



MV "CORAL BULKER"

**DEALING WITH A WRECK STRANDED ON A PORT
BREAKWATER**

**LES JOURNÉES D'INFORMATION DU CEDRE
INSTITUT OCÉANOGRAPHIQUE - PARIS
6 OCTOBRE 2003**

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TITAN MARITIME LLC**



"CORAL BULKER" WRECK REMOVAL



**CORAL BULKER AGROUND ALONGSIDE THE NORTH
BREAKWATER, VIANA DO CASTELO**



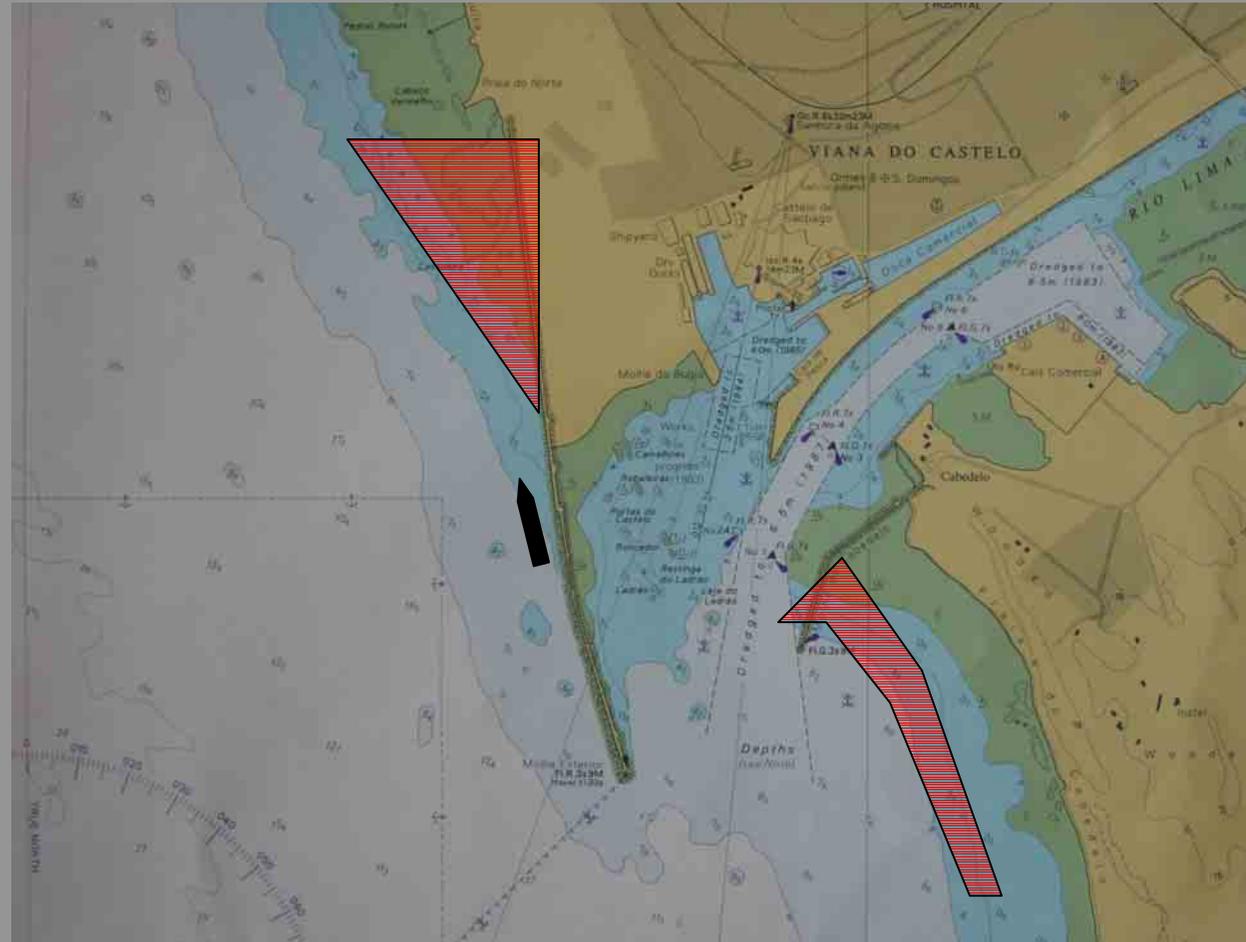
"CORAL BULKER" WRECK REMOVAL



**CORAL BULKER AGROUND ALONGSIDE THE NORTH
BREAKWATER, VIANA DO CASTELO**



"CORAL BULKER"-WRECK REMOVAL



CLOSE UP OF CHART SHOWING VIANA DO CASTELO AND THE BEACHES TO NORTH AND SOUTH OF GROUNDING AREA

PUBLIC BEACHES THREATENED WITH POLLUTION



"CORAL BULKER"-WRECK REMOVAL

**STRONG SOUTH WESTERLY
WINDS AND HEAVY SWELLS
PREVENTED EARLY DISCHARGE
OF TIMBER DECK CARGO.**

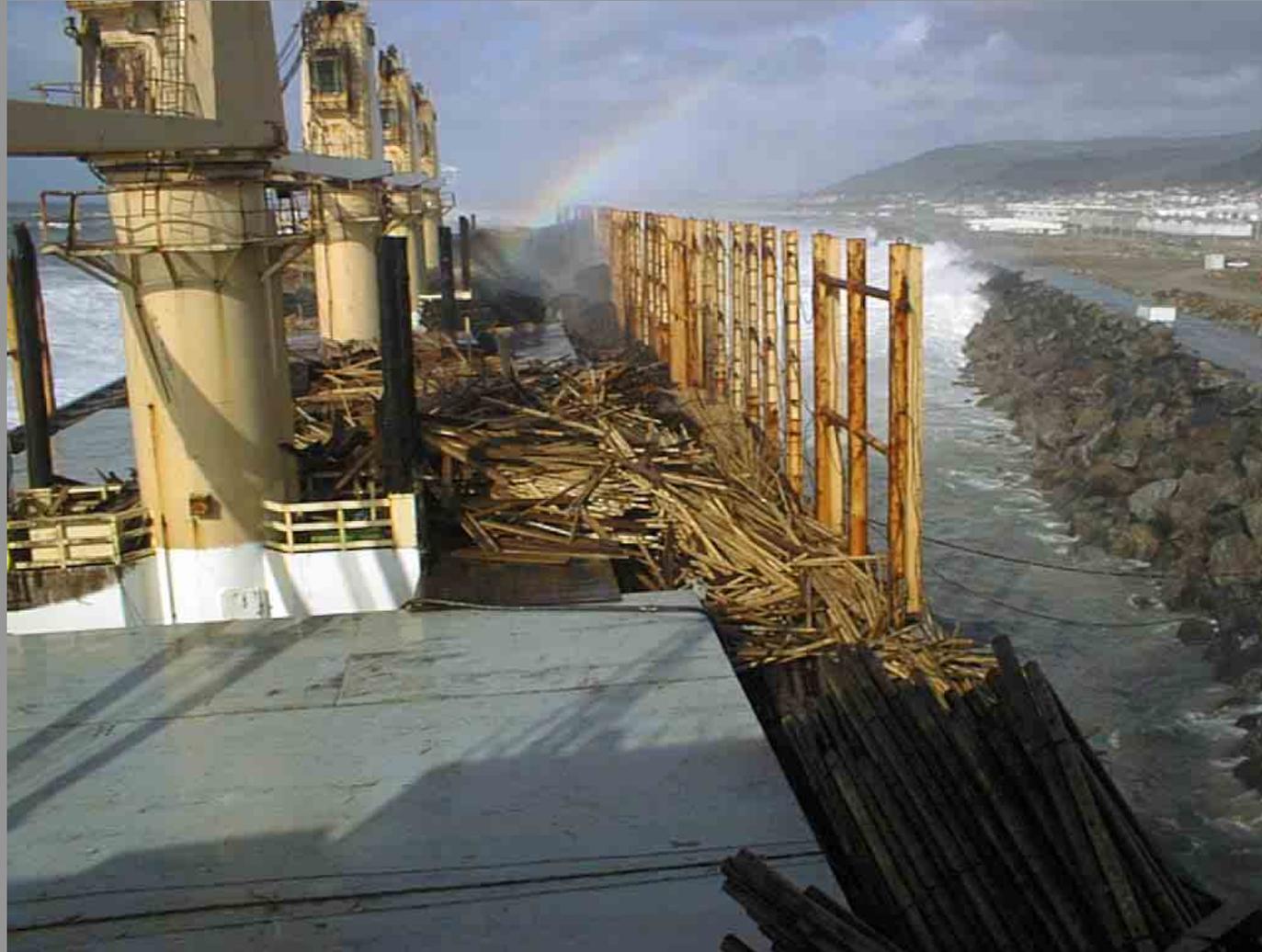
**AT TIMES CONDITIONS WERE SO
SEVERE AS TO MAKE BOARDING
THE CASUALTY UNSAFE.**





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"CORAL BULKER"-WRECK REMOVAL





“CORAL BULKER”-WRECK REMOVAL



HEAVY SEAS AND SWELLS BREAKING OVER CORAL BULKER



“CORAL BULKER”-WRECK REMOVAL



OIL REMOVAL OPERATION



"CORAL BULKER"-WRECK REMOVAL



CORAL BULKER FROM SOUTH DURING OIL REMOVAL



"CORAL BULKER"-WRECK REMOVAL



**CONTINUED BAD WEATHER PREVENTING DISCHARGE OF
UNDER DECK CARGO**



"CORAL BULKER"-WRECK REMOVAL

**TWO CRANES DISCHARGING
UNDER DECK CARGO USING
REMOTELY CONTROLLED GRAB
BUCKETS.**





"CORAL BULKER"-WRECK REMOVAL



DISCHARGE OF WOODCHIPS FROM #4 CARGO HOLD



“CORAL BULKER”-WRECK REMOVAL

**CONTAMINATED WOOD CHIP
CARGO IN #4 HOLD.**

**CONTAMINATED CARGO WAS
DISCHARGED BY GRABS INTO
THE LOADING HOPPER AND
INTO CLOSED SIDED TRAILERS
FOR ONWARD
TRANSPORTATION TO DISPOSAL
SITE.**





"CORAL BULKER"-WRECK REMOVAL



**EXTENSION TO BREAKWATER TO PROVIDE FIRM FOUNDATION
FOR HEAVY LIFT CRANES**



"CORAL BULKER"-WRECK REMOVAL

**ACCOMMODATION REMOVAL
CONCURRENT WITH
UNDERDECK CARGO
DISCHARGE.**





"CORAL BULKER"-WRECK REMOVAL



**EXTENDED BREAKWATER SITE, SHOWING TWO HEAVY LIFT CRANES
IMPORTED FROM UK.**



"CORAL BULKER"-WRECK REMOVAL

**BURYING HATCH COVER DEADMEN
TO THE EAST OF THE EXTENDED
BREAKWATER SITE. DEADMEN
USED AS ANCHOR FOUNDATION
FOR HYDRAULIC PULLERS.**





"CORAL BULKER"-WRECK REMOVAL



**LOOKING NORTH ALONG EXTENDED AND GRADED AREA TO BE USED FOR
HYDRAULIC PULLERS/BASES**



"CORAL BULKER"-WRECK REMOVAL



PULLERS IN USE, POSITIONED AT PREPARED AREA TO EAST OF WRECK



"CORAL BULKER"-WRECK REMOVAL



CONTINUOUS WAVE ACTION TAKES ITS TOLL ON THE SHELL PLATING.



"CORAL BULKER"-WRECK REMOVAL

**TITAN DEMOLITION CHISEL IN
USE.**

**CASUALTY WAS CUT INTO TWO
SECTIONS IN WAY OF #4 CARGO
HOLD USING BOTH THE
DEMOLITION CHISEL AND
TRADITIONAL GAS CUTTING
TECHNIQUES.**





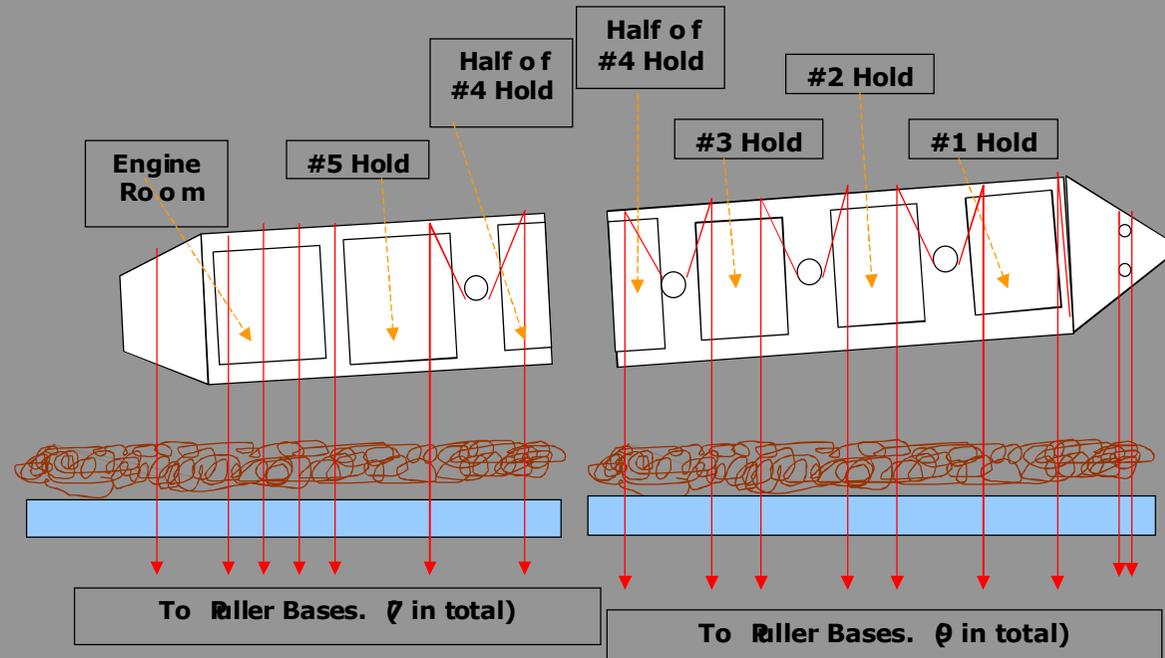
"CORAL BULKER"-WRECK REMOVAL



TEST PULLING FORWARD SECTION WITH 9 CHAINS/PULLERS.



"CORAL BULKER"-WRECK REMOVAL



SKETCH SHOWING LAYOUT OF PULLERS/BASES FOR BOTH FORWARD AND AFT SECTIONS



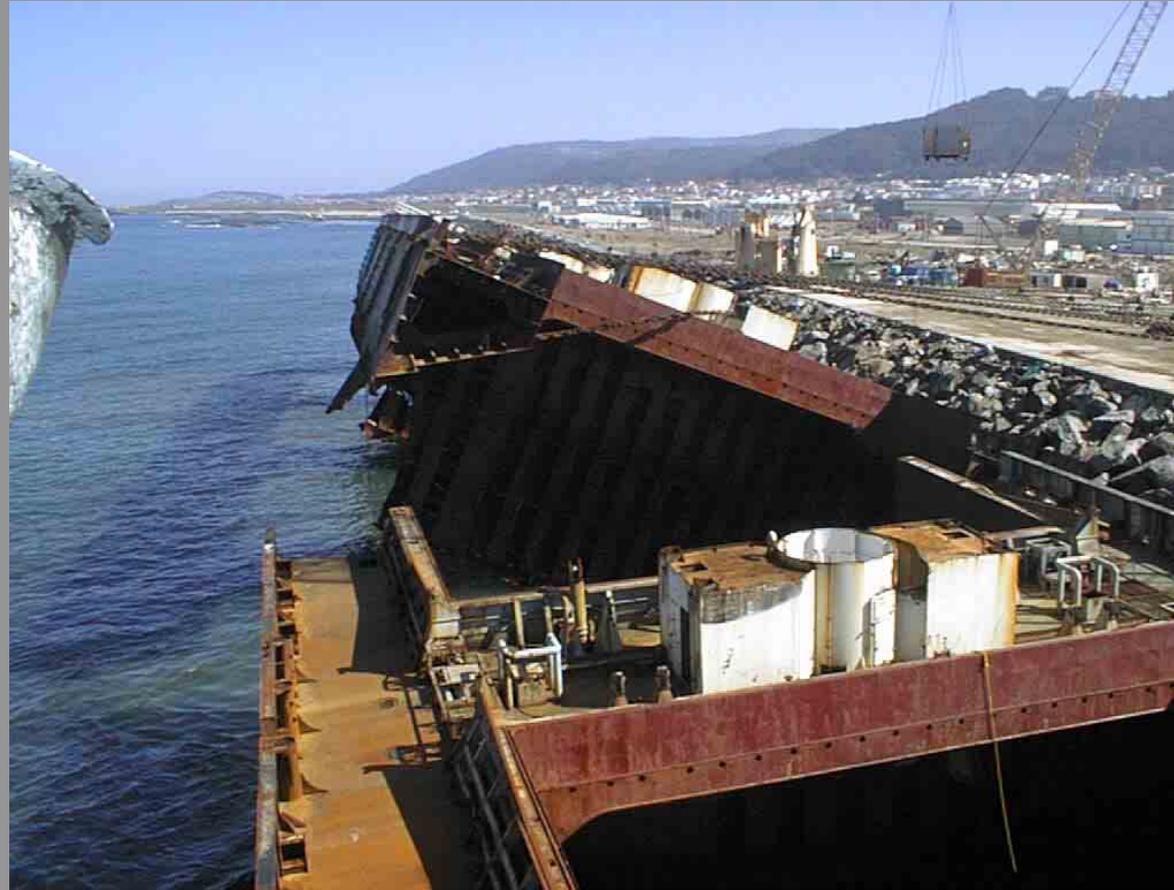
"CORAL BULKER"-WRECK REMOVAL



PULLING FORWARD SECTION WITH 9 CHAINS/PULLERS.



"CORAL BULKER"-WRECK REMOVAL



PULLING FORWARD SECTION WITH 9 CHAINS/PULLERS.



"CORAL BULKER"-WRECK REMOVAL



PULLING FORWARD SECTION WITH 9 CHAINS/PULLERS.



"CORAL BULKER"-WRECK REMOVAL



PULLING FORWARD SECTION WITH 9 CHAINS/PULLERS.



"CORAL BULKER"-WRECK REMOVAL



PULLING FORWARD SECTION WITH 9 CHAINS/PULLERS.



"CORAL BULKER"-WRECK REMOVAL



PULLING FORWARD SECTION WITH 9 CHAINS/PULLERS.



"CORAL BULKER"-WRECK REMOVAL



PULLING FORWARD SECTION WITH 9 CHAINS/PULLERS.



"CORAL BULKER"-WRECK REMOVAL



PULLING STERN SECTION WITH 7 CHAINS/PULLERS.



"CORAL BULKER"-WRECK REMOVAL



PULLING STERN SECTION WITH 7 CHAINS/PULLERS. SECTION AT 85 Degrees



"CORAL BULKER"-WRECK REMOVAL



PULLING STERN SECTION WITH 7 CHAINS/PULLERS. SECTION AT 85 Degrees



"CORAL BULKER"-WRECK REMOVAL



STERN SECTION ROLLED ONTO BREAKWATER



"CORAL BULKER"-WRECK REMOVAL



STERN SECTION ROLLED ONTO BREAKWATER



"CORAL BULKER"-WRECK REMOVAL



SCRAPPING OPERATION



"CORAL BULKER"-WRECK REMOVAL



SCRAPPING REMAINS OF STERN SECTION AT BREAKWATER SITE



"CORAL BULKER"-WRECK REMOVAL



BREAKWATER SITE RE-INSTATED UPON COMPLETION OF SCRAPPING OPERATION



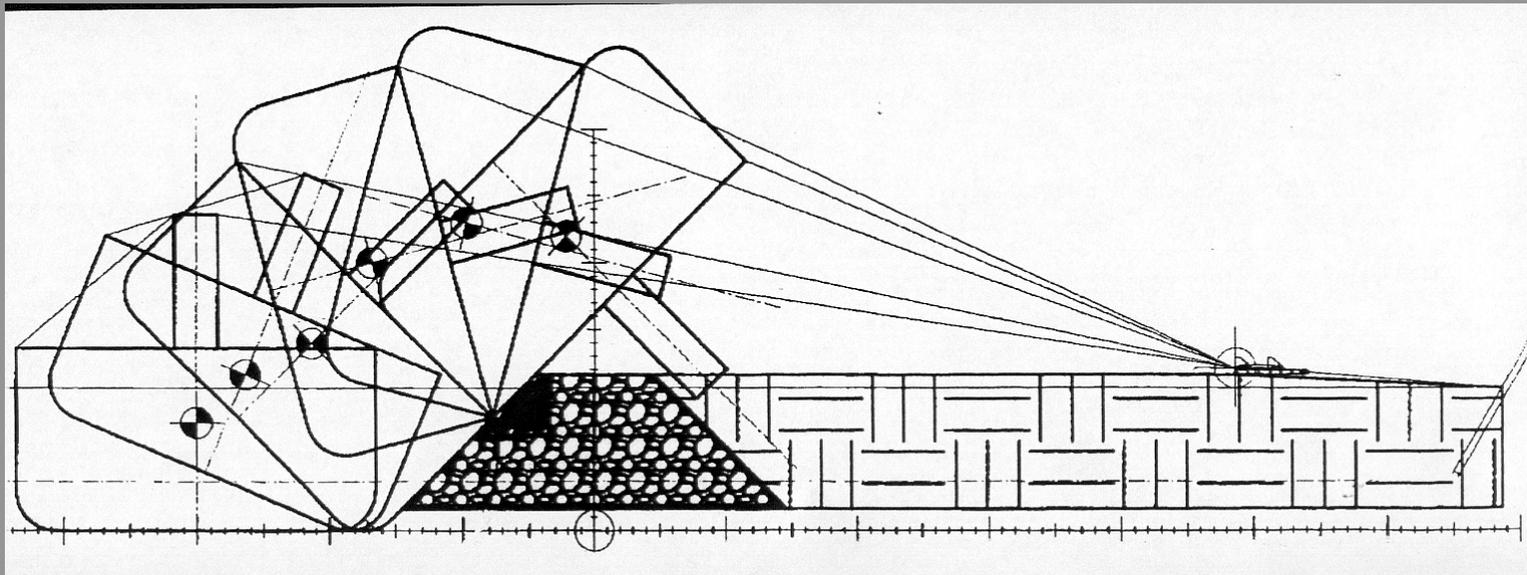
"CORAL BULKER"-WRECK REMOVAL



BREAKWATER SITE RE-INSTATED UPON COMPLETION OF SCRAPPING OPERATION



TITAN

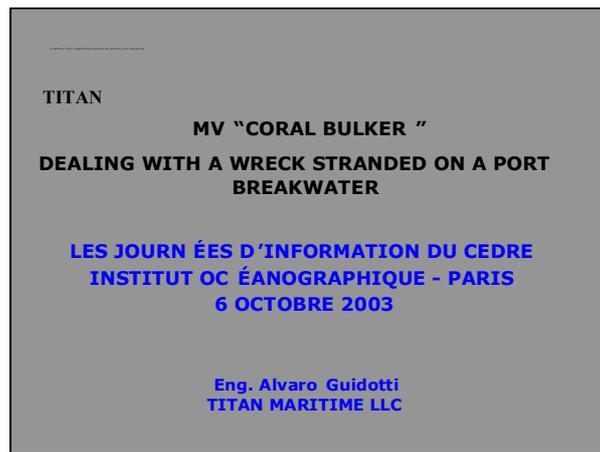


TEAM WORK PROVIDED A BRAVE AND INNOVATIVE SOLUTION



SPECIAL THANKS TO:

- LE CEDRE - for their excellent organization and support
- DGAM - PORTUGAL for the opportunity to participate in this important event
- Capt. Nick Haslam - London Offshore Consultants, for his invaluable contribution with this presentation



POWER POINT PRESENTATION NOTES - SLIDES OMITTED TO
REDUCE FILE SIZE.

Good afternoon Ladies and Gentlemen.

My name is Alvaro Guidotti, my presentation today is a case study
of the wreck removal of M.V. Coral Bulker.

As will be seen from the following slides the grounding and
subsequent wreck removal operation required an innovative
approach and method for wreck removal.

The motor bulk carrier "CORAL BULKER" dragged her anchor outside
the port of Viana De Castelo and ran aground adjacent to the
northern breakwater just before midnight on 25 December 2000.

She was loaded with over 20,000 metric tonnes of lumber
products.

There was also about 624 tonnes of heavy fuel oil and about 70
tonnes of diesel oil as well as other oils and lubricants onboard.

The grounding location was in an exposed area and was open to the
wrath of the winter North Atlantic swells.

In addition the site was in full view of the town and the summer
influx of tourists.

Owners signed a LOF 2000 with Smit Tak on 26th December 2000,
with Smit Tak immediately invoking SCOPIC.

As can be seen from the photograph, the grounding site was

exposed to the winter North Atlantic swells and within a short period of time it was evident that access to the vessel was not going to be easy. The stern being around 15 metres from the breakwater and the bow around 50 metres(Gangway).

Viana Do Castelo is an historic port located on the River Lima approximately 50 kilometres North of Oporto. Traditionally the port was the home for the Portuguese Atlantic fishing fleet, however, over the years this role has been superseded although there still remains a busy inshore fishing fleet. The port is now a thriving commercial enterprise primarily importing lumber products for the Portuguese paper manufacturing industry.

It became very apparent that the vessel posed an imminent threat to the local environment from oil pollution, in particular to the port and surrounding tourist beaches. In addition there was the threat of aesthetic pollution of the beaches by the deck cargo of logs and sawn timber. To the North of the grounding site at a distance of approximately 1000 metres there was a scientific based fish farm, although not stocked with fish at the time of the grounding the farm was to be later utilised as part of a university course study.

Smit personnel arrived on site by 27th December, in addition they sub-contracted the services of local contractors for the supply of personnel and equipment which had also arrived on site on the same day.

A local civil engineering company was contracted to construct an access road to the breakwater to enable the salvage operations to take place.

Access to the vessel was not gained until 29th December due to the adverse weather conditions and up to 5 metres swell. Due to the conditions it was not possible to complete a full and complete survey of the vessel, however, the survey did find that the heavy fuel oil (HFO) double bottom tanks were damaged and there was HFO within #4 ballast tank.

Portable salvage equipment arrived on site on 30th December. Following the initial survey the primary task was to gain access to the engine room and the fuel tanks so as to recover as much of the fuel oil as possible. Adverse weather continued to hamper access to the vessel throughout 31st December and the 1st-2nd January, during this period part of the deck cargo carried away. The casualty was working heavily on the rocky seabed. Preparations continued

throughout this period for oil removal including the transfer of pumps and hoses onboard by portable crane when conditions allowed.

Salvors were able to gain access to the vessel on 3rd January and continued oil removal preparations. Pumps were placed within the engine room and on the main deck and hoses run to a tank truck on the breakwater roadway. By the 4th January over 42 tonnes of mixed oils had been removed from the casualty. During this period the engine room was also skimmed.

With oil removal operations continuing an agreement between SMIT and Owners was reached and at 2400 hours 11th January 2001 the LOF/SCOPIE contract was terminated. SMIT Tak continued with the oil removal operation on a Wreckhire contract.

To allow access to the forward air vents of the heavy fuel oil double bottom tanks it was necessary to discharge the deck cargo in this area.

To facilitate cargo removal a local stevedoring company TRANSFRADELOS was contracted, to discharge the deck cargo. Mobilisation of equipment commenced on 19th January. To facilitate cargo discharge a 250 tonnes SWL, long reach, telescopic crane was hired. Using specialist log handling equipment the discharge of deck cargo was completed at 1800 hours 01st February, the cargo being transferred from the vessel to a holding area within the breakwater site.

Transfer of cargo from the breakwater site to the port was completed at 2000 hours 6th February with the total timber transferred being 3,252 tonnes from a maximum of 3,446 tonnes. Salvors continued to recover bunkers from the casualty during the deck cargo discharge operation.

To assist in liquefying the now solidified heavy fuel oil bunkers, a steam generator was hired. This was used to supply steam to heating coils inserted into the bunker tanks. Ultimately it became necessary to inject live steam into some of the tanks.

The bunker removal proved to be a slow operation. In total 226 m³ of mixed oils were recovered from the vessel. ITOPE estimated that the initial oil spill was in the region of 200m³, therefore approximately 250m³ of bunkers remained unaccounted for. It was therefore assumed that the initial oil spill was greater than that first estimated, in addition a percentage of the bunkers had been lost into the cargo holds and mixed with the underdeck cargo.

It had been decided early on in the operation that the salvage/wreck removal would be treated as 3 distinct phases. The first phase being oil and deck cargo removal. Second phase being underdeck cargo discharge leading into the Third and final phase wreck removal.

By mid-January the casualty had been declared a Constructive Total Loss, therefore during late January the decision was made to go out to competitive tender for the wreck removal.

During the latter part of January bidders sent representatives to inspect the casualty with a view to formulating a removal plan. The Invitation To Tender invited bids to be in by 2nd February.

Due to the position of the wreck one of the main problems the salvors had to overcome was gaining access to the vessel to initially discharge the underdeck cargo and secondly demolish the vessel. There were three options open to the salvors bidding for wreck removal:

(i) Bring the wreck to the shore

This method would rely upon suitable craneage being available with sufficient reach to achieve a span of over 75 metres. This method would rely greatly on traditional demolition methods i.e. gas cutting of the accommodation and hull sections. In addition a method of retrieving the underwater sections of the wreck would have to be devised, this would likely involve using divers within the wash zone around submerged sections of the wreck and rock breakwater.

(ii) Take the shore to the wreck

The second option was to infill the space between the wreck and the existing breakwater. This method would result in a high initial cost for backfill material and would result in a costly removal operation to place the breakwater back to its original condition.

(iii) Conventional salvage methods

The final option was to utilise a heavy lift sheerleg crane moored offshore of the wreck. The advantage of using a sheerleg being the wreck could be disposed of in larger sections therefore limiting the requirement of underwater cutting to a minimum. The downside of such a method was the open aspect of the grounding area.

During the bidding process all aspects of the different methods proposed were considered. The sheerleg option was discounted on

the basis of the expected downtime due to the weather conditions. The backfill option was seriously considered, however, after being advised by the Port Authority that the breakwater would have to be returned to its original condition this method was also declined. The favoured option appeared to be to bring the wreck to the shore. After careful consideration TITAN were awarded the contract. I will not at this time describe the methodology as this will become apparent throughout the following slides.

TITAN proposed to simultaneously discharge the underdeck cargo using TRANSFRADELOS as sub-contractor and at the same time commence demolition of the superstructures.

Discharge of the underdeck cargo would be undertaken using the ship's cranes and two long reach stick cranes fitted with remotely operated grabs. The cargo would be discharged to shore using hoppers positioned on the deck and conveyors to transfer the cargo ashore. Engineering work was started on the construction of a bridge to support the conveyor from the vessel to the shore. However, due to continued bad weather and subsequent damage to the vessel the method of discharge was revised. To expedite discharge the decision was taken to discharge the cargo directly to the shore using grabs.

During cargo discharge it became very evident that some of the missing bunker oil had been found!

After close liaison with the Customs, they agreed free movement with no importation fees for the underdeck cargo. The contaminated cargo was discharged ashore and was disposed of in boilers at local paper factories.

One of the main advantages of TITAN's method was the wreck removal and subsequent scrapping/disposal would be confined to a localised area adjacent to the breakwater. The processed steel would be shipped from the area using articulated trailers which, it was planned would depart from the site and transit the outskirts of the town during the night. There would be minimum disruption to both the local populace and to the tourists later on in the season. Apart from the two large cranes used to move the cut sections the operation was virtually invisible from the town.

In addition the proposed method did not incorporate any diving operations, experience by this time had shown that diving would be at best treacherous if not impossible. The only changes to the present site would be levelling and backfilling and therefore in effect

the site would be somewhat improved from its original condition.

Two heavy lift, latticed, long reach cranes were shipped from the UK to Viana Do Castelo on a chartered barge. The initial plan was to ground the barge to the East of the breakwater and use this as a foundation/anchorage for the hydraulic pullers, this plan was however modified and the barge was later towed back to Northern Europe. The two cranes would be used during the demolition of the vessel. Concurrent with the underdeck cargo discharge the demolition of the accommodation commenced. The accommodation was demolished using traditional gas cutting methods.

Rapid progress was made with both demolition of the accommodation and discharge of the underdeck cargo. It became apparent, due to further damage to the hull plating that it was possible to parbuckle the hull in two sections instead of the originally planned three sections if additional lightening of the hull was undertaken. TITAN decided that whilst waiting for the discharge of the cargo to be completed it would be better to use this time to cut down the main deck fittings and engine room further. Various pieces of engine room machinery were salvaged and these were later disposed of to third party companies.

The four hydraulic cranes performed well throughout the cargo discharge and demolition operation and it was decided to take the time and effort to remove these intact for later disposal to third parties.

During the cargo discharge and the lightening of the hull, part of the TITAN team had modified a number of the cargo hatch covers and these were to be used as deadmen ashore. The deadmen were buried vertically against the eastern extremity of the extended breakwater and would act as a solid foundation for the hydraulic pullers to act against.

A large area was levelled and backfilled to the East of the breakwater. As can be seen from the slide the condition of the area was greatly improved.

As the majority of the cargo was by now either discharged ashore or lost to sea TITAN commenced rigging the bow section for a test pull. This would achieve two things; it would prove that the hull sections

were capable of being moved by the hydraulic pullers and; would move the hull parallel to the breakwater, therefore making the parbuckling operation more effective.

Continued bad weather began to have an impact on the already damaged hull. The hull plating on the outboard side of the cargo holds already discharged became detached and quantities of the remaining woodchips and sawdust were lost to sea.

TITAN used a 13 tonnes demolition chisel which was rigged from number 3 crane, a winch was fitted to a firm foundation ashore and a wire reaved from the winch through tackles to the top of the demolition chisel. The winch was then used to raise and then drop the chisel through guides fitted to the cargo hatch, thus cutting the ship's bottom plating. When it was apparent that the underwater section had been successfully cut the upper wing tanks either side of the hatch and the remaining shell plating was cut using traditional gas cutting methods. The hull was now in two sections and ready for the parbuckling operation.

The decision was taken to rig the bow section first for parbuckling, this would allow additional time to further demolish and thus lighten the engine room section. The best estimate of the weight of the forward section had been revised to around 2,000 tonnes. TITAN had calculated that 8 pullers would be sufficient to overcome friction and enable the section to be rolled onto the breakwater. We decided however, to err on the side of safety and use 9 pullers.

As stated previously a number of the hatch covers were modified to act as deadmen for the hydraulic pullers. The pullers themselves were fitted to individual hatchcovers, these acted as a firm foundation for the pullers. There was insufficient room to fit 5 deadmen for the forward section so the two forward most pullers were secured using traditional anchors embedded in the beach to the East of the breakwater. By 17th May, TITAN were ready for a test pull of the forward section, the test proved effective and the section was seen to roll approximately 10° to starboard.

Number 3 crane and pedestal were removed and the section was ready for rolling. The operation went as planned, small sections of the hull plating remained connected to the stern section but this did not prove any problem.

The forward section was rolled through approximately 140-150° and remained under control throughout.

As can be seen from the slide a substantial amount of the ship's bottom had become detached from the upper hull sections and remained on the seabed. Later dive surveys showed that these sections had crushed down into the rocks and in places had become an integral part of the breakwater.

At 150° the section was laying against the rock breakwater with the port side overhanging the breakwater hardstanding. TITAN continued to pull the section in an attempt to move the whole section further up the breakwater, during this operation one of the kenter links failed in one of the puller chains and this had the effect of shock-loading the section. The hull steel work in way of the forward end of #1 hold failed and the bow was seen to roll down the breakwater still attached on the starboard side. TITAN then decided that the section could not be rolled any further and the pulling chains were slackened. During the next few days the forward section was cut into three separate sections and pulled successfully onto the breakwater.

TITAN had, in the interim period sub-contracted with a Spanish scrapper for disposal of the retrieved sections. This company later set up a scrap-processing site on and around the breakwater site. The larger sections were cut into manageable sections and were then moved to the North East of the breakwater site where the steel was then processed into approximately 1 square metre sections. The scrap was shipped from the site in closed sided trailers and was transported to Spain for final disposal.

With the forward section successfully pulled onto the breakwater, TITAN started moving the deadmen for the aft section pull. Again the deadmen were embedded vertically and the area backfilled and levelled. A local sub-contractor who provided plant undertook the backfilling and levelling operation and supplied some of the graded back fill material. The local town hall, the owner of the land adjacent to the breakwater, offered backfill material from the area to the North of the breakwater site. This enabled the sub-contractor to limit expenditure on purchasing backfill material and also enabled them to proceed quickly with the levelling operation.

With close co-operation between TITAN and their sub-contractors they were in a position to complete the stern section pull by 9th June. The weight of the stern section was estimated at around 2,200 tonnes, with experience gained on the forward section pull

the decision was made to use 7 pullers on the stern section. Additional time was taken to ensure the stern section was cut as level as practically possible so as to minimise the risk of any of the section snagging on the breakwater.

The stern section parbuckle was again a successful operation and went according to TITAN's calculations and plans. The section was rolled over to approximately 135° before falling onto the breakwater.

TITAN continued to pull the section but the pulling chains were observed to be cutting into the hull plating. The chains were re-rigged and over the next few days the section was further lightened by cutting and removing areas of the double bottom, the stern section was eventually pulled completely onto the breakwater.

By 18th June TITAN had commenced demobilising personnel and equipment from the site. TITAN maintained a presence at the site to ensure that their sub-contractors completed the scrapping operation in as expeditious manner as possible.

The scrapping operation continued throughout June and into July.

By mid-July the site had been cleared of all scrap and the site was finally levelled and cleaned before redelivery to the local Port Authority and the final signing off of the wreck removal by the Port Captain.

An official ceremony was sponsored by the Portuguese Navy and Pinto Basto Group as P&I correspondents to celebrate the success of the operation with all parties involved.

As a special gesture to all involved, the beach next to the breakwater was recently renamed Praia do Coral.

IN CONCLUSION

Location: The vessel had grounded in a very exposed location in the winter season. Any salvage was always going to be a timely and costly operation. Time and again the weather proved the worst enemy limiting activity at the site. It was often the case that with maximum costs there were at times minimum results.

Support of the Port Authority: Without the close support of the Port Captain , Comandante Antonio Carvalho, and Port Authority the operation may well have been a very different one. At all times the Authorities believed and supported the salvors and offered assistance wherever possible. The deck cargo was quickly and effectively discharged allowing access to the oil tanks. Salvors efficiently removed the oil from the vessel leaving minimum residues in the vessel and thereby limited environmental problems.

Wreck removal concept: TITAN tried to provide a brave, innovative, well engineered and well implemented concept. The method was brave in that the concept was unproven and at the time theoretical only. In addition the concept was offered with an innovative contract providing protection for all parties. The TITAN personnel employed throughout the operation worked conscientiously to provide solutions to the day-to-day problems that an operation of this scale inevitably throws up. Inexorably there are often changes to the initial concepts and handling these changes professionally providing written notification and supporting calculations to all parties is essential. The port authorities without question accepted these changes.

Proof of the concept: The proof of the initial concept was evidenced by the success of the operation. All went according to TITAN's engineered plan. The cost of the operation fell closely within TITAN's initial estimate.

The wreck removal of "CORAL BULKER" was a unique operation which was able to be confined to the port area without any disruption to the local populous. The contractors performed the operation to the highest standards, on schedule, and kept to a tight budget. Owners and their insurance interests and the competent marine authority acted in a most responsible and supportive manner throughout the whole operation.

It was a pleasure to be involved in the wreck removal I have described above and the experience gained by all parties can only benefit future operations.

OBS : PRESENTATION ORIGINALLY PREPARED BY CAPT NICK HASLAM - LONDON OFFSHORE CONSULTANTS - FOR THE 4TH INTERNATIONAL SALVAGE AND WRECK CONFERENCE 2001 AND MODIFIED BY ALVARO GUIDOTTI - TITAN MARITIME LLC - FOR THE CEDRE INFORMATION DAY 2003