



## **NATIONAL TRANSPORTATION SAFETY BOARD**

Office of Aviation Safety  
Washington, D.C. 20594

May 19, 2022

### **Group Chair's Factual Report**

## **SEARCH AND RECOVERY**

DCA21FA174

Attachment 3 - EGI Project Plan  
(198 pages)

**TRANSAIR FLIGHT 810, BOEING 737-257C,  
TAIL NUMBER N810TA  
PROJECT RECOVERY PLAN**



**TRANSAIR FLIGHT 810  
BOEING 737-257 RECOVERY  
🇺🇸 OAHU, HAWAII. 2021 🇺🇸**

**22 September 2021**

Submitted To:  
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**NOTE: It is a violation of Federal Regulation 49 CFR Part 831.13 for any party other than the NTSB to release any information about wreckage or the accident. This includes any photos, sketches, written descriptions, or statements.**

## INTRODUCTION

Eclipse Group Inc. (EGI), under contracted to AIG Aerospace, has been tasked with the recovery of the TransAir Flight 810 aircraft fuselage, engines and associated debris. At the completion of the operation, all recovered materials will then be delivered to Kalealoa Barbers Point Port. EGI is providing vessel, ROV and subsea navigation services in the form of EGI's R/V Bold Horizon Research Vessel (BH), derrick barge - D/B SALTA VERDE (DBSV), Barge assist Tug, GP-50 ROV System and all personnel required for the operation of this equipment.

EGI has prepared the following recovery project plan for review by the National Transportation Safety Board (NTSB), State of Hawaii and the United States Coast Guard (USCG).

Recovery plan objectives are to provide information related to EGI's proposed vessels and equipment, vessel operations, subsea operations / recovery techniques, associated logistics and safety methodology. A proposed task timeline is provided to demonstrate how recovery goals and objectives will be accomplished.

## PROJECT PLAN ORGANIZATION

To aid the reader, the project plan is organized in the following manner:

- ⇒ General Overview
- ⇒ Participants Introduction
- ⇒ Project Asset Description
- ⇒ General Overview of Operations & Timeline
- ⇒ Aircraft & Cargo Description
- ⇒ Aircraft & Cargo Present Condition
- ⇒ Location Maps and Debris Field Maps
- ⇒ Environmental Considerations
- ⇒ Recovery Methodology for both ROV and Barge Operations
- ⇒ Detailed Recovery Description
- ⇒ Defueling and Hazmat Description
- ⇒ Communications protocols
- ⇒ Appendices: Providing detailed supporting information

## PROJECT BACKGROUND

A Boeing 737-257C, operated by Rhoades Aviation as TransAir Flight 810 and registered as N810TA operating under 14 Code of Federal Regulations Part 121 as a cargo flight departed from HNL to Kahului International Airport (OGG), Kahului, Hawaii on July 2, 2021.

At approximately 0145 local time the airplane ditched into the Pacific Ocean south of the island of Oahu, about two nautical miles south of the Kalaeloa Airport. The occupants were two pilots who were subsequently rescued. The area is known as Mamala Bay. A preliminary survey has been conducted by use of a remote operated vehicles (ROV), which found that seafloor depths ranging from 360 – 420 feet seawater (FSW)

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## OPERATIONAL OVERVIEW

### RECOVERY OBJECTIVES - (DCA21FA174)<sup>1</sup>

- All items identified by the NTSB essential to the investigation during the course of the operations.
- Specific items identified for recovery include the following:
  - Aircraft cockpit
  - Main fuselage – to include:
    - Flight data recorders
    - Internal Cargo Containers
  - Engines
  - Thrust Reversers
  - Removal of misc. wreckage to include:
    - Forward landing gear
    - Separated Aircraft components
    - Cargo containers
    - Airplane debris, sheet metal etc.

### PERIOD OF PERFORMANCE

- September 30<sup>th</sup> thru October 31<sup>st</sup> 2021 – Includes transit times from vessel homeports to the operations area and back to homeport at the completion of the operation

### OPERATIONS AREA (OPAREA)

- Mamala Bay, Oahu, Hawaii
- The NTSB has coordinated with the FAA and USCG to close surrounding waters (1 NM) and airspace from October 8<sup>th</sup> – October 31<sup>st</sup> 2021

### ASSUMPTIONS

- RV BOLD HORIZON (BH) departure from San Diego, CA on September 30<sup>th</sup>
  - Transit will take approximately 10-days
  - Estimated arrival in Oahu is October 8<sup>th</sup>
- D/B SALTA VERDE (DBSV) departure from Long Beach, CA. October 2<sup>nd</sup>
  - Transit will take approximately 12-days
  - Estimated arrival in Oahu is October 12<sup>th</sup>
- Initial port of calls
  - BH – Honolulu
  - DBSV – Barbers Point
- Transmarine is the appointed agent for the BH for this operation and will be responsible for berthing arrangements
- Norko Marine Agency, Inc. is the appointed agent for the DBSV for this operation and will be responsible for berthing arrangements
- It is anticipated that arrival formalities and preparations after transit prior to commencement of operations will be

<sup>1</sup> The NTSB is also seeking the Ground Proximity Warning Computer. This is reportedly a bright blue Honeywell Mk VII avionics box which should stand out when using the ROV light. See OTHER DEBRIS section for a photo of examples.

- BH – One (1) day
- DBSV – Two (2) days
- Notice to Mariners and enforcement by the USCG will be made prior to start of operations
- Over-flight restrictions will be implemented by the FAA
- BH will commence operations prior to arrival of the DBSV
- BH and ROV will perform a pre-environmental survey before commencing recovery operations
- Operations tempo: 24-Hour operations in two 12-hour shifts
- Dates on scene: approximately 11-Days
- All Government and other client representative berthing will be located on the BH until arrival of the DBSV. This is being done for safety, and intended to limiting the number of people around the large equipment on the barge deck, meal planning. The majority of the work will be performed onboard the BH requiring the presence of investigative and technical personnel.
- Days lost to high seas or other environmental conditions will extend the period for an equal number of days.
- There maybe additional port calls to offload wreckage from the BH during the operation

#### PROJECT PARTICIPANTS

EGI is providing an experienced vessel and subsea recovery team for this effort with significant experience in aircraft recovery. EGI's Project Manager and Assistant Project Manager have 38 and 32-years experience respectively in the field of aircraft recovery and investigation. EGI's team also includes Ms. Darla White a highly regarded Hawaii based marine biologist to address environmental reporting on indigenous flora and fauna status at the recovery site and to report such findings to the State of Hawaii.

This effort will be in performed in cooperation and aided by The National Transportation Safety Board (NTSB). The NTSB team includes IIC and NTSB Structures Group Chairmen, each having approximately 25-years of accident investigation and recovery experience. The NTSB team will advise and direct the recovery of items of importance to the investigation. Boeing is providing a three-person team to assist with technical details in the investigation

AIG's on-site representative, Mr. Richard Ball, principle for Lone Star Retrievals has 38-years of direct experience. Mr. Ball will be present to monitor recovery efforts and to administer the disposal of the aircraft after recovery / delivery to shore.

AIG has contracted the services of Pacific Environmental Corporation (PENCO), an emergency response cleanup responder to assist in hazardous waste mitigation. PENCO reports directly to Lone Star Retrieval.

#### STATE OF HAWAII STATE EMERGENCY RESPONSE COMMISSION (SERC) / LOCAL FEDERAL AGENCIES

All aspect of this recovery will be reviewed, approved and monitored by the State of Hawaii SERC comprised by Department of Health (DOH), Department of Aquatic Resources (DAR), National Oceanic and Atmospheric Administration (NOAA) and the United States Coast Guard (USCG). Representatives of these departments are identified as the following\*:

**\*Note: It is recognized that there are many individuals who are active parties to and critical to this effort, any omission is strictly unintentional**



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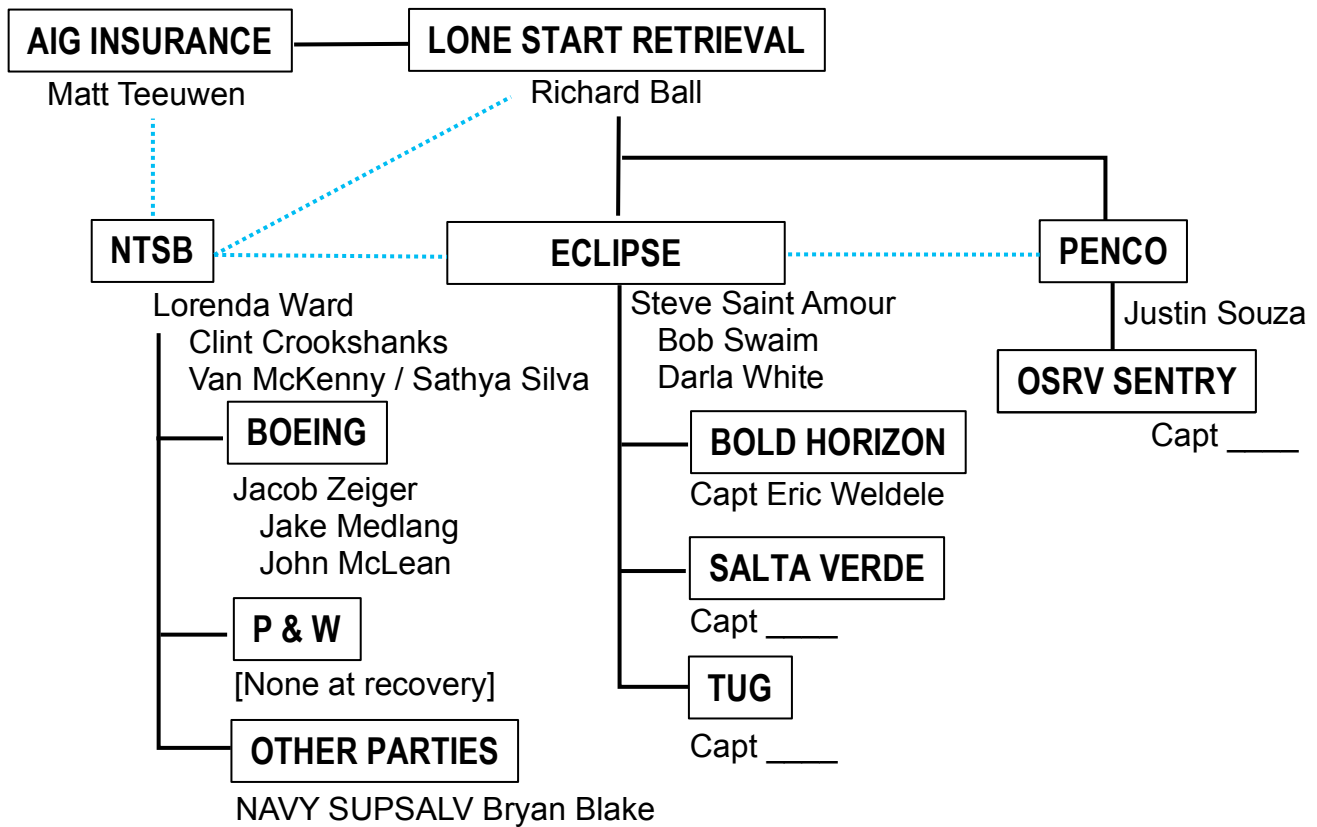
Waterways Management

**HAWAII DEPARTMENT OF TRANSPORTATION**

**Peter Pillone**

Harbor Master

Figure 6. Organization Chart



## PROJECT ASSET REVIEW

### ROV SUPPORT VESSEL - RV BOLD HORIZON (BH)



Figure 8. M/V Bold Horizon

The BH is a purpose-built, US Flagged, Jones Act compliant, United States Coast Guard (USCG) documented and American Bureau of Shipping (ABS) classed / inspected vessel. The BH has numerous features and capabilities not typically found on similarly sized vessels. Important discriminators include the abundance of interior and exterior deck spaces to support various missions' requirements. EGI brings experience from oil and gas, sciences and government services to each project, ensuring our clients benefit from the best of all areas of industry. The MV Bold Horizon maintains a permanent berth at the 10th Avenue Marine Terminal in San Diego. Detailed specifications maybe found in the Appendixes II & III.

#### Working Deck

The BH has an open main deck area of 2,000 sq. ft. with a minimum loading capacity of 800 pounds per square foot. The deck is equipped with 1"-8 x 24" x 24" O/C deck sockets rated at 5,000 lbs. each. Present around the deck are numerous 220 and 440 VAC, 3 phase outlets mounted at convenient points ar for client equipment power requirements.

The vessel is equipped with a variety of load handling equipment including:

- One (1) Nautilus 3400 – 051 telescoping pedestal deck crane located on the starboard aft quarter. The maximum boom extension is 70' and is able to reach most areas of the vessel. The crane capacities are 15,000lbs SWL at 15 ft. extension and 4,000 lbs. at 70 ft.
- One (1) hydraulically operated 12 ton SWL stern A-Frame

- Vertical clearance of 21 feet 7 inches between the cross member and deck,
  - Horizontal clearance of 14 feet between legs and cross member
- Starboard mounted J-Frame for side deployments with a safe SWL of 9,800 lbs.
- In addition to the load handling equipment the vessel carries two winches and one capstan for client use

### **Vessel Positioning, Endurance and Efficiency**

The BH is equipped with two (2) variable pitch propellers and bow thruster capable of precision station keeping. This vessel is fuel efficient with a low maximum fuel burn rate of 1,000 gallons per day, giving the vessel an endurance of up to 40-days and a maximum range of 9,600 miles. All vessel officers and crew are U.S. citizens.

The MV Bold Horizon routinely conducts projects where station keeping is a critical component of the mission. With the trawl winch operating off the stern through the 12t a-frame, the vessel/crew maintain high proficiency in holding a tight watch circle during science or ROV missions. The vessel deck equipment available for use during operations is controlled from the aft wheelhouse, allowing for clear lines of sight and communications to/from all stations.

### **Vessel Habitability**

The BH provides ample accommodations for charterers and crew combined. All cabins are either single or double bunk staterooms, a number of cabins have attached shared bathrooms with additional public shower and bathrooms facilities located on all decks. All interior spaces are environmentally controlled.

All client personnel will be provided with fresh linens and towels and the vessel is equipped with a washer/dryer. The vessel has a dedicated TV/conference room for client use. Communications while aboard include optional VSAT communications and 4G-cell signal booster. All decks have amplified 4G-cell service through access points on each deck.

### **Meal Plan & HSE**

A minimum of three (3) quality, nutritious and well-balanced meals in accordance with FDA standards shall be prepared and offered each charter day. A mid-night meal (MIDRAT) will also be prepared. A qualified cook will perform all food preparation in a hygienic manner. Snack foods will be available on a 24-hour basis and will include a selection of chips, nuts, fresh fruit and an adequate supply of bottled drinking water. The vessel will provide coffee service in the galley and bridge and will be available at all times. EGI's vessel manager shall address and accommodate special dietary needs as required.

EGI maintains a robust HSE program, which includes Job Site and Environment Analysis (JSEA) mission planning and risk assessment, toolbox talks and personnel who understand marine operations through years of performing similar projects around the world.

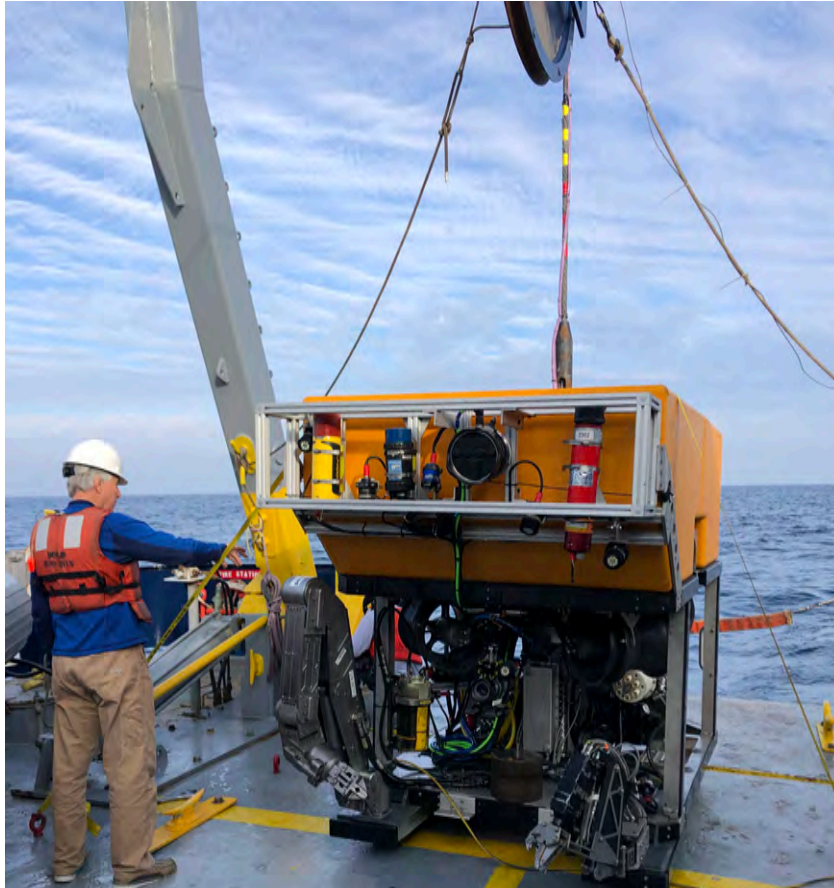
**EGI REMOTE OPERATED VEHICLES (ROV)**

Figure 9. The image shows the size of the ROV with reference to a person standing nearby

EGI is providing the GP-50 ROV (A second vehicle is also provided as back-up) as the host vehicle for this operation. The 6,000-meter rated GP 50 ROV system may be utilized by most vessels of opportunity due to designed flexibility in the topside control stations while using a variety of handling systems / launch and recovery methods. The ROV is optimized for each customer's project, ensuring that the needs of the project dictate the configuration of the system as it is mobilized.

The GP 50 is an EGI designed vehicle and is a continuation and advancement on previous EGI Deep-water vehicle systems. The ROV is purpose built for deep-water operations to a depth of 6,000 meters. Design considerations included an emphasis on reliability; flexibility and low cost of repair.

System architecture focuses on simplicity in design, ensuring reliability yet allowing for the integration of a various sensors and work packages to accomplish a wide range of missions. The technical simplicity, reliability and adaptability delivers low risk of performance and best price value to our customers. The vehicle is equipped with two manipulators, load releases and tooling ports allowing it to perform the work required for this scope of work. The vehicle is also equipped with INS and a DVL and capable of precision bottom navigation.

Data recording is achieved with a video suite consisting of standard definition (SD), High Definition (HD), low light cameras and lighting to ensure high quality image recording. All video is recorded using the Digital Edge EdgeDVR-1HD-4SD System. When used with the precision USBL subsea navigation system, ROV position, depth and other critical information would be overlaid onto the video and stored.

#### **VIDEO ACQUISITION**

The EdgeDVR-1HD-4SD is a quad channel digital video recorder (DVR), which can record 2-channels of high definition (HD) video and up to 3 channels of standard definition (SD) video or 4-channels SD video. It can display and record up to four video channels simultaneously including multiple ROV cameras and sonar.

The Edge DVR includes a built in video switcher, so the operator can easily switch between video inputs when in 1 or 2 channel recording mode. Switching can even be done within a video recording. A quad channel black box recorder is integrated into the EdgeDVR, so whenever a dive is open, all channels of video are recording be they HD or SD. The EdgeDVR includes HD and SD drag and drop quad independent channel overlay and can take in up to 4 survey or serial data feeds. Each channel includes fully independent overlay functionality including time / date / depth / position information. During the survey, real time digital stills and video clips can be acquired. The system has a built in eventing and automatic generation of dive, anomaly, video and photo logs. Other features include, HD/SD Digital Stills (Jpeg or Bitmap), Automatic dive, photo, video and anomaly logs and real time data logging stored on the redundant 3TB drives.

#### **SURVEY POSITIONING, TRACKING AND DATA ACQUISITION**

Surface / Sub surface tracking will be achieved by utilizing Sonardyne Ranger II Ultra Short Base Line (USBL) system with beacons to track the ROV position on the seafloor. This information will be provided to the QINSy Integrated Navigation system for tracking and data collection. The Sonardyne Ranger II Ranger 2 USBL is a precision, survey- grade Ultra-Short Base Line (USBL) acoustic positioning system designed for Dynamic Positioning (DP) reference and for ROV/towfish tracking operations, primarily for construction and survey use. Ranger 2 can track up to ten targets simultaneously to ranges of greater than 6,000 meters.

#### **QINSY INTEGRATED NAVIGATION SYSTEM**

QINSy (Quality Integrated Navigation System) is a hydrographic data acquisition, navigation and processing software package. The suite of applications can be used for various types of surveys, ranging from simple single beam surveys up to complex offshore construction works QINSy is well suited to these types of linear surveys, whether the inspection sensors are mounted on the surface vessel itself or on ROVs, or other subsurface vehicles. Interfacing is available for all the sensors commonly used for these types of surveys, from multibeam, to side scan, to pipe-trackers. Detailed specifications maybe found in the Appendixes IV.

## DERRICK BARGE SALTA VERDE (DBSV)



Figure12. Derrick Barge Salta Verde (DBSV)

Curtin Maritime Corporation (CM), based in Long Beach has been contracted by EGI to provide heavy lift assets for this recovery.

CM will provide the 200 Ton, 185 ft. LOA, 50 ft beam, US Flagged, Jones Act compliant, United States Coast Guard (USCG) documented and American Bureau of Shipping (ABS) classed / inspected 4-point DERRICK BARGE SALTA VERDE (DBSV).<sup>2</sup> This vessel provides the lift capability and deck space for the recovery of the aircraft to deck and delivery to Barbers Point Port.

The DBSV is equipped with all necessary equipment for this recovery. Deck equipment includes the following:

- Clyde Frame 7 Five Drum 2,000' of 1 1/8" Winch and Anchor System
- MD-97 Water Fall Recovery Winch with a drum pulling power of 195,000 lbs.
- Manfred: Manitwoc 4600 Series III Crane with a maximum lift capability of 270,000 lbs.
- Multiple pneumatic tuggers place around the deck
- Rigging / Welding Shop

### Vessel Positioning

The DBSV is positioned by use of a support tug, identified below. Once in place it is held in position by a 4-point anchor spread.

<sup>2</sup> The NTSB has also worked previously with this vessel for the recovery of the Dive Boat Conception in Santa Barbara, California.

The DBSV will be towed to site and tended by a Curtis Maritime tug for the duration of the operation. The barge will anchor on the seaward side of the debris field to provide a lee (flattened water) for the ROV Support vessel to perform its work and for the actual aircraft lift. The barge will be tended by its dedicated support tug in the event the anchors start to slip or the weather increases.

### **Vessel Habitability**

The DBSV can accommodate 10 barge and client personnel in 5 ea. 2-man staterooms. The barge is equipped with shower and bathroom facilities to accommodate the on-board personnel. The barge will provide 3-meals per day as well as snacks, soda and water.

Curtin will provide safety instructions to all aboard the DBSV and all people will wear a personal flotation device (PFD) when on deck. When the winches are in use, all exposed personnel will wear appropriate protective boots, hard hats, gloves, eye protection, and other personal protective equipment (PPE).

The DBSV has confined deck space for the amount of wreckage and activity to be aboard. Therefore, the only people permitted aboard will be CURTIN, ECLIPSE, and PENCO personnel, plus one representative at a time from each party related to the NTSB investigation. LSR may also require use of the DBSV galley for PENCO personnel when performing defueling operations. Detailed specifications maybe found in the Appendixes V.

### **TUG, SHIRLEY C 3**



Figure 14. Loadline Tug Shirley C

The 120 ft. CURTIN Loadline Tug Shirley C is expected to transport the DBSV from Long Beach, tend the anchors, and provide a safety vessel for the barge occupants.

<sup>3</sup> <https://curtinmaritime.com/fleet/ocean-tug-shirley-c-120-ft-tugboat/>

## OSRV SENTRY 4



Figure 15. Photo of OSRV SENTRY

AIG will provide the PENCO Oil Spill Response Vessel (OSRV) SENTRY. The MV SENTRY is a 100 ft. LOA offshore supply ship that has been modified for the collection and containment oil resulting from spills. The vessel is operated by [National Response Corporation](#). The ship's crew stands a round-the-clock watch to provide visiting tank ships with a quick-response capability in the event of an oil spill and has a local crew with a combined 40+ years of oil spill cleanup experience in Honolulu.

### GENERAL OPERATIONS DESCRIPTION

The BH will arrive at the wreck site to perform pre-recovery survey and basket deployment. Initial priorities are the following:

- Site Survey
- Deployment of baskets
- Engine Recovery
- Rigging to the extent possible prior to the arrival of the barge of the cockpit and aft section
- Depositing of wreckage in baskets as time allows
- After the arrival of the barge, recovery of the large sections

The DBSV will arrive approximately 5-days later and take up position in proximity to the main body of wreckage. Preparations will be made to lift the cockpit and then the main fuselage.

During recovery of the larger section, EGI intends to initially lift the aircraft a safe distance off bottom to avoid any contact with the seabed induced by the sea state. This altitude off bottom will be held for

<sup>4</sup> <https://www.maritimehawaii.com/2018/07/osrv-nrc-sentry/>

approximately 5-minutes to evaluate the status and condition of both the aircraft and the rigging prior to full recovery.

The ROV will then monitor the lifting of the aircraft to approximately 30 ft. from the surface. This will allow for the visual observation of both the aircraft and rigging to insure that the rigging is not slipping, excessively crushing or otherwise in risk of failure, the general aircraft condition will also be apparent.

For smaller wreckage, the ROV is normally operated from the BH on the stern while starboard cranes can be used to raise debris and as elevators for the debris baskets.

Berthed has been arraigned onboard the BH for the investigation group for the purpose of allowing access by the ROV team who might need access to an investigation person familiar with the airplane. Access to the ROV operations van is by invitation only. The more detailed incremental recovery plan is provided later in this document.

## **VESSEL LOGISTICS**

### **NAVIGATION SURVEY POSITIONING, TRACKING AND DATA ACQUISITION**

All vessels involved in this recovery have redundant GPS systems with NORTEK Navigation Systems. Surface / Sub surface tracking will be achieved by utilizing Sonardyne Ranger II Ultra Short Base Line (USBL) system with beacons to track the ROV position on the seafloor. This information will be provided to the Quality Integrated Navigation System (QINSy) for tracking and data collection. Five (5) beacons will be provided to track targets ranging from collection baskets, debris and areas of interest.

### **OPERATIONAL SUMMARY**

1. On arrival, an in-person meeting / review of operations will be conducted with representative(s) of Coast Guard, Hawaiian Natural Resource, NOAA, Port Officials, and PENCO. The vessels may undergo an invasive species hull inspection using the state provided ROV.
2. BH will transit to the OPAREA at the earliest time allowed. The vessel will shift into operations starting with an initial bottom survey of the debris area and proposed anchor sites. Upon completion of survey, recovery baskets will be deployed in the highest debris concentration areas in accordance with NOAA species protection guidelines.
3. The aircraft engines will be rigged and recovered to the Bold Horizon for eventual delivery to port
4. BH ROV will pre-rig the major fuselage and cockpit to the degree possible prior to the arrival of the DBSV. The forward fuselage will have a cable through the cockpit windows and another beneath the rear of the section.
5. The aft main section will have two lifting points, the first being two basket loops with one under each wing, coming to a common point above the fuselage. Then the ROV will pass a line under the tail and if sea-states allow, the BH will temporarily lift the aft section to allow two straps to be

deployed beneath the aft fuselage, under the pressure bulkhead and ahead of the aft doors.<sup>5</sup> Each sections with be rigged with two lifting point.

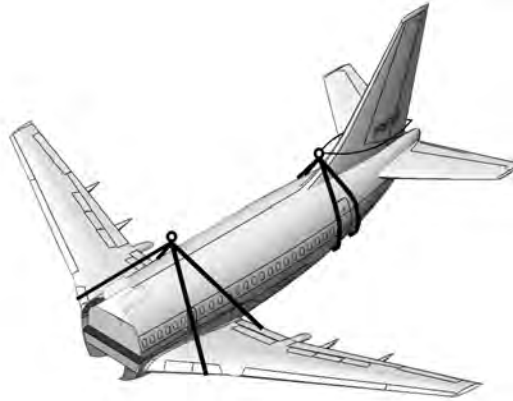


Figure 1. Aft fuselage after rear straps is passed beneath fuselage.

6. BH and ROV will fill debris baskets and recovers as much as possible pending arrival of DBSV.
7. BH and ROV will record / placement of DBSV anchors as part of the ongoing effort to document pre and post disturbance of the seabed.
8. If feasible and desired the BH will transfer debris from BH to DBSV.
9. DBSV will develop an operational flow by starting with lighter items, such as debris baskets and loose wreckage. The forward fuselage be recovered and placed on the DBSV deckhouse, which has the deck load capability and suitability for this purpose for later offload in port.
10. PENCO is responsible for capture of oil &/or fuel and will be on call from beginning of operations. The PENCO Oil Spill Response Vessel (OSRV, 100 ft.) SENTRY will be on site prior to moving the wings to prevent fuel from reaching shore.
11. The main lift will be from a barge waterfall-style anchor winch to the basket haul rigging, which has been passing under the wings. A second line from the main master link will be attached to the pair of straps beneath the aft fuselage. The fuselage will be raised at a tail low angle, minimizing the load on the crane both during the in-water lift and during the air-water interface lift to deck.
12. Two tugger lines from two separate tuggers oriented fore and aft of the barge will be attached to the wing tips to stabilize the load during all aspects of the recovery operations. These tuggers will also insure that the aircraft does not spin in the water column and to correctly orientate the aircraft during the air-water interface lift.
13. Once the aircraft has arrived at the air-water interface, the barge will perform a load transfer from the waterfall winch to the crane main and whip lines. A pre-installed stinger attached to the master link will be for this transfer.

14. It is anticipated that the aircraft cargo containers and other areas will contain entrained water adding to the overall weight in air. The BH will attempt to create drainage holes in the container and tale surfaces to facilitate drainage. The rate of lifting will be slow through the air-water interface as water drains from the fuselage. The load during the lift will be monitored by the ROV and by use of the crane load cell to insure loading on the crane do not exceed safe working loads.
15. The front section will be brought aboard and the crane will support the rear as tugger winches laterally move the airplane into place.<sup>6</sup>

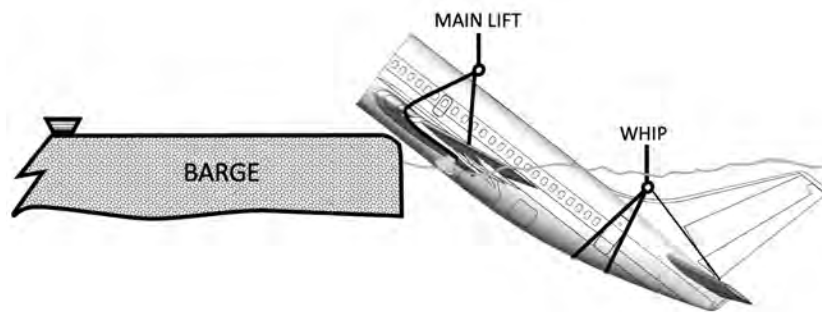


Figure 2. Airplane at air-water interface with wings resting on edge of barge

16. Once the aircraft is onboard, secured and stabilized the CVR and FDR will be recovered and moved to shore as soon as possible.<sup>7</sup> If needed a secured gangway will be utilized to allow safe access to the after door and access to the interior of the aircraft.
17. PENCO personnel will board DBSV to drain airplane fuel tanks into a 6,000 ISO tank, which they will provide.<sup>8</sup>
18. The tug will move DBSV to Barbers Point, probably to Pier 7. The BH with the ROV camera will remain on site to record bottom conditions, to include possible disruption where anchors had been placed.
19. Lone Star Retrieval (LSR) will have transportation waiting for the DBSV to unload debris at the pier.
20. PENCO to remove the ISO tank with the water/fuel mix from DBSV and clean spilled fuel from barge as required.

<sup>6</sup> Conditions may lead to the short need for a separate barge to transfer the main fuselage and wing section to shore if placement on the DBSV creates a hazard. Relative motion of two vessels with the section hanging from a moving crane may result in further damage to the fuselage so this is regarded as a contingency.

<sup>7</sup> The NTSB is to supply containers and transportation.

<sup>8</sup> Note that an absorbent cofferdam will surround the airplane on deck and due to dihedral the cofferdam does not need to reach the wing tips. The wing tips are higher than the center so any remaining water/fuel mixture will be near the fuselage.

21. End operations, load engines for return to California, conduct exit discussions. BH and DBSV depart.

NOTES:

- A. All dates are targets and may need to be altered for weather, sea state, or other conditions.
- B. Personnel are NOT permitted to move back and forth between shore and the vessels once aboard. If/when exceptional circumstances require somebody to go to shore, they will need a fresh negative COVID test to return to the vessels.

NOTIONAL TIMELINE

| DATE             | DAY   | DESCRIPTION OF ACTIVITY                                                                                                                                                        | NOTES                             | BH DAYS | CM DAYS | STATUS    |
|------------------|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|---------|---------|-----------|
| -                | -     | All people need a "Hawaii Safe Travels" account.<br>(2) Need to upload COVID tests w/in 72 hours prior to flights arriving and (3) have vaccination card to show at airport.   |                                   |         |         | On-Going  |
| <b>SEPTEMBER</b> |       |                                                                                                                                                                                |                                   |         |         |           |
| 9/20             | Mon   | Bunker Vessel                                                                                                                                                                  | • NA                              | NA      | NA      | Completed |
| 9/21             | Tues  | Baskets Arrive                                                                                                                                                                 | • NA                              | NA      | NA      | Completed |
| 9/22             | Wed   | CM winch needs to leave Houston <sup>9</sup>                                                                                                                                   | • NA                              | NA      | NA      | Completed |
| 9/23             | Thurs | General Preparations                                                                                                                                                           | • NA                              | NA      | NA      | Completed |
| 9/24             | Fri   | <ul style="list-style-type: none"> <li>Rigging ready to ship</li> <li>Winch arrives from Houston</li> <li>Start on foundation</li> </ul>                                       | • NA                              | NA      | NA      | Completed |
| 9/25             | Sat   | Cont. Foundation                                                                                                                                                               | • NA                              | NA      | NA      | Completed |
| 9/26             | Sun   | Start MOB winch onto barge                                                                                                                                                     | • NA                              | NA      | NA      | Completed |
| 9/27             | Mon   | <ul style="list-style-type: none"> <li>Receive Tuggers</li> <li>Receive Generator</li> </ul>                                                                                   | • NA                              | NA      | NA      | Completed |
| 9/28             | Tues  | <ul style="list-style-type: none"> <li>Start Securing BH for Sea</li> <li>Secure Tuggers</li> <li>Install Block on J-Leg</li> <li>WK Meeting with CM to review Prep</li> </ul> | • NA                              | NA      | NA      | Completed |
| 9/29             | Wed   | <ul style="list-style-type: none"> <li>Receive Rigging</li> <li>Load GP Mini</li> <li>Shift GP 50 Forward</li> </ul>                                                           | • Protect Vehicles during transit | NA      | NA      | Completed |
| 9/30             | Thurs | • BH Underway                                                                                                                                                                  | • NA                              | 01      | 00      | Completed |
| <b>OCTOBER</b>   |       |                                                                                                                                                                                |                                   |         |         |           |
| 10/01            | Fri   | • BH Underway                                                                                                                                                                  | • NA                              | 02      | 00      | Completed |
| 10/02            | Sat   | • DBSV Underway                                                                                                                                                                | • NA                              | 03      | 01      |           |
| 10/03            | Sun   | • Transit                                                                                                                                                                      | • NA                              | 04      | 02      |           |

<sup>9</sup> Curtin needs 14 days at dock, including pre-provisioning, crane wrapping, etc. PLUS 12 day transit. 10/02 early departure arrives 10/13.

|       |       |                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                           |    |    |  |
|-------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|--|
| 10/04 | Mon   | <ul style="list-style-type: none"> <li>Transit</li> </ul>                                                                                                  | <ul style="list-style-type: none"> <li>NA</li> </ul>                                                                                                                                                                                                                                                                                      | 05 | 03 |  |
| 10/05 | Tue   | <ul style="list-style-type: none"> <li>Transit</li> </ul>                                                                                                  | <ul style="list-style-type: none"> <li>NA</li> </ul>                                                                                                                                                                                                                                                                                      | 06 | 04 |  |
| 10/06 | Wed   | <ul style="list-style-type: none"> <li>Transit</li> </ul>                                                                                                  | <ul style="list-style-type: none"> <li>NA</li> </ul>                                                                                                                                                                                                                                                                                      | 07 | 05 |  |
| 10/07 | Thurs | <ul style="list-style-type: none"> <li>Transit</li> <li>EGI Project Team Arrives</li> </ul>                                                                | <ul style="list-style-type: none"> <li>Hotel</li> </ul>                                                                                                                                                                                                                                                                                   | 08 | 06 |  |
| 10/08 | Fri   | <ul style="list-style-type: none"> <li>Meet local officials to review environmental and other plans and implementation.</li> </ul>                         | <ul style="list-style-type: none"> <li>Hotel</li> </ul>                                                                                                                                                                                                                                                                                   | 09 | 07 |  |
| 10/09 | Sat   | <ul style="list-style-type: none"> <li>EGI Operations team travels to Hawaii</li> </ul>                                                                    | <ul style="list-style-type: none"> <li>Hotel</li> </ul>                                                                                                                                                                                                                                                                                   | 10 | 08 |  |
| 10/10 | Sun   | <ul style="list-style-type: none"> <li>BH Arrives</li> <li>Operations team embarks</li> <li>BH inspected by State ROV</li> </ul>                           | <ul style="list-style-type: none"> <li>Move aboard</li> </ul>                                                                                                                                                                                                                                                                             | 11 | 09 |  |
| 10/11 | Mon   | <ul style="list-style-type: none"> <li>BH Onsite</li> <li>Conduct Anchor location Survey</li> <li>Deploy Baskets</li> <li>Recovery Forward Gear</li> </ul> | <ul style="list-style-type: none"> <li>Columbus Day Holiday</li> </ul>                                                                                                                                                                                                                                                                    | 01 | 10 |  |
| 10/12 | Tues  | <ul style="list-style-type: none"> <li>BH Rigging and recovery of #1 Engine</li> </ul>                                                                     | <ul style="list-style-type: none"> <li>NA</li> </ul>                                                                                                                                                                                                                                                                                      | 02 | 11 |  |
| 10/13 | Wed   | <ul style="list-style-type: none"> <li>BH Rigging and recovery of # 2 Engine</li> <li>Engines to be transported to shore</li> </ul>                        | <ul style="list-style-type: none"> <li>NA</li> </ul>                                                                                                                                                                                                                                                                                      | 03 | 12 |  |
| 10/14 | Thurs | <ul style="list-style-type: none"> <li>BH rig cockpit</li> <li>DBSV arrival</li> <li>State ROV inspects tug and DBSV</li> </ul>                            | <ul style="list-style-type: none"> <li>NA</li> </ul>                                                                                                                                                                                                                                                                                      | 04 | 01 |  |
| 10/15 | Fri   | <ul style="list-style-type: none"> <li>DBSV Preps for work</li> <li>BH starts rigging of main section</li> </ul>                                           | <ul style="list-style-type: none"> <li>External representative may come aboard to observe, current negative COVID testing proof must be submitted prior to arrival</li> <li>Water Taxi will be provided by NTSB or LSR</li> <li>All DBSV Lifts will be conducted during daylight hours only</li> <li>PENCO OSRV SENTRY Standby</li> </ul> | 05 | 02 |  |
| 10/16 | Sat   | <ul style="list-style-type: none"> <li>DBSV anchors &amp; erects derrick</li> <li>Transfer Wreckage from BH to DBSV</li> </ul>                             | <ul style="list-style-type: none"> <li>During anchoring, BH will be restricted from the anchor zone</li> <li>PENCO OSRV SENTRY Standby</li> </ul>                                                                                                                                                                                         | 06 | 03 |  |
| 10/17 | Sun   | <ul style="list-style-type: none"> <li>Transfer personnel to DBSV</li> <li>DBSV Recovers Cockpit</li> <li>Finish Rigging Main Section</li> </ul>           | <ul style="list-style-type: none"> <li>PENCO OSRV SENTRY Standby</li> </ul>                                                                                                                                                                                                                                                               | 07 | 04 |  |
| 10/18 | Mon   | <ul style="list-style-type: none"> <li>DBSV Lifts main section</li> <li>CVR and FDR go to shore</li> <li>PENCO empties fuel tanks</li> </ul>               | <ul style="list-style-type: none"> <li>PENCO OSRV SENTRY Standby</li> </ul>                                                                                                                                                                                                                                                               | 08 | 05 |  |
| 10/19 | Tue   | <ul style="list-style-type: none"> <li>DBSV to Pier 7 at Kalaeloa Harbor</li> <li>PENCO removes ISO tank and Hazmat</li> <li>Offload Wreckage</li> </ul>   | <ul style="list-style-type: none"> <li>Project review and follow-up discussion with State reps</li> </ul>                                                                                                                                                                                                                                 | 09 | 06 |  |

|       |       |                                                                                                                                                                                                                                                                                                                                             |                                                              |     |     |  |
|-------|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|-----|-----|--|
|       |       | <ul style="list-style-type: none"> <li>BH Continues Site Clearance</li> </ul>                                                                                                                                                                                                                                                               |                                                              |     |     |  |
| 10/20 | Wed   | <ul style="list-style-type: none"> <li>DBSV Prepares for departure</li> <li>BH Continues Site Clearance</li> </ul>                                                                                                                                                                                                                          |                                                              | 10  | 07  |  |
| 10/21 | Thurs | <ul style="list-style-type: none"> <li>DBSV Departs</li> <li>BH Documents anchor locations</li> <li>Receives approval from SERC to conclude operations</li> <li>NTSB to have engines ready for pickup and transport to California on BH</li> <li>BH Delivers remaining debris to port</li> <li>Bunkers</li> <li>ROV Crew Departs</li> </ul> | <ul style="list-style-type: none"> <li>CM Transit</li> </ul> | 11  | -01 |  |
| 10/22 | Fri   | <ul style="list-style-type: none"> <li>BH Sails</li> </ul>                                                                                                                                                                                                                                                                                  | <ul style="list-style-type: none"> <li>CM Transit</li> </ul> | -01 | -02 |  |
| 10/23 | Sat   | <ul style="list-style-type: none"> <li>BH Transit</li> </ul>                                                                                                                                                                                                                                                                                | <ul style="list-style-type: none"> <li>CM Transit</li> </ul> | -02 | -03 |  |
| 10/24 | Sun   | <ul style="list-style-type: none"> <li>BH Transit</li> </ul>                                                                                                                                                                                                                                                                                | <ul style="list-style-type: none"> <li>CM Transit</li> </ul> | -03 | -04 |  |
| 10/25 | Mon   | <ul style="list-style-type: none"> <li>BH Transit</li> </ul>                                                                                                                                                                                                                                                                                | <ul style="list-style-type: none"> <li>CM Transit</li> </ul> | -04 | -05 |  |
| 10/26 | Tues  | <ul style="list-style-type: none"> <li>BH Transit</li> </ul>                                                                                                                                                                                                                                                                                | <ul style="list-style-type: none"> <li>CM Transit</li> </ul> | -05 | -06 |  |
| 10/27 | Wed   | <ul style="list-style-type: none"> <li>BH Transit</li> </ul>                                                                                                                                                                                                                                                                                | <ul style="list-style-type: none"> <li>CM Transit</li> </ul> | -06 | -07 |  |
| 10/28 | Thurs | <ul style="list-style-type: none"> <li>BH Transit</li> </ul>                                                                                                                                                                                                                                                                                | <ul style="list-style-type: none"> <li>CM Transit</li> </ul> | -07 | -08 |  |
| 10/29 | Fri   | <ul style="list-style-type: none"> <li>BH Transit</li> </ul>                                                                                                                                                                                                                                                                                | <ul style="list-style-type: none"> <li>CM Transit</li> </ul> | -08 | -09 |  |
| 10/30 | Sat   | <ul style="list-style-type: none"> <li>BH Transit</li> </ul>                                                                                                                                                                                                                                                                                | <ul style="list-style-type: none"> <li>CM Transit</li> </ul> | -09 | -10 |  |
| 10/31 | Sun   | <ul style="list-style-type: none"> <li>BH Transit</li> </ul>                                                                                                                                                                                                                                                                                | <ul style="list-style-type: none"> <li>CM Transit</li> </ul> | -10 | -11 |  |
| 11/01 | Mon   | <ul style="list-style-type: none"> <li>Demob</li> </ul>                                                                                                                                                                                                                                                                                     | <ul style="list-style-type: none"> <li>CM Transit</li> </ul> | -11 | -12 |  |
| 11/02 | Tues  | <ul style="list-style-type: none"> <li>Demob</li> </ul>                                                                                                                                                                                                                                                                                     | <ul style="list-style-type: none"> <li>Demob</li> </ul>      | -12 | NA  |  |

## ENVIRONMENTAL / WEATHER OPERATION LIMITS

Decisions to continue or restrict operations in changing environmental conditions are always at the sole discretion of the vessel masters and the EGI project manager. All operations personnel have “All Stop Authority” to halt any operations until reviewed by relevant parties to everyone’s satisfaction.

Factors that will be considered:

- The safety of the vessels involved
- The safety of the personnel
- The ability to recover the aircraft in a controlled and safe manner
- Considerations on the topic of aircraft recovery include the following:
  - A weather window that exceeds the estimated time to perform the lift of the object from the seafloor to the deck of the recovery vessel, typically established as a minimum of 24-hours.

Winds and swell height will also be considered. The cycle of swells induce the following conditions – momentary weightlessness, followed by sudden snap loading on wreckage, rigging and vessel and finally sudden acceleration of the object inducing strain and forces in excess of the weight of the object.

**\*The schedule and/or order of the lift may be adjusted to leverage favorable weather conditions.**

EGI has established the following as weather windows for the recovery of:

---

### **LARGER ITEMS - MAIN BODY AND COCKPIT SECTION**

- Swell - <1m. May be greater, depending on period of swells.
- Wave - <1.5m
- Wind - <15 knots. May vary and be less, depending on steady state versus gusts.

### **SMALL ITEMS – BASKET RECOVERIES, ENGINES AND SMALL DEBRIS**

- Swell - <2.5m. May be altered due to period of swells
- Wave - <2.5m
- Wind - <15 knots. May vary and be less, depending on steady state versus gusts.

### **WEATHER MITIGATION**

All vessels and equipment are designed and maintained to operate in open-ocean with the conditions that typically may be expected in an open environment. EGI uses established limits for weather conditions, as shown below. EGI vessels are required to continuously monitor weather and the company subscribes to the weather reporting service DTN, <https://www.dtn.com>

Typical service includes twice daily weather reports with a seven day forecast. EGI establishes weather parameters, which the DTN identifies and flags with both predicted wind, swell and wave heights with a color coding system to indicate where these states fall with-in EGI's established parameters. EGI also utilizes other local, publicly available weather reporting sources to include NOAA, and "Windy" as an example.

These weather reports will be transmitted daily to all vessels. Example of our report is shown below:



## Daily Planner

Issued: Thursday, January 14, 2021 at 06:00AM PST

| Eclipse Group   |                                        |    |    | La Jolla, CA                        |    |                   |                         | Position: 32.86 N 117.43 W |                     |                     |                          | Times: PST (-08:00 UTC Offset) |             |              |    |
|-----------------|----------------------------------------|----|----|-------------------------------------|----|-------------------|-------------------------|----------------------------|---------------------|---------------------|--------------------------|--------------------------------|-------------|--------------|----|
| TIME<br>(Local) | 10-Meter WIND (kt)<br>DIR / SPD / GUST |    |    | 50-Meter WIND<br>(kt)<br>SPD / GUST |    | WIND WAVE<br>(ft) | SWELL<br>DIR / ft / SEC |                            | SIG<br>WAVE<br>(ft) | MAX<br>WAVE<br>(ft) | VISIB.<br>(nm)           | APP.<br>TEMP.<br>(F)           | PRECIP<br>% | TSTM<br>PROB |    |
| Valid           | Thursday, January 14, 2021             |    |    |                                     |    |                   |                         |                            |                     |                     | Temperature (F): 62 / 55 |                                |             |              |    |
| 0600            | NE                                     | 2  | 3  | 3                                   | 3  | 0                 | WNW                     | 5                          | 13                  | 5                   | 9                        | 7.0                            | 57          | 0%           | 0% |
| 1200            | NW                                     | 5  | 7  | 5                                   | 7  | 0                 | WNW                     | 5                          | 13                  | 5                   | 9                        | 4.0                            | 58          | 0%           | 0% |
| 1800            | NNE                                    | 5  | 6  | 6                                   | 7  | 0                 | W                       | 4                          | 13                  | 4                   | 8                        | 8.25                           | 59          | 0%           | 0% |
| Valid           | Friday, January 15, 2021               |    |    |                                     |    |                   |                         |                            |                     |                     | Temperature (F): 64 / 58 |                                |             |              |    |
| 0000            | NNE                                    | 4  | 5  | 5                                   | 6  | 0                 | W                       | 4                          | 13                  | 4                   | 8                        | 10.5                           | 59          | 0%           | 0% |
| 0600            | NNE                                    | 7  | 9  | 8                                   | 10 | 0                 | W                       | 4                          | 12                  | 4                   | 7                        | 10.5                           | 59          | 0%           | 0% |
| 1200            | NW                                     | 4  | 5  | 4                                   | 5  | 0                 | W                       | 3                          | 12                  | 3                   | 6                        | 10.5                           | 60          | 0%           | 0% |
| 1800            | NNE                                    | 5  | 7  | 6                                   | 7  | 0                 | W                       | 3                          | 12                  | 3                   | 6                        | 10.5                           | 61          | 0%           | 0% |
| Valid           | Saturday, January 16, 2021             |    |    |                                     |    |                   |                         |                            |                     |                     | Temperature (F): 62 / 56 |                                |             |              |    |
| 0000            | NNW                                    | 3  | 4  | 3                                   | 5  | 0                 | W                       | 3                          | 12                  | 3                   | 6                        | 10.5                           | 58          | 0%           | 0% |
| 0600            | E                                      | 3  | 4  | 3                                   | 4  | 0                 | W                       | 3                          | 13                  | 3                   | 6                        | 10.5                           | 57          | 0%           | 0% |
| 1200            | NW                                     | 5  | 7  | 5                                   | 7  | 0                 | W                       | 4                          | 14                  | 4                   | 8                        | 5.0                            | 60          | 0%           | 0% |
| 1800            | NNW                                    | 4  | 5  | 5                                   | 6  | 0                 | W                       | 5                          | 14                  | 5                   | 9                        | 8.75                           | 60          | 0%           | 0% |
| Valid           | Sunday, January 17, 2021               |    |    |                                     |    |                   |                         |                            |                     |                     | Temperature (F): 61 / 57 |                                |             |              |    |
| 0000            | E                                      | 3  | 4  | 3                                   | 4  | 0                 | WNW                     | 6                          | 14                  | 6                   | 10                       | 10.5                           | 58          | 0%           | 0% |
| 0600            | E                                      | 3  | 4  | 3                                   | 4  | 0                 | W                       | 5                          | 14                  | 5                   | 10                       | 10.5                           | 58          | 0%           | 0% |
| 1200            | NW                                     | 4  | 6  | 4                                   | 6  | 0                 | W                       | 5                          | 13                  | 5                   | 9                        | 5.0                            | 59          | 0%           | 0% |
| 1800            | NE                                     | 3  | 4  | 4                                   | 5  | 0                 | W                       | 4                          | 13                  | 4                   | 8                        | 8.75                           | 60          | 0%           | 0% |
| Valid           | Monday, January 18, 2021               |    |    |                                     |    |                   |                         |                            |                     |                     | Temperature (F): 61 / 56 |                                |             |              |    |
| 0000            | ENE                                    | 1  | 1  | 1                                   | 1  | 0                 | W                       | 4                          | 14                  | 4                   | 8                        | 10.5                           | 58          | 0%           | 0% |
| 0600            | ESE                                    | 4  | 5  | 4                                   | 5  | 0                 | W                       | 4                          | 16                  | 4                   | 8                        | 10.5                           | 57          | 0%           | 0% |
| 1200            | SSW                                    | 6  | 8  | 7                                   | 9  | 0                 | WNW                     | 5                          | 17                  | 5                   | 9                        | 5.0                            | 59          | 0%           | 0% |
| 1800            | S                                      | 9  | 12 | 10                                  | 13 | 1                 | WNW                     | 6                          | 16                  | 6                   | 11                       | 8.75                           | 59          | 0%           | 0% |
| Valid           | Tuesday, January 19, 2021              |    |    |                                     |    |                   |                         |                            |                     |                     | Temperature (F): 64 / 57 |                                |             |              |    |
| 0000            | SE                                     | 7  | 10 | 8                                   | 10 | 0                 | WNW                     | 6                          | 16                  | 6                   | 11                       | 10.5                           | 58          | 0%           | 0% |
| 0600            | NNE                                    | 13 | 18 | 16                                  | 20 | 1                 | WNW                     | 5                          | 15                  | 6                   | 10                       | 10.5                           | 58          | 0%           | 0% |
| 1200            | NE                                     | 16 | 23 | 19                                  | 25 | 2                 | WNW                     | 5                          | 14                  | 5                   | 10                       | 10.5                           | 60          | 0%           | 0% |
| 1800            | NE                                     | 14 | 20 | 17                                  | 21 | 2                 | WNW                     | 5                          | 13                  | 5                   | 9                        | 10.5                           | 59          | 0%           | 0% |
| Valid           | Wednesday, January 20, 2021            |    |    |                                     |    |                   |                         |                            |                     |                     | Temperature (F): 61 / 55 |                                |             |              |    |
| 0000            | N                                      | 12 | 16 | 13                                  | 17 | 1                 | WNW                     | 4                          | 12                  | 4                   | 7                        | 10.5                           | 56          | 0%           | 0% |
| 0600            | NNE                                    | 11 | 16 | 13                                  | 17 | 1                 | W                       | 3                          | 12                  | 4                   | 6                        | 10.5                           | 57          | 0%           | 0% |
| 1200            | NNW                                    | 10 | 14 | 12                                  | 16 | 1                 | W                       | 3                          | 12                  | 3                   | 6                        | 10.5                           | 59          | 0%           | 0% |
| 1800            | NW                                     | 11 | 15 | 13                                  | 17 | 1                 | W                       | 3                          | 13                  | 3                   | 6                        | 10.5                           | 57          | 0%           | 0% |

| Weather Threats         | Green       | Yellow      | Red          |
|-------------------------|-------------|-------------|--------------|
| 10-Meter Wind Speed     | < 25 kt     | ≥ 25 kt     | ≥ 40 kt      |
| 10-Meter Wind Gusts     | < 25 kt     | ≥ 25 kt     | ≥ 40 kt      |
| 50-Meter Wind Speed     | < 25 kt     | ≥ 25 kt     | ≥ 40 kt      |
| 50-Meter Wind Gusts     | < 25 kt     | ≥ 25 kt     | ≥ 40 kt      |
| Wind Wave               | < 8 ft      | ≥ 8 ft      | ≥ 19 ft      |
| Swell Height            | < 8 ft      | ≥ 8 ft      | ≥ 19 ft      |
| Swell Period            | < 6 seconds | ≥ 6 seconds | ≥ 12 seconds |
| Sig Wave Height         | < 8 ft      | ≥ 8 ft      | ≥ 19 ft      |
| Max Wave Height         | < 8 ft      | ≥ 8 ft      | ≥ 19 ft      |
| Visibility              | > 3.00 nm   | ≤ 3.00 nm   | ≤ 1.00 nm    |
| App. Temp. - Wind Chill | > 10 F      | ≤ 10 F      | ≤ 0 F        |
| App. Temp. - Heat Index | < 90 F      | ≥ 90 F      | ≥ 95 F       |
| Precip. Probability     | < 40 %      | ≥ 40 %      | ≥ 80 %       |
| T-storm Probability     | < 30 %      | ≥ 30 %      | ≥ 60 %       |

### Apparent Temperature Definition

The perceived temperature accounting for effects of heat index and wind chill. For temperatures over 65 F, the max apparent temperature for 6 hr period is shown. For temperatures less than 65 F, the min apparent temperature for 6 hr period is shown.

### Sea State Definitions

**Significant Wave Height (SIG WAVE)** - Average of the highest 1/3 of waves. Combination of swell and wind waves.

**Maximum Wave Height (MAX WAVE)** - The highest 0.1% of waves. Theoretical maximum wave for a given significant wave height.

## AIRCRAFT - GENERAL REVIEW OF STRUCTURAL INTEGRITY

At-sea aircraft salvage / recoveries inherently evolve as more details about the condition of the aircraft becomes known. This requires a salvage plan to be flexible. Within reason, EGI evaluates as many factors and variables to formulate it's approach to salvage. Solicitation of information and advice from qualified experts familiar with the aircraft type and model is an integral component in the process.

Boeing Commercial Airplane Company (Boeing), manufacturer of the Boeing 737, is an integral party and is teamed with the NTSB for this investigation. Boeing has provided information, evaluation and analysis of the aircraft integrity based on review of available video documentation.

A key factor of this recovery is the relatively intact condition of the aircraft, in particular the wing structure. The wing near the fuselage has a number of spars, which carry both flight loads and those of landing, making this the strongest area of the airplane and will be our primary lift point for the aft fuselage.

The heavy structure includes the main landing gear "stub" spar, rear spar, center spar, spanwise beam, and [damaged] forward spar. The spars separate the upper and lower wing "skins" similar to an I-beam, and each of the "skins" is almost an inch thick. The minimum structural strength required for FAA certification is 3.8 Gs, plus a safety factor, which greatly exceeds the load being lifted. Either wing alone has the strength to recover the wreckage, yet the load is being divided between the two wings and the tail. Further, the airplane had been converted to a freighter, with the heavily reinforced floor designed to support up to eight 14,000 lbs. cargo containers, each in a 9G forward impact.<sup>10</sup>

Accounting for front spar damage recorded by a survey ROV and after multiple reviews with Boeing and all others involved, a high level of confidence exists that the structure will fully support all loads associated with the recovery. In a worst-case scenario and if unseen damage leads to breakage of the main structure into smaller pieces, the only impact will be additional time to rig and lift the smaller fragments. Sufficient rigging and recovery capabilities exist to recover such lesser debris.

The forward fuselage and aft section are both open and will drain immediately. The forward fuselage is open beneath the main floor and where the main deck floor meets the sidewalls is open by design for venting. In addition to being fully open at the front, the wing/tail section is missing major belly structure and a lower aft cargo door is open. As with the forward fuselage, where the main deck floor meets the sidewalls is open by design for venting.

Boeing engineers will be on the recovery vessels throughout the operation to provide guidance and support.

## AIRPLANE SPECIFICS

|                   |                                                                    |
|-------------------|--------------------------------------------------------------------|
| Registration:     | N810TA                                                             |
| Model:            | BOEING 737-275C (ADV)                                              |
| Serial:           | 21116                                                              |
| Manufacture Date: | 1975                                                               |
| Owner:            | RHOADES AVIATION INC<br>PO BOX 29239<br>HONOLULU, HI, US 968201639 |

<sup>10</sup> The cargo containers are designed to carry up to 14,500 lbs. each. Full of water, it is calculated to weigh 28,200 lbs. ea.



Figure 19. Accident airplane prior to the accident

### RELATIVE ASPECTS OF DAMAGE TO CONSIDER IN PLANNING

In the following illustrations, Figures 20 and 21, the lower portions shown in red appear to be missing or open. Solid blue areas are known to be open and finding further openings in the bottom of the fuselage is expected.





Figure 22. Relative damage in portions of fuselage

## WEIGHTS <sup>11</sup>

| DESCRIPTION                                                                  | TOTAL IN LBS. | NOTES                                                       |
|------------------------------------------------------------------------------|---------------|-------------------------------------------------------------|
| PRIOR TO ACCIDENT                                                            |               |                                                             |
| BASIC OPERATING WEIGHT (BOW)                                                 | 60,160        |                                                             |
| CARGO, ALL ON MAIN DECK WITH EMPTY LOWER HOLDS                               | 19,897        |                                                             |
| FUEL (-500 LBS. FOR TAXI AND TAKEOFF)                                        | 14,000        |                                                             |
| TAKE OFF WEIGHT                                                              | 93,557        |                                                             |
| TO BE RECOVERED                                                              |               |                                                             |
| FORWARD FUSELAGE                                                             | 15,200        |                                                             |
| NOSE GEAR AND STRUCTURE                                                      | 700           |                                                             |
| MAIN FUSELAGE AND WING STRUCTURE                                             | 31,000        |                                                             |
| CARGO                                                                        | 12,500        |                                                             |
| FUEL TANKS FULL OF WATER (4,783 GAL X 8.6 LBS./GAL) WORST CASE <sup>12</sup> | 41,000        |                                                             |
| TOTAL – MAIN STRUCTURE                                                       | 84,634 Total  | Shows high value from Boeing estimate of 63,000-85,000 lbs. |
| ENGINES – PRATT & WHITNEY JT8D-9A                                            | 5,000         | Each engine with reverser, intact                           |

<sup>11</sup> Boeing estimates

<sup>12</sup> It is expected that with the prolonged period in the water, the airplane fuel tanks will contain mostly water with a small amount of fuel. Therefore, the weight of water filling all tanks is to be used for weight calculations.

## LIFT CALCULATIONS FOR RIGGING AIRCRAFT CG FOR EACH SECTION

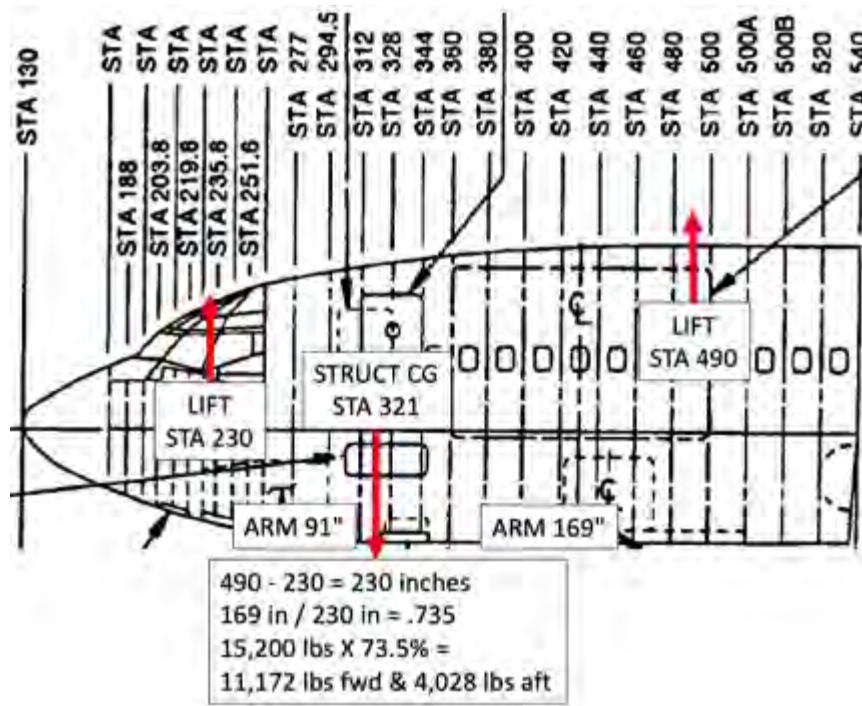


Figure 23. Lift locations and center of gravity for the forward fuselage.

## RECOVERY OF THE FORWARD SECTION

Per Boeing, approx. 15,200 lb and CG approx. STA 321, WL 184.

Lift locations and center of gravity for the wings and aft fuselage below assume the wing tanks are full of water which does not drain through breaches, despite having visible openings. Boeing calculates that cargo containers full of water may add up to 100,000 pounds (190,000 lbs. worst case) before draining IF SUSPENDED WHILE LEVEL, shifting the CG 30 inches forward when suspended above water. Even with this weight, Boeing estimates that on the basis of known damage, the fuselage and wing should stay intact and floor locks should hold each cargo container in place.

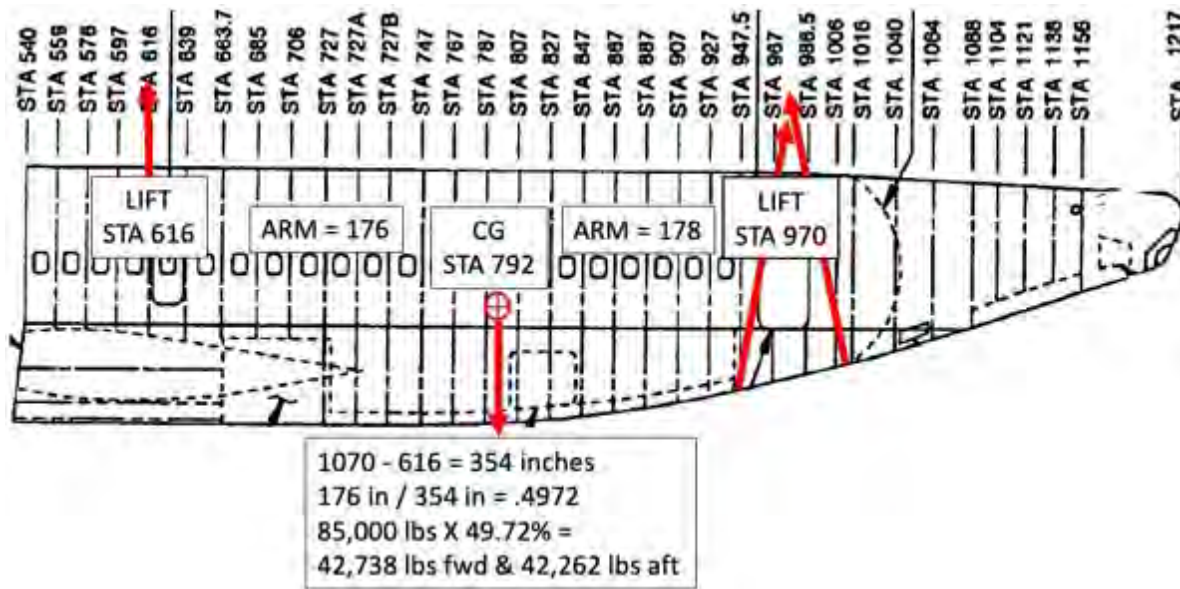


Figure 24. Lift locations and center of gravity for the wings and aft fuselage. CG provided by Boeing. Figure assumes wing tanks full of water which does not drain through breaches, despite having visible openings.

| LOADS FOR                          | NOMINAL IN TONS | WORST CASE IN TONS | NOTES                                                                                                                                                                                                                                                                                                                                                    |
|------------------------------------|-----------------|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| LEFT WING<br>(85000*.5028/2/2000)  | 10.69           | 21.25              | 21.25 Tons for worst case scenario assumes (1) tanks full of water (2) loss of tail lift so tail weight is divided between the wings                                                                                                                                                                                                                     |
| RIGHT WING<br>(85000*.5028/2/2000) | 10.69           | 21.25              | 21.25 Tons for worst case scenario assumes (1) tanks full of water (2) loss of tail lift so tail weight is divided between the wings                                                                                                                                                                                                                     |
| TAIL<br>(49.72%)                   | 21.12           | 31.81              | NOTES: 1) Worst case of 31.81 assumes failure of basket lift at one wing. 2) The 21.12 ton weight should be the load on the whip line when the wings are aboard the barge as the cargo containers above water level drain.                                                                                                                               |
| <b>AFT SECTION, TOTAL</b>          |                 | 42.5               | NOTES: 1) Shown suspended in level attitude and fully supported by crane, which is not the intended method of recovery. 2) Fuel tank draining reduces this to 22 tons total as water drains from wings. 3) The 21.12 ton weight should be the load on the whip line when the wings are aboard the barge as the cargo containers above water level drain. |
| COCKPIT WINDOWS (64%)              | 4.9             | 7.7                | Worst assumes total failure of either lift point                                                                                                                                                                                                                                                                                                         |
| REAR OF FWD FUSELAGE SECTION (36%) | 2.8             | 7.7                | Worst assumes total failure of either lift point                                                                                                                                                                                                                                                                                                         |
| <b>FORWARD FUSELAGE, TOTAL</b>     |                 | 7.7                |                                                                                                                                                                                                                                                                                                                                                          |

**DAMAGE OBSERVATIONS**

Survey video shows that little structure remains below the level of the reinforced cargo floor. Further, the nose landing gear (NLG) structure has separated and loose avionics indicate that the bottom of avionics compartment aft of the NLG box is also at least partially missing. Substantial structure exists in the reinforced floor structure, reinforced frame of the main deck cargo door, and nearly complete fuselage structure above the floor level.

The exposed cargo floor appears solid enough to bring a cable (blue line) beneath by ROV use of the fiberglass pole.



Figure 44. Blue line shows route of cable to lift forward fuselage

**MAIN FUSELAGE AND WING OBSERVATIONS**

Survey video shows that the structure is largely intact aft of about STA 540, near the forward wing spar. The center of the forward spar appears to have some degree of damage and the keel beam has separated. Nothing has been found to indicate that the inboard lower wing surface, upper surface, mid spar, rear spar, or stub spar has been structurally compromised.

The cabin floor bent upward around the forward cargo container to prevent the containers from falling out of the open cargo hold if the nose is lowered. While unlikely, cables and nets will be available to block the forward opening of the aft section if loose cargo is observed.

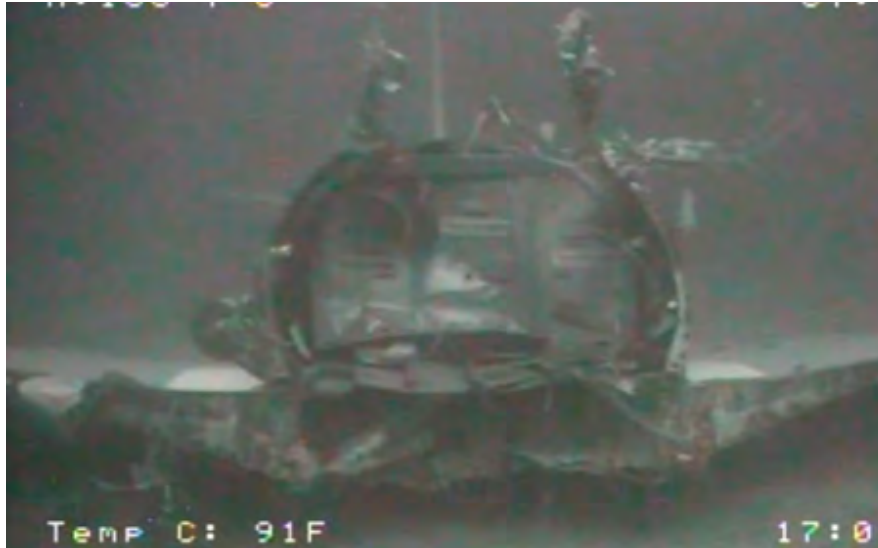


Figure 39. Front of wing/tail section, showing missing portion of front spar, broken lower wing skin, cargo floor folded up in front of cargo container #4, and top of fuselage ripped upward

The left wing fuel tank appears to have breached at and outboard of the engine position and open near the tip. The left flap appears to be up or near up with some debris (possibly consistent with keel beam area) between the wing and sea floor obstructing access inboard of mid-flap.



Figure 40. Left wing damage near location of where engine and pylon broken away. Inboard slats missing and outboard slats extended



Figure 41. Left wing flap in up position

The right forward wing spar appears to have damage inboard of the engine.

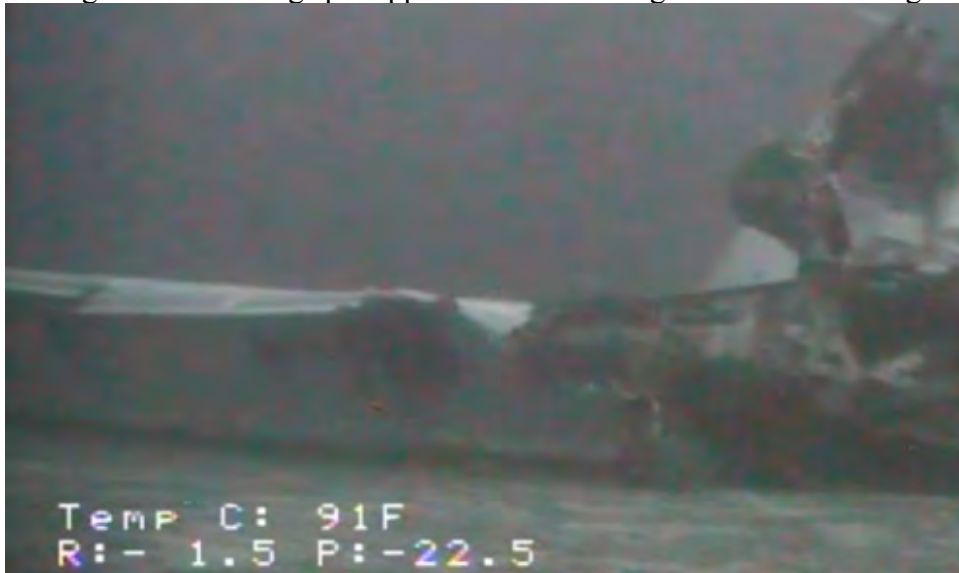


Figure 42. Right wing front spar damage near engine position

The right wing flap appears to be near the up position with clearance to run a cable close to the fuselage.



Figure 43. Right wing flap in up position, Leading edge slats extended

The aft cargo door appears to be open, possibly inward and APU doors are not in place. Boeing found that sheet metal near the aft left fuselage resembles belly skin from near stations 927-947. Otherwise, the aft fuselage appears intact, including at and above the level of the reinforced cargo floor structure.

#### **ENGINES, PRATT & WHITNEY JT8D-9A**

The engines totaled about 5,000 lbs. each prior to breaking into major sections. To support the NTSB investigation the BH will identify and recover debris associated with the engines in the first day(s) on site. A choke cable will be used around each of the larger parts to lift them separately. Minor debris will be placed in a basket to be lifted collectively. The NTSB for target identification by the ROV operators has provided the following photos. The NTSB representatives, Boeing engineers, and Project Manager will all also be available to assist the ROV operators.



Figure 28. Complete engine



Figure 29. Photo of main engine debris



Figure 30. #1 T/R on left. #1 Engine on right



Figure 31. Nose cowl (unknown which)



Figure 32. #1 Engine



Figure 33. Nose cowl (unknown which)



Figure 34. #2 Engine



Figure 35. #2 T/R



Figure 36. #2 Engine on right shows accessory gearbox



Figure 37. #2 Engine Inlet



Figure 38. #2 Engine

## CARGO CONTAINER AND METHODOLOGY FOR DRAINING

The departure manifest shows that the airplane was carrying a cargo pallet in the front (#1) position, followed by six aluminum cargo containers in positions two through seven.



Figure 16. Typical cargo container, showing aluminum door

Review of the manufacturer's (SATCO) specifications indicated the ULD containers carried have approximately 440 cubic feet of volume and have a tare weight of 482 lbs.<sup>13</sup>

The pallet and two containers from the forward fuselage separated from the airplane during the accident sequence. The Coast Guard rescued one pilot who was floating on the pallet and the survey ROV showed the empty remnants of cargo containers. Medical and other cargo from the containers was recovered and reportedly taken to the Coast Guard Station the following day.

Containers #4 through #7 remain in the main section of wings and aft fuselage. The accident sequence bent the reinforced cargo floor up around cargo container #4, effectively locking the aft containers in place.

The containers are believed to retain water, which will add to the overall weight being lifted once the aft fuselage is raised above the water. Seawater weights about 64 pounds per cubic foot, so each cargo container could add up to 28,200 pounds to the total weight if it retained a full load of water after surfacing. With four containers still on the airplane, that could be over 100,000 additional pounds of water in the cargo containers alone.

EGI intends to puncture these containers through the side of the fuselage to promote drainage. According to Boeing engineers, the airplane will lose no structural strength if holes are made through the window plugs, or through skin between the frames and stringers. The frames are spaced between the windows and the stringer locations are apparent when looking for horizontal rows of rivets. Methods under consideration are lancing the relatively thin aluminum with a pointed steel shaft in multiple places, use of a drill, and other options. Tools will be taken to puncture the containers.<sup>14</sup> The primary will be:

- A large step drill mounted on end of 2 ft. shaft with guides. Sleeve needed to back out of the holes created by the saw. The limitation is maximum diameter.
- A hole saw mounted on end of 2 ft. shaft. With guides needed to back out of the holes.
- Extra long drill bits & Steel Lance



<sup>13</sup> [https://www.satco-inc.com/product-container/?part\\_number=31324-601](https://www.satco-inc.com/product-container/?part_number=31324-601)

<sup>14</sup> Multiple copies of each to be stocked.

| transair (JRAA)                                                                                |                                                                         |                                                                       |                                                                      | Boeing 737-200 Load Manifest                                         |                                                                      |                                                                      |                                       |  |
|------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|-----------------------------------------------------------------------|----------------------------------------------------------------------|----------------------------------------------------------------------|----------------------------------------------------------------------|----------------------------------------------------------------------|---------------------------------------|--|
| Date                                                                                           | 7-2-21 / 0:54                                                           | A/C                                                                   | 810TA                                                                | Empty %MAC                                                           | 19.1                                                                 | Loaded %MAC                                                          | 19.1                                  |  |
| From                                                                                           | HNL                                                                     | To                                                                    | OGG                                                                  | Captain's Signature                                                  |                                                                      | Stabilizer Trim 5.2                                                  |                                       |  |
| PIC                                                                                            | Okai, Henry                                                             | SIC                                                                   | Ryan, Gregory                                                        | Load Supervisor's Signature                                          |                                                                      | NICKO                                                                |                                       |  |
| I certify the aircraft is loaded in accordance with this load plan and all company procedures. |                                                                         |                                                                       |                                                                      |                                                                      |                                                                      |                                                                      |                                       |  |
| 1 - max 8,000<br><b>1910</b><br>Dest. OGG<br>PAG45072-HAZ<br>Verified (Init): ND               | 2 - max 8,000<br><b>3103</b><br>Dest. OGG<br>SAA4054-NORPAC<br>Init: ND | 3 - max 8,000<br><b>2716</b><br>Dest. OGG<br>SAA34562-AIR<br>Init: ND | 4 - max 8,000<br><b>2758</b><br>Dest. OGG<br>SAA4076-GRD<br>Init: ND | 5 - max 8,000<br><b>3042</b><br>Dest. OGG<br>SAA3026-GRD<br>Init: ND | 6 - max 8,000<br><b>3084</b><br>Dest. OGG<br>SAA3006-GRD<br>Init: ND | 7 - max 8,000<br><b>3284</b><br>Dest. OGG<br>SAA4052-GRD<br>Init: ND |                                       |  |
| L1 - max 2,146<br><b>0</b><br>Dest. -                                                          | L2 - max 1,083<br><b>0</b><br>Dest. -                                   | L3 - max 2,257<br><b>0</b><br>Dest. -                                 | Center Tank Fuel<br><b>0</b>                                         |                                                                      | L4 - max 4,040<br><b>0</b><br>Dest. -                                | L5 - max 1,083<br><b>0</b><br>Dest. -                                | L6 - max 2,376<br><b>0</b><br>Dest. - |  |
|                                                                                                |                                                                         |                                                                       | Wing Tank Fuel<br><b>14,000</b>                                      |                                                                      |                                                                      |                                                                      |                                       |  |

Figure 17. Manifest of weights and positions for pallet (PAG) and containers (SAA)

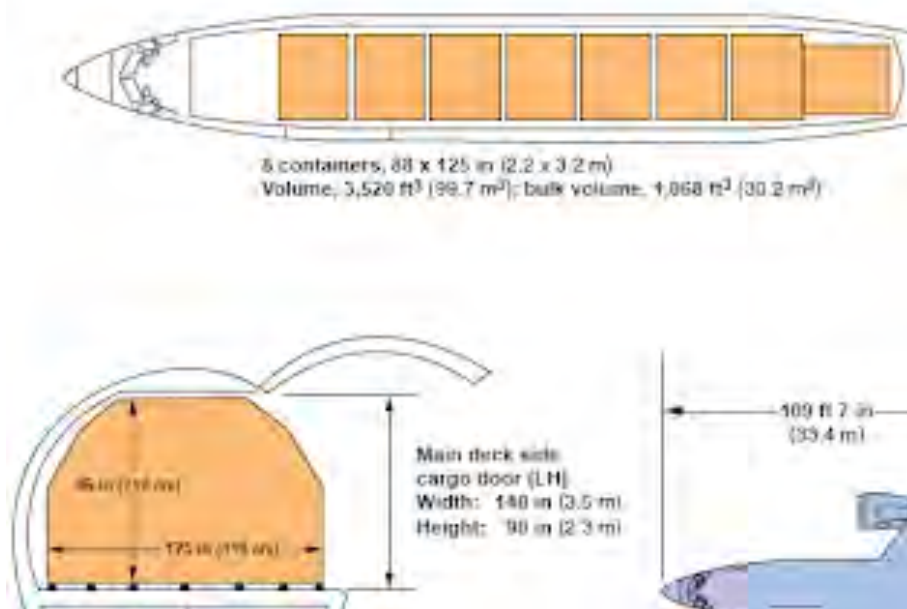


Figure 18. Cargo stations, labeled from front, #1 - #8. The manifest shows the #8 position was empty.

## TARGET POSITIONS

| Target Name                                                                         | X         | Y          | Latitude           | Longitude           | Depth (Ft) | Video time           |
|-------------------------------------------------------------------------------------|-----------|------------|--------------------|---------------------|------------|----------------------|
| Tail Section (with Main Wings)                                                      | 601212.42 | 2353304.38 | 21° 16' 43.2873" N | 158° 01' 27.6581" W |            | 7/7/2021<br>16:45:36 |
| Aft of Tail Section                                                                 | 601236.97 | 2353292.74 | 21° 16' 42.9038" N | 158° 01' 26.8086" W | 363        | 7/7/2021<br>16:56:41 |
| Forward of Tail Section                                                             | 601203.03 | 2353317.23 | 21° 16' 43.707" N  | 158° 01' 27.9811" W | 340        | 7/7/2021<br>17:01:06 |
| APU                                                                                 | 601111.13 | 2353168.36 | 21° 16' 38.8839" N | 158° 01' 31.2017" W | 366        | 7/8/2021<br>9:19:12  |
| Engines                                                                             | 601111.84 | 2353172.94 | 21° 16' 39.0325" N | 158° 01' 31.176" W  | 366        | 7/8/2021<br>9:21:30  |
| Nose Landing Gear                                                                   | 601115.93 | 2353177.83 | 21 °16' 39.1909" N | 158° 01' 31.0332" W | 354.5      | 7/8/2021<br>9:29:28  |
| Forward of Cockpit Section                                                          | 601122.79 | 2353184.31 | 21° 16' 39.4002" N | 158° 01' 30.7938" W | 363.5      | 7/8/2021<br>9:33:16  |
| Aft of Cockpit Section                                                              | 601135.39 | 2353198.86 | 21° 16' 39.871" N  | 158° 01' 30.3533" W | 364        | 7/8/2021<br>9:36:25  |
| Thrust Reverser Engine 1                                                            | 601154.04 | 2353136.19 | 21° 16' 37.829" N  | 158° 01' 29.7198" W | 437        | 7/8/2021<br>9:58:48  |
| Inlet Guide Vane                                                                    | 601160.42 | 2353123.46 | 21° 16' 37.4135" N | 158° 01' 29.5009" W | 440        | 7/8/2021<br>10:06:15 |
| Tires                                                                               | 601202.36 | 2353202.37 | 21° 16' 39.9715" N | 158° 01' 28.029" W  | 432        | 7/8/2021<br>10:24:50 |
| FedEx Cargo Can (SAA 34562 FX)                                                      | 601158.96 | 2353256.42 | 21 °16' 41.7382" N | 158° 01' 29.5234" W | 341        | 7/8/2021<br>10:36:19 |
| TransAir Cargo Can (SAA 4054 TXHA)                                                  | 601154.91 | 2353244.99 | 21° 16' 41.3671" N | 158° 01' 29.6662" W | 345        | 7/8/2021<br>10:39:18 |
| Keel Beam                                                                           | 601087.2  | 2353202.52 | 21° 16' 40" N      | 158° 01' 32.0246" W | 350        | 7/8/2021<br>13:52:59 |
| X and Y coordinates are UTM North Zone 4 meters. Depth is from ROV pressure sensor. |           |            |                    |                     |            |                      |

In the following chart, the distance between the Inlet Guide Vane and Forward of Tail Section is 0.11 nm (648 ft). The direction of travel was lower left to upper right (arrow) and the tail was floating when the Coast Guard arrived.

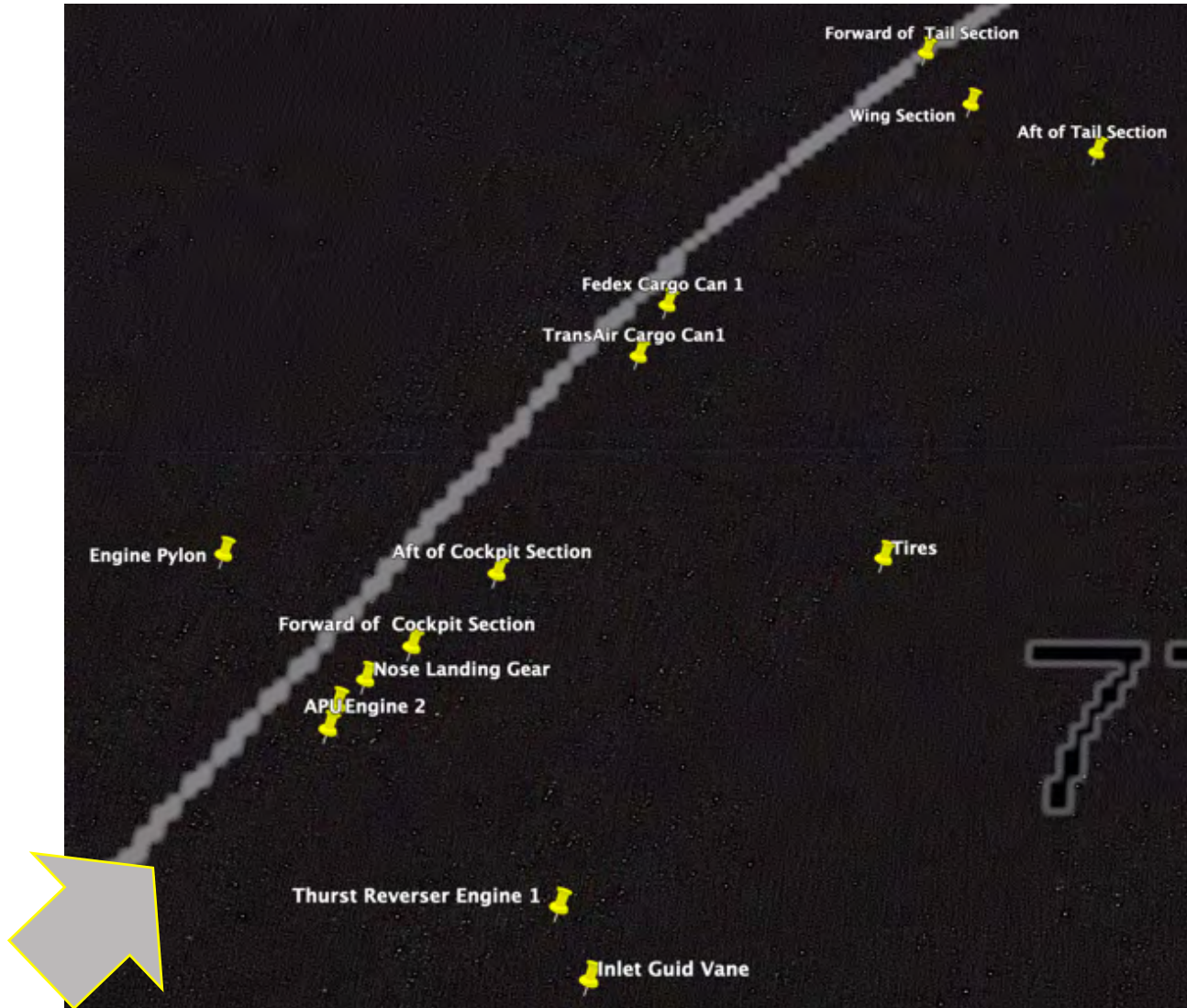


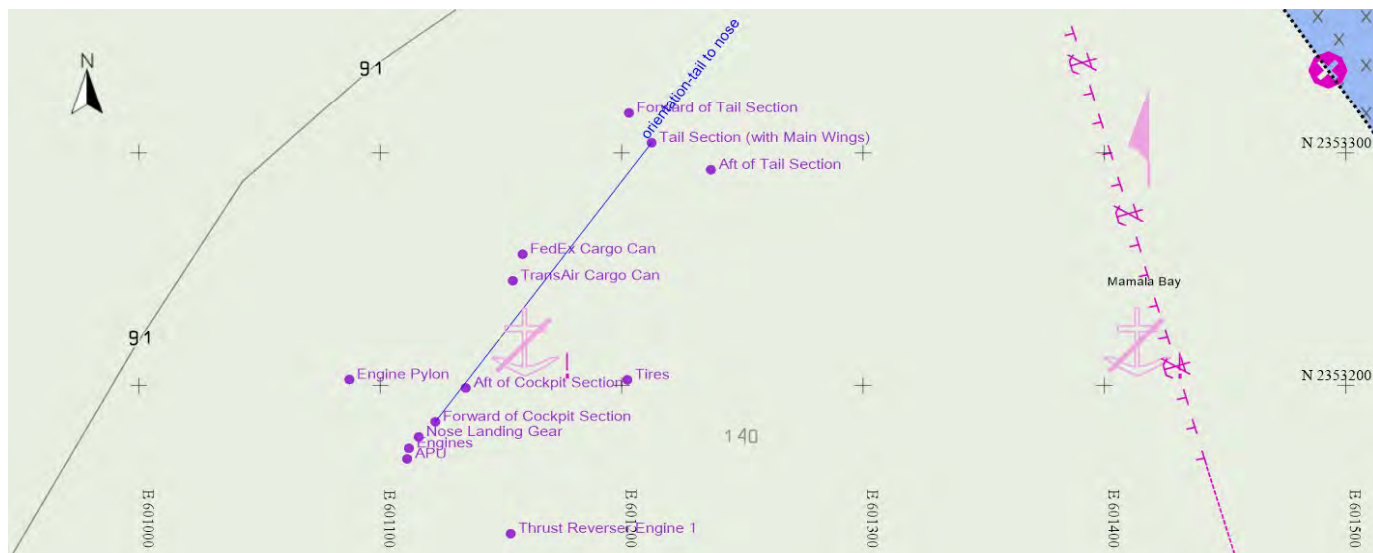
Figure 5. Relative locations of debris determined by survey ROV.

Note the following corrections:

- The part marked Engine Pylon was subsequently found to be the Keel Beam.
- The part marked APU was subsequently found to be an air conditioning pack
- The part marked Thrust Reverser Engine 1 is not confirmed to be from that engine.

## COCKPIT & MAIN BODY DISTANCE SEPARATION

| name (target from-to)             | layer       | sol e     | sol n      | eol e     | eol n      | dist(ft) | dist(m) | bearing(deg) |
|-----------------------------------|-------------|-----------|------------|-----------|------------|----------|---------|--------------|
| orientation-tail to nose (1 to 7) | SURVEYLINES | 601212.42 | 2353304.38 | 601122.79 | 2353184.31 | 491.58   | 149.83  | 216.74       |



## WATERWAY RESTRICTION AREAS

A Navy restricted area off of Ewa Beach overlaps a small portion of the debris field. EGI routinely operates within restricted Navy Ranges off SOCAL and has a long relationship with the U.S. Navy Office of the Supervisor of Salvage (SUPSALV). The USN has approved operations within this exercise zone.

The following two charts overlay the wreckage site with the critical habitat for both false killer whales and Hawaiian monk seals. The wreckage falls outside of both but close enough to be considered when placing anchors for the DBSV.

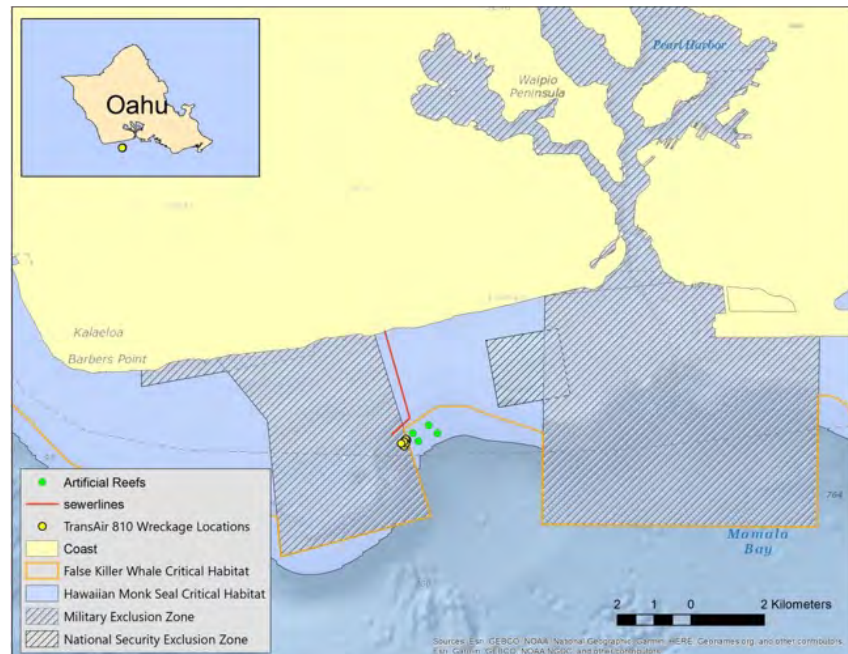


Figure 3. Location of operation and related zones

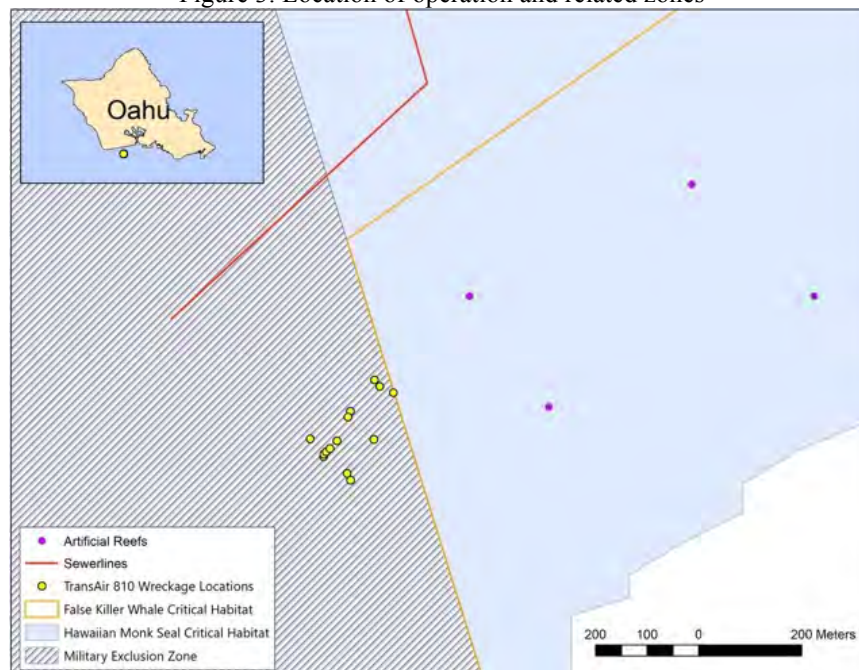


Figure 4. Closer view of location of features near operation

## INDIGENOUS PROTECTED SPECIES AND ENVIRONMENTAL IMPACT REPORTING

This operation is classified as an emergency operation and although only minimal residual fuel is believed to remain in the wreckage, all efforts are being taken to prevent further impact on the local environment, habitat, and species, regardless of protection status.

The work area is adjacent to designated critical habitat zones for ESA-listed Hawaiian monk seals (*Neomonachus schauinslandi*) and Hawaii's distinct population of insular false killer whales (*Pseudorca crassidens*), and sea turtles (*Chelonia mydas*, *Eretmochelys imbricata*) are likely to be present in this area (Figures 3 and 4).

The BH ROV will record images of where the anchors are placed, both before and after the operation. To minimize reef damage by sawing of a steel cable, the tug and DBSV will have a shot of chain attached to the anchors

Best Management Practices (BMPs) as provided by NOAA consultations will be implemented at all times and are detailed below. Eclipse Group has retained Marine Field Ecologist, Darla White, MSc.<sup>[1]</sup> to coordinate the protected species related environmental monitoring requirements and BMP implementation in the event of animal interaction with operations.

Ms. White is part of the project planning, and will serve as the Protected Species Observer (PSO) during all recovery operations. As the PSO, she will ensure all parties are knowledgeable of the BMPs, record observation data, and summarize the observations into a report upon completion of the recovery operation.

Below is the list of NOAA consultation BMPs and responses with each as will be addressed:

1) All workers associated with this project, irrespective of their employment arrangement or affiliation (e.g., employee, contractor, etc.) should be fully briefed on these BMPs and the requirement to adhere to them for the duration of their involvement in this project.

RESPONSE: Eclipse Group will provide the BMPs to all parties involved in the project via the planning document, email, and in-person briefings.

2) Constant vigilance by an observer should be kept for the presence of any ESA-listed marine species during all aspects of the proposed activities.

RESPONSE: Darla White will serve as the Protected Species Observer onboard for all operations. All others involved in observing operations will be appraised of the BMPs and also watch for animals as well.

3) All work should be postponed or halted when motile ESA-listed marine species are within 50 meters of the proposed work, and should only begin/resume after the animals have voluntarily departed the area.

RESPONSE: When an ESA-listed animal is spotted near the area, the operation leaders will be notified by the observer immediately to halt operations until the animal leaves of its own accord.

4) When piloting vessels, vessel operators should alter course to remain at least 50 meters from marine mammals and sea turtles.

RESPONSE: The vessel operators will alter course to remain at least 50 m from marine mammals and sea turtles when piloting vessels.

5) Reduce vessel speed to 10 knots or less when piloting vessels at or within the ranges described above from marine mammals and sea turtles. Operators should be particularly vigilant to watch for turtles at or near the surface, and if practicable, reduce vessel speed to 5 knots or less.

RESPONSE: The vessel operators will reduce speed to 10 knots or less when within 50 m or less of sea turtles and marine mammals.

6) Marine mammals, sea turtles and other ESA-listed motile species should not be encircled or trapped between multiple vessels or between vessels and the shore.

RESPONSE: The vessel operators will be cognizant to proactively avoid any encircling or entrapment of ESA-listed species between vessels or between vessels and the shore. The vessel operators will wait for the animal to leave the area before proceeding with operations that would put the animal in this situation.

7) Do not attempt to intentionally interact with any ESA-listed marine species.

RESPONSE: No interactions will be made with ESA-listed species by anyone on the project, and the team will be informed of species-specific practices such as avoiding eye contact with Hawaiian monk seals.

8) The project manager and heavy equipment operators should perform daily pre-work equipment inspections for cleanliness and leaks. All heavy equipment operations shall be postponed or halted should a leak be detected, and should not proceed until the leak is repaired and equipment cleaned.

RESPONSE: All equipment will be inspected for cleanliness and leaks prior to daily operations. Operations will be postponed should a leak be detected until repaired and cleaned.

9) If the salvaged sections of the aircraft cannot be transported and defueled at a safe location on land, place absorbents around the edge of the barge to make sure fuel products do not return to the ocean.

RESPONSE: The description is seen as a reactive step for fuel, which leaks; while the project plan calls for both preventive and reactive measures to keep potential contamination from happening in the first place. These include placement of a cofferdam of fuel absorbents at the periphery of the barge deck and around the portions of wing, which contain fuel tanks that may leak. Further, absorbent material is normally preventively placed near heavy hydraulics.

10) Prepare a plan for how the transfer of fuel products is expected to occur and what contingencies will be taken in the event of unforeseen circumstance (i.e. if a spill occurs and respective clean up) or in the event of leaking or debris loss during the retrieval and what steps will be taken for fuel recovery.

RESPONSE: As detailed elsewhere and discussed with both State of Hawaii and NOAA, very little fuel is expected to remain in the airplane fuel tanks by virtue of both the accident and fuel tank venting designs. Regardless, to capture the maximum possible amount of petroleum products, the recovery plans include:

1. As described in the previous response, extensive absorbent materials will be placed around the wing tanks and edge of the barge deck.
2. A specialized Honolulu-based maritime environmental response company, Pacific Environmental Group (PENCO), will station an oil skimmer (OSRV SENTRY) downstream of the wreckage prior to the raising in order to capture all possible leakage as soon as it is known.
3. PENCO personnel experienced in de-fueling safely will board the barge to perform the de-fueling operation when the wing section is brought aboard.
4. A 6,000 gallon ISO tank will be placed adjacent to the wing for defueling as efficiently as possible and in as limited of a space as possible. As a contingency, the barge was originally built and certified to transfer oil products and if something were to happen to the ISO tank, the water/fuel mix could be temporarily captured in the barge.
5. Deck spills will be remediated with the absorbents already described.
6. Once at a pier and with the wings unloaded to shore, the water/fuel mixture in the ISO tank will be moved from the barge to shore. A PENCO truck will move the mix to a dedicated waste facility in accordance with PENCO standard procedures already in place with the State of Hawaii. PENCO personnel will then clean any remaining spillage from the barge.

11) Ensure basket lids are securely closed during deployment and retrieval, and that ESA-listed animals do not become trapped within while baskets are in-water.

RESPONSE: Basket lids will be shut securely before they are deployed and retrieved. The ROV will be used to visually inspect baskets for ESA-listed animal presence before retrieval. If an animal is present, the basket will remain until the animal leaves of its own volition.

12) Keep all retrieval cables and ROV lines as taut as practicable, and deployed only as long as needed to properly accomplish the required task.

RESPONSE: ROV operators will be cognizant of keeping the retrieval cables taut. All deployment operations will be efficiently run, minimizing time at depth.

13) Use the ROV cameras to ensure no presence of ESA-listed species in and around large debris pieces prior to lifting.

RESPONSE: The ROV will inspect each large piece of debris for ESA-listed species prior to lifting. The ROV will also accompany the large sections for most of the ascents and will be able to spot ESA-listed species which enter the operation. When an ESA-listed animal is spotted near the area, the operation will halt until the animal leaves of its own accord.

14) If an observer determines an ESA-listed individual has been disturbed, harassed, harmed, injured, or killed, report to NMFS within one business day to [danielle.jayewardene@noaa.gov](mailto:danielle.jayewardene@noaa.gov).

RESPONSE: Darla White will record any interactions and report any observations of such events within one business day to Danielle Jayewardene at NMFS.

## **OPERATIONS AND RECOVERY METHODOLOGY**

### **ROV PLACEMENT OF RIGGING**

The rigging will be inherently heavy, making some portions difficult for the ROV to handle unaided. EGI will utilize the capabilities of the two vessels to lower the heavier rigging with air tuggers and hold that rigging in place while the ROV manipulates the rigging over the wings and tail section. Rigging will be released from the tuggers using ROV Friendly releases.

### **ROV PLACEMENT OF RECOVERY**

Baskets will be placed in or near high-density debris areas by either the ROV or lowering from the Bold Horizon. These baskets will be released, opened, and when appropriate debris will be placed in the baskets for later recovery. One basket will be retained to quickly recover high value targets. The baskets will be raised and lowered by the BH Starboard J-Leg lifting point as an elevator system.

### **WRECKAGE DOCUMENTATION**

It is incumbent that it is the sole responsibility of the NTSB and Boeing to document wreckage that is recovered. EGI will keep general logs however does not have the technical expertise to identify specific components of the aircraft.



Figure 10. The BH Starboard J-Leg lifting point is shown above



Figure 11. Debris baskets

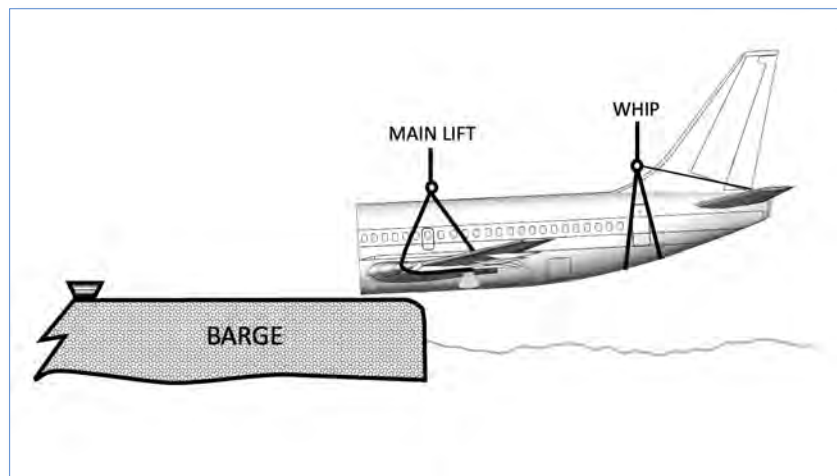
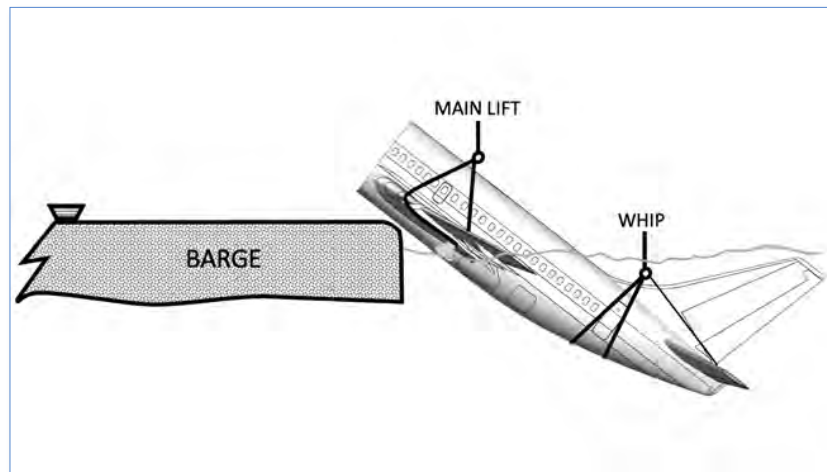
The BH and possibly the tug will periodically need to move away from the work site to clear sewage. This will be coordinated to ensure that one vessel stays with the DBSV at all times.

#### **DBSV SET-UP AND OPERATIONS SUMMARY**

- EGI is working with the State of Hawaii to define the placement of anchors to ensure minimal habitat change is created.
- The only vessel to be anchored will be the DBSV, in a 4-point mooring. The approximate locations are being reviewed with the State of Hawaii.
- Upon arrival, the barge will be positioned by the tug and monitored for sea action

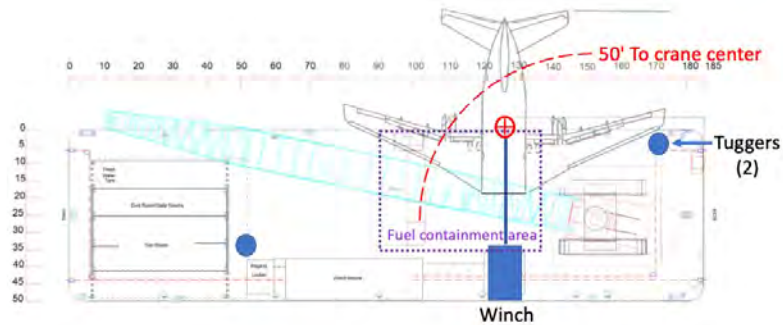
- Once orientation of the barge is established, the anchors will be placed to minimize impingement on the False Killer Whale and Monk Seal Habitat Exclusion Zones
- Once the anchors are placed from the four corners of the barge, the sea action of the DBSV will again be monitored prior to erecting the derrick
- The DBSV is fitted with a version of heavy Danforth anchor design. To prevent wire rope from cutting back and forth on bottom features, chain will be used between each anchor and the wire rope leading to the barge.
- Designated personnel will transfer to the DBSV for the approximately four-days during the lift of the main fuselage, aircraft nose, and other debris. It is anticipated that EGI will place Swaim, LSR – Ball, NTSB - Crookshanks, McKenny, and Boeing - Medlang or McClean onboard the DBSV
- Inter-vessel transfers will be accomplished either by use of the barge's skiff or by water taxi. Personnel transfers will only occur during daylight hours, appropriate sea states and by permission of vessel masters only. The barge does not have enough berths for all of these people to be on at once, so NTSB and Boeing people will need to trade out on a 12-hour shift basis with counterparts weather permitting
- Safety will be strictly enforced: It is mandatory that all personnel wear appropriate PFD, protective boots with toe protection hard hats, gloves, eye protection, while on the working deck. Non-essential personnel are not allowed on deck during ROV operations or during recovery of wreckage
- To develop a workflow on the DBSV, initial operations will start by getting debris off of the BH and first recovering small debris from the bottom.
- While bringing the two large sections up through the water column, the barge will utilize an onboard waterfall winch to lift them from the seabed to the ocean surface. This winch, while not a "true" heave compensated winch, does have rendering capability and a tensiometer. Rendering is defined as the ability of the winch to slow down, stop or even reverse if the weight / strain exceeds a set value. In effect the rendering capability acts as a shock absorber mitigating sudden increases in weight as a result of excessive or sudden acceleration due to ocean swell. The tensiometer digital read out provides immediate feedback for monitoring the weight / strain on the line. This allows monitoring of the lift to adjust accordingly and keep the maximum lift from exceeding safe conditions
- Recovery speed will be adjusted for the conditions and feed-back from the winch tensiometer. The anticipated ascent rate will be on the order of 2 meters a minute with an anticipated recovery from the seabed to the surface in approximately 50 minutes.
- The large sections will be recovered over the port side of the barge, with derrick loads and barge list not to exceed the values shown on the attached DBSV load chart.

- The safety of PENCO personnel is the responsibility of PENCO. While not expected to be higher than four feet, the tops of the wings may be slick so safety lines are recommended.
- EGI intends to initially lift the major sections of aircraft a safe distance off the bottom to avoid any contact with the seabed induced by the sea state. The sections will be held at this height for 5 to 10 min to evaluate the status and condition of both the aircraft and the rigging. The ROV will follow and monitor the two large sections to within about 30 feet of the water surface.
- The ROV will monitor for marine life during all phases of this evolution.
- The airplane will be lifted and landed tail low, the crane will never lift the full load of the fuselage, plus water in the wings, water in the containers, and water in the tail.

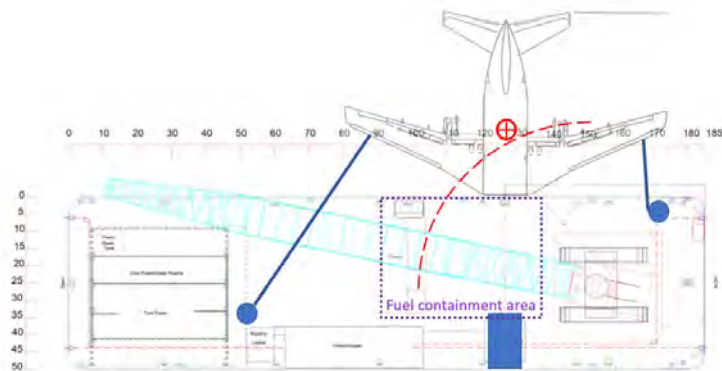


Figures 25a and 25b. Landing of wing and aft fuselage on edge of barge to let cargo containers and fuselage drain (Fig. 25a). Note that edge of the barge should be at or aft of the center-section spanwise beam. The tail would be raised and fuselage pulled into place (Fig 25b).

**Step 1**  
**Beneath barge**  
**Transfer tail to whip**  
Load <43,500 lbs under water  
35 ft boom & load 28 ft to C/L < 1° list



**Step 2**  
**Boom out**  
**Transfer wing to main**  
**Release waterfall winch load**  
**Lift wing tips to surface to attach tuggers**  
Load ~50,000 lbs w/exposed structure  
55 ft boom & load 47 ft to C/L < 1° list

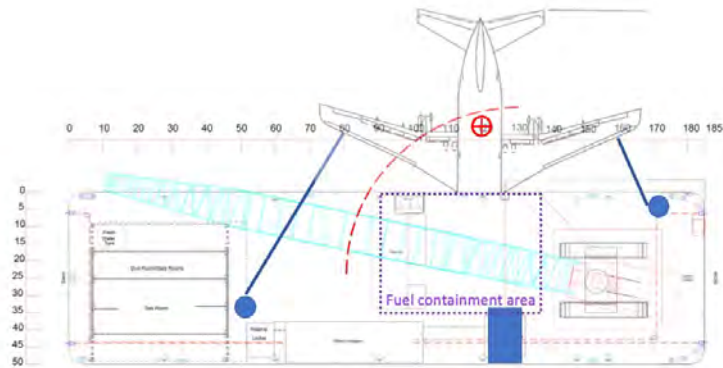


**Step 3**

Lower tail ~45°

Crane out to clear fairlead

Load ~50,000 lbs w/exposed structure  
60 ft boom & 47 ft to C/L < 1° list

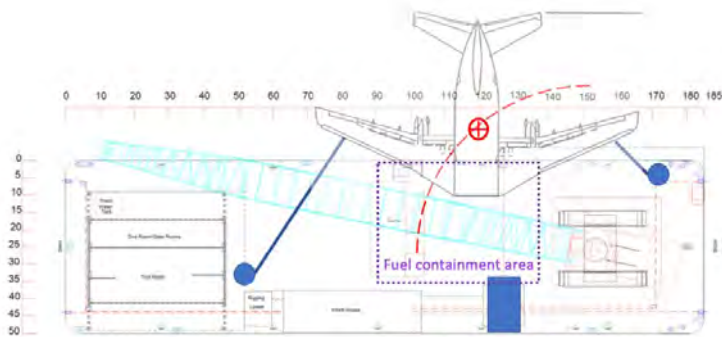


**Step 4**

Lift wing center on to edge

Slow lift as water drains

Load 86,000 lbs max  
<50 ft boom & 36 ft max to C/L < 3° list



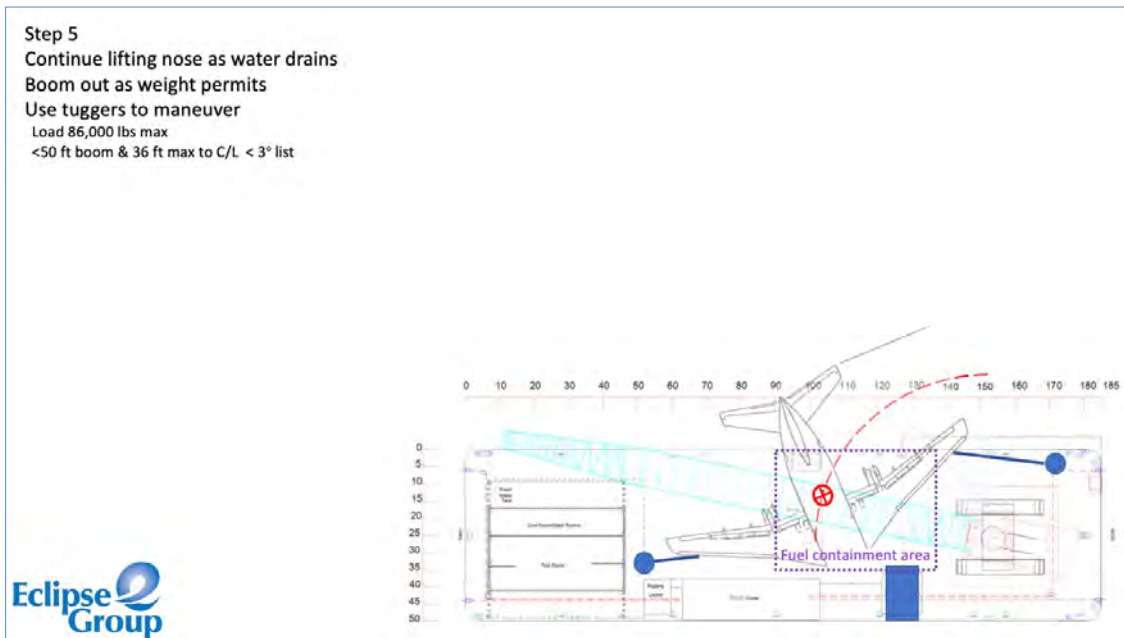


Figure 13. Graphic showing intended placement of airplane debris on the DBSV

To facilitate drainage of water from the wings, cargo containers, and tail, lifting the section will be extremely slow with the tail substantially lower than the wings. Holes will also have been made by the ROV in the cargo containers and tail stabilizers to facilitate drainage.

Recovery of large wreckage from the ocean progressively slides or hops it aboard to prevent swinging back and forth on a cable. This prevents endangering both crew and equipment, while resulting in the full weight not being hung suspended in the air or lifted by the crane. For safety, no accident investigation personnel may approach or be on the fuselage sections until the sections are cribbed and fastened to the deck. The Project Manager must be present. If the aft doors being beyond the edge of the barge, PFDs will be mandatory, man overboard lines will be used, and plan for access to the FDR to likely be through the R2 galley door.

The planning has applied a 1.5 factor and based all rigging requirements on a total weight of 150,000+ lbs. The steel rigging has a 5 to 1 safety factor and woven strap has a 7 to 1 safety factor. These are over the safe working load before failure, to be consistent with best industry practices and provide what is accepted as adequate safety margin. EGI has developed a rigging list, calculations, and drawings of how rigging will be utilized with this document. Further Rigging information may be found in Appendix VII.

|                                                       |                                                                                                                                                                                                                                                                                      |
|-------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Wing break-out cable, each loop (one left, one right) | <ul style="list-style-type: none"> <li>2 Each - 5/8 x 50 ft., 8 part braided sling</li> </ul>                                                                                                                                                                                        |
| 12" Strap                                             | <ul style="list-style-type: none"> <li>Flat Web Sling for the tail section, we would go with the 12" wide 2-Ply with Taper eyes and Cordura on one side for added protection.</li> <li>Vertical - 33,000 LBS.</li> <li>Choker - 26,400 LBS.</li> <li>Basket - 66,000 LBS.</li> </ul> |

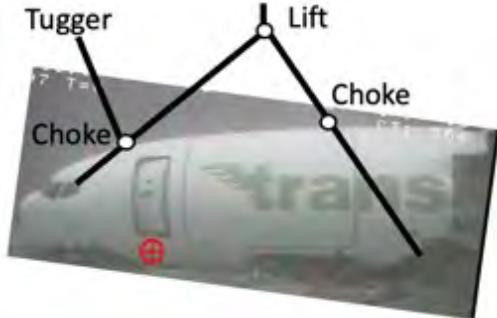
## TRANSFER OF LIFT POINTS AT SURFACE

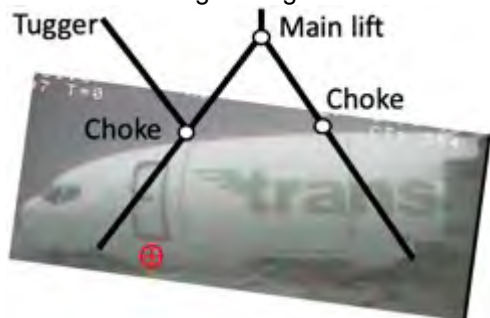
It is anticipated that the large aircraft sections will contain entrained water adding to the overall weight in air. The barge will perform a load transfer at the surface from the anchor winch for the wings and whip once the sections have arrived at the air-water interface. The sections will be slowly raised thru the air-water interface to allow water to drain from the fuselage & container operations.

Transfer of lifting means is a standard procedure in offshore operations and salvage. In deep-water recoveries the load is typically lifted underneath a stern mounted A-Frame and then transferred to the crane. This allows the load to be much closer to the vessel to minimize impact on stability and allow the crane to maximize its lifting capabilities within its safe lifting charts.

An inline D-ring between the winch lift hook will have a short pennant line shackled in. The bitter end of the pennant line is attached to the crane hook. The winch line is then lowered until the crane is taking the load. The winch line can remain or be detached as deemed appropriate by the Barge Master. The crane then booms out and the wreckage is very slowly lifted so that aircraft clears the side of the barge and the process of de-watering may occur. Eclipse Group used this method for the recovery of an F-14 fighter from 3,200 meters of water, when the 43,000 lb. load was transferred from the A-Frame to the vessel crane for recovery.

## FORWARD FUSELAGE RECOVERY CHECKLIST

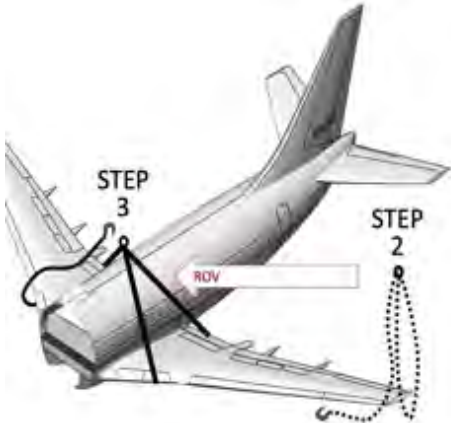
| Step   | Item                                                                                                                                                                                                                                                                             | Complete?<br>Operator<br>notes |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| 1 ROV  | <p>The right cockpit window is ajar but not open. ROV needs to fully open window with manipulator by pushing aft from front edge.</p>                                                         |                                |
| 2a ROV | <p>Use fiberglass pole to pass leader through cockpit windows and rigging to choker. NOTE: The Tugger line is only shown as a contingency if the section begins to spin uncontrollably.</p>  |                                |
| 2b ROV | If cockpit window could not be opened, use fiberglass pole to pass leader                                                                                                                                                                                                        |                                |

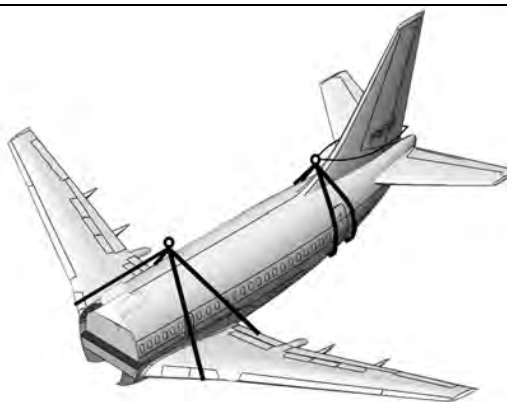
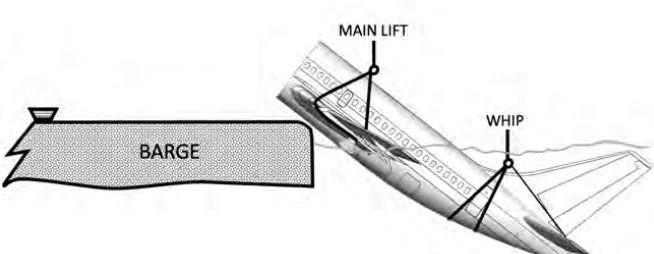
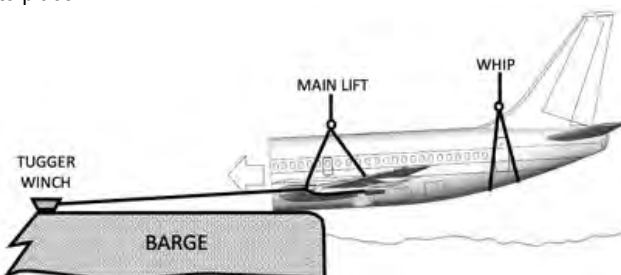
|            |                                                                                                                                                                                                                                                                                                        |  |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|            | <p>beneath cockpit in area of missing nose gear.</p>  <p>NOTE: A cargo net may also be used as contingency.</p>                                                                                                      |  |
| 3 ROV      | The aft cable/strap will be brought as far forward as possible and brought together (choked) above the fuselage, then pass to the lifting ring. NOTE: It may be possible for the fiberglass pole to pass from the area of the missing cargo door to better support the cargo floor.                    |  |
| 4 ROV      | To prevent the aft cable from slipping off, bring cables to a common lift ring from chokers. Attach main lift line to ring.                                                                                                                                                                            |  |
| 5 ROV      | Attach tugger winch to choker above cockpit to stabilizer during lift if needed. NOTE: The Tugger line is only shown as a contingency if the section begins to spin uncontrollably.                                                                                                                    |  |
| 6 DBSV ROV | Barge master slowly lifts section and stops at about 15 feet off bottom for ROV to inspect for lift security and integrity of bottom. NOTE: This lift should be about 15,200 lbs.                                                                                                                      |  |
| 7 DBSV ROV | Lift with anchor winch until at surface with ROV monitoring.                                                                                                                                                                                                                                           |  |
| 8 DBSV     | Change lift to main or whip.                                                                                                                                                                                                                                                                           |  |
| 9 DBSV     | Place on deck house roof. Crib. Lash down.<br><br><b>NOTE: It is a violation of Federal Regulation 49 CFR Part 831.13 for any party other than the NTSB to release any information about wreckage or the accident. This includes <u>any</u> photos, sketches, written descriptions, or statements.</b> |  |
| 10 PM NTSB | Once given clearance by Project Manager, NTSB can enter to document cockpit. <sup>15</sup>                                                                                                                                                                                                             |  |

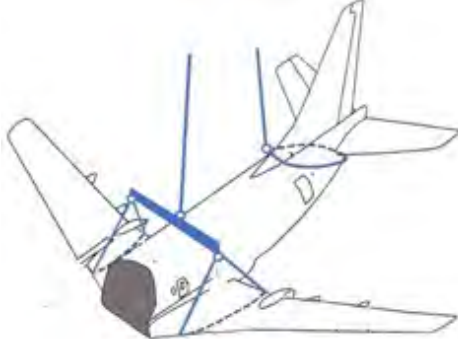
## WING / TAIL RECOVERY CHECKLIST

| Step  | Item                                                                                                                                                                                                                                                                     | Complete?<br>Operator notes |
|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| 1 ROV | LEFT WING: The ROV will first attempt to pull out or remove as much as possible of the debris currently caught under the left flap.                                                                                                                                      |                             |
| 2 ROV | A lifting ring will be lowered from BH with one cable looped and a second with an unattached hook on the bitter end. The looped cable will be moved from the left wing tip to as far inboard as possible. Review of the ROV survey video indicates that the wing station |                             |

<sup>15</sup> This permission is not a guarantee or statement about personal safety and NO such assurances are provided by the permission to approach the structure. This permission only represents that the structure is fastened sufficiently to the deck that it is unlikely to fall off of the vessel. The structure should be considered hazardous at all times, with the possibility of movement leading to falls and crush injuries, shifting and loose cargo or structural items, and the possibility of severe cut injuries. ALL liability and potential for injury is assumed by any person approaching the structure.

|          |                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|          | <p>will be approximately the mid span of the inboard flap. Crushing of the flap will ensure the cable does not move or slip when under load and this location will gain the strength of the main landing gear support beam (aka stub spar). The cable should come up the leading edge at the #2 slat.</p>                                             |  |
| 3 ROV    | <p>RIGHT WING: A fiberglass pole will be used to run the bitter end of the second cable under the right wing at similar wing stations to match the left wing. The hook on the end of the cable will then be brought up to the common lifting ring.</p>                                                                                                                                                                                 |  |
| 4 Penco  | <p>LSR/PENCO will be in place with the OSRV SENTRY and oil containment downstream measures of the DBSV.</p>                                                                                                                                                                                                                                                                                                                            |  |
| 5 ROV    | <p>Loop a cable under the HSTABs and connect to lift ring at tail. NOTE: Although the lift line will hit the vertical tail, placement behind tail adds leverage to reduce load on BH crane.</p>                                                                                                                                                     |  |
| 6 ROV    | <p>ROV connects lift cable from BH to lift ring at tail. Move ROV away to monitor lift cable and bottom of fuselage in next step.</p>                                                                                                                                                                                                                                                                                                  |  |
| 7 BH ROV | <p>Person at winch monitors winch load meter and slowly lifts tail until ROV operator says he can get two straps under aft fuselage, fore and aft of rear doors.<br/>NOTE: This lift should be about <math>(43,500 \text{ lb section}) / (2 \text{ points}) / (2 \text{ for leverage to CG point}) = 11,000 \text{ lbs}</math>, plus bottom suction. The load will be significantly less if lifted from the aft edges of the tail.</p> |  |
| 8 ROV    | <p>Let silt clear away then record any damage under aft fuselage with ROV.</p>                                                                                                                                                                                                                                                                                                                                                         |  |
| 9 ROV    | <p>ROV passes fiberglass pole with leader line for the aft 12" strap beneath fuselage between one and two feet aft of the rear doors. On the <b>right</b>, this would cover the "TA" of N810TA. Bring strap under and to a choker above the rear door.</p>                                                                                                                                                                             |  |
| 10 ROV   | <p>ROV passes fiberglass pole with leader line for 12" strap beneath fuselage between one and two feet forward of the rear doors. Look for a vertical row of rivets which show where the frame is. Bring strap under and to the choker above the rear door.</p>                                                                                                                                                                        |  |

|             |                                                                                                                                                                                                  |  |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|             |                                                                                                                |  |
| 11 ROV      | Create cargo container drainage holes between frames and stringers with step drill, 4" hole saw, or extra long drill.                                                                            |  |
| 12 DBSV ROV | ROV connects DBSV anchor winch to choker above wings and the choker above rear doors. Move clear and monitor initial lift.                                                                       |  |
| 13 DBSV ROV | Lift airplane level to 15-20 ft above bottom and hold for ROV to check security of lift and integrity of structure. Record bottom damage.                                                        |  |
| 14 DBSV ROV | Lift until D-rings clear water surface. ROV to follow and monitor as able.                                                                                                                       |  |
| 15 DBSV     | Transfer D-rings to main and whip lift lines.                                                                                                                                                    |  |
| 16 DBSV     | Lower tail to about 30-45 degrees nose up attitude.                                                                                                                                              |  |
| 17 DBSV     | Very slowly and while monitoring load meter for drainage, lift section until wing can rest on barge at or behind the center section spanwise beam. Attach tugger winch lines.                    |  |
|             |                                                                                                              |  |
| 18 DBSV     | Raise tail as load meter permits until slightly higher than wings. Use tugger winches to slide the section into place.                                                                           |  |
|             | <br><br>NOTE: Barge Master may elect to move main lift line to tail lift, as wings will be resting on barge. |  |
| 19          | Alternative lift method with 25 ft spreader bar (contingency plan):                                                                                                                              |  |

|         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|         |                                                                                                                                                                                                                                                                                                                                                                                                                                      |  |
| 20 DBSV | Once on deck the section will be cribbed and lashed aboard the DBSV.                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |
| 21 DBSV | Once the section is secured to the deck and until the wing section is cleared of fuel, for ignition prevention measures.<br>Nobody other than crew is to go near the section until it is lashed in place and the Project Manager gives permission. <sup>16</sup><br><br><b>NOTE: It is a violation of Federal Regulation 49 CFR Part 831.13 for any party other than the NTSB to release any information about wreckage or the accident. This includes any photos, sketches, written descriptions, or statements.</b> |  |
| 22      | Once permission is given, PENCO may commence de-fueling. Note that only NTSB personnel with a mission requirement may approach any openings or enter the wreckage. The section is evidence in a major aircraft accident investigation and subject to Federal regulations pertaining to evidence. Violations will result in immediate removal from the DBSV and may result in potential legal action.                                                                                                                  |  |

## RECOVERY OF FLIGHT DATA RECORDERS

NTSB should expect permission to access and recover the flight data recorder (FDR above aft left door) and cockpit voice recorder (CVR, open aft cargo) once the section is cribbed and lashed in place. However, if the sea state, weather, or other conditions are deemed to be hazardous by the Project Manager, recovery of at least the FDR may need to wait until the structure is off-loaded to land. The Project Manager must be present.

The location of the CVR in the lower cargo hold doorway will create minimal risk since it should be easily accessed at thigh level, accessed without fully entering the hold, and far from the edge of the vessel. The use of fall lines or PFDs would be detrimental, since these could increase snag risks.

Access to the aft fuselage to retrieve the FDR should be with a stepladder to the R2 door, which will be over the barge deck.

Alternate method - If the secured wreckage has the door near or beyond the side of the barge, access may be safely accomplished several ways, but it should be noted that proper safety equipment will include fall

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arrestors and PFDs. A cable attached to a secure deck point will cross over the fuselage to above the door to provide an extremely secure attachment for fall arrestors. Once the section is cribbed and lashed, we plan to extend a gangway to the R2 galley door, choosing the right side since it will be over or closest to the edge of the barge deck. Use of the gangway to the left door is the primary contingency. Again, a cable over the fuselage from the deck and the gangway again would provide a solid safe walkway to the L2 door. If neither door can be opened, the airplane end of the gangway will be raised to provide a solid platform for cutting through the airplane above the door.

The NTSB is to provide containers for the recovered FDR and CVR. The NTSB is expected to transport the recorders immediately and various options for transport to shore discussed include calling for a Coast Guard boat and a water taxi.

### DE-FUELING STEPS

Lone Star Retrieval is responsible for defueling, which is expected performed onboard the DBSV by Lone Star Recovery (LSR) subcontractor Pacific Environmental Company (PENCO). PENCO will have the oil spill response vessel (OSRV) SENTRY available prior to movement of the large section, which contains the fuel tanks. PENCO plans to have the SENTRY on scene while lifting the wing section and for the recovery of fuel, plus any unforeseen hazardous materials.

The left wing appears to have been opened outboard of the engine position and the right may have been opened inboard of the engine station to create the large oil slick seen by the Coast Guard during rescue. The center tank was empty at departure, containing a minimal amount of sump fuel. If the center tank or right wing did retain any fuel through the accident sequence, the internal vents are along the upper wing surfaces and fuel is lighter than water. That means the right wing should have vented most of its' fuel very quickly and the majority of what remains in the three tanks is seawater with small amounts of fuel.

Due to the lack of aircraft power to operate valves in the wings, the de-fueling method is expected to follow these steps:

1. PENCO will bring aboard:
  - 3 PENCO personnel when main section safe and secure to defuel. They would be transported by another taxi vessel and stay aboard DBSV till defueling is complete. If berthing is needed, this will be aboard the SENTRY. PENCO has related that their crew are all vaccinated against COVID.
  - Crew safety lines, PFDs, and any other personal protective equipment
  - 6,000 gallon ISO tank
  - 2-185cfm compressor
  - 200ft of fuel transfer hose 1 1/2 “
  - 2-2” double diaphragm pump
  - 2-100ft cp air hose
  - Tool box
  - Absorbent materials, drums approx..4-6 pallets of these items total (this can be increased or decreased accordingly)

2. Fuel spill containment barriers on the DBSV will be in place both where fuel may leak from the wing tanks, around equipment liable to leakage, and at the deck edge as a cofferdam.
3. A hole saw will be used to cut holes in the top of each wing. Hoses will be fed into each fuel tank and external pumps will transfer the fuel into a compartment within the DBSV.
4. To maintain aircraft balance on the DBSV deck, fuel should be progressively removed from each wing.
5. LSR/PENCO will clean/remediate any fuel/water mixture spilled on the deck of the DBSV.
6. Once the barge arrives at the pier, LSR/PENCO will remove the water/fuel mix to a facility unrelated to the search and recovery. LSR/PENCO will clean the DBSV of any remaining fuel spill.

## PENCO EQUIPMENT

| ITEM                                             | PENCO | CURTAIN |
|--------------------------------------------------|-------|---------|
| AIR COMPRESSOR 185CFM                            | X     |         |
| 2" DOUBLE DIAPHRAGM PUMP (2EA)                   | X     |         |
| 400FT 1.5" FUEL TRANSFER HOSE                    | X     |         |
| 400FT 3/4" CP AIR HOSE                           | X     |         |
| HYDRAULIC POWER PACK (1EA)                       | X     |         |
| HYDRAULIC DRILL (1EA)                            | X     |         |
|                                                  | PENCO | CURTAIN |
| 200FT HYDRAULIC HOSE                             | X     |         |
| 4" HOLE SAW (6EA)                                | X     |         |
| PNEUMATIC DRILL (1)                              | X     |         |
| 100 FT 3/8" AIR LINE QUICK DISCONNECT TO CP      | X     |         |
| TOOL BOX WITH BASIC HAND TOOLS                   | X     |         |
| GROUNDING CABLES                                 | X     |         |
| SAFETY HARNESS / LINES                           | X     |         |
| 6,000 GALLON STORAGE CONTAINER                   | X     |         |
| Material List- Defueling                         |       |         |
| ABSORBENT MATERIALS                              | X     |         |
| 55 GAL DRUMS (PLACE IN FUEL IMPACTED ABSORBENTS) | X     |         |
| CASE TRASH BAG / POLYSHEETING ROLL               | X     |         |

## POLLUTION CONTROL / CHEMICAL, FUEL AND OIL

Lone Star Retrieval is responsible for defueling, is expected to be executed onboard the DBSV by Lone Star Recovery's (LSR) subcontractor Pacific Environmental Company (PENCO). PENCO will have the oil spill response vessel (OSRV) NRC SENTRY available prior to movement of the large section, which contains the fuel tanks. PENCO plans to have the NRC SENTRY on scene while lifting the wing section and for the recovery of fuel, plus any unforeseen hazardous materials.

OSRV NRC SENTRY will be on positioned down current from potential sources of release. The OSRV is fitted with containment boom, 2 skimming systems, outrigger arms, and recovered oil storage, but due to the light-end nature of the jet fuel, SENTRY will likely opt to deploy her outrigger arms along with a wide, U-shaped “pocket” of sorbent material. This wide-sweep method will result in the most efficient and efficacious recovery, given the operating environment and product to be recovered. NRC’s response personnel in collaboration may make on-scene adjustments to this plan with the salvage master, based on experience and on-scene conditions. NRC SENTRY and her crew are the best equipped to make best efforts to recover spilled oil, but will make no guarantees of recovering every drop of released product.

While no loss of fluid is anticipated, the BH ROV utilizes a biodegradable hydraulic fluid.

#### **ADDITIONAL HIGH VALUE TARGETS**

The Honeywell MK VII Ground Proximity Warning Computer (GPWS) is to be recovered when seen. Below are examples showing the unique bright blue color that should be conspicuous when using the ROV light.



Figure 45. Examples of avionics unit sought by NTSB

#### **COMMUNICATIONS BETWEEN VESSELS**

EGI is providing both navigational data and a ROV video feed to the winch control house on the DBSV so derrick operations monitor and have situational awareness on the seabed by viewing the ROV video real time.

Voice communications between the deck and vessels will be over marine band VHF radios. Communication between EGI personnel will be with VHF hand-held radios on frequency 82A. A list of frequencies will be published prior to the start of the operation.

NTSB has requested and EGI agreed to have the engines transported on the BH to the Port of San Diego, CA. Packing / loading must be completed prior to departure. The vessel is Jones Act Compliant and allowed to provide this service. Loading must not delay departure of the vessel upon completion of the operation and makes no guarantees or assurances for the safe return of the engines. EGI will endeavor to properly secure these items consistent with the securing of any of our equipment.

---

**APPENDICES I**  
**ADDITIONAL AIRCRAFT INFORMATION**

# 707-727-737

## AIRPLANE RECOVERY

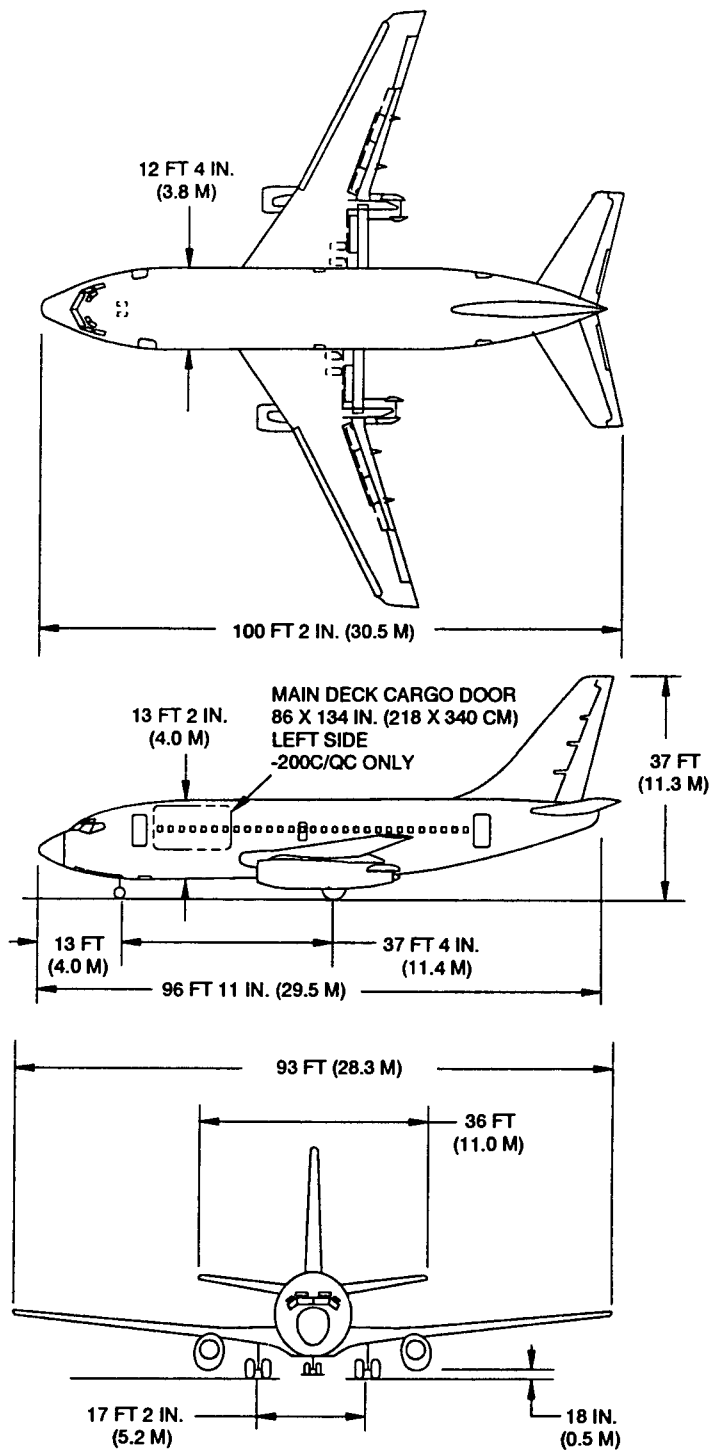
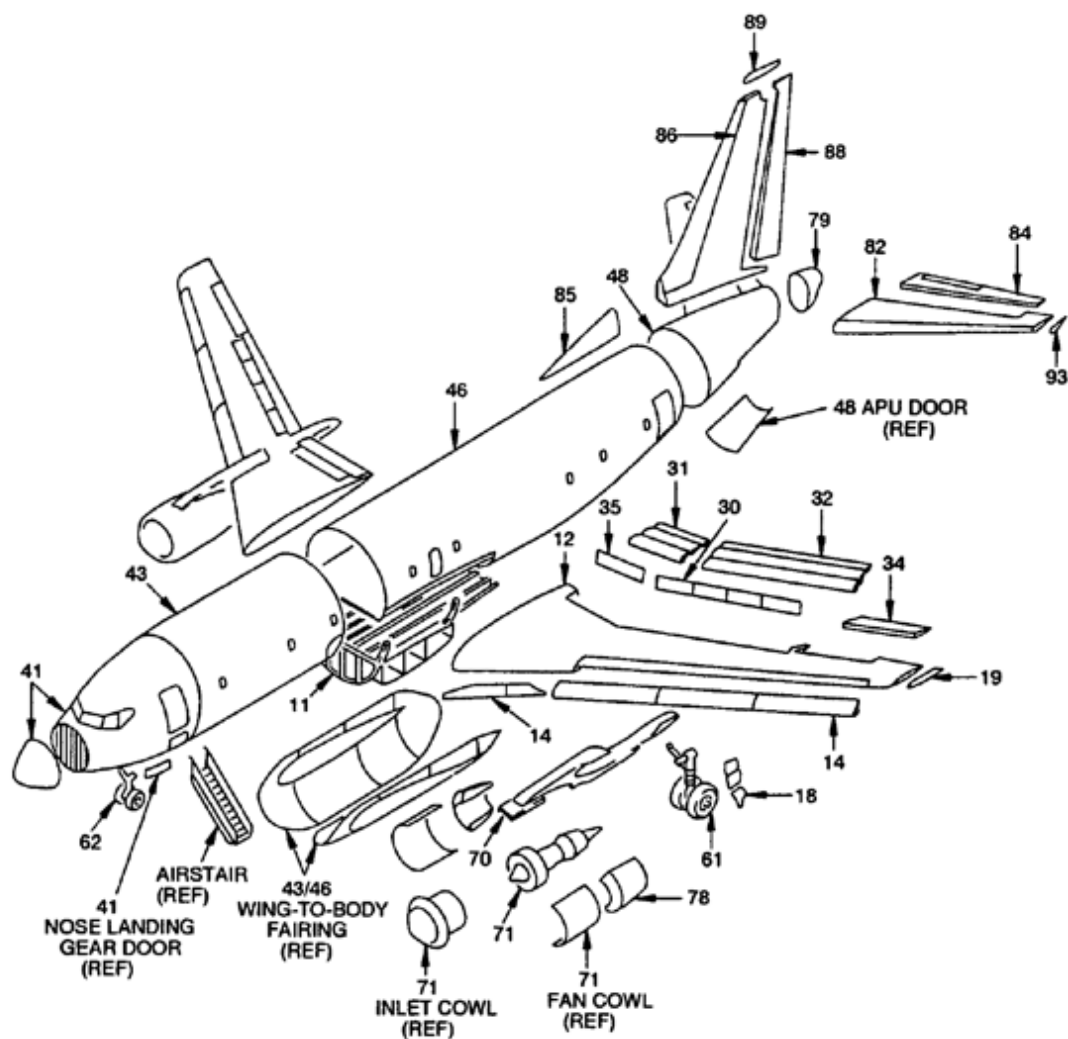
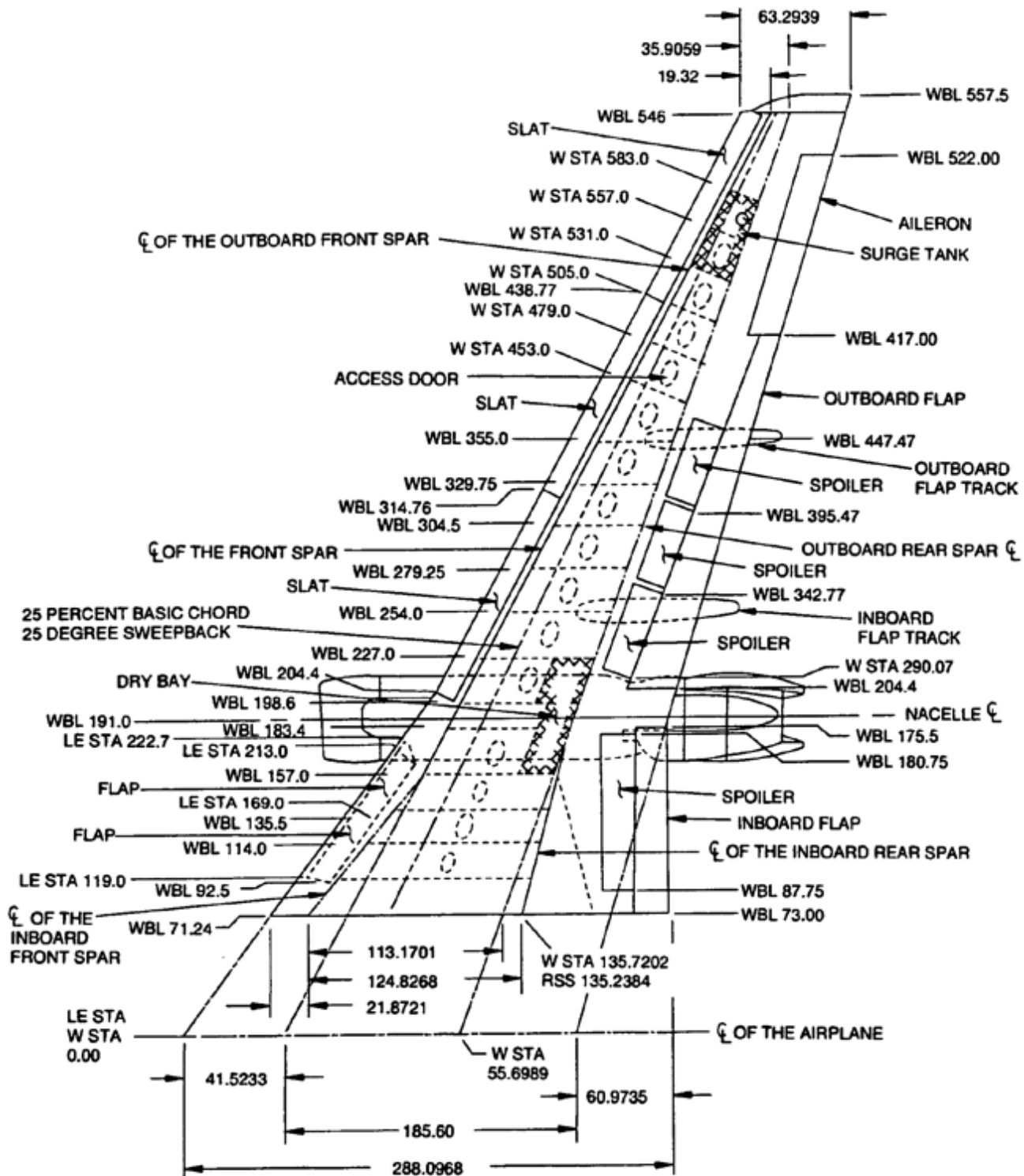


FIGURE 1-10-2-5 PRIMARY AIRPLANE DIMENSIONS, 737-200, -200C/QC



| SECTION<br>NUMBER | DESCRIPTION                               | SECTION<br>NUMBER | DESCRIPTION                            |
|-------------------|-------------------------------------------|-------------------|----------------------------------------|
| 11                | WING CENTER SECTION ASSEMBLY              | 71                | POWERPLANT INSTALLATION                |
| 12                | WING ASSEMBLY                             | 78                | FAN DUCT COWL AND THRUST REVERSER      |
| 14                | LEADING EDGE FLAPS AND SLATS INSTALLATION | 79                | TAIL CONE INSTALLATION                 |
| 18                | MAIN LANDING GEAR DOOR INSTALLATION       | 82                | HORIZONTAL STABILIZER ASSEMBLY         |
| 19                | WING TIP INSTALLATION                     | 84                | ELEVATOR INSTALLATION                  |
| 30                | OUTBOARD SPOILER                          | 85                | DORSAL FIN ASSEMBLY                    |
| 31                | INBOARD TRAILING EDGE FLAP INSTALLATION   | 86                | VERTICAL FIN ASSEMBLY                  |
| 32                | OUTBOARD TRAILING EDGE FLAP INSTALLATION  | 88                | RUDDER INSTALLATION                    |
| 34                | AILERON INSTALLATION                      | 89                | VERTICAL FIN TIP ASSEMBLY              |
| 35                | INBOARD SPOILER INSTALLATION              | 93                | HORIZONTAL STABILIZER TIP INSTALLATION |
| 41                | BODY INSTALLATION, SECTION 41             | 41                | NOSE LANDING GEAR DOOR INSTALLATION    |
| 43                | BODY INSTALLATION, SECTION 43             | 43/46             | WING-TO-BODY FAIRING INSTALLATION      |
| 46                | BODY INSTALLATION, SECTION 46             | 71                | INLET COWL ASSEMBLY                    |
| 48                | BODY INSTALLATION, SECTION 48             | 71                | FAN COWL ASSEMBLY                      |
| 61                | MAIN LANDING GEAR INSTALLATION            | 71                | PRIMARY EXHAUST INSTALLATION           |
| 62                | NOSE LANDING GEAR INSTALLATION            | 48                | APU DOOR INSTALLATION                  |
| 70                | STRUT INSTALLATION, CFM56-3 ENGINE        |                   |                                        |

FIGURE 1-10-3-1 STRUCTURAL SECTIONS, 737

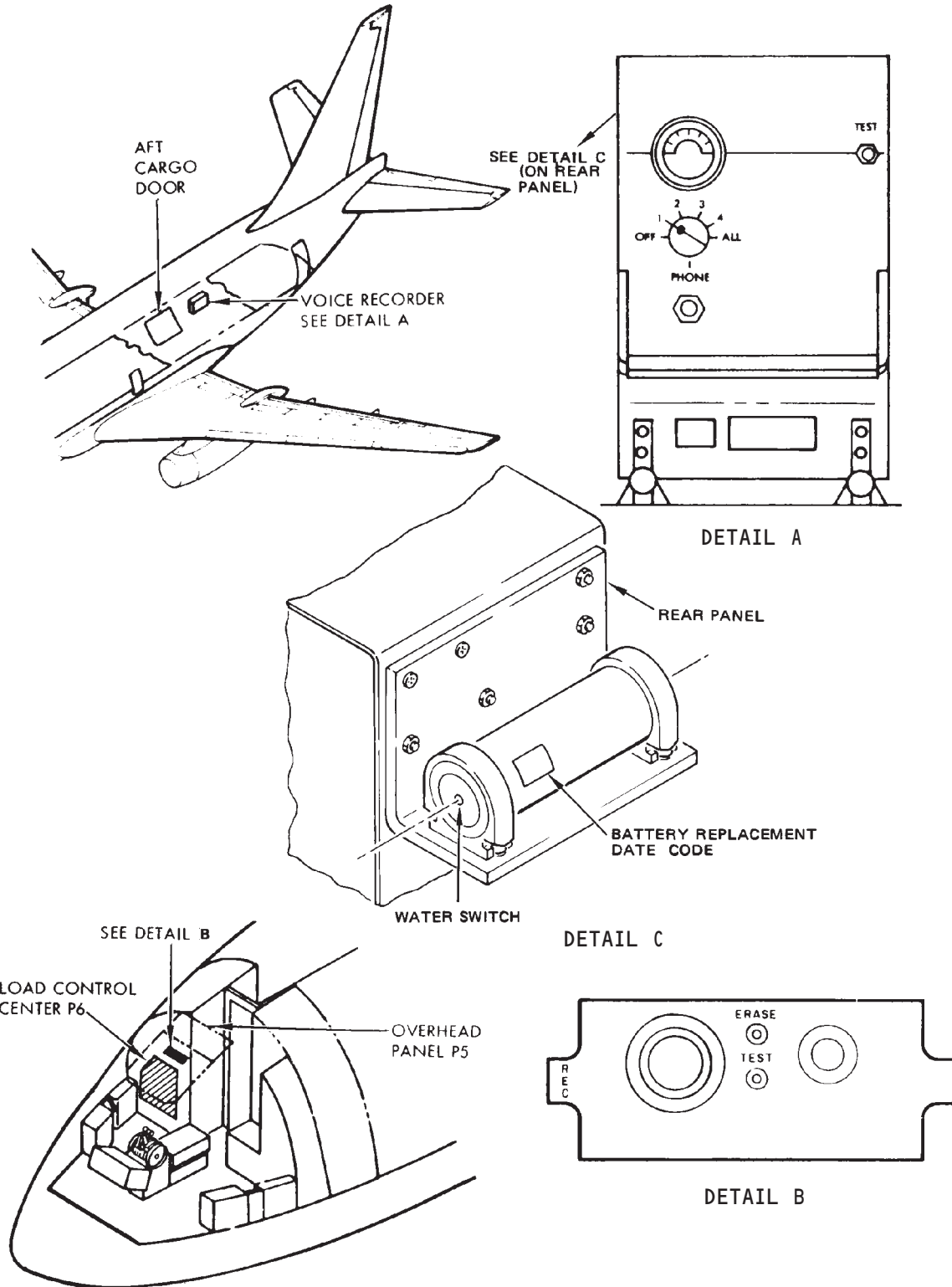


NOTES:

1. THE BASIC LEADING EDGE ANGLE TAN EQUALS .52203862
2. THE SEMI-SPAN IS 46.50 FEET (14.17 METERS)

DIMENSIONS ARE GIVEN IN INCHES  
1 INCH EQUALS 2.54 CENTIMETERS

FIGURE 1-10-4-16 WING STATION DIAGRAM, 737-100/-200



Voice Recorder System Component Location  
Figure 1

EFFECTIVITY

TEW 810;

D6-37152

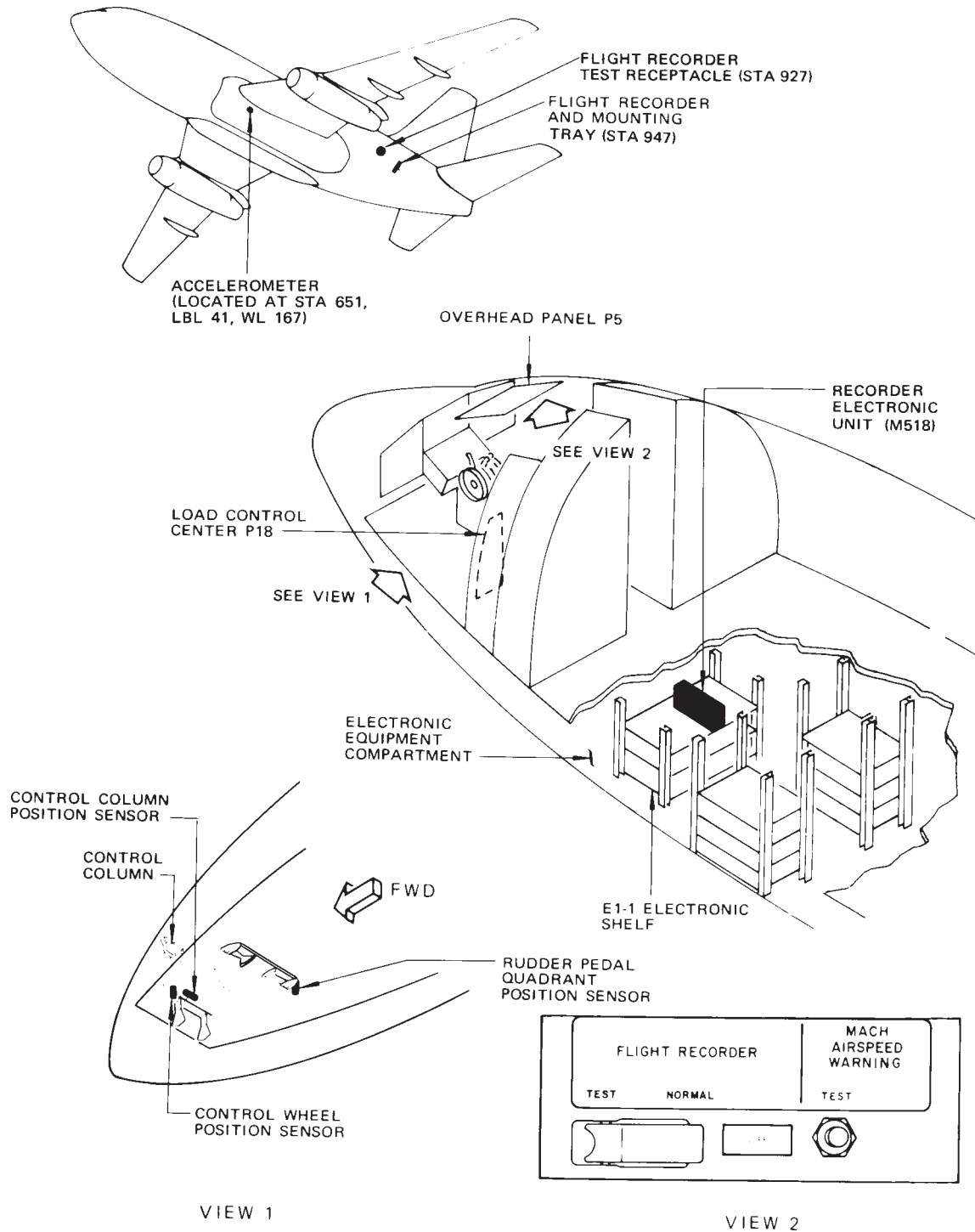
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**23-71-00**

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**BOEING**  
**737**  
**MAINTENANCE MANUAL**



Flight Recorder System Component Location  
Figure 1

EFFECTIVITY

TEW 810;

D6-37152

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GROUND PROXIMITY WARNING SYSTEM – DESCRIPTION AND OPERATION

1. General

A. TEW 413, 810;

The ground proximity warning system (GPWS) provides the pilots with aural and visual warning of potentially dangerous flight paths relative to the ground. The GPWS processes radio altitude information from the No. 1 low range radio altimeter (LRRRA), altitude rate information from the No. 1 central air data computer (CADC) glide slope deviation information from VOR/ILS system and landing gear and landing flap position signals to provide warnings of the following hazards:

(1) TEW 413, 810;

Level flight or too shallow climb towards rising terrain.

(2) TEW 413, 810;

Excessive rate of descent.

(3) TEW 413, 810;

Altitude loss after takeoff.

(4) TEW 413, 810;

Unsafe terrain clearance.

(5) TEW 413, 810;

Excessive deviation below the glide slope.

B. TEW 413, 810;

The GPWS consists of a ground proximity computer, two warning lights labeled PULL UP, a warning speaker, a test switch, two glide slope warning indicator/inhibit switches labeled BELOW G/S, a guarded flap/gear inhibit switch, and a GPWS failure monitor INOP light. Equipment location is shown in [Fig. 1](#).

C. TEW 413, 810;

Primary power for the system is 115 volts ac supplied from the essential radio bus in panel P18 through a circuit breaker labeled GROUND PROXIMITY WARN.

D. TEW 413, 810;

26 volts ac is also received from the central air data system as a reference voltage for the altitude rate circuits.

2. TEW 413, 810;

Computer

A. TEW 413, 810;

The ground proximity warning computer (GPWC) is rack-mounted on shelf No. 4 of electronic equipment rack E2. The GPWC consists of a logic and power supply module, a comparator and closure warning module and an audio module. A power transformer and an interference capacitor are also mounted in the rear of the chassis above the electrical connector. In addition, a test switch, mode annunciators, reset switch, and fault indicators are installed on the front panel.

B. TEW 413;

The functions and displays of the indicators and switches are as follows:

(1) TEW 413;

The five magnetic latching annunciators, labeled HI SINK, TERRAIN, TAKE OFF, GEAR/FLAP, and G/S will change from black to white color when modes 1, 2, 3, 4, and 5 warnings are activated, respectively.

EFFECTIVITY

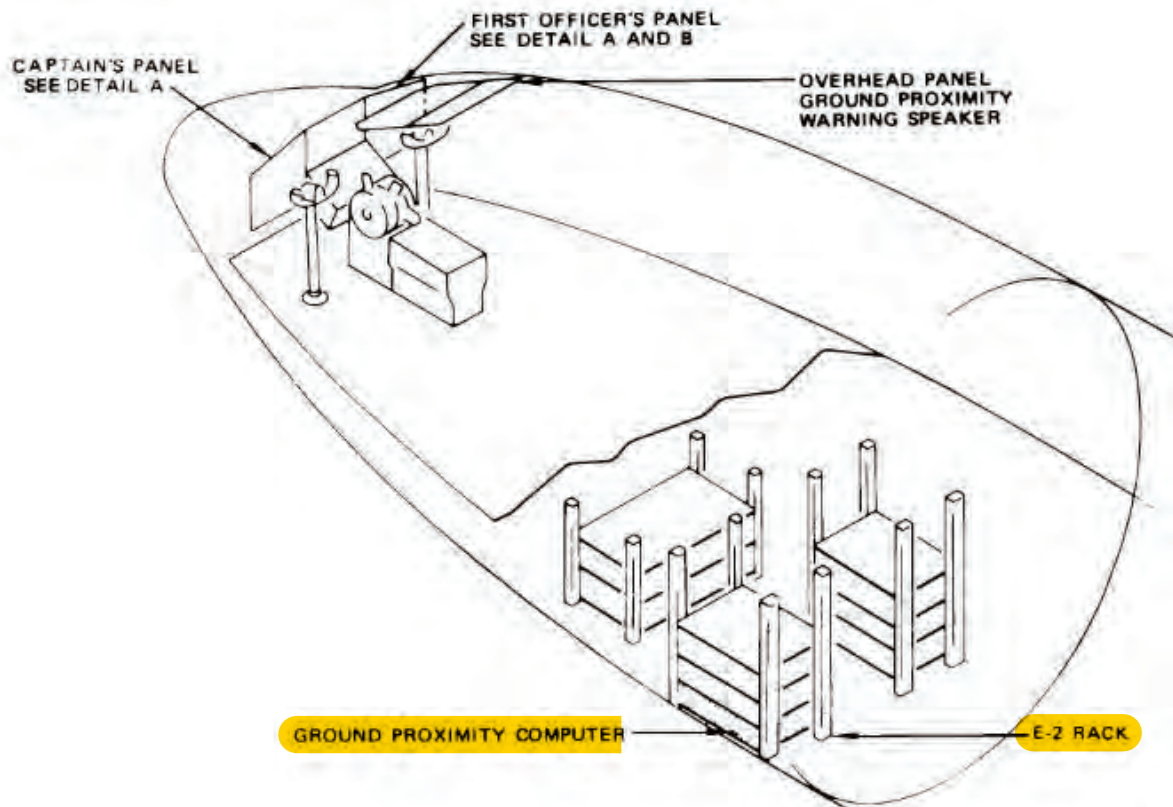
TEW 413, 810 PW 742, 743, 752;

D6-37152

**34-42-00**

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**BOEING**  
**737**  
**MAINTENANCE MANUAL**

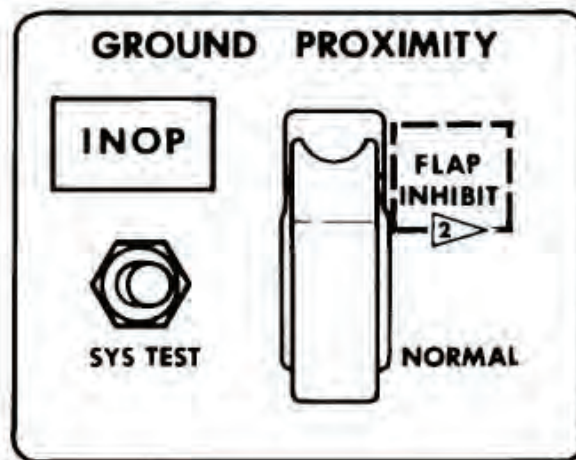


DETAIL A



1 AIRPLANES INCORP GEAR  
INHIBIT INSTALLATION

2 AIRPLANES PRIOR TO  
INCORP GEAR INHIBIT  
INSTALLATION



GROUND PROXIMITY WARNING SYSTEM CONTROLS

DETAIL B

Ground Proximity Warning System Component Location  
Figure 1

EFFECTIVITY

TEW 810;

D6-37152

**34-42-00**

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# N810TA Recovery

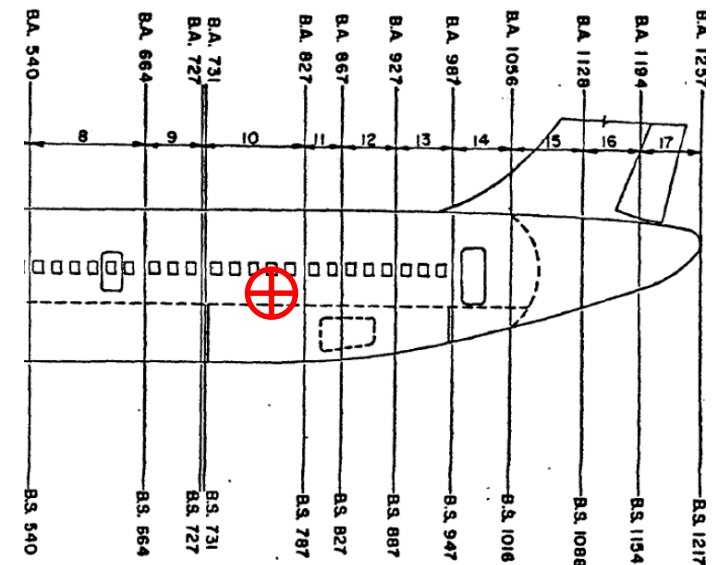
Weight Estimates

# Airplane Details

- Delivery Configuration
  - 737-200C (convertible, in cargo configuration)
  - PY151
  - LN 427
- Operator Data (pounds):
  - BOW: 60,160
  - Cargo: 19,897 (all on main deck, lower lobes empty)
  - Fuel: 14,000 (-500 for taxi)
  - TOW: 93,557

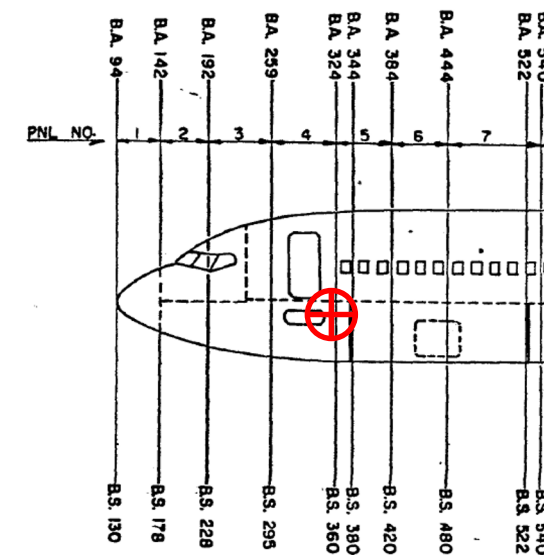
# Tail Section

- Assumptions
  - Tail section weight = 36,500 lb
    - Fuselage from STA 540 aft
    - Wings included
    - Tail included
    - Engines not included
    - Pylons included
  - 14,000 pounds fuel (conservative)
  - 12,500 pounds cargo (conservative)
  - No water weight
- Estimated weight: 63,000-85,000 lb
- Estimated CG: BA 792, WL 215



# Nose Section

- Assumptions
  - Nose section weight = 15,200 lb
    - Fuselage nose to STA 540
    - Delivery FWD Galley Included
  - 5,000 pounds cargo (conservative)
  - No water weight
- Estimated weight: 20,200 lb
- Estimated CG: BA 322, WL 184



# Engines

- Assumptions:
  - Full JT8D engine core
  - Complete thrust reverser assembly
- Engine + Thrust Reverser = 5000 lb/each



# Nose Landing Gear

- Assumptions
  - Nose gear only = 500 lb
  - Nose wheel well instl = 200 lb
    - Wheel well / Surrounding structure
  - No water weight
- Estimated weight: 700 lb



---

## APPENDICES II

### RV BOLD HORIZON SPECIFICATIONS & GAS



## SURVEY / ROV SUPPORT VESSEL

### GENERAL

|                        |                                   |
|------------------------|-----------------------------------|
| Owner                  | Bold Horizon, LLC.                |
| Vessel Management      | Eclipse Group, Incl               |
| Vessel Type            | Survey Vessel - Cargo Misc.       |
| Year Built             | 1978                              |
| Yard Built             | Atlantic Marine Shipyard          |
| Flag State             | United States of America          |
| Port of Registry       | San Diego, CA                     |
| Official Number        | 1265983                           |
| Classification Society | American Bureau of Shipping (ABS) |
| Class Certifications   | * A1, * AMS*, Loadline            |
| Class Number           | 1265983                           |
| Call Sign              | WKWB                              |
| IMO Number             | 7723821                           |
| MMSI Number            | 303273000                         |
| Selective Calling No.  | 71478                             |
| Operations             | World Wide                        |
| USCG Designation       | Work Vessel                       |
| SOLAS                  | Pending                           |
| FCC Registration       |                                   |
| Number (FRN)           | 0025079617 (FRN)                  |
| INMARSAT No.           | 1501554                           |

### GENERAL

|                         |                                     |
|-------------------------|-------------------------------------|
| Maximum Endurance       | 40 Days                             |
| Maximum Range nm        | 9600 nm                             |
| Maximum Speed           | 10 knots                            |
| Economic Cruising Speed | 8 knots                             |
| Minimum Speed           | Variable to 0 knots                 |
| Rudder                  | 2 ea. Flap Rudders                  |
| Total Horsepower        | 1,700 Hp                            |
| Bollard Pull            | 16.7 Long Tons (Estimated)          |
| Number off Propellers   | 2 ea, CCP Variable Pitch Propellers |
| Additional Thrusters    | 1 ea. Bow Thruster                  |
| Jones Act               | Compliant                           |
| Crew                    | 8 Total                             |
| Client Berthing         | 12 Total                            |
| Crew Nationality        | United States Citizens              |
| Fuel                    | Low Sulfur No. 2 Marine gas oil     |

### DIMENSIONS

|                        |                                 |
|------------------------|---------------------------------|
| Length Overall LOA     | 170' - (52m)                    |
| Breadth Moulded        | 36' - (11m)                     |
| Draft Light            | 9.35' - (2.85m) Lightship 12.18 |
| Loadline Draft         | ft. (3.71)                      |
| Max. Free Board        | 4 ft. (1.2)                     |
| Min. Free board        | 2.64 ft. (0.8) - Tropical       |
| ITC Gross Tonnage      | Loadline 797 tons               |
| ITC Net Tonnage        | 239 tons                        |
| Registered Tonnage,    |                                 |
| Gross                  | 202 tons                        |
| Loaded Displacement    | 1,007 Long tons                 |
| Lightship Displacement | 663 Long tons                   |

### GENERAL

|                               |                            |
|-------------------------------|----------------------------|
| <b>Contact Information</b>    |                            |
| 24-Hour Response Number:      | 001-410-533-3041           |
| Vsat Satellite Phone Numbers: | 001-954-538-7802           |
|                               | 001-954-538-7803           |
| In Port Ship Phone Number:    | 001-619-488-2383*          |
| *(voip technology)            |                            |
| <b>Main Vessel Emails</b>     |                            |
| Managing Director:            | ssaintamour@eclipse.us.com |
| Chief Operating Officer:      | jsaintamour@eclipse.us.com |
| Vessel Manager:               | pmurphy@eclipse.us.com     |
| Bridge Email:                 | bridge@eclipse.us.com      |
| Captain's Email:              | captain@eclipse.us.com     |

# M/V BOLD HORIZON

## PROPULSION/MACHINERY

|                   |                                                              |
|-------------------|--------------------------------------------------------------|
| Total Horse Power | 1700 hp (1268 kW)                                            |
| Main Engines      | 2 ea. Caterpillar model D398, 850 hp (634 kW) main engines   |
| Propulsion        | 2 ea. CPP Variable Pitch Propellers                          |
| Bow Thruster      | LIPS Variable-Speed Electric Tunnel Thruster 250 hp (186 kW) |
| Main Generators   | 2 ea. Detroit Diesel 460 VAC, 3-Phase, 230 kW generators     |
| Clean Power       | 16.8 KW Katon "clean power" generator                        |
| Emergency Power   | 6 kW Onan emergency generator (port aft deck house)          |

## FUEL CONSUMPTION

|                                 |                                             |
|---------------------------------|---------------------------------------------|
| Fuel Use Transit / Max Speed    | Marine Diesel 1,000 gal/day (3 MT/day) est. |
| Fuel Use Cruising Speed         | Marine Diesel 800 gal/day (2.5 MT/day) est. |
| Fuel Use In Port                | 72 gal/day (.25 MT/day)                     |
| Fuel Use at San Diego Home Port | Shore Power                                 |

## TANK CAPACITIES

|                                     |                             |
|-------------------------------------|-----------------------------|
| Marine Diesel                       | 44,366 gal (139 MT)         |
| Fresh Water                         | 2,095 gal (6.6 MT)          |
| Lube Oil                            | 500 gal (1.57 MT)           |
| Wash Water                          | 6,498 gal (20.44 MT)        |
| Desalination Plant Total Capability | 1,600 gal/day (6,057 l/day) |
| Reverse Osmosis Plant               | 800 gal/day (3,028 l/day)   |
| Evaporator Plant                    | 800 gal/day (3,028 l/day)   |
| Sewage Treatment System             | MSD Type II                 |
| Holding Tank                        | 3,700 gal (11.64 MT)        |

## DECK FEATURES

|                                  |                                                               |
|----------------------------------|---------------------------------------------------------------|
| Free Work Deck Space             |                                                               |
| Main Working Deck                | 1,730ft <sup>2</sup> (160m <sup>2</sup> )                     |
| 01 Deck                          | 840ft <sup>2</sup> (78m <sup>2</sup> )                        |
| Total Open Deck                  | 2,570ft <sup>2</sup> (238m <sup>2</sup> )                     |
| Deck Load                        |                                                               |
| Main Working Deck                | 500lbs/ft <sup>2</sup> (2.4MT/m <sup>2</sup> )                |
| 01 Deck                          | 500lbs/ft <sup>2</sup> (2.4MT/m <sup>2</sup> )                |
| Maximum Cargo Capacity           | 130 Long Tons                                                 |
| Deck Tied Down Points            |                                                               |
| Main Working Deck                | 2' x 2' Baxter Bolt Pattern @ 800 lbs. ea.                    |
| 01 Deck                          | 2' x 2' Baxter Bolt Pattern @ 800 lbs. ea.                    |
| Available Deck Electrical Supply |                                                               |
| 480 VAC                          | 3 ea. 480 VAC 3 phase, 50 Amp outlet plugs                    |
| 208 VAC                          | 3 ea. 208 VAC 3 phase 30 Amp outlet plugs                     |
| Deck Hydraulic Connections       | Multiple Hydraulic Connections with Local and Remote Control  |
| Hydraulic Pressure and Volume    | Working Pressure 2200 PSI With Output of Upto 70 GPM          |
| Hydraulic Power Units            | 2 ea. Independent Hydraulic Systems Providing 100% Redundancy |
| Deck Fresh Water Supply          | 2 ea. Fresh Water Hook Ups With Shore Water Supply            |
| Deck Salt Water Supply           | 1 ea. Salt Water Hook Up                                      |
| Deck Pressure Washer             | 1 ea. Permanently Installed 2,200 PSI High Pressure Washer    |
| High Pressure Air                | 2 ea. Quincy Model 325A Air Compressors                       |
| Stern Trawl Ramp                 | 12 ft wide With Removable Deck Cap                            |
| Moon Pool                        | 41" Diameter Transducer Well Located on The 01 Deck           |
| Removable Cable Chute            | Available as needed                                           |
| Deck Refrigeration unit          | 5' x 7' Walk-in Scientific Ref/Freezer Located Fwd of J-frame |
| HAZMAT/Chemical Storage          | Located on the Main Deck                                      |

# M/V BOLD HORIZON

## SURVEY & DECK EQUIPMENT

### **Stern A-Frame W/Multiple Sheave Positions**

Tow Static Safe Working Load  
Dynamic & Lifting Safe Working Load  
Vertical Clearance  
Horizontal Clearance  
Travel

### **Stbd J-Frame**

Static Safe Working Load  
Dynamic Safe Working Load  
Vertical Clearance  
Inboard Reach  
Outboard Reach

### **Telescoping Deck Crane**

Max. Reach  
Max. Safe Working Load  
Max. Safe Working Load - 1st Extension  
Max. Safe Working Load - 2nd Extension  
Slew Range

### **Trawl/Survey Winch 01 Deck**

Capabilities  
Wire Capacity  
Line Pull  
Speed

### **Hydrographic Winch**

Wire Capacity  
Line Pull  
Speed

### **Hydrographic Winch**

Wire Capacity  
Line Pull  
Speed

### **Electric Vertical Capstan**

Line Pull  
Low Speed  
High Speed

### **Hydraulic Vertical Capstan**

Static (Bollard) Pull

Nominal Line Speed (FPM)

### **Hydraulic Tugger / Winch**

Line Pull  
High Speed

### **Anchor & ground tackle**

### **1 ea. Vessel A-Frame**

18,000lbs (8,165kg) - Outboard against stops 12,000lbs (5,443kg)  
18.5ft (5.6m)  
14ft (4.3m)  
16ft (4.9m) forward of transom to 9ft (2.7m) aft of transom

### **1 ea. Vessel J-Leg**

9,200lbs (4,173kg) SWL  
9,200lbs (4,173kg) SWL  
17.5ft (5.3m)  
5.6ft (1.7m)  
7.5ft (2.3m)

### **1 ea. Nautilus 3400-051**

70ft (21m) - Pier Side, 50ft (15m) - At sea  
15,000lbs (6,804kg) SWL @ 14ft (4.3m)  
4,000lbs (1,814kg) SWL @ 50ft (15m)  
500lbs (226kg) SWL - Pier Side Use Only  
360 Degrees Range

### **1 ea. Dynacon Traction Winch**

Capable of Lifting, Towing, Side Scan Sonar or ROV Operations  
32,810ft (10,000m) of 9/16" cable or .680 coax or electro / fiber optic umbilical  
30,000lb (13,608kg)  
100 ft/min (30m/min)

### **1 ea. Markey DUSH-6 CTD Winch**

32,810ft (9,100m) 0.322" Conductor Wire (CTD) Lebus Grooving  
13,734lbs (6,300kg) bottom layer  
161ft/min (49m/min)

### **1 ea. Markey DUSH-4 Hydrographic Winch**

32,810ft (9,100m (10,000m)) 0.322" Conductor Wire (CTD) Lebus Grooving  
13,734lbs (6,300kg) (6230 kg) bottom layer  
170ft/min (51.8m/min)

### **1 ea. New England Trawler Equipment Model X-1238 Electric Vertical Capstan**

5,000lbs (2,268kg)  
20ft/min (6m/min)  
40ft/min (12.2m/min)

### **1 ea. Schoellhorn-Albrecht's SA1014 Vertical Capstan**

35,000lbs (15,875kg)  
40ft/min (12.2m/min)

### **1 ea. Pull Master Model M**

55,060lbs (2,268 kg)  
84ft/min (25.5m/min)

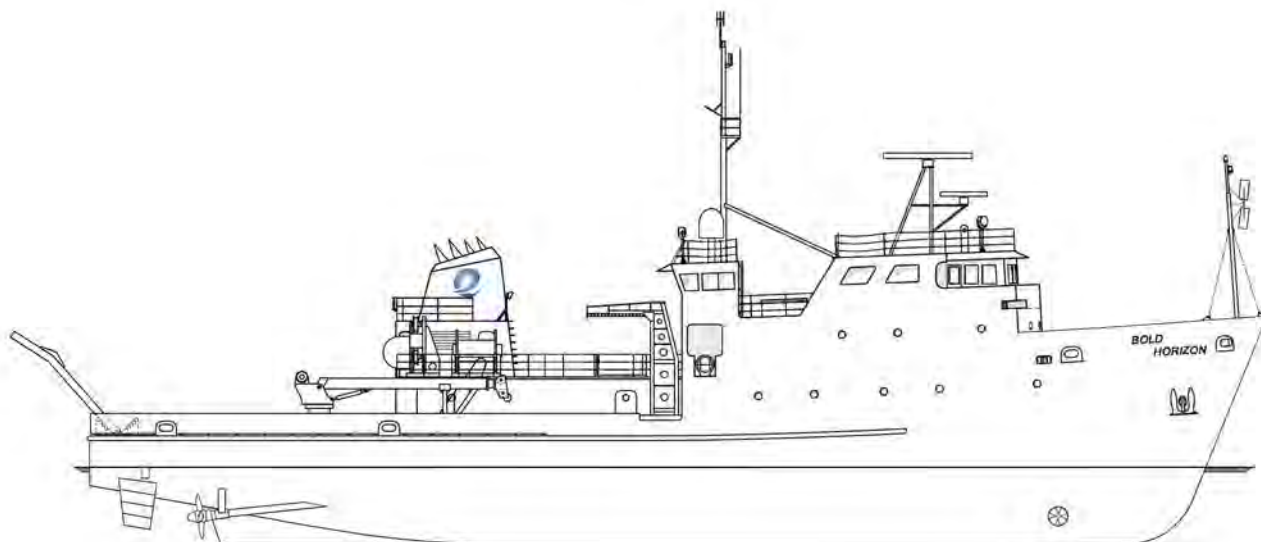
### **2 ea. 2,000lb (907kg) Navy Danforth anchors with 9 shots of 1" chain rode**



# M/V BOLD HORIZON

## NAVIGATION EQUIPMENT

|                                                      |                                                                                                                                                                                                                                                                                                                                                                                               |
|------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Radios</b>                                        | 2 ea. Sperry Marine Compact VHF Radios-RT2048<br>2 ea. Sperry Marine Compact VHF DSC - RM2042<br>1 ea. Standard Communications VHF Radio - GX1250S<br>1 ea. Furuno SSB Radio - FS-1562-25<br>1 ea. Furuno SSB Radio - FS-1503<br>1 ea. Furuno MF/HF DSC Terminal - DSC-6<br>1 ea. Furuno MF/HF DSC Receiver - AA-50<br>1 ea. Simrad-Taiyo, TD-L1620 Automatic Digital Direction Finder (ADDF) |
| <b>Navigation Radar</b>                              | 1 ea. Furuno 21X7 ARPA Radar<br>1 ea. Furuno 28X8 ARPA Radar                                                                                                                                                                                                                                                                                                                                  |
| <b>Compasses</b>                                     | 2 ea. Sperry Mk 37 Gyros Compasses<br>1 ea. Sperry Magnetic Compass<br>1 ea. Furuno 21X7 ARPA Radar<br>1 ea. Furuno 28X8 ARPA Radar                                                                                                                                                                                                                                                           |
| <b>Auto Pilot</b>                                    | 1 ea. Robertson                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Echosounder</b>                                   | 1 ea. Furuno FCV-382                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Deep Water Echosounder</b>                        | 1 ea. Knudsen 320B/R 3.5 and 12 kHz dual frequency                                                                                                                                                                                                                                                                                                                                            |
| <b>Doppler Speed Log</b>                             | 1 ea. Furuno DS-50                                                                                                                                                                                                                                                                                                                                                                            |
| <b>GPSs</b>                                          | 2 ea. Furuno GP-90<br>1 ea. Furuno GP-36                                                                                                                                                                                                                                                                                                                                                      |
| <b>DGPS</b>                                          | 1 ea. Trimble NT 300                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Weather Station</b>                               | 1 ea. Furuno 208 Weather System                                                                                                                                                                                                                                                                                                                                                               |
| <b>Charting System</b>                               | 1 ea. Nobeltec Trident - Chart / Tracking System and Fixed Electronic Positioning System.                                                                                                                                                                                                                                                                                                     |
| <b>Survey System</b>                                 | 1 ea. QINSy QPS, a hydrographic data acquisition, navigation and processing system                                                                                                                                                                                                                                                                                                            |
| <b>Subsea Positioning System</b>                     | 1 ea. Sonardyne Lodestar GyroUSBL Ultra Short Base Line Tracking System (Rental)                                                                                                                                                                                                                                                                                                              |
| <b>Communications<br/>VSAT</b>                       | GMDSS Fully Compliant<br>VSAT & Fleet Broadband/LTE<br>Intellian v100GX V3-11A-P-Ku to Ka Band convertible antennas system with 103cm reflector, X-pol and Co-pol                                                                                                                                                                                                                             |
| <b>INMAR Sat C</b>                                   | 1 ea. Furuno Felcom 15<br>1 ea. Furuno Felcom 16                                                                                                                                                                                                                                                                                                                                              |
| <b>High-frequency, single-side band transceivers</b> | 1 ea. ICOM M800<br>1 ea. Harris 230M- Continuously Monitors 2182 kHz                                                                                                                                                                                                                                                                                                                          |



# M/V BOLD HORIZON

## NETWORK COMMUNICATIONS

|                                           |                                                                                                                                                          |
|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Wi-Fi                                     | All Decks                                                                                                                                                |
| Wi-Fi Network Security                    | iDirect platform, X5 modem currently on board uses AES256bit encryption                                                                                  |
| Cisco Switch network                      | High security vlan configurations to isolate various ships networks (corporate, security, guest, and client networks)                                    |
| Wi-Fi Network Security                    | Unifi 4 SSID wireless AP's, Unifi 4 SSID wireless AP's configurable as needed to each vlan in ships network. Complete ship coverage using AES encryption |
| Voice Communications                      | 2 vsat voice lines. 1 voip line will near shore                                                                                                          |
| 4G Lte                                    | 4G modem for near shore broadband network communications.                                                                                                |
| Intellian v100GX V3 antenna               | iDirect platform with X5 modem using MTN Satellite provider, System capability 1024 ship to shore and 1024 shore to ship using ka band Inb.              |
| Communications Speed                      | Burstable speeds up to 1.5 Mbps depending on satellite traffic.                                                                                          |
| Vsat security                             | Multiple VPN encryption designs to meet requirements,                                                                                                    |
| Video & Data Ship to Shore Communications | Tricaster 855 16 c h video production device- capable of multiple encoding formats to stream to shore over VSAT.                                         |
| 5.4 Ghz and 2.4 Ghz ship to shore         | 13 dbi i Onmi directiona l antenna's mounted on ships mast for near shore WiFi connections/bridges.                                                      |
| Vessel Video System                       | Ability to monitor nine (9) interior and exterior cameras with motion sensing from any shore location.                                                   |

## INTERIOR WORKING SPACES

|                                   |                    |
|-----------------------------------|--------------------|
| Ocean Lab with Direct Deck Access | 355ft2 (33m2)      |
| Wet Lab                           | 160ft2 (14.8m2)    |
| Dry Lab/Survey Room               | 405ft2 (37.6m2)    |
| 01 Office / Lab Space             | 200ft2 (18.6m2)    |
| Conference Room                   | 198ft2 (18.4m2)    |
| All Available Lab Space           | 1,318ft2 (122.4m2) |

## ACCOMMODATIONS

|                               |                                                                      |
|-------------------------------|----------------------------------------------------------------------|
| <b>Total Number of Cabins</b> | <b>22 ea.</b>                                                        |
| Single Man Staterooms         | 11 ea.                                                               |
| Two Man Staterooms            | 9 ea.                                                                |
| Independent cabins            | 2 ea. Separate personnel berths for female or VIP Berthing           |
| <b>Total Number of berths</b> | <b>31 Bunks</b>                                                      |
| Crew                          | 10 ea                                                                |
| Charterers                    | 18 ea.                                                               |
| Galley                        | Seating for 17                                                       |
| TV Lounge / Conference Room   | 12 person, 198 sq. ft. conference room with wireless internet access |
| Office                        | 200ft2 (18.6m2)                                                      |
| <b>Heads</b>                  | <b>14 ea. Total:</b>                                                 |
| Public heads w/shower         | 4 ea.                                                                |
| Public heads w/o shower       | 2 ea.                                                                |
| Private heads w/shower        | 8 ea.                                                                |
| <b>Showers</b>                | <b>12 Total:</b>                                                     |
| Public Showers                | 4 ea.                                                                |
| Private Showers               | 8 ea.                                                                |
| Climate Control               | Full A/C and heating                                                 |
| Laundry                       | 1 ea. Washer and Dryer                                               |



# M/V BOLD HORIZON

## SAFETY

|                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Life Rafts                                                | 4 ea. Elliot 20-person ISSI life rafts with hydro static releases                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Life Rings                                                | 9 ea. Life rings (seven with strobes and two with smoke)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Life Jackets                                              | 41 ea. type III adult with lights                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Immersion Suites                                          | 38 ea. Type I adult                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Immersion Suites                                          | 3 ea. Type I Adult Small (Child)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Immersion Suites                                          | 3 ea. Type I Oversize                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Rescue Boat                                               | **Coming Soon**                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Fire Protection                                           | <p>The vessel has in place a fully functional Simplex 4010 Fire Control System and equipment, including portable and semi-portable fire extinguishers, fire pumps, fire mains, fixed gas extinguishing systems. All fire detection and alarm protection systems and system components installed meet and are in accordance with USCG or SOLAS requirements.</p> <p><b>Additional Fire Protection Features:</b></p> <ul style="list-style-type: none"><li>a) Self-priming power-driven fire pump connected to a fixed fire main piping system with a sufficient number of hydrants to reach any part of the vessel with a single length of fire hose.</li><li>b) A Halon Fixed, gaseous fire extinguishing system that serves the engine compartment</li><li>c) Kidde CO2 fixed, gaseous fire extinguishing system that serves paint locker</li><li>d) A grease extraction hood and extinguishing system that serves galley cooking equipment</li><li>e) A fire detection and alarm system or an independent modular smoke detector or fire detecting unit located in each accommodation space</li><li>f) 2 ea. SCBA with firefighting suits</li></ul> |
| Emergency position indicating radiobeacon station (EPIRB) | 2 ea. Category 1, 406/121.5 MHz float-free, automatically activated EPIRB detectable by satellite anywhere in the world and is recognized by GMDSS. The EPIRB is registered per the NOAA Search and Rescue Satellite Aided Tracking (SARSAT) .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Other equipment                                           | Emergency steering pump, five fire axes, two bolt cutters, emergency lighting, 15 emergency escape breathing devices, watertight door in cabin passageway, rescue swimmer's equipment, life sling, body basket, backboard, two line throwers, Pathfinder SART, emergency lighting system, and day shapes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Medical                                                   | <ul style="list-style-type: none"><li>1 ea. Chemical Shower Station</li><li>4 ea. Eyewash station - Portable Sterile Bottles</li><li>2 ea. Eyewash Station - Fixed</li><li>1 ea. Automated External Defibrillator (AED)</li><li>7 ea. First Aid Stations</li><li>1 ea. Medaire Ship's Medical Chest 3.0 Rx</li></ul> Medical Advisory Service (MAS)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Vessel Alarm System                                       | External siren and flashing light                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Vessel Video Security System                              | 16-Channel Network Video Recorder with 12 IP camera's in key locations. Remote alert configurations for motion detection and video tampering. 4 day recording capability 24/7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |



# M/V BOLD HORIZON

## ROV SYSTEMS

Super Mohawk Work Class ROV  
SERIO Observation Class ROV  
Optional GP60 Work Class ROV

2,000-meter rated system presently installed on the 01 Deck  
300-meter rated hand launched system presently on board  
6,000-meter rated stern launched system  
\*Specification Sheets available upon request

## SIDESCAN SYSTEMS

Klein 3,000 Sidescan  
Bluefin12 Sidescan / AUV  
Optional BF21 Sidescan, Multi-beam AUV  
Optional AMS Towed Sidescan

3,000-meter rated system  
1,500-meter rated system  
4,500-meter rated system  
6,000-meter rated system  
\*Specification Sheets available upon request

## ADDITIONAL FEATURES

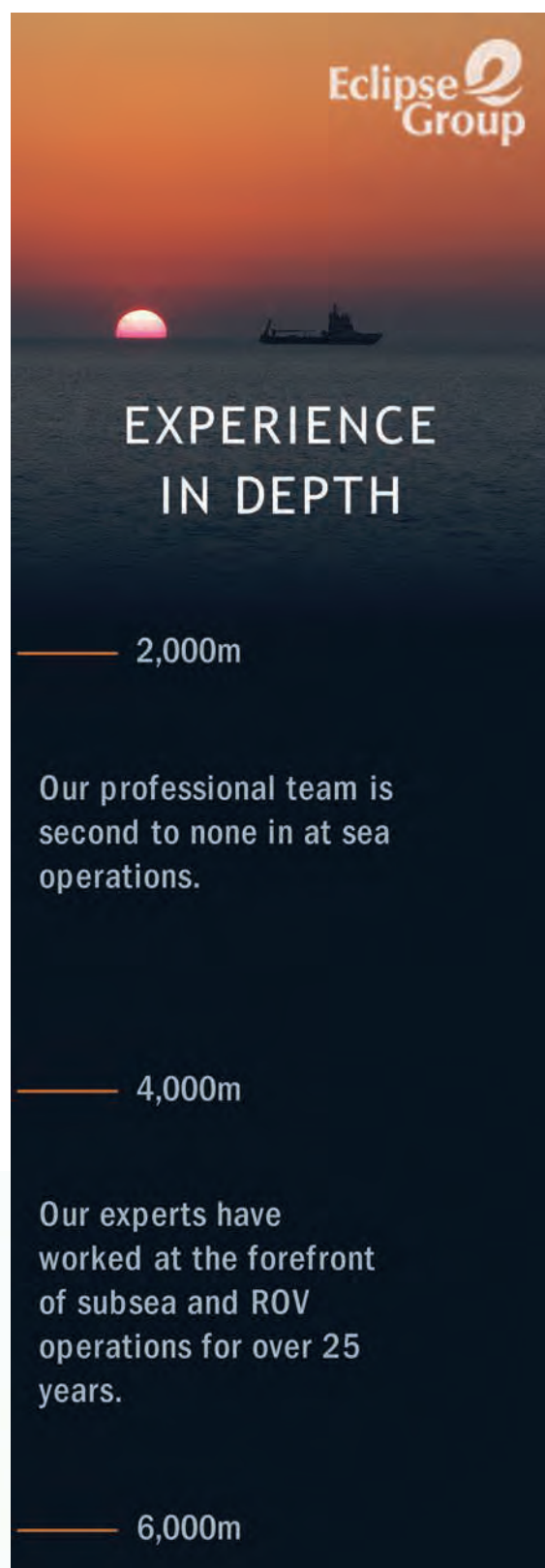
Expendable Bathythermograph (XBT)

Other Vessel Features

1 ea. WTP XBT Launcher  
1 ea. Surface Mounted 37.5 & 40 kHz Pinger Locator System  
1 ea. 5ft (1.5m) by 7ft (2.1m) Refrigerated / freezer, biological containment unit  
1 ea. Instrument Moon pool 42in (1.06m) diameter



## COMPREHENSIVE SERVICES



The graphic features a vertical gradient from orange at the top to dark blue at the bottom. At the top, the 'Eclipse Group' logo is displayed. Below it, a silhouette of a ship is on the horizon under a red sun. The text 'EXPERIENCE IN DEPTH' is centered. On the left, three horizontal lines mark depths of 2,000m, 4,000m, and 6,000m. Text blocks describe the company's expertise at these depths.

**Eclipse Group**

**EXPERIENCE  
IN DEPTH**

— 2,000m

Our professional team is second to none in at sea operations.

— 4,000m

Our experts have worked at the forefront of subsea and ROV operations for over 25 years.

— 6,000m

### Let us help you move forward

Eclipse Group strives to provide our clients with the highly qualified personnel and technical solutions.

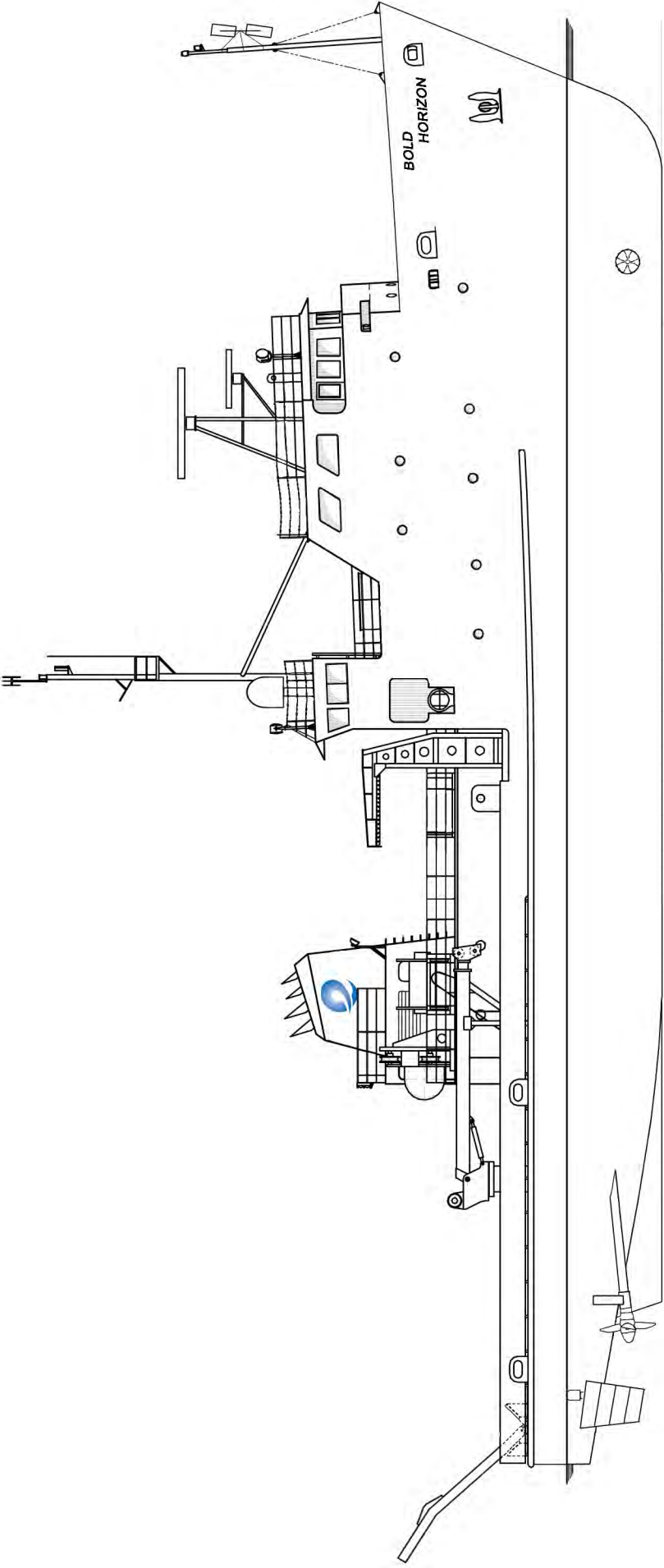
#### Our comprehensive service lines include:

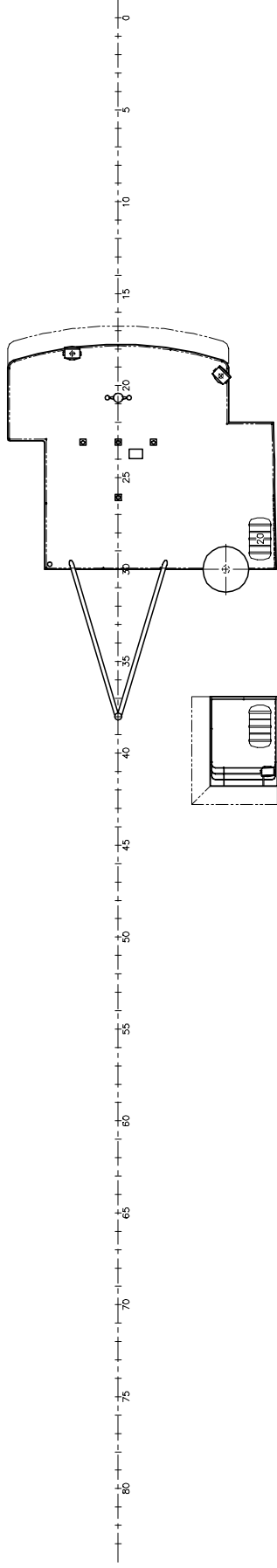
- Marine services
- Vessel operations and management
- Subsea services
  - ROV operations
  - Diving operations
- Government services
- Civil and military air crash investigation
- Construction and infrastructure
  - Survey
  - Cable and pipeline installation

Our mission is to become a leader in comprehensive subsea and ROV services worldwide. We welcome the opportunity to discuss our services with your organization.

Eclipse Group, Inc.  
1997 Annapolis Exchange Parkway, Suite 300  
Annapolis, MD 21401, USA  
Tel: +1 410 533 3041  
E-mail: [sales@eclipse.us.com](mailto:sales@eclipse.us.com)  
[www.eclipse.us.com](http://www.eclipse.us.com)

**In-depth. Worldwide. Solutions.**





M/V Bold Horizon  
03 Deck Plan  
6/7/99

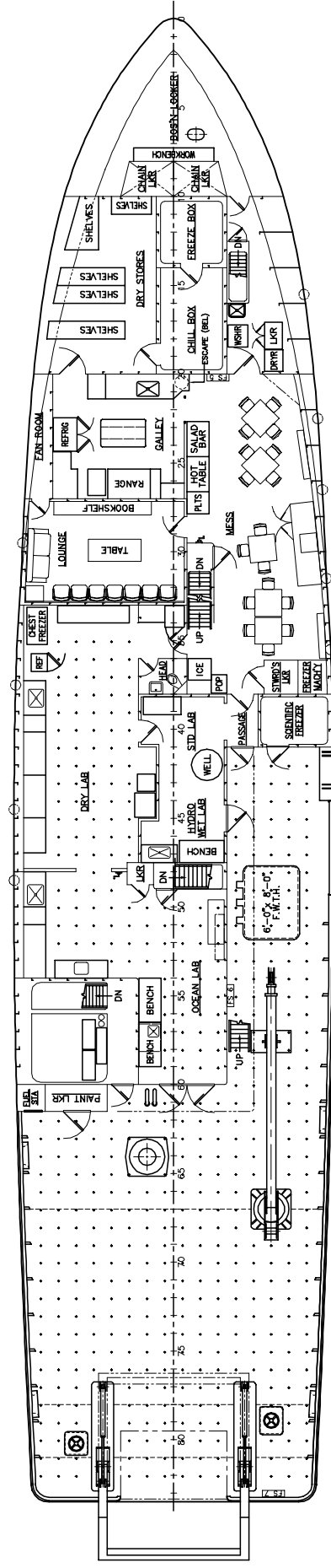
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80

CHART ROOM  
CHART TABLE  
DECK LKR  
RADAR ROOM  
PILOT HOUSE  
FLAG LKR  
COMM. CENTER  
PASSAGEWAY  
STORES  
REC. EQ.  
DECK LKR  
HATCH  
CYRO REFEATER P/S

Diagram of a ship's hull cross-section showing internal compartments. The main compartment is labeled "STACK". To its right is a smaller compartment labeled "HATCH". Below the "STACK" compartment is a compartment labeled "SHAFT LO TANK".

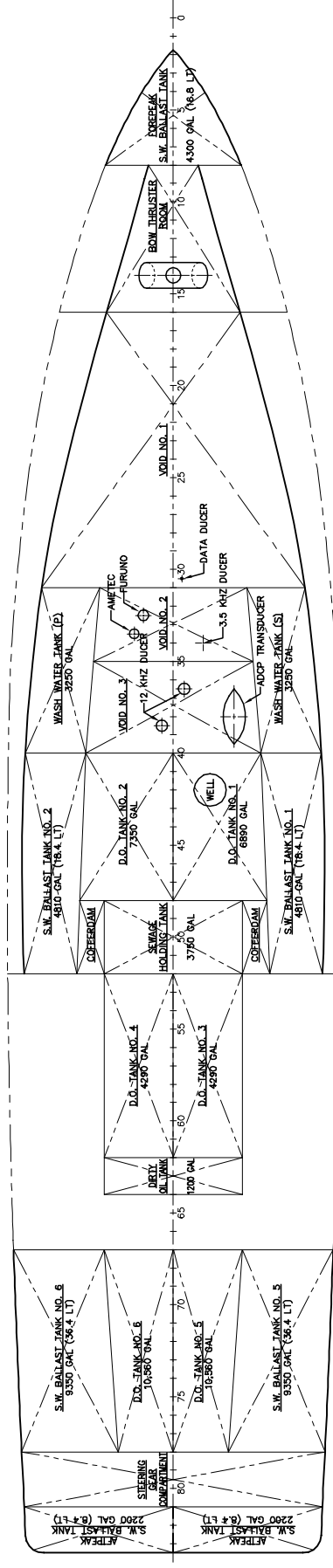


M/V Bold Horizon  
01 Deck Plan  
6/7/99

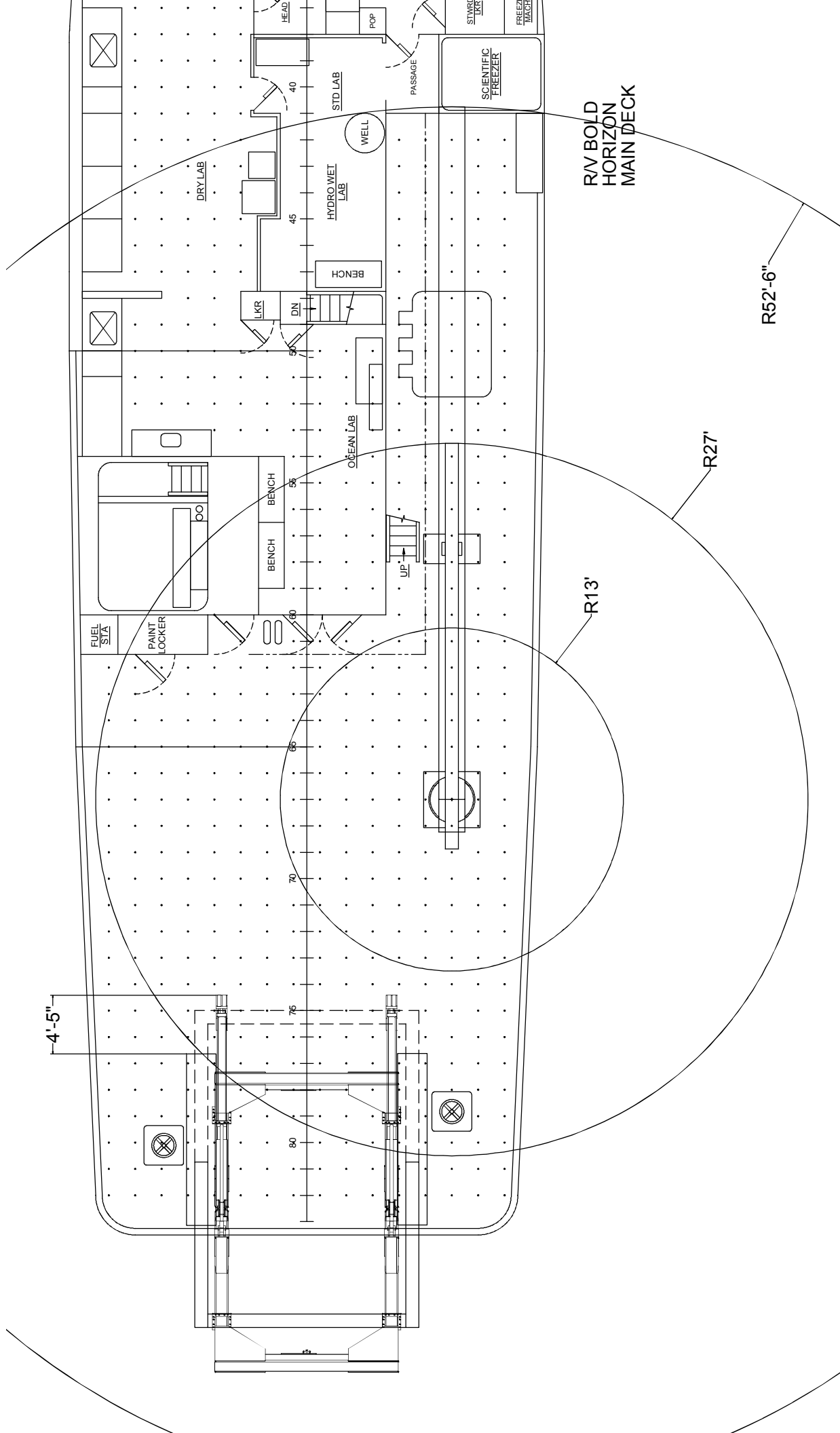


MV Bold Horizon  
Main Deck Plan  
6/7/99





M/V Bold Horizon  
Hold Plan  
6/7/99



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### APPENDICES III

### BOLD HORIZON GENERAL INFORMATION

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## APPENDICES IV GP-50 ROV SPECIFICATIONS

# GP-50 Work Class ROV

**The GP-50 ROV System** is a general purpose built ROV system which was designed by Eclipse Group to be cost effective, reliable, powerful and utilize industry standard tooling packages. The system operates as a 50 HP system with 25gpm flow whenever a smaller footprint system is required to mobilize onto a vessel of opportunity, or may run with twin electric motor pump configuration with a bigger umbilical, providing 50 hp / 40 gpm in order to utilize larger tooling packages.

## FEATURES

- **Rapid Shipment / Mobilization**
- **Vessel A-Frame or Crane Launched**
- **PLC Based Control System - Flexible Design**
- **4K UHD Camera Option**
- **Industry Standard Tooling Packages Available**
- **Science, salvage, or survey applications**



## SPECIFICATIONS

|                           |                   |
|---------------------------|-------------------|
| <b>Length</b>             | 138" / 3800mm     |
| <b>Width</b>              | 80" / 2000mm      |
| <b>Height</b>             | 80" / 2000mm      |
| <b>Weight in Air</b>      | 6600lbs / 3000kgs |
| <b>Depth Rating</b>       | 6,000 msw         |
| <b>Payload</b>            | 550lbs / 250kgs   |
| <b>Through Frame Lift</b> | 4000lbs / 1815kgs |

## PERFORMANCE / THRUSTER CONFIG

|                                |                               |
|--------------------------------|-------------------------------|
| <b>Hydraulic Power</b>         | 2 x 25 hp                     |
| <b>Forward / Aft / Lateral</b> | 1213lbft / 550kg              |
| <b>Vertical (up)</b>           | 728 lbft / 330kgs             |
| <b>Horizontal Vectored</b>     | 4 x 1002 Innerspace Thrusters |
| <b>Vertical (up)</b>           | 3 x 1002 Innerspace Thrusters |

## MANIPULATORS AND HYDRAULIC TOOLING

|                           |                                                         |
|---------------------------|---------------------------------------------------------|
| <b>Standard</b>           | 2 x Spatially Correspondent<br>Titan 4 Schilling Manips |
| <b>Standard</b>           | 1 x 3 Function Grabber                                  |
| <b>Tooling Supply</b>     | 0-10 gal/min @ up to 3200<br>PSI                        |
| <b>Reservoir Capacity</b> | 2.5 Gallons                                             |

## Umbilical

|                 |                                   |
|-----------------|-----------------------------------|
| <b>Standard</b> | Rochester .681 Armoured           |
| <b>Winch</b>    | Dynacon Direct Line Pull<br>Winch |

## VEHICLE CONTROL AND SENSOR PACKAGES

|                                     |                                                   |
|-------------------------------------|---------------------------------------------------|
| <b>Automatic Control</b>            | Auto Heading/depth/altitude<br>Cruise Control     |
| <b>Heading and Altitude Sensors</b> | Navigation Grade Gyro<br>Backup Flux Gate Compass |
| <b>Navigation</b>                   | Teledyne Workhorse DVL                            |
| <b>Depth Sensor</b>                 | Paroscientific 8CB                                |
| <b>Altitude</b>                     | Programmable Sonar Altimeter                      |
| <b>Sonar Systems</b>                | Super Sea King DF 330 / 675kHz                    |
| <b>Measurement</b>                  | Dual Red Laser                                    |

**Spare RS232/485, 10Based T, GigE and Optical Channels**

## CAMERA AND LIGHTING

|                          |                                                                              |
|--------------------------|------------------------------------------------------------------------------|
| <b>Primary Camera</b>    | DSP&L HD Zoom Camera                                                         |
| <b>Secondary Cameras</b> | DSPL Low Light SeaCam<br>DSP&L Super Wide-i SeaCam<br>DSP&L Low Light SeaCam |
| <b>Optional Camera</b>   | DSP&L Apex 4K UHD                                                            |
| <b>Lighting</b>          | 6 x DSP&L 10,000 Lumen LED                                                   |
| <b>Pan &amp; Tilt</b>    | 2 x Hydro-Lek Hyd Pan / Tilts<br>2 x Hydro-Lek Tilts                         |

Additional SD and HD Channels available through CWDM over Single Mode Fiber

|                      |                                                                |
|----------------------|----------------------------------------------------------------|
| <b>Miscellaneous</b> | Full Compliment of Topside, ROV,<br>and Handling System Spares |
|----------------------|----------------------------------------------------------------|

## LAUNCH AND RECOVERY OPTIONS

|                       |                          |
|-----------------------|--------------------------|
| <b>Vessel Crane</b>   | without docking head     |
| <b>Vessel A-Frame</b> | with or w/o docking head |

**Eclipse Supplied Options Available**

\*The specifications listed on this data sheet are subject to change without notice and cannot be used for contractual purposes. Up-to-date specifications will be supplied on request. All details without guarantee.



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**APPENDICES V**  
**DB SALSA VERDE SPECIFICATIONS & GAS**

## Fleet

# DB Salta Verde

## 185' ABS Load Lined Derrick Barge 2000 Tons

This 185' deck barge is the perfect solution to fulfill project cargo, heavy-lift, and module transportation requirements as they are needed.

### Specifications

**Length:** 185'

**Beam:** 50'

**Crane:** 240 Ton Manitowoc 4600 Series 3

#### Winch and Anchor System:

Clyde Frame 7 Five Drum 2000' of 1 1/8", (4) 4500 lbs HHP Flipper Deltas

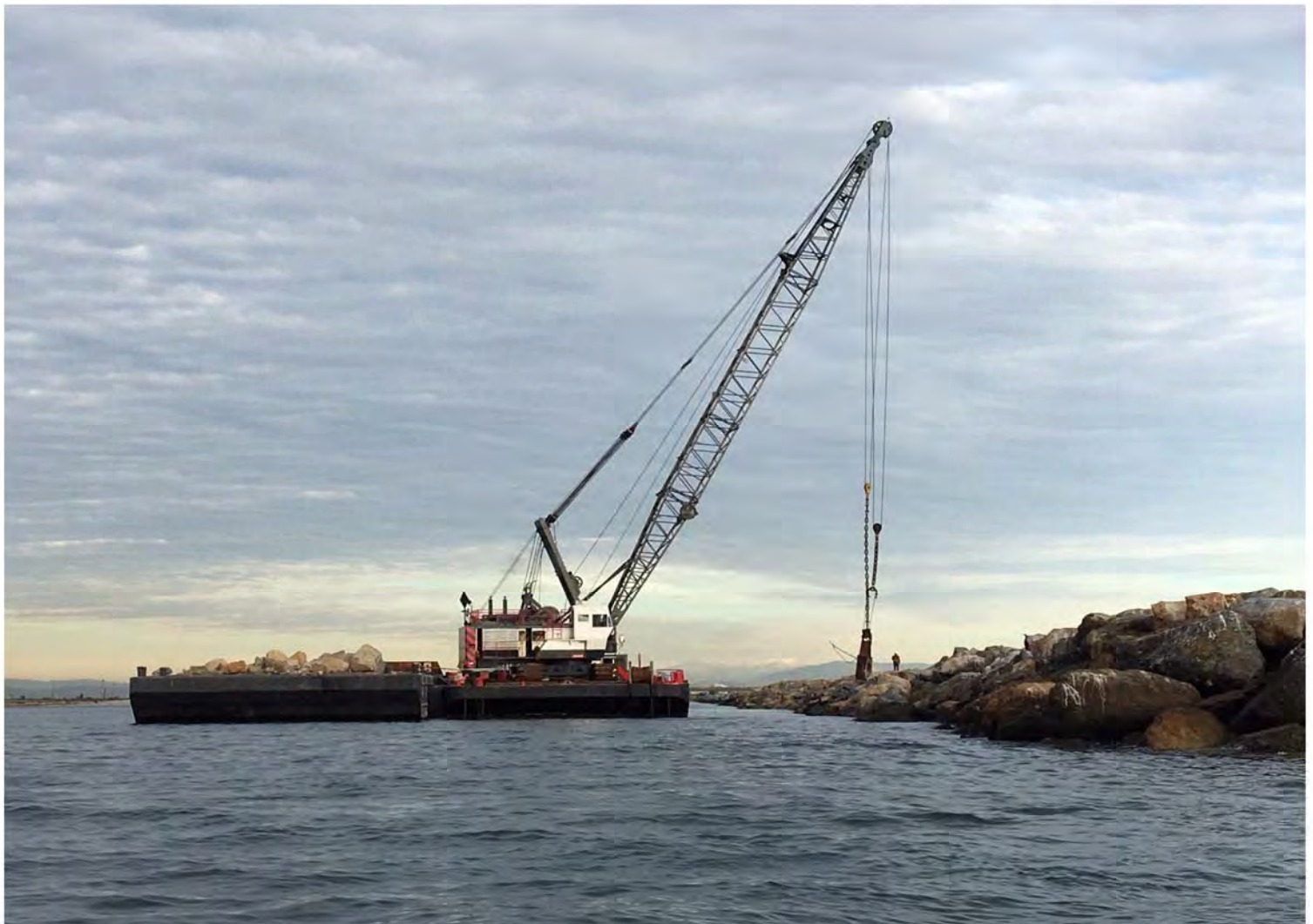
#### Accommodations:

5 state rooms  
Occupancy 10 men

**Head / Showers:** (2) heads, showers, and sinks

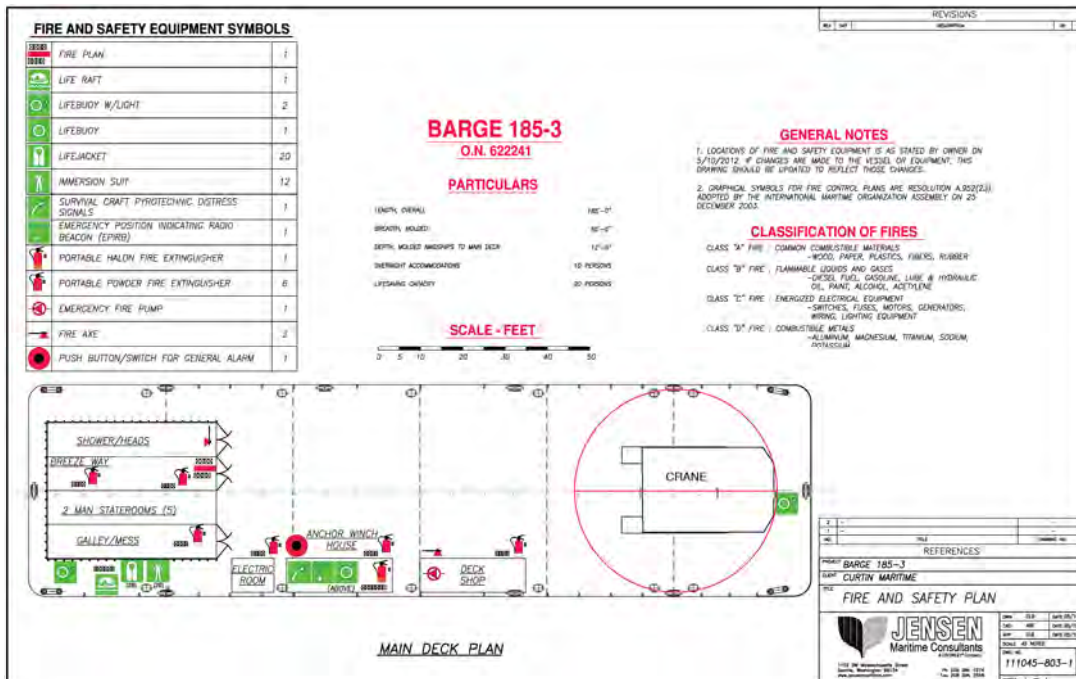
**Gensets:** Two(2) 150KW Tier III in Sound Attenuated Enclosures

**Electronics:** (2) VHF, 5 camera video, nobeltec positioning



# 185-3 ABS Load Lined Derrick Barge

## Deck Plans



**Mooring gear:** hose lock, chain lock, buoy roller, and fire monitor, 300,000 lb rated overboard roller

**Fuel tank and transfer:** 3000 gall with 35 gpm pump with meter

**Hyd Pac:** 20 GPM 2500 PSID

**Air Compressor:** 300 CFM 140 psi 75hp Ingersoll Rand

**Draft:** 9.5 ft to load line

**Draft:** 1.5 ft light

**GRT:** 869

**NRT:** 260

## Specifications

**Official Number:** 613867

**Hull Built:** 1979, Kaiser Steel

**Rebuilt:** 2008, CMC

**Depth:** 12'

**Control House:** Pilot Hose, Wabco single lever air control

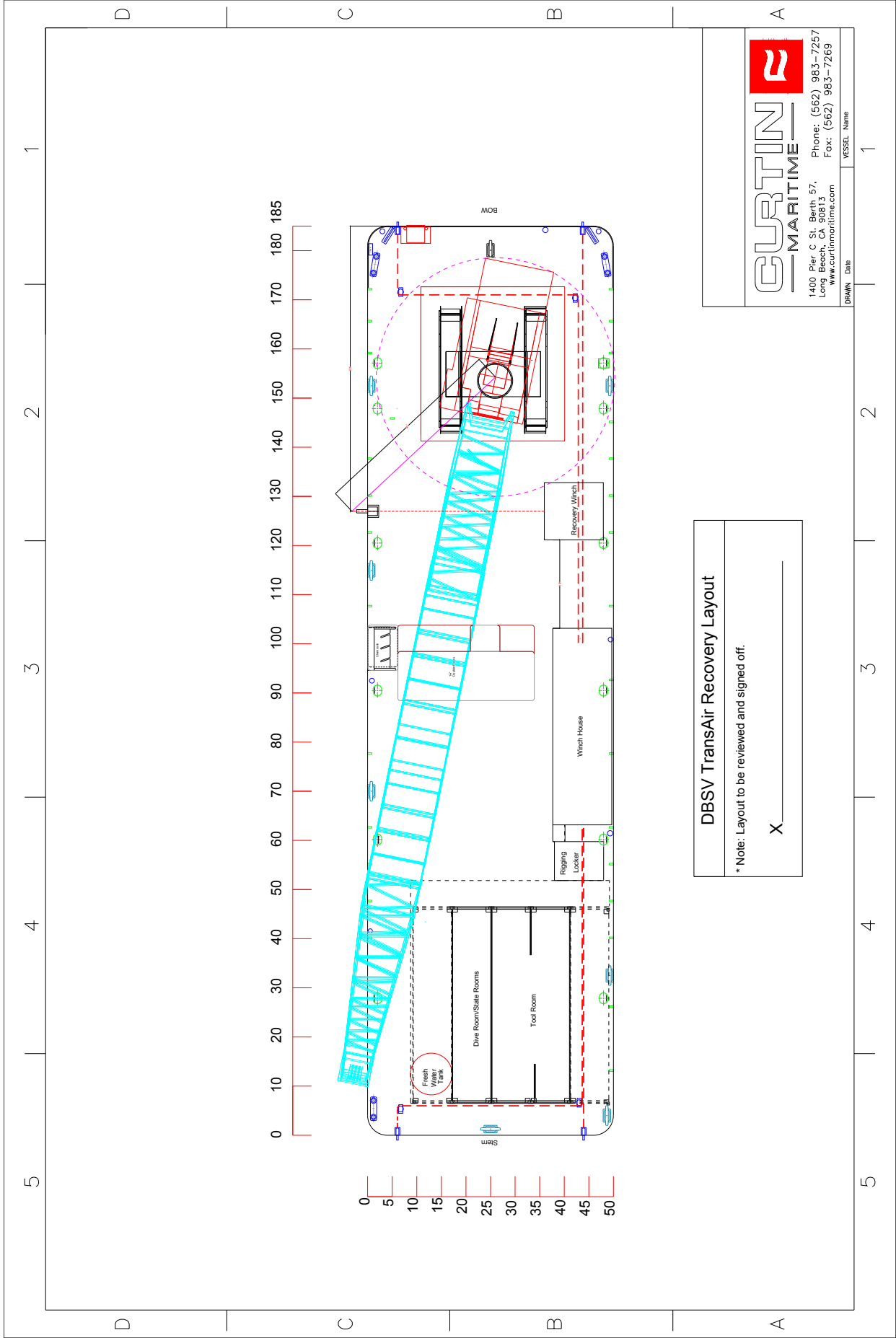
**Galley/Dinner:** with cook

**Welder:** (2) miller XMT 350

**Burning Rig:** (2) victor journeymen

**Deck shop and storage:** 25 x 10 with roll up doors with full tools





# Manfred: Maniwoc 4600 Series III

## Specifications

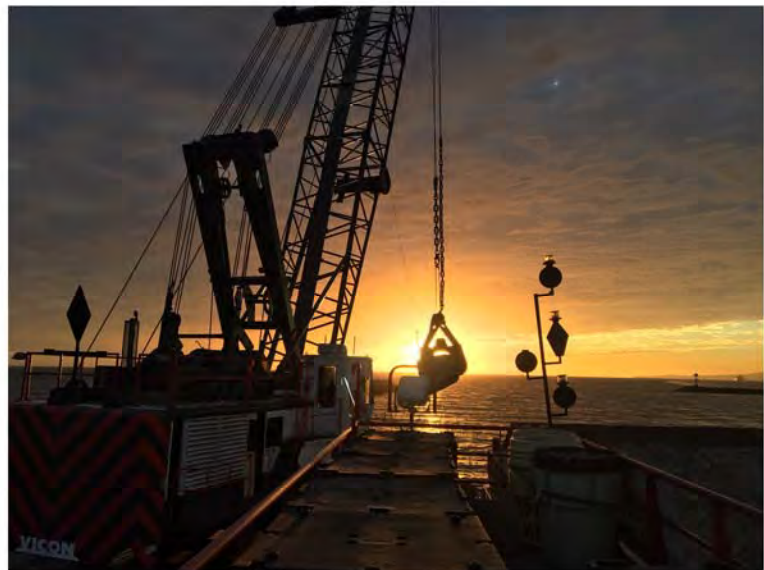
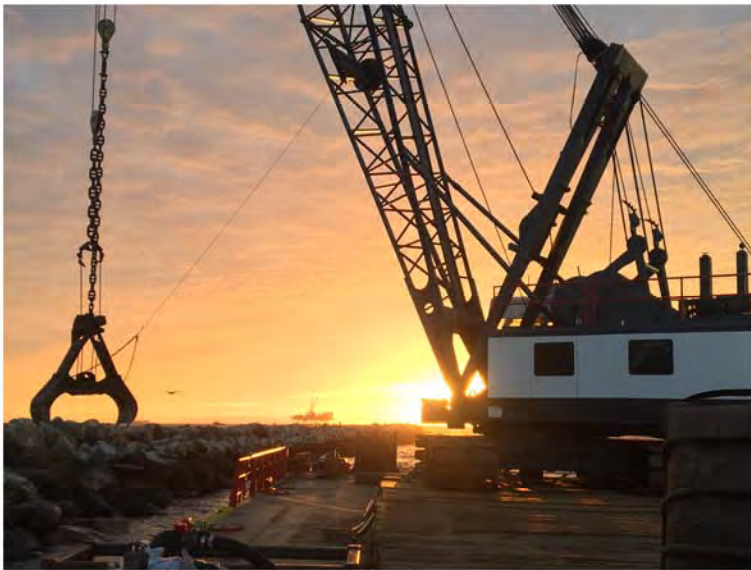
Distance from Deck to Boom Heel: 8'  
Boom Length to Main Drum: 143"  
Boom Main Drum to Aux. Drum: 8'

## DRAW WORKS MAIN DRUMS:

Front Drum: 55,000 lbs SLP  
Rear Drum: 56,000 lbs SLP

**Engines:** Detroit Diesel 8V-71 318HP  
Detroit Diesel 8V-71 318HP

**Torque Converters:** Vicon Torque Converter 11,000 Series  
Vicon Torque Converter 10,000 Series





# INTERNATIONAL LOAD LINE CERTIFICATE

Issued under the provisions of  
the International Convention on Load Lines, 1966,  
as modified by the Protocol of 1988 relating thereto  
under the authority of the Government of

United States of America  
Commandant, U.S. Coast Guard

by American Bureau of Shipping

Particulars of Ship

| Name of Ship     |                                      | Distinctive Number or Letters |  |
|------------------|--------------------------------------|-------------------------------|--|
| DB SALTA VERDE   |                                      | 622241                        |  |
| Port of Registry | Length(L) as defined in Article 2(8) | IMO Number <sup>1</sup>       |  |
| Long Beach, CA   | 177 Feet 7-3/16 Inches               | N/A                           |  |

Freeboard Assigned as: New

Type of Ship: Type B

Freeboard from Deck Line:

Load Line

|                              |                      |        |                                           |            |
|------------------------------|----------------------|--------|-------------------------------------------|------------|
| Tropical                     | 4 Feet 7-3/4 Inches  | (T)    | 1-13/16 Inches                            | above (S)  |
| Summer                       | 4 Feet 9-9/16 Inches | (S)    | Upper edge of line through center of ring |            |
| Winter                       | 4 Feet 11-3/8 Inches | (W)    | 1-13/16 Inches                            | below (S)  |
| Winter North Atlantic        | 5 Feet 1-3/8 Inches  | (WNA)  | 3-13/16 Inches                            | below (S)  |
| Timber Tropical              | N/A                  | (LT)   | N/A                                       | above (LS) |
| Timber Summer                | N/A                  | (LS)   | N/A                                       | above (S)  |
| Timber Winter                | N/A                  | (LW)   | N/A                                       | below (LS) |
| Timber Winter North Atlantic | N/A                  | (LWNA) | N/A                                       | below (LS) |

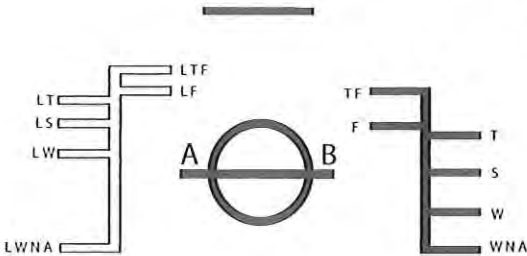
Allowance for fresh water for all freeboards other than timber: 1/8 Inches

For timber freeboards: N/A

The upper edge of the deck line from which these freeboards are measured is:

Opposite The Top of Upper Steel

deck at side.



?This certificate is valid as long as the operating restrictions in the barge's Stability Letter, issued by ABS and dated 3 October 2019, are observed.?

<sup>1</sup> In accordance with the IMO Ship Identification Number Scheme, adopted by resolution A.600(15).

**THIS IS TO CERTIFY:**

1. That the ship has been surveyed in accordance with the requirements of article 14 of the Convention.
2. That the survey showed that the freeboards have been assigned and load lines shown above have been marked in accordance with the Convention.

This certificate is valid until 31 May 2026<sup>2</sup>

Subject to the annual surveys in accordance with article 14(1)(c) of the Convention.

Completion date of the survey on which this certificate is based: 30 July 2021

Issued at Los Angeles, United States on 30 July 2021  
 (Place of issue of certificate)

Electronically Signed By  
Ulrich, Bradley W, Los Angeles Port  
 (Surveyor, American Bureau of Shipping)

**NOTES:**

1. When a ship departs from a port situated on a river or inland waters, deeper loading shall be permitted corresponding to the weight of fuel and all other materials required for consumption between the point of departure and the sea.
2. When a ship is in fresh water of unit density the appropriate load line may be submerged by the amount of fresh water allowance shown above. Where the density is other than unity, an allowance shall be made proportional to the difference between 1.025 and the actual density.
3. It is the owner's responsibility to furnish the master with approved information and instructions for loading and ballasting this vessel to provide guidance as to stability of the vessel under varying conditions of service and to avoid unacceptable stresses in the vessel's structure, as defined in 46 CFR 42.09-1.
4. The Winter North Atlantic Load Line applies only to vessels of 328 ft. in length or less, which enter any part of the North Atlantic Ocean during the winter months as defined by the Load Line Regulations in 46 CFR 42.30-5 and 42.30-35. The periods during which the other seasonal load lines apply in different parts of the world are stated in the Load Line Regulations 46 CFR 42.30-5 to 42.30-30, inclusive.
5. This Load Line Certificate will be cancelled by the Commandant, U. S. Coast Guard, if...
  - a) The annual surveys have not been carried out within three months either way of each anniversary date of the certificate.
  - b) The certificate is not endorsed to show that the ship has been surveyed as indicated in (a).
  - c) Material alterations have been made to the hull or superstructures such as would necessitate the assignment of an increased freeboard.
  - d) The fittings and appliance for the protection of the openings, guardrails, freeing ports, or the means of access to the crew's quarters have not been in as effective a condition as they were when the Certificate was issued.
  - e) The structural strength of the ship is lowered to such an extent that the ship is unsafe.
6. When this Certificate has expired or been cancelled, it must be delivered to the Assigning Authority.



<sup>2</sup> Insert the date of expiry as specified by the Administration in accordance with article 19(1) of the Convention. The day and the month of this date correspond to the anniversary date as defined in article 2(9) of the Convention, unless amended in accordance with article 19(8) of the Convention.

**ENDORSEMENT FOR ANNUAL SURVEYS**

**THIS IS TO CERTIFY** that, at an annual survey required by article 14(1)(c) of the Convention, the ship was found to comply with the relevant requirements of the Convention.

Annual Survey:

Signed:

*(Surveyor, American Bureau of Shipping)*

Place:

Date:

Annual Survey:

Signed:

*(Surveyor, American Bureau of Shipping)*

Place:

Date:

Annual Survey:

Signed:

*(Surveyor, American Bureau of Shipping)*

Place:

Date:

Annual Survey:

Signed:

*(Surveyor, American Bureau of Shipping)*

Place:

Date:

**ANNUAL SURVEY IN ACCORDANCE WITH ARTICLE 19(8)(c)**

**THIS IS TO CERTIFY** that, at a survey in accordance with article 19(8)(c) of the Convention, the ship was found to comply with the relevant requirements of the Convention.

Signed:

*(Surveyor, American Bureau of Shipping)*

Place:

Date:

**ENDORSEMENT TO EXTEND THE CERTIFICATE IF VALID FOR  
LESS THAN 5 YEARS WHERE ARTICLE 19(3) APPLIES**

The ship complies with the relevant requirements of the Convention, and this certificate shall, in accordance with article 19(3) of the Convention, be accepted as valid until \_\_\_\_\_



Signed:

*(Surveyor, American Bureau of Shipping)*

Place:

Date:

### ENDORSEMENT WHERE THE RENEWAL SURVEY HAS BEEN COMPLETED AND ARTICLE 19(4) APPLIES

The ship complies with the relevant requirements of the Convention, and this certificate shall, in accordance with article 19(4) of the Convention, be accepted as valid until \_\_\_\_\_

Signed: \_\_\_\_\_

(Surveyor, American Bureau of Shipping)

Place: \_\_\_\_\_

Date: \_\_\_\_\_

### ENDORSEMENT TO EXTEND THE VALIDITY OF THE CERTIFICATE UNTIL REACHING THE PORT OF SURVEY OR FOR A PERIOD OF GRACE WHERE ARTICLE 19(5) OR 19(6) APPLIES

This certificate shall, in accordance with article 19(5)/19(6)<sup>3</sup> of the Convention, be accepted as valid until \_\_\_\_\_

Signed: \_\_\_\_\_

(Surveyor, American Bureau of Shipping)

Place: \_\_\_\_\_

Date: \_\_\_\_\_

### ENDORSEMENT FOR ADVANCEMENT OF ANNIVERSARY DATE WHERE ARTICLE 19(8) APPLIES

In accordance with article 19(8) of the Convention, the new anniversary date is \_\_\_\_\_

Signed: \_\_\_\_\_

(Surveyor, American Bureau of Shipping)

Place: \_\_\_\_\_

Date: \_\_\_\_\_

In accordance with article 19(8) of the Convention, the new anniversary date is \_\_\_\_\_

Signed: \_\_\_\_\_

(Surveyor, American Bureau of Shipping)

Place: \_\_\_\_\_

Date: \_\_\_\_\_





United States of America  
Department of Homeland Security  
United States Coast Guard

Certification Date: 24 May 2017

Expiration Date: 24 May 2022

# Certificate of Inspection

For ships on international voyages this certificate fulfills the requirements of SOLAS 74 as amended, regulation V/14, for a SAFE MANNING DOCUMENT;

|                                                                                                                                                                                                                                                                                                                                  |                                                                                                  |                              |                   |                                      |     |                    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|------------------------------|-------------------|--------------------------------------|-----|--------------------|
| Vessel Name                                                                                                                                                                                                                                                                                                                      | Official Number                                                                                  | IMO Number                   | Call Sign         | Service                              |     |                    |
| DB SALTA VERDE                                                                                                                                                                                                                                                                                                                   | 622241                                                                                           |                              | WDF9705           | Industrial Vessel                    |     |                    |
| Hailing Port                                                                                                                                                                                                                                                                                                                     | Hull Material                                                                                    | Horsepower                   | Propulsion        |                                      |     |                    |
| LONG BEACH, CA                                                                                                                                                                                                                                                                                                                   | Steel                                                                                            |                              |                   |                                      |     |                    |
| UNITED STATES                                                                                                                                                                                                                                                                                                                    |                                                                                                  |                              |                   |                                      |     |                    |
| Place Built                                                                                                                                                                                                                                                                                                                      | Delivery Date                                                                                    | Keel Laid Date               | Gross Tons        | Net Tons                             | DWT | Length             |
| NAPA, CA                                                                                                                                                                                                                                                                                                                         | 17Mar1980                                                                                        |                              | R-<br>1-869       | R-<br>1-260                          |     | R-177.6<br>1-177.6 |
| UNITED STATES                                                                                                                                                                                                                                                                                                                    |                                                                                                  |                              |                   |                                      |     |                    |
| Owner                                                                                                                                                                                                                                                                                                                            | Operator                                                                                         |                              |                   |                                      |     |                    |
| CURTIN MARITIME CORP<br>1500 PIER C ST BERTH 57PO BOX 2531<br>LONG BEACH, CA 90801<br>UNITED STATES                                                                                                                                                                                                                              | CURTIN MARITIME CORP<br>1400 PIER C BERTH 57PO BOX 2531<br>LONG BEACH, CA 90801<br>UNITED STATES |                              |                   |                                      |     |                    |
| This vessel must be manned with the following licensed and unlicensed Personnel. Included in which there must be 1 Certified Lifeboatmen, 0 Certified Tankermen, 0 HSC Type Rating, and 0 GMDSS Operators.                                                                                                                       |                                                                                                  |                              |                   |                                      |     |                    |
| 0 Masters                                                                                                                                                                                                                                                                                                                        | 0 Licensed Mates                                                                                 | 0 Chief Engineers            | 0 Oilers          |                                      |     |                    |
| 0 Chief Mates                                                                                                                                                                                                                                                                                                                    | 0 First Class Pilots                                                                             | 0 First Assistant Engineers  | 1 Able Seaman/PIC |                                      |     |                    |
| 0 Second Mates                                                                                                                                                                                                                                                                                                                   | 0 Radio Officers                                                                                 | 0 Second Assistant Engineers |                   |                                      |     |                    |
| 0 Third Mates                                                                                                                                                                                                                                                                                                                    | 0 Able Seamen                                                                                    | 0 Third Assistant Engineers  |                   |                                      |     |                    |
| 0 Master First Class Pilot                                                                                                                                                                                                                                                                                                       | 0 Ordinary Seamen                                                                                | 0 Licensed Engineers         |                   |                                      |     |                    |
| 0 Mate First Class Pilots                                                                                                                                                                                                                                                                                                        | 0 Deckhands                                                                                      | 0 Qualified Member Engineer  |                   |                                      |     |                    |
| In addition, this vessel may carry 0 Passengers, 0 Other Persons in crew, 0 Persons in addition to crew, and 19 Industrial Workers. Total Persons allowed: 20                                                                                                                                                                    |                                                                                                  |                              |                   |                                      |     |                    |
| Route Permitted And Conditions Of Operation:<br>---Oceans---                                                                                                                                                                                                                                                                     |                                                                                                  |                              |                   |                                      |     |                    |
| MANNED BARGE WITH OVERNIGHT ACCOMMODATIONS FOR 12 INDUSTRIAL PERSONNEL. THE ABLE SEAMAN/PERSON IN CHARGE (PIC) IS ONLY REQUIRED WHEN THE VESSEL IS MANNED. BARGE IS NOT AUTHORIZED TO CARRY 12 OR MORE PERSONNEL ONBOARD FOR VOYAGES OF MORE THAN 3 DAYS DURATION BETWEEN PORTS, AS BARGE IS NOT EQUIPPED WITH A HOSPITAL SPACE. |                                                                                                  |                              |                   |                                      |     |                    |
| AN ATTENDING VESSEL CAPABLE OF CARRYING ALL PERSONS ON THE BARGE MUST BE PRESENT WHEN BARGE IS AWAY FROM THE DOCK, AND PERSONNEL ARE ON BOARD.                                                                                                                                                                                   |                                                                                                  |                              |                   |                                      |     |                    |
| ***SEE NEXT PAGE FOR ADDITIONAL CERTIFICATE INFORMATION***                                                                                                                                                                                                                                                                       |                                                                                                  |                              |                   |                                      |     |                    |
| With this Inspection for Certification having been completed at Long Beach, CA, UNITED STATES, the Officer in Charge, Marine Inspection, Los Angeles - Long Beach certified the vessel, in all respects, is in conformity with the applicable vessel inspection laws and the rules and regulations prescribed thereunder.        |                                                                                                  |                              |                   |                                      |     |                    |
| Annual/Periodic/Re-Inspection                                                                                                                                                                                                                                                                                                    |                                                                                                  |                              |                   | This Ar                              |     |                    |
| Date                                                                                                                                                                                                                                                                                                                             | Zone                                                                                             | A/P/R                        | Signature         | G, (By direction)                    |     |                    |
| 24May2018                                                                                                                                                                                                                                                                                                                        | SEC LA/LB                                                                                        | A                            | PUMA JASON        | Officer in Charge, Marine Inspection |     |                    |
| 13Aug2019                                                                                                                                                                                                                                                                                                                        | SEC LA/LB                                                                                        | A                            | DELORME GARY      | SECTOR SAN DIEGO                     |     |                    |
| 14Jul2020                                                                                                                                                                                                                                                                                                                        | SEC LA/LB                                                                                        | A                            | DIX JAMES         | Inspection Zone                      |     |                    |
| 23Aug2021                                                                                                                                                                                                                                                                                                                        | SEC LA-LB                                                                                        | A                            |                   |                                      |     |                    |



United States of America  
Department of Homeland Security  
United States Coast Guard

Certification Date: 24 May 2017  
Expiration Date: 24 May 2022

# Certificate of Inspection

Vessel Name: DB SALTA VERDE

\*  
IMMERSION SUITS ARE NOT REQUIRED WHEN OPERATING BETWEEN 32 DEGREES NORTH LATITUDE AND 32 DEGREES SOUTH LATITUDE.

THE DECK CRANE SHALL BE IN THE STOWED POSITION WHEN THE BARGE IS UNDERWAY.

## ---Hull Exams---

| Exam Type          | Next Exam | Last Exam | Prior Exam |
|--------------------|-----------|-----------|------------|
| DryDock            | 31Jul2023 | 06Jul2021 | 20May2019  |
| Internal Structure | 31Jul2023 | 06Jul2021 | 20May2019  |

## ---Stability---

| Type   | Issued Date | Office |
|--------|-------------|--------|
| Book   | 09May2012   | ABS    |
| Letter | 09May2012   | ABS    |

## --- Liquid/Gas/Solid Cargo Authority/Conditions ---

Authorization:

| Total Capacity | Units | Highest Grade Type | Part151 Regulated | Part153 Regulated | Part154 Regulated |
|----------------|-------|--------------------|-------------------|-------------------|-------------------|
|                |       |                    | No                | No                | No                |

## \*Hazardous Bulk Solids Authority\*

Not Authorized

## \*Conditions Of Carriage\*

## ---Lifesaving Equipment---

Total Equipment for 20 Persons

| Primary Lifesaving Equipment       | Quantity | Capacity | Required                   |
|------------------------------------|----------|----------|----------------------------|
| Lifeboats (Total)                  | 0        | 0        | Life Preservers (Adult) 20 |
| Lifeboats (Port)                   | 0        | 0        | Life Preservers (Child) 0  |
| Lifeboats (Starboard)              | 0        | 0        | Ring Buoys (Total) 3       |
| Motor Lifeboats                    | 0        | 0        | With Lights 1              |
| Lifeboats With Radio               | 0        | 0        | With Line Attached 1       |
| Rescue Boats/Platforms             | 0        | 0        | Other 1                    |
| Inflatable Rafts                   | 1        | 20       | Immersion Suits 20         |
| Life Floats/Buoyant App            | 0        | 0        | Portable Lifeboat Radios 0 |
| Inflatable Buoyant Apparatus (IBA) | 0        | 0        | Equipped With EPIRB? YES   |

## --- Fire Fighting Equipment ---

### \*Fire Extinguishers - Hand portable and semi-portable\*

| Quantity | Class Type |
|----------|------------|
| 1        | 10-B:C     |
| 2        | 2-A        |



United States of America  
Department of Homeland Security  
United States Coast Guard

Certification Date: 24 May 2017

Expiration Date: 24 May 2022

# *Certificate of Inspection*

Vessel Name: DB SALTA VERDE

4

40-B:C

## ---Certificate Amendments---

| Amending Unit    | Amendment Date | Amendment Remark                                                     |
|------------------|----------------|----------------------------------------------------------------------|
| Sector San Diego | 06Jul2021      | Amended COI to reflect credit for Hull and Internal Structural Exam. |

\*\*\*END\*\*\*

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## APPENDICES VI

### WINCH & CRANE SPECIFICATIONS & LOAD CHARTS

# MANITOWOC ENGINEERING CO.

Division of The Manitowoc Company, Inc. Manitowoc, Wisconsin 54220



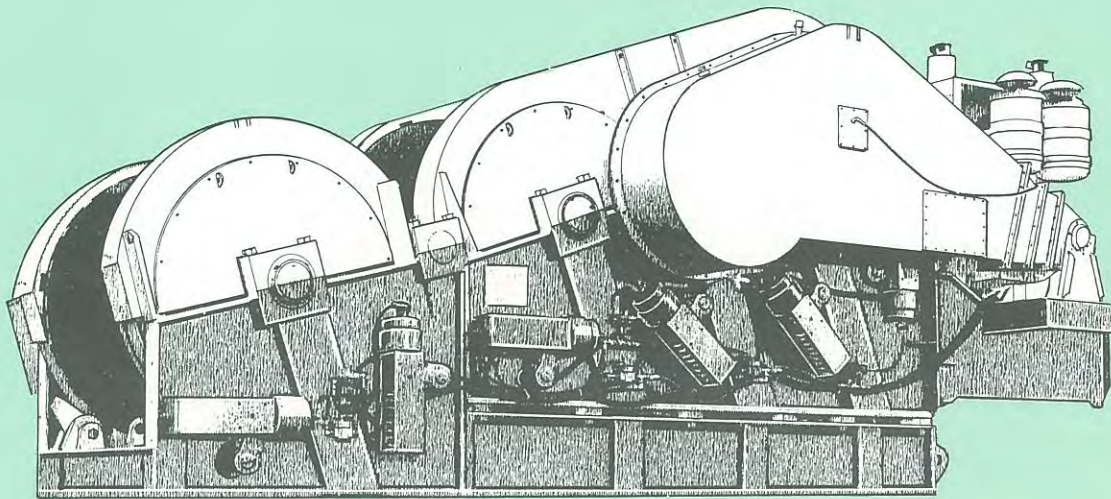
## LIFT CRANE CAPACITIES

4600

BOOM NO. 7 WITH OPEN THROAT TOP  
WITH VICON INDEPENDENT BOOM HOIST  
112,000 LB. COUNTERWEIGHT  
CRAWLER MACHINE ON A BARGE  
0 DEGREE THRU 3 DEGREE MACHINE LIST  
NO TRAVEL - 360 DEGREE RATING  
SERIAL NO. 46134

| BOOM<br>LGTH.<br>FEET | OPER.<br>RAD.<br>FEET | BOOM<br>ANG.<br>DEG. | BOOM<br>POINT<br>ELEV.<br>FEET | CAPACITY<br>0 DEGREE<br>LIST<br>POUNDS | CAPACITY<br>1 DEGREE<br>LIST<br>POUNDS | CAPACITY<br>2 DEGREE<br>LIST<br>POUNDS | CAPACITY<br>3 DEGREE<br>LIST<br>POUNDS |
|-----------------------|-----------------------|----------------------|--------------------------------|----------------------------------------|----------------------------------------|----------------------------------------|----------------------------------------|
| 130                   | 26                    | 81.2                 | 136.3                          | 270,400                                |                                        |                                        |                                        |
|                       | 27                    | 80.8                 | 136.1                          | 255,100                                |                                        |                                        |                                        |
|                       | 28                    | 80.3                 | 136.0                          | 241,300                                | 211,800                                |                                        |                                        |
|                       | 29                    | 79.9                 | 135.8                          | 228,800                                | 201,900                                |                                        |                                        |
|                       | 30                    | 79.4                 | 135.6                          | 217,600                                | 192,900                                | 172,700                                |                                        |
|                       | 32                    | 78.5                 | 135.2                          | 197,900                                | 177,000                                | 159,600                                | 144,900                                |
|                       | 34                    | 77.6                 | 134.8                          | 181,300                                | 163,300                                | 148,200                                | 135,200                                |
|                       | 36                    | 76.7                 | 134.3                          | 167,100                                | 151,500                                | 138,200                                | 126,700                                |
|                       | 38                    | 75.8                 | 133.8                          | 154,800                                | 141,200                                | 129,400                                | 119,100                                |
|                       | 40                    | 74.9                 | 133.3                          | 144,100                                | 132,100                                | 121,500                                | 112,300                                |
|                       | 45                    | 72.6                 | 131.9                          | 122,500                                | 113,300                                | 105,200                                | 98,000                                 |
|                       | 50                    | 70.3                 | 130.2                          | 106,000                                | 98,900                                 | 92,500                                 | 86,600                                 |
|                       | 55                    | 67.9                 | 128.3                          | 93,200                                 | 87,400                                 | 82,200                                 | 77,400                                 |
|                       | 60                    | 65.5                 | 126.1                          | 82,800                                 | 78,100                                 | 73,700                                 | 69,700                                 |
|                       | 65                    | 63.1                 | 123.7                          | 74,200                                 | 70,300                                 | 66,600                                 | 63,200                                 |
|                       | 70                    | 60.6                 | 121.1                          | 67,100                                 | 63,700                                 | 60,600                                 | 57,700                                 |
|                       | 75                    | 58.0                 | 118.1                          | 61,000                                 | 58,100                                 | 55,500                                 | 53,000                                 |
|                       | 80                    | 55.4                 | 114.8                          | 55,800                                 | 53,300                                 | 51,000                                 | 48,800                                 |
|                       | 85                    | 52.7                 | 111.2                          | 51,200                                 | 49,100                                 | 47,100                                 | 45,100                                 |
|                       | 90                    | 49.8                 | 107.2                          | 47,200                                 | 45,400                                 | 43,600                                 | 41,900                                 |
|                       | 95                    | 46.9                 | 102.7                          | 43,700                                 | 42,100                                 | 40,500                                 | 39,000                                 |
|                       | 100                   | 43.8                 | 97.8                           | 40,500                                 | 39,100                                 | 37,700                                 | 36,400                                 |
|                       | 105                   | 40.5                 | 92.3                           | 37,700                                 | 36,500                                 | 35,300                                 | 34,100                                 |
|                       | 110                   | 37.0                 | 86.0                           | 35,200                                 | 34,100                                 | 33,000                                 | 32,000                                 |
|                       | 115                   | 33.2                 | 78.9                           | 32,900                                 | 31,900                                 | 31,000                                 | 30,100                                 |
| 140                   | 120                   | 28.9                 | 70.6                           | 30,800                                 | 29,900                                 | 29,100                                 | 28,300                                 |
|                       | 125                   | 23.9                 | 60.5                           | 28,900                                 | 28,200                                 | 27,400                                 | 26,700                                 |
|                       | 130                   | 17.7                 | 47.4                           | 27,100                                 | 26,500                                 | 25,900                                 | 25,300                                 |
|                       | 27                    | 81.4                 | 146.2                          | 254,600                                |                                        |                                        |                                        |
|                       | 28                    | 81.0                 | 146.1                          | 240,800                                |                                        |                                        |                                        |
|                       | 29                    | 80.6                 | 145.9                          | 228,400                                |                                        |                                        |                                        |
|                       | 30                    | 80.2                 | 145.8                          | 217,100                                | 190,900                                |                                        |                                        |
|                       | 32                    | 79.4                 | 145.4                          | 197,400                                | 175,200                                | 156,900                                |                                        |
|                       | 34                    | 78.5                 | 145.0                          | 180,800                                | 161,700                                | 145,800                                | 132,300                                |
|                       | 36                    | 77.7                 | 144.6                          | 166,600                                | 150,000                                | 136,000                                | 124,100                                |
|                       | 38                    | 76.9                 | 144.1                          | 154,300                                | 139,800                                | 127,400                                | 116,700                                |
|                       | 40                    | 76.0                 | 143.7                          | 143,600                                | 130,800                                | 119,700                                | 110,000                                |
|                       | 45                    | 73.9                 | 142.3                          | 122,000                                | 112,200                                | 103,700                                | 96,100                                 |
|                       | 50                    | 71.8                 | 140.8                          | 105,500                                | 97,900                                 | 91,100                                 | 85,000                                 |
|                       | 55                    | 69.6                 | 139.0                          | 92,600                                 | 86,500                                 | 81,000                                 | 75,900                                 |
|                       | 60                    | 67.4                 | 137.0                          | 82,300                                 | 77,200                                 | 72,600                                 | 68,400                                 |
|                       | 65                    | 65.2                 | 134.8                          | 73,700                                 | 69,500                                 | 65,600                                 | 62,000                                 |
|                       | 70                    | 62.9                 | 132.4                          | 66,500                                 | 63,000                                 | 59,700                                 | 56,600                                 |
|                       | 75                    | 60.5                 | 129.7                          | 60,500                                 | 57,400                                 | 54,600                                 | 51,900                                 |
|                       | 80                    | 58.2                 | 126.8                          | 55,200                                 | 52,600                                 | 50,100                                 | 47,800                                 |
|                       | 85                    | 55.7                 | 123.5                          | 50,700                                 | 48,400                                 | 46,200                                 | 44,200                                 |
|                       | 90                    | 53.2                 | 119.9                          | 46,700                                 | 44,700                                 | 42,800                                 | 40,900                                 |
|                       | 95                    | 50.6                 | 116.0                          | 43,200                                 | 41,400                                 | 39,700                                 | 38,100                                 |
|                       | 100                   | 47.9                 | 111.7                          | 40,000                                 | 38,500                                 | 37,000                                 | 35,500                                 |
|                       | 105                   | 45.1                 | 107.0                          | 37,200                                 | 35,800                                 | 34,500                                 | 33,200                                 |
|                       | 110                   | 42.1                 | 101.7                          | 34,700                                 | 33,400                                 | 32,200                                 | 31,100                                 |
|                       | 115                   | 39.0                 | 95.9                           | 32,400                                 | 31,300                                 | 30,200                                 | 29,200                                 |
|                       | 120                   | 35.6                 | 89.3                           | 30,300                                 | 29,300                                 | 28,300                                 | 27,400                                 |
|                       | 125                   | 31.9                 | 81.8                           | 28,400                                 | 27,500                                 | 26,700                                 | 25,800                                 |
|                       | 130                   | 27.8                 | 73.1                           | 26,600                                 | 25,800                                 | 25,100                                 | 24,400                                 |
|                       | 135                   | 23.0                 | 62.6                           | 25,000                                 | 24,300                                 | 23,700                                 | 23,000                                 |
|                       | 140                   | 17.1                 | 48.9                           | 23,500                                 | 22,900                                 | 22,400                                 | 21,900                                 |

# MD-97 Waterfall Heavy Duty Hoists



## Pulling for you ...with everything we've got

The Skagit Model MD-97 is available in two, three, and four-drum arrangements with waterfall design—the two-drum configuration is standard and weighs approximately 51,000 pounds.

Designed for cable diameters between 1½-inch and 2-inch, the MD-97 will spool 2,750 feet of 2-inch diameter cable. It will produce a single drum line pull of 60,000 pounds at a line speed of 75 feet per minute. When used for anchoring service, the MD-97 has a single drum pulling power of 195,000 pounds maximum on the second wrap with 225,000 pounds of brake holding power.

Standard brakes are spring-set, air-released; single brakes are standard.

Available brake options include spring-set, air-operated and straight air-operated. Double brakes are optional.

Air-operated controls are easy to operate and conveniently located at a stand-up or seated operator console. Remote control arrangements and enclosed cab versions are also available. All guards are designed to provide maximum protection for equipment and personnel while retaining easy access features for servicing and maintenance.

**Skagit**  
DIVISION



**Continental Emsco Company**  
an LTV company

Other LTV companies are Jones & Laughlin Steel Corporation, Kentron International, Lykes Bros. Steamship Co., Inc., Vought Corporation, The LTV Corporation, Dallas, Texas



# MD-97 Waterfall Specifications

## Drum Size

|                                |    |
|--------------------------------|----|
| Flange diameter (inches) ..... | 66 |
| Barrel diameter (inches) ..... | 26 |
| Barrel length (inches) .....   | 46 |

## Cable Capacity

|                         |       |
|-------------------------|-------|
| 1-1/8-inch (feet) ..... | 8,750 |
| 1-1/4-inch (feet) ..... | 7,050 |
| 1-3/8-inch (feet) ..... | 5,850 |
| 1-1/2-inch (feet) ..... | 4,900 |
| 1-5/8-inch (feet) ..... | 4,150 |
| 1-3/4-inch (feet) ..... | 3,600 |
| 1-7/8-inch (feet) ..... | 3,150 |
| 2-inch (feet) .....     | 2,750 |

Note: Additional cable capacity is available with optional 60" wide drum barrel.

## Maximum Cable Size

|                         |   |
|-------------------------|---|
| Diameter (inches) ..... | 2 |
|-------------------------|---|

## Drum Brake Holding Power

|                                   |         |
|-----------------------------------|---------|
| Maximum pounds on second layer .. | 225,000 |
|-----------------------------------|---------|

## Drum Brake Dimensions

|                         |    |
|-------------------------|----|
| Diameter (inches) ..... | 64 |
| Width (inches) .....    | 7  |

## Drum Clutch

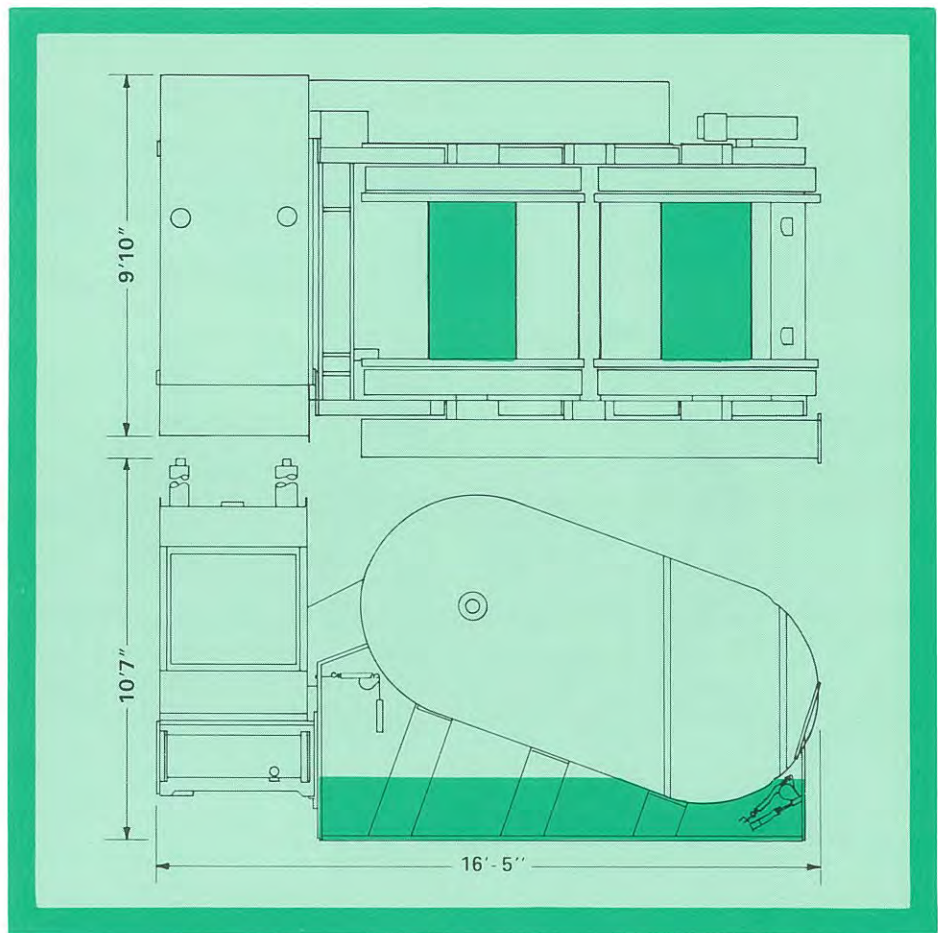
A Skagit internal-expanding, air-actuated, band-type clutch is mounted on the drum shaft. The clutch diameter in inches is... 52

## Approximate Weight

|                                    |         |
|------------------------------------|---------|
| Single drum (pounds) .....         | 32,000  |
| Double drum — standard (pounds) .. | 51,000  |
| Three drum (pounds) .....          | 78,000  |
| Four drum (pounds) .....           | 114,000 |

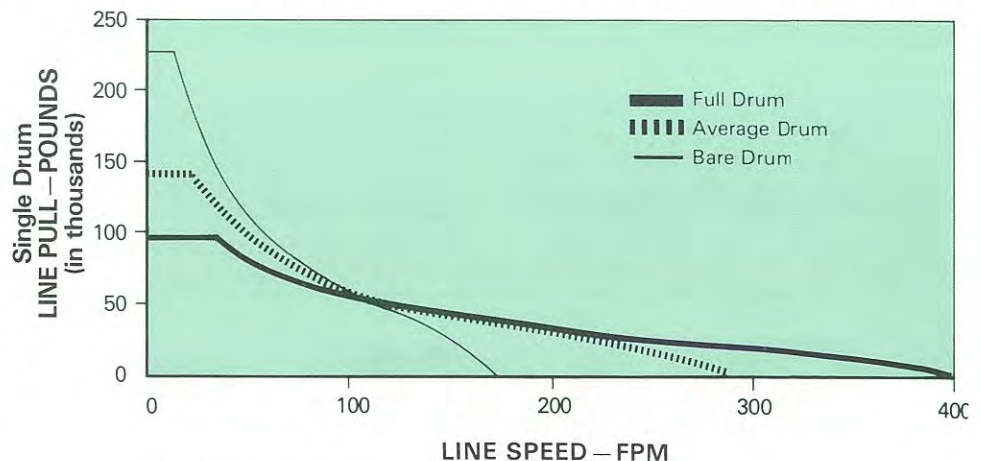
## Marine Treatment

Inorganic zinc over sandblasted frame and guards with finish coats of marine machinery epoxy on entire machine.



## Performance

Typical single drum line pull in pounds and line speed in feet-per-minute with a Detroit Diesel 8V-71N-N65 diesel engine driving through a TD 10,000/MS470 torque converter with an input ratio of 115/22.



For more information on Skagit's complete line of offshore machinery, contact the factory:

**Skagit Division**  
Continental Emsco Company

P.O. Box 151 • Sedro-Woolley, Wash. 98284  
Telephone (206) 855-1141 Telex 32-8815

*All specifications subject to change without notice.*

Note: Consult factory for performance of the unit when more than one drum is used simultaneously.

State of California  
Department of Industrial Relations  
Division of Occupational Safety and Health

**CERTIFICATE OF UNIT TEST AND/OR EXAMINATION OF  
CRANES AND DERRICKS USED FOR LIFTING SERVICE  
PLATE V**

1. Owner: Curtin Maritime Phone: (562) 343-3170
2. Owner's Address: P.O. Box 2531, Long Beach, CA 90801
3. Device (check): Crane ☒ Derrick ☐ Other ☐  
Location: (a) Remains at worksite ☐ (b) Changes worksite ☐ (c) On barge ☒
4. Description: Crawler Crane Rated Capacity: 400,000 lbs.
5. Manufacturer: Manitowoc Model No.: 4600 Serial No.: 46134
6. Owner's Identification (if any): 46134 License Plate No. N/A
7. Service Status At Time of Survey: Lifting ☐ Other (describe) ☐
8. Boom At Time of Survey: Length: 140' Type: #7 Jib: N/A
9. Test Loads Applied, Including Functional (partial) Test Load:

| Radius            | Proof Load         | Rated Load         | Outriggers<br>(Yes, No) | Boom Direction<br>(Over Rear/Side) |
|-------------------|--------------------|--------------------|-------------------------|------------------------------------|
| <u>105'</u>       | <u>41,800 lbs.</u> | <u>38,000 lbs.</u> | <u>No</u>               | <u>Over Side</u>                   |
| <u>          </u> | <u>          </u>  | <u>          </u>  | <u>          </u>       | <u>          </u>                  |
| <u>          </u> | <u>          </u>  | <u>          </u>  | <u>          </u>       | <u>          </u>                  |
| <u>          </u> | <u>          </u>  | <u>          </u>  | <u>          </u>       | <u>          </u>                  |
| <u>          </u> | <u>          </u>  | <u>          </u>  | <u>          </u>       | <u>          </u>                  |

Description of Proof Loads: Known Weights with Dynamometer

10. Basis for assigned load ratings: Manufacturers Specifications
11. The examination shall cover the points listed on reverse as applicable.
12. Remarks and/or limitations imposed: Not to exceed manufacturers load chart.  
Tested single part line

I certify that on the 28th day of May, 20 21, the above described device was tested and examined by the undersigned; that said test and examination met with the requirements of the Division of Occupational Safety and Health (DOSH); that any deficiencies affecting the safe operation of the crane have been corrected prior to the issuance of this certificate. A copy of such Certificate(s) attesting to Annual and Quadrennial Certification shall be maintained in the crane or at the work site at all times.

Certifying Agency: Tilley Crane Inspection Service Co., Inc. Phone: (714) 970-1367

This Certificate is: ( ☒ ) Annual ( ☐ ) Quadrennial Proof Load. Quad Attached: ( ☐ ) Yes ( ☒ ) No

Next Annual Due: 5-28-22 Last Quadrennial Done: 6-2-20 By: C A 33

Signature: [Redacted] DOSH License No.: C A 33

Print Name: David S. Tilley Expires: 2-28-23 Category: M, B & G

Title: Surveyor Date: May 28, 2021

Certification No: 21-C361 Issue Date: 5-28-21 Mailed to DOSH: 5-28-21



# Certificate

of  
Examination and Test of Wire Rope  
Before Being Taken into Use

Reel No: 8228096



This Certificate when properly executed by a competent person, in accordance with 29CFR 1919.37, is accepted by the Government of the United States of America as being in accordance with the requirements of 29CFR 1918.12 and 1919.33.

**Name and address of maker or supplier:**

WIREROPE WORKS, INC.  
100 MAYNARD STREET  
WILLIAMSPORT, PA 17701

**Name and address of customer:**

JACK RUBIN & SONS/IT 30  
WAREHOUSE TRANSFER  
COMPTON, CA 90222

**Date Tested:** August 16, 2018

**Actual Break Strength in Pounds:** 451,300

**Catalog Break Strength in Pounds:** 434,000

**Description:** 2" 0649 BR EEI RR IW S

**Size:** 2" (in inches, unless otherwise specified.)

**Number of Strands:** 06 **Number of Wires per Strand:** 49

**Finish:** Bright (Uncoated)

**Grade:** Extra Extra Improved Plow

**Lay:** Right Regular Lay

**Core:** Wire Rope

Design load, subject to any stated qualifying conditions such as minimum pulley diameter, direct tensile load, etc. :  
"Using a design factor of 5, the design working load would be one-fifth of the rated catalog breaking strength."

Manufactured in accordance with RRW410-E, F, G or H; ASTM A1023; or API9A specification where applicable.

**Name and address of public service, association, company, or firm making the examination and test:**

Wirerope Works, Inc.  
880 South Second Street  
Sunbury, PA 17801

**Position of signatory in public service, association, company, or firm making the examination and test:**

Quality Engineer

I certify that the above particulars are correct and that the examination and test were carried out by a competent person.

**Certificate No.** 023625

**Signature:**

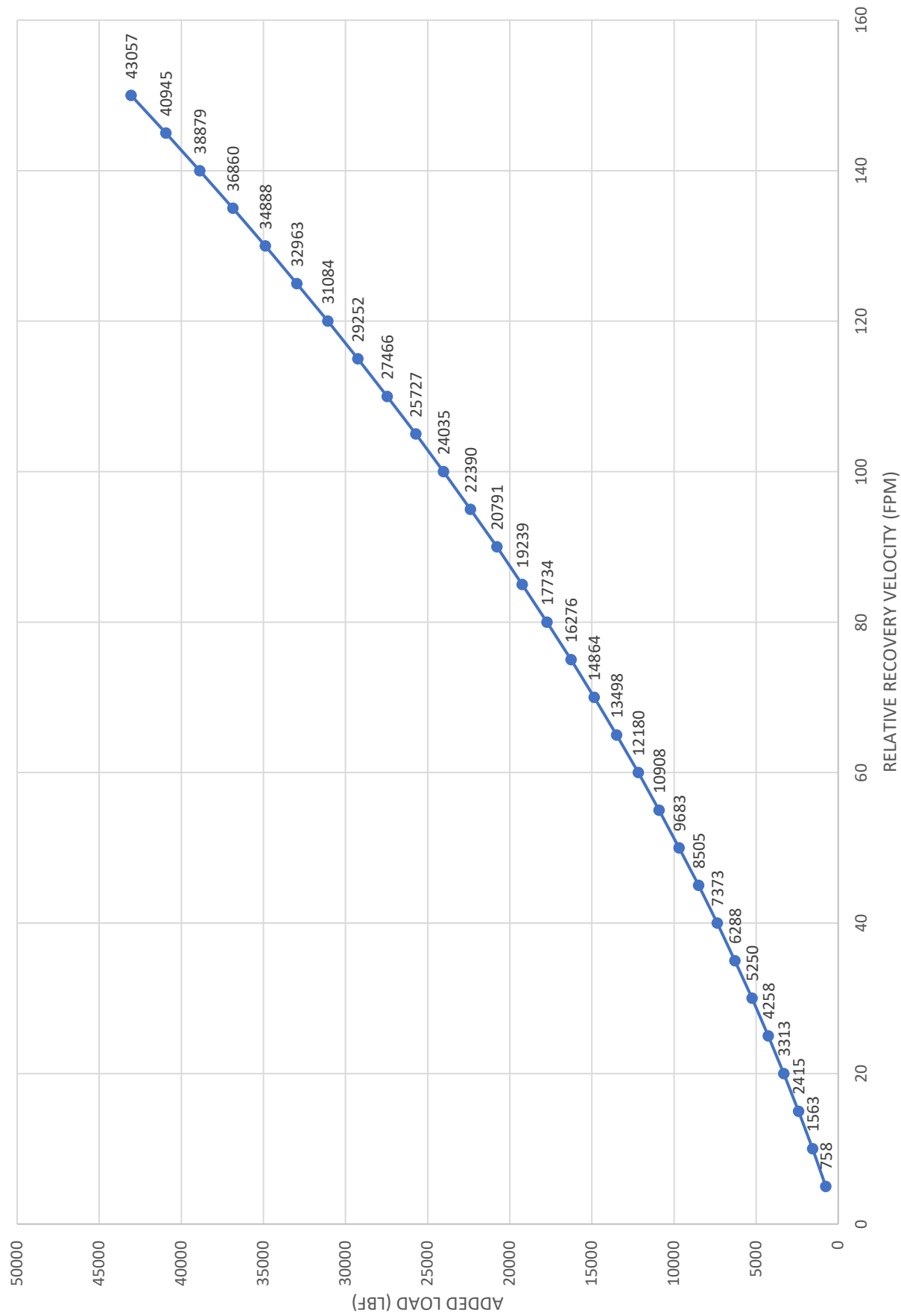
per authority of Roger Gilliland  
Director of Engineering  
and Technical Services

**Date:** 08/21/2018

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## APPENDICES VII PROJECT RIGGING SPECS

Combined Drag and Added Mass vs Speed



### Boeing 737 Main Body Lifting Calculations

$$F_{\text{weight\_main}} := 84500 \text{ lbf}$$

$$F_{\text{drag}} := 2335 \text{ lbf}$$

$$F_{\text{entrained\_mass}} := 7348 \text{ lbf}$$

$$\text{Dynamic\_Factor} := 1.5$$

$$F_{\text{Total}} := (F_{\text{weight\_main}} + F_{\text{drag}} + F_{\text{entrained\_mass}}) \cdot \text{Dynamic\_Factor} = 141275 \text{ lbf}$$

$$F_{\text{Design}} := 150000 \text{ lbf}$$

$$\text{Num\_Slings} := 2 \quad \text{2 slings in basket haul configuration}$$

$$\text{Num\_Sling\_Legs} := 4$$

Assume basket haul configuration with each sharing 1/2 load. Due to the nature of the double basket lift, the tension in each leg of the each respective sling will be identical.

### Basket Haul sling evaluation

$$\text{Basket\_Haul\_Tension} := \frac{F_{\text{Design}}}{\text{Num\_Slings}} = 75000 \cdot \text{lbf}$$

$$\text{Basket\_Haul\_Tension} = 37.5 \cdot \text{tonf}$$

$$\text{Basket\_Leg\_Tension} := \frac{\text{Basket\_Haul\_Tension}}{2} = 37500 \text{ lbf}$$

$$\text{Basket\_Leg\_Tension} = 18.75 \text{ tonf}$$

Using Holloway Houston HH-120 chart for 8-Part Bradied slings, the Basket capacity is twice the vertical capacity.

AHH-120-9/16 sling has a Vertical capacity of 22 ton force = 44,000 lbf vertical or 44 tonf (88,000 lbf) in basket haul configuration

$$\text{Rating}_{\text{HH1209\_16}} := 44 \text{ tonf}$$

$$\eta_{\text{HH1209\_16}} := \frac{\text{Rating}_{\text{HH1209\_16}}}{\text{Basket\_Haul\_Tension}} = 1.17$$

The HH-120 sling includes a 5:1 factor for breaking, so the safety factor against breaking is as follows:

$$\eta_{HH1207\_16\_Fail} := \eta_{HH1209\_16} \cdot 5 = 5.87$$

**Result of Calculation:** Using two each HH-120-9/16" 8-part slings, one under each winch, will be adequate to properly support the anticipated load.

Using the leg tension above, we will use this to size the remaining lifting components such as Shackles and Master Links \ D-Rings

$$\text{Basket\_Leg\_Tension} = 18.75 \cdot \text{tonf} \quad \begin{array}{l} \text{**Note the ratings for Crosby G2130 Shackles are in} \\ \text{1 Metric Tonne} = 2205 \text{ lbf} \end{array}$$

$$\text{Shackle\_25T} := 55125 \text{ lbf}$$

$$\eta_{\text{shackle\_25T}} := \frac{\text{Shackle\_25T}}{\text{Basket\_Leg\_Tension}} = 1.47$$

Each leg of the sling assembly will have a Crosby G-2130 25Tonne Shackle, P/N: 1019659 installed to secure the sling to the Master Link / Subassembly

Accepted rigging practice is to only install 2 legs into a single master link (aka D-ring) With a 4 legged sling, a Master Link - Subassembly is used. This includes one large Master Link with 2 smaller master links already forged around the large master link.

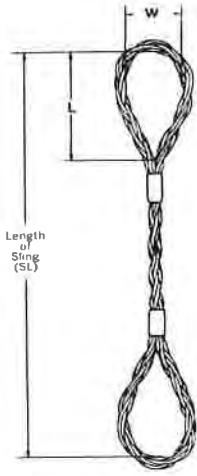
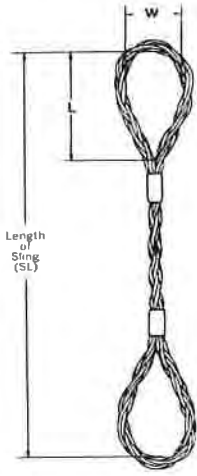
$$\text{Master\_Link\_2\_5IN} := 160000 \text{ lbf}$$

$$\eta_{\text{Master\_Link\_2\_5IN}} := \frac{\text{Master\_Link\_2\_5IN}}{F_{\text{Design}}} = 1.07$$

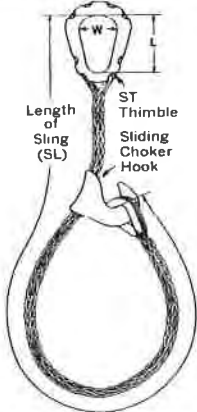
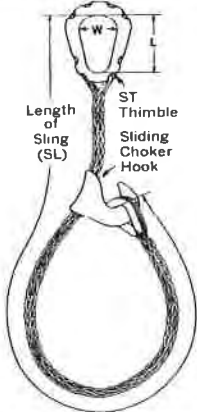
Summary:

EGI Shall use one each HH-120-9/16 slings under each winch, rigged with 25T shackles at each end, secured to a 80T Master link assembly.

## HH-120 8-Part Braided Slings

| Diameter<br>Of<br>Rope | EIPS<br>Vertical<br>Capacity<br>In Tons | Minimum<br>Sling<br>Length<br>ft-in | Eye<br>Dimensions |               |  |
|------------------------|-----------------------------------------|-------------------------------------|-------------------|---------------|------------------------------------------------------------------------------------|
|                        |                                         |                                     | Width<br>in.      | Length<br>in. |                                                                                    |
| 1/8                    | 1.1                                     | 1'10"                               | 3                 | 6             |  |
| 3/16                   | 2.4                                     | 2'10"                               | 5                 | 10            |                                                                                    |
| 1/4                    | 3.9                                     | 3'6"                                | 6                 | 12            |                                                                                    |
| 5/16                   | 5.9                                     | 4'6"                                | 8                 | 16            |                                                                                    |
| 3/8                    | 8.4                                     | 5'0"                                | 8                 | 16            |                                                                                    |
| 7/16                   | 13.0                                    | 5'9"                                | 9                 | 18            |                                                                                    |
| 1/2                    | 17.0                                    | 6'5"                                | 9                 | 18            |                                                                                    |
| 9/16                   | 22.0                                    | 8'0"                                | 12                | 24            |                                                                                    |
| 5/8                    | 26.0                                    | 9'4"                                | 14                | 28            |                                                                                    |

## HH-126 Single Leg Slings with 8-Part Braided Rope Leg & Sliding Choker Hook

| Diameter<br>of<br>Individual<br>Ropes | EIPS<br>Capacity<br>in Tons | Slip-thru Thimbles |             |  |
|---------------------------------------|-----------------------------|--------------------|-------------|--------------------------------------------------------------------------------------|
|                                       |                             | Size               | Dimensions  |                                                                                      |
| 1/8                                   | .83                         | W-2                | 2-1/8x4-1/8 |  |
| 3/16                                  | 1.8                         | W-3                | 2-3/8x4-3/8 |                                                                                      |
| 1/4                                   | 3.0                         | W-4                | 3-3/8x6-5/8 |                                                                                      |
| 5/16                                  | 4.5                         | W-5                | 3-3/4x7-1/8 |                                                                                      |
| 3/8                                   | 6.4                         | W-5                | 3-3/4x7-1/8 |                                                                                      |
| 7/16                                  | 10.0                        | W-6                | 4-3/8x8-3/8 |                                                                                      |
| 1/2                                   | 13.0                        | W-7                | 5x9-1/2     |                                                                                      |

**NOTE:** Rated capacities of choker hitches apply when the angle of choke is greater than 120 degrees

*Leaders in **Lifting Safety!***

**HOLLOWAY HOUSTON, Inc.**

# Crosby® Bolt Type Shackles

**Load Rated**

**Fatigue Rated**

**QT**

**QUIC-CHECK®**

**MAXTOUGH®**

**TA**

## BOLT TYPE ANCHOR SHACKLES



### G-2130 / S-2130

G-2130 Bolt Type Anchor shackles with thin head bolt - nut with cotter pin. Meets the performance requirements of Federal Specification RR-C-271F Type IVA, Grade A, Class 3, except for those provisions required of the contractor. For additional information, see page 444.

- Capacities 1/3 thru 150 metric tons, grade 6.
- Working Load Limit and grade "6" permanently shown on every shackle.
- Forged - Quenched and Tempered, with alloy pins.
- Hot Dip galvanized or Self Colored. (85, 120, and 150 metric ton shackles are all hot dip galvanized bows and the bolts are Dimetcoated® and painted red)
- Fatigue rated (1/3t - 55t).
- Shackles 25t and larger are **RFID EQUIPPED**.
- Approved for use at -40 degree C (-40 degree F) to 204 degree C (400 degree F).
- Meets or exceeds all requirements of ASME B30.26.
- Shackles 85 metric tons and larger are individually proof tested to 2.0 times the working load limit.
- Shackles 120 metric tons and larger are proof tested, Magnetic Particle Inspected and provided with Serialized Pin and Bow.
- Type Approval and certification in accordance with ABS 2006 Steel Vessel Rules 1-1-17.7, and ABS Guide for Certification of Cranes.
- 3.1 Certification as standard available for charpy and statistical proof test for pg 79 only up to 25 tons to DNV2.7-1 and EN13889.
- Crosby 2t through 25t G2130 anchor shackles are type approved to DNV Certification Notes 2.7-1- Offshore Containers. These Crosby shackles are statistical proof and impact tested to 42 joules (31 ft.-lbs.) min. ave. at -20 degree C (-4 degree F). The tests are conducted by Crosby and 3.1 test certification is available upon request. Refer to page 76 for Crosby COLD TUFF® shackles that meet the additional requirements of DNV rules for certification of lifting applications - Loose Gear.
- All other 2130 and all 2150 shackles can meet charpy requirements of 42 joules (31 ft.-lbs) avg at -20 degree C (-4 degree F) upon special request.
- Look for the Red Pin® ... the mark of genuine Crosby quality.



## BOLT TYPE CHAIN SHACKLES

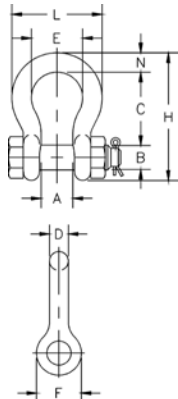


### G-2150 / S-2150

G-2150 Bolt Type Chain shackles. Thin hex head bolt - nut with cotter pin. Meets the performance requirements of Federal Specification RR-C-271F Type IVB, Grade A, Class 3, except for those provisions required of the contractors. For additional information, see page 444.

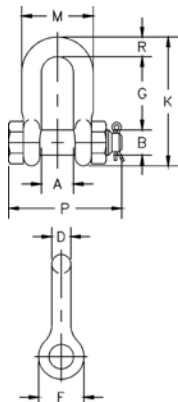
Shackles

### G-2130 / S-2130



| Nominal<br>Size<br>(in.) | Working<br>Load<br>Limit<br>(t)* | Stock<br>No. |         | Weight<br>Each<br>(lbs.) | Dimensions<br>(in.) |      |       |      |       |      |       |       |      |     | Tolerance<br>+ / - |  |
|--------------------------|----------------------------------|--------------|---------|--------------------------|---------------------|------|-------|------|-------|------|-------|-------|------|-----|--------------------|--|
|                          |                                  | G-2130       | S-2130  |                          | A                   | B    | C     | D    | E     | F    | H     | L     | N    | C   | A                  |  |
| 3/16                     | 1/3 ‡                            | 1019464      | —       | .06                      | .38                 | .25  | .88   | .19  | .60   | .56  | 1.47  | .98   | .19  | .06 | .06                |  |
| 1/4                      | 1/2                              | 1019466      | —       | .11                      | .47                 | .31  | 1.13  | .25  | .78   | .61  | 1.84  | 1.28  | .25  | .06 | .06                |  |
| 5/16                     | 3/4                              | 1019468      | —       | .22                      | .53                 | .38  | 1.22  | .31  | .84   | .75  | 2.09  | 1.47  | .31  | .06 | .06                |  |
| 3/8                      | 1                                | 1019470      | —       | .33                      | .66                 | .44  | 1.44  | .38  | 1.03  | .91  | 2.49  | 1.78  | .38  | .13 | .06                |  |
| 7/16                     | 1-1/2                            | 1019471      | —       | .49                      | .75                 | .50  | 1.69  | .44  | 1.16  | 1.06 | 2.91  | 2.03  | .44  | .13 | .06                |  |
| 1/2                      | 2                                | 1019472      | 1019481 | .79                      | .81                 | .64  | 1.88  | .50  | 1.31  | 1.19 | 3.28  | 2.31  | .50  | .13 | .06                |  |
| 5/8                      | 3-1/4                            | 1019490      | 1019506 | 1.68                     | 1.06                | .77  | 2.38  | .63  | 1.69  | 1.50 | 4.19  | 2.94  | .69  | .13 | .06                |  |
| 3/4                      | 4-3/4                            | 1019515      | 1019524 | 2.72                     | 1.25                | .89  | 2.81  | .75  | 2.00  | 1.81 | 4.97  | 3.50  | .81  | .25 | .06                |  |
| 7/8                      | 6-1/2                            | 1019533      | 1019542 | 3.95                     | 1.44                | 1.02 | 3.31  | .88  | 2.28  | 2.09 | 5.83  | 4.03  | .97  | .25 | .06                |  |
| 1                        | 8-1/2                            | 1019551      | 1019560 | 5.66                     | 1.69                | 1.15 | 3.75  | 1.00 | 2.69  | 2.38 | 6.56  | 4.69  | 1.06 | .25 | .06                |  |
| 1-1/8                    | 9-1/2                            | 1019579      | 1019588 | 8.27                     | 1.81                | 1.25 | 4.25  | 1.13 | 2.91  | 2.69 | 7.47  | 5.16  | 1.25 | .25 | .06                |  |
| 1-1/4                    | 12                               | 1019597      | 1019604 | 11.71                    | 2.03                | 1.40 | 4.69  | 1.29 | 3.25  | 3.00 | 8.25  | 5.75  | 1.38 | .25 | .06                |  |
| 1-3/8                    | 13-1/2                           | 1019613      | 1019622 | 15.83                    | 2.25                | 1.53 | 5.25  | 1.42 | 3.63  | 3.31 | 9.16  | 6.38  | 1.50 | .25 | .13                |  |
| 1-1/2                    | 17                               | 1019631      | 1019640 | 19.00                    | 2.38                | 1.66 | 5.75  | 1.53 | 3.88  | 3.63 | 10.00 | 6.88  | 1.62 | .25 | .13                |  |
| 1-3/4                    | 25                               | 1019659      | 1019668 | 33.91                    | 2.88                | 2.04 | 7.00  | 1.84 | 5.00  | 4.19 | 12.34 | 8.80  | 2.25 | .25 | .13                |  |
| 2                        | 35                               | 1019677      | 1019686 | 52.25                    | 3.25                | 2.30 | 7.75  | 2.08 | 5.75  | 4.81 | 13.68 | 10.15 | 2.40 | .25 | .13                |  |
| 2-1/2                    | 55                               | 1019695      | 1019702 | 98.25                    | 4.13                | 2.80 | 10.50 | 2.71 | 7.25  | 5.69 | 17.90 | 12.75 | 3.13 | .25 | .25                |  |
| 3                        | † 85                             | 1019711      | —       | 154.00                   | 5.00                | 3.30 | 13.00 | 3.12 | 7.88  | 6.50 | 21.50 | 14.62 | 3.62 | .25 | .25                |  |
| 3-1/2                    | † 120 ‡                          | 1019739      | —       | 265.00                   | 5.25                | 3.76 | 14.63 | 3.62 | 9.00  | 8.00 | 24.88 | 17.02 | 4.38 | .25 | .25                |  |
| 4                        | † 150 ‡                          | 1019757      | —       | 338.00                   | 5.50                | 4.26 | 14.50 | 4.00 | 10.00 | 9.00 | 25.68 | 18.00 | 4.56 | .25 | .25                |  |

### G-2150 / S-2150



| Nominal<br>Size<br>(in.) | Working<br>Load<br>Limit<br>(t)* | Stock<br>No. |         | Weight<br>Each<br>(lbs.) | Dimensions<br>(in.) |      |      |      |      |       |       |       |      |     | Tolerance<br>+ / - |  |
|--------------------------|----------------------------------|--------------|---------|--------------------------|---------------------|------|------|------|------|-------|-------|-------|------|-----|--------------------|--|
|                          |                                  | G-2150       | S-2150  |                          | A                   | B    | D    | F    | G    | K     | M     | P     | R    | G   | A                  |  |
| 1/4                      | 1/2                              | 1019768      | —       | .13                      | .47                 | .31  | .25  | .62  | .91  | 1.59  | .97   | 1.56  | .25  | .06 | .06                |  |
| 5/16                     | 3/4                              | 1019770      | —       | .23                      | .53                 | .38  | .31  | .75  | 1.07 | 1.91  | 1.15  | 1.82  | .31  | .06 | .06                |  |
| 3/8                      | 1                                | 1019772      | —       | .33                      | .66                 | .44  | .38  | .92  | 1.28 | 2.31  | 1.42  | 2.17  | .38  | .13 | .06                |  |
| 7/16                     | 1-1/2                            | 1019774      | —       | .49                      | .75                 | .50  | .44  | 1.06 | 1.48 | 2.67  | 1.63  | 2.51  | .44  | .13 | .06                |  |
| 1/2                      | 2                                | 1019775      | 1019784 | .75                      | .81                 | .64  | .50  | 1.18 | 1.66 | 3.03  | 1.81  | 2.80  | .50  | .13 | .06                |  |
| 5/8                      | 3-1/4                            | 1019793      | 1019800 | 1.47                     | 1.06                | .77  | .63  | 1.50 | 2.04 | 3.76  | 2.32  | 3.56  | .63  | .13 | .06                |  |
| 3/4                      | 4-3/4                            | 1019819      | 1019828 | 2.52                     | 1.25                | .89  | .75  | 1.81 | 2.40 | 4.53  | 2.75  | 4.15  | .81  | .25 | .06                |  |
| 7/8                      | 6-1/2                            | 1019837      | 1019846 | 3.85                     | 1.44                | 1.02 | .88  | 2.10 | 2.86 | 5.33  | 3.20  | 4.82  | .97  | .25 | .06                |  |
| 1                        | 8-1/2                            | 1019855      | 1019864 | 5.55                     | 1.69                | 1.15 | 1.00 | 2.38 | 3.24 | 5.94  | 3.69  | 5.39  | 1.00 | .25 | .06                |  |
| 1-1/8                    | 9-1/2                            | 1019873      | 1019882 | 7.60                     | 1.81                | 1.25 | 1.13 | 2.68 | 3.61 | 6.78  | 4.07  | 5.90  | 1.25 | .25 | .06                |  |
| 1-1/4                    | 12                               | 1019891      | 1019908 | 10.81                    | 2.03                | 1.40 | 1.25 | 3.00 | 3.97 | 7.50  | 4.53  | 6.69  | 1.38 | .25 | .06                |  |
| 1-3/8                    | 13-1/2                           | 1019917      | 1019926 | 13.75                    | 2.25                | 1.53 | 1.38 | 3.31 | 4.43 | 8.28  | 5.01  | 7.21  | 1.50 | .25 | .13                |  |
| 1-1/2                    | 17                               | 1019935      | 1019944 | 18.50                    | 2.38                | 1.66 | 1.50 | 3.62 | 4.87 | 9.05  | 5.38  | 7.73  | 1.62 | .25 | .13                |  |
| 1-3/4                    | 25                               | 1019953      | 1019962 | 31.40                    | 2.88                | 2.04 | 1.75 | 4.19 | 5.82 | 10.97 | 6.38  | 9.33  | 2.12 | .25 | .13                |  |
| 2                        | 35                               | 1019971      | 1019980 | 46.75                    | 3.25                | 2.30 | 2.10 | 5.00 | 6.82 | 12.74 | 7.25  | 10.41 | 2.36 | .25 | .13                |  |
| 2-1/2                    | 55                               | 1019999      | 1020004 | 85.00                    | 4.12                | 2.80 | 2.63 | 5.68 | 8.07 | 14.85 | 9.38  | 13.58 | 2.63 | .25 | .25                |  |
| 3                        | + 85                             | 1020013      | —       | 124.25                   | 5.00                | 3.25 | 3.00 | 6.50 | 8.56 | 16.87 | 11.00 | 15.13 | 3.50 | .25 | .25                |  |

\* NOTE: Maximum Proof Load is 2.0 times the Working Load Limit. Minimum Ultimate Strength is 6 times the Working Load Limit. For Working Load Limit reduction due to side loading applications, see page 91.

† Individually Proof Tested with certification.

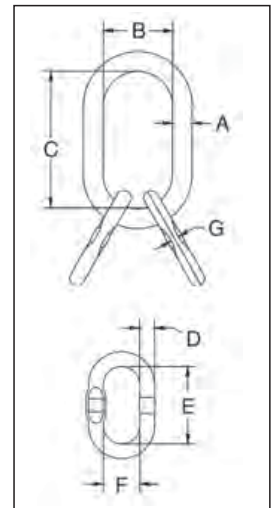
‡ Furnished in Anchor style only and furnished with Round Head Bolts with welded handles.

# Alloy Master Links with Engineered Flat



**A-345**  
Alloy Master  
Links

- Alloy Steel — Quenched and Tempered.
- Individually Proof Tested to values shown, with certification
- Proof Tested with 60% inside width special fixtures sized to prevent localized point loading per ASTM A952, reference page 276.
- Forgings have a Product Identification Code (PIC) for material traceability, along with the size, the name Crosby and USA in raised lettering.
- Selected sizes designated with "W" in the size column have enlarged inside dimensions to allow additional room for sling hardware and crane hook.
- Incorporates patented **QUIC-CHECK**® deformation indicators.
- Meets or exceeds all requirements of ASME B30.26 including identification, ductility, design factor, proof load and temperature requirements. Importantly, these links meet other critical performance requirements including fatigue life, impact properties and material traceability, not addressed by ASME B30.26.



Rigging  
Accessories

Load Rated

Fatigue Rated

QT

QUIC-CHECK

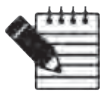
MAXTOUGH

CE

## A-345 Master Link Assembly with Engineered Flat for use with S-1325A coupler link.

| Size   |      | A-345<br>Stock No. | Weight Each<br>(lb) | Working Load Limit<br>Based on 5:1<br>Design Factor<br>(lb)* | Proof Load<br>(lb)** | Dimensions<br>(in) |       |       |      |       |       |     |                          |
|--------|------|--------------------|---------------------|--------------------------------------------------------------|----------------------|--------------------|-------|-------|------|-------|-------|-----|--------------------------|
| (in)   | (mm) |                    |                     |                                                              |                      | A                  | B     | C     | D    | E     | F     | G   | Deformation<br>Indicator |
| 3/4W   | 19W  | 1014739            | 3.5                 | 12300                                                        | 28400                | .73                | 3.20  | 6.00  | .56  | 3.35  | 1.77  | .30 | 4.00                     |
| 7/8W   | 22W  | 1014742            | 4.8                 | 15200                                                        | 35200                | .88                | 3.75  | 6.38  | .56  | 3.35  | 1.77  | .30 | 4.50                     |
| 1W     | 26W  | 1014766            | 9.3                 | 26000                                                        | 60000                | 1.10               | 4.30  | 7.50  | .75  | 3.94  | 2.36  | .33 | 5.50                     |
| 1-1/4W | 32W  | 1014779            | 15.8                | 39100                                                        | 90400                | 1.33               | 5.50  | 9.50  | 1.00 | 6.30  | 3.54  | .51 | 7.00                     |
| 1-1/2W | 38W  | 1014807            | 34.1                | 61100                                                        | 141200               | 1.61               | 5.90  | 10.50 | 1.25 | 7.09  | 3.94  | .65 | 7.50                     |
| 1-3/4  | 44   | 1014814            | 46.7                | 84900                                                        | 212250               | 1.75               | 6.00  | 12.00 | 1.38 | 8.00  | 5.00  | .73 | 7.50                     |
| 2      | 51   | 1014832            | 67.2                | 102600                                                       | 256500               | 2.00               | 7.00  | 14.00 | 1.50 | 9.00  | 5.75  | -   | 9.00                     |
| 2-1/2  | 64   | 1014855            | 206                 | 160000                                                       | 320000               | 2.50               | 8.38  | 16.00 | 2.50 | 16.00 | 8.38  | -   | 11.00                    |
| 2-3/4  | 70   | 1014864            | 282                 | 216900                                                       | 433800               | 2.75               | 9.88  | 18.00 | 2.75 | 18.00 | 9.88  | -   | 12.50                    |
| 4      | 102  | 1014999            | 667                 | 373000                                                       | 746000               | 4.00               | 12.00 | 24.00 | 3.50 | 24.00 | 12.00 | -   | 15.50***                 |

\* Ultimate Load is 5 times the Working Load Limit. The maximum individual sublink working load limit is 75% of the assembly working load limit except for 2-1/2" and 2-3/4", which are 100% of assembly working load limit. Applications with wire rope and synthetic sling generally require a design factor of 5. \*\*Proof Test Load equals or exceeds the requirement of ASTM A952(8.1) and ASME B30.9.

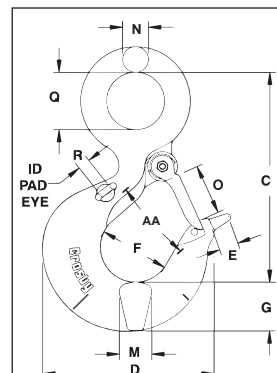


For use with chain slings, refer to page 244 for sling ratings and page 240 for proper master link selection.



L-320R  
ROV EYE HOOK

- Hook identification code stamped on each hook
- Quenched and Tempered.
- QUIC-CHECK® deformation and angle indicators forged on the hook.
- Fluorescent yellow finish for high "subsea" visibility.
- Tip extension allows for easy handling.
- Sizes 3.2t through 31.5t utilize new integrated latch (S-4320) that meets the world-class standard for lifting.
  - Heavy duty stamped latch interlocks with the hook tip.
  - High cycle, long life spring.
- Pad eyes are provided on either side of hook as cable guides. The cable is passed through a hole drilled in the latch that assists in allowing the "remotely operated" cable to open latch.
- Crosby supplies latches with drilled holes for sizes 5.4t through 31.5t. Other sizes can be fitted by your local Authorized Crosby Dealer. Cables are not provided by Crosby.



Fatigue Rated®

Load Rated®

CE

"QT"

QUIC-CHECK®



### L-320R ROV Hooks

| Working Load Limit (t)* | Hook ID Code | L-320R Stock No. | Weight Each (lb) | Dimensions (in) |       |      |      |      |      |      |      |      |     |       | Replacement Latch Stock No. |
|-------------------------|--------------|------------------|------------------|-----------------|-------|------|------|------|------|------|------|------|-----|-------|-----------------------------|
|                         |              |                  |                  | C               | D     | E    | F    | G    | M    | N    | O    | Q    | R   | AA**  |                             |
| †3.2                    | HA           | 1298427          | 2.0              | 4.69            | 3.97  | .39  | 1.63 | 1.13 | .94  | .58  | 1.09 | 1.25 | .25 | 2.00  | 1096468                     |
| †5.4                    | IA           | 1298497          | 4.0              | 5.77            | 4.81  | .39  | 2.00 | 1.44 | 1.31 | .72  | 1.36 | 1.56 | .25 | 2.50  | 1096515                     |
| †8                      | JA           | 1298567          | 8.2              | 7.37            | 6.27  | .79  | 2.50 | 1.81 | 1.66 | .90  | 1.61 | 2.00 | .38 | 3.00  | 1096562                     |
| †11.5                   | KA           | 1298637          | 15               | 9.07            | 7.45  | 1.18 | 3.00 | 2.25 | 1.63 | 1.11 | 2.08 | 2.44 | .38 | 4.00  | 1096611                     |
| †16                     | LA           | 1298707          | 21               | 10.08           | 8.30  | 1.18 | 3.25 | 2.59 | 1.94 | 1.27 | 2.27 | 2.84 | .38 | 4.00  | 1096657                     |
| †22                     | NA           | 1298777          | 38               | 12.53           | 10.30 | 1.77 | 4.25 | 3.00 | 2.38 | 1.56 | 3.02 | 3.50 | .75 | 5.00  | 1096704                     |
| †31.5                   | OA           | 1298847          | 60               | 14.07           | 13.63 | -    | 5.00 | 3.62 | 3.00 | 1.75 | 3.67 | 3.50 | .75 | 6.50  | 1090161                     |
| 37                      | PA           | 1298857          | 107              | 18.19           | 14.06 | -    | 5.38 | 4.56 | 3.19 | 2.00 | 3.75 | 4.50 | .75 | 7.00  | 1090189                     |
| 45                      | SA           | 1298867          | 137              | 20.12           | 15.45 | -    | 6.00 | 5.06 | 3.24 | 2.18 | 4.25 | 4.94 | .75 | 8.00  | 1090189                     |
| 60                      | TA           | 1298877          | 224              | 23.72           | 18.50 | -    | 7.00 | 6.00 | 3.91 | 2.53 | 5.12 | 5.69 | .75 | 10.00 | 1090205                     |

\*Minimum Ultimate Load is 4 times the Working Load Limit. \*\* Deformation Indicators. † Utilizes Crosby S320N style hook. Maximum proof load is 2 times the Working Load Limit.

### ROV PRODUCTS

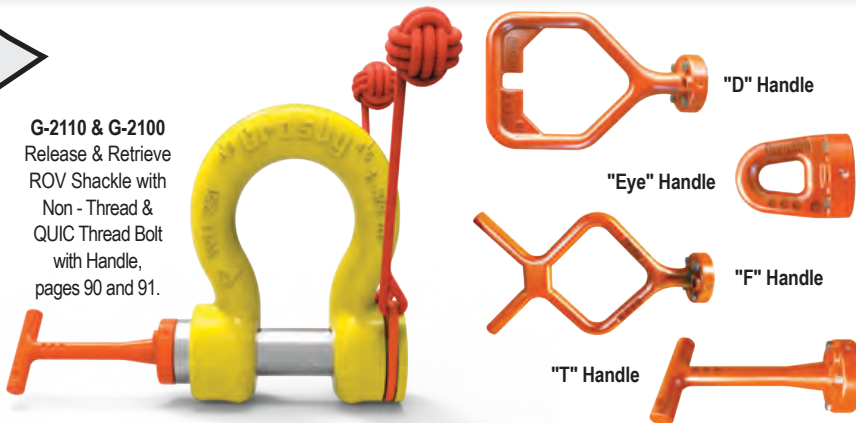
Developed in conjunction with major North Sea subsea operators.

For efficient load handling and attachment for Remote Operating Vehicles in subsea and other hard-to-reach applications.

Pad eyes are placed on either side of hook as cable guides which allows the "remotely operated" cable to open latch.

Available on pages: 90, 91.

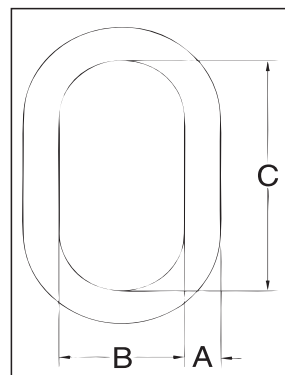
G-2110 & G-2100  
Release & Retrieve  
ROV Shackle with  
Non - Thread &  
QUIC Thread Bolt  
with Handle,  
pages 90 and 91.





**A-342**  
Alloy Master  
Links

- Alloy Steel — Quenched and Tempered.
- Individually Proof Tested to values shown, with certification
- Proof Tested with special fixtures sized to prevent localized point loading. See foot notes, and reference page 276.
- Forgings have a Product Identification Code (PIC) for material traceability, along with the size, the name Crosby and USA in raised lettering.
- Selected sizes designated with "W" in the size column have enlarged inside dimensions to allow additional room for sling hardware and crane hook.
- Crosby 7/8" to 2" 342 master links are type approved to DNV GL-ST-E271-2.7-1 Offshore Containers. These Crosby master links are 100% proof tested, MPI and impact tested. The tests are conducted by Crosby and 3.1 test certification is available upon request. Refer to page 164 for Crosby COLD TUFF® master links that meet the additional requirements of DNV rules for certification of lifting appliances - Loose Gea .
- Incorporates patented **QUIC-CHECK®** deformation indicators.
- Meets or exceeds all requirements of ASME B30.26 including identification, ductility, design factor, proof load and temperature requirements. Importantly, these links meet other critical performance requirements including fatigue life, impact properties and material traceability, not addressed by ASME B30.26.



Load Rated

Fatigue Rated

QT

QUIC-CHECK

MAXTOUGH

TA

CE

### A-342 Alloy Master Links

| Size     |        | A-342<br>Stock No | Weight Each<br>(lb) | Working Load<br>Limit (lb)* | Proof Load<br>(lb)** | Dimensions (in) |       |       |                       |
|----------|--------|-------------------|---------------------|-----------------------------|----------------------|-----------------|-------|-------|-----------------------|
| (in)     | (mm)   |                   |                     |                             |                      | A               | B     | C     | Deformation Indicator |
| 1/2W     | 13W    | 1014266           | 1.3                 | 7400                        | 17200                | .62             | 2.80  | 5.00  | 3.50                  |
| 5/8      | 16     | 1014280           | 1.5                 | 9000                        | 18000                | .62             | 3.00  | 6.00  | 3.50                  |
| 3/4W     | 19W    | 1014285           | 2.0                 | 12300                       | 28400                | .73             | 3.20  | 6.00  | 4.00                  |
| 7/8W     | 22W    | 3522213           | 3.3                 | 15200                       | †38000               | .88             | 3.75  | 6.38  | 4.50                  |
| 1W       | 26W    | 3522214           | 6.1                 | 26000                       | †65000               | 1.10            | 4.30  | 7.50  | 5.50                  |
| 1-1/4W   | 32W    | 3522215           | 12.0                | 39100                       | †97750               | 1.33            | 5.50  | 9.50  | 7.00                  |
| 1-1/2W   | 38W    | 3522216           | 18.6                | 61100                       | †152750              | 1.61            | 5.90  | 10.50 | 6.50                  |
| 1-3/4    | 44     | 3522217           | 25.2                | 84900                       | †212250              | 1.75            | 6.00  | 12.00 | 7.50                  |
| 2        | 51     | 3522218           | 37.0                | 102600                      | †256500              | 2.00            | 7.00  | 14.00 | 9.00                  |
| 2-1/4    | 57     | 1014422           | 54.1                | 143100                      | 289200               | 2.25            | 8.00  | 16.00 | 10.00                 |
| 2-1/2    | 63     | 1014468           | 68.5                | 160000                      | 320000               | 2.50            | 8.38  | 16.00 | 11.00                 |
| 2-3/4    | 70     | 1014440           | 94.0                | 216900                      | 433800               | 2.75            | 9.88  | 18.00 | 12.50                 |
| 3        | 76     | 1014486           | 115                 | 228000                      | 456000               | 3.00            | 9.88  | 18.00 | 13.00                 |
| 3-1/4    | 83     | 1014501           | 145                 | 262200                      | 524400               | 3.25            | 10.00 | 20.00 | 13.50                 |
| 3-1/2    | 89     | 1014529           | 200                 | 279000                      | 558000               | 3.50            | 12.00 | 24.00 | 15.50                 |
| 3-3/4    | 95     | 1015051           | 198                 | 336000                      | 672000               | 3.75            | 10.00 | 20.00 | 13.50                 |
| 4        | 102    | 1015060           | 264                 | 373000                      | 746000               | 4.00            | 12.00 | 24.00 | 16.00                 |
| †† 4-1/4 | †† 108 | 1015067           | 302                 | 354000                      | 708000               | 4.25            | 12.00 | 24.00 | -                     |
| †† 4-1/2 | †† 114 | 1015079           | 345                 | 360000                      | 720000               | 4.50            | 14.00 | 28.00 | -                     |
| †† 4-3/4 | †† 121 | 1015088           | 436                 | 389000                      | 778000               | 4.75            | 14.00 | 28.00 | -                     |
| †† 5     | †† 127 | 1015094           | 516                 | 395000                      | 790000               | 5.00            | 15.00 | 30.00 | -                     |

\*Ultimate Load is 5 times the Working Load Limit. Based on single leg sling (in-line load), or resultant load on multiple legs with an included angle less than or equal to 120 degrees. Applications with wire rope and synthetic sling generally require a design factor of 5. \*\*Proof Test Load equals or exceeds the requirement of ASTM A952(8.1) and ASME B30.9. †Offshore Container Master Links Proof Tested to 2.5 times the Working Load Limit with 70 percent fixtures. †† Welded Master Link.

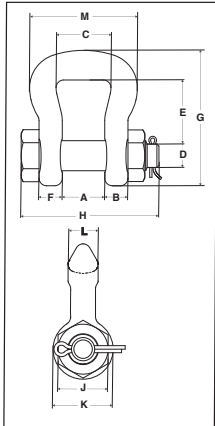


For use with chain slings, refer to page 243 for sling ratings and page 240 for proper master link selection.

## Sling Saver® Web Sling Shackles



**S-252**  
BOLT TYPE  
SLING SHACKLE



- Shackles available in size 3-1/4 to 50 metric tons.
- All Alloy construction.
- Design factor of 5:1.
- Each shackle has a Product Identification Code (PIC) for material traceability along with a Working Load Limit and the name Crosby forged into it.
- Increased radius of bow gives wider sling bearing surface resulting in an increased area for load distribution, thus:

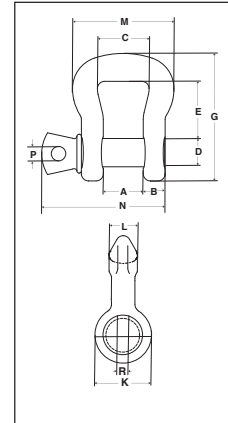
Increasing Synthetic Sling efficiency as compared to standard anchor and chain shackle bows and conventional hooks. This allows 100% of the sling's rated Working Load Limit to be achieved.

Allows better load distribution on internal fibers.

- Meets or exceeds all requirements of ASME B30.26 including identification, ductility, design factor, proof load and temperature requirements. Importantly, these shackles meet other critical performance requirements including fatigue life, impact properties and material traceability, not addressed by ASME B30.26.
- Shackles available in both a Screw Pin and Bolt, Nut and Cotter Pin configuration.
- Bolt (Pin) has a larger diameter that provides better load distribution.
- Look for the Red Pin®... the mark of Genuine Crosby quality.



**S-253**  
SCREW PIN  
SLING SHACKLE



**Sling Saver®**

**Fatigue Rated**

**Load Rated**



Crosby Sling Saver hardware meets the requirements for minimum stock diameter or thickness, and effective contact width shown in the Recommended Standards Specification for Synthetic Polyester Round Slings by the Web Sling & Tie Down Association. WSTDA-RS1.

### S-252 Bolt Type Sling Shackle

| Web Sling<br>Eye Width<br>(in) | Round<br>Sling Size<br>(No.) | Working<br>Load Limit<br>(t)* | S-252<br>Stock<br>No. | Weight<br>Each<br>(lb) | Dimensions<br>(in) |      |      |      |      |      |       |       |      |      |      |       |  |
|--------------------------------|------------------------------|-------------------------------|-----------------------|------------------------|--------------------|------|------|------|------|------|-------|-------|------|------|------|-------|--|
|                                |                              |                               |                       |                        | A                  | B    | C    | D    | E    | F    | G     | H     | J    | K    | L    | M     |  |
| 1                              | 1 & 2                        | 3-1/4                         | 1020485               | 1.4                    | 1.06               | .58  | 1.38 | .75  | 1.50 | .44  | 3.38  | 3.68  | 1.12 | 1.50 | .75  | 2.69  |  |
| 1.5                            | 3 & 4                        | 6-1/2                         | 1020496               | 2.4                    | 1.25               | .75  | 1.75 | .88  | 1.88 | .50  | 4.15  | 4.25  | 1.31 | 1.81 | 1.00 | 3.38  |  |
| 2                              | 5 & 6                        | 8-3/4                         | 1020507               | 4.1                    | 1.38               | .88  | 2.25 | 1.00 | 2.81 | .56  | 5.50  | 4.72  | 1.50 | 2.09 | 1.12 | 4.19  |  |
| 3                              | 7 & 8                        | 12-1/2                        | 1020518               | 8.0                    | 1.62               | 1.12 | 3.25 | 1.25 | 3.06 | .75  | 6.34  | 5.88  | 1.88 | 2.62 | 1.38 | 5.62  |  |
| 4                              | 9 & 10                       | 20-1/2                        | 1020529               | 16.9                   | 2.12               | 1.38 | 4.50 | 1.50 | 5.25 | .88  | 9.45  | 7.19  | 2.25 | 3.12 | 1.75 | 7.50  |  |
| 5                              | 11 & 12                      | 35                            | 1020540               | 35.0                   | 2.50               | 1.75 | 5.50 | 2.00 | 6.34 | 1.12 | 11.50 | 9.31  | 3.00 | 4.19 | 2.25 | 9.19  |  |
| 6                              | 13                           | 50                            | 1020551               | 57.5                   | 3.00               | 2.12 | 6.50 | 2.25 | 7.70 | 1.25 | 13.75 | 10.38 | 3.38 | 4.75 | 2.75 | 11.00 |  |

\* Maximum Proof Load is 2.5 times the Working Load Limit.

### S-253 Screw Pin Sling Shackle

| Web Sling Eye Width (in) | Round Sling Size (No.) | Working Load Limit (t)* | S-253 Stock No. | Weight Each (lb) | Dimensions (in) |      |      |      |      |       |      |      |       |       |      |      |
|--------------------------|------------------------|-------------------------|-----------------|------------------|-----------------|------|------|------|------|-------|------|------|-------|-------|------|------|
|                          |                        |                         |                 |                  | A               | B    | C    | D    | E    | G     | K    | L    | M     | N     | P    | R    |
| 1                        | 1 & 2                  | 3-1/4                   | 1020575         | 1.4              | .88             | .62  | 1.38 | .75  | 1.50 | 3.38  | 1.50 | .75  | 2.69  | 3.22  | .44  | 1.00 |
| 1.5                      | 3 & 4                  | 6-1/2                   | 1020584         | 2.2              | 1.25            | .75  | 1.75 | .88  | 1.88 | 4.15  | 1.81 | 1.00 | 3.38  | 4.03  | .50  | 1.19 |
| 2                        | 5 & 6                  | 8-3/4                   | 1020593         | 3.8              | 1.38            | .88  | 2.25 | 1.00 | 2.81 | 5.50  | 2.09 | 1.12 | 4.19  | 4.50  | .50  | 1.44 |
| 3                        | 7 & 8                  | 12-1/2                  | 1020602         | 7.3              | 1.62            | 1.12 | 3.25 | 1.25 | 3.06 | 6.34  | 2.62 | 1.38 | 5.62  | 5.59  | .62  | 1.81 |
| 4                        | 9 & 10                 | 20-1/2                  | 1020611         | 15.2             | 2.12            | 1.38 | 4.50 | 1.50 | 5.25 | 9.45  | 3.12 | 1.75 | 7.50  | 6.88  | .75  | 2.13 |
| 5                        | 11 & 12                | 35                      | 1020620         | 30.8             | 2.50            | 1.75 | 5.50 | 2.00 | 6.34 | 11.50 | 4.19 | 2.25 | 9.19  | 8.66  | 1.00 | 2.88 |
| 6                        | 13                     | 50                      | 1020629         | 52.0             | 3.00            | 2.12 | 6.50 | 2.25 | 7.70 | 13.75 | 4.75 | 2.75 | 11.00 | 10.22 | 1.22 | 3.19 |

\* Maximum Proof Load is 2.5 times the Working Load Limit.

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## **APPENDICES VIII PORT INFORMATION**

## KALAELOA BARBERS POINT HARBOR

Kalaheo Barbers Point Harbor plays an important role in **PORT HAWAII** servicing a niche market. It contains a number of specialized cargo handling facilities not found in Honolulu Harbor (*i.e.*, a coal bulk unloader system and a pneumatic cement pump system). Kalaheo Barbers Point Harbor main channel entrance measures 3,100-feet long by 450-feet wide and is 42-feet deep. The main basin is approximately 2,500-feet long by 1,800-feet wide and is 38-feet deep. The Harbors Division recently expanded the main basin to the northeast by excavating a rectangular section measuring 600-feet wide by 1,100-feet long and 38-feet deep. The harbor also includes an area called Barge Basin located near the entrance channel. Barge Basin is the outline of the original harbor constructed in 1961.

For more information on Kalaheo Barbers Point Harbor, please contact the Kalaheo Barbers Point Harbor Agent's Office at:

Department of Transportation  
Harbors Division  
91-550 Malakole Street  
Kapolei, Hawai'i 96707  
Telephone: (808) 682-3389



Air Survey Images Photo



A pneumatic cement pump system.



# KALAELOA BARBERS POINT HARBOR



*Flatting dry-docks can accommodate large vessels for ship repair and maintenance.*



*Barge Basin is the outline of the original harbor built in 1961.*



*A vessel berthed at the Ferry/Tug Pier.*



## KALAELOA BARBERS POINT HARBOR

| PIER           | BERTH LENGTH (feet) | YARD AREA (acres) | SHED AREA (sq. ft.) | DESIGN DEPTH AT PIER (feet) * | PRINCIPAL CARGO/PIER USE                                                                                  |
|----------------|---------------------|-------------------|---------------------|-------------------------------|-----------------------------------------------------------------------------------------------------------|
| Barge Basin    | 255                 | S-1 & S-2 = 4.4   |                     | 16                            | Liquid-bulk cargo and pipelines. Scrap metal and sand.                                                    |
| P-3            |                     |                   |                     |                               | Dry-dock.                                                                                                 |
| Ferry/Tug Pier | 150 per side        |                   |                     | 38                            | Ferry terminal.                                                                                           |
| P-5A           | 300                 |                   |                     | 38                            | Neo-bulk cargo, petroleum and scrap metal.                                                                |
| P-5B           | 800                 | S-3 = 4.7         | 45,000              | 38                            | Liquid-bulk cargo and pipelines. Neo-bulk cargo and scrap metal.                                          |
| P-6            | 800                 | S-4 & S-5 = 30.0  |                     | 38                            | Liquid-bulk cargo and pipelines. Dry- and neo-bulk cargos and scrap metal. Dry-bulk unloader and storage. |
| P-7            | 800                 | S-6 = 3.1         |                     | 38                            | Dry-bulk cargo.                                                                                           |

\* For current depths, please contact the Harbor Division.

## APPENDICES IX

### PROJECT HEALTH & SAFETY

Last reviewed/updated: March 11, 2020

By: Els Weeg, EH&S Manager for the Eclipse Group, Inc. of Annapolis, MD

# **IMS Handbook**

## **Integrated QHSE Management System**

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## **Safety Principles**

All individuals are accountable for the following safety rules:

- If in doubt, safety takes priority;
- Follow safe practices and procedures;
- Use the correct Personal Protective Equipment (PPE). Report and replace defective items;
- Always challenge unsafe acts, omissions or hazardous conditions;
- Report all incidents and hazardous situations – when in doubt, report;
- Correct competency is needed to commence a job;
- STOP work if you ever feel unsafe or uncomfortable and always communicate your concerns.

## **Information & Communication**

By providing this handbook and other documentation, the company draws your attention to your responsibilities towards Quality, Health, Safety, Welfare and the Environment.

Principles applicable to processes and tasks that you carry out in the normal course of your employment are contained within the Management Systems.

Further QHSE information will be brought to your attention in ‘Safety Alerts’ which highlight particular incidents that have occurred and give information on remedial action to prevent recurrence.

The QHSE Department will also circulate a ‘Topic of the Month’ for discussion at Worksite QHSE Meetings. These Worksite QHSE Meetings are an opportunity for you to raise issues of importance in the knowledge that there will be no recriminations against you.

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Effective exchange of information, in other words good communication, is crucial in all of us being able to benefit from the lessons learned by any one of us, and make continuous improvements in how we deliver our services, particularly from a perspective of safety.

Management welcomes anyone's suggestions on how we can improve our Quality, Health, Safety and Environmental performance. An effective Integrated Management System must rely on the exchange of ideas between all those who are involved in the execution of a project.

Regular talks between supervisors and personnel are a forum for discussion of the potential risks involved in a job and to clarify how those risks should be managed during the execution.

Each employee and contractor must be aware of the Company's Quality, Health, Safety & Environmental policies and what measures are in place to implement them.

## QHS&E POLICY

Our areas of expertise are ROV services, survey & positioning services, geotechnical services, data processing & management, installation & construction support services, inspection repair & maintenance services, and decommissioning.

Our commitment to Quality, Health, Safety & Environment starts with the leadership of our organization and cascades to every employee and contractor; it is embedded in everything we do.

We aim to continuously improve our QHSE performance. We do this by constantly challenging ourselves, our customers, our business partners and our practices. Nothing is done because it's the way it has always been done in the past. We aim to use the current best, state-of-the-art practices. We also aim to deliver our services in the safest possible manner.

### **QUALITY**

The managing director is directly responsible for the Quality Management System and has appointed a Manager of Quality to implement and maintain this system in accordance with the requirements of the **Quality Standard ISO 18001:2018**.

We will provide our clients with services that meet the clients' needs as captured in the **RFP**, and we will use equipment that is fit for the intended purpose. We will always fulfill our contractual obligations.

Client satisfaction is very important to us; we solicit client's feedback and we review our performance in this regard continuously, making improvements as needed/suggested to ensure that we continue to deliver to a very high standard.

All of our employees are trained in the concepts of Quality and empowered to make decisions that will improve the Quality of the services we deliver.

### **HEALTH & SAFETY**

The managing director is directly responsible for the Health & Safety Management System and has appointed an EHS Manager to implement and maintain this system in accordance with the requirements of the **Health & Safety Standard OHSAS 18001:2007**.

All work is planned to ensure that our employees and any other individuals that may be affected by our activities will not be harmed.

We are committed to the prevention of injury and illness in the workplace. A comprehensive risk management process has been implemented to ensure that all risks are as low as practically feasible.

We are committed to continuous improvement as we work to establish a robust safety culture. We will achieve this by continuously monitoring our EHS performance, reviewing all incidents and near-misses, providing training to all employees, setting strategic targets, and achieving them.

### **ENVIRONMENT**

The managing director is directly responsible for the Environmental Management System and has appointed an EHS Manager to implement and maintain this system in accordance with the requirements of the **Environmental Standard ISO 14001:2015**.

We value the natural environment as a finite resource and we are committed to its preservation.

We plan all of our activities in such a way that the natural environment will not be harmed. A comprehensive risk management process has been implemented to ensure that all risks are as low as practically feasible.

We are committed to continuous improvement as we work to establish a culture of environmental awareness. We will achieve this by continuously monitoring our EHS performance, reviewing all incidents and near-misses, providing training to all employees, setting strategic targets and achieving them.

When we talk about Quality, we are talking about the ability to satisfy stated and implied needs. This brings together the concepts of fitness for purpose, customer satisfaction and conformance to requirements. These requirements include cost and schedule aspects as well as the characteristics of the product or service supplied.

Within EGI we have adopted an integrated QHSE Management System approach. This is to say that we do not have separate systems for each element. We believe that Quality, Health, Safety and Environmental Awareness are inter-connected. All four aspects should be considered, if we are to protect people and the environment while meeting our clients' needs.

Employing a systems approach should help us to do things right the first time. By 'right', we mean in accordance with the meaning of 'Quality' as given above. A systematic approach must ensure that all requirements are recognized and communicated, that suitable arrangements are made for enabling their achievement and that records are kept to demonstrate their achievement. At EGI we aim to do things better, that is to achieve superior performance by continuously improving on previous practices. We are part of a supply chain. In order for us to do our work, we rely on suppliers of information and resources. We need to provide them with our requirements and feedback. In turn, each of us has customers who depend on our performance to enable them to do their work, and they supply us with their requirements and feedback.

The key to improvement is to continuously evaluate all parts of this supply chain and look for better ways of doing things in order to increase our efficiency and meet or exceed our customers' expectations.

### **What Does Quality Mean To You?**

Everyone within EGI is responsible for the quality of his or her contributions.

The Management System provides the tools and techniques to consistently meet requirements but the only person who can actually

achieve quality in any particular task, is the person doing the work. Make sure you know and follow your job description. Understand the requirements and extent of your assigned tasks well. When in doubt, ask a supervisor. Follow all applicable procedures, instructions and specifications.

### Definitions

*Procedure*: an established or official way of doing something. Example: The officer did not follow procedure when he entered the dwelling without a warrant.

*Instruction*: detailed information on how something should be done, operated, or assembled. Example: By following the enclosed instructions exactly, I was able to assemble the cabinet without any issues.

*Specification*: a set of documented requirements to be satisfied by a material, design, product, or service. A type of technical standard. Example: The levels of impurities in the tested sample exceeded the maximum acceptable limits as documented by the raw material specification.

Ensure that the procedures, associated with your work, remain fit for purpose and relevant to the work. Look for continuous improvement in your way of working and in how you manage customer-supplier relationships. If you believe that a procedure is in need of a revision/update, speak with your Manager, Supervisor or Team Leader.

In order to ensure that we always adopt best practices and prevent non-value-added work from being done, interfaces are established with the EGI Management System, through the use of common procedures and processes.

### Auditing

The purpose of conducting audits is to ascertain that all activities are conducted in accordance with the management system and that the

desired results are obtained. In other words, audits exist to determine the effectiveness of the management system.

The EGI QHSE audit schedules identify what audits should be performed; they will be performed by internal auditors.

Sub-contractors and suppliers are required to operate management systems in accordance with appropriate standards e.g. ISO 9001, ISO 14001. Confidence in the effectiveness of these systems enables the levels of monitoring and inspection by EGI to be reduced.

### **Housekeeping**

Maintaining a good standard of housekeeping is a primary requisite of good Safety Practice. Your work area should be kept as clean and tidy as possible during the shift and thoroughly cleaned when work has finished. A tidy work area will help prevent accidents and allow you to work safely, particularly when space is restricted or hazardous materials are being used.

Oil and similar spills should be cleaned up immediately to prevent fire and the risk of slips, trips and falls. Rags and absorbents used to clean up spills should be disposed of properly because of the risk of fire.

Paints and other flammable materials should be kept in a designated Paint Store at all times when not in use. Do not draw more materials than your immediate operational needs require.

Ensure that Hazardous Waste is stored in a safe and correct manner so as not to pose a potential pollution problem.

Tools and Equipment when not in immediate use should be returned to the stores or designated storage areas. Good housekeeping practices should be observed, and you should be aware of your surroundings, including awareness of emergency access and egress.

### Hazard Observations, Near-Miss, Incident & Accident Reporting

You are responsible for ensuring that any hazard or potential hazard is reported to your supervisor. It is important to capture potential incidents or near-misses, so that preventative actions can be taken to avoid future potential incident or injury.

When an incident occurs, it is important that steps are taken immediately to prevent escalation or a repeat of the incident. Hazards, Incidents, Near-Misses and Accidents can all be reported through Hazard Observation Cards, Accident Report Forms, verbally or via electronic communication to [qhse@eclipse.us.com](mailto:qhse@eclipse.us.com). When the situation is stabilized, you may be required to assist in an investigation and ensuing preparation and possible submission of a report to an authority.

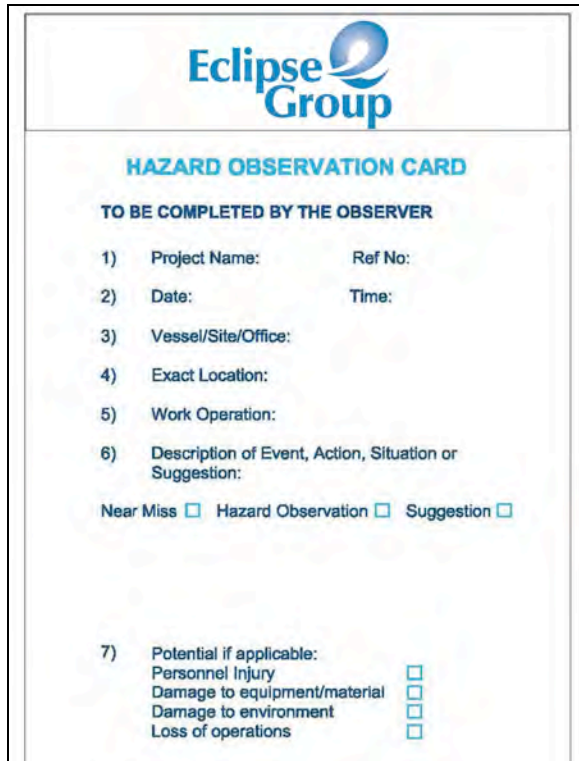
### What happens when you report an incident?

- Eclipse Management will review each incident and investigate further if necessary; root cause(s) are established and a report is drafted;
- Qualified individuals review the report and decide what, if any, measures should be taken to prevent recurrence; the report is finalized and communicated to all employees. If contractors were involved or could benefit from the communication, the report may be shared with them as well;
- In all cases, the emphasis is on preventing recurrence.

### **Hazard Observation Cards (HOC)**

A Hazard Observation Card scheme has been implemented into all Specialist Subsea Services operations to help develop and record the safety culture of all personnel. An observation-based safety scheme can

be the foundation of a positive safety culture by actively encouraging the workforce to get involved, creating greater safety awareness both individually and collectively.



The image shows a 'HAZARD OBSERVATION CARD' form from Eclipse Group. The form is titled 'HAZARD OBSERVATION CARD' and 'TO BE COMPLETED BY THE OBSERVER'. It contains seven numbered sections for data entry. Section 1 asks for Project Name and Ref No. Section 2 asks for Date and Time. Section 3 asks for Vessel/Site/Office. Section 4 asks for Exact Location. Section 5 asks for Work Operation. Section 6 asks for Description of Event, Action, Situation or Suggestion, with checkboxes for Near Miss, Hazard Observation, and Suggestion. Section 7 asks for Potential if applicable, with checkboxes for Personnel Injury, Damage to equipment/material, Damage to environment, and Loss of operations.

**Eclipse Group**

**HAZARD OBSERVATION CARD**

**TO BE COMPLETED BY THE OBSERVER**

1) Project Name: Ref No:

2) Date: Time:

3) Vessel/Site/Office:

4) Exact Location:

5) Work Operation:

6) Description of Event, Action, Situation or Suggestion:

Near Miss ☐ Hazard Observation ☐ Suggestion ☐

7) Potential if applicable:

Personnel Injury ☐

Damage to equipment/material ☐

Damage to environment ☐

Loss of operations ☐

There are various benefits of implementing the Hazard Observation Card Scheme such as;

- Enhanced safety awareness throughout the industry;
- Improved safety and environmental performance throughout the industry;
- Improved operational performance within companies;
- Increased client satisfaction and enhanced reputation within the industry.

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Hazard Observation Cards will be available on all operational worksites and will be provided to all offshore personnel working on client worksites.

Hazard Observation Cards can be filled out and emailed/faxed or scanned directly to HUqhse@eclipse.us.com (email still valid?) or handed to the QHSE Manager. All submissions will be treated as confidential, with issues being reviewed and controls implemented if required.

All Hazard Observation Cards will be documented, and the feedback issues and trends raised accordingly at the monthly onshore safety meetings.

However, immediate action should always be taken at the local work site if a HOC matter is raised.

Whilst EGI has implemented a HOC system of its own, we wholly recognise that there may/will be a requirement to use the “local sites/3rd party/clients” implemented HOC system.

In this situation, we would request that you copy the “local site/3rd party/clients” HOC card that is completed by you and forward this copy to the office for capture in our own safety system.

The HOC is a crucial element of our ability to understand and analyse all aspects of safety operations offshore and thereby learn from these, even although they may not be directly related to our own system. Knowledge can be turned into action and thereby improve our ability to change working practises to ensure best safety approach.

## Safety Task and Responsibility (S.T.A.R.) Cards

The Safety Task and Responsibility card scheme has been implemented to ensure that all EGI and Subcontractors' operations are conducted safely with minimal risk, as far as reasonably possible, to personnel. The STAR cards will be issued to all personnel working on operational worksites. Sections of these Cards can be filled out on arrival to a client's worksite and then completed prior to work commencing or during work to ensure that the risk to personnel is minimal.

STAR cards should be filled out and identified risks addressed at the worksite with the relevant company and client HSE representatives where by the identified hazard is removed or reduced to a level that allows the scope of work to continue or be completed.

| HAZARD / RISK MANAGEMENT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  | HAZARD / RISK MANAGEMENT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  | <br><b>Safety Tasks And Responsibility</b>                                                                                                                                        |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <b>Will the Work Involve:</b> <ul style="list-style-type: none"> <li>Have all the significant work hazards involved with the work being identified? <input type="checkbox"/></li> <li>Have adequate control measures been identified for these hazards? <input type="checkbox"/></li> <li>Have the individuals responsible for implementing these control measures been identified and are controls in place? <input type="checkbox"/></li> <li>Is everyone aware of what work is being conducted at the worksite and procedures? <input type="checkbox"/></li> <li>Do those involved in the task understand what everyone else is doing? <input type="checkbox"/></li> <li>Does everyone understand that any changes to the workplan have to be communicated to everyone involved in the work? <input type="checkbox"/></li> <li>Does everyone understand that any changes to the roles or personnel in the workplan must be given a full and thorough handover? <input type="checkbox"/></li> </ul> |  | <b>Will the Work Involve:</b> <ul style="list-style-type: none"> <li>The use of lifting equipment? <input type="checkbox"/></li> <li>Exposure to Hazardous Substances, noise, vibration or other dangers to health? <input type="checkbox"/></li> <li>Manual Handling: moving objects or loads? <input type="checkbox"/></li> <li>Working in tight confined spaces or poor lighting? <input type="checkbox"/></li> <li>Working in or near areas that could cause personnel to slip, trip or fall? <input type="checkbox"/></li> <li>Using portable electrical equipment? <input type="checkbox"/></li> <li>Working with equipment or connections under pressure? <input type="checkbox"/></li> <li>Working near movable objects? <input type="checkbox"/></li> <li>Personnel who are new to the worksite or each other? <input type="checkbox"/></li> <li>Equipment that is potentially dangerous? <input type="checkbox"/></li> <li>Working at heights? <input type="checkbox"/></li> </ul> |  | Client: _____<br>Location/Vessel/ System: _____<br>Task Leader: _____<br>Job/Project: _____<br>Date: _____ Time: _____<br>Signature: _____<br>Attendees<br><div style="display: flex; justify-content: space-around;"> <span>Print</span> <span>Sign</span> </div> |  |
| If the outcome to ANY of these questions is NO, the safety of people MAY BE AT RISK                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  | If YES to any of these questions, the work may be hazardous and care should be taken to ensure the work is done safely.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  | 1: _____ 1: _____<br>2: _____ 2: _____<br>3: _____ 3: _____<br>4: _____ 4: _____<br>5: _____ 5: _____<br>6: _____ 6: _____<br>7: _____ 7: _____<br>8: _____ 8: _____                                                                                               |  |
| <b>STOP</b><br>ADVISE SUPERVISOR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  | Implement Appropriate<br>Safety Controls                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |                                                                                                                                                                                                                                                                    |  |

Completed STAR cards should be copied and sent to (insert email address) as soon as possible, where it will be documented and trends

analysed with appropriate actions developed and implemented by our QHSE Department.

However, immediate action should always be taken at the “local work” site anytime STAR card issues are raised.

## **Emergency Actions**

### **First Aid**

In the event of an injury or illness incapacitating a colleague, sound the alarm, seek assistance from a qualified first aider, and remain with the patient until help arrives, whilst ensuring your own safety.

### **Fire Precautions**

Observe all fire and preventative measures.

- Make sure all fire safety instructions are adhered to;
- Keeps access to firefighting equipment without obstructions.
- Report all defective, damaged or ‘out of test date’ equipment to your supervisor;
- Keep all means of escape clear of obstruction at all times;
- Make sure you are familiar with the main and alternative means of escape from your particular location or workstation;
- Know where the fire alarm points are and how to operate them;
- Keep fire doors closed but not locked;
- Store all flammable materials in an appropriate place and in the appropriate quantities.

In the event of any emergency or on hearing the emergency alarm, you must take the following actions: (does our facility have an alarm system?)

- If you have the time and it is safe to do so, turn off equipment and make your work area safe.

---

DO NOT RETURN TO YOUR WORK AREA FOR ANY REASON

- Go immediately to your Muster Point (parking lot right outside of the facility?)

Use the safest route (probably external walkways).

Report immediately to the Muster Checker (who is this for the EGI facility? This person would be responsible to make sure, for instance, that everyone is accounted for in case of a fire).

- Behave responsibly at the Muster Point.  
Keep calm and do not stray from the Muster Point.  
Listen carefully for any further instructions.  
Do not smoke, eat or drink during the emergency.

Alarms at various sites/vessels may differ. During your induction you will be made aware of your site-specific alarms and it is your responsibility to ensure that you are fully familiar with these and able to take appropriate action in the event of an emergency.

## Spills

The following actions should be taken:

- Upon identification of the spill on an EGI worksite, Steven Saint Amour must be notified and called onsite to evaluate the extent of the spill and set an appropriate course of action.
- Personnel involved with the spill response must wear the appropriate PPE in order to tackle the spill safely and effectively.
- On a client's/3rd party worksite, EGI personnel shall follow the on-site system provided by the client.

## **Permit to Work (PTW)**

Permit to Work is employed to control and coordinate certain hazardous work activities and to ensure that risks associated with the work have been properly considered and are being properly controlled. You will be trained to use the PTW system, as required. This will enable you to work with our clients' PTW system, or our own.

Some types of PTW are:

Hot Work (work involving exposed flames, welding, use of electrical power tools, grinding, etc).

Confined Space Working

Over Side Working

Working at Height

Don't cut corners when you are about to undertake work that falls within the scope of PTW. History has taught us that many people have been seriously injured, or worse, either because they were unaware of the PTW process or because they chose to cut corners.

## **Routine and Non-Routine Tasks**

### **Routine Tasks**

The potential risk from routine tasks is mitigated by following the measures set out in the Company's procedures for such tasks. Not all tasks require procedures. An example of a routine task that requires a procedure is the painting of parts in the enclosed space of the painting booth. An example of a routine task that does not require a written procedure is cleaning of the shop floor. Whether or not a procedure is needed, is determined by the EHS manager, who will make that decision based on the nature and frequency of exposure to chemicals and/or the probability of injury during the execution of the task.

However, our overall commitment to safety and avoidance of injury applies to all tasks.

### **Non-Routine Tasks**

These tasks are characterized by one or more of the following:

- They require the preparation of a ‘Specific Task-Based Risk Assessment’;
- They involve multiple disciplines;
- They are completely new to the company.

If you are about to execute a NON-ROUTINE TASK, review the activity from a safety standpoint, before undertaking it. This may be done with the use of a STAR card and in discussion with your supervisor.

STAR Cards may be completed on arrival to a client’s worksite, prior to work commencing or during work to ensure that the risk to personnel is properly controlled. Appropriate controls are implemented and recorded before such a task commences.

### **Toolbox Talks Checklist**

#### **Introduction**

- Discuss the objectives of the specific jobs to be undertaken;
- Identify and organise the job steps;
- Identify potential hazards/risks.

#### **Plan and Methods**

- Discuss and establish procedure;
- Consider how each step will be handled;
- Identify/discuss all precautions (PTW/PPE etc.).

---

### Responsibilities

- Identify the individual with overall responsibility;
- Identify all other individual and group responsibilities;
- Ensure understanding of responsibilities within the work party.

### Manpower and Skill

- Identify the manpower required for each job step;
- Discuss the needed skills;
- Emphasize that personnel carry out only their assigned steps.

### Access and Evaluation

- Identify any confined space entry or difficult access hazards;
- Discuss PTW-specific requirements;
- Ensure understanding.

### Work Environment

- Identify hazards/risks caused by environmental conditions;
- Discuss, as applicable, weather conditions, heat, noise etc;
- Evaluate the effect of changes in the environment.

### Hazards

- Review and discuss all the hazards identified. Conduct needed Risk Assessment(s);
- Discuss the procedure for reporting additional hazards that may occur;
- Emphasize responsibilities for reporting and acting on hazards.

### Equipment

- Identify the tools required for the job and associated standards;
- Discuss the correct use of tools;
- Review the PPE to be deployed, why it is important, and its correct use.

---

### Materials

- Review all materials to be used;
- Identify any chemical substances to be used;
- Ensure an understanding of applicable product data sheets;
- Ensure that the correct PPE is in use and the planned work area is compatible with materials to be used.

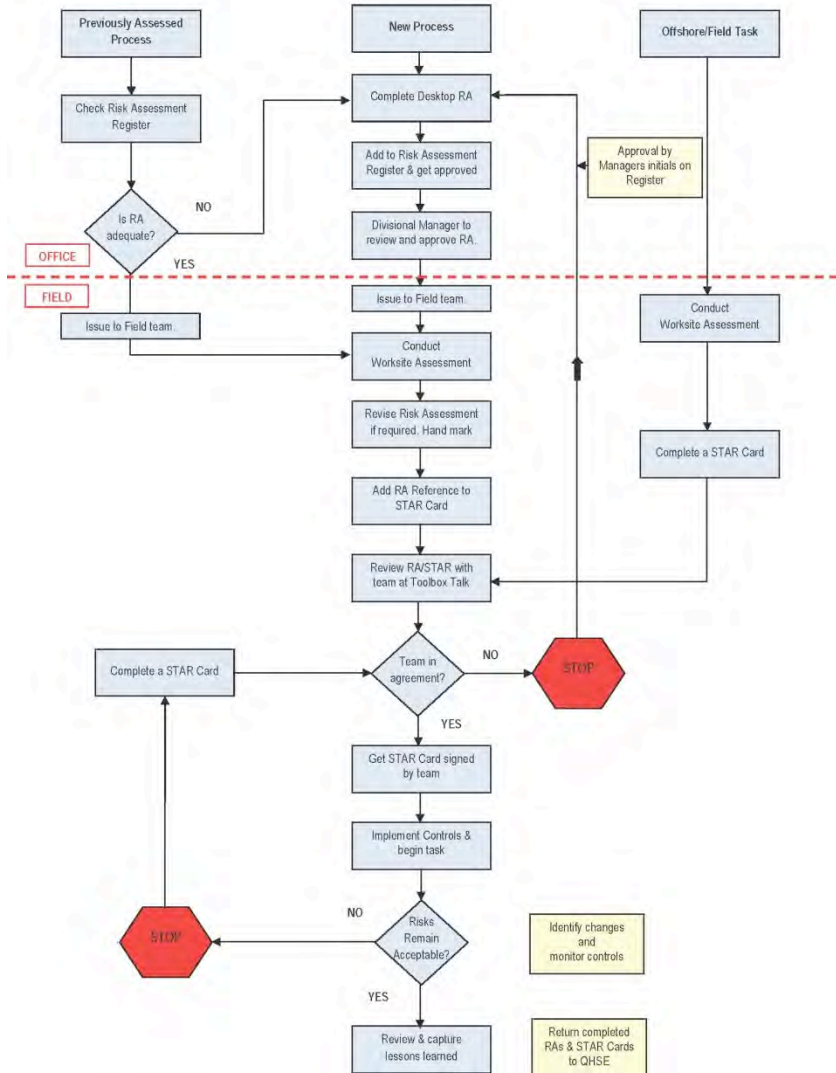
### Isolations

- Discuss all isolations (mechanical, hydraulic and electrical) required by PTW;
- Ensure an understanding of the need for isolations;
- Emphasise that no work is to be undertaken until the isolations are fully in place.

### Conflicting Activities

- Identify other work that may take place in the same areas;
- Review the potential for conflicting activities;
- Discuss any preventative action which must be taken;
- Evaluate the effect of changes in the environment.

## Risk Assessment Flow Diagram



## **Working At Height**

A place is 'at height' if a person could be injured if they fell from it.

All EGI operations that involve working at height will be properly planned, organized and supervised, taking into account weather conditions that could endanger the health and safety of the individuals working at height and those around the worksite.

When working at the client's or a third-party worksite, EGI personnel will adhere to the health and safety system in use.

EGI will ensure that all personnel performing tasks that involve working at height will be fully trained and competent in doing so and the equipment used is appropriately inspected on a regular basis.

A risk assessment **MUST** be carried out for all operations working at height over two meters before the work commences.

Where operations are to be carried out at a height of more than two meters, appropriate provisions for safe access and egress, to the height where the work is being performed, shall be provided.

The choice of method shall be based on the results of a risk assessment, which shall take into account the nature and duration of the work and the prevailing conditions.

## **Lifting Operations and Lifting Equipment**

Lifting equipment covers any work equipment used for lifting and lowering loads and includes attachments used for anchoring, fixing or supporting. Examples of equipment include cranes; lifts; mobile elevating platforms; lorry-mounted cranes; forklift trucks; chain hoists; ropes; slings; eye-bolts etc., whether new or existing.

---

Key areas for consideration to ensure safety during lifting operations are:

- Competence assurance of persons planning and supervising lifting operations;
- Risk Assessment addressing all resources, procedures, and responsibilities necessary for safe operation;
- Assignment of lifting-competent personnel workforce from multi-skilled workforce;
- Identification of equipment that requires thorough examination.

### **Definitions**

**Lifting Operation:**

Any operation involving the lifting/lowering of a load.

**Load:**

The item to be lifted/lowered.

**Lifting Equipment:**

Any machinery, appliance or apparatus for lifting/lowering loads.

**Lifting Gear/Accessory:**

Any attachment to the load to enable it to be lifted during lifting operations, e.g. slings, shackles, swivel or eye bolts.

**Lifting Plan:**

Step-by-step instructions for carrying out a lifting operation and a Risk Assessment and Lifting Plan shall cover all lifting operations.

### **Routine Lift:**

All of the conditions below must exist for a lifting operation to be considered routine:

- Working within the low-to-mid range of the SWL (Safe Working Load) of the selected lifting equipment;

- 
- Working over non-sensitive areas;
  - Working in a stable environment;
  - Using familiar equipment and operators;
  - Lifting familiar loads of known size and weight;
  - Using standard rigging arrangements.

Non-Routine Lifts are those that do not conform one or more of these requirements.

**Non-Routine Lift:**

The existence of any of the conditions listed below shall deem the lift Non-Routine:

- Working at or near the SWL of the selected lifting equipment
- Working over sensitive areas
- Working in unknown environmental conditions
- Using unfamiliar equipment and/or operators
- Lifting loads of unknown centre of gravity
- Using non-standard rigging arrangements
- Lifting operations involving ‘tandem lifts’
- Lifting operations involving load transfer from crane to crane
- Complex lifting operations

Non-Routine Lifts shall have a specific Risk Assessment and Lift Plan undertaken Each Time the lift is performed.

**Lifting Gear General Guidance**

This guidance outlines the care and safe use of “wire rope slings” and their associated shackles and securement practices which company staff should consider and use in any preparation and lifting operations.

The information is of a general nature, covering the main points, and it may be necessary to supplement this information for specific EGI applications and operational scenarios.

For example, EGI ROV systems use the recommended 5-leg sling setup, which consists of a “top leg” which is designed to allow crane hook-up at truck ground or vessel deck level, without the need to climb onto the containers or the individual equipment to be lifted.

Always:

- Handle and store wire rope slings correctly;
- Ensure the correct units are fitted to the respective items to be lifted;
- Inspect each unit and shackles prior to use, and before placing in storage. Remove and reject any which appear defective, or are kinked and knotted;
- Fit slings correctly, ensuring they are not twisted and hanging correctly from master links, and;
- If required, pad any sharp corners/edges to avoid damage to units;
- Lightly lubricate wire and ferrules every 6 months with a suitable light oil or wax to prevent corrosion on surfaces and internally.

Never:

- Shorten, knot or i.e. wire rope slings;
- Force, hammer or wedge slings or their fittings into position;
- Lift directly on the wire with crane hooks;
- Shock load slings and accessories during the lifting operation;
- Use wire rope slings above 100□ or below - 40□ without first contacting the supplier to make sure this is OK;
- Use acidic lubrication on the wire ropes or aluminium ferrules;
- Leave slings in pools of water. Instead, hang them to dry.

## Shackles and Master Links

By their size and flexibility, shackles can be moved from a sling set and may be subjected to overload if not fit for purpose. Therefore, lifting slings with shackles pre-attached or selected from stocks should always be checked for full rating in relation to the overall weight of the item to be lifted.

For a 5-leg sling assembly, 2 off-master links will be fitted and connected, together, to the short “top leg” that will be used by the crane for lifting the load. Each of the master links will then be connected to 2 of the remaining 4 main links.

If this configuration is not present in EGI equipment, STOP the lift and have the setup inspected by a competent person.

## Lifting Operations Checklist

### Part 1

This part applies to routine lifts that can be carried out by suitably trained personnel.

|                                                                                                                  | NO                       | YES                      |
|------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------------|
| ▪ Has the lifting operation been performed before?                                                               | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Is there a documented EGI Lifting Plan?                                                                        | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Check the lifting gear                                                                                         |                          |                          |
| ▪ Are you experienced with all the lifting equipment being used?                                                 | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Has the load been checked and made ready for lifting? (E.g. sea fastenings released, hold-down bolts removed). | <input type="checkbox"/> | <input type="checkbox"/> |

- |                                                                             |                          |                          |
|-----------------------------------------------------------------------------|--------------------------|--------------------------|
| ■ Do you have the needed experience to lift a load of this weight?          | <input type="checkbox"/> | <input type="checkbox"/> |
| ■ Is the lift in an area free from obstructions and other possible hazards? | <input type="checkbox"/> | <input type="checkbox"/> |

If the answer to ALL seven questions is 'YES', then and only then, proceed with the lifting operation in accordance with the documented procedure.

If the answer to ANY OF THE ABOVE is 'NO', go on to Part 2.

## Part 2

This part applies to simple lifts that can ALSO be carried out by properly trained personnel:

- |                                                                                                                                                                                     | NO                       | YES                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------------|
| ■ Do you know the weight of the load and does the lifting operation appear to be straightforward?                                                                                   | <input type="checkbox"/> | <input type="checkbox"/> |
| ■ If the load is heavier than you normally handle, do you have the necessary permission?                                                                                            | <input type="checkbox"/> | <input type="checkbox"/> |
| ■ Does the load have certified lifting points (lifting eyes/collar, eyebolts etc.) fitted? If not, can slings be wrapped around easily (e.g. no sharp edges, load not fragile etc)? | <input type="checkbox"/> | <input type="checkbox"/> |
| ■ Is there ample headroom for lifting appliance/slides?                                                                                                                             | <input type="checkbox"/> | <input type="checkbox"/> |
| ■ Is the lift stable (e.g. centre of gravity below lifting points)?                                                                                                                 | <input type="checkbox"/> | <input type="checkbox"/> |
| ■ Is the lift balanced (e.g. centre of gravity in the                                                                                                                               | <input type="checkbox"/> | <input type="checkbox"/> |

middle) or fitted with special slings to compensate?

- |                                                                                                                            |                          |                          |
|----------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------------|
| ■ Is the load free to be lifted (e.g. sea fastenings released, all hold-down bolts removed?)                               | <input type="checkbox"/> | <input type="checkbox"/> |
| ■ Is the removal route clear of any obstructions?                                                                          | <input type="checkbox"/> | <input type="checkbox"/> |
| ■ Is there a suitable laydown area and is the load's Weight within the allowable load-bearing capacity of the ground/deck? | <input type="checkbox"/> | <input type="checkbox"/> |
| ■ Are you experienced in using all the equipment and gear involved?                                                        | <input type="checkbox"/> | <input type="checkbox"/> |

If the answer to ALL 10 questions is 'YES', then and only then, can you proceed with the lift.

If you have answered 'NO' to any of the above, check with your supervisor.

## **Control of Crane Operations**

### **Planning of Lifting Operations**

All lifting operations must be planned to ensure that they are carried out safely and that all foreseeable risks have been taken into account. In cases of repetitive or routine operations, periodic reviews may be required to ensure no factors have changed.

Planning will include the following:

- The load, its characteristics and method of lifting;
- The selection of suitable mobile- or vessel-installed cranes;
- The selection of lifting gear. Note that the weight of the gear is part of the load;
- The position(s) of the cranes and load before, during and after the lift;
- The size of the operations, taking into account proximity hazards, space, availability and suitability of the ground;
- Any necessary erection and dismantling of the cranes;
- Any relevant environmental conditions which may necessitate stopping the operation;
- Any interface that may present a hazard to the public.

### **Selection of Cranes**

Cranes are available in different forms and the characteristics of each must be considered in relation to the contract and task requirements.

Positions to be considered include:

- Weights, dimensions and characteristics of the load;
- Number, frequency and types of lifting operations;
- Operational speeds, radius, height of lift and areas of movement;

- 
- Task duration;
  - Site, ground and environmental conditions and restrictions arising from other buildings;
  - Space available for cranes across, erection, travelling, operation and dismantling;
  - Any special conditions required.

### **Siting of Cranes**

The siting of the crane must take into account:

- Ground conditions, including any slope, also check underground services prior to setting up crane;
- Proximity to other cranes;
- Proximity to hazards;
- The effect of wind (particularly out of service);
- Access for erection and dismantling or for movement across the site.

### **Safe Working Load**

The Safe Working Load (SWL) must NEVER be exceeded.

### **Operating in High Winds**

All cranes have a maximum design wind speed for safe operation. When the wind speed exceeds this limit; the crane must be taken out of service.

Do not raise or lower personnel, unless the crane and (for example) the personnel basket are both certified for the work task, and the work tasks are fully risk-assessed by everyone involved, including the crane driver.

## **Hand Signals**

### **Crane Operations and Lifting Gear**

In all crane operations, only one person (the Signaller) is allowed to signal to the crane driver, though anyone can ‘STOP’ lifting operations if an unsafe act is observed.

The Signaller shall be chosen prior to commencing crane operations.

The Rigger (attaches lifting apparatus to load) should be clearly identified to the crane operator and wear high-visibility clothing. The most commonly used crane signals are shown (refer to figure on p. 37). Only these signals shall be used.

Always check that the load does not exceed the capacity of the crane or lifting equipment. Visually inspect all lifting equipment before use and replace all worn or damaged parts. Ensure the lifting equipment and the slings are within their stamped inspection dates.

Personnel must not ride a load that is being handled by a crane. Prior to moving any piece of equipment, all loose objects including dirt, must be removed or secured, otherwise they may fall and injure someone.

Look for pinch points when holding onto hooks or slings while the slack is being taken up. Always be prepared for the load to swing unexpectedly (perhaps straight at you or someone else) as the crane takes the strain and starts to lift it.

Always leave yourself space to retreat or avoid sudden load movements. Do not lift unbalanced loads.

NEVER stand below equipment supported by a crane.

NEVER leave a load suspended with the crane unattended.

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Where ‘TAG LINES’ are required to control rotation and positioning of equipment, these shall only be as long as necessary to do the work.

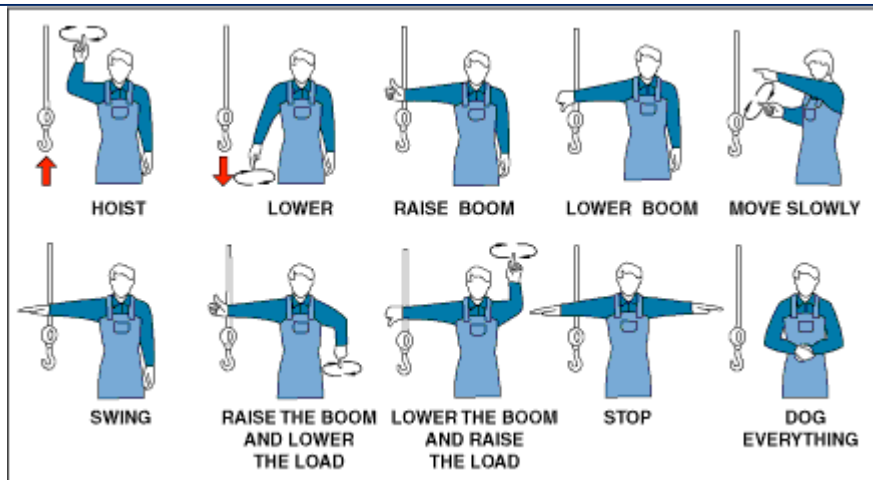
### Hand Signals

The Signaller should stand in a safe position where he can see the load and can be clearly seen by the driver.

Always face the driver, if possible, and make each signal distinct and clear.

When signals are relayed by radio:

- Make sure the crane driver has a good radio reception and understands you well (dialects can pose a challenge);
- Speak clearly and precisely;
- Start and end each operation correctly, e.g. ‘operations start’ – ‘operations end’.



These hand signals should not be taken as instructions to control crane operations, but merely to aid understanding of such operations.

### Offshore Transfers

The transportation to and from an offshore Vessel, Rig or Platform will be by:

- Helicopter;
- Vessel;
- Basket.

### All Transfers

- Personnel must be on time for a scheduled departure;
- Each passenger being transferred via helicopter must provide the ground staff with a correct estimate weight of his/her luggage or other materials to be transported;
- Personnel shall not approach the helicopter until they have received the signal to approach from the pilot or ground crew.

- Personnel shall not be left on Vessels, Mobile Drilling Rigs or Wellhead structures without transportation being available to them in the immediate area;
- Where hoisting equipment is available, personnel baskets may be provided;
- Personnel riding within a basket will stand on the outer rim of the net facing inwards. No cargo will be transferred in personnel baskets;
- All boat landings on manned vessels will be equipped with life ring buoys;
- Boat landings and personnel baskets will be maintained in pristine condition with all cables and the basket being inspected monthly;
- Signs will be located at the top of stairways and on heliports informing all personnel and visitors to check in on manned vessels so an accurate roster of all personnel on vessels can be maintained;
- Personnel transferring between boats and tenders must wear approved life-preserver or work vests;
- Inflate your life jacket only when instructed to do so by aircrew if being transferred by helicopter (never inflate your life-jacket in the aircraft).

In the event of a helicopter emergency landing, remain in your seat with your seatbelt tightly fastened. The pilot will provide further evacuation instructions as and when required.

An overview of the most relevant regulations aiming to protect worker safety is provided in the Addendum on pages 56-58. It is impossible to give a complete overview here; there are simply too many regulations and relevant guidance documents. Managers should educate themselves on the regulations that pertain to the specific activities that their direct

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reports will undertake, as well as the recommended safe practices, and make sure that people are well trained in safe work practices before they begin the work. The web sites of US Occupational Health and Safety Administration (OSHA.gov) and the UK Health and Safety Executive (HSE.gov.uk) contain a wealth of helpful information in this regard.

Some of the most relevant regulations for our industry are discussed in more detail in the pages that follow.

If you become aware of a need for a specific training module to be created, delivered, or both, please notify EGI's HSE Manager.

PUWER - The Provision and Use of Work Equipment Regulations (1998) regulates the standards of safety for equipment used in work environments. Its obligations apply to both employers, employees, and those who provide equipment for others to use at work.

For example, forklift trucks and computers are considered ‘work equipment’ and - generally - any fixed or portable equipment used at our sites and in our offices and warehouses will fall under these regulations.

The general duties are supported by a number of more specific requirements in such areas as:

- Protection against high or low temperatures;
- Emergency stop controls;
- Control systems;
- Isolations from sources of energy;
- Stability, lighting and maintenance operations.

LOLER - The Lifting Operations Lifting Equipment Regulations (1998) are set of regulations created to reduce the risk of injury from lifting equipment used at work. Areas covered in the regulations include the requirement for lifting equipment to be strong and stable enough for safe use and to be marked to indicate safe working loads; ensuring that any equipment is positioned and installed so as to minimise risks; that the equipment is used safely ensuring that work is planned, organised and performed by a competent person; that equipment is subject to ongoing thorough examination and where appropriate, inspection by competent people.

MANUAL HANDLING - is well covered by the UK's Manual Handling Operations Regulations of 1992. These regulations are designed to protect an individual's health and safety where manual handling is required. For reference, accidents caused by manual handling of loads account for some 25% of all reportable work-related accidents based on UK data.

However, you can dramatically reduce this risk by following the checklist below:

Can moving the load be avoided?

IF NOT:

Examine the Object

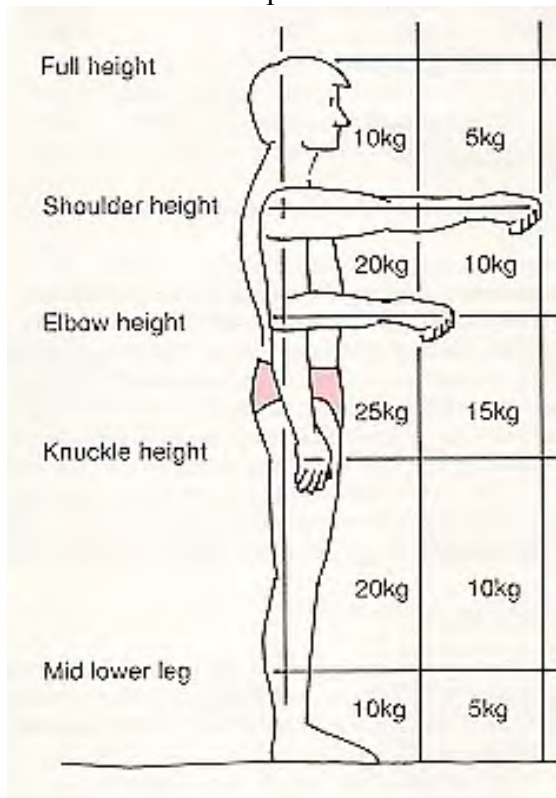
- Check weight, centre of gravity, stability;
- Are there any sharp edges?
- Check with your Supervisor.

Plan the Task:

- Consult your Supervisor;
- Plan a route that is free from tripping or slipping hazards;
- Provide opportunities for rest and recovery;
- Know where to unload.

Get a Good Grip:

- Decide in advance how to hold the load;
- Grasp firmly and with both hands;
- Attain a good posture;
- Are you wearing suitable gloves;
- Watch your fingers.



### Get Help:

- Can a mechanical aid be used?
- Can someone else be of assistance?
- Rotate the task.

### Are you wearing the correct PPE?

- Protective eyeglasses;
- A hard hat;
- Eye protection;
- Overalls/durable clothing;
- Protective non-slip footwear.

### Lifting and Lowering Guidelines

- If the hands enter more than one of the box zones during the operation, the smallest weight figure should be used;
- If handling beyond the box zone is unavoidable or there is significant twisting to the side, a more detailed assessment should be made;
- The basic guideline figures for lifting and lowering are for relatively infrequent operations (up to approximately 30 operations per hour) where the pace of work is not forced, adequate rest and recovery are possible and the load is not supported for any length of time.

## **Forklift Safety**

### Basic Rules for Fork Lift Truck (FLT) Operators:

#### Never:

- Drive a forklift truck unless you are certified to do so. If it is to be used on public roads, ensure that the vehicle is taxed, has valid number plates fitted and that the lights, indicators, and wipers are fully operational;
- Lift loads that exceed the truck's rated capacity;

- 
- Travel forwards with a bulky load that may obscure the drivers' vision;
  - Travel on soft ground unless the FLT is suitable for this purpose;
  - Carry Passengers;
  - Block fire-fighting equipment or exits by parking or stacking in front of it;
  - Attempt to carry out repairs. Leave this to a qualified maintenance engineer;
  - Use attachments unless:
  - Derating (reducing the rated capacity of the FLT) has been carried out by a competent and authorised dealer or manufacturer;
  - Operators have been properly trained and are competent and authorised to use the truck with the attachment;
  - The attachment is used in accordance with the manufacturer's instructions.
  - Allow people to walk under a raised mast or load;
  - Attempt to turn on an incline.

Always:

- Leave the truck with fork arms fully lowered and parked with toes down, with the heels close to the ground;
- Observe floor loading limits. Find out the weight of the laden truck and make sure that it is within the floor loading limits;
- Watch out for obstructions;
- Ensure the load is not wider than the width of the proposed travel route;
- Avoid sudden steps;
- Slow down for corners and sound the horn, where appropriate;

- Travel with fork arms lowered whilst maintaining ground clearance (When on public roads, a “Fork Guard” should be fitted before moving from site to site without a load);
- Carry out a pre-shift check of the FLT;
- Lower loads as soon as they are clear of the racking/trailer;
- Lower heavy loads slowly;
- Switch off and remove the key when leaving the truck;
- Take note of the load capacity indicator when fitted;

When travelling ensure that:

- When carrying the load, it faces uphill;
- When no load is carried, the fork arms face downhill;
- Where fitted, the tilt is adjusted to suit the gradient and the fork arms are raised to provide ground clearance.

**NEVER ALLOW AN UNAUTHORISED PERSON TO OPERATE A  
FORK LIFT**

## **Loading and Unloading**

Accidents can occur during loading and unloading of vehicles, for example, employees being struck by part of a falling load, being struck or run over by a moving or overturning vehicle, or falling from a height.

The following basic procedures should be followed when loading/unloading trailers:

- Loading/unloading should be carried out in an area away from passing traffic, pedestrians and other people not involved in the loading/unloading operation;
- Loading/unloading operations should never be carried out on gradients steep enough to make the operation unsafe. To

maintain stability, trailers should be situated on firm ground which is free from pot-holes or debris which could cause vehicles and trailers to overturn;

- Loading/unloading should be carried out in such a way that, as far as possible, the load is spread evenly. Uneven distribution can result in the vehicle or trailer becoming unstable, especially if it is an articulated or similar type of trailer which has been detached from the powered unit;
- Ensure the vehicle or trailer has its brakes applied and/or is stabilised, as appropriate, to prevent unsafe movements during loading and unloading operations.

## **Potential Dropped Objects (PDOs)**

What is a PDO?

Anything that has the potential to fall from one level to another and cause personnel injury or damage to equipment, such as:

- Tools, plant equipment, materials that are not adequately secured or that are ‘at height’ and therefore have the potential to fall and injure someone;
- Hand tools, plant equipment and material lying loosely on open gratings or access platforms;
- Loose components of platform structure.

What are the main causes of PDOs?

- Poor housekeeping;
- Improper use of tools;
- Improper racking/stacking and securement of materials;
- Improperly slung suspended loads;
- Improper use of lifting equipment;
- Improperly loaded/packed containers.

## **Hazardous Substances**

There is a range of substances used at work that have the potential to cause harm if not handled properly. In the USA, the Occupational Safety and Health Authority (OSHA) governs their use of most of these.

Under these regulations, assessments have been produced to indicate the hazards and necessary precautions to be taken.

- Always read and understand the Safety Data Sheet (SDS) and instructions provided by the vendor, before starting work. Never use a substance or mixture of substances (a.k.a. a product) for a purpose for which it is not intended. Addendum 2 on page 58 shows an example of an SDS for Marine Fuel Oil. Some important observations are:
  - Cancer hazard! Avoid exposure to such materials as much as possible, whether by inhalation or by contact with the skin. A cancer hazard doesn't result in immediate harm, but that's exactly the problem – a cancer may appear many years after exposure ended.
  - Fire hazard! Fuel is, of course, flammable. Avoid sources of ignition (sparks) and use well-grounded equipment. In case of a fire, don't use a stream of water, which may help the fire spread. Use water fog, foam, dry chemical or carbon dioxide to contain and extinguish the fire.
  - Physical and Chemical properties: SDSs are not always perfect. Read them carefully, and question what you read as well. For instance, it's mentioned here that the flammability was not determined, but of course we know that fuel is flammable (Cat. 3, OSHA GHS). The H<sub>2</sub>S (hydrogen sulphide) content is reported as "not determined". However, the company should have determined it, and made sure that it's below 2 mg H<sub>2</sub>S per kg fuel, as required (ISO 8217 2017 FUEL

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STANDARD for marine fuels). This standard exists because H<sub>2</sub>S is a toxic gas.

- Conduct a risk assessment before using the substance. Anticipate the ways in which you/others may be exposed in the course of the work. Consider not only the normal exposures that you would expect in the course of the work, but also any reasonably foreseeable accidental exposures. Will exposure be by inhalation and/or by dermal contact? Is there any chance that eye splashes may occur? Is there any potential that the substance or mixture may become mixed with other materials in the course of the work? If so, is this OK? In case of a spill, will the floor become slippery? Consult the Safety Data Sheet for the clean-up procedure.
- Before using, transporting or storing any material, always read and understand the container label. If the label is damaged or missing, report it to your supervisor;
- Always follow the requirements of the assessment and the instructions on the label;
- Never mix two materials or substances together unless you are sure that it is safe to do so;
- Always report leaks or spillages to your supervisor and use correct clean-up procedures;
- Use the protective equipment as recommended in the Safety Data Sheet;
- Familiarize yourself with what you should do in the event of an emergency, e.g. fire, spillage etc., and understand first aid requirements.

- Do not eat, drink or smoke when using or near hazardous materials.

## **Flammable Liquids**

The transportation, storage and use of flammable liquids, including gases are strictly controlled by law. They are defined according to their flash point and must be labelled 'Flammable', 'Highly Flammable' or 'Extremely Flammable'.

- Look for the warning symbol on the container label;
- Do not smoke, and exclude all sources of ignition when using flammable liquids and in areas where flammable liquids are being stored. When you consider the area, keep in mind that some vapours are heavier than air and can form low layers at the ground/floor level, that can travel some distance undetected;
- Replace the lid on all containers when not in use. Containers or cylinders which are believed to be empty may contain residual material and catch fire or even explode;
- Use the correct method for the disposal of empty containers.
- Flammable liquids should be stored in a secure area protected from direct sunlight and at least 4 meters away from other buildings, stores or boundary fences.

## **Slips, Trips & Falls**

These are the safe minimum standards.

They **MUST** be followed.

- Check the condition of the deck/floor surface;

- No loose/missing grating, no uneven surfaces, not wet/slippery, no trailing hoses/cables;
- No storage or obstructions in walkways or under stairways;
- Do not carry a load that obstructs your vision;
- Barrier off any signposts, holes, gaps and hoses;
- When using stairs, keep 2 points of contact. Use the handrails;
- Use safe access, no climbing, do not cut corners;
- Ensure lighting is sufficient – report faults;
- DO NOT RUN in any circumstances;
- All PPE is in good condition;
- Check treads on boots, dry gloves, and clean lenses.

### **Ladders and Steps**

- Check condition of ladder before use;
- Keep 3 points of contact;
- If there are both stairs and a ladder, use the stairs;
- Ladder secured at top and bottom;
- Ladder is at appropriate angle, 1 rung out for every 4 rungs up, on an even surface;
- Vertical ladders: properly place any safety bar/chain;
- Do not hand-carry anything when you are on a ladder.

### **Injuries**

- Sprains and strains;
- Burns;
- Dermatitis;
- Fractures;
- Lacerations;
- Ingestion/inhalation of potentially toxic dusts/gases/fluids.

### **Danger Zones**

- Handling or struck by sharp object;
- Caught in rotating equipment;
- Energising systems (Electrics, gas or hydraulics);
- Struck by, or against, objects;

- Caught in pinch points;
- Misuse of portable power tools, working on energised tools;
- Contact with hot objects or materials;
- Contact with caustic/corrosive materials;
- Poor hygiene practices;
- Repetitive motion/poor equipment design;
- Improperly dressed wounds;

## **Gloves**

### **General Purpose Gloves**

In the first instance, there are general purpose work gloves, often made of cotton or some knitted fabric and pimpled with rubber.

These give the minimum amount of protection against abrasion and general wear and tear on your hands (for other general or low risk uses, there are rubber and plastic gloves.)

### **Specialized Gloves**

In manual handling, sharp or pointed objects may pierce your hands. Typical examples would be a broken strand in a wire rope sling or a nail protruding from a piece of wood. In the repeated handling of rough objects such as bricks for example, your hands would be subject to abrasion.

To protect against all of the above, use gloves with leather palms and fingers.

## **Ear and Eye Protection**

Dust, splinters of material, aggressive fluids, radiation and the like form a danger to our eyes. Therefore, the use of the correct type of protection and face is mandatory.

Noise can damage your hearing for life. This type of damage is not reversible. When required, use the correct protection.

## **Man Overboard**

Anyone seeing a person falling overboard, or spotting someone in the sea, shall raise the alarm and immediately throw the nearest lifebuoy as close as possible to the person and endeavour to keep them in sight, and shout “man overboard” repeatedly. Get someone to notify the radio room/bridge and give the location of the overboard person. A marking/positioning buoy should be thrown overboard.

## **Substance Abuse**

EGI operates a substance abuse policy, which you will have been made aware of at induction and will be made available to you on request. If you are found in possession of, under the influence of, or consuming any alcohol, unauthorised drug or controlled substance at an onshore EGI site or at an offshore work location, disciplinary action will result.

The transportation of any alcohol, unauthorised drug or controlled substance to an Offshore Installation Vessel is strictly forbidden. If you are found to be in possession of, or under the influence of these substances at the point of departure for an Offshore Installation Vessel you will be subject to disciplinary action. The consumption or use of these substances on an Offshore Installation is similarly forbidden and disciplinary action will result if you are found to be in breach of this rule.

If you have to carry prescribed medication to an Offshore Installation Vessel, you should register the medication at the heliport check-in prior to departure and with the Installation Vessel Medic on arrival. You may also be subject to the substance abuse policies imposed by clients at their various sites and installations. EGI reserves the right to test for the presence of controlled substances.

## **Office Safety**

### **Office Planning/Precautions**

#### **Office Layout**

Office premises and furniture layouts are designed and constructed to provide a safe and healthy working environment. Staff therefore must not alter their office layout in such a way that they may create risks to health and safety. If there is a need to alter the layout, staff should seek advice from the Office Services/Facilities Management.

#### **Furniture (Chairs, Desks, Tables, Filing Cabinets, etc)**

Staff should:

- Ensure that furniture remains stable and in a good state of repair.
- Ensure that furniture (especially waste paper bins) does not create an obstruction in the event of an emergency. This is essential in passageways and open plan areas;
- Desk surfaces should be cleared as far as possible at the end of the working day – preferably totally cleared (note that this means clear of confidential, etc. documents);
- Ensure that waste paper bins are not used for the disposal of broken glassware, sharp objects, e.g. razor/scalpel type blades. This could prove a further hazard to others who empty and dispose of trash;
- Report all defects so that repairs can be made as soon as practicable;
- Paper and cardboard which is to be ‘recycled’ shall be disposed of in correct bins and locations onsite and not placed in general trash bins and in or on desks and work surfaces;

## **Electrical Equipment**

- All portable electrical equipment shall be inspected and tested. Office Services/Facilities Management is responsible for compliance and this includes maintaining an inventory;
- Staff who need to take personal electrical equipment into their workplace shall obtain permission from their supervisor (who may require that the item be inspected);
- If electrical equipment is faulty, switch off and remove plug from the power socket and report the fault immediately. Do not attempt to repair – this must be carried out by a Competent Electrical Person (e.g. Building Services Contractor);
- Equipment should be switched off at the end of the working day unless it is necessary to remain live for operational reasons (e.g. server machines, printers, fax machines, etc);
- Never work on equipment while it is connected to a power source unless power is necessary;
- Do not use any equipment that has damaged cables;
- Keep all liquids away from electrical equipment;
- The physical and electrical handling of batteries must be performed with great care. PPE must be worn when handling.

## **Electricity on Vessels**

When operations are conducted on board a vessel, you should first determine if an Electrical Permit to Work system is in place. If such a system is in place, your actions must comply with the Permit System.

- Never leave equipment unattended and connected to a live power source with the protective covers removed;
- Ensure sufficient barriers and warning signs are displayed;
- Never touch transmitting antennae of any sort unless you know that there is no possibility of the transmitter being switched on. Always ensure that appropriate signage at the transmitter is displayed, if there is any possibility of it being switched on by

anyone. If it is necessary for you to work in the vicinity of a transmitting antenna, ensure that an agreed-to method of signalling is in place to indicate to a colleague when you want to transmissions to stop and start. Radios are a good source of unambiguous communication;

- All cable runs should be routed out of the way of footways, doors, hatches, wire antennas, portable equipment or any other potential source of injury to personnel or damage to the cable;
- Temporary cables should be supported, protected (either taped or tied off) at intervals dependent on their technical class, location, weight and strength.
- Permanent cables shall be supported to the required technical class and standard;
- All cables installed over doors and walkways are to be secured by metal tie wraps.

## **Lighting**

Staff shall observe the following precautions:

- Light fittings should be kept clean, where practicable;
- Faulty bulbs/fittings/cables, etc. should be reported immediately and be attended to by a Competent Electrical Person;
- Light sources should not be shielded by makeshift screens, as this will create a temperature rise, possibly leading to a fire.

## **Waste and Pollution**

Legislation controlling activities affecting the environment is increasing. By adopting the best practical environmental processes, EGI seeks to attain continuous improvement in its environmental performance.

If you become aware of any environmental non-conformance regarding waste control processes, it is your duty to promptly bring it to the attention of your Supervisor.

Even though some wastes and emissions may not be considered ‘high-risk’, it is important to remember that virtually all of these substances have the potential to cause environmental damage if not correctly managed.

Additionally, whilst on site you should report to your Supervisor any concerns that you may have over activities relating to potential emissions. Suggestions or ideas that you may have relating to how the company may minimise the environmental impact of its activities are welcomed.

EGI encourages all of its employees, subcontractors, vendors and service providers to incorporate responsible environmental practices into your everyday activities away from the workplace, for example when you are in your home.

### **Stop the Job.**

Any individual has the authority and responsibility to STOP THE JOB.

If anyone concerned about the safety of a task stops the job, that person’s decision must be supported, even if it turns out to be based on false reasoning. Being critical of a decision in such circumstances will increase the likelihood of the next job not being stopped when perhaps it should have been.

It is essential that all persons involved in an activity are made fully aware that they have both the authority and the responsibility to stop the job if there is any doubt about the safety of the operation.

Supervisors have a crucial role in this area. They must make clear to all individuals in the work team that they will be fully supported when taking action to stop the job. An individual who stops the job when there is a concern over the safety of the activity should be recognised as doing their job correctly. Any concerns a supervisor may have regarding productivity must not be expressed at this time. Safety must always take priority.

Many incidents happen when conditions at the worksite change, when conditions are not as foreseen, or when there is a deviation from the work programme. It must be made clear to all personnel, especially during toolbox talks, that when such conditions arise the expectation is that the individual or work team will stop the job and re-assess the situation. Only when the reassessment indicates that the risks are being managed properly, are kept as low as reasonably possible and are within what is considered to be acceptable risk, should the task be restarted.

## **Environment**

We as a company consider sustainable management of the environment to be of prime importance in the way we conduct business.

We are firmly committed to continually enhancing our performance through documented procedures and following long term environmental goals sustained by achievable, year on year, environmental targets.

Through utilising a systematic approach to environmental management, via planned procedural auditing, periodic external monitoring of principal & secondary contractors and ongoing training/communication we are evolving a dynamic integrated management system designed to take account of the inherent challenges faced by a business which by its very nature places great demands on the surrounding environment.

Everyone within EGI is responsible for the management of the environment, whether from a hands-on perspective such as spills

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containment/management to ensuring that the relevant legislation is taken into account within the engineering process.

Environmental legislation is a diverse and complicated arena which is continually evolving to account for the many directives, which are to be implemented over the coming years, in complying with, said legislation it is important that we as a company ensure that our impacts are managed in accordance with the minimum environmental standards and procedures set out by our clients.

Ensure that you know and follow your job description; the full requirements and extent of you assigned task and the applicable procedures, work instructions and specifications relating to any facet of environmental management.

Environmental impacts should be considered at all stages of the project process. All aspects of the work process can and will include specific environmental requirements which need to be controlled to ensure we are in compliance with the relevant legislation and adhering to the concept of continuous improvement within our business performance.

### **Acknowledgement**

I acknowledge receipt of my personal copy of this IMS Handbook and confirm that I have attended the Induction course

I agree to abide by the rules and recommendations set out in this handbook. I will seek clarification from my Manager or the QHS&E Manager on any point about which I am unsure.

Signed,

X

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Date: .....

Name (print): .....

## Addendum 1

### AN OVERVIEW OF THE MOST RELEVANT REGULATIONS IN THE USA AND UK

| USA OSHA, NIOSH                                                                                                                                                                                                                                  | UK HSE and corresponding EU Directives                                                                                                                                                                                                               |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 29 CFR § 1910 - Occupational Safety and Health Standards.                                                                                                                                                                                        | <a href="#">Health and Safety at Work etc. Act (1974); Workplace (Health, Safety and Welfare) Regulations (1992); Management of Health and Safety at Work Regulations (1999).</a><br><a href="#">EU Directive 89/391 - OSH "Framework Directive"</a> |
| 29 CFR 1926.500-503 - Working at Heights.                                                                                                                                                                                                        | <a href="#">Work at Height Regulations (2005)</a>                                                                                                                                                                                                    |
| 29 CFR § 1910.334 - Use of Equipment.                                                                                                                                                                                                            | <a href="#">PUWER - Provision and Use of Work Equipment Regulations (1998).</a>                                                                                                                                                                      |
| 29 CFR § 1910.1200 - OSHA's <a href="#">Hazard Communication Standard (HCS)</a> , designed to ensure that information about chemical and toxic substance hazards in the workplace and associated protective measures is disseminated to workers. | <a href="#">EU Directive 98/24/EC - risks related to chemical agents at work.</a>                                                                                                                                                                    |
| 29 CFR § 1910.95 - Occupational noise exposure                                                                                                                                                                                                   | <a href="#">Control of Noise at Work regulations (2005)</a>                                                                                                                                                                                          |

|                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| - OSHA requires employers to implement a hearing conservation program when noise exposure is at or above 85 decibels averaged over 8 working hours, or an 8-hour time-weighted average (TWA). | <a href="#">Directive 2003/10/EC - noise</a> , on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (noise) (Seventeenth individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC). |
|                                                                                                                                                                                               | Electricity at Work Regulations (1989)                                                                                                                                                                                                                                           |
| 29 CFR § 1910.15 - Shipyard employment.                                                                                                                                                       |                                                                                                                                                                                                                                                                                  |
| 29 CFR § 1917.152 - Welding, cutting and heating (hot work).                                                                                                                                  | Asphyxiation hazards in welding and allied processes.<br><a href="https://www.hse.gov.uk/pubns/eis45.pdf">https://www.hse.gov.uk/pubns/eis45.pdf</a>                                                                                                                             |
| 29 CFR § 1917.2 - Definition of hazardous cargo, materials, substance, or atmosphere.                                                                                                         | <a href="https://www.hse.gov.uk/pubns/indg446.pdf">https://www.hse.gov.uk/pubns/indg446.pdf</a>                                                                                                                                                                                  |
| <a href="https://www.osha.gov/SLTC/etools/computerworkstations/components_monitors.html">https://www.osha.gov/SLTC/etools/computerworkstations/components_monitors.html</a>                   | Health and Safety (Display Screen Equipment) Regulations 1992<br><a href="#">Directive 90/270/EEC - display screen equipment</a> on minimum safety and health requirements for work with display screen equipment.                                                               |
| 29 CFR § 1926.753 - Hoisting and rigging.<br><a href="https://www.ihsa.ca/PDFs/Products/Id/M035.pdf">https://www.ihsa.ca/PDFs/Products/Id/M035.pdf</a>                                        | Lifting Operations and Lifting Equipment Regulations 1998 (LOLER)<br><a href="https://www.hse.gov.uk/pubns/indg290.pdf">https://www.hse.gov.uk/pubns/indg290.pdf</a>                                                                                                             |
| 29 CFR Subpart I - PPE                                                                                                                                                                        | <a href="#">PPE at Work (1992)</a>                                                                                                                                                                                                                                               |

|                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>OSHA does not have a standard which sets limits on how much a person may lift or carry. NIOSH has developed a mathematical model that helps predict the risk of injury based on the weight being lifted and other criteria. The model is incorporated in the Applications Manual for the Revised NIOSH Lifting Equation<br/> <a href="http://www.cdc.gov/niosh/docs/94-110/">http://www.cdc.gov/niosh/docs/94-110/</a></p> | <p>Manual Handling Operations Regulations (1992) <a href="#">EU Directive 90/269/EEC</a> - <a href="#">manual handling of loads</a> on minimum health and safety requirements for the manual handling of loads where there is a risk particularly of back injury.<br/> <a href="https://osha.europa.eu/en/publications/factsheets/73">https://osha.europa.eu/en/publications/factsheets/73</a></p> |
| <p>29 CFR § 1910.146 - Permit-required confined spaces. <a href="https://www.osha.gov/Reduction_Act/CON-SPA3.html">https://www.osha.gov/Reduction_Act/CON-SPA3.html</a></p>                                                                                                                                                                                                                                                   | <p>Confined Spaces Regulations (1997)<br/> <a href="https://www.hse.gov.uk/pubns/indg258.pdf">https://www.hse.gov.uk/pubns/indg258.pdf</a></p>                                                                                                                                                                                                                                                     |

## Addendum 2



# MSDS Material Safety Data Sheet FUEL OIL

### 1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION

**Trade name:** INTERMEDIATE MARINE FUEL  
**Product code:** IFO  
**Suppliers name and address:** OilChart UK Ltd  
 90 Long Acre, Covent Garden  
 London, WC2E 9RZ  
 UK  
**Routine inquiries:** Phone: +44 (0) 208 747 3611  
 e-mail: offshore@oilchart.com

### 2. COMPOSITION/INFORMATION ON INGREDIENTS

| Components                                                                                                                                                                                                                                                                                          | CAS no. | range in % |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------------|
| Atmospheric tower petroleum residues (CAS No. 64741453) or light vacuum petroleum residues (CAS No. 64741566) blended with heavy catalytic cracked petroleum distillates (CAS No. 64741599), catalytic cracked clarified petroleum oils (CAS No. 64741624) or pyrolysis fuel oil (CAS No. 69013214) |         |            |

### 3. HAZARD IDENTIFICATION

#### EMERGENCY OVERVIEW:

#### WARNING STATEMENT:

AVOID PROLONGED AND REPEATED SKIN CONTACT. IF SKIN CONTACT OCCURS, WASH EXPOSED AREA WITH SOAP AND WATER.

LAUNDRY CONTAMINATED CLOTHING

FLAMMABLE

MAY BE HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN.

USE ONLY AS A FUEL.

#### EFFECTS OF OVEREXPOSURE:

##### SKIN:

Brief contact may cause slight irritation. Repeated or prolonged contact may cause more severe irritation and discomfort, seen as local oil acne, redness, itching, inflammation, cracking and possible secondary infection. May cause allergic reactions in some individuals. Absorption from prolonged or repeated skin contact may cause systemic toxicity.

Skin contact may produce a sunburn-like condition through an increased sensitivity to sunlight or other light sources. Contact with heated material may cause thermal burns.

##### EYE:

May cause irritation, experienced as mild discomfort and seen as slight excess redness of the eye.

##### INHALATION:

May cause respiratory tract irritation. May release toxic hydrogen sulfide vapors and cause harmful central nervous system effects. Effects may include headache, dizziness, drowsiness, blurred vision, fatigue, tremors, convulsions, loss of consciousness, coma, respiratory arrest and death.

#### INGESTION:

May be irritating to mouth, throat, and stomach. Symptoms may include pain, nausea, vomiting, and diarrhea.

#### LONG TERM TOXIC EFFECTS:

Suspect cancer hazard. Contains a component(s) that may cause cancer. Risk of cancer depends on duration and level of exposure.

Toxic gas hazard.

See section 11 for additional information.

### 4. FIRST AID

#### SKIN CONTACT:

Wash skin thoroughly with plenty of water, using soap if available. Remove contaminated clothing. In case of burns through contact with hot product, cool with plenty of running water. Get medical attention.

#### EYE CONTACT:

Rinse immediately with plenty of water until irritation subsides, or at least 15 min. Hold eyelids apart while flushing to rinse entire surface of eye and lids with water. Splashes of hot product should be immediately flushed with clean water until irritation subsides. Get immediate medical attention.

#### INHALATION:

In emergency situations use proper respiratory protection to immediately remove the affected victim from exposure. If not breathing, ensure clear airway. Remove to fresh air. Administer artificial respiration if breathing has stopped. If breathing is difficult, qualified medical personnel may administer oxygen. Keep at rest. Call for prompt medical attention.

#### INGESTION:

If swallowed, DO NOT induce vomiting. Aspiration of the material can cause serious lung injury such as chemical pneumonia. Call a doctor immediately if spontaneous vomiting occurs, keep head below hips to prevent aspiration and monitor for breathing difficulty. Never give anything by mouth to an unconscious person.

#### ADVICE TO DOCTOR:

This product may present an aspiration hazard. See related comments in this MSDS. If spontaneous vomiting has occurred after ingestion, the patient should be monitored for difficult breathing, as adverse effects of aspiration into the lungs may be delayed up to 48 hours. The use of nitrites in H2S poisoning is recommended as part of the treatment regimen, although the efficacy has not been unequivocally demonstrated. Hyperbaric oxygen therapy (as used in cyanide poisoning with some success) may also benefit if other measures are ineffective.

### 5. FIRE-FIGHTING MEASURES

#### APPROPRIATE EXTINGUISHING MEDIA:

Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish flames.

#### INAPPROPRIATE EXTINGUISHING MEDIA:

Straight Streams of Water

#### FIRE EXTINGUISHING AGENTS:

Combustible material, low hazard. The product can form flammable mixtures or can burn only on heating above the flash point. However, in a small percentage of residual fuels, light hydrocarbon components can generate flammable headspace gases not detectable by the flash point test.



# MSDS

## Material Safety Data Sheet

### FUEL OIL

If leak or spill has not ignited, ventilate area and use water spray to disperse gas or vapor and to protect personnel attempting to stop leak. Use water to flush spills away from sources of ignition.

#### SPECIAL FIRE-FIGHTING PROCEDURES:

Water fog or spray, to cool fire-exposed surfaces (e.g. containers) and to protect personnel, should only be used by personnel trained in fire fighting. Cut off "fuel", depending on circumstances, either allow the fire to burn out under controlled conditions or use foam or dry chemical powder to extinguish the fire.

Respiratory and eye protection required for fire fighting personnel exposed to fumes or smoke.

#### HAZARDOUS COMBUSTION PRODUCTS:

Smoke, sulphur oxides, and carbon monoxide in the event of incomplete combustion. Possible release of hydrogen sulphide during heating or hot storage.

## 6. ACCIDENTAL RELEASE MEASURES

#### PERSONAL PRECAUTIONS:

See Section 8.

#### NOTIFICATION PROCEDURES:

In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations. In the event of a spill or accidental release, notify immediately relevant authorities in accordance with all applicable regulations. US regulations require reporting releases of this material to the environment which exceed the applicable reportable quantity or oil spills which could reach any waterway including intermittent dry creeks. Isolate spill or leak area immediately for at least 25 to 50 meters (80 to 160 feet) in all directions. Stay upwind. Keep out of low areas. Ventilate closed spaces before entering.

STOP LEAK IF YOU CAN DO IT WITHOUT RISK.

#### PROTECTIVE MEASURES:

Avoid contact with spilled material. Warn or evacuate occupants in surrounding and downwind areas if required due to toxicity or flammability of the material. See Section 5 for fire fighting information. See the Hazard Identification Section for Significant Hazards. See Section 4 for First Aid Advice. See Section 8 for Personal Protective Equipment.

#### SPILL MANAGEMENT:

##### LAND SPILL:

Shut off source taking under normal safety precautions. Prevent liquid from entering sewers, water courses or low lying areas; advise the relevant authorities if it has, or if it contaminates soil/vegetation. Take measures to minimise the effects on ground water.

Recover by skimming or pumping using explosion-proof equipment, or contain spilled liquid with booms, sand, or other suitable absorbent and remove mechanically into containers. If necessary, dispose of adsorbed residues as directed in Section 13.

##### WATER SPILL:

Contain the spill immediately with booms. Warn other shipping. Notify port and other relevant authorities.

Remove from the surface by skimming or with suitable absorbents. Disperse the residue in unconfined waters, if permitted by local authorities and environmental agencies.

#### ENVIRONMENTAL PRECAUTIONS:

Large Spills: Dike for ahead of liquid spill for later recovery and disposal. Prevent entry into waterways, sewers, basements or confined areas.

## 7. HANDLING AND STORAGE

#### HANDLING:

Avoid contact with skin. Use proper bonding and/or grounding procedures. Prevent small spills and leakage to avoid slip hazard. Material can accumulate static charges which may cause an electrical spark (ignition source).

#### STORAGE:

Keep container closed. Handle containers with care. Open slowly in order to control possible pressure release. Store in a cool, well-ventilated area. Storage containers should be grounded and bonded. Drums must be grounded and bonded and equipped with self-closing valves, pressure vacuum bungs and flame arresters.

## 8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

#### ENGINEERING CONTROLS:

Ventilation and other forms of engineering controls are often the preferred means for controlling chemical exposure.

#### EYE/FACE PROTECTION:

Avoid eye contact. The wearing of chemicals safety goggles or face shield is recommended.

#### SKIN PROTECTION:

Avoid contact with skin or clothing. Skin contact can be minimized by wearing impervious protective clothing including gloves. Protective clothing made from neoprene, nitrile, or n-butyl rubber is suitable in these applications.

Exposed employees should exercise reasonable personal cleanliness; this includes cleansing exposed skin several times daily with soap and water, and laundering or dry cleaning soiled work clothing at least weekly.

#### RESPIRATORY PROTECTION:

If engineering controls do not maintain airborne contaminant concentrations at a level which is adequate to protect worker health, an approved respirator may be appropriate. Respirator selection, use, and maintenance must be in accordance with regulatory requirements, if applicable. Types of respirators to be considered for this material include:

No special requirements under ordinary conditions of use and with adequate ventilation. For high airborne concentrations, use an approved supplied-air respirator, operated in positive pressure mode. Supplied air respirators with an escape bottle may be appropriate when oxygen levels are inadequate, gas/vapor warning properties are poor, or if air purifying filter capacity/rating may be exceeded.

#### PERSONAL PROTECTION:

In open systems where contact is likely, wear safety goggles, chemical-resistant overalls, and chemically impervious gloves.

Where only incidental contact is likely, wear safety glasses with side shields. No other special precautions are necessary provided skin/eye contact is avoided.



## MSDS Material Safety Data Sheet FUEL OIL

### 9. PHYSICAL AND CHEMICAL PROPERTIES

|                                         |                                                      |
|-----------------------------------------|------------------------------------------------------|
| <b>★ BOILING POINT:</b>                 | > 204.4 °C                                           |
| <b>★ FLASH POINT:</b>                   | > 60 °C                                              |
| <b>FLAMMABILITY:</b>                    | Not determinate                                      |
| <b>VAPOUR PRESSURE:</b>                 | Negligible                                           |
| <b>VAPOUR DENSITY AT 1 BAR (Air=1):</b> | Heavier than air                                     |
| <b>DENSITY:</b>                         | g/ml. at 15 °C range 0.94 - 1.01 (varies with grade) |
| <b>AUTO-IGNITION:</b>                   | Not determinate                                      |
| <b>VISCOSITY:</b>                       | mm2/s: 30-700 at 50 °C                               |
| <b>★ POUR POINT:</b>                    | < 10 °C                                              |
| <b>BENZENE:</b>                         | Not determinate                                      |
| <b>★ HYDROGEN SULPHIDE:</b>             | Not determinate                                      |
| <b>SULPHUR:</b>                         | < 4.5%                                               |
| <b>★ APPEARANCE / ODOUR:</b>            | Black viscous liquid with a petroleum oil odour      |

### 10. STABILITY AND REACTIVITY

#### STABILITY:

Material is stable under normal conditions.

#### CONDITIONS TO AVOID:

Open flames and high energy ignition sources.

#### INCOMPATIBLE MATERIALS:

Avoid contact with strong oxidants such as liquid chlorine and concentrated oxygen.

#### HAZARDOUS DECOMPOSITION PRODUCTS:

Material does not decompose at ambient temperatures.

#### HAZARDOUS POLYMERIZATION:

Will not occur.

### 11. TOXICOLOGICAL INFORMATION

#### EFFECTS OF OVER EXPOSURE:

**SKIN CONTACT:** Prolonged or repeated contact may dry and deplete the skin, leading to irritation and possibly dermatitis.

Prolonged or repeated contact may also lead to more serious skin disorders, including skin cancer.

Exposure to hot material may cause thermal burns.

**EYE CONTACT:** Hot splashes may cause eye burns and permanent tissue damage.

**INHALATION:** Negligible hazard at ambient/normal handling temperatures. In high concentrations and/or at elevated temperatures, vapour or mist is irritating to mucous membranes, may cause headaches and dizziness, may be anaesthetic and may cause other central nervous system effects.

Contains small amount of hydrogen sulphide which can accumulate to dangerous levels in the air space above the material.

**INGESTION:** Minute amounts aspirated into the lungs during ingestion or vomiting may cause severe pulmonary injury and death.

**CHRONIC:** Lifetime skin painting tests indicate that materials of similar composition have produced skin cancer in experimental animals. The relationship of these results to humans has not been fully established.

Contains polynuclear aromatic hydrocarbons (PNAs). Prolonged and/or repeated skin contact with certain PNAs has been shown to cause skin cancer. Prolonged and/or repeated exposures by inhalation of certain PNAs may also cause cancer of the lung and of other sites of the body.

### TOXICITY DATA:

**ACUTE:** The exact composition of this product may vary and the potential health hazards described were based upon the possible components.

**CHRONIC:** Based on what is known of this product and of materials of similar composition and refining history, this product would be expected to have carcinogenic potential.

### 12. ECOLOGICAL INFORMATION

In the absence of specific environmental data for this product, this assessment is based on information for general hydrocarbon components found in residual fuels. Residual fuels, immediately following a release into the environment, will remain largely on the soil surface, and in water, will distribute largely between the water and sediment surfaces. Based on chemical/physical information from the literature for selected components in this product, harmful effects to terrestrial and aquatic habitats could occur. This product is expected to be resistant to biodegradation and to persist in the environment.

### 13. DISPOSAL CONSIDERATIONS

This product contains hazardous ingredients listed in Section 2. Collect and dispose of it at an authorised disposal facility, in conformance with national and local regulations, and in accordance with directives on hazardous waste, etc.

### 14. TRANSPORT INFORMATION

#### USUAL SHIPPING CONTAINERS:

Tankers, rail cars, tank trucks, drums. Do not use galvanised steel, zinc/lead or zinc/copper alloys or natural rubber tank material.

#### TRANSPORT TEMPERATURE:

deg. C: 10 - 60

#### AIR (IATA):

Not Regulated for Air Transport

### 15. REGULATORY INFORMATION

For current health and safety information on marine fuels, contact any Sales representative in the country where the bunker purchase took place.

### 16. OTHER INFORMATION

#### PRODUCT TYPE / USES:

Heavy fuel oil for large slow speed marine diesel engines, steamships and as blending stock for intermediate marine diesel fuels.

#### SOURCE OF KEY DATA:

The recommendations presented in this Material Safety Data Sheet were compiled from actual test data (when available), comparison with similar products, component information from suppliers and from recognised codes of good practice.

### NOTE

The information and recommendations contained herein are, to the best of knowledge and belief, accurate and reliable as of the date issued, but are offered without guarantee or warranty. They relate to the specific material designated and may not be valid for such material used in combination with any other materials or in any process. Conditions of use of the material are under the control of the user; therefore, it is the user's responsibility to satisfy himself as to the suitability and completeness of such information for his own particular use.

### END

## **APPENDICES X COVID POLICES**

| SAFETY MANAGEMENT MANUAL |      |                    |   |                                                     |
|--------------------------|------|--------------------|---|-----------------------------------------------------|
| SMS - SECTION 16         |      |                    |   | Title<br><b>COVID 19 Precautions and Procedures</b> |
| Company                  |      | Eclipse Group Inc. |   |                                                     |
| Date                     | Rev. | 05/01/20           | 0 |                                                     |

Rest assured that the safety and wellbeing of crew and passengers is of the utmost priority. Resources, medical and operational, will be available to provide you and all onboard personnel proper protection, support and assistance.

## PRIOR TO BOARDING

It is the responsibility of:

1. **Charter/Contract Department-** to issue a COVID-19 Health Declaration Form to any client or any of their personnel visiting or joining the vessel
2. **Crewing Department-** to issue the COVID-19 Health Declaration Form to all crew prior to joining vessel.
3. **Vessel-** to issue the COVID-19 Health Declaration Form to any visitors coming on board who have not received a copy by any of the means above.

The completed COVID-19 Health Declaration Form must be completed and returned to the person who sent the form 24 **hours** prior to boarding for review.

If access is granted the complete form should be emailed to the Vessel Project Manager [pmurphy@eclipse.us.com](mailto:pmurphy@eclipse.us.com) with a copy sent to the Managing Director/ Designated Person (DP) [ssaintamour@eclipse.us.com](mailto:ssaintamour@eclipse.us.com)

**NOTE:** It is the responsibility of the individual and the departments listed above to ensure compliance in this process. If the process is not followed this will result in access to R/V Bold Horizon being denied.

## COVID-19 HEALTH DECLARATION FORM

1. QUESTION 1: If yes has been checked in either box, the individual shall be denied access and informed immediately.
2. QUESTION 2: If yes has been checked in all boxes the individual shall be denied access and informed immediately. (see 3 for further information)
3. QUESTION 3: Access shall be granted even if **YES** has been checked in question 2, if a valid medical certificate is present confirming the ailment is not COVID-19 related and is more than 4 days old.
4. **ACCESS SHALL BE DENIED:**
  - If the individual refuses to complete the form
  - The form is not submitted by the deadline

## ADMINISTRATIVE USE OF THE FORM

### Purpose – written health record of an onboarding individual

Prior to boarding:

1. The individual must confirm submitted form responses are still accurate.
2. The individual's temperature shall be checked and completed in the relevant section.
3. If the individual has an elevated temperature of 100° F, access shall be temporarily denied, until the temperature is checked again after at least 30 minutes. The individual is not allowed to medicate with fever reducing drugs during this examination period. If the temperature is unchanged or rising, vessel access shall be denied. Individual shall be advised to seek medical attention.

| SAFETY MANAGEMENT MANUAL |      |                    |                                                         |  |   |
|--------------------------|------|--------------------|---------------------------------------------------------|--|---|
| SMS - SECTION 16         |      |                    | Title<br><br><b>COVID 19 Precautions and Procedures</b> |  |   |
| Company                  |      | Eclipse Group Inc. |                                                         |  |   |
| Date                     | Rev. | 05/01/20           |                                                         |  | 0 |

**NOTE:** The Captain must decide where this process shall take place based on gangway configuration.

## SUSPECTED COVID-19 CASE ON BOARD

**NOTE:**

- ✓ All communications to the USCG, CDC or any media organization shall be initiated by and through the DP [ssaintamour@eclipse.us.com](mailto:ssaintamour@eclipse.us.com).
- ✓ Ensure all personnel onboard are aware of the SOCIAL MEDIA POLICY and the importance of protecting the family of any person who may be infected.

### 1. IF A CREW MEMBER FEELS UNWELL OR SUSPECTS CONTAGION AT SEA

Immediately take their temperature and if above 100° F or more, isolate the individual in a pre-determined cabin and report the situation to the Captain or Vessel Project Manager (VPM). The Captain and/or VPM will contact the Managing Director/ DP who is responsible for notifying the Port Captain, USCG and the CDC. This chain of command is paramount in safely managing the vessel operations during a potential contagious viral infection.

Inform crew and passengers to maintain a perimeter distance of 6 feet from the infected crewmember. Sanitize all regularly used spaces with proper disinfectant. Washing hands on a regular basis shall be a routine requirement.

- ✓ 6 hourly disinfection regimes of all hand rails, work surfaces and other areas touched by hands.
- ✓ 12 hourly disinfection of other areas such as flooring and bulkheads

Updates on the situation on board should be sent to the DP [ssaintamour@eclipse.us.com](mailto:ssaintamour@eclipse.us.com) as determined, but at a minimum every 24 hours at noon EST.

#### 1.1 CARE FOR A SUSPECTED COVID-19 CASE

- ✓ One individual shall be assigned to provide support and care to the patient.
- ✓ Both the patient and the caregiver should be provided with personal protection equipment (PPE).

#### Food should be provided to the patient in the following manner:

1. Food shall be placed on a tray outside the cabin.
2. The cabin door shall be opened by the patient once the designated person has retreated
3. Once the food is consumed, the tray shall be kept in the cabin until collected
4. Face mask and latex gloves will be worn at all times by the designated caregiver
5. All utensils should be washed and disinfected separately from any other items
6. Sealable waste bags shall be provided to the patient. These will be collected at the same time as the tray is collected.
7. The designated caregiver shall place waste in a second bag and dispose of properly
8. Any laundry- shall be double bagged, washed thoroughly with hot water and detergent and returned in a sealed bag.

| SAFETY MANAGEMENT MANUAL |      |                    |   |                                                         |
|--------------------------|------|--------------------|---|---------------------------------------------------------|
| SMS - SECTION 16         |      |                    |   | Title<br><br><b>COVID 19 Precautions and Procedures</b> |
| Company                  |      | Eclipse Group Inc. |   |                                                         |
| Date                     | Rev. | 05/01/20           | 0 |                                                         |

### 1.2 Staying up to date:

- ✓ The patient should report symptoms and measure their own temperature on a regular basis. All results shall be given to their caretaker to be recorded. If symptoms become increasingly worse, medical guidance should be taken from authorities on shore.
- ✓ The infected individual must remain in isolation until there has been a clear 14 days without evidence of symptoms, unless cleared by shore side medical professional or facility.

### 1.3 ACTIONS FOR ALL OTHER ONBOARD PERSONNEL

- ✓ Check temperature of all onboard personnel and keep the Managing Director/DP advised of the findings. Identify any personnel who may be in a higher risk category (diabetes, heart, lung or kidney disorders). DP shall obtain medical advice on treatment.
- ✓ If the vessel is in port, you may not be able to move safely. Therefore, advise the Managing Director/DP who will liaise with the port on necessary actions.

## 2. IF YOU ARE AT PORT WHEN YOU FIND AN UNWELL CREW MEMBER

- ✓ If at port or at port anchorage, you should immediately report to the Managing Director/DP who will contact the appropriate shore authorities. The infected individual should be isolated in a predetermined cabin immediately and have their temperature checked. The Port Authorities will provide advice on the available facilities to treat the crewmember.
- ✓ If the port will not take the sick seafarer to a medical facility, then you will have no choice but to keep the individual isolated and follow steps as per protocol 1. above.

## NO ONE SHOULD GO ASHORE

### 3. IF AT SEA AND SCHEDULED TO ARRIVE AT PORT WITHIN HOURS

Take the temperature of all personnel on board including the unwell individual and isolate them in a cabin as per protocol 1. above. Report to the Managing Director/DP who will provide advice on the next steps, including arriving at Port.

### 4. STEPS TO BE TAKEN SHOULD SOMEONE DIE DUE TO THE VIRUS ON BOARD

Isolate the body as per any loss of life on board and advise the Managing Director/DP immediately. Maintain a close watch on all persons on board by taking temperatures and ensuring actions are taken as per protocol 1. above.

The Managing Director/DP will contact the authorities and inform the vessel of the appropriate location for disembarkation of the body. DP will also notify the family of the deceased. Again, the Chain of Command here is paramount to appropriately manage the death of an individual on board the vessel.

*There shall be no social media, email or text messaging about the deceased until after the next of kin are notified. Doing so will result in immediate termination of offender.*

| SAFETY MANAGEMENT MANUAL |      |                    |                                                         |  |   |
|--------------------------|------|--------------------|---------------------------------------------------------|--|---|
| SMS - SECTION 16         |      |                    | Title<br><br><b>COVID 19 Precautions and Procedures</b> |  |   |
| Company                  |      | Eclipse Group Inc. |                                                         |  |   |
| Date                     | Rev. | 05/01/20           |                                                         |  | 0 |

## 5. SHORE LEAVE IF THERE IS AN INFECTION ON BOARD

It is highly unlikely that the Port Authority will allow anyone ashore if there is an infection on board or an infection in the region of the port.

### NOTE:

The Managing Director and Designated Person (DP) listed above, for the purpose of this document can be identified in the R/V Bold Horizon SMS Section 4. All contact information is provided in R/V Bold Horizon SMS Section 4.

| SAFETY MANAGEMENT MANUAL |                   |                 |                                                                                          |  |
|--------------------------|-------------------|-----------------|------------------------------------------------------------------------------------------|--|
| SMS - SECTION 17         |                   |                 | <div style="text-align: center;"> Title<br/> <b>COVID Health Declaration Form</b> </div> |  |
| Company                  | Eclipse Group Inc |                 |                                                                                          |  |
| Date                     | Rev.              | 06/01/20      0 |                                                                                          |  |

**Important Note:** To prevent the spread of novel coronavirus in our community and reduce the risk of exposure to our employees and visitors, we are conducting a simple screening questionnaire which is to be completed and submitted at a minimum 24 hours before visiting an Eclipse Group Inc facility or boarding the R/V Bold Horizon. Your participation is mandatory to ensure precautionary measures to protect you and others are implemented. All information received will be processed in accordance to HIPPA regulations. Please complete the questions honestly and to the best of your knowledge and email return to sender. If the completed form is not received and approved, access will be denied to EGI facility and/or RV Bold Horizon. Thank you for your responses.

NAME: \_\_\_\_\_ COMPANY: \_\_\_\_\_

VISIT DATE: \_\_\_\_\_ VISIT PURPOSE: \_\_\_\_\_

QUESTIONS YES/NO

1. Did you, in the past 14 days, come in close contact with someone who:

a. Is a confirmed COVID-19 case?

b. Is part of a COVID-19 cluster?

2. Do you have flu like symptoms?

Fever

Cough

Difficulty breathing (shortness of breath)

Any other symptoms

If so, please Specify:

3. If you have answered **YES** to any of the above questions, have you visited a Doctor and what was the diagnosis? Please specify:

4. Have you been in contact with anyone who has the aforementioned symptoms in the last 10 days? Please Specify:

| SAFETY MANAGEMENT MANUAL |      |                   |   |                                                                                          |
|--------------------------|------|-------------------|---|------------------------------------------------------------------------------------------|
| SMS - SECTION 17         |      |                   |   | <div style="text-align: center;"> Title<br/> <b>COVID Health Declaration Form</b> </div> |
| Company                  |      | Eclipse Group Inc |   |                                                                                          |
| Date                     | Rev. | 06/01/20          | 0 |                                                                                          |

**NOTE:** Your body temperature will be checked prior to entering the office or boarding our Vessel.

**Declaration:** I hereby declare the above information to be true and correct. If, there is any change in circumstance I will inform Eclipse Group Inc and/or R/V Bold Horizon immediately.

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_

***PLEASE EMAIL COMPLETED AND SIGNED FORM TO SENDER AT THIS POINT***

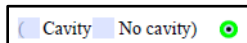
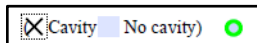
| FOR MGMT USE PRIOR TO CLIENT, VENDOR OR CREW BOARDING |
|-------------------------------------------------------|
| TEMPERATURE READING: _____ °F                         |
| DATE:                                                 |
| TIME:                                                 |
| READING ADMINISTERED BY (NAME):                       |
| POSITION:                                             |
| SIGNATURE:                                            |

# Instructions for the Maritime Conveyance Illness or Death Investigation Form

Please download this form, type the vessel name at the top of the form, and save it for future use.

## Completing and submitting

- Complete this form as specified by [www.cdc.gov/quarantine/cruise-reporting-guidance.html](http://www.cdc.gov/quarantine/cruise-reporting-guidance.html) or [www.cdc.gov/quarantine/cargo-reporting-guidance.html](http://www.cdc.gov/quarantine/cargo-reporting-guidance.html).
- Remember to use a separate form for each ill or deceased person.
- Note that all fields with **red text and an asterisk symbol (\*)** are required. These fields include: Person filling out form, E-mail, Type of notification, Type of traveler, Conveyance type, Vessel company/name, Country of departure, Departure date, Next U.S. port and state, Arrival date at next U.S. port, Embarkation port, Embarkation date, at least one Sign, Symptom, or Condition, and Presumptive diagnosis/cause of death.
- Please note that for some questions (temperature unit, rash type, cough type, chest x-ray result, and presence of cavity) you won't be able to clear your selection by unclicking the box. To clear your selection you should click on the green default circle located to the right of the main selections. For example, if 'cavity' is checked in error, you may clear the selection by clicking the green default circle to the right of 'no cavity.' See images below.



- For more information about the fields on this form, visit: [www.cdc.gov/quarantine/key-fields.html](http://www.cdc.gov/quarantine/key-fields.html).
- Submit to the [CDC Quarantine Station](#) with jurisdiction over the **next U.S. seaport of arrival** by one of the methods described below.

## Instructions by section

**Sections 1–4** (Quarantine Station Notification, Vessel Information, Medical History, and Evaluation of Ill or Deceased Person)

- To complete **Sections 1–4**, you may type directly into the form, or print and fill out by hand.
- To submit the form, choose from the following options:
  1. Click on the gray “**Send Via E-mail**” button in the upper left-hand corner of the form (Note: In order to use this option, your e-mail account must be set up to automatically generate an e-mail message from a PDF), or save the form, then attach to your e-mail and send it to [MaritimeAdmin@cdc.gov](mailto:MaritimeAdmin@cdc.gov), or
  2. Look up the contact information for the [CDC Quarantine Station](#) with jurisdiction over the next U.S. seaport of arrival at [www.cdc.gov/quarantine/QuarantineStationContactListFull.html](http://www.cdc.gov/quarantine/QuarantineStationContactListFull.html) and send by **fax**, or
  3. By **telephone**.
- A confirmation e-mail will be sent to the e-mail address that was entered on the form within 1-2 business days. The quarantine station will contact you if follow-up information is needed.
- If you don't receive confirmation of your report, or if you have any questions, please contact the [CDC Quarantine Station](#) with jurisdiction over the next U.S. port of arrival, the CDC Emergency Operations Center at 770-488-7100, or the Maritime Activity Administrator ([MaritimeAdmin@cdc.gov](mailto:MaritimeAdmin@cdc.gov)).

**Section 5** (General Information About Ill or Deceased Person)

- **Please DON'T submit Section 5 unless the quarantine station asks you to do so.**
- To complete **Section 5**, **print out** the form and **fill in by hand**. This section contains personally identifiable information (PII), so you won't be able to type into the fillable PDF form.
- **Submit by fax or telephone.**
- **Do not submit any forms with PII to CDC through e-mail.**

PII is any information that can be used alone or in combination to identify an individual. This includes names, addresses, phone numbers, dates (birth, hospital admission, travel), identifying numbers (passport, social security, driver's license, alien), medical records, photographs, and for rare diseases, geographic locations.

## Reminder to cruise ships

1. Report cumulative influenza and influenza-like illness (ILI) cases (including zero) for each voyage with the Maritime Conveyance Cumulative Influenza/ Influenza-Like Illness (ILI) Form: [www.cdc.gov/quarantine/cumulative-form.html](http://www.cdc.gov/quarantine/cumulative-form.html). Influenza and ILI are defined as fever (temperature of 100°F [37.8°C] or greater) and a cough and/or a sore throat without a KNOWN cause other than influenza.
2. Send gastrointestinal (GI) illness reports to CDC's Vessel Sanitation Program (VSP). For more information call 800-323-2132 or visit <http://www.cdc.gov/nceh/vsp/>.
3. Report a case of Legionnaires' disease by sending an e-mail to [travellegionella@cdc.gov](mailto:travellegionella@cdc.gov).



Send Via Email

Form Approved  
OMB Control No.0920-0134 (Section 1-3), Exp 9/30/2017  
OMB Control No. 0920-0821 (Section 4-5), Exp 4/30/2016

# Maritime Conveyance Illness or Death Investigation Form

## U.S. Centers for Disease Control and Prevention

### Section 1. Quarantine Station Notification

|                              |                                                                    |                       |                                                                     |                      |                                                                                                       |
|------------------------------|--------------------------------------------------------------------|-----------------------|---------------------------------------------------------------------|----------------------|-------------------------------------------------------------------------------------------------------|
| Person filling out form (*): |                                                                    | Phone:                |                                                                     | E-mail (*):          |                                                                                                       |
| Type of notification (*):    | <input type="checkbox"/> Illness<br><input type="checkbox"/> Death | Type of traveler (*): | <input type="checkbox"/> Crew<br><input type="checkbox"/> Passenger | Conveyance type (*): | <input type="checkbox"/> Cruise ship <input type="checkbox"/> Cargo<br><input type="checkbox"/> Other |

### Section 2: Vessel Information

|                           |                                    |                |                                            |                                                     |             |
|---------------------------|------------------------------------|----------------|--------------------------------------------|-----------------------------------------------------|-------------|
| Vessel company/name (*):  |                                    | Voyage number: |                                            | Number on board:                                    |             |
|                           |                                    |                |                                            | Crew:                                               | Passengers: |
| Country of departure (*): | Departure date (*) & time (24 hr): |                | Arrival date & time (24 hr) at final port: |                                                     |             |
|                           | mm / dd / yyyy hh : mm             |                | mm / dd / yyyy hh : mm                     |                                                     |             |
| Itinerary:                |                                    |                |                                            |                                                     |             |
| Next U.S. port (*):       |                                    |                |                                            | Arrival date (*) & time (24 hr) at next U.S. port : |             |
|                           |                                    |                |                                            | mm / dd / yyyy hh : mm                              |             |

### Person information while onboard vessel:

|                       |                                   |                                                                        |                      |
|-----------------------|-----------------------------------|------------------------------------------------------------------------|----------------------|
| Cabin number:         | If crew, list job title & duties: | If crew member has contact with passengers, describe extent/frequency: |                      |
|                       |                                   |                                                                        |                      |
| Embarkation port (*): | Embarkation date (*):             | Disembarkation port:                                                   | Disembarkation date: |
|                       | mm / dd / yyyy                    |                                                                        | mm / dd / yyyy       |

### Section 3: Medical History

Include relevant medical history of ill or deceased person (present illness, other medical problems, vaccinations, overseas physician diagnosis, etc.):

#### Signs, Symptoms, and Conditions (\*) [Check all that apply] :

|                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> FEVER ( $\geq 100^{\circ}\text{F}$ or $\geq 38^{\circ}\text{C}$ ) <b>OR</b> history of feeling feverish/ having chills in past 72 hrs<br>Onset date:<br>Current temperature: $^{\circ}\text{F/C}$ <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="radio"/>                                                     | <input type="checkbox"/> Difficulty breathing/shortness of breath<br>Onset date:<br><input type="checkbox"/> Swollen glands<br>Onset date:<br>Location: <input type="checkbox"/> Head/neck <input type="checkbox"/> Armpit <input type="checkbox"/> Groin                                                                          | <input type="checkbox"/> Decreased consciousness<br>Onset date:<br><input type="checkbox"/> Recent onset of focal weakness and/or paralysis<br>Onset date:<br><input type="checkbox"/> Unusual bleeding<br>Onset date:<br><input type="checkbox"/> Obviously unwell<br><input type="checkbox"/> Chronic condition<br><input type="checkbox"/> Asymptomatic<br><input type="checkbox"/> Injury<br><input type="checkbox"/> Other signs, symptoms, conditions: |
| <input type="checkbox"/> Rash<br>Onset date:<br>Appearance:<br><input type="checkbox"/> Maculopapular <input type="checkbox"/> Vesicular/Pustular <input checked="" type="radio"/><br><input type="checkbox"/> Purpuric/Petechial <input type="checkbox"/> Scabbed <input type="checkbox"/> Other                                                                 | <input type="checkbox"/> Vomiting<br>Onset date:<br># of times in past 24 hrs:<br><input type="checkbox"/> Diarrhea<br>Onset date:<br># of times in past 24 hrs:<br><input type="checkbox"/> Jaundice<br>Onset date:<br><input type="checkbox"/> Headache<br>Onset date:<br><input type="checkbox"/> Neck stiffness<br>Onset date: |                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <input type="checkbox"/> Conjunctivitis/eye redness<br>Onset date:<br><input type="checkbox"/> Coryza/runny nose<br>Onset date:<br><input type="checkbox"/> Persistent cough<br>Onset date:<br><input type="checkbox"/> With blood <input type="checkbox"/> Without blood <input checked="" type="radio"/><br><input type="checkbox"/> Sore throat<br>Onset date: |                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

|                   |                |                           |
|-------------------|----------------|---------------------------|
| Deceased persons: | Date of death: | Time of death (24 hours): |
|                   | mm / dd / yyyy | hh : mm                   |

#### Presumptive diagnosis/cause of death (\*):

During the past 3 weeks, has anyone (onboard ship or disembarked) had similar signs and symptoms? (Please verify by a medical log review):

|                                                     |                            |
|-----------------------------------------------------|----------------------------|
| <input type="checkbox"/> No                         |                            |
| <input type="checkbox"/> Yes*, total # ill of crew: | total # ill of passengers: |
| <input type="checkbox"/> Unknown                    |                            |

\*If yes, please fill in a new form for each person in the cluster

#### Section 4. Evaluation of Ill or Deceased Person

Traveler has taken (include those given on board):

- ☐ Antibiotic/antiviral/antiparasitic(s) in the **past week**; list with dates started:  
☐ Fever-reducing medications (e.g., acetaminophen, ibuprofen) in the **past 12 hours**; list with dates started:  
☐ Other (related to current symptoms/illness); list with date(s) started:

| Countries visited in the past 3 weeks | State/city/village | Arrival date | Exposure to ill persons                                     | Exposure to animals                                         | Other exposures (chemical, drug ingestion, etc.)            |
|---------------------------------------|--------------------|--------------|-------------------------------------------------------------|-------------------------------------------------------------|-------------------------------------------------------------|
|                                       |                    |              | <input type="checkbox"/> No<br><input type="checkbox"/> Yes | <input type="checkbox"/> No<br><input type="checkbox"/> Yes | <input type="checkbox"/> No<br><input type="checkbox"/> Yes |
|                                       |                    |              | <input type="checkbox"/> No<br><input type="checkbox"/> Yes | <input type="checkbox"/> No<br><input type="checkbox"/> Yes | <input type="checkbox"/> No<br><input type="checkbox"/> Yes |
|                                       |                    |              | <input type="checkbox"/> No<br><input type="checkbox"/> Yes | <input type="checkbox"/> No<br><input type="checkbox"/> Yes | <input type="checkbox"/> No<br><input type="checkbox"/> Yes |

Number of potentially exposed contacts (e.g., cabin, work, bathroom mates):

Are any traveling companions ill? ☐ No ☐ Yes\*, how many are ill: ☐ N/A (no companions)

If passenger is a child, does s/he attend day care/youth program on ship?

☐ No ☐ Yes, total # of children in day care/program: # of children with similar signs & symptoms\*:

*\*Note: Submit a separate form for each ill or deceased person not previously reported to a CDC Quarantine Station.*

##### Seen in ship infirmary?

- ☐ No  
☐ Yes, date of first visit: mm / dd / yyyy  
☐ No infirmary

##### Ill/deceased person isolated after illness onset?

- ☐ No  
☐ Yes, date isolated: mm / dd / yyyy

##### Seen in health-care facility ashore?

- ☐ No  
☐ Yes; facility/health care provider(s) information (name, location, dates, telephone number, e-mail):

##### Hospitalized?

- ☐ No  
☐ Yes, dates hospitalized: from to mm / dd / yyyy

#### Lab/Imaging Results

| Tests                            | Date performed (mm/dd/yyyy) | Results (if unknown, provide name and phone number of lab/facility which performed tests/imaging)                                    |
|----------------------------------|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| Chest x-ray:                     |                             | <input type="checkbox"/> Normal <input type="checkbox"/> Abnormal <input type="checkbox"/> Cavity <input type="checkbox"/> No cavity |
| <i>Legionella</i> urine antigen: |                             | <input type="checkbox"/> Positive<br><input type="checkbox"/> Negative                                                               |
| Test 1:                          | 1.                          | 1.                                                                                                                                   |
| Test 2:                          | 2.                          | 2.                                                                                                                                   |
| Test 3:                          | 3.                          | 3.                                                                                                                                   |

##### Deceased persons:

Body released to medical examiner? ☐ No ☐ Yes Telephone: City/Country:

Discharge/final diagnosis/cause of death (determined by medical examiner or other):

| <b>Section 5. General information about ill or deceased person</b>                                                                                                                        |  |                                                                                                                                                                                                                                                                                            |                  |                                                                                                                                                                                                                                                                                                                                                                                               |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Last/paternal name:                                                                                                                                                                       |  |                                                                                                                                                                                                                                                                                            | First/given name |                                                                                                                                                                                                                                                                                                                                                                                               |  |
| Middle name:                                                                                                                                                                              |  | Maternal name (if applicable):                                                                                                                                                                                                                                                             |                  | Other names used (e.g., former name, alias):                                                                                                                                                                                                                                                                                                                                                  |  |
| Gender:<br><input type="checkbox"/> Male <input type="checkbox"/> Female                                                                                                                  |  | Date of birth:      /      /<br>mm      dd      yyyy                                                                                                                                                                                                                                       |                  | Age (if date of birth unknown):      Days      Weeks<br>Months      Years                                                                                                                                                                                                                                                                                                                     |  |
| Country of birth:                                                                                                                                                                         |  | Passport country/citizenship:                                                                                                                                                                                                                                                              |                  | Type of ID document:                                                                                                                                                                                                                                                                                                                                                                          |  |
| ID document #:                                                                                                                                                                            |  | Alien #:                                                                                                                                                                                                                                                                                   |                  |                                                                                                                                                                                                                                                                                                                                                                                               |  |
| Home address:                                                                                                                                                                             |  | City:                                                                                                                                                                                                                                                                                      |                  | State/province:                                                                                                                                                                                                                                                                                                                                                                               |  |
| Zip/postal code:                                                                                                                                                                          |  | Country of residence:                                                                                                                                                                                                                                                                      |                  |                                                                                                                                                                                                                                                                                                                                                                                               |  |
| Home phone:                                                                                                                                                                               |  | If visiting, total duration of U.S. stay:                                                                                                                                                                                                                                                  |                  | Days      Months<br>Weeks      Years                                                                                                                                                                                                                                                                                                                                                          |  |
| Contact in U.S. – Address/hotel:<br>Same as home address above                                                                                                                            |  |                                                                                                                                                                                                                                                                                            |                  | E-mail:                                                                                                                                                                                                                                                                                                                                                                                       |  |
| Contact in U.S. - City:                                                                                                                                                                   |  | Contact in U.S.-State/territory:                                                                                                                                                                                                                                                           |                  | Contact phone in U.S.:                                                                                                                                                                                                                                                                                                                                                                        |  |
| Cell      # of days reachable at contact phone: _____                                                                                                                                     |  | Emergency contact name:                                                                                                                                                                                                                                                                    |                  |                                                                                                                                                                                                                                                                                                                                                                                               |  |
| Emergency contact relationship:                                                                                                                                                           |  | Emergency contact phone:                                                                                                                                                                                                                                                                   |                  |                                                                                                                                                                                                                                                                                                                                                                                               |  |
| <b>Comments:</b>                                                                                                                                                                          |  |                                                                                                                                                                                                                                                                                            |                  |                                                                                                                                                                                                                                                                                                                                                                                               |  |
| <b>TO BE COMPLETED BY QUARANTINE STAFF ONLY</b>                                                                                                                                           |  |                                                                                                                                                                                                                                                                                            |                  |                                                                                                                                                                                                                                                                                                                                                                                               |  |
| QARS Unique ID #:                                                                                                                                                                         |  | CDC User ID:                                                                                                                                                                                                                                                                               |                  | Date Quarantine Station notified:      /      /                                                                                                                                                                                                                                                                                                                                               |  |
| Time Quarantine Station notified (24 hrs):      :                                                                                                                                         |  | When was the Quarantine Station notified?<br>Before any travel was initiated<br>During travel<br>Prior to boarding conveyance<br>While traveler was on a conveyance<br>After disembarking conveyance<br>After travel completed (reached final destination for that leg of trip)<br>Unknown |                  |                                                                                                                                                                                                                                                                                                                                                                                               |  |
| Where was the traveler when the QS was notified?:<br>In U.S. jurisdiction (within 3 nautical miles of U.S. coast or traveling between U.S. ports)<br>Outside U.S. jurisdiction<br>Unknown |  |                                                                                                                                                                                                                                                                                            |                  | Ill person was (check all that apply):<br>Released to continue travel<br>Advised to seek medical care<br>EMS responded<br>Recommended to not continue travel<br>Transported to hospital ( <input type="checkbox"/> MOA activated): _____<br>Transported to non-hospital location: _____<br>Detained by law enforcement, location: _____<br>Denied boarding by law enforcement<br>Other: _____ |  |
| <b>Response or Info Only:</b><br>Requires DGMQ Response & Follow-Up<br>Information Report Only / No Follow-Up Needed                                                                      |  |                                                                                                                                                                                                                                                                                            |                  |                                                                                                                                                                                                                                                                                                                                                                                               |  |
| <b>NOTE:</b> If ill/deceased person also traveled via Land and/or Air conveyances, please fill out the appropriate form                                                                   |  |                                                                                                                                                                                                                                                                                            |                  |                                                                                                                                                                                                                                                                                                                                                                                               |  |

Sections 1-3: Public reporting burden of this collection of information is estimated to average 2 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. An agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a currently valid OMB Control Number. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to CDC/ATSDR Reports Clearance Officer, 1600 Clifton Road NE, MS D-74, Atlanta, Georgia 30333; ATTN: PRA 0920-0134.

Sections 4-5: Public reporting burden of this collection of information is estimated to average 5 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. An agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a currently valid OMB Control Number. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to CDC/ATSDR Reports Clearance Officer, 1600 Clifton Road NE, MS D-74, Atlanta, Georgia 30333; ATTN: PRA 0920-0821.

|                      |                       |                 |                        |
|----------------------|-----------------------|-----------------|------------------------|
| Vessel Company/Name: | Country of departure: | Departure date: | Presumptive Diagnosis: |
|----------------------|-----------------------|-----------------|------------------------|