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Written testimony for the House Committee on Transportation and Infrastructure

April 15, 2007

Introduction:

I am Scott Sampson, a current civil service employee working for the Coast Guard Maintenance and Logistics Command Atlantic in the Vessel Specifications Branch. There I am a Section Chief of the Development Section. My branch is responsible for technical evaluations and recommended repair procedures for Coast Guard vessels. As such I was extensively involved with the problems and analysis of the 123s. I have been serving in this position since August 2004.

Prior to my job with the Coast Guard, I worked as a Naval Architect for Combatant Craft Division, a detachment of the Naval Surface Warfare Center Carderock Division. The Division exercises total design and engineering authority for U.S. Navy Combatant Craft and Boats and supports other D.O.D., non-D.O.D. activities and private industry. I was the primary point of contact for Coast Guard work within my command. I worked for Combatant Craft Division from October 2001 until August of 2004.

Before starting with Combatant Craft Division (CCD), I worked for the CG in the same branch I am in currently except I was employed as a Naval Architect specializing in structures. I worked there from September of 1996 until October of 2001.

Background:

Combatant Craft Division or CCD had extensive experience with a very similarly constructed vessel, a 170' Cyclone Patrol Coastal Class commonly referred to as a PC. Both the CG's 110 and the Navy's PC were based off similar designs by the same company, Vosper Thorny Craft. The PC experienced damage similar to what the 123s have experienced.

As a result of the PC damage, CCD performed extensive investigations into the hull failures and determined that the 1997 American Bureau of Shipping (ABS) High Speed Craft Rules, which the PCs were built to, under predicted dynamic loading conditions, thus the PC was not built to withstand the forces placed upon it in a seaway and damage occurred. A fix was designed using another classification society's rules in conjunction with other calculations.

Shortly afterward CCD designed an extension to the PCs of nine feet which incorporated a stern launch and recovery system, the same type of modification performed later on the CG conversion of the 110s to 123s. CCD designed the modification using the same method they used for the original fix to determine the amount of additional structure needed to ensure the platforms would not experience damage. Since the modifications and incorporation of 2 tons of additional structure (the PCs weigh approximately 385 tons), none of the PCs have experienced damage and several are in fact on loan to the Coast Guard and serving successfully.

Chronology of Events:

While working at Combatant Craft in February of 2002, Carderock worked with Capt Jeffery Gamble, Chief, Office of Naval Engineering at Coast Guard Headquarters and Capt Kevin Jarvis, Chief, Platform Management Division at ELC to make sure they were aware of a Memorandum of Agreement between the CG and Navy to facilitate the Coast Guard's access and use of Carderock's experience and expertise. This effort was coordinated by a Carderock Employee by the name of William Moss. This MOA was reviewed specifically in anticipation that Carderock would be able to help support the Coast Guard with design efforts and questions associated with the Deepwater program.

In late July or early August of 2002, I became aware of the ICGS proposed modification of the Coast Guard's 110 patrol boat. The described design at that point gave me some grave concern for the success of the modification.

I contacted Debu Ghosh, who is the Branch Chief of the Naval Architecture Boat Branch at the Coast Guard's, Engineering Logistics Center (ELC). I communicated my concerns to Mr. Ghosh based on my understanding of the modification. After our initial conversation, we agreed to have a more purposeful phone conversation.

9 August 2002 – Debu Ghosh and Chris Barry of ELC and Carl Casamassina and myself from CCD had a phone conference to discuss the 110 conversion to the 123. Mr. Casamassina, a Naval Architect, was extensively involved with the PC during the hull failures and subsequent lengthening. During this phone conference ELC described the intended modification of the 110 and we (CCD) indicated to ELC our experience with the Navy's 170/179 conversion. In particular we covered several areas including:

- Longitudinal Bending – It was the understanding of CCD at the time that no additional structure was purposed in the middle of the hull. The PC required additional structure and it had only a 5% length increase as compared to the 12% length increase of the 110. It was clear to CCD that a significant amount of strength would have to be added to the 110's hull to prevent failure. High speed craft such as the 110 generally are not built with reserve strength to handle this significant increase in length. Having familiarity with this platform from my previous job with the Coast Guard, I was extremely concerned that the craft was in jeopardy. CCD emphasized what they considered to be deficiencies in the dynamic load predictions of the 1997 ABS High Speed Craft Rules and cautioned the CG not to use it. We were concerned that this violation of basic naval architecture principals would result in longitudinal failures. No structure was added to the middle of the hulls during the conversion of the 110s.

- Running Trim – It was the understanding of CCD at the time that the extension would be a continuation of the existing shape of the hull. CCD strongly recommended that the bottom of the extension actually curve up to reduce its buoyancy. By doing so the trim of the vessel (fore and aft attitude) would remain the same or be very similar to the 110's. CCD during model testing of the 170/179 discovered that if they continued the hull bottom straight back (as was purposed on the 123) the stern would rise and the front of the cutter would dip down farther than what it does normally increasing the power it needs to push it through the water, it would also make launch and recovery of a small boat more difficult. By curving the aft shape of the hull up, it maintains close to the original trim and could be easily adjusted. The 110 hull was extended straight back. The continuation of the hull shape forced relocation of the potable water tanks from the forward part of the cutter to the extreme stern to shift weight aft to maintain close to the original trim. While this minimized the problem associated with trim, it likely contributed to the failures of the hull.

- Engineering experience – CCD performed all the engineering and design of the PC hull extension and provided it to Bollinger Shipyard. Bollinger provided excellent production details, but they performed none of the design associated with the modification of the PC 170/179. It was CCD's understanding there was a misconception that many in the CG saw little risk associated with this project because Bollinger built the 110's and performed the modification on the PCs and thus were very familiar with the design issues when in fact it was CCD that had performed all the design work for the PC.

Mr. Ghosh indicated at this meeting his desire to hire CCD to provide assistance in reviewing designs on site at Bollinger Shipyard.

19 August 2002 – Per Mr. Ghosh's request I sent him an estimate of $42,000 to provide 14 days of on site technical support at Bollinger Shipyard for 2 naval architects and a sea keeping analysis to show a comparison between the original 110 and the modified hull. CCD's understanding at this time was that Bollinger Shipyard was far along on the project and Mr. Ghosh was questioning some of the engineering/naval architecture aspects on the design and desired our assistance due to our expertise. Later Mr. Ghosh told me that Deepwater denied the funding but gave no reason.

22 August 2002 - I met with a Deepwater Program Manager, (I do not recall his name or exact title) and the Deepwater Surface Technical Director, Diane Burton and addressed CCD's concerns with the proposed approach for modifying the 110s. This was a short briefing with very little discussion.

3 Sept 2002 – Had a meeting with Mr. Ghosh and Carl Casamassina of CCD to discuss actual tests that were performed on the PC 179.

9 September 2002 – Mr. Ghosh told me that he was writing a letter to CG Headquarters to ask why he could not get the support he needed.

Some time after the 3 September meeting, Carl Casamassina and myself called Dennis Fanguy, the head of the Engineering Department at Bollinger Shipyard. CCD had a very

good rapport with Bollinger Shipyard due to the many projects we worked on together and felt comfortable talking openly about the 123 project concerns. We informed him of our design concerns in the hopes that Bollinger Shipyard might take action and attempt to correct the situation. The conversation was short with little discussion.

The MATAGORDA was inducted into Bollinger Shipyard on 2 February 2003. On 5 March 2004, MATAGORDA was delivered back to the CG and on 10 May 2003 entered a Post Delivery Maintenance Availability. Within days of leaving the availability, in the early part of September 2004 MATAGORDA suffered damage in the middle of the cutter, buckling the side shell and deck. This is the type of longitudinal failure that Combatant Craft anticipated seeing and warned the Coast Guard about back in August 2002. This predicted failure occurred not as result of fatigue, but rather from one short period of operation in a sea reported to be 4-6' in height. This longitudinal bending failure was acknowledge in a report issued by ELC entitled "*MATAGORDA* Buckling Incident Analysis" dated 24 September 2004 and verified our concerns expressed during the meeting on 9 August 2002.

As a result of MATAGORDA's hull failure a fix was designed by ELC and installed on all delivered 123s. On March 28, 2005, the NUNIVAK which had the fix installed reported hull damage on her maiden transit from Bollinger Shipyard to home port in Key West. This lead to a visit to Key West from 29 March to April 1, 2005 where three other 123's were home ported. The team inspected the NUNIVAK, PADRE, MATAGORDA, and METOMPKIN. It was my opinion that all 123s experienced similar damage as seen on the NUNIVAK just to a lesser degree. This inspection indicated to me that the fix did not resolve the problem and that longitudinal bending problems still existed.

In July 2005 CCD offered to do a quick analysis of the 123s problems using information provided by Debu Ghosh. CCD remained convinced that the problems were related to inadequate section modulus to support global longitudinal bending loads. On the 8th of July CCD met with Debu Ghosh to share their results of their analysis. Mr. Ghosh did not agree with the basis of the analysis and CCD's investigation into the failure of the 123s did not continue.

On July 12, 2005 my command, the Maintenance and Logistics Command Atlantic paid for the travel of Malcolm Whitford of CCD to investigate the damage sustained to the NUNIVAK while being repaired at Global Shipyard in Savannah, GA. The opinion of Mr. Whitford continued to be that the damage observed on the NUNIVAK was primarily a function of longitudinal bending.

After a second attempt at a fix, the cutters continued to fail structurally. The damage continued to appear in plating, frames and engine girders in the form of deformation. As a result of the continuing distortion of the hull, constant shaft alignments were needed. Eventually in December 2006 the decision was made to lay up all eight 123s at the Coast Guard Yard.

<u>Conclusion</u>:

While engineers continue to discuss whether a solution to the many problems that plague the 123 exists, it is clear to me that the initial problem of not increasing the strength of the 123 was a serious oversight of basic naval architecture and their failure was predicted. Despite

the offering of applicable experience and lessons learned, ICGS and the Coast Guard failed to take advantage of them and suffered a devastating setback to the program and its mission capability. It is my sincerest hope that these issues can be resolved and better interagency relationships can be established.