Salvage Plan

Seatec

N35 Salvage Vessel

Introduction

The Salvage Plan presented details the procedures, pollution control measures, and environmental impact assessments required for the retrieval of cargo from the *SS Ohio*, a steamship located 142 NM from the Irish territorial waters and at 330 meters deep. This comprehensive plan aims to ensure the safe recovery of the cargo while minimizing potential environmental risks, in accordance with UNCLOS legislations and other applicable international laws governing operations in international waters.

1. Overview

- Wreck Name: *SS Ohio*.

- Location of the wreck: 51ºN 52,720; 014ºW 16,880.

- Type of cargo: General cargo, non ferrous metals.

- Wreck state: The vessel is destroyed in two pieces and laying upright like a bathtub, leaving all the cargo visible from the top. Many parts from the vessel itself and the cargo are scattered through the seabed, being the main environmental risk.

- No oil pollution risks: After a thorough assessment, it has been determined that the vessel does not pose an immediate risk of oil pollution as a World War I era vessel with boilers, also the cargo holds are not close to any machinery while the bunkers are filled with coal away from the cargo holds.

2. Wreck

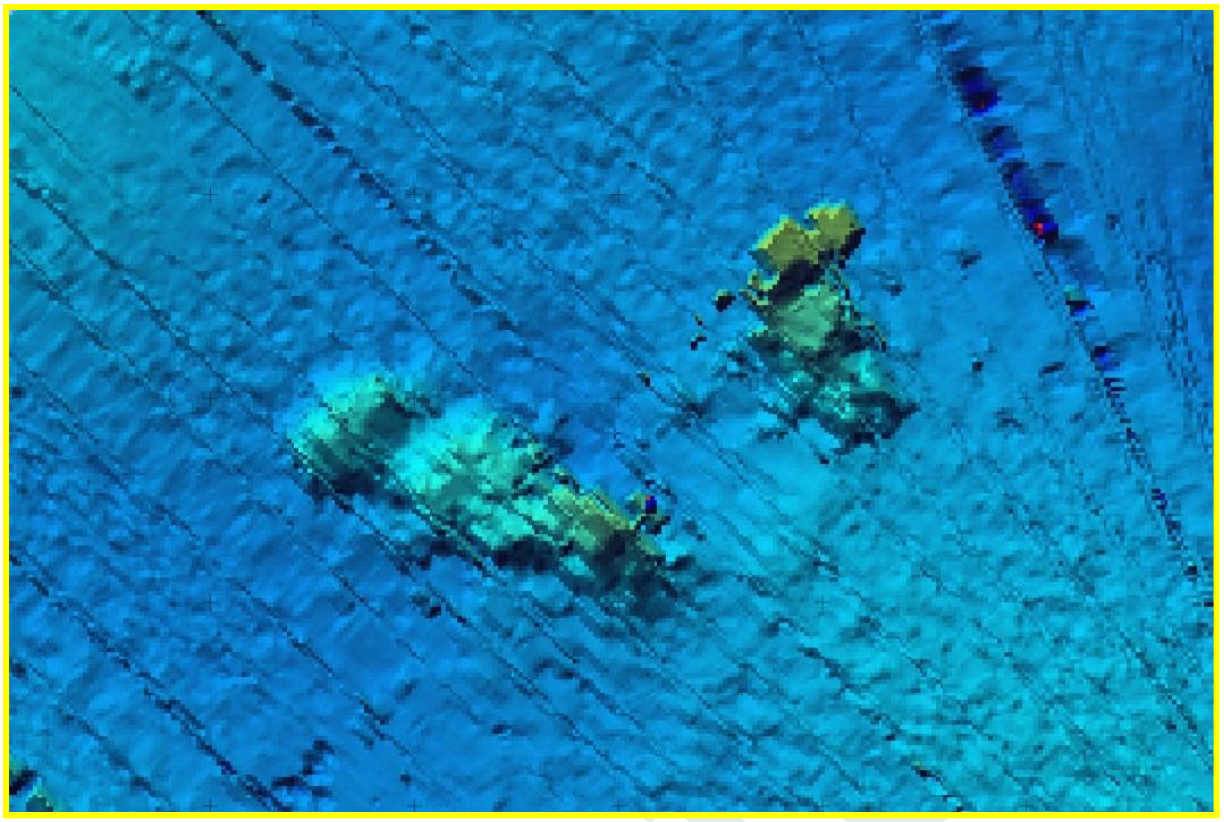
- General details:
  - Nationality: French
  - Purpose: Transport
  - Type: Cargo Ship
  - Propulsion: Steam
  - Date build: 1914
  - Tonnage: 8719 grt
  - Dimensions: 135.6 x 18.7 x 8.4 m
  - Material: Steel
  - Engine: 1 x 3 cylinder triple expansion steam engine, single shaft, 1 screw
  - Power: 2170 h.p.

- History: *SS Ohio*, built by Chantiers de Normandie, in Rouen in 1914, and owned at the time of her loss by Cie. des Chargeurs Français, was a French steamer of 8719 tons. On March 7th, 1917, *SS Ohio*, on a voyage from New York to Havre was torpedoed and sunk by the German submarine *U-44* (Paul Wagenführ), 152 miles northwest from the Skelligs.

- Cargo: Part of the cargo consisted of 6000 tons of metals. 4600 tons steel, 720 tons brass, 250 tons zinc and 250 tons copper. There are also truck parts and general food.

- Initial survey and identification: The wreck of the *SS Ohio* was discovered on June 17th, 2023, during a comprehensive scanning operation conducted at various suspected locations. The initial multibeam scan revealed a ship torn in two, which matched the dimensions of the *SS Ohio*. Subsequently, the research vessel *N35* positioned over the wreck and initiated operations to confirm its identity using cameras. Due to adverse weather conditions and poor visibility at the seabed, these identification efforts were interrupted at times. After several weeks, conclusive investigations were carried out, confirming that the wreck indeed corresponds to the *SS Ohio.* The position of the wreck was cross-checked with U-Boat information, and the observed cargo on the seabed matched the ship's manifest. Additionally, the camera survey helped identify specific parts of the wreck that matched the steamship construction diagram plans.

- Actual state of the wreck: The *SS Ohio* is currently divided into two sections, with both parts resting upright at a depth of approximately 330 meters. The separation occurred at cargo hold number 2, where part of the brass was originally stored, and it now lies on the ocean floor. Cargo holds 1, 3, and 4 remain intact and accessible. Notably, the accommodation castle and center bridge is destroyed. The bow of the wreck points at a bearing of 325º, while the stern, situated approximately 50 meters away, points at a bearing of 115º.



-Bunkers: The storage of the coal that powered the steam engine is located under the accommodation castle, out of reach.

3. Salvage Operations

- Equipment and Resources: The salvage vessel, *N35*, is equipped with a DP2 system, enabling it to maintain position without anchors, minimizing seabed impact. A 100-ton crane operated by cables reduces environmental risks by avoiding hydraulics. Two grabs equipped with cameras, lights and USBL transponder ensure precise cargo removal, complemented by two submarine ROVs for additional camera usage. Onboard, a Kobelco crane and necessary safety equipment facilitate safe cargo handling. The experienced crew has prior involvement in similar operations worldwide.

- Approach: The vessel positions directly above the wreck using the DP2 system. Once the cargo and its position are identified, the crane operator retrieves it with the grab, assisted by the USBL positions. This proven method minimizes the risks associated with accessing other parts of the wreck.

- Goals: The main objective of the salvage operations is to retrieve all the non ferrous metals located at the cargo holds 1, 3 and 4. Hold number 2 is torn apart and

the cargo is laying on the seabed, mainly consisting of brass. The operations will focus on retrieving all the brass, copper, zinc and steel from the holds 1, 3 and 4. The purpose is to recover everything from the holds. The estimates are to salvage 200 tons of copper and 500 tons of brass.

- Safety Measures: All crew members are equipped with personal protective equipment (PPE), and daily safety meetings and briefings are conducted before commencing tasks. Continuous equipment inspection and thorough daily reviews ensure operational safety. The safety officer works closely with the ship's master and crew to maintain a secure environment onboard. Emergency response protocols adhere to SOLAS and SOPEP regulations, with communication primarily conducted via VHF radios.

- Salvage Timeline: Operations are scheduled to occur depending on weather conditions in May 2024. Salvage operations may extend up to 2 years, contingent upon weather factors and any mechanical issues. The significant depth of over 300 meters allows for an estimated five cargo retrievals per hour. Considering the weather conditions, the salvage operation is planned during the summer season, stopping during the winter season due to adverse weather conditions. The west and southwest coast of Ireland are exposed to the Atlantic Ocean, which brings variable winds, occasionally strong gusts, and prevailing directions from the southwest or northwest. Swells and waves generated by the Atlantic Ocean, influenced by the North Atlantic Current and Irish Coastal Current, impact the size and conditions of waves, determined by factors such as wind strength and fetch. These environmental factors significantly influence the pace of salvage operations.

- Step by step methodology: Salvage operations try to follow a daily basis methodology, nevertheless the works can suffer from delays due to weather or mechanical issues. Therefore, the step by step methodology is set as stages that can take up weeks to complete.

Preparation stage: After the initial survey and obtaining the licenses the team will prepare the salvage vessel with all the necessary tools and replacements to fulfill the salvage operations in the safest way. For the case of the *Ohio*, the *N35* vessel has in possession all the necessary machinery to manage the salvage operations. The vessel carries two (2) mechanical grabs of different dimensions to ensure a limited impact on the wreck site while recovering the cargo. In this stage, the vessel is stocked with all the necessary to work at sea for 3 months: food, fuel, tools, replacements, cables, PPE...

Stage 1: The initial stage of the recovery consists in reinvestigating the wreck. The salvage vessel will scan the wreck again and explore the site with cameras. The approach will commence positioning the vessel over the wreck. All these maneuvers are accomplished with the DP2 system and with a heading aligned against wind and

current to provide the most stable working conditions on deck. The cameras are lowered down with the help of the crane, which provides the best and safest location of the equipment next to the wreck. The communications are carried out via VHF between the bridge, crane and camera operators.

During this stage the ROV marks the points on the wreck with the use of a USBL (Ultra-Short Baseline) sonar system. The USBL provides underwater acoustic positioning to locate various points of the wreck. This process can take up time, as it is crucial to locate and mark the salvage points and also identify points to avoid during the operations.

- How the USBL sonar system works:

- Transceiver Deployment: The transceiver is deployed in the water, mounted on the vessel in a fixed position underwater.

- Transponder Attachment: The ROV to be tracked is equipped with a transponder. The transponder emits an acoustic signal in response to a signal from the transceiver.

- Signal Transmission: The transceiver sends out an acoustic signal, typically in the form of a short pulse, which travels through the water.

- Transponder Response: When the transponder receives the signal from the transceiver, it sends back a response signal. The response signal is generated by the transponder and contains information about the transponder's identity and position.

- Signal Reception and Analysis: The transceiver receives the response signals from the transponders. By analyzing the time it takes for the signals to travel back and forth, the transceiver can calculate the distance between the transceiver and each transponder.

- Position Calculation: Using the distance measurements and known positions of the transceiver, the USBL sonar system calculates the positions of the transponders relative to the transceiver. This information can be used to mark the locations in real-time with a margin error inferior to 50 cm.

During this stage, the USBL is also used to mark points to avoid during the operations. The engine room and bunkers are marked, as to avoid getting close to them during the retrieve stage. In the case of the *SS Ohio*, the cargo holds are open and visible from the top, which facilitate the stage 1.

After marking all the designated salvage points on the cargo holds 1, 3 and 4 and the points to be avoided, stage 1 is considered to be finalized.

Stage 2: Once the targets have been identified and located, the retrieval operations are ready to commence. This stage is dependent on weather conditions and is scheduled to take place when Beaufort 5 conditions or less are present. A daily schedule is developed during this stage.

- 8:00 AM: The ship repositions itself using the DP2 system, and a debriefing takes place between the master, safety officer, and the crew to discuss the main objectives for the day. The lifting equipment is thoroughly inspected for any damage or worn-out parts. If any issues are detected, immediate replacements are made.

- 9:00 AM: The crane initiates its descent to the wreck with the assistance of USBL locations. The grab has a transponder to track its precise location at all times. The operations are planned to begin from astern to the bow, even though the ship is in two pieces. Starting from cargo hold 4 at the stern, the grab descends and positions itself over the hold using the USBL locations. The camera attached to the grab ensures precise positioning inside the hold.

- 9:30 AM - 1:00 PM: Under constant weather conditions, the crane can retrieve approximately 17 grabs within the first 3.5 hours. Each grab can retrieve between 2-10 tons of material. The descent and ascent of the grab can take up to 12 minutes per grab. During this time, the deck crew has sufficient time to begin organizing and moving the retrieved material. Non-ferrous metals are stored on palettes on the starboard side, while other materials such as wood, metals, nets… are stored in a container for future disposal on arrival to port. Before the grab reaches the waterline, the safety officer ensures that the deck is clear for discharge. Only when the grab returns to the water is the crew permitted to handle the cargo. The safety officer inspects the cables for any potential damage or wear after each retrieval.

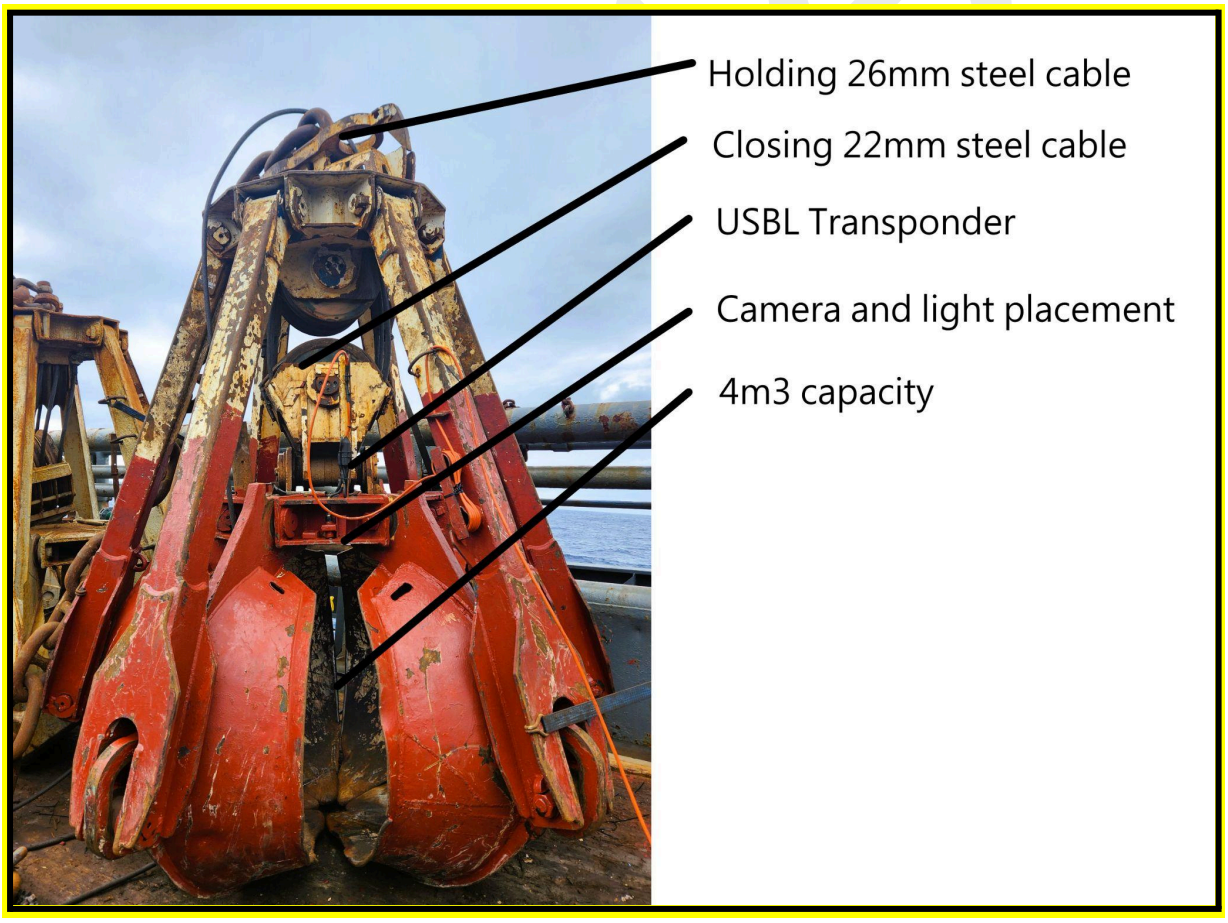
- 1:00 PM - 3:00 PM: Work is paused for lunch and rest. The crane operations cease, allowing the crew to have lunch and take a break.

- 3:00 PM - 7:00 PM: Another briefing is conducted, and the lifting equipment is rechecked. If conditions remain favorable, the operations resume. The team on the bridge continually adjusts the vessel's heading using the DP2 system to compensate for wind and waves, ensuring a stable deck for the crane operations. They also monitor maritime traffic and any potential hazardous and noxious substances (HNS) in the sea. The crane continues its work for another 4 hours.

- 7:00 PM - 9:00 PM: The retrieval operations for the day are concluded. The crane is inspected, lubricated, and safely secured to the ship. The crew finalizes the organization of the retrieved cargo before going for dinner and rest. The ballast of the ship is also adjusted during the operations.

Every few days, the ROVs descend to the wreck once again to assess any changes in its condition and mark new USBL points. This operation takes place in the morning when the visibility on the seabed is clear, prior to the start of crane operations.

Crane System: The vessel is equipped with a 100-ton crane that is capable of handling different grabs. The primary choice is a 4 m3 capacity grab, and there is also a smaller option of 2.5 m3. These grabs utilize a system of pulling cables, avoiding the need for hydraulics and eliminating the risk of spills during operations. The holding wire is a sturdy 26mm steel cable attached to a 40 mm chain to the grab, while the closing wire is a 22mm steel cable. To ensure precise positioning on the wreck, the grab is equipped with a camera and a USBL transponder.



This stage can span several weeks or even months. The retrieval plan prioritizes cargo recovery from hold number 4, followed by number 3, and ultimately number 1 at the bow. The progress of these operations is subject to weather conditions and any mechanical issues that may arise.

If the cargo already occupies the maximum capacity of the salvage vessel's deck, it will need to be discharged in port before the salvage operations can continue. Consequently, stage 3 can occur concurrently still with cargo retrieval from the wreck.

Stage 3: Once the vessel's deck reaches its maximum capacity or the salvage operations are completed, the vessel must sail to port for cargo discharge. The planned port for unloading is Vlissingen in the Netherlands. Therefore, the vessel will navigate to the designated port where the cargo will be unloaded.

Bad Weather Stage: In the event that weather conditions reach Beaufort 6 or higher, the salvage operations cannot proceed. This can lead to different scenarios. If an extended period of severe weather is expected, such as Beaufort 9 or above, the vessel will sail to port to discharge the cargo and await more favorable conditions.

On the other hand, if the conditions are not optimal for crane operations but not severe enough to abandon the site entirely, the crew takes precautions to secure the crane, cargo, and machinery. During this period, other maintenance tasks are performed, and the crew can enjoy longer rest periods.

Weather assessment is a critical factor in determining the feasibility of operations. Prior to scheduling any activities, thorough checks and evaluations of weather conditions are conducted to ensure the most appropriate and safe working methods are employed.

4. Pollution Control Measures and Environmental Risk

- Prevention Measures: The cargo's location is pre-determined using ROVs with USBL sonars to minimize impact on the wreck. Considering the steam-powered nature of the wreck, oil is absent onboard, further eliminating the risk of oil spills. In the highly unlikely event of an oil spill, the response plan aligns with SOLAS regulations.

- Spill Response: If an oil spill occurs, the ship follows the Shipboard Oil Pollution Emergency Plan (SOPEP), deploying appropriate containment booms, skimmers, and sorbent materials to contain and mitigate the spill as of Tier 1 (up to 7 tons). SOLAS mandates the development and implementation of a ship-specific SOPEP. This plan outlines procedures and resources for preventing, mitigating, and responding to oil spills. It includes information on communication, reporting, containment, and clean-up procedures to be followed in the event of an oil spill.

The Oil Spill Response Team provides an external plan for the event of an oil spill covering Tier 2 spills.

- Waste Management: Any additional materials retrieved during the operation, apart from the cargo, will be responsibly stored and disposed of upon arrival at port.

5. Environmental Impact and Risk Assessments

- Environmental Impact Assessment: The seabed in the area of the wreck is predominantly composed of clay. The main risk for the environment in this location are the non ferrous metals that the own wreck holds, which are hazardous for marine life.

- Environmental surroundings: The wreck is situated outside of any designated protected marine areas. An initial assessment of the seabed revealed that the primary environmental concern is the presence of the cargo of non-ferrous metals dispersed throughout the seabed due to the impact of the torpedoes and the wreck itself.

It is essential to acknowledge and avoid operating in specific areas due to their protected status within the west-southwest Exclusive Economic Zone (EEZ) of Irish waters. Here are some examples of designated protected areas:

1. Rockall Bank Special Area of Conservation (SAC): Located approximately 370 kilometers northwest of County Donegal, this SAC safeguards a diverse range of marine habitats. It provides protection to cold-water coral reefs, deep-sea sponge aggregations, and deep-sea muds, which support a multitude of marine organisms and contribute to the ecological balance of the region.

2. Porcupine Bank SAC: Situated around 200 kilometers west of Ireland, this SAC covers a significant portion of the Porcupine Bank. It encompasses various habitats, including reefs, sandbanks, and deep-sea muds. These habitats serve as vital ecosystems, harboring a wide array of marine species and supporting their life cycles.

3. Porcupine Seabight SAC: Located further west of the Porcupine Bank, this SAC extends into the deep-water area known as the Porcupine Seabight. It safeguards diverse habitats, including cold-water coral reefs and deep-sea sediments. These habitats provide crucial feeding and breeding grounds for numerous fish species, invertebrates, and other marine organisms.

4. Belgica Mound Province SAC: Found in the northeastern part of the Porcupine Seabight, this SAC protects a cluster of submarine mud volcanoes known as the Belgica Mounds. These mounds possess unique geological features and provide a habitat for specialized biological communities that rely on the unique conditions created by the mounds.

In addition to these designated protected areas, it is important to note the Northeast Atlantic Fisheries Commission (NAFO) Regulatory Area. While not classified as a traditional protected area, the NAFO Regulatory Area encompasses portions of the Irish EEZ and enforces regulations and management measures to ensure the conservation and sustainable management of fishery resources within the region.

By recognizing and avoiding these protected areas and adhering to the regulations set forth by the NAFO Regulatory Area, the salvage operation can minimize its impact on sensitive marine habitats and contribute to the preservation of biodiversity in the region.

- Risk Assessment (See attached document): Some of the risks that the operation can encounter are related to the crane operation. When the cargo is unloaded on deck everybody must give space for the grab. During the salvage operations, the potential risks are significantly reduced when favorable weather conditions prevail, ensuring a safer working environment. Therefore, the operations are scheduled to occur when the wind conditions are Beaufort scale 5 or below, guaranteeing a more manageable and less hazardous situation. After every work daily meetings and briefings take place to acknowledge any potential risks.

Crane Operation Risks: The operation involves the use of a 100-ton crane for cargo retrieval at a depth of 300 meters. Some potential risks associated with crane operations include:

a. Equipment Failure: The crane equipment may be subjected to heavy loads and operating conditions, increasing the risk of mechanical failure. Regular equipment inspections and maintenance are necessary to mitigate this risk. The loads are always limited to a 20% of the crane maximum operation limit.

b. Falling Objects: During cargo retrieval, there is a risk of objects falling from the crane, potentially endangering personnel or causing damage to the salvage vessel. Proper securing and handling procedures should be followed to prevent such incidents.

c. Operator Error: Crane operations require skilled and experienced operators. Errors in load handling, positioning, or control could result in accidents or damage to the cargo, wreck, or vessel. The crane operator follows strict operating procedures and has previous experience in open seas worldwide.

d. Weather conditions: Operating a crane on a vessel in open waters during Beaufort scale 6 or higher poses a significant danger and increases the risk factors involved. The strong winds and rough sea conditions associated with Beaufort scale 6 or above can create unstable and unpredictable conditions, compromising the stability

and control of the crane. The vessel's motion becomes more pronounced, making it challenging to safely maneuver heavy loads and increasing the likelihood of accidents, such as swinging or dropping of cargo. Furthermore, the higher wind speeds can cause the crane's lifting capacity to be reduced, further jeopardizing the safety and effectiveness of the operation. Hence, it is crucial to prioritize the safety of personnel and equipment by refraining from crane operations during Beaufort scale 6 or higher in open waters.

6. Stakeholder Communication

- Stakeholder Engagement: Contacts with relevant maritime authorities and environmental agencies have taken place to ensure compliance with regulations and to minimize environmental impact. Irish Coast Guard; Environmental Protection Agency (EPA); the Foreshore section of the Department of Agriculture, Food and Marine; National Parks and Wildlife Service (NPWS); and Maritime Area Regulatory Authority (MARA).

Conclusions

The Salvage Plan presented here adheres to various legislation and laws governing salvage operations in international waters, particularly in accordance with the United Nations Convention on the Law of the Sea (UNCLOS) and other applicable international regulations. The following points highlight the legal considerations involved in the salvage operation:

UNCLOS and International Salvage Laws: UNCLOS is a comprehensive international treaty that sets forth the legal framework for activities in the world's oceans. It establishes the rights and responsibilities of states, including regulations for environmental measures. The Salvage Plan ensures compliance with UNCLOS and relevant international laws applicable to salvage operations in international waters, such as the 1989 Salvage Convention and the Brussels Convention on Salvage of 1910.

SOLAS (Safety of Life at Sea) Regulations: The Salvage Plan incorporates safety measures and emergency response protocols in accordance with SOLAS regulations. These regulations focus on ensuring the safety of vessels, crews, and the marine environment. The Salvage Plan adheres to SOLAS requirements for onboard safety equipment, emergency procedures, and communication systems, including the use of VHF radios.

Shipboard Oil Pollution Emergency Plan (SOPEP): In the event of an oil spill, the Salvage Plan follows the SOPEP regulations. SOPEP is an IMO (International Maritime Organization) requirement that mandates the development and implementation of a ship-specific oil pollution emergency plan. The plan outlines the procedures and resources for preventing, mitigating, and responding to oil spills.

Waste Management Regulations: The Salvage Plan includes provisions for responsible waste management. Any additional materials retrieved during the salvage operation, apart from the cargo, will be stored and disposed of responsibly upon arrival at the port. Compliance with waste management regulations ensures the proper handling and disposal of potentially hazardous materials.

Stakeholder Engagement and Transparency: The Salvage Plan recognizes the importance of stakeholder engagement and communication. Establishing proper communication channels with local authorities allows for regular updates on the operation's progress, as well as the ability to address any concerns or potential risks promptly. This approach ensures transparency and fosters cooperation with relevant stakeholders involved in the salvage operation.

By incorporating these legislative requirements and adhering to international regulations, the salvage operation maintains a commitment to safe and environmentally responsible practices. The Salvage Plan strives to minimize potential risks, prevent pollution, and safeguard the marine environment throughout the retrieval process.

Company details
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