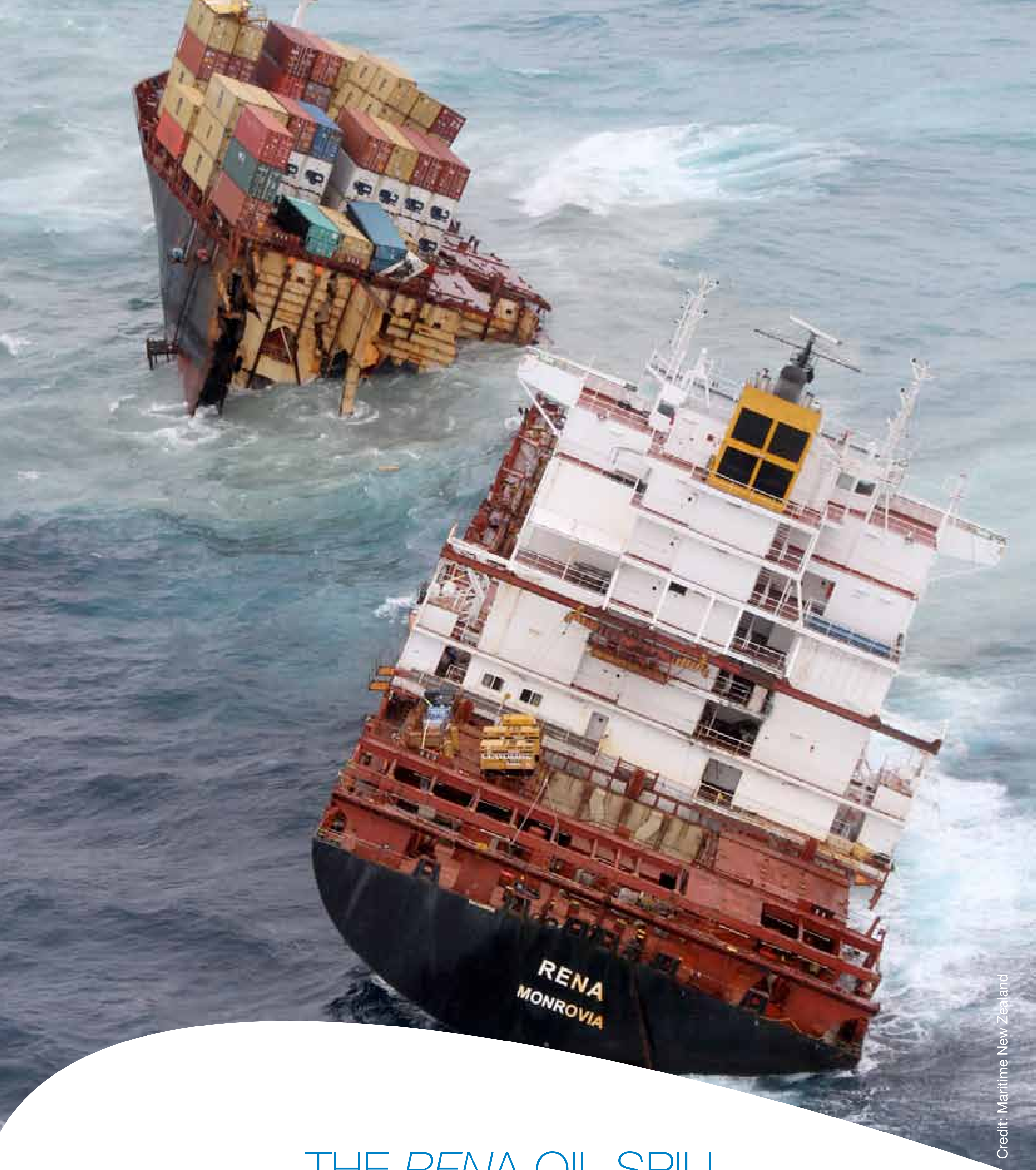



Credit: Maritime New Zealand

# THE *RENA* OIL SPILL

## A CASE STUDY FOR THE FOR SYSTEM

JLMD ecologic system

MARITIME PASSIVE SAFETY

*An accidental oil spill can come as quite an unpleasant shock, but when it happens, the revolutionary onboard FOR System saves time, money, and the environment.*

The maritime shipping industry is exploding. Larger ships are coming onto the scene, carrying increasingly more hazardous materials, significantly raising the potential for accidental pollution in the marine environment.

The extreme clean-up costs of environmental marine disasters is a major concern to ship owners and stakeholders, and although 'active' safety measures such as the use of radar and smart automatic piloting systems can help prevent these tragic accidents, little has been done to equip ships with onboard 'passive' safety devices that can help to prevent and minimize post-accident environmental damage.

It is time to dispel the myth of zero risk and meet the next major challenge that the shipping industry will face: ending catastrophic damage on the marine environment.


## GILLES LONGUÈVE
JLMD ECOLOGIC GROUP

Managing Director

26 Boulevard Malesherbes
75008 Paris, France
Tel: + 33 (0)1 43 12 59 02
Fax: + 33 (0)1 58 18 31 53

Mobile + 33 (0) 6 72 87 70 87
glongueve@jlmdsystem.com

www.jlmdsystem.com

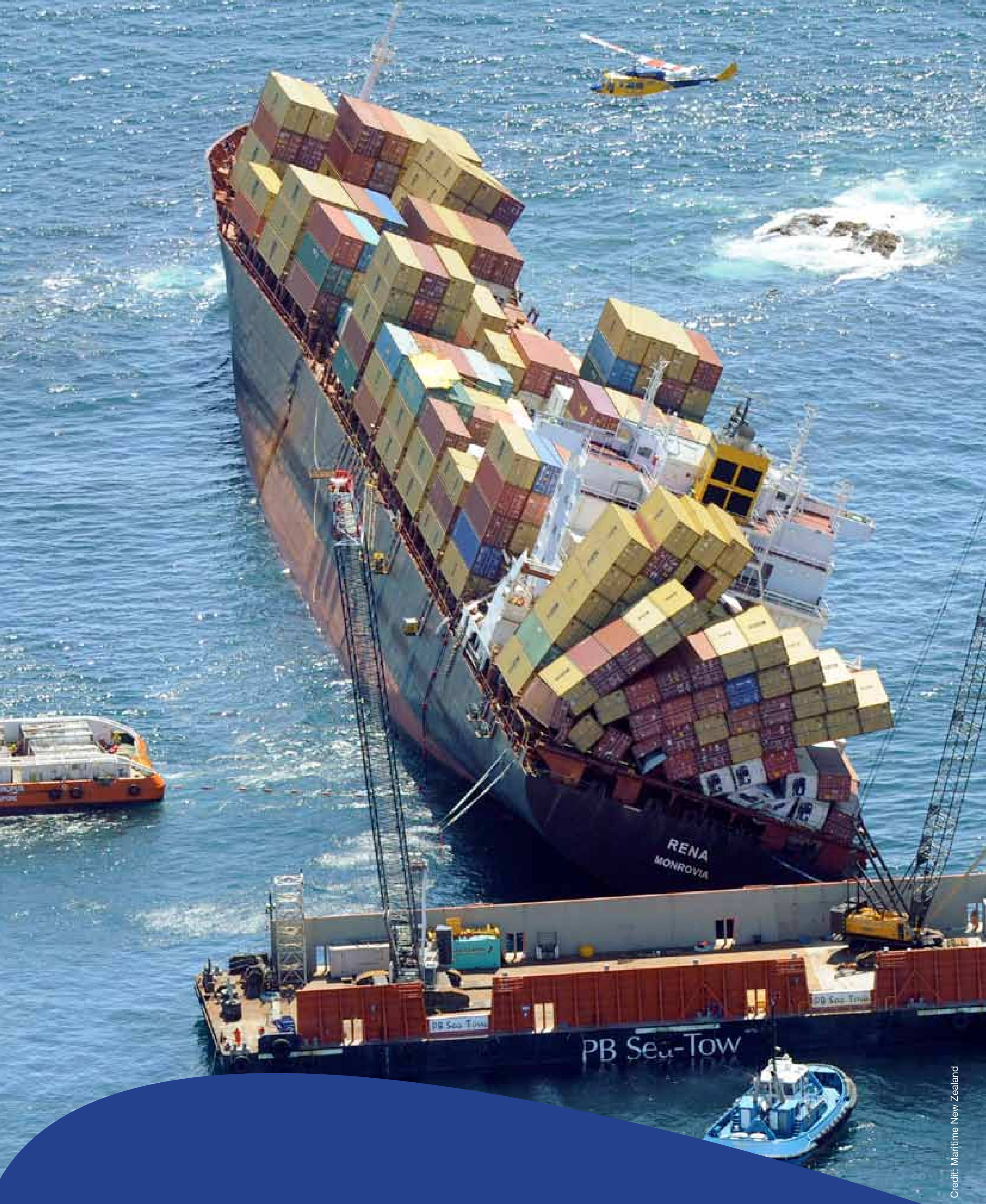
# INNOVATION LEADS THE WAY

JLMD Ecologic Group, a maritime engineering company headquartered in Paris, France, is at the forefront of developing state-of-the-art passive safety technologies that are changing the way ship owners and salvors respond to incidents involving accidental spills. Geared specifically toward the safety of salvors, and the quick recovery of liquid pollutants, JLMD's Fast Oil Recovery System (FOR) has already been installed on a diverse range of ships such as bulk carriers, container and tanker vessels.

The FOR System, developed following 10 years of research by JLMD, is a standardized permanently-installed passive safety device with a specific class notation issued from Bureau Véritas. It has been engineered to enable fast, easy access to cargo and bunker tanks to recover oil or hazardous materials through relatively simple means – tanks becomes accessible by emergency connectors from the ship's upper deck. The system needs no maintenance, works with any kind of liquid pollutant, and can be installed in existing vessels as well as on new ships.

Major oil spill disasters that have occurred like the 1989 *Exxon Valdez*, that spilled 42 million litres of crude oil into the Prince William Sound, Alaska, the *Erika*, which broke up in stormy seas in 1999, dumping approximately 20,000 tonnes of fuel oil into the Bay of Biscay, and the *Prestige*, which sank off the coast of Galicia in 2002, spilling 76,000 $m^3$ of oil into the ocean, serve as stark reminders that the maritime industry is still ill-prepared for such eventualities and does not have the necessary preventative measures in place to recover pollutants. This can result in the loss of salvors' lives, time, money, and can cause severe damage to a company's reputation.

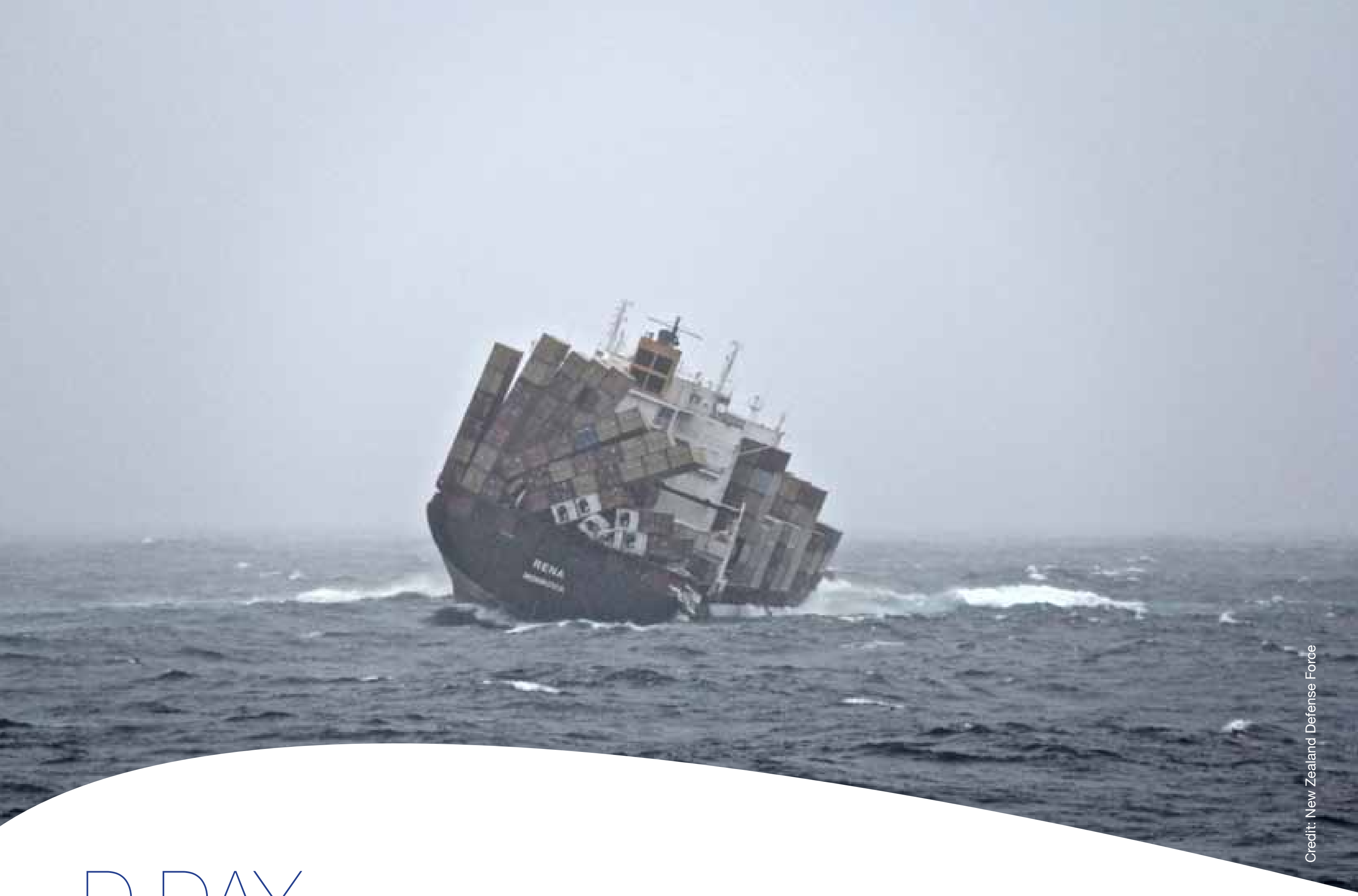
Unfortunately, the container ship *Rena*, which ran aground off New Zealand in October, 2011, has been added to the long list of environmental disasters that continue to happen to our merchant ships that transit around the globe every year.



Credit: Maritime New Zealand

# THE *RENA* OIL SPILL DISASTER:

## A SALVAGE TEAM'S LOGISTICAL NIGHTMARE



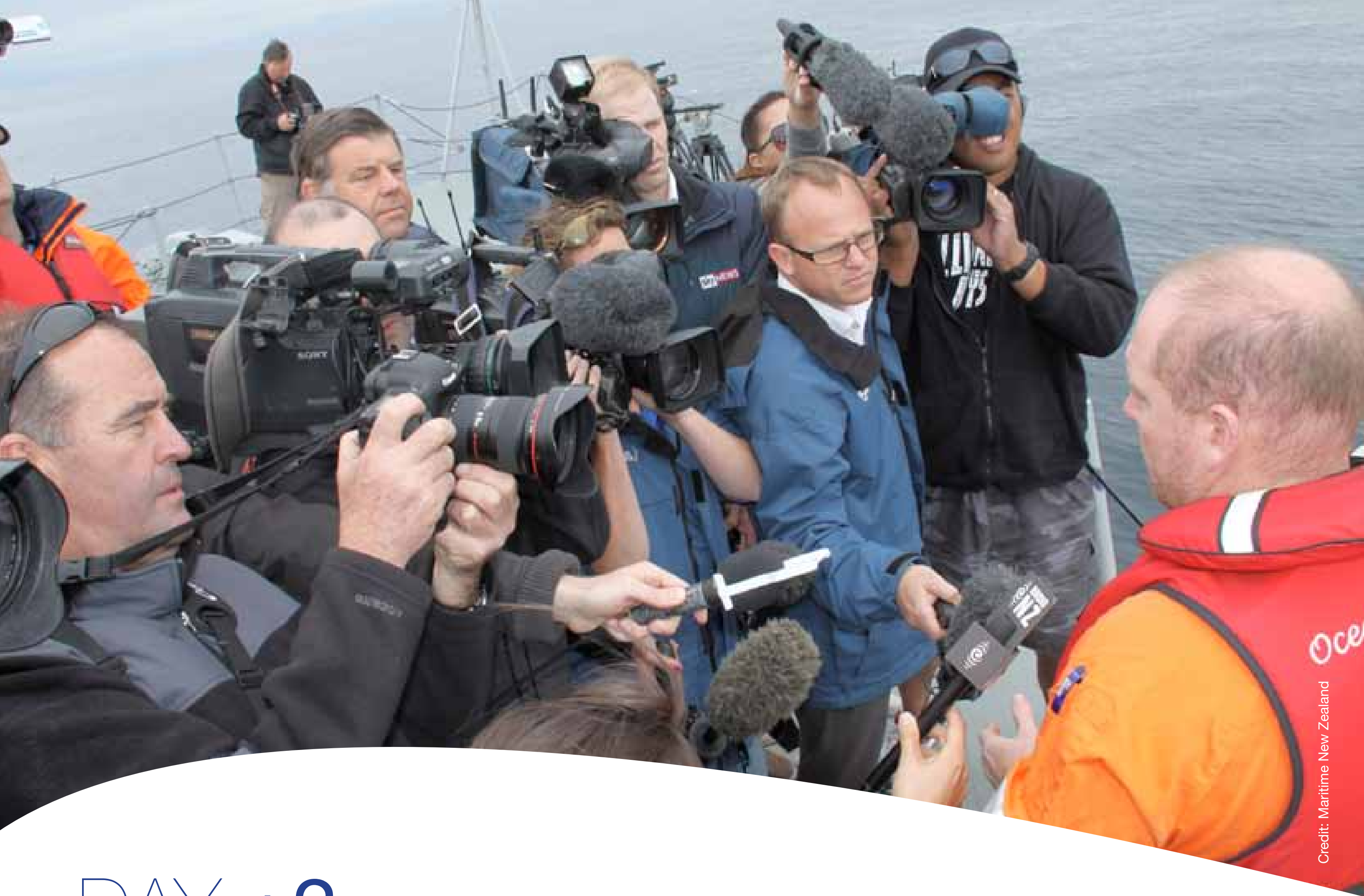

Credit: New Zealand Defense Force

# D DAY

On October 5, 2011, the world was shocked to learn that once again, an environmental disaster was unfolding at sea. The 2500 TEU container ship *Rena*, owned by the Greek company Costamare Shipping, had run aground on the fragile Astrolabe Reef off the New Zealand coast.

Initially spilling 350 of her 1,712 tonnes of oil and subsequently killing thousands of sea birds, it would become the region's worst maritime disaster.

To gain a greater understanding of the complexity of the situation faced by the salvors, let us consider the events that occurred following the incident:




# DAY +2

Operation planning and wreck survey: a dedicated unit was established to manage the crisis, which included New Zealand authorities, several salvage teams, and key stakeholders.

The team of experts quickly put in place an oil recovery plan to release the ship of the pollutant still onboard but much-needed data necessary to establish an emergency response plan was missing, and information onboard was out-of-date. In the meantime, harsh weather conditions made any attempt at salvage efforts difficult.

No concrete plan could be defined. No pollutant removal operation could begin.

# DAY +4

Finally, several salvage and oil spill clean-up teams were mustered on October 9th. Initially, salvors focussed on pumping oil from the damaged No.3 and No.5 tanks near the rear of the vessel.

Just 10 tonnes of oil has been pumped before the weather stopped workers who had been using onboard power to transfer as much oil as possible from forward tanks to rear tanks where oil was easier to remove as long the ship was floating.

But the ship began to list heavily to starboard, dumping a further 300 tonnes of pollutant, eventually sprouting a large crack in her No. 3 starboard cargo hold. It would be another six days before pumping would start again.

Credit: Bay of Plenty Regional Council

Credit: Maritime New Zealand

# DAY +9

It was decided that a floating platform attached to the port side of the vessel was needed to aid in flat-surface oil evacuation. Evacuation teams remained on standby but salvors faced another blow when the ship lost power, as well as heating capacity, thus rapidly changing the viscosity of the trapped oil.

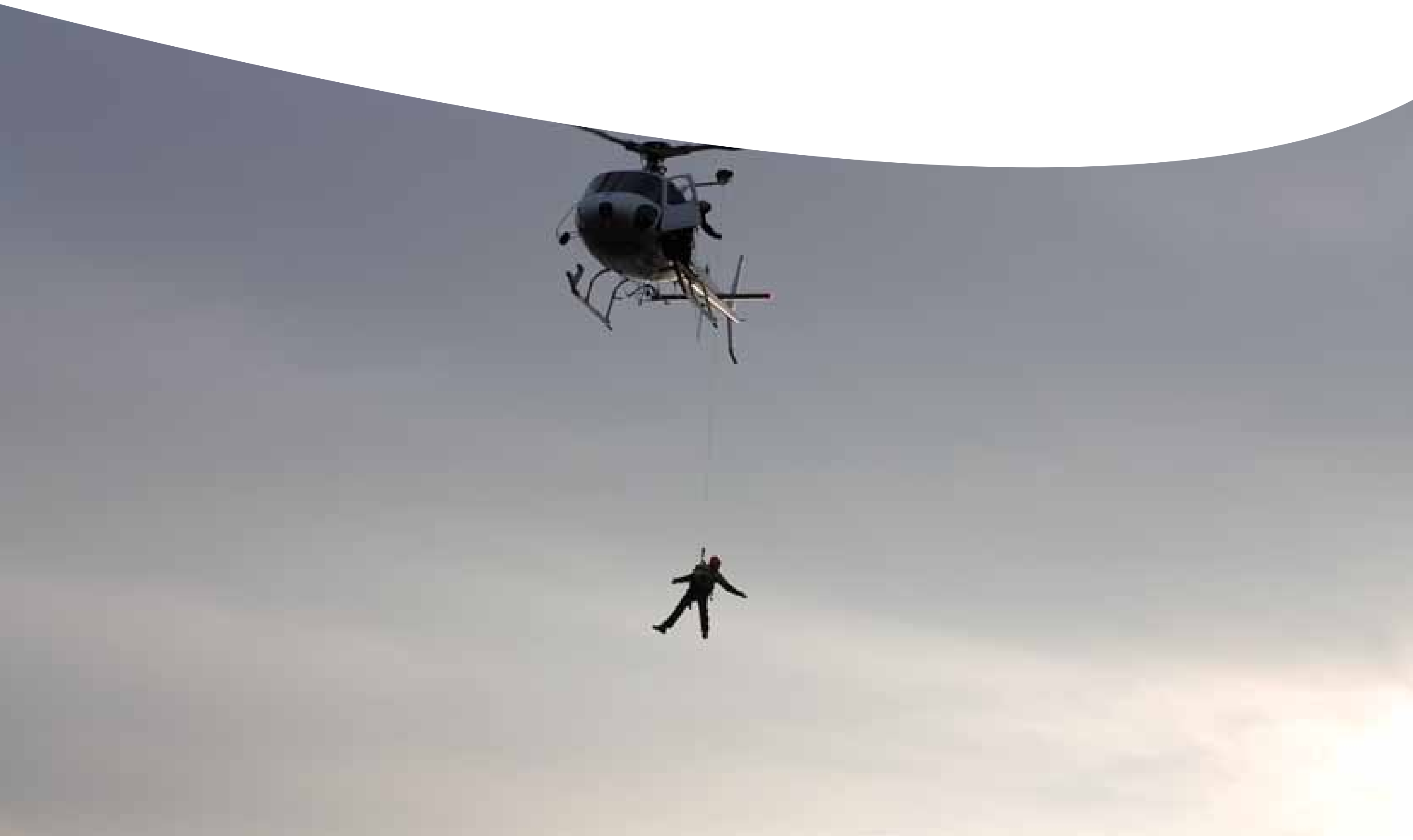
As a result, another new salvage plan had to be set up and new and costly equipment came aboard. A screw pump was inserted into the No. 5 tank to evacuate the thick, sludge-like oil. This process, made to move oil via several meters of hoses to the upper deck, however proved time consuming, especially as the design of the tank requires to constantly move the pumps through the tank's internal frames in order to reach the fluctuating oil level.

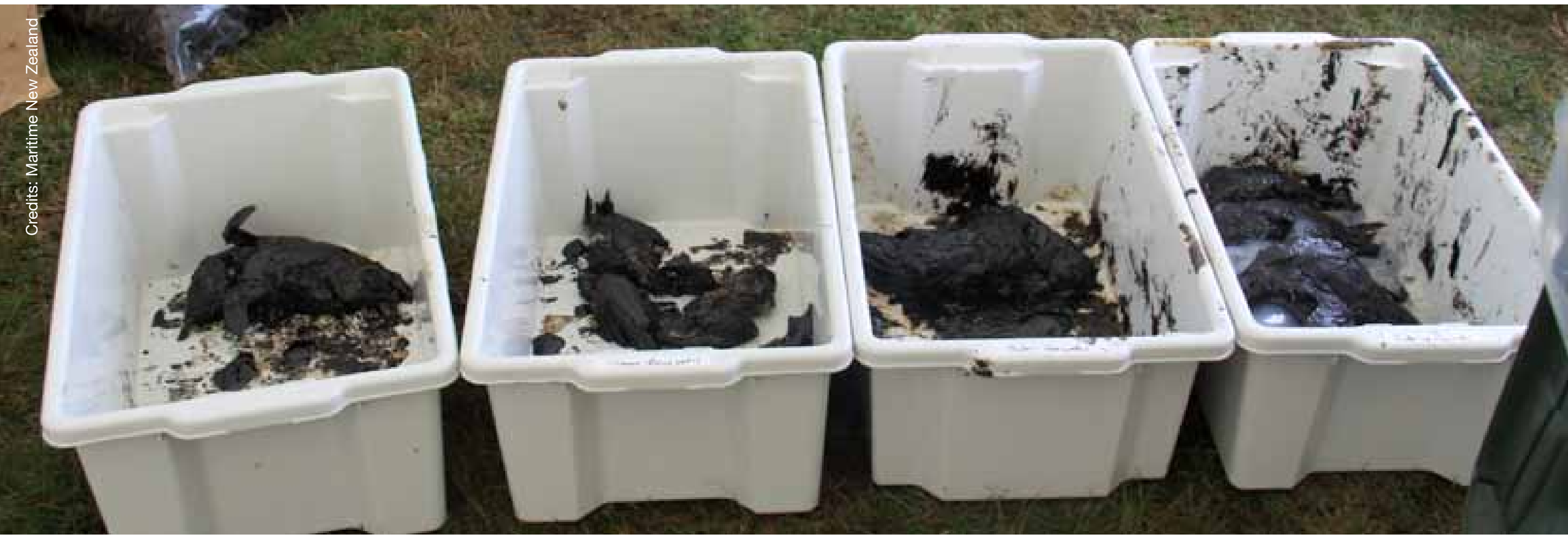
The outcome was that very little oil was recovered. Time was already running out as teams continued battling the wind, the waves, and more unexpected technical challenges.

# DAY +11

Finally, when pumping resumed, just 21 tonnes of oil were recovered. The oil had to be pushed through 150 meters of hose, a laboriously slow process.

Salvors were set to work through the night but operations continue to be risky, especially as the stress on the ship's structures increased by the hour.





Credits: Maritime New Zealand

Credit: LOC

# DAY +14

The October 19th dawned with up to four meter swells and very strong winds. Booster pumps and additional pumps were installed to speed up oil evacuation. More costly, heavy equipment was manhandled aboard, including a six-inch pipe to help increase the oil flow rate.

But by the 22nd, only 256 tonnes of 772 tonnes of oil had been pumped from the N °5 port tank. The challenge for salvors became even more complex on the submerged starboard N°5 tank.

Teams scrambled to come up with a plan to remove oil from the starboard tank. They had not yet started pumping any of the 220 tonnes of oil out of the settling tanks.

The extreme heel angle, inclement weather conditions, and slippery decks made the operation for salvors both difficult and dangerous. Even the simplest actions posed a huge risk, and sometimes took long hours to execute.

# DAY +24

Twenty-four days had passed and there were still 870 tonnes of oil left on the ship. Sadly, another five to 10 tonnes had leaked out into the delicate eco-system. Then salvors focused on accessing the manhole of the submerged No. 5 tank by draining the water off the cofferdam, expected to be built along the hull but they could not begin pumping because of more weather delays that lasted until November 3rd. Then they faced yet another huge blow; the bad weather had destroyed the cofferdam under construction reducing all work to nothing.

With no time to rebuild it, the only option was to begin hot tapping, a laborious process that would take valuable man-hours to complete, yet another stressful delay in the grueling saga.


Credit: NZDF

Credit: Maritime New Zealand

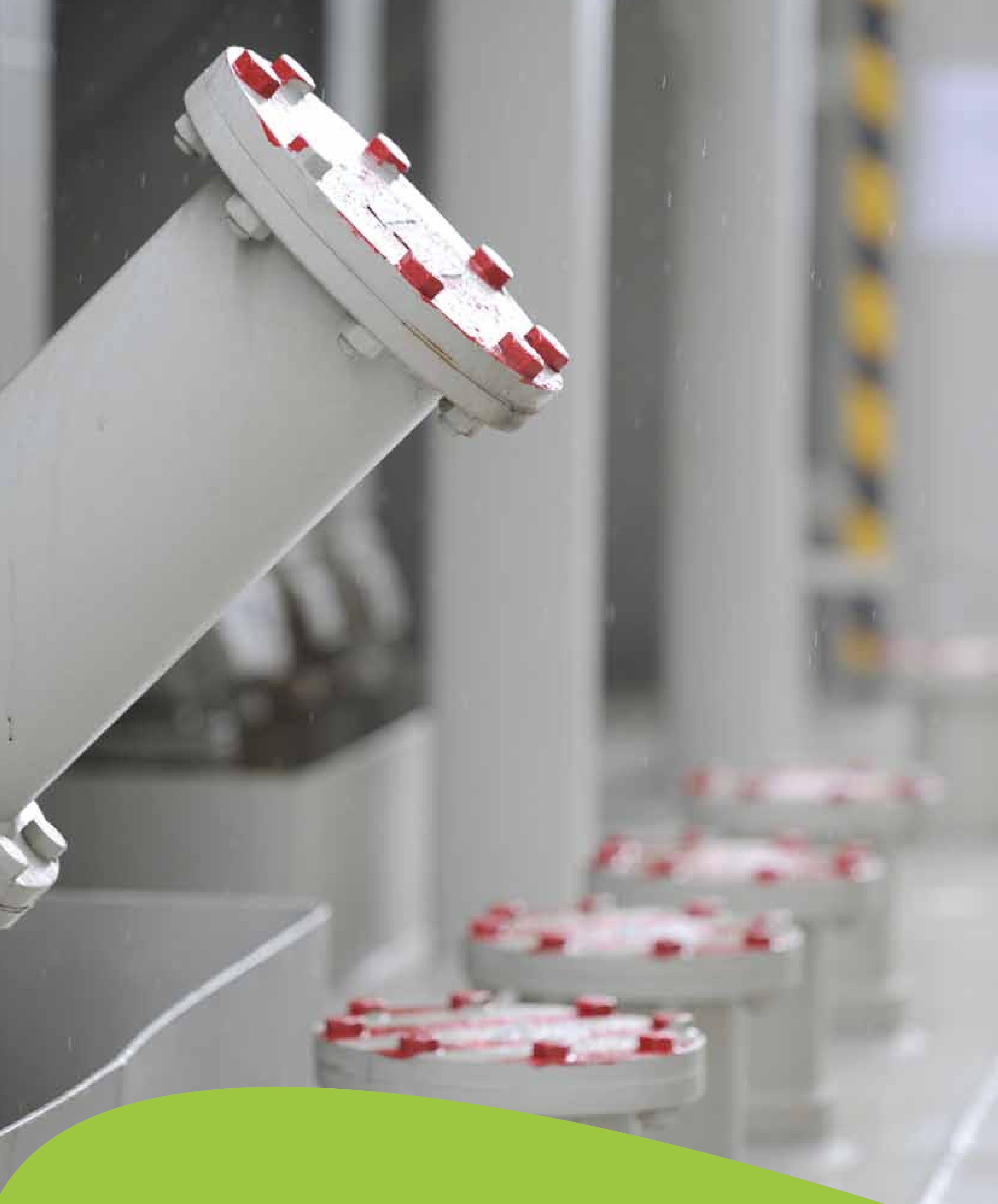
# DAY +31

Incredibly, a month had gone by with operations still complicated, lengthy and dangerous due to changing weather conditions and logistical challenges. On November 6th, it took almost six days to complete the pumping of 750 tonnes of seawater into the starboard No. 5 tank. Finally, as the teams prepared to pump oil, they had to get 150 meters of hose that weighed over three tonnes, two large pumps, and close to 40 meters of ladders onboard. The ladders would be used to help keep the oil flow as straight as possible. Desperate to find another solution, salvors then considered a third and fourth hot tapping operation.

By the 11th, 36 days after the disaster first occurred, only two-thirds of the oil on the ship had been removed. Salvage teams were exhausted as the exorbitant costs continued to mount. It wasn't until November 16th that the first container could be removed.

In early December, another half tonne of oil escaped the stricken ship. A significant amount of oil remained in tanks and on the ship that salvors couldn't reach. In early January, the battered wreck ultimately split in two, with the stern section partly sinking two days later.

The environmental threat is still present. Salvage operations are still complex and dangerous. For all crisis players, money and pollutants are still flying the wrong way.



# How could the FOR System have changed the outcome of the *Rena* accident?

# NORMALLY POLLUTANT RECOVERY OPERATIONS INVOLVE A 5-STEP PROCESS.

1. **A survey of the wreck is carried out to assess the location, quality and quantity of pollutant to recover**

2. **Ship design and structural data is gathered**

3. **A recovery plan is defined**

4. **Engineering procedures are devised, laid out and adapted, and people and equipment are flown in and transported onboard**

5. **Operations are carried out with a vigilant eye on the weather and the ship's condition**

Time is an aggravating factor: Oil viscosity, stress on the ship's structure, salvors' safety, leaks of pollutants, financial and reputation damages, etc….

Every stage of recovery requires meticulous planning and execution. And with ever-changing conditions, salvage teams often have to rethink their game plan on the fly.

# WRECK SURVEY:

Immediately, the FOR System reduces survey operations: Emergency connectors and circuits are made easy to locate as they are detailed on a ship's mandatory plans and visible on the deck period. Data is readily-accessible regarding every tank; it includes the length from the connector to the tank, pump insertion facilities, and top or bottom tank access indication (a data plate is welded to each connector). Ship owners and other authorized persons can access additional drawings such as piping diagrams and capacity plans on a 24/7 basis on the JLMD website.

# SHIP DESIGN AND STRUCTURAL DATA IS GATHERED:

In order to remove the oil onboard, there is no need to gather any other data than what the FOR System circuits provides, which is easily and readily accessible.

The FOR System locations determine the tank concerned. This data combined with the ship's position and context determines the pollutant removal procedures, and a logical plan can be followed, all while ensuring the ship's structural integrity.

# DETAILED RECOVERY PLAN DEFINITION:

The FOR System offers two options: the recovery of the oil by inserting a handy submersible pump (60 Kg. Dia. 150mm, L 613mm) into the tank through the FOR piping; or by injecting sea water through one pipe and extracting the oil through a second.

Such options can be carried out by any salvage experts in the world since all sizes of connectors, pipes, and pumps have been chosen in compliance with standard salvage tools.

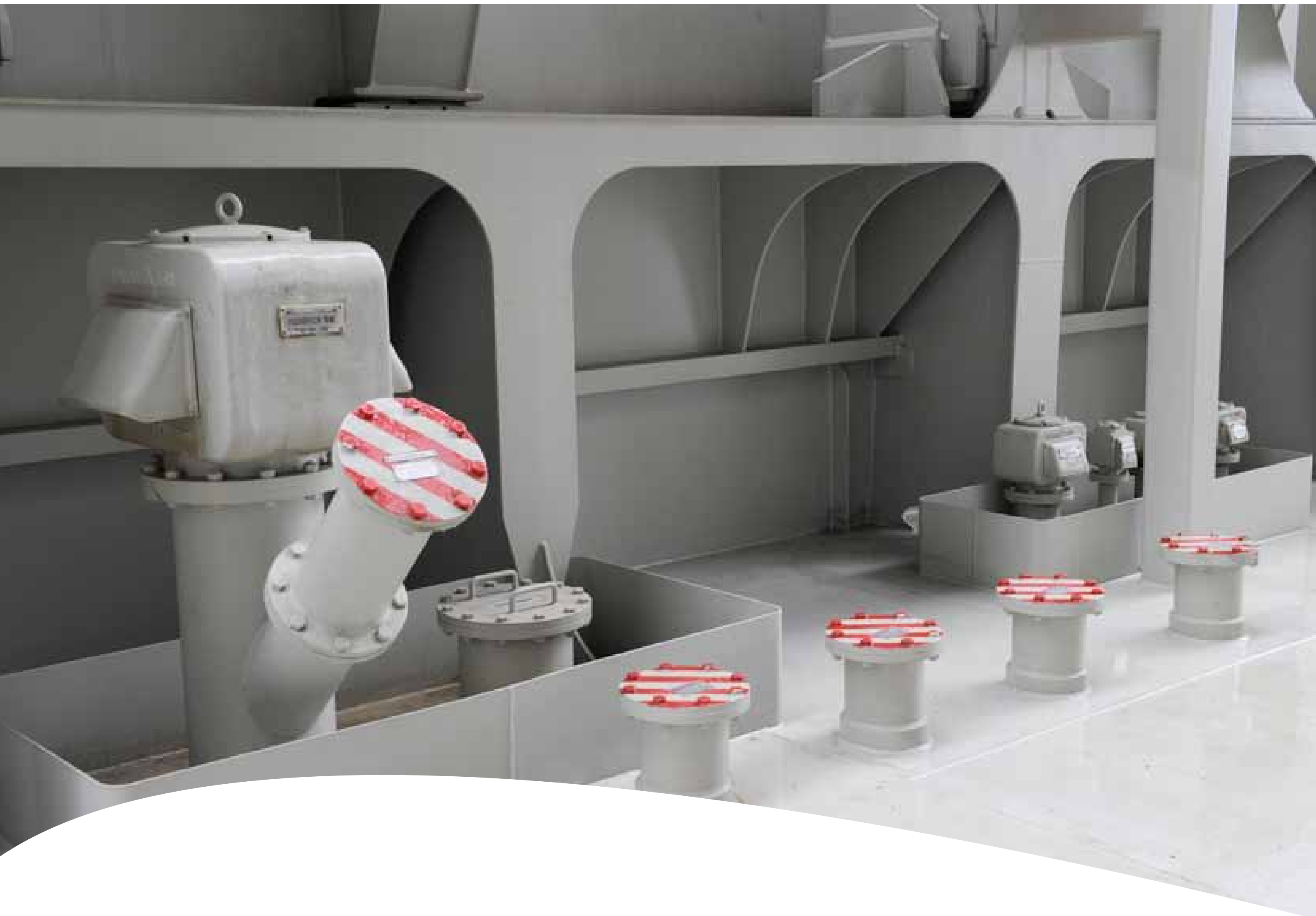
The position of each FOR System and allocation of free working space around it have also been pre-determined in order that salvors or ROV (Remotely Operated Vehicles) operators can work safely and efficiently.

# OPERATIONS VS. WEATHER CONDITIONS:

As soon as weather conditions allow salvors to do their job, the FOR System gives them an easy, efficient and safe way to do so, speeding up the removal process for a faster, more effective outcome. The FOR System also allows operations to alternatively be stopped and resumed quickly.

# ELEMENTS THAT CAN BE MITIGATED WITH THE FOR SYSTEM:

At the top of the list is the factor of time, especially as an incident escalates, as well as the safety of salvors.



A ship's structure is stressed, which increases the danger to exhausted salvage teams who, at times, can be working around the clock. With a FOR System onboard, the speed at which salvors can work can be significantly increased.

Accelerating the pumping: The FOR System allows streamlined removal of the pollutants before the oil temperature drops, increasing the pollutant viscosity.

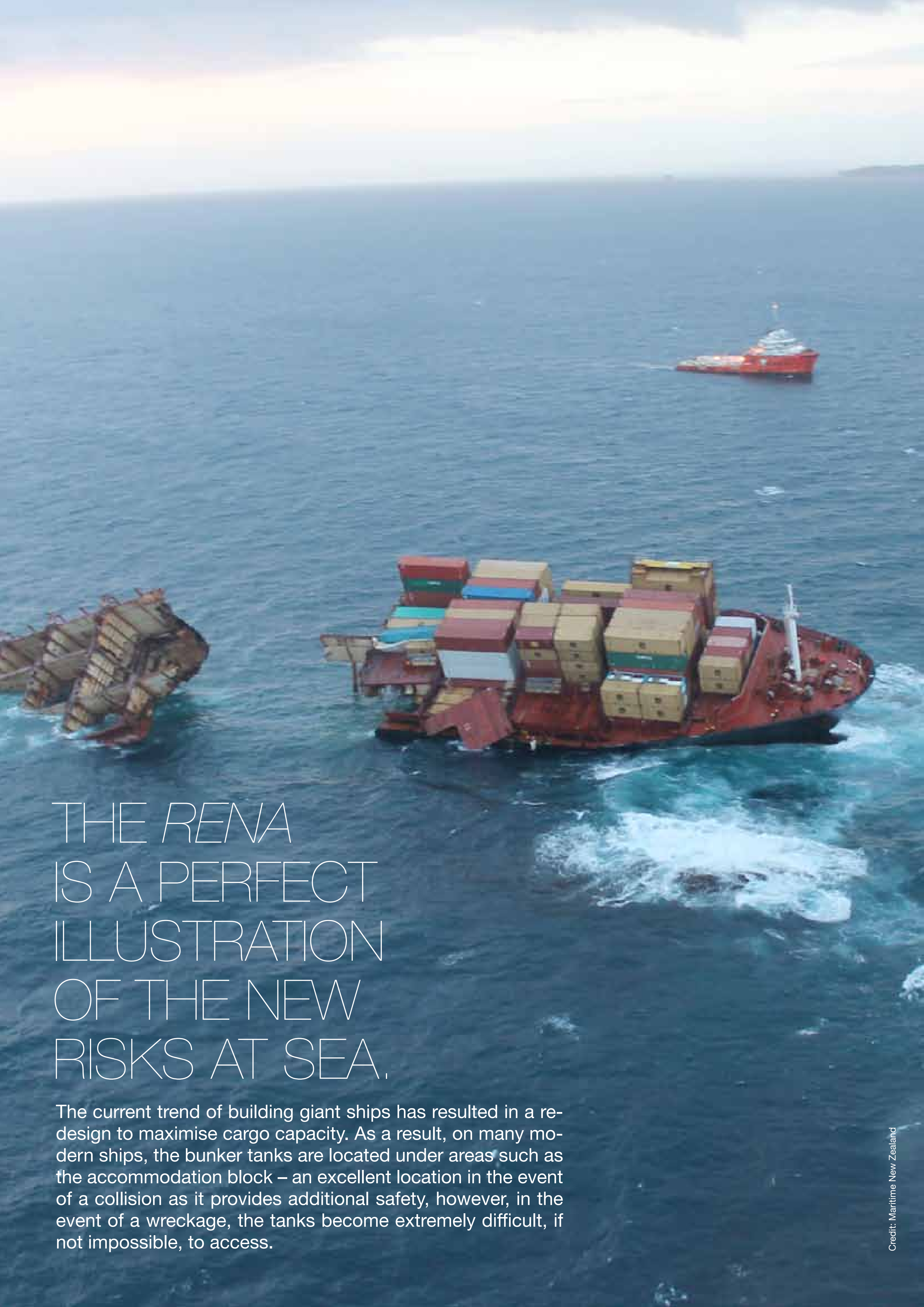
The longer the pollutant leaks out into the marine eco-system, the greater the impact to the environment: The FOR System drastically reduces the risk of leakage.

Owner, operator, and crisis players are deeply impacted by the media: The FOR system enables salvage teams to work faster and more effectively, minimizing media scrutiny.

The cost of the incident dramatically increases every day: With the FOR System onboard, much less time, people and equipment is needed, which reduces overall costs. The salvage processes are readable, making cost and time appreciation easier.

The FOR System is considered to be a proven environmentally-sound investment by the ship owner: The FOR System helps reduce civil liability while demonstrating a willingness by the ship owner to ensure mitigation methods are in place should an incident occur, in order to avoid damaging the marine environment. It is no surprise then that regulating bodies and insurance companies are working on the opportunity to offer civil liability advantages to encourage the ship owners to get equipped.

IF A FOR SYSTEM HAD BEEN ONBOARD RENA, THE COST OF CLEANING UP THIS MARINE DISASTER COULD HAVE BEEN CUT BY AS MUCH AS **50 PERCENT**.



Credit: Maritime New Zealand

# THE *RENA* IS A PERFECT ILLUSTRATION OF THE NEW RISKS AT SEA.

The current trend of building giant ships has resulted in a redesign to maximise cargo capacity. As a result, on many modern ships, the bunker tanks are located under areas such as the accommodation block – an excellent location in the event of a collision as it provides additional safety, however, in the event of a wreckage, the tanks become extremely difficult, if not impossible, to access.

# RISK REDUCER: A SIMPLE SOLUTION TO A MAJOR PROBLEM

Each year, thousands of ships transiting the world's oceans will have an accident; many will cause oil spills. There are numerous preventative measures ship owners can take, but even designing a ship with a double hull is not always enough to mitigate the consequences of an environmental disaster. When you consider the cost of the *Rena* oil spill has been estimated in the tens of millions of U.S. dollars, investing in the FOR System is well worth the peace of mind. In fact, the salvage operation is expected to continue for some months.

The FOR System is paving the way for the maritime community to step up its green leadership in the world of transportation, and continue its commitment to minimizing the risk for ship owners, shareholders, the public, and the environment.

The fact remains: accidents at sea will happen. When they do, the stakes are extremely high. Planning and handling the consequences of accidents and incidents at sea are major steps towards better protection of the marine environment. Now there is an easy and efficient way to be prepared – by installing the FOR System – a safer, more sustainable choice for the maritime industry.

GILLES LONGUÈVE
JLMD ECOLOGIC GROUP

Managing Director

26 Boulevard Malesherbes
75008 Paris, France
Tel: + 33 (0)1 43 12 59 02
Fax: + 33 (0)1 58 18 31 53

Mobile + 33 (0) 6 72 87 70 87
glongueve@jlmdsystem.com

www.jlmdsystem.com

## ACKNOWLEDGEMENT ABOUT THE ILLUSTRATIONS

The photos of the *Rena* and salvage operations included in this document remain the property of Maritime New Zealand and the people who supplied them. We would like to thank them for their amiable permission of use. To get full illustrated coverage of the salvage operations deployed for the *Rena*, please visit Maritime New Zealand's website: www.maritimenz.govt.nz/Rena/