

FIELD REPORT: Entanglement Hazards at *El Faro* Wreckage Site

MISSION LIMITATIONS DUE TO STREAMING LINES (LINE HAZARDS TO OV & AUV)

The Woods Hole Oceanographic Institutes (WHOI) research vessel *Atlantis* located the VDR and surveyed the wreckage and debris field of the *El Faro* with the observation vehicle (OV) named *Alvin Observation Vehicle* (AOV) and the autonomous underwater vehicle (AUV) *Sentry*. The *Atlantis* was operating at the wreckage site from April 21 to May 1, 2016. In addition to the mission to locate the VDR, an additional mission was to operate the AUV *Sentry* to sonar survey the site with multi-beam (bathymetric) and side-scan sonar, as well as take detailed photographs of the debris field and hull wreckage. The towed AOV was also employed to take detailed hi-res photographs and video of the wreckage hull and bridge, with the intent to produce photo-mosaic images in the plan, port, starboard, bow and stern views.

Upon review of initial sonar surveys and video imaging of both the bridge and the hull, various lines and hawsers were found to be streaming (floating) far upwards and moving in the current. These lines were determined by WHOI to pose significant hazards to both *Sentry* and the AOV. Accordingly, the required vehicle proximity to accomplish complete, and detailed hull and bridge photo-mosaics with the OV was lost. Additionally, the required fly-over (altitude) heights for *Sentry* to produce hi-resolution multi-beam and 850kHz side-scan data for imaging was also determined to be hazardous.

Due to the hazards, the mission was ultimately unable to photograph the entire hull and bridge as planned. However, they were photographed as closely as possible, and to the greatest extent as safely practicable within the mission time frame. Similarly, planned *Sentry* hi-res bathymetry and 850kHz side-scans were not done around or over the hull and bridge, but around them as close as deemed safely possible.

The following briefly details the line hazards encountered on the wreckage.

NOTED LINE HAZARDS from ATLANTIS AT33-04 MISSION (At wreck site April 21-May 1 2016)

HAWSER LINES

Several blue A-strand polypropylene hawsers were found near the bow and stern of the wreck, as well as entangled on the aft side of the bridge.

FOCSLE

A mass of tangled hawsers extending high above the deck between the bow and the windlass prevented the AOV and *Sentry* from approaching closely. Some smaller yellow polypropylene lines with knotted loops were also found in the vicinity.

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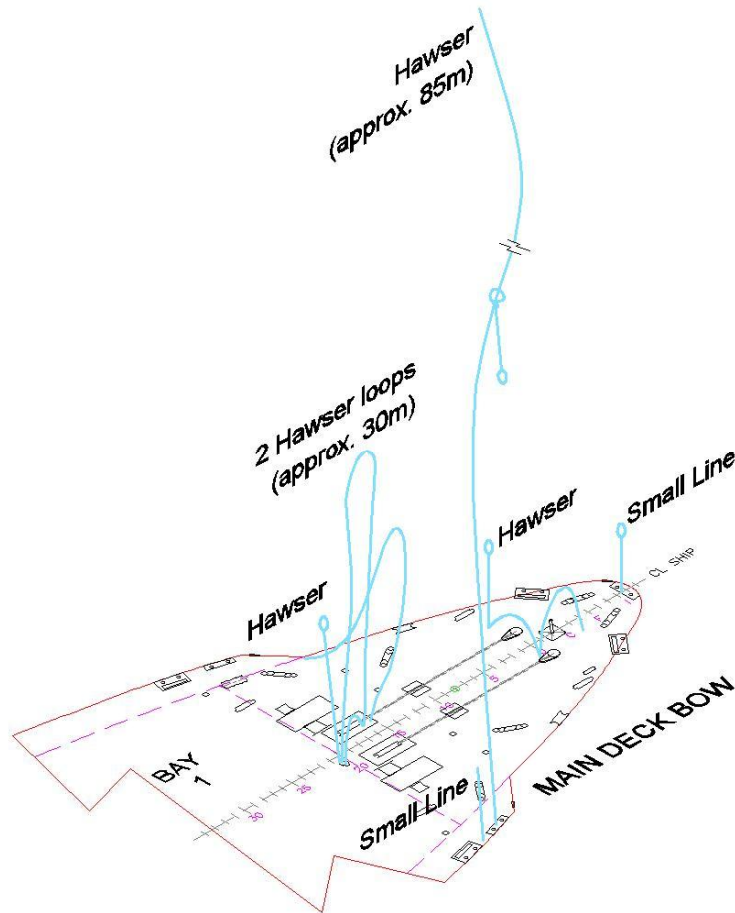


Figure 1: Diagram showing general location and orientation of lines on the focsle deck

Approximately midway between the bow and the windlass, two lines extend upward. The port side line is looped up into the water column and then back down to the deck. The line on the starboard side extends upward, and terminates in a spliced loop.

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Figure 2: View of focsle from the starboard bow, with the bow on the right

In the vicinity of the windlass, several blue polypropylene hawsers are tangled up, with two loops extending upward into the water column, and back down to the deck. The starboard-most hawser extends upward and terminates in a spliced loop.

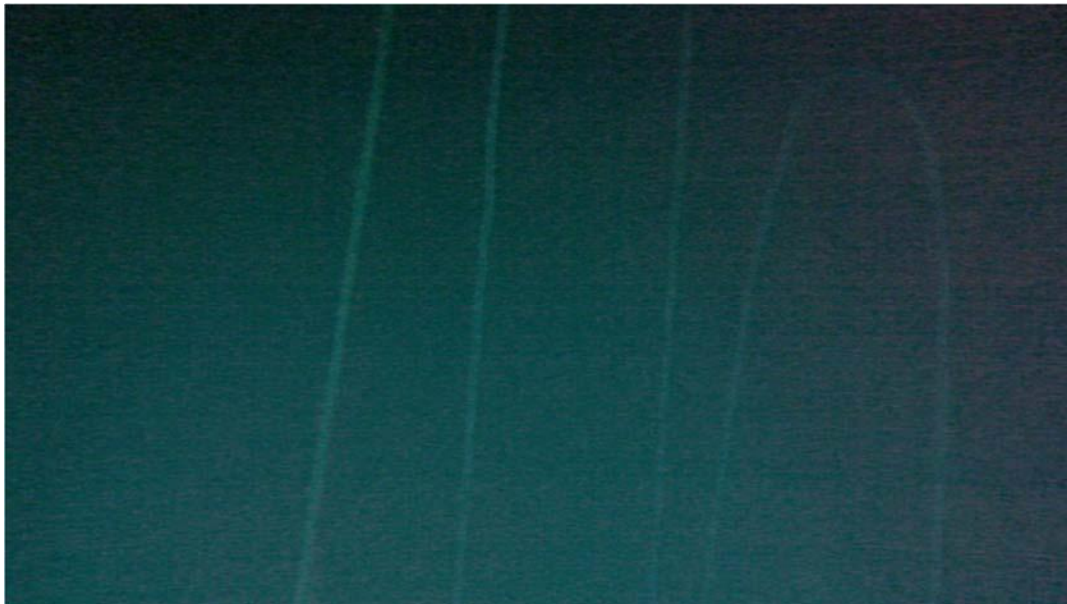


Figure 3: Lines from vicinity of windlass extending up into the water column

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Figure 4: Lines entangled in the vicinity of the windlass

Outboard on the starboard side of the focsle deck, along the gunwale, another blue polypropylene hawser extends upward in the water column, and terminates 85 meters above the seafloor.



Figure 5: Hawser extending upward from starboard bow

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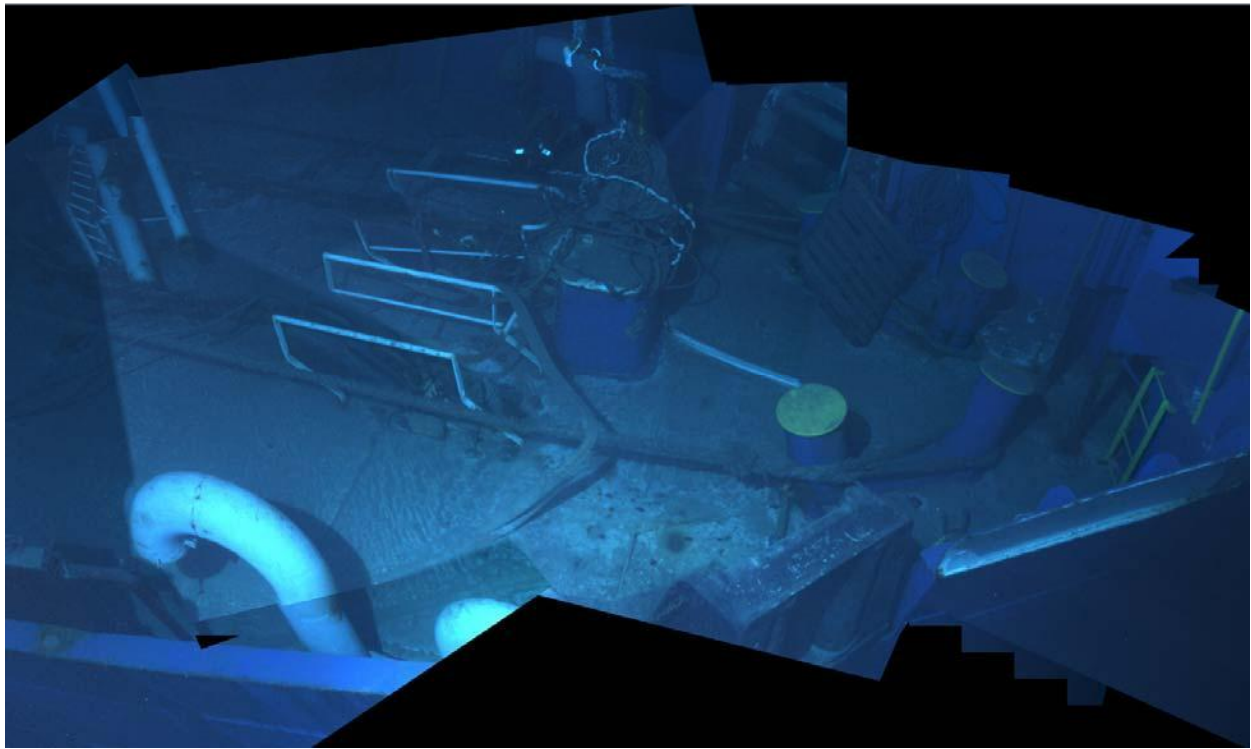


Figure 6: Preliminary Photo-Mosaic of Bow

PORT/STARBOARD QUARTER (CARGO BAY 18-19)

On the port and starboard quarters in the vicinity of cargo bays 18 and 19, hawsers protrude outward from openings on the second deck, and extend upward into the water column.

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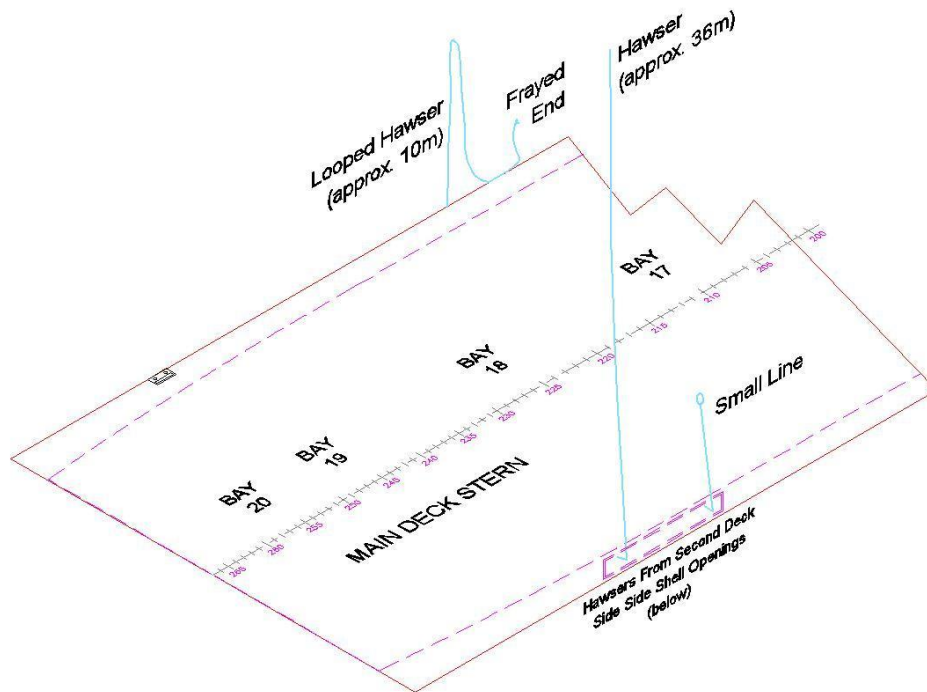


Figure 7: Diagram showing general location and orientation of lines on the port and starboard quarters

On the port side, a hawser with a frayed end protrudes just forward of a looped hawser.



Figure 8: End of frayed line extending from the port quarter

On the starboard side, a hawser protrudes from an opening on the second deck, and extends upward at least 36 meters above the seafloor.

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Figure 9: Hawser extending upward from the starboard quarter

BRIDGE

Another hawser was found entangled in debris on the aft side of the bridge deck, slightly to starboard of centerline. This one extends approximately 55 meters upward.

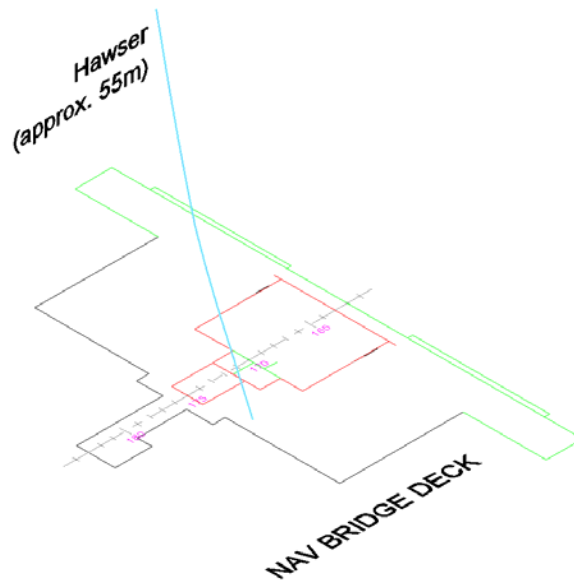


Figure 10: Diagram showing general location and orientation of the hawser on the bridge

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Figure 11: Hawser entangled in debris on the starboard aft side of the bridge, looking to port

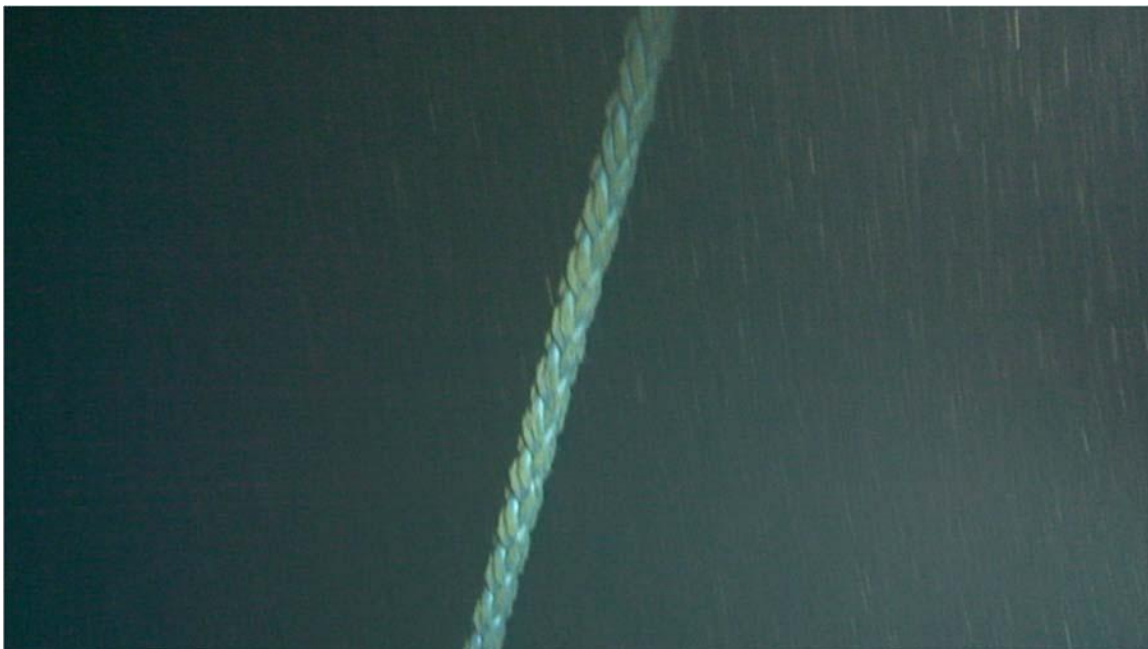


Figure 12: Close-up of bridge hawser

SMALLER LINES

A 3/8 inch to 1/2 inch lines was found on the gangway in the debris field.

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A line was found sinking aft of the transom to the seafloor.



Figure 13: Line from transom

List of OV Video Screen Shots with Hawser (used in this report)

- Dive 02 15-11-01 19.24.31_C2.wmv Mooring lines floating above port aft deck near stern @19:31
- Dive 02 15-11-01 19.24.31_C4.wmv Mooring lines floating above port aft deck near stern @19:31
- Dive 02 15-11-01 19.54.31_C2.wmv Bow Mooring lines @19:54 view of bow
- Dive 02 15-11-01 19.54.31_C4.wmv Bow Mooring lines @19:54 view of bow
- Dive 02 15-11-01 22.22.16_C2.wmv Stern /floating rigging Bay 18 @ 22:28 /stern open hatches / stbd side boat deck
- Dive 02 15-11-01 22.22.16_C4.wmv Stern /floating rigging Bay 18 @ 22:28 /stern open hatches / stbd side boat deck
- Dive 08 15-11-11 07.24.40_C1.wmv Bridge structure, rope floating up from corner @ 07:24
- Dive 08 15-11-11 07.24.40_C2.wmv Bridge structure, rope floating up from corner @ 07:24
- Dive 08 15-11-11 07.24.40_C3.wmv Bridge structure, rope floating up from corner @ 07:24
- Dive 08 15-11-11 08.54.40_C1.wmv Bridge structure, rope floating up on right @ 09:20
- Dive 08 15-11-11 08.54.40_C3.wmv Bridge structure, rope floating up on right @ 09:20
- Dive 08 15-11-12 03.24.49_C1.wmv Debris on seafloor / long strip of material floating up off of seafloor @ 03:24