

Navy Divers

Complete Critical Repairs to Chinese Vessel

Emergency Response Prevents Major Fuel Spill

Divers from Mobile Diving and Salvage Unit (MDSU) 1, the “Heavy Lifters,” made emergent repairs to rescue the damaged Chinese-flagged motor vessel (M/V) Tong Cheng earlier this year and prevented a major oil spill into Hawaiian waters.

On 19 January 2007, the U.S. Coast Guard (USCG) Sector Honolulu received a report from Tong Cheng, which was en route from Busan, Korea to the Panama Canal. The vessel had a 29-inch crack in her port hull and was experiencing progressive flooding in her number two cargo hold. The Tong Cheng also reported that she was carrying a load of more than 140,000 gallons of petroleum product that if released had the potential to cause damage to the ocean environment.

Structural engineers from the Navy’s Supervisor of Salvage (SUPSALV) and the USCG Naval Architectural Branch studied the ship’s drawings and photographs taken from aircraft flyovers. As a result, the engineers

grew increasingly concerned over the structural integrity of the vessel. They realized that a major oil spill was eminent if action was not taken to stop the progressive flooding and to dewater the vessel to relieve the water pressure on the forward bulkhead of the number two cargo hold. The salvage engineers’ calculations revealed that if Tong Cheng also lost the adjacent number one cargo hold, the ship would sink.

Meanwhile the National Oceanographic and Atmospheric Administration conducted spill trajectories to estimate the potential damage to Hawaii’s fragile environment if the ship sank. Spill trajectories indicated that the closer the vessel got to Hawaii the greater the impact on the environment would result if fuel spilled into the ocean.

While the Incident Command Center (ICC) assessed the situation, Tong Cheng remained 80 nautical miles South Southwest of Oahu. Based on prevailing winds and seas, this location was designated to reduce the threat to the environment if the vessel

came apart. The ICC required more data on the condition of the Tong Cheng’s hull to determine the best course of action.

The USCG then called the Navy divers from MDSU 1 to get that information.

On 21 January, Tong Cheng went dead in the water (DIW) to allow Chief Warrant Officer Jason Deatruck from MDSU 1 and other members of an advance party to assess the ship and develop a tag out plan to de-energize pumps and other machinery that could pose a hazard to divers in the water.

“A significant language barrier compounded the situation,” said Deatruck. “Fortunately, the ICC dispatched translators to resolve the communication problem.”

Navy divers completed an open ocean, underwater hull survey on the ship that rose and fell with the constant wave action. Divers located the 1/8-inch wide crack 30 feet below the water line, which had extended from 29-inches long to 56-inches long. They discovered two additional 6-inch “L” shaped cracks that were spreading. Deatruck’s team captured underwater video and still photos that were forwarded to the ICC to fill in infor-

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People's Republic of China-flagged M/V Tong Cheng at anchor and bow heavy due to flooding of forward cargo hold.

Photo by Lt. Lee Shannon

The salvage engineer team evaluated the underwater video and determined that the ship's hull was failing.

mation gaps that could help decision makers determine whether or not it was safe for the ship to enter the port in its present condition.

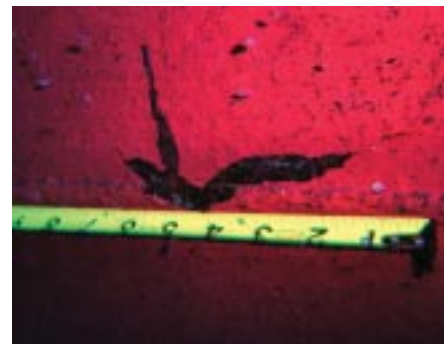
The salvage engineer team evaluated the underwater video and determined that the ship's hull was failing. It was not a matter of "if," but "when" the ship would sink, unless it was repaired. Meanwhile, the Heavy Lifters developed a plan to affect emergency repairs to patch the multiple cracks. If the cracks could be patched, the ship could be dewatered and stability could be restored. This would reduce the risk of the ship's hull failing and the risk of a catastrophic release of fuel into the water.

MDSU 1 proposed a plan to apply a temporary patch.

"The two-part epoxy was the only option available and while we were optimistic, we were also skeptical that the patch would hold during Tong Cheng's 80 nautical mile transit into four- to six-foot high seas to anchorage," said Navy Diver 1st Class Jason Mette, a dive team member.

The next day, with the weather window for diving operations closing, Tong Cheng again went DIW and Navy scuba divers installed the temporary patches, which required a four- to six-hour cure time. The integrity of the patch could not be confirmed until dewatering began and the water level in the cargo hold dropped.

After applying the temporary patch, MDSU 1 divers turned their efforts towards stabilizing the ship and began



One of three cracks discovered during MDSU 1 Detachment 9's at-sea underwater hull survey and damage assessment of the M/V Tong Cheng.

Photo by Chief Navy Diver Travis Richardson



Temporary repairs conducted by the MDSU 1 scuba team. Waterproof epoxy was used to fill the cracks and control the flooding prior to surface supplied diving and pumping operations once the vessel was moved close to shore.

Photo by Chief Navy Diver Travis Richardson



Dive tenders assist a diver in moving from the bench to the ladder to enter the water.
Photo by Lt. Lee Shannon



A Navy diver from MDSU 1 installs self tapping screws using an underwater hydraulic impact wrench while installing a hot tap flange on the M/V Tong Cheng.
Photo by Navy Diver 1st Class Jason Mette

USCG District 14 commander Rear Admiral Brice-O'Hara commended MDSU 1 for their professionalism.

assisting the USCG Strike Team with dewatering operations. MDSU 1 had transferred several trash pumps to the American Islander, a USCG contract vessel. The trash pumps are named for their ability to pump large volumes of water and debris. Limited space aboard Tong Cheng could accommodate only one trash pump. Together with the ship's installed pumps, the space was dewatered enough to confirm the temporary patch was holding and no additional cracks existed.

The ICC considered cutting access holes in the deck to place additional hoses and get more pumps running. However, hot work could not be done because explosive gases in the cargo hold posed an unacceptable risk. The pumping would proceed slowly using a combination of one trash pump and the ship's installed pumps.

The team encountered still more challenges. The vessel's installed pumps failed from nearly 30 days of continuous pumping to try and stay even with the progressive flooding.

When the Tong Cheng's installed pumps became inoperable, and due to limited options for access to the effected cargo hold, MDSU 1 deployed a surface

supplied dive team that embarked an ocean barge and completed the staggered installation of hot taps at 14, 21, and 28 feet below the water line.

Hot tapping is a procedure used to remove liquid loads from sunken vessels that are inaccessible by normal pumping means, explained Navy Diver 2nd Class Shawan Gerasimchik, who assisted in the hot tap installation. The procedure involves using a hole saw to cut 4-inch diameter holes in which ball valves are installed. The valves are connected to suction hoses and pumps that remove liquid from tanks.

"The procedure does not involve any welding. This made it safe in an environment with a potentially explosive



MDSU Navy diver climbs back aboard the barge after completing a dive. Diving operations on M/V Tong Cheng were conducted from a contact barge.
Photo by Lt. Lee Shannon

atmosphere,” said Gerasimchik. “The installation of hot tap flanges and valves on a moving ship was a unique challenge, but we were able to overcome this by rehearsing the procedure topside,” added Gerasimchik.

Once the hot taps were installed, the pumps were rigged. However, the team was confronted with a new set of obstacles. The oil spill response barge (OSRB)—the vessel onto which the contact water in Tong Cheng’s hold would be pumped once the hot taps were installed—was significantly higher than the Tong Cheng. This created a static head in excess of what the pumps could overcome. The pumps struggled to take suction and continuously lost their prime. The MDSU 1 pumping crew worked tirelessly throughout the night to develop a plan to overcome the static head. Finally, through a combination of trial by error and ingenuity, the pumping crew perfected a pumping configuration that progressively increased in capacity until they were dewatering at a rate of 8,000 to 12,000 gallons per hour.

MDSU 1 divers continued to dewater the ship, removing in excess of 210,000 gallons of fuel-contaminated water and restoring the ship’s draft to 35 feet, the minimum required for safe entry into Barber’s Point Harbor where permanent repairs could be made.

In a message from the USCG, District 14 commander Rear Admiral Brice-O’Hara commended MDSU 1 for their professionalism in providing essential underwater inspection, assessment and temporary repairs to the cracked hull

of M/V Tong Cheng, and recognized the assistance provided by MDSU 1 as part of a team effort that prevented the ship’s sinking, ensured the safety of its 26 crew members, mitigated the pollution potential of a catastrophic oil spill in the waters of Hawaii and contributed to the goodwill between the United States and the People’s Republic of China.

MDSU 1 is an expeditionary diving and salvage command that belongs to Explosive Ordnance Disposal Group 1, and is part of Commander, Naval Expeditionary Combat Command. ⚓

CONTACTS

Terri Kojima
Navy Region Hawaii
808-473-2926, 808-473-2888
DSN: 473-2888
terri.kojima@navy.mil

LCDR Keith Dowling
Mobile Diving and Salvage Unit 1
808-474-6692
DSN: 315-471-9292, x-223
keith.b.dowling@navy.mil