increased number of radars and display track history plots and sensor data on the single air situation display.
  - Provides internet protocol-based radar and flight plan interfaces and an upgraded capability for tactical datalink operations.
- The BCS-F Increment 3.1 upgrade also provides a new air defense operating system that integrates the National Capital Region Sentinel radars and replaces the NORAD Contingency Suite (NCS) at the two continental U.S. sectors. The DoD employed the NCS system following 9/11 to allow the integration of continental U.S. interior radar data and

to meet the expanded mission requirements of Homeland Defense. The two continental U.S. air defense sectors are now providing a tactical air picture to NORAD headquarters and other external agencies via remote tactical air picture/remote workstation, versus the NCS.
- A planned Increment 3, Release 3.2 upgrade will advance BCS-F capabilities through improved tactical datalinks, air tasking order and airspace control orders integration, increased system track capacities, and updated hardware and software.
- BCS-F is employed by the U.S. and Canada.

Mission
- NORAD and U.S. Pacific Command commanders use BCS-F to execute command and control and air battle management in support of air sovereignty and air defense missions for Homeland Defense.
- Air defense operators employ BCS-F to conduct surveillance, identification, and control of U.S. sovereign airspace and control air defense assets, including fighters, to intercept and identify potential air threats to U.S. airspace.

Major Contractor
Thales-Raytheon – Fullerton, California

Activity
- The Air Force contracted development of Increment 3.1, R3.1.2, to address three critical system deficiencies and 43 functional fixes to non-critical system problems. The Air Force also contracted development of R3.1.2.1 to address two new critical deficiencies discovered during 3.1.2 testing.

- The Air Force conducted operational testing on R3.1.2 at three U.S. sites and the Canadian site in November and December 2010. In addition, they conducted testing on

R3.1.2.1 at all four U.S. sites and the Canadian site in January and February 2011.

• The Air Force contracted development of R3.1.2.2 as a software patch to increase the number of external connections for the remote tactical air picture. The Air Force conducted a limited test of R3.1.2.2 in April 2011 to ensure no degradation to BCS-F operations at the four U.S. sites and the Canadian site.

• The Air Force further contracted development of R3.1.3 to address five critical system deficiencies identified during 3.1 and 3.1.2 operational testing. R3.1.3 also contains over 60 software fixes, the majority of which address information assurance and system administration fixes.

• The Air Force conducted operational testing of R3.1.3 at the system support facility at Tyndall Air Force Base, Florida, in June and July 2011, the Eastern Air Defense Sector, the Alaska Regional Air Operations Center, and the Canadian Air Defense Sector in September 2011. Operational testing at the Western Air Defense Sector is scheduled for September 2011 and operational testing at the Hawaii Regional Air Operations Center is scheduled for October 2011.

• The Joint Interoperability Test Command (JITC) completed a Joint Interoperability Test datalink certification for Increment 3.1 in August 2009. JITC reported in February 2010 that Increment 3.1 conforms to required joint and DoD standards; however, a JITC certification cannot be attained on Increment 3.1 until the Information Support Plan has been certified by the Joint Staff. The program is currently operating under an interim certificate to operate.

• The Increment 3.1 system security penetration testing still remains outstanding. The testing must be completed in order to complete operational testing in accordance with the DOT&E-approved test plan. R3.1.3 testing is scheduled for September through November 2011.

• The Air Force conducted developmental testing on a new upgrade under BCS-F Increment 3, Release 3.2 at the system support facility in July and August 2011. IOT&E is scheduled for April through June 2012 and the Test and Evaluation Master Plan must be finalized and approved prior to the start.

• The Air Force has cancelled plans for a follow-on Increment 4 upgrade.

Assessment

• A final assessment of Increment 3.1 performance will not be available until all testing is completed in FY12 and the data have been analyzed. However, DOT&E initial analyses indicate:
  - BCS-F Increment 3.1 is able to support NORAD air defense operations, providing the ability to adequately perform core competencies and tasks required to accomplish the air defense mission.
  - BCS-F Increment 3.1 provides an improved functionality and capability over the legacy Increment 2 system. Operators from each sector overwhelmingly stated that Increment 3.1 enhanced situational awareness and their ability to perform their missions.

- Shortfalls in system security management and deficiencies in all information assurance assessment areas jeopardize secure system operations. The Air Force has implemented some corrections but a complete assessment of Increment 3.1 performance will not be available until information assurance and penetration T&E is completed in November 2011.

- Test data collected to date indicate Increment 3.1 has demonstrated adequate reliability, maintainability, and availability. Increment 3.1 has an average system availability of 99.97 percent, with over 1,900 hours of system operation during operational test. Increment 3.1.2's average availability is 99.86 percent over 1,500 hours of testing.

- Deficiencies exist in Increment 3.1 training for the intrusion detection system, the firewall, the local area network, the gateway manager, system doctrine, and combat identification. Additionally, Increment 3.1 lacked adequate security plans specifically in system vulnerability management.

- Results from remote workstation testing highlight major deficiencies with training, documentation, logistics/spares, help desk support, and information assurance that may significantly affect the long-term sustainment of the remote workstations.

- Results from Increment 3, Release 3.2 developmental testing revealed a critical deficiency in the system's datalink gateway manager capability that would have prevented the system proceeding to IOT&E. The Air Force placed a high priority on corrective action. On-going developmental regression testing is assessing the effectiveness of those actions.

- The program must conduct a portion of the developmental and operational testing at the operational sites due to limitations of the System Support Facility test-bed, and uniqueness of each air defense site. If the Air Force upgraded the System Support Facility to more accurately represent the air defense sites, it would support more robust BCS-F developmental and operational testing capability and would minimize the overall impact of testing at operational sites.

Recommendations

• Status of Previous Recommendations. The Air Force made progress on one of the two FY10 recommendations. The Air Force still needs to correct and formalize all BCS-F Increment 3 system documentation and training deficiencies. If the Air Force decides to continue future incremental development, they should document current and future users' requirements through a new Joint Capabilities Integration Development System document. The Air Force still needs to address the FY09 recommendation to upgrade the System Support Facility to support more robust BCS-F developmental and operational testing capability in order to minimize the impact of overall testing on the operational sites.

• FY11 Recommendations. The Air Force should:
1. Submit the BCS-F Increment 3, Release 3.2 Test and Evaluation Master Plan for approval.
2. Complete all information assurance testing to include penetration testing on BCS-F R3.1.3 at an operational air defense sector and schedule information assurance and penetration testing for R3.2.
3. Continue to track and correct information assurance deficiencies to completion.
4. Brief NORAD leadership on results of testing conducted to date to include information assurance testing.
5. Ensure all system documentation and training identified as deficient be corrected and formalized.
6. Develop a plan for remote workstation management to include sustainment, training, documentation, and information assurance compliance.