MOTOR-TANKER COIMBRA - THE MILLION GALLON GAMBLE

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ABSTRACT

In January of 1942, the M/T COIMBRA, a British flag vessel, carrying 64,800 barrels of lubricating oil and fuel oil was torpedoed by the German submarine U-123. It sank 26 NM south of Shinnecock Inlet, NY. The vessel was classified by the National Oceanic and Atmospheric Administration (NOAA) as a Remediation of Underwater Legacy Environmental Threats (RULET) vessel and was ranked the second highest pollution threat in the First Coast Guard District area of responsibility and the highest for U. S. Coast Guard Sector Long Island Sound.

In 2015, Sector Long Island Sound started receiving pollution reports from the National Environmental Satellite Data and Information Service (NESDIS) via NOAA of anomalies in the vicinity of the wreck location of M/T COIMBRA. The anomalies were later confirmed by U.S. Coast Guard overflights and surface sheen sampling as oil. The Federal On-Scene Coordinator (FOSC) determined that M/T COIMBRA posed a substantial threat to the environment and opened the Oil Spill Liability Trust Fund to complete an assessment and execute an oil removal operation from the vessel that was deteriorating on the bottom of the Atlantic Ocean for 77 years. The vast number of unknowns, government regulations, technological challenges, varying weather patterns, diverse marine fauna, and lack of historical records about non-U.S. flagged vessels complicated the response to this pollution threat.

Establishing a diverse team of professionals comprised of federal, academic, and state specialists, a detailed statement of work was created, and a contractor was chosen to complete objectives established by the FOSC. As a result of the operation, the U.S. Coast Guard determined the following:

- Types and quantity of oil onboard the subject vessel
- Best practices for the oil removal from an historic wreck
- The impacts of salt water on the riveted hull structures
- Challenges of the oil removal from various historical ship construction types

A total of 81 out of 87 wrecks on the RULET database remain unassessed and unexplored in the United States alone. RULET wrecks and other historical polluting wrecks around the world may present a significant threat to the environment. The COIMBRA project answers some of the questions that will make future cases of these polluting historical wrecks more cost effective and less time consuming. In the best-case scenario this project will serve as an example for establishment of the framework for future projects of this nature.

INTRODUCTION/HISTORICAL BACKGROUND

On the morning of January 15, 1942, the 422-foot British-flagged motor-tanker COIMBRA, was under the steady hand of a 36-year-old British Merchant Navy Captain, named John Patrick Barnard. Captain Barnard, along with 45 sailors from Britain, Canada, Australia, Ireland, and Norway, were sailing from New Jersey to Halifax, Canada on their final voyage aboard a motor-tanker loaded with over 2.7 million gallons of oil. After two torpedoes were fired from the German submarine U-123, the motor-tanker COIMBRA sustained direct hits, resulting in her being split into three sections and sinking 180 feet below the surface of the frigid waters of the North Atlantic. She became the second maritime casualty of World War II. Of the 46 souls onboard the COIMBRA, only 10 would survive, and the rest would perish along with the thought that the millions of gallons of cargo onboard would vanish into the depths of the ocean.

The idea that any significant amount of cargo would remain inside the tanks after decades of resting on the ocean floor would leave experts guessing that it was minimal since the majority of the cargo was thought to disappear after the torpedo explosions. Based on accounts of recreational divers, NOAA's research, side scan sonar images, and visual inspections by U. S. Navy divers, less than 20,000 gallons were estimated to be on board. In 2015, when Coast Guard responders began to receive satellite reports of surface anomalies over the remains of the COIMBRA wreck, the reports posed more questions than answers regarding response actions. Given the distance offshore, depth of water, dangers and risks of underwater salvage, scarcity of local regional resources, and little to no information about the construction of the wreck, any action would be a gamble. Moreover, opinion "out of sight, out of mind" of some subject matter experts and industry leaders and the belief that 26NM offshore was enough distance from the shoreline to avoid negative consequences of oil discharge were fueling doubts within a team

about the need for the response. After three years of planning and two failed attempts to deploy overhead COIMBRA for the assessment, the responders found themselves taking the greatest professional gamble of a lifetime; trying to find oil in a torpedoed tanker.

The Incident Management Division from the Coast Guard Sector Long Island Sound (SLIS) based their response justification on many facts and theories including *Schrödinger's Cat thought experiment*, where a cat inside a box was described as both alive and dead until the box was opened and the actual state of the cat was witnessed by an observer. The same approach was applied to the COIMBRA response, as there was no true way to confirm the degree of threat of the sunken tanker unless steps were taken to look inside the skin of the ship.

The location of the wreck was a major factor in justifying response actions given the potential impacts to the environment and regional maritime industry. In case of the average most probable discharge (AMPD), the potential trajectories could have brought oil ashore anywhere from the south side of Long Island to Halifax, Canada (Basta, 2013). The impacts on maritime commerce could be significant. The wreck was sheening in the middle of a busy traffic separation scheme close to Coast Guard Sector New York, one of the largest and busiest maritime ports in the country, and to Coast Guard Sectors Southeastern New England and Boston where the $8.7 billion fishery industry is vital for the northeast Atlantic Coast and the world economy. These lucrative fishing grounds are the lifeblood of fishermen all along the eastern seaboard and serve as critical maritime transportation navigational routes through SLIS's Captain of the Port Zone into the port of New York from all over the northern Atlantic. In addition to economic impacts, the scenario of an AMPD or even greater, could have vast negative impacts on the critical mammal, fish, and bird habitats, as well as impacts on federally recognized Tribal Nations along the coasts of New York, Connecticut, and Rhode Island. Taking

all these factors into consideration, the exhaustive planning process began to assess the COIMBRA and to have the team ready for a removal in case significant amounts of oil were found.

PLANNING CHALLENGES

Weather Pattern Impacts

Delays in response between 2016 and 2019 were primarily caused by the unpredictable weather patterns of the Northeast Atlantic and unusually active hurricane seasons of 2017 and 2018. A quick snapshot of the tropical cyclone activity is demonstrated in Figure 1, and gives a visual representation of the hurricane pathways. The first attempt to collect surface oil samples above COIMBRA commenced in November 2016. Due to multiple operational challenges and risks in utilizing Coast Guard assets for surface sample collection, the SLIS FOSC made the decision to hire a commercial contractor to deliver Coast Guard personnel on scene and obtain samples. Coast Guard aircraft support was also planned to vector the ship and responders to the sheen. Unfortunately, rough seas hampered the operation.

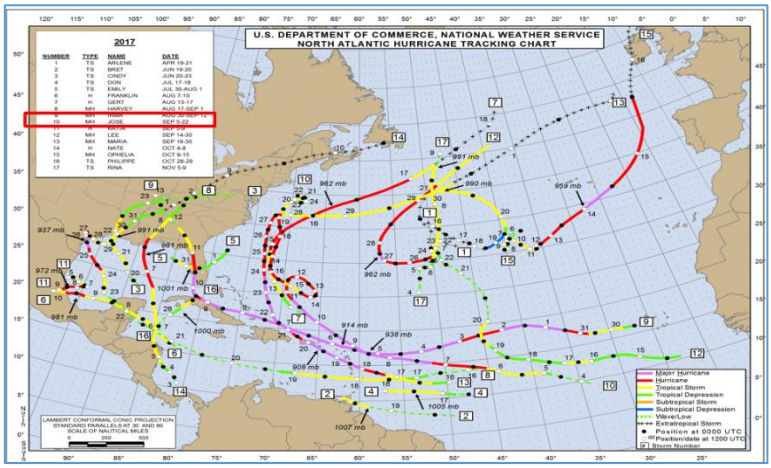

Figure 1. Historic tropical cyclone activity from 19 April 2017

In 2017, SLIS was able to utilize a cost-free survey of opportunity to conduct a preliminary assessment with the Navy Mobile Dive and Salvage Unit 2 (MDSU 2). On 5 June, ten members of an Interagency Task Force embarked the motor-vessel SHELIA BORDELON and conducted mixed-gas dive operations on the wreck. For three days, MDSU 2 and the Task

Force acquired surface samples of the satellite anomaly, validated active sheening, conducted dives to the COIMBRA, acquired a metal sample of the hull, documented the ship with a high definition videography and photographs, and obtained an updated sonar picture of the wreck. This cost-free survey was the first of its kind since a similar Coast Guard operation took place in 1967. A second phase of the 2017 Coast Guard-MDSU 2 assessment was scheduled for 24-26 June, but was canceled due to inclement weather. The results of the Coast Guard-MDSU 2 survey were enough to determine that COIMBRA was indeed the source of pollution, but the volume of the product remained unknown. After a debrief of the joint survey, a more extensive assessment was needed to determine if any removal operation was necessary.

In 2017, there were 17 named storms with six becoming major hurricanes: Harvey, Irma, Jose, Lee, Maria, and Ophelia. The national response to these storms hindered the COIMBRA operation as the National Pollution Funds Center (NPFC) and Shore Infrastructure Logistic Center (SILC) became heavily involved in supporting the disaster response effort that extended well into late 2018. This and a subsequent active hurricane season in 2018 delayed the COIMBRA response a second and third time. With three cancelled deployments and countless work hours of preparation wasted, the Task Force was forced to set a specific window for response. With the help of a NOAA Senior Scientific Coordinator, who analyzed the weather patterns in the region and identified parameters for the safe underwater operations, the deployment was set for May 2019.

Contractor Selection

What began as *back of a napkin-style* planning on an office white board evolved into a nine-page statement of work for an intrusive assessment. The description of tasks in the statement of work allowed for the salvage industry to present their best ideas on conducting the

assessment operation. Some of the key tasks outlined by the Coast Guard included: providing a Project Manager savvy with Incident Command System (ICS) principles, generating a ship schematic of COIMBRA as she lay on the ocean floor, documentation of the wreck and surrounding site identifying active leaks, munitions, and other hazards using hi-definition video, creating a 3-dimensional manipulatable model, a full survey of the wreck, and obtaining oil samples from intact tanks within the ship. During the initial planning and assessment phase in 2016, the FOSC did not intend to remove any product found immediately following the assessment phase.

SILC and the SLIS FOSC received four proposals that varied in levels of complexity, techniques, and equipment used. When selecting amongst the proposals, SLIS FOSC faced two major challenges: technical acumen and fairness. During 2016 and 2017, the FOSC and some of the Federal On-Scene Coordinator's Representatives (FOSCRs) interacted and worked alongside salvage industry representatives, technical experts, and other potential bidders during disaster response operations while also researching the COIMBRA response problem and preparing for the assessment operation. Unintentionally, these FOSCRs were exposed to solicitations and offers by those who would take part in the bidding process for the COIMBRA response. In order to ensure fairness, any and all those who had contractor interaction recused themselves from the contractor evaluation and selection panel. This ensured the integrity of the contractor selection process was above board.

The second challenge was finding the technical expertise that was required to assess the proposals and select the best contractor. The FOSC determined that the evaluation panel would consist of representatives from the SLIS Incident Management Division, Marine Safety Detachment Coram, Coast Guard Salvage Engineering Response Team (SERT), Coast Guard

Atlantic Strike Team, United States Coast Guard Academy, Coast Guard First District, Navy Supervisor of Salvage, and the New York Department of Environmental Conservation. The evaluation panel took the following factors into consideration when ranking proposals:

- Mobilization capabilities and geographical location of the equipment and assets.
- Size and capabilities of the Command and Control Vessel.
- Use of a working-class Remotely Operated Vehicle (ROV) and ability to penetrate the hull of the vessel.
- Ability to plan and respond to a Worst-Case Discharge (WCD) scenario and diver intervention capabilities.

For the COIMBRA response, the contractor selection process mirrored the conventional emergency response priorities set forth by the Coast Guard Acquisition Procedures Instruction for the Basic Ordering Agreement (BOA) and known by every qualified FOSCR.

Response Time → Technical Capability → Price

Mobilization capability was synonymous to the response time requirement, with an added requirement being that the contractor would need to be able to respond during an FOSC-prescribed weather window. This was a result of lessons learned from the earlier deployments cancelled due to inclement weather. Additional factors fell under the technical capability requirement. Given the complexity of the response and the number of unknowns, the evaluation board scrutinized the contractor's methodical salvage approaches and associated costs. The board also considered the various scenarios that the contractors presented in their proposals that were not initially considered as potential response alternatives. Lastly, the estimated cost was considered.

Consultations

A response of this magnitude required the SLIS FOSC to comply with additional U. S. laws and follow federal regulations procedures known in the marine environmental response community as *consultations*. The complexity and extent of the consultations processes were underestimated and was a significant lesson learned for the incident planners. Figure 2 captures the types of consultations and the number of agencies involved in consultations which are all very time intensive.

Consultation type	Involved agencies/nations		
Section 106	DOI	NPS	Tribal nations
Section 7	NMFS	USFWS	
Sunken Military Craft Act	DOS	United Kingdom	CG-47

Figure 2. Consultation types and agencies involved

Before describing the challenges of the consultations processes, it should be known the terms "**no adverse effect**", "**may affect, but is not likely to adversely affect**", "**is likely to adversely affect**" used in both the Endangered Species Act (ESA), Section 7 and National Historic Preservation Act (NHPA) of 1966, Section 106 *may* be interpreted differently by the action agency and the trustee. Moreover, the determination by the action agency of "**no adverse effect**" doesn't eliminate the burden of responsibility for the action agency in the case of "take" or adverse effects on the historic properties of a place. Failure to conduct these consultations could have legal ramifications for the FOSC.

The Section 106 consultation process is daunting for the uninitiated. Luckily for the planners given some extensive networking, the Coast Guard Office of Environmental Management (CG-47) provided a qualified and dedicated Cultural and Historic Resource Specialist.

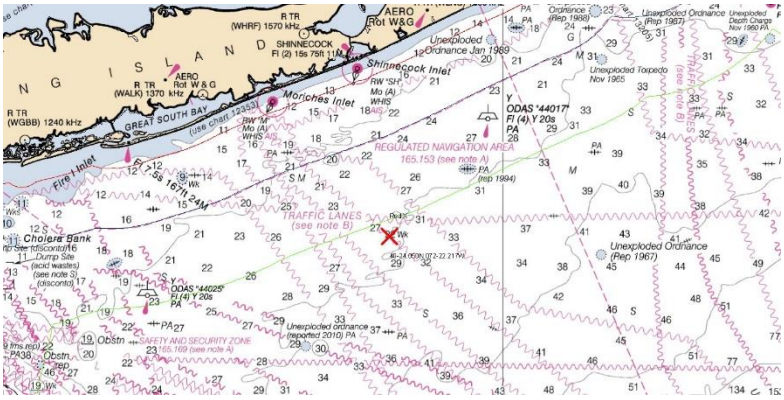

Figure 3. COIMBRA wreck location in relation to the 24 NM Contiguous Zone (green line)

This Specialist helped identify three critical points of the 106 consultations for the response operation: outlining impacts on the three federally-recognized tribal nations in the event of a WCD scenario, impacts on disturbance of the adjacent seabed to the COIMBRA impacting indigenous peoples inhabiting the area before sea level rise during the late Archaic period, and discovering the fact that the COIMBRA shipwreck was included in the National Register of Historic Places (NRHP).

The Section 106 implementing regulations require the Coast Guard to, “consider a Federal undertaking's effects on the characteristics of a property that qualify it for inclusion or being eligible for inclusion in the National Register of Historic Places (36 CFR Part 800, Protection of Historic Properties).” The COIMBRA wreck had been nominated to the NRHP by NOAA even though the wreck didn’t fully meet the requirements of the NHPA--which requires it to be a U.S. flagged vessel or vessel within the Contiguous Zone of the United States, see location of the wreck in Figure 3. The incident planners learned that nomination and subsequent listing was done and approved out of good faith, which consequently required the Coast Guard to invest more time in this process.

With COIMBRA being a British-flagged vessel, it required the Coast Guard to engage with the British authorities through a Coast Guard liaison officer at the U. S. State Department. To respect and honor those that were lost, the United States promised to place a wreath at the site of the wreck and conduct a

Figure 4. Prayer after the completion of the operation

prayer (see figure 4) and observe a moment of silence at the start and conclusion of the response. In the minds of the incident planners and the liaison officer, this was not only sufficient but served as a newly established best practice.

The ESA required consultation with both the *services*: the U.S. Fish and Wildlife Service (USFWS) and NOAA National Marine Fisheries Service (NMFS). The purpose of the consultation with USFWS was to address the WCD scenario impact on wildlife. The Coast Guard sought "***may affect, but not likely to adversely affect***" determination concurrence for WCD impact on seven species of birds, insects, and plants located on the south shore of Long Island. This streamlined a process and ensured that both the action agency and the trustee were ready to engage in more thorough consultations in the event of an actual WCD.

Compared to the relatively straightforward USFWS consultation, the consultation with NMFS was very comprehensive and detailed. NMFS required more information than just a response to a WCD, to include the impacts of the Command and Control vessel operations, subsea pump noise levels, and sonar acoustic ranges on various fish and mammal species in the area. The Coast Guard sought "***may affect, but not likely to adversely affect***" determination concurrence from NMFS for seven species of mammals, turtles, and fish. The consultations with NMFS required that all the response equipment be listed and provided to NMFS for review. This also required the Coast Guard to obtain proprietary technical information from the multiple contractors and sub-contractors that were scheduled to be used for NMFS review as well.

The major challenge of the consultations was scarcity in familiarity of the overall consultation process, absence of consultation guidance for RULET specific cases, and the limited subject matter expertise at the Coast Guard Sector-level. It is strongly recommended that responders engage in consultations as soon as possible and establish a good working relationship

with the trustee POC. Recently, the Coast Guard Headquarters Office of Marine Environmental Response Policy has identified this as a known blind spot and can serve as a great advisory source for any future responses.

Cost: Assessment/Removal *now* vs. Assessment/Removal *on standby*

This historic $17 million operation started in 2016 with a simple request from SLIS to NPFC to open a $12K project to collect oil sheen samples from the anomalies offshore of Long Island. The close proximity of the sheen to the COIMBRA wreck led responders to believe that the sheen originated from the leaking tanker, however, scientific proof was needed. That proof could justify a more thorough response. The location and frequency of the sheens were meticulously documented by NOAA NESDIS reports and Coast Guard overflights. Although the sampling operation of 2016 essentially failed due to weather, the groundwork was laid for a future response and 2017 survey of opportunity. During this survey, the first recorded official surface samples were collected by Coast Guard responders. The Coast Guard Marine Safety Laboratory verified that the product causing the seen was lubricating oil, which validated the COIMBRA cargo manifest and gave the FOSC the confidence to proceed further with the assessment efforts. In 2018, after Resolve Salvage & Fire (Americas), Inc. was selected to conduct the assessment, the project ceiling was raised from $12K to $1.5 million after SILC completed the required Congressional notifications. After the third delay in 2018, the executive decision was made by the FOSC to plan for an immediate removal operation. The additional ten months allowed the planning team to enhance the plan and hold a workshop to test and convey the plan to the public. During this time, the planning team conducted a cost-benefit analysis. Mobilization costs were a significant cost factor and included but were not limited to: scheduling, outfitting, and delivering the Command and Control vessel on-scene, ordering the

mixed gas and dive equipment, renting the hyperbaric chambers, and finding available divers. The standalone removal operation added another estimated $3.7 million to the price tag but more importantly added at least another one year delay and other unforeseen circumstances that could further hinder the response. Therefore, to SLIS, it was more cost effective to combine assessment and removal operations into one operation.

NPFC concurred with SLIS's analysis and raised the ceiling from $1.5 million to $4.7 million. After three days on scene, on 01 May 2019, oil was found to be leaking from the COIMBRA and the FOSC activated the dive team and commenced a month-long phased assessment/removal operation. After discovering oil, 355,000 gallons of lubricating oil, 103,400 gallons of Heavy Fuel Oil (HFO), and 18,000 gallons of oily mixture were safely removed from 16 tanks. The total timeline tripled and cost of the operation quadrupled to $17.098 million. The contractor and the Coast Guard faced a number of unknowns that affected the cost and length of the originally planned operation. Despite these unknowns, the response team decided to combine the assessment with the removal phases to expedite the operation. This decision saved a significant amount of money on mobilization and demobilization costs and resulted in the removal of a substantial volume of cargo of oil from SLIS's top pollution threat.

External and Public Affairs

A known best practice within the marine environmental response community is having a strong public affairs posture, which can make or break a response. The FOSC ensured that a robust Public Information plan was established ahead of the operation addressing the following:

- Provide safety messages to the public in a timely manner with the broadest dissemination feasible.
- Provide timely information about response efforts: keep all stake holders informed of

containment, collection and mitigation efforts.

- Proactive outreach to the commercial fishing vessel fleet and recreational vessels.
- Provide reports of affected ecosystems and wildlife. Damage to the environment is a specifically sensitive subject and should be addressed with care. All communication with the public about the impact to the environment should be honest and forthcoming to build trust.
- The Unified Command will provide accurate and timely information about economic impact and events with potential for economic impact.
- Keep elected officials informed of operations.
- Crisis communications plan for possible protesters.
- Instill reverence throughout the operation due to the vessel being a maritime grave.

As a result of these strategic communications, the operation was supported by all parties and covered by the national media in a positive light.

OPERATIONAL CHALLENGES

Initial Assessment

The first night of the response was exciting for all involved in the operation. Aside from the Coast Guard team, the majority of the crew were from the Gulf Coast, with little experience in the North Atlantic. There is a seasonal change from late spring to early summer in the North Atlantic, and weather can be hazardous at times with seas reaching greater than 14 feet.

Figure 5. Oil globules captured by the ROV's camera

Additionally, this period is when migratory bird season is at its peak. Periodically, migrating birds would land on what appeared to be an oasis, the SHELIA BORDELON which was 30 nautical miles offshore. The migrating birds would expire due to dehydration, exhaustion, or starvation. A safety plan had to be generated to address the carcasses, which were removed safely and discarded humanely and to protect the crew from sickness. Once at the wreck, Phase 1 – Mobilization was complete and Phase 2 – Survey, could begin. The ROV was splashed and commenced a comprehensive scan of COIMBRA for hazards. Once deemed safe for work, the ROV identified pinhole oil seeps (visible in Figure 5) in the mid-section of the ship, which lay nearly fully inverted. Oil was positively identified by the ROV, some of which oiled the ROV itself and was recovered using cottons swabs on the surface. The oil tested positive as lube oil, matching the surface sheen results obtained in 2017. Magnetic patches were sometimes deployed from the ROV over these small seeps. During survey, there were many small leaks discovered. Plugging each leak would have prolonged the survey, therefore, each leak was documented and prioritized for the third phase. After scanning the ship visually, wire brush and cavitation cleaners were used to clear the ship's surface of growth so that magnets could be attached to identify sections of the ship for Phase 3 - Removal. Occasionally when a wire brush on the ROV made a pass over a rivet, oil began leaking from the tanks at a faster rate. The rivets that joined sections of hull plating began rotating and created small pathways for oil to escape the wreck. The movement of the rivets in the hull plating highlighted the fragility of the wreck and increased the urgency of the response.

Discovering unknowns: Hull Plating Thickness and Material

In the previous two assessments of COIMBRA, neither could clearly show the ship's orientation on the bottom of the sea floor. Additionally, there were several other unknowns that

persisted through the planning phase and well into the operations phase. As the unknowns became knowns, each translated into a significant operational impact.

From the sister-ship plans that the Coast Guard and Resolve naval architects were working from, it was expected that COIMBRA's hull was constructed primarily using lap joints and rivets to connect sections of steel. Resolve utilized an ROV-operated Ultrasonic Thickness (UT) measurement device to gauge the thickness of the hull plating. The UT measurements were vital for the planning and placement of the *hot-taps* in the hull. The UT measurements in each tap location were all measured at approximately ½" of steel. As the divers began to place hot-taps, it became clear that the hull plating was doubled up, and there was over an inch of plating to penetrate in most of the tap locations. It was discovered that the UT device had been measuring to a slight gap between the plates and presenting the thickness of only one sheet of steel. The double hull plating increased stresses on the hot-tap equipment during the placement of each tap and it increased the risk of equipment failure during placement. COIMBRA had burned on the surface for some time before sinking and the specific quality of the steel used during construction was not known. In order to test the hot-tap equipment on the actual hull plating, approval was obtained to cut a small section of the hull and bring it to the surface for testing and examination on-deck of the SHELIA BORDELON.

Tank Volume Calculations

The most significant and impactful unknown that the team encountered was the quantity of product still onboard COIMBRA. After the initial ROV survey concluded and a comprehensive scan and assessment had been completed, a Resolve naval architect completed an AUTOCAD overlay of COIMBRA, demonstrated in Figure 6. The resulting product served as a roadmap for the remainder of the operations. Efforts to employ a high-resolution underwater

sonar were derailed after experiencing technological hurdles. The sonar issues were resolved after mobilizing a technician to the scene. The sister-ship plans were used to create a General Hydrostatics (GHS) model and AUTOCAD transverse sections of the ship. The Resolve naval architects and SERT used both GHS and AUTOCAD to approximate the volume of oil in the tanks. The three sections of the ship are at different angles of heel, and due to the differences in density between the oil products and water, the oil became trapped in wedges on the high side of the wreck. Utilizing the measurement tools available and the computer modeling, the naval architects were able to present approximate minimum and maximum volumes of oil in each tank.

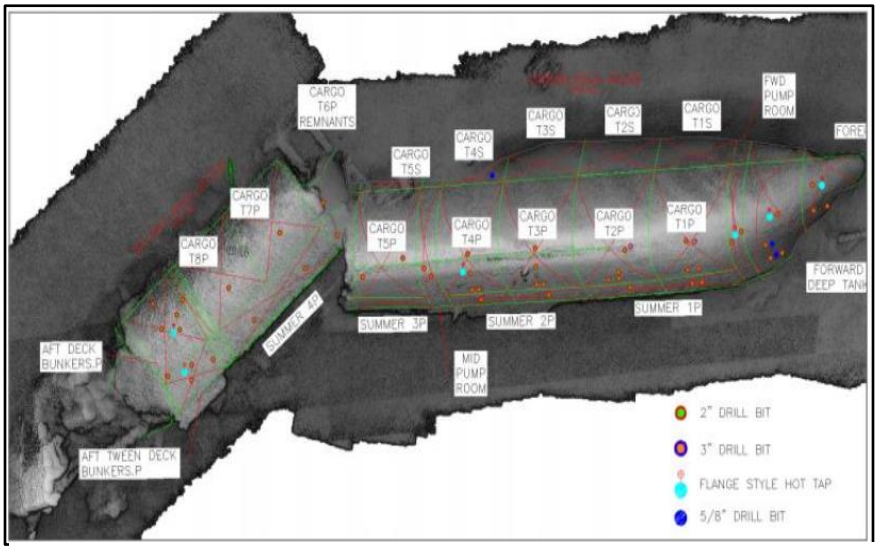

Figure 6. AUTOCAD overlay of the wreck, tank and taps locations

While the ROV survey revealed that some of the tanks had varying levels of damage, it was also discovered that large sections of the ship were fully intact and likely contained oil. From these observations, tanks could be prioritized and classified as threats or not. Perhaps due to the war-time nature of her service, COIMBRA was carrying cargo and fuel oil in areas of the ship that were not meant or designed to carry product, including the fore-peak tank. Therefore, the team concluded that oil was likely in each intact space.

Lightered Product Differences and Cargo Carriage

COIMBRA was carrying two different bulk liquid cargos--lube oil (LO) and a heavy fuel oil (HFO). The two types of oil behave very differently with regards to viscosity. Despite the

frigid temperatures where the cargo was contained, the lube oil was still viscous enough to flow through the pumping system. However, pumping the cargo did present a number of equipment failures, and the pumping flowrates achieved were less than originally planned. When HFO was discovered in the wreck, it was so viscous that it would not flow without heating. The HFO sampled from COIMBRA had visible differences from the LO, and several pumps were damaged during the initial HFO lightering efforts. The differences in the LO and HFO cargos necessitated two different equipment configurations onboard SHELIA BORDELON, requiring the crew pulled into Philadelphia during the middle of the operation to outfit for HFO pumping.. HFO pumping operations required a new complement of heating, pumping, and skimming equipment.

Cargo carriage requirements for vessels differ based on the Code of Federal Regulations (CFR) subchapter under which they are regulated and the contents of the cargo that the vessel wishes to carry. A dedicated effort was put into determining the appropriate regulations to apply to the carriage of the products being lightered from COIMBRA. This process necessitated the Coast Guard's Office of Design and Engineering Standards (CG-ENG) and the SLIS Officer in Charge, Marine Inspection (OCMI) to make policy determinations and classify the lightered products. This determined the necessary approvals for the vessel and the requirements for the offload facilities that would be utilized when product was removed. Additionally, permission from the states that the oil was being transported to had to be granted in the event of an offload. Published reports claimed COIMBRA sailed carrying a lube oil cargo, which would be regulated under 46 CFR subchapter D. The Command and Control vessel, SHELIA BORDELON, was issued a temporary certification as an Oil Spill Recovery Vessel (OSRV), operating under 46 CFR subchapter D, by the SLIS OCMI and was allowed to carry up to 20% of her deadweight of the lightered product in her installed tanks. The ability to lighter product from COIMBRA

directly into SHELIA BORDELON was not only the safest method but also the most cost-effective. The HFO that was lightered, was stored in deck tanks which were later transferred ship-to-ship to a secondary transport vessel for further transfer to a disposal facility.

How Clean Is Clean

The primary mission of the COIMBRA oil removal operation was to address the pollution threat posed by the wreck. Due to the unknown total amount of product in each tank, it was difficult to have a precise end goal. However, using the equipment that was outfitted on SHELIA BORDELON for HFO lightering, the operators were able to systematically heat and flush the content of each tank. By heating and flushing the tanks, the amount of petroleum product that remained entrained in each tank could be minimized. Consult with the NOAA Senior Scientific Support Coordinator was vital for this response consideration. While no method could realistically remove every trace of petroleum onboard COIMBRA, the determination was made that the methods used to pump and flush the tanks met the objectives of the operation and sufficiently decreased the WCD threat. Full transparency of this reality was shared with the public, communicating that the COIMBRA would be reasonably cleaned to the best and most cost-effective extent possible.

LESSONS LEARNED

There were several lessons learned during this historic response. Here's a summary:

Incident Command System

The principles of the ICS proved to be beneficial for the incident responders, managers and planners. Choosing the right team members to form the Task Force led to a Unified Command. Identifying a primary planner and surrounding them with seasoned responders, technical specialists, and creating a workplace climate where everyone felt comfortable providing input

and feedback was critical and a recommended best practice.

Fostering Relationships

Building collegial relationships with state partners, response experts, mission support professionals, and industry paid dividends during the response phase. Having them test the plan helped to identify blind spot and allowed the incident planner to navigate federal requirements.

Leadership

Courageous leadership in doing the right thing for the environment can be a challenge but was not in this case. Had it not been for the FOSC providing autonomy, top cover, and support, this operation would not have taken place. It would have likely been shelved as too *risky*.

Special Teams

The SERT's engineering knowledge and skills proved vital for this response. Their value as a technical advisor to the Incident Command could not be overstated especially when dealing with advanced salvage and naval architecture principles. Embedding a public affairs officer in the response team helped tell the story throughout while the optimally sized team was multi-tasked. Safety was paramount and no significant injuries occurred during the response much to the professionalism of the Atlantic, Pacific, and Gulf Strike Teams.

Technology

Connectivity was slow on the SHELIA BORDELON so large file transfers, photos, satellite telephone communications, and very high frequency radio chatter made information sharing challenging. A quad slide served well in providing a concise summary of response actions. A basic 30-day desk calendar proved to be the tool of choice in long-term planning when the project grew in scope. It also provided a visual for the fellow project managers to coordinate relief crews due to endurance and fatigue. Noting phase endpoints on this calendar provided

transparency amongst the team.

Weather

Tactical weather reports provided by the National Weather Service for the operating area, the ports and harbors where supply vessels would sail out of, were critical planning aids for the Coast Guard and Resolve planners. These reports also drove safety and planning meetings.

Three-A-Days

A 0500L Safety Kick-Off, 1200L Alignment Meeting, and a 1900L Debrief, were critical events throughout the day and worked well with the response cadre. During the early phases of the response, key personnel were not in the loop or were unaware of certain activities, transfers, or movements. The three-a-day meetings solved that problem and helped create a special bond amongst the team, which paved the way to morale events like a Father's Day barbecue, port call pizza nights, and ice cream socials.

External Affairs

The media days led by the FOSC and Resolve Project Manager allowed for transparency to the public. Embarking Congressional staff members and the media on the SHELIA BORDELON for on-camera interviews and a personal tour of the operations before the weekend boosted the relevancy of the Coast Guard across the country and got significant and positive media coverage with the associated press.

CONCLUSION

In conclusion, it took honor, respect, and devotion to duty to spend three years trying to enact a response to this RULET vessel. This paper should serve to better inform incident response planners and industry personnel who are assessing a RULET wreck and considering further action. Responders should expect the unexpected when responding to the historical

wrecks, both from the policy and technical aspects, essentially deeming any response a gamble. Additionally, this paper highlights some of the factors to take into consideration and incorporate into the planning phase. Coming in with an end goal in mind is a great start to providing a vision for a response team. With these types of wrecks, the authors encountered their fair share of doubters and skeptics. Ultimately, it came down to a choice, patience, and taking a gamble—one that paid off with 476, 000 gallons of oil found and successfully removed.

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* 36 CFR Part 800, Protection of Historic Properties
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US Department of Commerce 2017 National Weather Service Hurricane Tracking Chart