STATEMENT FOR THE RECORD

Mr. James E. Anton, Vice President Deepwater Program
Northrop Grumman Ship Systems (NGSS)
1000 Jerry St. Pe` Highway
Pascagoula, Mississippi 39568
Tel: 228-935-1526

Testimony Before:
The House Maritime and Global Counter-Terrorism Subcommittee And
The House Management, Investigations and Oversight Subcommittee

THURSDAY, MAY 17, 2007
2:00 PM
311 Cannon House Office Building

Good afternoon Chairperson Sanchez, Chairman Carney and distinguished members of the Subcommittees.

Thank you for the opportunity to appear before you today to discuss the Deepwater Program. As you know, within the Integrated Coast Guard Systems (ICGS) structure, a joint venture established by Northrop Grumman and Lockheed Martin, Northrop Grumman Ship Systems (NGSS) is responsible for hull, mechanical and electrical design construction, installation of Command, Control, Communications and Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) equipment provided by Lockheed Martin, and overall support of the surface assets, such as the 110 foot to 123 foot converted Island Class Patrol Boats. References in this statement to ICGS or separately to Northrop Grumman or NGSS should be construed to mean the role of Northrop Grumman Ship Systems as part of ICGS.

Northrop Grumman has nearly 70 years of experience designing, constructing and maintaining ships of all types. In that time, NGSS's Gulf Coast operations has produced a total of 534 ships -- 351 ships at Ingalls and 183 at Avondale -- and has built 24 percent of the Navy's current fleet of 276 vessels. In just the last 30 years, we have completed 15 new designs representing a diverse group of military and commercial seagoing ships: LSD 49; CG47, DDG993, LHD1, LHD8, LSD41, LMSR, USCGC Healy (Polar Icebreaker), 2 Classes of T-AO (Kaiser & Cimarron), Polar, NSC, LPD17, Saar5, and DDG1000.

On behalf of Northrop Grumman and all of the men and women working in support of this program, I would like to thank these Subcommittees for your strong support of the Coast Guard, and of the Deepwater Program. We look forward to working closely with you and the Coast Guard to ensure the success of this important modernization**.** The following statement contains information that I, on behalf of Northrop Grumman, am submitting based on my current knowledge, information and belief.

The Coast Guard's current 110 foot patrol boats were built in the 1980s and early 1990s by Bollinger Shipyards, Inc. These boats have seen extensive duty in support of the Coast Guard mission to save lives, interdict aliens and seize drugs. ICGS and its teammate, Halter Bollinger Joint Venture (HBJV), proposed to convert the 110 foot boats to 123 foot boats as an interim measure to improve the capability of this vessel until its FRC replacement entered operation in 2018.

ICGS proposed the conversion concept as a means to provide the Coast Guard with the capability to continue to meet its mission objectives while remaining within the confines of program funding requirements. Deepwater competitors were required to propose a "system of systems" solution that did not exceed the funding limitation of $500 million per year. With new assets such as the National Security Cutter (NSC), Maritime Patrol Aircraft (MPA) and the Vertical Unmanned Air Vehicle (VUAV) being developed early in the program, it was not possible to design, develop and construct new patrol boats at program inception while keeping within annual funding limitations.

Bollinger had designed and built the original 110 foot boats and was very familiar with their construction. Bollinger was awarded a contract for 16 110' Island class boats in August 1984 and another contract for 33 more boats in 1986. The design of the 110' Island class was approximately 20 years old and was based on an existing patrol boat developed by a British firm, Vosper Thornycroft (UK) Ltd. The 110' Island Class boats were commissioned between November 1985 and 1992. Notably, after the first boats came into service, it was discovered that the 110s suffered from hull problems when operated in heavy seas. As a correctional measure, heavier bow plating was added to hulls 17 through 49 during construction and additional stiffeners were retrofitted to earlier hulls.

Under the proposed Deepwater conversion plan, HBJV added a 13 foot extension to the 110', which was similar to the 9 foot extension they had successfully added to the Cyclone patrol boats starting in 2000. This extension accommodated a stern ramp for the launch and recovery of a small boat, used primarily to support boarding and rescue operations. In addition, the conversion installed an improved pilot house, enhanced C4ISR capabilities, and extensively improved habitability and maintenance. During the conversion process HBJV identified and renewed hull plating in areas where an ultrasonic thickness inspection indicated that the existing plating was deteriorated.

At the time the proposal was submitted, some general knowledge about the condition of the 110s was available, and ICGS believed that replacement of the hull plating would adequately address and offset their deteriorated condition. This is consistent with the findings of the Coast Guard's 110' WPB Service Life Extension Board, published in March 2002, which recommended a program of systematic hull repairs, predominantly in documented problem areas, to address the hull deterioration problems that were impacting the operational availability of the 110s.

As is typical of ship construction projects, periodic reviews of the 123' conversion design were held. Prior to each review, the contractors submitted numerous design documents, including engineering data, calculations and model test results, to the Coast Guard for its review and comment. Coast Guard comments were received in conjunction with each of the three primary design reviews, all of which included Coast Guard, NGSS, ICGS and HBJV representatives.

The first such review was the Preliminary Design Review (PDR). The Preliminary Design Review was not a contract requirement, but was conducted by ICGS as part of the 110' to 123' design process. As part of the PDR process, approximately 43 contract-required data items

(CDRLs), including 23 drawings and 14 analyses were delivered to the Coast Guard for consideration and review. During PDR, the Coast Guard was provided with an overview of procurement, model testing procedures and schedule, as well as the planned hull/structure inspection process, which included blasting the hull to the main deck, ultrasonic and visual inspection, as well as bulkhead Ultra Sonic Testing allowance. The Coast Guard represented 23 of the 46 attendees at PDR.

The next phase was the Critical Design Review (CDR). In connection with CDR, the Coast Guard reviewed 47 design deliverables. In addition to 123' conversion design information and drawings, CDR presentations included design tests such as model basin testing for bare hull resistance, propeller and open water cavitation, self propulsion, planar motion maneuvering and course keeping, numerical simulations of turning circle and course keeping, and sea keeping. The Coast Guard represented 34 of the 75 in attendance at CDR.

CDR was followed by a Production Readiness Review (PRR). During the PRR, the production process, procedures and state of the design to convert the 110' vessel into a 123' were presented. Following the PRR, ICGS received notification from the Coast Guard that "ICGS had presented a comprehensive assessment of the state of the design development and readiness for production." The Coast Guard did not identify any risks associated with hull deformation or buckling. Four days later the USCG delivered Matagorda to Bollinger at Lockport, Louisiana for conversion.

In addition to these various reviews with the Coast Guard, during the conversion of the first vessel, the Matagorda, the American Bureau of Shipping (ABS) examined the design of the hull extension and new deckhouse and monitored key elements of the work being performed. The Coast Guard had a Program Management Resident Office on site at Bollinger to oversee the 123' conversions. At the completion of each conversion and as part of the acceptance process, the Coast Guard established an INSURV board to examine the performance of the converted cutter and make a formal recommendation of acceptance. At the conclusion of the Matagorda work, ABS issued a letter of approval for the conversion work and expressed no reservations with the feasibility of the conversion. Based on all of these reviews and actions, the Coast Guard accepted delivery of the Matagorda. This same process was applied to each of the other seven patrol boats delivered to and accepted by the Coast Guard.

The Performance Specification requirement calls for the 123' to be capable of unrestricted operation up through sea state 3, or seas averaging approximately four feet or less. Coast Guard operation restrictions are imposed beginning at sea state four, or seas less than eight feet, where the boats are to be able to sustain limited operations, altering course or reducing speed as required to maintain a ride which does not damage the boat or its machinery or overly fatigue the crew. The Performance Specification requires the 123' to be able to survive sea state 5, or seas averaging between eight and 13 feet, maneuvering as necessary to minimize damage or injury to the crew, and then be capable of returning to port under its own power once the seas have subsided.

In September of 2004, after all 8 hulls had entered the conversion program and the first 4 hulls had been delivered, the Matagorda was forced to conduct a high speed transit to avoid Hurricane Ivan. This operational necessity forced the Coast Guard to transit in a sea state and speed where the cutter was operating near or above the design limits of the 123' conversion. Upon arrival at their destination, the crew discovered buckling of the side shell and main deck on the starboard side near midship. An engineering tiger team was formed consisting of Coast Guard and NGSS personnel. This team was dispatched to investigate the problem where it was discovered that the Matagorda had an inherent workmanship issue in the baseline 110' that existed prior to the

conversion and contributed to the hull buckling. Specifically, a hidden, unwelded aluminum deck stringer was discovered immediately beneath the area where the failure occurred. Other boats were examined, and this unwelded stringer was also found on one additional hull undergoing conversion. When modeled using finite element analysis, the stresses in the panels which failed on Matagorda were significantly higher than the stresses shown when the model was run with this stringer intact. Based on this finding, the team believed this to be the primary cause of the buckling on Matagorda, and repairs were made accordingly.

In addition, a reconstruction of the engineering analysis of the 123' structure was conducted. Based on this, it was also discovered that an early calculation overstated the strength margin for the boat. A revised calculation using a common, agreed to set of assumptions by a Coast Guard, Northrop Grumman and Bollinger engineering team showed the 123' would still meet the required operations defined in the Performance Specification.

In an effort to further improve the structural integrity on the 123s, three stiffener bands were installed; one at the upper edge of the side shell, one below this one and another on the edge of the main deck to increase the overall structural strength. While the finite element analysis and conventional calculations both agreed that the original hull, with the stringer under the deck intact, should be sufficient throughout the operating range of the 123', these additional stiffeners were considered to provide an added margin of strength.

By March, 2005, 6 of the 123s had received the structural upgrade and had been delivered. Certain operational restrictions imposed on these boats by the Coast Guard following repairs to the Matagorda had been lifted. Then, during a transit from Key West to Savannah, Georgia, the Nunivak experienced hull deformation in an area aft of the new reinforcing straps. This deformation occurred in a different area from that of the Matagorda. Further, this was not an area which had indicated potential for high stresses under any conditions modeled in the earlier finite element analysis.

An outside engineering firm, Designers and Planners, was engaged by the Coast Guard to perform a more detailed finite element analysis of the 123' hull, which showed that the overall hull structure design was adequate under all expected operating conditions up to the worst operating condition modeled. The analyses were not able to replicate the deformation seen on Nunivak. A more detailed look at specific regions on the hull showed an area with high potential for localized buckling in a section of the side shell where the original 110' hull had been constructed of exceptionally thin four-pound plate. Despite this finding, no actual failures had ever been experienced in this area on 110' or 123' patrol boats. As a precaution, this thin plate was replaced with heavier plating on those cutters undergoing the Post Delivery Maintenance Availability, with plans to eventually upgrade all the boats. Lastly, a metallurgical analysis of the deck material determined that the particular grade of aluminum used on the 110s is prone to corrosion and cracking in elevated heat and marine conditions. We provided that information as input to the testing and analysis that was being conducted by the USCG.

In July 2005, then Coast Guard Commandant Admiral Collins' written testimony before Congress outlined the twofold reason for stopping the conversion process as follows: "As the first eight 110' to 123' conversions were conducted, the Coast Guard found that the 110' WPB hulls were in much worse condition than anticipated. This extended the conversion timeline and would have increased projected costs for conversions after the first eight (the first eight were negotiated under a firm-fixed-price contract). An operational analysis of the 123' WPBs also identified high risks in meeting mission needs, particularly in the post-9/11 environment." Based on the deteriorated

condition of the 110' hulls and post 9/11 requirements, the Coast Guard accelerated FRC design and construction by ten years to meet the shortfall in patrol boat hours.

On April 13, 2007, Admiral Allen decided to decommission the eight 123 patrol boats converted under the Deepwater Program. To date the problems associated with the 123' conversion include buckling or hull deformation and shaft alignment problems. In addition to the actions previously described, additional and substantial work has been (and continues to be) done to determine cause or causes. In addition to the repairs and reviews of structural calculations, the review process has continued by conducting two independent finite element analyses, modeling both the original and the upgraded hull, and completing metallurgical testing that revealed an issue in the main deck which exists on both the 123s and across the legacy 110 fleet. Extensive strain gage testing has been conducted on a 123' hull to validate the finite element model and to identify potential problem areas which the model may not show. The parent craft designer, Vosper Thornycroft, was engaged by the Coast Guard to evaluate the 123' hull and provide recommendations. Data has been collected on shaft alignment and maintenance procedures both during the conversion and since, so that the procedures for checking and correcting alignment can be validated for both the 110' and the 123'. Elements of the 123' design, including the propellers and the SRP stern-launch system are being reexamined and validated.

We are committed and determined to identify the root cause of the structural problems. Reviews and analyses of available data on the 110' and 123' patrol boats continue in an effort to better understand the cause or causes of both hull buckling and shaft alignment problems. Until these efforts are complete, it is premature to speculate on the final cause.

I want to assure the Subcommittees that Northrop Grumman will continue to work with the Coast Guard to address its mission requirements throughout the life of the Deepwater Program.

Thank you for this opportunity to discuss with you the progress of the Deepwater Program.