## I. Program Overview

| Organization Name/Program Name: | Northrop Grumman Corp. – Prime Contractor  
Space Tracking and Surveillance System Demonstration (STSS-D) |
|-------------------------------|------------------------------------------------------------------|
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| Program Category | System level R&D/SDD program or project |

### Program Background:

#### What is this program all about? (No more than one page). Describe:
- The overarching need for this program
- History of the program
- The product that is created by this program
- Scope of work – original & updated
- Expected deliverables
- Current status of the program

#### Need:
One of the greatest threats facing our national security is the increasing proliferation of ballistic missiles. We are limited, though, in “seeing” them all the way through their trajectories, from launch to reentry, because:
- Missiles are hardest to track during the longest – or midcourse phase – of flight, which is about 80 percent of total flight time. This is the crucial period when their engines stop firing, they deploy deadly warheads and begin reaching their highest speed before re-entering the atmosphere. But traditional radar and infrared sensors can’t always follow them.
- Without the ability to track missiles through midcourse, there's no hope of having a real defense against intercontinental ballistic missiles.

That’s why the U.S. Missile Defense Agency is pursuing STSS-D and operating the two-satellite STSS-D constellation as the experimental space layer of the Ballistic Missile Defense System (BMDS). The two unique satellites have the only sensors with the sensitivity and line-of-sight precision that can leverage the high ground of space to track missiles full-course.

#### History:
STSS-D traces its missile defense lineage to March 23, 1983, when former President Ronald Reagan announced the Strategic Defense Initiative. To succeed, the country needed a quick and efficient way to detect and track hostile missiles through their complete flights.

The solution: Constellations of infrared (IR) satellites serving as a watchtower for the entire BMDS. Initially known as “Brilliant Eyes,” program direction changed several times, morphing into successor efforts called the Flight Demonstration System and Space-Based Infrared System-Low (SBIRS-Low). After being cancelled in 2000, SBIRS-Low was resurrected in 2002 and renamed STSS.

#### Product / Expected Deliverables:
- Two low-earth orbiting satellites, each with a pair of IR sensors: (1) A short-wave IR, wide-field-of-view acquisition sensor to monitor, autonomously detect and track missiles through boost phase; and (2) A narrow-field-of-view, gimbaled track sensor capable of tracking missile from post-boost, through midcourse and then to reentry or intercept, using multiple IR bands.
- An operational ground segment, located at Schriever Air Force Base, Colo.

#### Scope of Work: MDA’s contract awarded in 2002 called for Northrop Grumman to: (1) Complete development of each segment; (2) Launch, calibrate and operate the space vehicles and (3) Plan for and execute on-orbit activities.
Current Status:
- Both satellites are operating nominally on-orbit under the control of the Missile Defense Space Development Center (MDSDC) at Schriever Air Force Base, Colo. They are participating in integrated BMDS testing, meeting all test objectives and providing significant risk reduction for a future missile defense operational satellite constellation.
- They have generated “stereo” or 3-dimensional missile tracks, yielding the best quality data yet seen from a space-based sensor.
- They successfully performed the ultimate mission for missile defense sensors in March 2011 – full-course, or ‘birth-to-death’ tracking of a ballistic missile.
- Altogether, they have validated key objectives in four main categories: (1) Birth-to-death tracking, (2) launch-on-remote, (3) space situational awareness, and (4) risk-reduction for a follow-on, operational constellation.

II. Value Creation = 20 points

Value: What is the value, competitive positioning, advantage, and return created by this program to your:
- Customers – National interests, war fighter
- Company – Strength, bottom line, and shareholders
- Scientific/technical value (particularly for R&D programs)

Excellence and Uniqueness: What makes this program unique? Why should this program be awarded the Program Excellence Award?

Customer Value: STSS-D satellites are showing space-based sensors can deliver taxpayer value, highlighted by the MDA Director’s May 25, 2011 congressional budget testimony: “Two recent flight tests demonstrated that STSS dramatically improved the precision of threat missile tracks and provided more accurate fire control quality data to the Aegis ships several minutes earlier than less accurate data provided by organic radars in the Aegis or THAAD systems.” STSS-D is:
- Reducing the risk – and ultimately the cost – of MDA’s long-term strategy of fielding a constellation of precision tracking satellites as a key BMDS element.
- Achieving first-ever milestones like birth-to-death tracking. Previously, this took a combination of sensors in space, on the ground, in the air and at sea.
- Implementing Aegis destroyer launch-on-remote (LOR), allowing Navy cruisers to cover larger areas with fewer ships.
- Enabling early missile intercept through global monitoring and tracking, giving war fighters more time and opportunities for successful intercept.
- Re-using flight hardware and software designed – and then abandoned – in the previous century to achieve these successes.

Company Value: Northrop Grumman’s experience as STSS prime contractor stands to provide substantial shareholder value.
- STSS-D positions the company well for growth opportunities in future low-earth orbiting (LEO) missile defense competitions.
- The knowledge in place now from building and operating the satellites lays the groundwork for productivity gains on current and future programs.

Scientific / Technical Value: STSS-D is generating the highest-precision, high-quality missile tracking ever produced by space-based sensors. This data allows analytic models to be anchored with higher fidelity than ever before, benefiting all phases of system development and operation for PTSS, SM3-2B and other programs across the Defense Department.

Excellence and Uniqueness: The Northrop Grumman-Raytheon team faced a challenge never before seen in government or industry: Revalidating partially built flight hardware – most manufactured in the 1990s, from warehouse storage. The team launched the satellites in 2009, ending one chapter of a most unusual and unprecedented space story that set the stage for on-orbit successes.
## III. ORGANIZATIONAL PROCESSES/BEST PRACTICES: (HOW DO YOU DO THINGS) = 30 POINTS

### Strategic: Opportunity Management -
**Describe how your program has identified its operational and business opportunity, and manages this opportunity throughout the program’s life cycle.**

**Opportunity Management:** Northrop Grumman manages operational and business opportunities STSS-D presents in three main ways:

- **Contract structure:** The current MDA contract’s structure provides a vehicle for acquiring a follow-on system. It defines a series of cycles with contract line items that can be used for an operational constellation.
- **Communications campaign:** On-orbit successes are being publicized through ongoing, integrated communications activities to inform all audiences about these never-been-done-before capabilities. This helps create a more favorable business environment in which to shape the acquisition plan for and architecture of a follow-on system.
- **Concept development:** Northrop Grumman is proposing its own concept for an affordable follow-on system by “refreshing” current technology and incorporating key lessons-learned from STSS-D. By making 1-for-1 comparisons between government and industry concepts, the company is stimulating interest and debate about the best way to deliver taxpayer value.

### Strategic: Strategic Supply Chain Integration and Cost Effectiveness Management -
**Describe how your program is integrating its supply chain to assure visibility and adapting long-term cost effectiveness up and down the supply chain.**

**Supply Chain Management:** A supplier management technique used for the first time yielded the most results – embedding engineering resources from the prime contractor into a subcontractor’s onsite operations. Most activity occurred in the technical area and gave Northrop Grumman early warning of potential issues. This initiative also provided visibility and connectivity into three other areas of supplier operations: management and mission assurance.

Embedding is an enhancement to traditional supply chain management performed through subcontract management teams. These are small, integrated product teams (IPT) charged with (1) successfully executing the supplier’s work scope and (2) closely coordinating the supplier’s efforts with other program IPTs.

### Strategic: Operational Integration and Systems Engineering –
**Describe the challenges faced by your program in terms of integrating the system into its operational environment and its impact on systems engineering planning and management.**

**Operational Integration and Systems Engineering:** STSS-D was conceived as a contributing sensor for demonstrating operational concepts. As such, it had limited interfaces to the overall BMDS. As BMDS capabilities matured, though, MDA required its participation in all system-wide tests. This meant complex interface upgrades and operational concept changes to adapt the demonstrators for a much broader mission.

- To accommodate Aegis LOR, for example, the system engineering team developed numerous data flow options for getting data to an Aegis cruiser. A new external interface was implemented and validated through early hardware-in-the-loop testing. So far, STSS-D has achieved LOR quality of service in two BMDS tests, with plans for an actual intercept based on STSS-D data.
- Similarly, a reverse cue, from system track to STSS-D, was used to acquire and track a target. We continue to look for ways to leverage the performance of other BMDS elements to improve STSS-D’s performance as part of an ongoing “cue and be-cued” test campaign.

### Operational: Planning, Monitoring, and Controlling -
**Describe your planning and resource allocation processes. How do you monitor and review your**

**Planning, Monitoring and Controlling:** The earned value baseline and integrated master schedule (IMS) capture resource assignments and the integrated program plan for achieving all objectives.

- Sufficient resources are assigned to each IPT to complete each baseline activity. Cross-IPT hand-offs were captured as “giver-receivers” in the IMS, with agreed-to completion criteria.
program’s progress and make corrections to keep the program on track?

- “Change requests” are processed when IPT budget or forecast resources change, such as a testing failure that requires hardware repair.
- Detailed “inch-stone” schedules with weekly updates are used to monitor progress on critical path activities, as well as on parallel, near-critical paths.
- Additional resources were assigned and conflicts resolved by management. Activities are frequently re-sequenced to minimize impact, while assuring that all required work was completed and that all elements were ready to move forward past critical gates.
- Financial trends are monitored monthly, at the control account level, and corrective action plans generated to reduce the variance at complete.
- Plans and status are communicated with the USG SPO regularly, to ensure insight and to enable adequate oversight. Issues are identified and resolution plans developed at the IPT level. Programmatic issues are adjudicated at the Program Change Board, where the NG and SPO directors make decisions.

Operational:
Supply Chain and Logistics Management -- What processes, tools and relationship-building methods have you used to develop, refine and improve supply chain and stakeholder integration? Please indicate also methods used to analyze/fact-find regarding supplier proposals. This is one of the most imperative needs of our industry – please provide specific details and data that assisted you in gauging the effectiveness.

Supply Chain / Logistics Management: Relationships for STSS-D subcontracts were established under SBIRS-Low and re-established when the program resumed as STSS. Throughout these changes, we have sought process consistency through:

- Maintaining a badge-less environment that fully integrates supplier and prime employees into a single team.
- Embedding technical and quality control managers at vendors.
- Full subcontractor participation in program risk and opportunity management processes. These primarily involve identifying risks, mitigation planning and tracking risks to retirement. Resident engineers seek to identify issues early on and aggressively work to resolve them.

Subcontractor performance across multiple programs is tracked through quarterly scorecards shared in a shared database. This allows technical managers to track any given supplier’s positives and negatives and to devise approaches for preventing recurrence of substandard performance. Executive-level meetings are held with major subcontractors to discuss performance across the portfolio of programs at least quarterly to ensure clear communications.

Operational: System Integration, Testing & Reviews - Describe the activities and processes used to succeed in your system integration, and testing. How did you conduct system design and technical reviews?

STSS-D used three parallel activities during system development to achieve an integrated system:

- **Space vehicle developmental test program:** An electrical engineering model test bed (EEMTB) validated closed-loop subsystem operations using operational flight software and a vehicle dynamics simulator (VDS). The VDS provided simulated sensor input data to the EEMTB, allowing flight software operation in flight modes, with onboard control loops enabled and responding to simulated inputs. The sensor payload flight software was validated using the integrated pathfinder facility (IPF). The EEMTB and IPF were combined to form an integrated test bed (ITB) that enables real-time space platform operations using the full ground system, either at Northrop Grumman or at MDSDC. The ITB is currently used during STSS-D mission readiness preparations for dry runs of operational command sequences and for pre-installation checkout of new operational flight software.
- **System-level compatibility tests:** Implemented by the risk management board, these tests were performed throughout system development and
integration to ensure command, telemetry and mission data compatibility between ground and space segments. These tests were scheduled between major space vehicle integration operations, using links between the ground system development facility and the space vehicles’ I&T high bay.

- **System software integration tests:** These were performed using a real-time system emulator (RTSE), which complements the ITB by providing a mission-level simulation with two simulated space vehicles, driven by a payload mission simulator, and operated/controlled through an engineering version of the ground segment. The payload mission simulator executes BMDS mission simulations and provides simulated acquisition and track sensor data to the payload mission software, creating optical sighting messages (OSM) that are routed to and processed by the ground control segment.

  RTSE enabled incremental cross-program mission processing software evaluations, ensuring that gaps in processing threads were identified and corrected long before the system was deployed. RTSE is presently used to (1) validate collection plans to be used for BMDS tests; (2) to provide simulated OSMs for use in BMDS-level HWIL simulations; and (3) to prototype new system software capabilities.

**Operational:**
**Risk / Opportunity Management:**

- Adopting a formal risk management process in the pre-launch phase based on Northrop Grumman best practices. This process identified risks and instituted mitigation plans. Individual IPTs executed mitigation plans, presenting status to the risk management board. Many opportunities for additional risk reduction were identified by IPTs and subsequently authorized.
- Expanding the scope of system-level compatibility tests to (1) ensure the ground command database was completely validated against the space vehicle, and to (2) include performing several simulated “day-in-the-life” tests, where operators at MDSDC conducted mission operations with the space vehicle in thermal vacuum at Northrop Grumman (allowing payload operations).
- Performing software upload tests that validated processes for on-orbit software updates. These tests identified new tools and validation steps that were incorporated into post-launch processes and procedures, greatly reducing on-orbit risks.

**Forward-Leaning Effort:** Post-launch risk and opportunity management is being performed at the BMDS test level as part of test operations concept development. A major risk to maximizing STSS-D’s potential involves launch times for missile targets and whether the satellites are in position to participate. An example is an Aegis LOR exercise April 15 at the Reagan Test Site, Kwajalein. Conditions forced the launch of an intermediate range ballistic missile when the demonstrators were out of viewing range.

The test team didn’t walk away. It quickly arranged for the satellites to be cued remotely by another BMDS sensor – a function that didn’t exist previously. The result: Both STSS-D space vehicles received the external cue, acquired the target and provided hundreds of seconds of valuable midcourse tracking data – including the first 3-dimensional or “stereo” observations of multiple objects.
Team Culture and Motivation: Very few engineers get to launch and operate first-of-a-kind space systems. The realization that their efforts directly affect mission success, and the opportunity to participate in never-been-done before challenges, is very motivational.

- Before launch, a comprehensive series of rehearsals prepared the team to handle unexpected anomalies and assured that engineering and operations teams were well-integrated for maximum efficiency. Each rehearsal incorporated additional participants and new anomalies that injected stress that helped develop real-time troubleshooting skills. A hot-wash after each rehearsal captured lessons-learned and areas for improvement, resulting in improved definition of roles and responsibilities, refined the chain of command, and made decision making processes crisper. These rehearsals built esprit de corps among Northrop Grumman, Raytheon, Aerospace Corp. and military personnel, successfully integrating the team towards a common goal of successfully launching and activating the satellites.

- As sensor calibration was completed, MDA tasked STSS-D with participating in Minuteman III ICBM test flights or Glory Trips, allowing the demonstrators to prove their capabilities. Equally importantly, this motivated the payload test team to complete sensor calibration.

- STSS-D makes extensive use of individual and team recognition tools. Key task leaders participate in a Northrop Grumman bonus program and most team members received checkbook awards for their contributions. Many events celebrated incremental successes during EOT.

Lessons Learned & Knowledge Management: STSS-D uses both structured and traditional, informal processes to capture lessons-learned and expertise.

- The program is required to capture long-term preventative actions, in addition to tactical corrective actions. Pre-launch, Mission Assurance used a closed-loop process to assure these actions were captured through updated procedure or test software. The mission operations team captured appropriate actions in both their flight procedures and in the flight operations constraint database. All new / modified flight operations procedures are cross-referenced against this constraint database, as part of the formal procedure peer-review process, assuring that previously learned lessons are incorporated in new procedures. As new lessons are learned during on-going operations, they are added to the constraint database, assuring that it remains current.

- Detailed sub-system level design, validation and performance data was captured by the sub-system engineer in a launch notebook that provided a summary of the pre-launch data and links to a complete pre-launch data set. These notebooks were the key resource used as we expanded the sub-system level teams from one engineer to four, in order to provide a dedicated team for each space vehicle, with two 12-hour shifts per day. Notebooks are still used as a resource for the operations team and when new members join the team.

- Additionally, several key space vehicle I&T engineers were added to the on-orbit operations team to ensure that as much of the general STSS-D space vehicle I&T experience / knowledge was transferred to the operations team as possible.
**Team Leadership:** Leadership Development
How do you develop team’s skills and build future leaders

**Leadership Development:** Leadership and team development are critical activities for STSS-D. Effective integration of 24/7 operations at MDSDC and day-staff at Northrop Grumman required empowering MDSDC team members, solid communications and knowledge transfer between teams. Northrop Grumman’s site manager and senior engineers at MDSDC are veterans from other spaceflight operations, responsible for hiring and training MDSDC engineering and space vehicle operations teams. This team was established two years prior to launch and all members were certified for STSS operations after completing comprehensive training and certification. The MDSDC team hosted launch rehearsals, using its experience to pull knowledge from factory experts, who were temporarily at the MDSDC to assure readiness.

One model that worked well involved pairing senior engineers on the factory team with junior operations engineers to foster mentor–protégé relationships, and to transfer technical and procedural knowledge to less experienced team members. As knowledge was transferred and the next generation of leaders identified, senior engineers transitioned to other programs. This same process was used to develop an expanded payload test planning and execution team during payload calibration, where senior-level calibration engineers developed diagnostics and junior engineers implemented them. As junior engineers learned processes and demonstrated their capabilities, they were given increased responsibilities as EOT continued. They are now leading BMDS test planning and execution activities.

Communications between factory and MDSDC teams occur daily in mission planning meetings where priorities, requirements and constraints are integrated into each day’s operations plan. MDSDC personnel frequently travel to the factory for detailed discussions, facilitating knowledge transfer to the MDSDC.

**Best ( & Next) Practices:** Identify your program’s specific Best Practices that you believe are unique, and could be shared with others and become industry's Next Practices.

**Best Practices:** Three risk-reduction best practices significantly improved the STSS’s readiness for on-orbit operations and BMDS tests:

1) Day-in-the-life testing conducted at the space vehicle level was crucial in determining our overall preparedness to operate the satellites. This test revealed weaknesses in operational procedures, ground software and plans, all of which were corrected before launch.

2) MDSDC operations crews executed virtual operations daily for several months before launch using recorded Air Force Space Control Network data. This increased their proficiency and fine-tuned procedures, and also revealed several minor issues involving data handling, archiving and retrieval that were resolved before launch.

3) A comprehensive risk and opportunity management process was integrated into our BMDS test planning process, forcing the test team to actively identify and mitigate risks to STSS-D mission success. We either identified alternate operational concepts, or improved existing ones, that enabled STSS-D to fully participate in tests that occur outside our preferred window.
IV. ADAPTING TO COMPLEXITY: (HOW DO YOU DEAL WITH YOUR PROGRAM’S UNIQUE COMPLEXITIES) = 20 POINTS

**Market Uncertainty:** STSS-D is a New to the World capability. MDA had the foresight to resurrect this program from the cancelled SBIRS-Low FDS to demonstrate the value of tracking post-burn-out targets – a never-been-done-before capability. The pair of satellites has demonstrated “birth-to-death” tracking of ballistic missiles and advanced the Technology Readiness Level of required hardware and software functions to the highest level.

With minor updates to the already proven STSS-D algorithms, an operational system could be fielded with no changes to the space vehicles’ (bus and payload) architecture. STSS-D flight hardware, designed in the mid-1990s, would require a hardware refresh to assure manufacturability.

**Technological Uncertainty:** STSS-D is a High-Technology program that uses advanced hardware and software technologies the Government Accountability Office deemed “unacceptable risks for an operational system” in 2001. Today, those technologies are rated TRL 9. To address those issues, the industry team:

- Implemented a comprehensive pre-launch test program of the payload, space vehicle hardware, and flight software. Comprehensive acceptance testing was conducted on flight hardware at the black-box level, the payload level, and the space vehicle level.
- Performed thorough environmental tests on integrated payloads and integrated space vehicles, including thermal cycling, thermal vacuum, and acoustic tests.
- Tested flight software at the unit level, and qualified it at the system integration level. Software also was tested in the real-time system emulator, the electrical engineering model test bed, and with flight hardware.

Failures that occurred during these tests were investigated by a Failure Review Board to determine immediate and root causes. The board also oversaw hardware rework or repair, directed penalty retests, and assessed reach-across to other similar hardware. The board successfully identified and corrected several mission-critical design defects in the flight hardware. This process necessarily delayed launch, to assure the hardware was robust, reliable and suited for use in its intended environment. Mission software processing of photons received by the sensors could be tested only at the integrated space vehicle level during thermal vacuum testing, where the focal planes function. Only one minor payload software change has been required since launch, demonstrating the effectiveness of the pre-launch payload software validation process.

**System Complexity:** STSS-D is a System, as previously described. Program processes have been established to effectively manage the operation and configuration of all of these elements. Specific software versions for each flight Software Item are maintained and can be loaded into the EEMTB or RTSE to provide the highest fidelity simulation of the flight system. RTSE with two simulated space vehicles is especially important for pre-mission BMDS test simulations. New operational procedures (or operational databases) are developed and validated in the appropriate test bed before being released to MDSDC for operational use. The customer participates in pre-release procedure validation and specifically approves their transfer and installation on the operational system at MDSDC. New ground software builds are factory acceptance tested before
delivery to MDSDC. At MDSDC, new software is installed on the back-up string for initial site acceptance, transitioned into operations for a “soak period” before installation on the primary string for long-term mission operations.

Identify the **Pace and Urgency** of your team’s effort using the definitions below. Then describe how you deal with the program’s pace requirements:

- **Regular timing** – no specific time pressures.
- **Fast/Competitive** – time to market is important for competitiveness.
- **Time Critical** – there is an absolute and critical-to-success deadline.
- **Blitz** – there is a crisis element driving the need for immediate response

**Pace and Urgency:** The pace and urgency of STSS-D operations are a mix of *Regular timing, Time Critical and Blitz*. The test and mission planning process is designed to assure that space vehicle command loads have been validated and are ready for execution in advance of the scheduled load time, enabling 24/7 operations of two space vehicles to occur with no specific time pressure. Daily contact schedules include backup contacts to mitigate the risk of a lost or dropped communication contact. The program continuously strives to maximize the number of data collections across both space vehicles. These data collections are comprised of planned tests that have several weeks to months of planning, as well as short-term targets of opportunity (TOO). In addition to specific BMDS test events, there are longer term campaigns that focus on extending and/or enhancing system capabilities to support test events in general. Current examples include a space situational awareness campaign and communications crosslink proficiency campaign. Targets of opportunity and the pursuit of continuous performance envelope expansion result in a **Time Critical** environment when the mission planning team must prioritize and replan activities on the space vehicle as real-world events – such as newly identified targets or a major BMDS test – are delayed due to weather at the target launch site. Often, planned targets are slipped from primary to alternate days and short lead time TOOs out prioritize scheduled maintenance activities. **Blitz** environments occur infrequently, when space vehicle anomalies occur and non-standard operations must be performed to restore a safe, stable condition. With proper processes and procedures, the well-trained STSS-D operations crew has been able to execute very complex missions routinely with very few human errors. Additionally, operations crews have successfully responded to several spacecraft anomalies, executing pre-planned contingency procedures to recover the space vehicles.

**Unknown Factors:** The rapid termination of the previous SBIRS-Low FDS contract did not allow adequate time for design teams to complete and document flight hardware status. When STSS-D restarted, the program team recovered as much previous documentation as possible. The team was forced, however, to develop the best possible “path forward” for hardware units based on engineering judgment. The satellite ground link standard (SGLS) transponders were troublesome for a different reason – the original vendor was no longer certified to handle and test flight hardware. Northrop Grumman was forced to develop new engineering and production test capabilities to repair anomalies detected during space vehicle testing. Two of the specific anomalies detected in a SGLS unit reached across to the other three units, requiring that they all be repaired and undergo re-acceptance testing to assure the reliability of critical space-to-ground communications links.

**Customer Satisfaction:** Measures of customer satisfaction are award and mission success fees with objective and discretionary criteria, and a fee penalty clause.

- From inception in 2002 to date, STSS-D has earned greater than 88 percent of...
Performance - How do you measure and assess the long-term contribution of your program to the corporation/organization?

- Long-Term Contributions: Northrop Grumman uses return on sales (ROS) to measure financial performance. Recent STSS-D Mission Success fee awards improved STSS-D’s ROS performance, resulting in significant profit.
- A new series of contract line items for operations and test support in FY 2011 through FY 2013 were negotiated in April 2011, representing new contract award / top line growth of more than $150 million. These new line items include an award fee opportunity that does not dilute the current STSS-D ROS.
- The current STSS-D team is focused on improving the financial performance through excellent on-orbit performance and by exceeding customer expectations.
- Northrop Grumman is aggressively pursuing expansions of STSS-D operations and support. In response to a request by MDA’s director, we submitted suggestions for additional tasks that could be performed to prolong the life of the system and to increase the operations / BMDS test tempo. If implemented, these would result in additional contract awards beginning in FY11.
- As mentioned, the company is developing concepts and approaches for a follow-on operational missile tracking system. Currently, we are in discussions with MDA and DOD regarding effective approaches to leverage STSS-D’s approach and team experience for an affordable operational system.

Team Development / Employee Satisfaction: Northrop Grumman uses retention rates as a measure of employee satisfaction. The STSS-D team has a very high retention rate of greater than 99 percent. Only one team member voluntarily accepted an engineering position at another company since launch in Sept. 2009. Our ability to execute never-before-done missions is a tribute to the team’s commitment, attention-to-detail, creativity and ingenuity. The company acted in advance to improve the work environment and to reduce stress levels during the particularly trying period of EOT.