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MEMORANDUM

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To: Distribution

Subj: FINAL DECISION LETTER ON THE CGC POLAR SEA CB-L CAPSIZING, CLASS "B" MISHAP, 09 MAR 2009.

Ref: (a) Safety and Environmental Health Manual, COMDTINST M5100.47
(b) Department of Defense Human Factors Analysis and Classification System (DoD HFACS)
(c) Crew Endurance Management Instruction, COMDTINST 3500.2

1. SYNOPSIS. During the fifth day of Tailored Annual Cutter Training (TACT), 09 March 2009, POLAR SEA was preparing to launch the CB-L for a routine passenger transfer in the vicinity of Port Townsend, WA. POLAR SEA was on an easterly heading with an approximate speed over ground of 5 knots with an ebbing current to the NNW of 1-2 knots. The resulting speed through the water exceeded 5 knots. The CB-L was launched with a partially deflated port sponson and upon entering the water, the CB-L veered away from the cutter. The crew was unable to detach the release mechanism and the CB-L capsized; resulting in 6 personnel in the water. Four personnel were immediately recovered by POLAR SEA, and two personnel were recovered by CGC MIDGETT. All six personnel were examined by the corpsman and Emergency Medical Technicians (EMT's) with minor injuries.

2. CLASSIFICATION. Class "B" mishap. Costs to repair damage to the CB-L exceed the $50K threshold.

3. CAUSAL AND CONTRIBUTORY FACTORS. A factor is considered "causal" when if removed in the sequence of events it would most likely have broken the chain of errors and the mishap would not have occurred. A factor is considered "contributory" when it is not singularly responsible for the mishap; however, when combined with causal or other contributory errors it influenced the progression of the mishap.

A. HUMAN FACTORS: As outlined in reference (b), the Department of Defense Human Factors Analysis and Classification System (DoD HFACS) provides a systematic, multidimensional approach to error analysis, standardizing the human factors analysis approach for the investigation of mishaps. DoD HFACS examines four main tiers of failures/conditions: Acts, Preconditions, Supervision, and Organization. Enclosure (1) illustrates the relationship of HFACS elements in an Influence Diagram for this mishap.

I. ACTS: The purpose of this section is to describe what happened in the mishap. The following errors (mental or physical activities in which the operator failed to achieve intended outcome) were committed.

1) Errors: Skill-based Errors - Procedural Errors: (Causal) - Procedural Error is a factor when a procedure is accomplished in the wrong sequence or using the wrong technique or when the wrong control or switch is used. This also captures errors in navigation, calculation or operation of automated systems.

a. The Conning Officer was directed to make 4-5 knots through the water as per the ship's Standard Operating Procedure during small boat launch and recovery efforts. At launch, the speed of the cutter was 5 knots speed over ground (SOG), while the current was approx 1-2 knots. The combined speed through the water exceeded 5 knots.

b. The davit operator noticed that the boat engineer was unable to release the hook, and began to pay out more cable. In previous evolutions, this procedure had proved successful giving the boat engineer more time to work. In this particular situation, the small boat and sled had already veered to starboard and additional cable resulted in greater tension on the release hook.

II. PRECONDITIONS: Active and/or latent conditions of the operators prior to the mishap, or environmental or personnel factors which affect practices, conditions or actions of individuals and result in human error or an unsafe situation. The following preconditions existed:

1) Condition of Individuals:

a. Psycho Behavioral Factors:

i. Excessive motivation to succeed: (Contributory) – Consistent comments from the crew and command interviews suggested preoccupation with success. The CO marketed his vessel to other programs and D-17 with Arctic domain awareness as a multi-mission platform as a means to support the Polar Program.

ii. Motivational Exhaustion: (Contributory) – There was an uncertainty of the schedule time and length for TACT. There was no set schedule to prepare for, so the crew of the POLAR SEA was constantly on a changing schedule that did not provide adequate rest. The motivation was to complete TACT, but the long days were exhausting for the crew. The crew expressed feeling frustrated with the endless days filled with drills and constantly changing schedules. This combined with the perceived benign environmental conditions and acceptance of the known boat/davit interface problems, resulted in reduced threat perception when conducting risk assessment (GAR/ORM).

b. Adverse Physiological States - Fatigue: (Contributory) – The crew was working long workdays conducting drills for TACT that lasted until 2300 daily. Combined with a 0645 reveille, the crew was afforded approximately five hours of sleep per day. Risk assessments using the Crew Endurance Management (CEM) analysis tool revealed that 85% of the boat crew members were in the 'red', exposed to high levels of endurance risk.

2) Personnel Factors: Coordination/Communication/Planning Factors - Mission Planning: (Contributory) – Pre-mission planning did not consider alternatives for conducting a personnel transfer (i.e. proceeding farther into the bay to minimize currents and delay or reschedule the personnel transfer entirely as it was not mission critical). The command and crew accepted the risk assessment without addressing mitigation strategies.

III. SUPERVISION: Methods, decisions or policies of the supervisory chain of command which directly affect practices, conditions, or actions of individuals and result in human error or an unsafe condition. The following supervisory factors were identified:

1) Inadequate Supervision:

a. Local Training Issues / Programs: (Contributory) – The crew never received manufacturer-provided training on operating the davit system. The Command was aware of the deficiencies with the boat launch retrieval system and attempted to overcome these deficiencies through training. However, the unit never developed a formal training program (JQR).

b. Supervision – Policy: (Causal) – The lack of a speed curve led to confusion on the bridge regarding the throttle positions needed to produce 5 knots of speed. In addition, there was no formal boat launch and recovery checklist and the procedures were executed from memory/experience by bridge personnel. The lack of a boat launch and recovery checklist contributed to the lack of communication and supervision between the OOD and the Conning Officer.

2) Planned Inappropriate Operations: Risk Assessment – Formal: (Contributory) – A decision was made to execute a routine personnel transfer even though the GAR identified substantial risk. Half of the GAR elements were rated 5 out of 10 and the unit did not recognize the need to mitigate the elevated risks. The unit did not perform additional risk analysis (SPE) as required by COMDTINST 3500.3, Operational Risk Management (ORM) to evaluate the potential impact on mission effectiveness and execution.

IV. ORGANIZATIONAL INFLUENCES: Communications, actions, omissions or policies of upper-level management which directly or indirectly affect supervisory

practices, conditions or actions of the operator(s) and result in system failure, human error or an unsafe situation.

1) Resource / Acquisition Management - Acquisition Policies / Design Processes: (Causal) – The lack of coordination between the Offices of Cutter Forces, Boat Forces and Naval Engineering to review and evaluate system designs and conduct system engineering analyses resulted in system deficiencies that created an unsafe condition. Examples include; boat/davit interface and no follow-up corrective action taken after the prototype davit system failure in December 2007.

2) Organizational Climate:

a. Equipment Change: (Causal) – Unapproved modifications were made to various components of the davit/boat system (i.e., replaced the chain lifting pendent in the rigging to a synthetic sling, removal of the hook from the rigging and hard mounted inverted to the CB-L lifting bracket).

b. Organizational Structure: (Causal) – Multiple Coast Guard Programs are responsible for different parts of the cutter/boat/davit system; failure to adhere to established configuration control processes to review and test interactive system components resulted in a cutter/boat/davit system that was marginally functional and unsafe.

3) Organizational Process:

a. Ops Tempo/Workload: (Contributory) – As a result of the POLAR SEA's unpredictable schedule through a series of preparing for and canceling of TACT and standby status for Deep Freeze, readiness and endurance was compromised and added to the mental fatigue already placed on the crew.

b. Programs and Policy Risk Assessment: (Contributory) – There was no evidence that a Mission Needs Statement (MNS) and Operational Requirements Document (ORD) was developed for the POLAR SEA to conduct traditional CG missions (i.e., LE/boardings). In addition, there was no evidence that operational risk assessments, risk associated with conducting an LE mission on an icebreaking platform had been conducted.

c. Procedural Guidance/Publication: (Contributory) – There was a lack of guidance including;

i. No general launch and recovery parameters established, except for speed of the cutter.

ii. No guidance on the relationship of throttle position to speed.

iii. No boat launch and recovery checklist for the bridge.

iv. POLAR SEA's Cutter Organization and Regulations Manual (CORM) Instruction (PSEAINST M5000A) does not differentiate between boat launch and recovery evolutions.

d. Organizational Training Issues/Programs: (Contributory) – There is no formal training program for operating the Miranda davit in the Coast Guard. Cutter Boat STAN is currently under development.

e. Doctrine: (Contributory) – There is no boat launch and recovery doctrine in place for Coast Guard cutters.

f. Program Oversight/Program Management: (Contributory) – Program oversight and management for cutter boat launch and recovery is not owned by either the Offices of Cutter Forces or Boat Forces. This deficiency leads to a lack of policy and standardized training requirements.

4. CONCLUSION. The deficiencies with POLAR SEA's boat/davit system were well documented yet the system continued in operation. The lack of coordination between the Offices of Cutter Forces (CG-751), Boat Forces (CG-731) and Naval Engineering (CG-45) to evaluate system design and conduct system engineering analyses resulted in the current system deficiencies and created the unsafe situation resulting in the capsized CB-L. The application of acquisition processes and requirements for system engineering analyses would have prevented this mishap at the design and analysis phase of the boat/davit acquisition. Without HQ Program coordination, the changes to the CB-L never underwent system engineering analysis. These organizational deficiencies were the prime causal factors of this mishap.

Procedural and Supervisory errors also played a significant role in the CB-L capsize. The POLAR SEA CO's Standing Orders states that the safe speed for launching the small boat is 3 to 5 knots. At the time of the launch, the cutter's speed exceeded 5 knots. Most of the crew reported being fatigued from conducting drills until 2300 daily during TACT. Risk assessments using the Crew Endurance Management (CEM) analysis tools revealed that 85% of the boat crew members were in the 'red', exposed to high levels of endurance risk, just prior to the mishap. Finally, POLAR SEA's CORM Instruction states that high risk operations with the small boat should not be conducted for routine logistics missions. The decision to conduct the routine passenger transfer, with known deficiencies regarding the davit and CB-L interface, was not consistent with the CORM. These factors, in their entirety, shaped a system that was destined to fail. It was not a question of "if" but "when" the mishap would occur. The fact that the mishap occurred in ideal sea and weather conditions, and in the vicinity of MIDGETT, which recovered two crew members from the water, were fortuitous. If this mishap had occurred in the Bearing Sea the results could have been catastrophic.

5. CORRECTIVE ACTIONS.

A. Completed Actions:

1. POLAR SEA received ORM training and conducted Safety Stand Down.

2. POLAR SEA received NATON exportable rigging and crane safety training.

3. POLAR SEA developed and posted an engine configuration speed table on the bridge and conducted training with bridge personnel.

B. Required Actions:

1. The Office of Cutter Forces shall develop/update the operational requirements document concerning POLAR SEA small boat operations. Provide a concept of operations for small boat utilization and operation on POLAR SEA.

2. The Office of Naval Engineering, upon receipt of an updated ORD or small boat utilization concept of operation, shall coordinate an engineering assessment of the boat/davit system to be used on POLAR SEA. Upon delivery or installation of any system, design testing, evaluation, and training need to be provided.

3. POLAR SEA shall develop a small boat launch and recovery checklist to ensure safe, effective, and efficient operations.

4. The Office of Cutter Forces shall develop or direct FORCECOM to develop procedural level doctrine, checklists, and qualification standards for any cross program interface (ship-helicopter, cutter-cutter boat).

5. The Office of Cutter Forces shall ensure all future changes to cutter boat and davit configurations be engineered as a complete system and approved by the configuration control board.

6. The Office of Naval Engineering shall conduct a thorough engineering assessment of the Miranda davit small boat interface on CGC HEALY to ensure safe operations.

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Encl: (1) HFACS Influence Diagram

Dist: COMDT (CG-00, CG-09, CG-092, CG-094, CG-DCO, CG-1, CG-4, CG-45, CG-5, CG-7, CG-11, CG-113)
FC-5, FC-7
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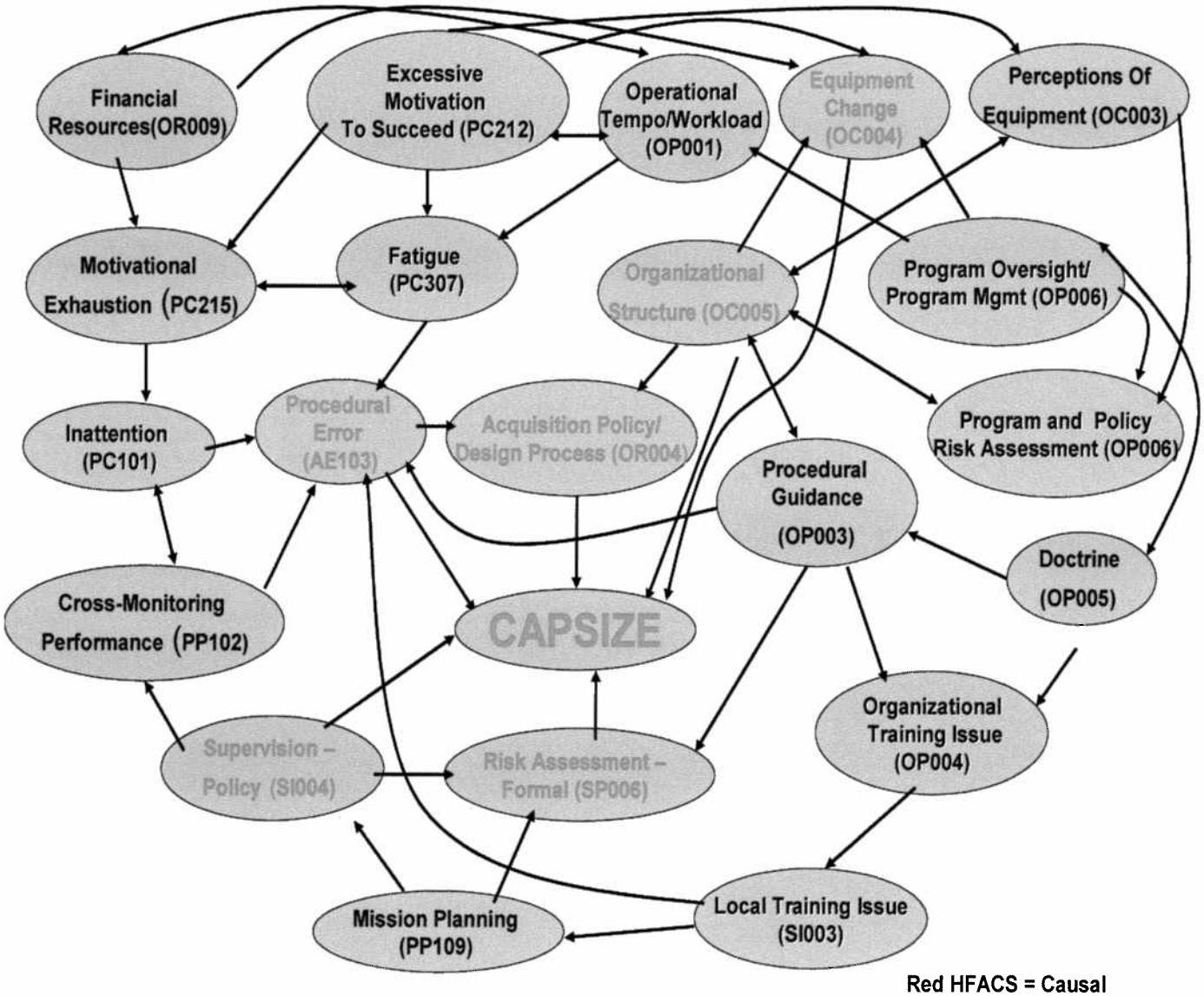
Relationship of HFACS Elements



Red HFACS = Causal
Black HFACS = Contributory