

Interspill Conference

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Name of Paper: Rigs, Wrecks and Sunken Oil – Operators views on their contribution to the subjects.

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Introduction

The principles of salvage are as old as the principles of seamanship but whilst salvage as a practice is ancient salvage as a commercial enterprise is a more modern story. Basic techniques, developed in the last century, have evolved and been changed and adapted to meet the needs of different types and complexities of vessels and their disparate and changing cargoes. We have been at the forefront of some of these changes and would like to describe and share a recent advancement with you.

Dronik Maritime Consultants

We are Dronik Maritime Consultants Limited, a fully independent company who offer a wealth of personal experience in the field of underwater search and survey. We are dedicated to the shipping and maritime industry and our services are generally conducted on behalf of the international maritime shipping industry as well as government authorities.

We provide a range of underwater services from the location and identification of missing vessels, cargo, damaged cables and pipelines, to the survey and assessment of the located targets, the removal of bunkers and cargo and of the repair or replacement of cables and pipelines. Our personnel are almost exclusively from an underwater background and have extensive military and commercial experience in the fields of diving, the piloting of remotely operated vehicles, sonar interpretation, oceanographic and hydrographic surveying.

In October 2007 we added a new range of counter pollution services to the specialist underwater services that we provide in recognition that many of our projects involved the search for pollutants or wrecks containing potentially polluting cargo and bunkers. We now provide a full risk assessment and contingency planning suite with spill modelling software.

However we are not and do not profess to be professional salvors. Our business and our interests lie underwater but we are often asked by clients to either comment upon proposed solutions or are commissioned as underwater experts to deliver a complete survey and recover project.

Pollutant Recovery

In recent years we have been involved in a number of projects that have included a cargo or bunker recovery component. These include the ECE in 2006 where we were contracted to locate and survey the vessel, recover the bunkers and conduct a controlled release of the cargo of phosphoric acid and

the FINNBIRCH in 2007 where we were contracted to locate and survey the vessel and recover the bunkers. In our most recent and current project we were instructed in late 2008 to project manage the recovery of bunkers from the sunken cruise liner SEA DIAMOND lying in 140 metres of water off the idyllic and picturesque island of Santorini in southern Greece. This project is still on-going and as it is central to the theme of this paper we will return to it in greater detail later.

Our work is almost exclusively a diver-free operation which may seem odd given that the majority of our people come from a diving background! However the diving industry is extremely safety conscious and there has been a physical shift away from the use of divers to the utilisation of remotely operated vehicles (ROVs). This shift not only removes many of the human safety problems but also enables us to work and conduct operations in much greater depths of water.

Traditionally, once a wreck is located, a diving team would conduct a “hot-tap” operation to remove the cargo or bunkers. Hot-taps are a modification of an oil field device developed by, among others T.D. Williamson Inc of Tulsa, Oklahoma¹, to allow entry into a flowing pipeline without stopping the flow or spilling the fluid. These devices have been used to remove cargo and bunkers from tanks that cannot be accessed through their normal openings because of the position of the ship, the location of the tank or the condition of the tank or surrounding area. A more recent development is the use of ROVs to position and operate the hot-tap equipment, thus eliminating the need for a diving team, providing a safer operation that can work at greater depths.

Our work has given us the opportunity to use most of the “hot-tap” devices that are commercially available today and it is these experiences that have lead us to work with equipment designers and manufacturers to devise and develop systems that meet the challenges we face.

SEA DIAMOND Project

More and more frequently our industry is being asked to remove cargo and bunkers from sunken vessels. These may be recent sinkings or historical wrecks that pose an environmental or economic threat. This was the case in the SEA DIAMOND incident. Elsewhere in this conference you will find a paper by Drs O’Brien and Mamaloukas-Frangoulis of ITOPF and Environmental Protection Engineering SA respectively, describing the response to the oil spill following the grounding, capsizing and subsequent sinking of the SEA DIAMOND in April 2007.

Our involvement with the incident started in November 2008 when the owners, through their P&I Club, the West of England, engaged us to review a number of proposals for recovering the remaining bunkers from with the wreck. In December 2008 we were contracted to plan and execute the recovery of the pumpable pollutants from the wreck, currently lying in 140 metres of water.

The passenger vessel “SEA DIAMOND”, bound for Fira, Santorini, grounded on a rocky outcrop in the Caldera, Santorini, just south of the town of Fira at approximately 15:30 LT (12:30 UTC) 5th April 2007. The vessel sank at around 06:50 LT on 6th April 2007. During the period between the grounding and the sinking the vessel was evacuated and towed into an adjacent bay slightly to the south of the grounding position.

¹ Page 145 Modern Marine Salvage, William I. Milwee Jr, Cornell Maritime Press

Of the 1155 passengers and 339 crew said to have been onboard, all but two of the passengers were safely evacuated by various Hellenic Coastguard and local craft. Eyewitness and media reports confirmed that following the grounding the vessel listed heavily to starboard before capsizing and sinking stern first. On 10th April 2007, the wreck of the vessel was located initially by sonar and then confirmed by a Remotely Operated Vehicle (ROV) from the research vessel "PHILIA", operated by the Hellenic Centre for Marine Research (HCMR) at a depth of approximately 140 metres.

Further surveys of the wreck have shown that she is badly damaged and that there is considerable debris and other material surrounding the wreck that could affect the deployment of ROVs and which will need to be removed before recovery operations can commence. Estimates of the remaining oils within the wreck range from 128m³ to 223 m³ and are composed of heavy fuel oil (HFO 380 cst), marine gas oil, lubricating and hydraulic oils. Studies by ALS Marine Limited demonstrated that the fuel tanks would have imploded at a depth ranging from 25m to 55m and that all tanks can now be considered to be open.

The oil is now collected in pockets throughout the vessel, entrapped in the fabric and furnishings and leaking at a small rate. Our task is to eliminate, as far as we can, the ongoing leakage and recover the pumpable pollutants.

Advances in Hot-Tap Design

The SEA DIAMOND is in approximately 140 metres of water and, with the exception of one or two specialised state-funded operations, the marine salvage industry has rarely worked at such depths and indeed, never to undertake the work being proposed.

We understood, from an early stage, that we would require more sophisticated and innovate equipment before we could undertake such a venture and whilst the principles of hot-tap operations have been around for countless decades they would need to be re-designed to face these challenges.

We spoke with a number of designers and users of hot-tap equipment before selecting Deep-Tek Limited to design and build an ROV-capable adaption of the systems. Our design brief was straightforward; to design a system capable of being manoeuvred by ROV, operated from the surface, with a minimal target impact area and capable of working on any angle of distorted hull!

The result is a simple and elegant design standing less than 2 metres high and weighing around 350 kilograms. The tool is supported on three legs, each fitted with a hydraulically-operated suction pad. This allows the tool to be manoeuvred into place by a standard work-class ROV and for the tool to attach itself firmly to the hull, regardless of hull material, alignment or distortion. A brooch cutter then cuts into the tank and a liner hydraulically "swages" a manifold to the hull opening. A pre-installed hydraulic valve on this manifold controls the recovery of pollutants or the injection of water or a displacement medium to the tank. A typical cutting operation will take less than 4 minutes per tank.

Once the tank valve is in place then the pollutants can be recovered to the surface and onto the mother-ship by gravity, by installed pump at the tank valve or by fluid displacement. Very viscous fluids can be aided by water injection, booster pumps and non-collapsible hoses as required.

You may ask why this differs from other models that are already available. Speaking frankly our experience with most other models is that they are cumbersome and difficult to manoeuvre with a large footprint that cannot easily handle any hull distortion. Operations that require us to focus on bunker tanks or chemical tankers, with strengthened hulls and smaller frame spacings have lead us to this development.

Summary:

In order for us, as operators, to continue to meet the challenges posed the wrecks and to provide the services being demanded by the maritime industry and government bodies, we need to be able to constantly adapt and develop our tools. Our skills and flexibility allow us to develop these tools to solve these problems, for by developing such solutions we ensure a steady stream of competitively priced, safe and efficient operations. However having the solution is only part of the answer we need to ensure that industry and governments are aware of these developments and therefore we welcome the opportunity afforded by this conference to highlight such advances.

Thank You.

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