CENTRE OF DOCUMENTATION, RESEARCH AND EXPERIMENTATION ON ACCIDENTAL WATER POLLUTION

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Sea & Shore Technical Newsletter *n°35*

2012-1

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Storm and coastal pollution: grounding of the cargo ship *TK Bremen* (Erdeven, France)

On the 15th December 2011, in anticipation of the approaching storm *Joachim*, the Maltese cargo vessel *TK Bremen* left the commercial port of Kergroise (Lorient, Morbihan) where it had just unloaded its 5,300-tonne cargo of sunflower meal. The captain of the vessel had decided to anchor on the leeward side of Groix and wait for the storm to pass, sheltered by the island. However, in the worsening sea and weather conditions the anchorage proved to be insufficient to stop the unladen vessel from dragging its anchor. Despite repeated attempts to stabilise the vessel, the *TK Bremen* slipped its anchor eastward and during the evening definitively left its shelter from the swell, in winds now reaching over 70 to 80 km/hour.

Late evening, the vessel, using its engine but in poor operating condition, unsuccessfully attempted to sail against 100 to 110 km/hour winds to reach a sheltered area indicated by the maritime rescue coordination centre CROSS Etel.

16th December 2011: Oil spill from the TK Bremen, grounded on Kerminihy Beach (Source: Marine Nationale)

Faced with the gradual drifting of the vessel into increasingly shallow waters where, under wave action, its structure was under significant mechanical strain, the captain requested the assistance of a tug. However at this stage, no assistance measures could have forestalled the grounding of the *TK Bremen*, which occurred at around 02:00 on Kerminihy Beach (Erdeven, Morbihan), in the last-ditch attempts to anchor. The vessel had an estimated volume of 190 tonnes of intermediate fuel oil (IFO 120) and 40 tonnes of marine diesel in its bunker tanks.

Under the control of the French maritime authorities, a French Navy Caïman helicopter from the Lanvéoc-Poulmic naval air base evacuated the 19 crew members still aboard. At first light, a 1 km-long slick trailing from the vessel was detected.

The Morbihan departemental operations centre (COD56)[1], activated by the land authorities in anticipation of the passage of Storm *Joachim*, was informed at 02:00 of the cargo vessel's grounding by the maritime authority PREMAR Atlantique. At around 02:30 the fire brigade established a command post for the site in the immediate vicinity of the wreck; they noticed a strong smell of fuel and the presence of oil on the beach. The COD56 immediately notified the DREAL[2], responsible for the coordination of response resources in the Western Defence Zone (ZDO), and informed CETMEF[3] and the POLMAR stockpile in Saint-Nazaire of the situation, as well as *Cedre.* The latter, at the request of the Morbihan Prefecture, sent agents on-site that night to provide advice and expertise to the authorities managing the shoreline response.

The departmental POLMAR contingency plan was activated at 04:20 and the operational command centre (PCO) gathering together various services (fire brigade, DDTM, UT-DREAL etc.) and the local stakeholders in crisis management was established in the early morning in Erdeven. Under the direction of the Prefect of Morbihan, in the first hours, and then the Sub-Prefect of Lorient, the PCO ensured the management of the POLMAR operations on land until the end of December. In January, the PCO was closed and measures were scaled back to a monitoring committee, coordinated from the Lorient Sub-Prefecture. Under the management of this committee, the responsibility for clean-up operations was transferred to the insurer of the *TK Bremen* and their technical experts (ITOPF[4] and contracted companies). The *Cedre* experts supporting the PCO organised surveys of the beach and the shores of the Etel Ria.

[1] Including the following operational services: Fire brigade (SDIS), *Gendarmerie*, Police, Defence and Civil Protection Department (SIDPC), Departmental Directorate for Territories and the Sea (DDTM), Departmental Military Commission (DMD), Departmental Information and Communication Service (SDSIC).

[2] Regional Directorate for the Environment, Planning and Housing

[3] *Centre d'Etudes Techniques Maritimes Et Fluviales* (maritime and rivers technical research centre)

[4] International Tanker Owners Pollution Federation

16th December 2011: ribbons of fuel on the sand in the immediate vicinity of the wreck (Source: Cedre)

The initial surveys confirmed (i) the oiling of the sandy foreshores of the incident site and (ii) the incursion of floating oil into the Etel Ria (situated 2 km north and well-known for oyster production), contaminating a small number of oyster farms and threatening others farther upstream (Etel, Belz and Locoal-Mendon sectors).

Over and above the risks generated for oyster farming activity, particularly high during the festive season, (in total, 6 farms out of 40 were impacted), the wreck also posed a clear environmental hazard, as the affected shore enclosed 2 sites in the Natura 2000[5] network: the Gâvres-Quiberon dunes (classified *Grand Site de France*) and the Etel Ria.

The Morbihan Prefecture asked the ZDO to mobilise complementary external equipment and personnel for the emergency. These resources were mobilised from the first day of the incident including: 50 FORMIISC[6] soldiers and reinforcements from other departments (110 firemen) working alongside local emergency services, and response equipment (mainly booms as well as manual tools and PPE) from the POLMAR stockpile in Saint-Nazaire. The Prefecture requisitioned the company SITA Ouest to manage liquid and solid waste. Under the control of the UT-DREAL, the company took responsibility for the preparation of storage sites and the evacuation of waste to the appropriate treatment and disposal sites.

On-land response priorities were:

- the protection of sensitive areas in the Etel Ria, in particular the oyster farms;
- the initial clean-up operations and removal of the oil washed up on the shore;
- the evaluation of health hazards due to the oiling of oyster farms in the river as well as a shellfish gathering area at the entrance of the ria.

Meanwhile, the maritime authorities focused on managing the oil at the source by lightering the grounded wreck: oil pumping operations were initiated from the first day of the incident using CEPPOL[7] equipment and personnel. The maritime authorities also studied the feasibility of refloating the vessel at the next high tide. However, 3 days after the incident the survey results on the state of the breached structure led the authorities to dismiss this option in favour of dismantling the wreck in situ. On the 22nd December PREMAR gave the manager of the *TK Bremen* four days' notice to present an action plan aimed at eliminating the safety and environmental risks posed by the wreck.

On the 19th December, a working meeting, co-chaired by the Maritime Prefect and the Prefect of Morbihan, outlined the response strategy in terms of organisation (monitoring committee) but also in terms of the goals and deadlines of pumping, dismantling, clean-up and restoration operations.

From the 18th December, pumping operations for the fuel and other lubricants were taken over from CEPPOL by the Dutch company Smit Salvage. The DREAL, after a thorough survey of the area, approved plans to create a path through the dunes enabling pumping equipment and later heavy machinery to be brought to the beach. This single access path was covered with a Deschamps roll out mat to limit the impact of passing machinery on the dunes underneath.

Pumping operations finished on the 23rd December with, in total, approximately 270 m^3 evacuated by the company SITA Ouest to authorised facilities[8].

[5] European Community network grouping Special Areas of Conservation (SAC) under the Directive on the Conservation of Natural Habitats and Special Protection Areas (SPA) under the Birds Directive

[6] Formations militaires d'instruction et d'intervention de la sécurité civile (military civil protection)

[7] Centre of Practical Expertise in Pollution Response

[8] To an authorised treatment site in Lillebonne, Seine-Maritime ran by the company SCORI



20th December 2011: defining access through the dune to set up the site for the bunker tank pumping operations by Smit Salvage and the evacuation of pumped fluids (Source: Cedre)

In the initial days after the incident, 570 m of floating booms were laid in 2 sectors of the ria (Etel and Saint-Cado) to protect aquaculture facilities: 4 shallow-draught booms were laid at 10:00 am on the day of the incident before response means had been mobilised from the POLMAR centre in Saint-Nazaire. As soon as the alert was raised, discussions began during the night on the means of protecting the oyster farms in the Etel River. CETMEF and the DDTM[9] expressed their doubt as to the appropriateness of such an operation; *Cedre* was of the same opinion. The complete closure of the ria using heavy floating booms was not feasible due to the strong currents characteristic of the site. Yet the option was called for by certain parties, as was the case during the *Erika* incident. Another option, a far more restricted, permanent herringbone set-up at the port of Etel, had been tested and showed possible efficacy. At high tide, floating debris such as seaweed, litter etc. naturally gathers in the watercourse (and so the pollutant would as well), tending to spread along the length of the Etel quay before part of it enters the marina or is brought back towards the centre of the river then continuing on a course upstream.

Protective measures in Etel port: floating boom in "J" formation with sorbent booms (Source: Cedre)

Bolstered by these tests, CETMEF, the *Phare & Balises* Service (lighthouses and beacons), oyster farmers and *Cedre* agreed on the location, length (200 m) and formation of the set-up ("J", moored to the quay and tied to a 6-tonne sinker in the water). Laid in tenuous safety conditions, using an oyster-farming barge, by the Lorient *Phares & Balises* Service, with help from oyster farmers and *Cedre*, the boom was the principle element of protective measures in the event of a sudden leak from the wreck or remobilisation from heavily oiled beaches downstream.

In place up until the end of response operations, it intercepted a small volume of the pollutant and oiled debris drifting upstream from the ria entrance.

From the day of the incident the main, initial clean-up sites along the shoreline were defined. Around 250 people per day were mobilised at the start of the incident (mainly firemen and civil protection personnel, with the help of local authority staff). Divided into 2 operational sectors, the sites were logistically coordinated by 2 on-site command posts (PCC) from the Morbihan fire brigade (Kerminihy Beach PCC and Etel Ria PCC), under the control of the PCO. From the 16th to the 26th December, manual and selective recovery of oiled sand and fuel accumulations (tarballs and patties) resulted in the collection of around 780 m^3 of waste.

Following this first phase, the ship manager took over the final clean-up operations. The insurer called upon the specialised private company *Le Floch Dépollution* to manage all of the clean-up sites. For several weeks, a site committee[10], with the technical leadership of *Cedre,* carried out surveys and was in charge of the definition (terms of reference, technical criteria) then daily monitoring and finally the closure of clean-up sites. Other than the manual collection of pollutant and heavily oiled seaweed accumulations, the majority of operations within the Etel Ria consisted in pressure washing hard surfaces (rocks and oyster-farming and port facilities). The last sites were closed in mid-March 2012. Meanwhile, a specific washing area for pleasure craft was set up in the open space next to the marina, a few dozen craft were hauled out to be washed between March and April by *Le Floch Dépollution.*

As regards the ocean, relatively heavy pollution (both surface and infiltrated or buried) was reported

[9] Direction départementale des territoires et de la mer (departmental directorate of territories and the sea)

[10] Bringing together the various concerned parties: representatives of the injured parties (State services, local authorities, oyster farmers, *Natura 2000* site managers - the federations of Gâvres-Quiberon and of the Etel Ria - management of the Etel Marina etc.) and representatives of the ship owner (insurer, ITOPF, clean-up company).

practically at the entrance to the ria, on the whole north part of Kerminihy Beach on the upper foreshore. The observation of this clear source of contamination for the ria through the flow of future spring tides, led *Cedre,* from the 19th of December*,* to suggest surfwashing[11] after having tested its applicability on a few cubic metres of sand (in relation to the pollutant and hydrodynamic conditions).

The aim was to anticipate the inevitable release of oil from contaminated sand, to recover as much oil as possible and to encourage drift and natural dispersion of residue towards the open sea and not towards the ria.

In light of positive results, *Cedre* recommended the large-scale implementation of the technique that very night to the PCO, defining the precise operational procedure, namely:

- the window of opportunity as regards tide (ebb tide), wind (towards the open sea and not the ria) and the sea state (presence of formed waves);
- the recovery system (using fine mesh nets);
- the location of the sand deposit, mid-beach (chosen so that the longshore drift would eventually return the sand to the site from which it had been removed).

With the agreement of the parties present (State, Local Authorities, General Council, oyster farmers, Natura 2000 site managers etc.) and using the considerable means made available by the General Council, this technique underwent a second test the next day (approx. 20 m^3) and the day after that (over 60 m^3). These operations had to be suspended due to overly calm sea and weather conditions; awaiting a favourable window, *Cedre* had the oiled layer of sand in affected areas stripped, and deposited in heaps close to the surfwashing point. Operations were resumed in February, at the request of the insurer, by the company Le Floch Dépollution, this time under the supervision of ITOPF and the control of CEPPOL with the direct technical assistance of *Cedre* who had defined the operational procedure. The totality of the oiled part of the beach, an overall volume of sand over 3,000 m^3, was efficiently treated in this way in under a week, just before the March spring tides.

From the early hours of the incident, the spectacular stranding, in the holiday season and on a remarkable site, triggered an impressive flood of onlookers (estimated at 100,000 people in 10 days) who trampled on the extremely fragile dunes to reach the wreck. In order to avoid damage to the environment, but also for obvious health and safety reasons (related to the ongoing and upcoming operations at the sites and the stream of tanker trucks and other heavy machinery), the authorities took security measures from the 23rd December on, including both a traffic plan and measures to restrict access to the site (through reinforcements from the Gendarmerie). From the 27th December, the ship manager took the necessary measures: closing the whole area (with a 2.5-metre metal fence over a length of 5 km); using a surveillance company, night and day; a horse-mounted brigade in the dunes and the obligatory wearing of badges etc.

From the day of the incident and for about a month in the sectors of the ria impacted by the spill (until the 19th January 2012), Prefectoral by-laws banned shellfish gathering and restricted the sale of aquaculture products from the Etel Ria. During this period, the health monitoring of water and consumable resources, including the definition of reference standards, sampling methods and interpretation of results, was jointly undertaken by ARS, IFREMER and DML[12]. To help maintain aquaculture stocks during the month of December (peak period for producers) tanker trucks from the fire brigade were used to renew seawater in the aquaculture basins.

On the 22nd of December the ship manager was given notice (i) to dismantle the wreck and (ii) to rehabilitate the site by the 6th April 2012. Preparation for dismantling operations (marking; extension and reinforcement of the single access point to the beach by levelling, laying metal sheets, planks and barriers; cutting platform on the beach etc.) began on the 26th December.

The same day, a Prefectoral by-law on emergency conservation measures under Classified Facilities for the Protection of the Environment (ICPE) legislation ordered measures on: (i) the prevention of pollution and other risks related to dismantling operations and (ii) the assessment of repercussions and the proposal of a restoration plan. Checks to ensure compliance with these recommendations were performed by the DREAL during operations, through inspection visits (bringing together the ARS, DML and the fire brigade on 2 occasions), and even a guidance meeting (January 2012) to raise the awareness of the companies involved.

[11] Technique consisting of placing the polluted sand in the surf zone and using wave energy to separate the sand from the oil, facilitating the recovery of the pollutant without removing sediment from the beach.

[12] Respectively: Regional Health Agency, French Research Institute for Exploitation of the Sea, Sea and Shore Delegation.

The company TECHNITAS was in charge of the overall coordination of operations which included the following actions:

- The specialist Dutch company Euro Demolition was contracted to cut up the wreck, which it carried out between the 6th and 25th January 2012 using a giant, 280-tonne track excavator, fitted with an articulated boom and shears. This operation resulted in the removal of 2,000 tonnes of metal;
- The internal deconstruction of the vessel as well as the prior clean-up and pumping of the tanks were entrusted to *Recycleurs Bretons* and its subsidiary *Alzeo Environnement* respectively;
- The scrap metal was taken to Lorient to be recycled by the company *GDE Atlantique*, while the polluted effluents were treated in Saint-Malo by EVTV *(Entreprise de Vidange des Trois Villes*).

January 2012: cutting and removal of the TK Bremen wreck (Source: Cedre)

Other companies were involved in the treatment of specific materials (asbestos removal by the company SODEPOL), the implementation of the Prefectoral by-law related to the impact of operations on the site (Morbihan consultancy firm ALTHIS for the ecological impact study) and the remediation and restoration of the sites (local company ACE Paysage).

During the cutting operations there were inevitably some leaks (from pockets of pollutant trapped in various crevices and piping of the wreck) some of which, like the one reported on the 10th January, were quite serious. For want of an at-sea recovery system provided by the demolition company, CEPPOL used an inflatable craft to deploy a small Thomsea trawl net as well as a small NOTIL (Nymphea Oil Trawler Instant Launch) mobilised by the company *Nymphea environnement*.

Site rehabilitation operations began as soon as the wreck had been dismantled on the 26th January 2012, in accordance with the recommendations laid out by ALTHIS in the impact assessment and the remediation report.

These operations included sand screening to a depth of 3 to 5 metres at the wreck site (over 120 m along the beach and its entire breadth) using a rotary bucket fitted on a hydraulic arm, and the remediation of the dune by an environmental engineering company (reprofiling of the dune and the original pedestrian path; scraping and decompacting the ground to facilitate natural regrowth; replanting beachgrass etc.). In mid-March 2012 the Morbihan Prefect and the Maritime Prefect along with local authorities and site managers inspected the dune. The rehabilitation objective was judged to have been attained and the last steering committee meeting, at which the site was officially reopened, was held on the 16th March.

Grounding of the bulk carrier *Tycoon* after breaking its moorings (Christmas Island, Australia)

On the 8th January 2012, under the effect of a violent storm striking the Indian Ocean, the moorings of the Panamanian bulk carrier broke while it was in dock in the port of Flying Fish Cove, the capital of Christmas Island[13] (external Australian territory). Pushed by winds and waves the vessel was rapidly pushed against the base of the cliffs next to the port area where it suffered assaults from the powerful surf. The 15 crew members were safely evacuated by the Royal Australian Navy and the Australian Federal Police together.

[13] With a surface area of about 140 km², of which 2/3 has National Park status.

In addition to its 260-tonne cargo of phosphate, the *Tycoon* was carrying 102 tonnes of intermediate fuel oil, 32 tonnes of diesel oil and 11 m^3 of lubricant oil.

Faced with the risk posed by the vessel's position, the Australian Maritime Safety Authority (AMSA) activated the National Plan[14] and sent experts to the site[15] to support the local port authorities (Christmas Island Harbour Master, in charge of the crisis management in the first hours following the incident).

During the night, wave action (4 to 5 m-high waves) cracked the vessel's structure and it foundered at the base of the cliffs where it broke in two early in the morning of the 9th, releasing the main bulk of its cargo and the contents of its bunker tanks.

8th January 2012: The Tycoon grounded on the cliffs of Flying Fish Cove, Christmas Island (Source: AMSA)

A spill of phosphate and oil was visually confirmed as well as fuel stranded on the shoreline. Initially, sea and weather conditions made any possibility of action at sea or on land unforeseeable for at least 24 hours. Nevertheless shore clean-up teams were rapidly established under the auspices of a centralised command, the National Response Team (NRT), bringing together representatives from various relevant government agencies[16].

Manual shoreline clean-up at Flying Fish Cove (Source: AMSA)

While no operations could be carried out at sea, clean-up on the shore, mainly manual recovery, began on the 10th January under the joint coordination of AMSA and local authorities who led around 80 volunteers.

These operations were scaled back 8 days after the incident as significant arrivals of oil on shore had ceased[17]. Thereafter, some volunteers remained mobilised to clean up the residual pollution on rocks and the quays, while sporadic, small-scale oiling continued as a result of wave action on the wreck. The National Plan was deactivated on the 17th February, 6 weeks after the incident.

In retrospect, the AMSA Marine Environment Division considered that, despite having impeded the deployment of response and personnel (mainly at sea but also on several occasions on land), the difficult sea and weather conditions had facilitated the rapid dissolution and dilution of the phosphate in the marine environment and even a significant quantity of the oil. Similarly, a strong natural cleaning potential for the oiled rocks was reported due to their exposure to wave action.

In spite of the high ecological sensitivity of local marine life (including the whale shark, 17 species of shore crustaceans, including the endemic red crab known for its striking annual mass migration from the tropical forest of the island to the sea to release its eggs, and 2 bird species), no substantial environmental impact was identified following surveys led by a dedicated team (Wildlife Coordinators) within the NRT. Furthermore, no pollution was reported at environmentally sensitive sites. Diving surveys confirmed expectations of little impact in the area surrounding the wreck following the incident, nevertheless monitoring visits were planned.

In the days following the grounding of the *Tycoon*, its owner was given notice by the authorities to submit a salvage plan for the wreck, whose state was continually degrading (broken into 3 parts in February). Owing to the lack of such a plan, and in accordance with the Australian Navigation Act 2012, AMSA[18] announced on the 16th April that they would coordinate the operations, which resulted in the removal of over 1,600 tonnes of metal in July 2012 (after 8 weeks of operations). The authorities intend to seek compensation from the ship owner for the public funds used. In light of the

[14] National Plan to Combat Pollution of the Sea by Oil and other Noxious and Hazardous Substances

[15] Notably 2 coordinators, concerning the action related to pollution response (Marine Pollution Response Incident Coordinator) and salvage of the wreck (Casualty Coordinator from the Western Australia Department of Transport).

[16] Department of Regional Australia, Local Government, Art and Sport, Australian Transport Safety Bureau, Department of Sustainability, Environment, Water, Population and Communities

[17] Without precise information, various press sources reported the recovery of 51 bags of oiled debris by that date.

[18] In cooperation with the Department of Regional Australia, local Government, and Arts and Sport.

situation the Australian authorities also debated the opportunity to adopt the Nairobi International Convention on the Removal of Wrecks[19].

For further information
https://www.spillcon.com/documents/ParsonsJocelyn.pdf
http://www.amsa.gov.au/environment/major-historical-incidents/MVTycoon/index.asp

Diesel spill in remote inshore waters: *Karakumneft* grounding (South Kuril Islands)

On the 15th February, the oil tanker *Karakumneft* ran aground on a shallow 80 m from the coast of Iturup Island (South Kouril Islands, Russia). Due to the advent of a storm, the vessel, carrying 1,300 m^3 of diesel, had suspended the unloading of its cargo at Kurilsk Port, which it left only to run aground a short time after.

The creation of half a dozen breaches in the hull led to the release of at least 300 m^3 of pollutant in the inshore waters and left traces of pollution along around 10 km of coastline. Following the rescue of the 20 crew members, no response operations at sea were undertaken due to weather conditions. Subsequent surveys by divers enabled the identification of the breaches responsible for the vessel's leaks. The poor local availability of lightering resources led to the establishment of a system made up of pipes drawn between the wreck's tanks and vacuum trucks for later removal to storage facilities.

Release of heavy fuel oil and loss of dangerous goods: the *Bareli* container ship incident (Fujian Province, China)

On the 19th March 2012, while approaching Fuzhou International Container Terminal, China (capital of Fujian Province), the container ship *Bareli* (Singapore flag, 35,881 GT) grounded on a shallow due to an unspecified cause. The damaged bunker tanks, containing a total of 1,190 tonnes of heavy fuel oil, 136 m^3 of diesel oil and 134 m^3 of lubricant oil, started to leak. At the time of the incident the *Bareli* was also transporting 1,397 containers, 101 of which contained dangerous goods.

The grounded Bareli container ship. (Source: ITOPF)

Once the 21 crew members had been rescued, the provincial authorities (Fujian Maritime Rescue Center) sent various vessels (over a dozen, up to 45 according to some sources) and response equipment (booms for containment and recovery) to the area. The response at sea was coordinated by the Maritime Safety Authority, who supervised the Ship Pollution Response Operations (SPROs) conducted by local service companies also appointed to lighter the vessel. Salvage companies were also contracted to remove the containers. The release of oil into the sea was intermittent and finally estimated at around 100 m^3 of heavy fuel oil.

According to ITOPF (International Tankers Owners Pollution Federation, technical expert for the insurer on site), 165 containers fell overboard, 80 of which contained packaged hazardous products (plant protection products, sodium hydroxide); some of which washed ashore on neighbouring islands. A minor quantity of oil arrivals was reported on several islands to the west/south-west of the wreck. Clean-up sites were established, continuing for over 2 months, and consisted in manual collection of oil, oiled waste and hazardous products. No contamination of aquaculture farms (mainly seaweed and abalone) in the region was reported.

Manual recovery of oil on the shore (Source: ITOPF)

At sea and in the coastal waters, recovery attempts, made difficult by adverse sea and weather conditions, were mainly based on the use of sorbents due to the lack of availability of adequate mechanical resources, in good working order or correctly deployed[20].

In spite of its relatively minor nature, this incident posed some secondary pollution problems:

- on land, following the inappropriate initial storage of polluted waste (lack of ground

[19] Adopted within the framework of the International Maritime Organization (IMO), this convention sets out international rules on the removal of wrecks. Its entry into force requires at least 10 States to have signed the convention. Currently (late 2013), 6 States have ratified the convention and 6 others (including France) have signed it, thus expressing their intention of becoming a Party.

[20] Certain sources report damage to the floating booms caused by improper deployment, due to insufficient training of SPRO personnel.

protection, retention systems etc.);
- regarding the wreck, during improper recovery operations of oil which had overflowed into the container holds (recovery attempts using an excavator on a fuel which was too fluid for this method).

Finally, in addition to the loss of 80 of the 101 dangerous goods containers at sea, safety issues arose for the responders and population (scavenging attempts on the containers on deck).

Gas and condensate leak from an offshore platform following the eruption of a gas well (Elgin, North Sea)

The Elgin rig, on the 27th March 2012 (2 days after the leak was reported) (Source: Total)

On the 25th March 2012, an eruption occurred at the Elgin-Franklin offshore gas field (in the North Sea between Scotland and Norway) from the plugged G4 well operated by the subsidiary Total EP UK Ltd, leading to an uncontrolled gas and condensate leak.

The incident was the result of the unforeseen rise in gas pressure in the well, which is speculated to have been caused by the sudden influx from another reservoir[21]. Whatever the reason, this influx of gas led to the rupture of a tube, despite being intended to withstand high pressure, whose seals, on further analysis, appeared to have been weakened by unexpected corrosion. Their rupture allowed the gas and condensates to rise up to the platform.

At the platform, the leak appeared as a visible gas cloud being released into the atmosphere and the formation of sheen on the sea surface over an area of around 12 km^2. The sheen formed by the condensates, widespread with low persistence (rapid evaporation), presented no risk of reaching the coast, and furthermore was not suited to sea response action[22]. On the other hand, the explosive risk proved to be worrying regarding any direct action on the platform (e.g. landing of personnel and logistic means by helicopter). In addition, the fact that the flare was still burning was cause for concern; as luck would have it, the prevailing winds in the days following the incident aided the dilution of the gas plume and blew it away from the flare. The flare extinguished itself on the 30th March, the residual hydrocarbons remaining in the system having burnt off after the closure and de-pressurisation of the facility.

The Elgin G4 wellhead: view of the source of the leak (Source: Total)

On the day of the incident, Total, with the support of the UK Maritime and Coastguard Agency (MCA), had the 238 crew members evacuated from the platform and activated its emergency plan.

An Emergency Response Centre (ERC) was established in Scotland (Aberdeen), bringing together representatives and experts from Total, their consultants and the relevant UK authorities (in particular the Department of Energy & Climate Change – DECC, and the Scottish Environmental Protection Agency - SEPA). The Secretary of State's Representative for Maritime Salvage and Intervention (SOSREP) was also kept informed of developments in the situation and the response, of which he was in charge. While an expert committee acting for UK regulatory authorities (Government Regulators' Group, including the DECC, Health & Safety Executive - HSE, MCA, Marine Scotland, Marine Lab) was set up to facilitate discussions with Total regarding the response.

As regards communication, the amplitude of the incident[23] prompted Total (and the authorities) to publish regularly updated statements online, providing the latest information and complete archives (e.g. product analysis, water samples etc.) giving readers further details (see links mentioned at the end of the article).

It should be noted that the characteristics of the leak (essentially affecting the atmosphere), of the pollutant (low persistence), and of the general environment (open sea) allowed the authorities (in particular the DECC) to rule out the initial hypothesis of a significant risk for the marine environment. Furthermore, the results of water and sediment quality monitoring carried out 2 nautical miles away

[21] Chalky layer around 1,000 metres above the tapped reservoir.
[22] OSRL, mobilised to carry out aerial surveys of the area, was on stand-by in case dispersant needed to be sprayed, although this proved necessary.
[23] And, one is tempted to add, the lessons learnt after the Macondo well accident almost 2 years earlier.

from the Elgin platform by Marine Scotland confirmed low direct contamination of the environment.

The emergency response included as a priority close aerial surveillance of the spread of the pollution (three flights per day with visible and infrared detection) and the elaboration of an action plan by Total to control the leak at the source. Actions included:

- **surveillance of the area**, entailing the presence in the area, other than aerial means, of 2 platform support vessels and 4 Anchor Handling Tug Supply vessels (AHTS, for anchoring/towing platforms). Total revealed that the vessel *Highland Fortress* - equipped with a ROV - and the Marine Safety Vessels (MSV) *Kommander Stuart* and *Island Intervention* were on stand-by for various eventualities. The aerial surveillance of the sector was carried out by OSRL whose C-130 Hercules, fitted with an aerial dispersant system, based in the East Midlands was mobilised;
- **control of the leak**, through the implementation of 2 strategies:
  - (i) plugging of the leak by pumping heavy mud from the top (top kill procedure). For this, 2 vessels in particular were mobilised: the *West Phoenix*, and, for support, the *Skandi Aker*. On the 3rd May, the DECC approved the implementation of the top kill procedure which had been submitted by Total. This operation was successfully carried out on the 15th May, stopping the leak after around a dozen hours' work;
  - (ii) the provisional drilling of 2 relief wells in order to stop the eruption from the bottom (bottom kill) and then to seal the well. Two drilling rigs, used by neighbouring fields, were mobilised (*Sedco 714* and *Rowan Gorilla V*). The first drill began on the 18th April once authorisation had been granted by the relevant authorities and ended in summer when the well had reached a depth of 3,700 m (plans for a second well, subsequently deemed unnecessary, were abandoned). Five cement plugs, each with a depth of 200 m, were laid between May, at the stop of the leak, and the month of October, definitively capping the well.

These leak control operations had been preceded by other indispensable actions, in particular:

- platform inspections by experts from Total and Wild Well Control (company specialised in well response). The first was carried out on the 5th April (transportation by helicopter) enabling the personnel to conduct a survey of the leak zone and to establish secure access areas for response actions;
- securing the platform, on the 26th April, through the installation of a device called a "diverter" (made up of flexible hoses positioned at the leak) in order to prevent the accumulation of gas around the G4 wellhead and the platform.

After comparing modelling results, on one hand, and measurements of the gas concentration[24] in the air (carried out by the National Centre for Atmospheric Science, NCAS), on the other hand, Total disclosed an estimated leak rate of between 50,000 and 100,000 m^3/day between April and May, which was a sharp drop in the estimated rates from the first days after the eruption (200,000 m^3/day). In August, official estimates conveyed to the HSE by Total reported a leak of 3,096 tonnes of gas and 3,076 tonnes of condensates – 407 tonnes of which had led to rapidly evaporating sheen on the sea surface.

Marine Scotland published the results of analyses carried out in April 2012 then in January-February 2013, on PAH concentrations in sediment samples and hydrocarbon analysis in muscle and liver tissue samples of the principal fish species in the area, both inside and outside of the exclusion zone defined following the gas leak.

In 2012, the PAH concentrations in sediment samples were revealed to comply with typical values in this North Sea sector (dominated by pyrolytic PAHs from anthropic activity). In 2013, the PAH and *n*-alkane concentrations were higher in sediment samples taken closer to the offshore platform complex (i.e. inside the exclusion zone, but also in 1 sample taken outside the zone). Higher than before the incident (2009), this petrogenic contamination could nevertheless have been the result of drilling activity (and the oil-based mud).

In fish flesh samples, the levels of both saturated hydrocarbons (*n*-alkanes) and unsaturated hydrocarbons never strayed from reference values, showing no variation attributable to the incident.

[24] Methane concentrations, majority component and considered a good tracer of the volume released into the atmosphere.

Additional organoleptic testing in 2013 demonstrated that no sensory (taste, smell etc.) contamination was present in fish samples.

On the 9th March 2013, Total announced that it had resumed production from the Elgin-Franklin area following the approval of the safety case by the HSE.

For further information
https://www.gov.uk/government/news/elgin-platform-incident--3
http://www.elgin.total.com/elgin/home.aspx

Webster L., Russell M., Hussy I., Packer G., Dalgarno E.J., Craig A., Moore D.C., Jaspars M. and Moffat C.F., 2012. *Environmental Assessment of the Elgin Gas Field Incident – Report 5, Fish and Sediment Update*. Marine Scotland Science Report 17/12, 27 pp.

Webster L., Russell M., Hussy I., Packer G., Dalgarno E. J. and Moore D. C., 2013. *Environmental Assessment of the Elgin Gas Field Incident 2013 – Sediment and Fish*. Marine Scotland Science Report 10/13, 50 pp.

• Past incidents

Sea Diamond incident: heavy penalties announced in Greece (2007)

On the 5th April 2007, the Greek cruise ship *Sea Diamond* ran aground close to the port of the island of Santorini (Cyclades, Aegean Sea) on a well-charted reef before sinking 130 metres deep, causing the death of 2 French tourists and resulting in a spill of around 100 m^3 of bunker fuel (see LTML n° 18 - in French).

A fine of over one million euros was imposed in 2007 for pollution, while the Port Authorities of Santorini threatened the owner with a fine of €8,800 per day without response operations to pump the oil contained in the wreck (the Greek Merchant Marine Ministry had ordered the owner to present a pumping plan to eliminate the pollution risk - a request which remained unanswered).

At the same time, the captain of the *Sea Diamond* and the 5 crew members were charged with negligence leading to the sinking of the ship and pollution of marine waters, as well as with violating international maritime rules on navigation safety. While the crew of the cruise ship blamed currents for the incident, the company found fault with the nautical charts produced by the hydrographic service of the Hellenic Navy for the accident zone (in particular the position of the incriminating reef), with the aim of obtaining, through an opposing expert assessment, the rescission of the fines imposed.

On the 31st July 2013, the Piraeus court in Greece ruled on the case against the 13 people standing trial for the incident. Various prison sentences were imposed on the defendants (ranging from 6 months to over 12 years), including the ship's captain, an employee from the ship's classification society, the navigation officer, the chief engineer and the legal representative for the Cypriot owner of the *Sea Diamond*. The defendants appealed the ruling and the final adjudication will be made after another trial. As regards the pollution, the case is still ongoing as, although the company Louis Cruises took on the cost of response operations carried out in 2007, the wreck of the *Sea Diamond* still lies on the seafloor, holding around 100 m^3 of fuel according to estimates.

Feedback on the management of the *Rena* spill (2011)

A review of actions carried out by Maritime New Zealand (MNZ) in the response to the container ship *Rena* incident in New Zealand in October 2011 (see LTML n°34), drawn up by an independent expert, was recently released by the Ministry of Transport.

As we suggested in our previous Newsletter, one of the general lessons drawn from the review was on the efficiency of the response plan, overall deemed to be satisfactory considering the complexity of the situation (e.g. response to the wreck and containers, chemical risk, coastal pollution by oil, environmentally sensitive context, management of potentially exposed bird populations etc.). Some strong points highlighted were the collaboration between the different agencies and the level of administrative organisation - national to local, residential communities - including Maori society etc.

Moreover, MNZ has already initiated a certain number of measures suggested in the review, based on lessons learnt from the incident, regarding in particular:

- Optimisation of information procedures and coordination between the State representatives (Ministry of Transport, Department of Prime Minister and Cabinet etc.) and the agencies directly involved in the response to these kinds of maritime incidents;
- Reinforcement of the National Response Team (NRT), founded on a network of national

experts in oil spill response and particularly indispensable for coordinating response operations in the event of a Tier 3 incident (involving national and international resource mobilisation);

- Appointment of an exercise leader and a logistics manager within MNZ's Maritime Pollution Response Service (MPRS);
- Updating international support arrangements for oil spill response (in both public and private sectors), including specialist support in hazardous and noxious substances;
- Updating provisions under the National Plan regarding wildlife response, particularly to ensure better integration of specialists in charge of this area of response into the NRT;
- Initiation of discussions with the Department of Conservation aimed at the development of a memorandum of understanding to broaden the current response policy framework on marine and coastal natural resource protection to include non-oil pollution;
- Training for MNZ personnel on procedures and requirements to compile compensation claims, in particular within the framework of the International Oil Pollution (IOPC) Compensation Fund.

The full report, entitled Independent Review of Maritime New Zealand's Response to the MV Rena Incident on 5 October 2011, is available online:

http://www.maritimenz.govt.nz/Environmental/Responding-to-spills-and-pollution/Past-spill-responses/Rena-documents/Independent-Review-MNZ-response-to-Rena.pdf

• Remote sensing

Non-contact near-field oil sensors

In 2012, the German firm Optimare, well established in the marine pollution detection market with its remote sensors designed for aircraft, launched SpillWatch, a stationary, non-contact system for the detection of oil in water.

It is in principle intended to monitor potential pollution from industrial facilities (chemical plants, petrochemical plants, pipelines, etc.). With this in mind, and like certain analogue systems marketed by other firms – in particular SlickSleuth by US firm InterOcean Systems, Inc. – this system is fitted to a stationary structure (dock, pillar, etc.) overlooking the area to be investigated, which is analysed using technology based on oil fluorescence detection (with excitation by an UV light-emitting diode).

With a vertical range of 2 to 5 m, the advantages put forward by the SpillWatch constructor are the low maintenance required by the system (no operations over a 2-year period) and a design which filters out ambient fluctuations (e.g. variability in sunlight), thus ensuring that the sensor is very reliable in a wide range of light conditions, climate conditions, etc.

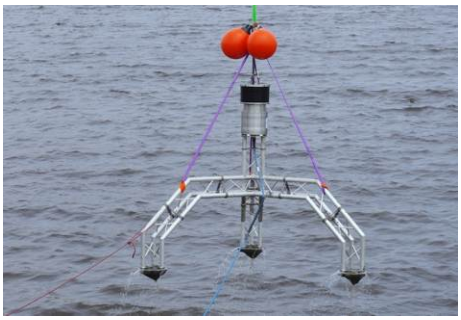
As for the InterOcean Systems Inc. sensors, the SlickSleuth range has been extended in order to be applied in various fields, ranging from inland waters, ports, etc. (vertical range of up to 8 metres according to models) to offshore installations (SS360-Rig Guard model with a range of 20 m).

Finally, the Estonian firm Laser Diagnostic Instruments (LDI) also markets a sensor based on analogue technolgy, the Remote Oil Watcher. With a 10 m high range, it is designed for applications comparable to those of the Optimare and InterOcean solutions.

For further information
http://www.optimare.de/cms/fileadmin/PDF/GB_MMS/optimare_product_mms_spillwatch_120215pt.pdf
http://www.slicksleuth.com/prod.html
http://www.ldirow.com/LDI_ROW_tech_data_sheet.pdf

Deepwater offshore oil and gas leaks: detection and alert system

The British company Sonardyne recently launched a new sonar system which is designed to automatically detect oil leaks in a deepwater environment. The ALDS (Automatic Leak Detection Sonar) is designed to monitor waters around oil and gas structures at sea – platforms, wells, pipelines and other underwater installations – for early detection of leaks or, for example, in the event that oil is detected on the surface, to identify the leaking structure.



Deploying an ALDS in water (Source: Sonardyne)

According to the manufacturer, the device's sensitivity allows it in principle to detect oil leaks with a very low flow rate, from 1 to 2 m^3/day (even 10 times less for gas), in a volume of around 30 km^3 (1 billion cubic feet) of seawater from a fixed sensor. In practice, the system is designed to be installed on the sea bed up to 3,000 m deep, in the vicinity of the facility to be monitored. It provides 360° coverage in a detection range of over 500 m. Data is transmitted to the surface in real time.

Presented at Oceanology International in London in March 2012[25], its potential application in a response context for pollution from deepwater offshore installations is a timely response to oil industry concerns following the *Deepwater Horizon* platform disaster. Sonardyne plans trials from 2012 in collaboration with a company operating in the Gulf of Mexico.

For further information
http://www.sonardyne.com/products/all-products/systems/897-automatic-leak-detection-sonar.html

R&D: detection of submerged or sunken viscous oil

EIC Laboratories has developed a detection system for oils with a density of over 1, submerged in the water mass or even deposited on the seabed. The instrument, called Oscar, is a front scanning sensor, whose technology is based on fluorescence polarisation (laser excitation) and can discriminate viscous oil from other naturally fluorescent material present in the near environment (e.g. vegetation).

Controlled remotely, the Oscar prototype can be deployed at depths of up to 1,500 m with a range of 1 to 10 m. It was tested in 2009 in the OHMSETT (USA) tanks, then following the *Deepwater Horizon* disaster (and at its selection for the Alternative Response Technologies (ART)[26] evaluation programme put in place by BP) at the request of the Unified Area Command.

The Oscar prototype, sensor for submerged or sunken oil (Source: EIC Laboratories)

In 2012, EIC Laboratories announced the satisfactory performance of the device during testing in various United States Coast Guards (USCG) installations in depths of up to 10 m. Moreover, on the issue of response in a cold/Arctic environment, the company has announced that it has also tested the potential of the device in detecting oil accumulations trapped under a layer of ice when deployed pointing towards the surface.

For further information
Bello J., Smirnov A.G. and Toomey P., 2012. Development of a fluorescence polarization submersible instrument for the detection of submerged heavy oil spills. In *Proc. SPIE* 8372, Ocean Sensing and Monitoring IV, 83720B (June 11, 2012); doi:10.1117/12.919509; http://dx.doi.org/10.1117/12.919509

• Containment and recovery

Floating booms with zipped connections

The French company Eurofilet produces floating booms for various purposes: anti-jellyfish, anti-litter and also for pollution response.

The company offers 3 models of permanent booms of varying diameters for surface pollution containment (BS200, BS250 and BS300), with floats in the form of expanded polystyrene cylinders; they are sold in 20-metre sections, with freeboards of 20, 25 or 30 cm which have 50, 70 or 80-centimetre high skirts respectively. There is a 20-centimetre diameter sheath along the base of the skirt which can hold chains of different weights depending on requirements (calm area or strong currents).

[25] Dedicated to innovative technology and instruments in oceanographic research: autonomous sensors, probes, buoys, ROVs etc.
[26] Evaluation programme on emerging technologies. It jointly involved representatives from BP, USCG, NOAA, US EPA, the oil industry (Joint Industry Oil Spill Preparedness and Response Task Force) and other organisations involved in response (consultants, OSROs etc.).

An original feature of the booms made by Eurofilet is the connection system between sections which uses industrial marine zips, reported to withstand traction of 4 to 8 tonnes per metre. The advantage sought is deployment without requiring equipment, guaranteeing a sound watertight connection.

We also note the availability of the models BS250S and BS300S which, with the addition of a submerged curtain, are designed for the containment of sediment and suspended materials (up to 12 m deep depending on the curtain model) for use in maritime works (port construction etc.).

For further information
http://www.eurofilet.fr/

"S14" connection system (industrial marine zip) (Source: www.eurofilet.fr/)

Small disposable floating booms

The manufacturer DESMI Ro-Clean has developed a small, lightweight, floating boom known as the A-Boom for the protection of sensitive sites in calm waters (lakes, ports, etc.). This boom (freeboard: 25 cm, draught: 50 cm) is designed to be deployed by 1 or 2 people in an emergency.

Not only can it be rapidly deployed without requiring any specialised equipment, the materials used – high density polyethylene blocks for the floats, polypropylene sleeve and skirt, bamboo stiffeners – mean that it can be incinerated after use, with the exception of the skirt ballast chains. This boom is thus designed as a disposable or single-use product.

For further information
http://www.desmi.com/UserFiles/file/oil%20spill%20response/e-leaflet/03-02_A-BOOM.pdf

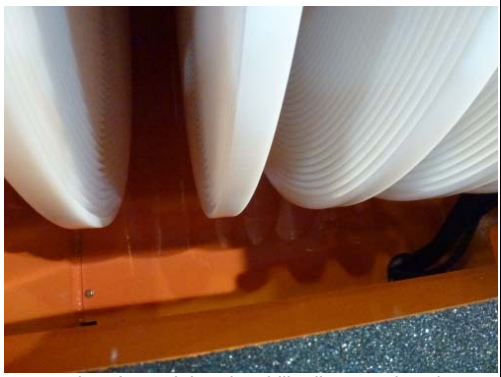
Oleophilic grooved disc skimmer

Following the Macondo well blowout in the Gulf of Mexico in spring 2010 (see LTML 29-30 - in French), the private foundation X Prize, with the support of Shell, launched the Wendy Schmidt Oil Spill Cleanup X Challenge. The competition aimed to promote the emergence of more efficient at-sea recovery systems than those used to respond to the Deepwater Horizon spill which were considered disappointing.

The challenge for manufacturers taking part in the competition was to develop technologies with a minimum oil recovery rate (10 m^3/min) and efficiency (less than 30 % water content in the fluid recovered); the performances were measured during trials in controlled conditions organised at OHMSETT (USA).

The first prize was awarded to a new model of oleophilic skimmer by Elastec/American Marine with an average recovery rate recorded at almost 18 m^3/hour and an average efficiency of around 90 %. The skimmer, named the X150, was launched commercially in spring 2012 (unveiled at the international Interspill exhibition in London in March) and was also tested at OHMSETT in May.

Using a principle similar to that applied by the brand in their groove drum skimmers (see LTML 2006-2 - in French), this model is an adaptation featuring grooved discs, the grooves increasing the contact area between the oleophilic surface and the oil.



Grooved surface of the oleophilic discs on the Elastec X150 skimmer (Source: Cedre)

Two series of discs on the X150 skimmer (Source: Cedre)

Smaller than the prototype, the X150 features 2 axles each fitted with 5 grooved polyethylene discs housed in a steel structure measuring 2 m x 3 m. According to the manufacturer, the skimmer has a recovery rate of 150 m^3/hour (hence the commercial name of the model).

The skimmer can be used in static position or fitted with booms (operating like arms in a "V" formation to concentrate the oil). Its performance is most of all perceived as an advantage for use in a dynamic mode in high current conditions.

For further information
http://www.elastec.com/

• Response preparedness

Strengthening the EMSA network of stand-by oil spill response vessels

The European Maritime Safety Agency (EMSA) strengthened its network of stand-by oil spill response vessels in summer 2013 by (i) contracting the Italian oil tanker *Brezzamare* (storage capacity of 3,290 m^3, stationed in Genoa) and (ii) incorporating the *Monte Arucas* (storage capacity of 2,940 m^3, stationed in Ferrol) after acceptance tests carried out off the coast of Galicia, Spain.


The oil tanker Brezzamare, equipped to enter into service with the EMSA network of stand-by oil spill response vessels (Source: EMSA)

Engaged mainly in bunkering operations in the port of Genoa and its vicinity, *Brezzamare* will join the EMSA network in late 2013 after being adapted and equipped with the necessary means to carry out its future oil recovery missions at sea (including 12 m Koseq sweeping arms, 2 x 250 m sections of single point inflation Markleen Uniboom X-1 900 boom, 1 Tarantula DESMI offshore skimmer and 1 Consilium detection system).

The *Monte Arucas*, on stand-by and assigned to the Bay of Biscay, is equipped with 15 m sweeping arms, ocean oil booms (2 x 250 m), an offshore weir skimmer (self-adjusting Lamor LWS 1300) operated by an umbilical hose reel, and a Miros oil spill detection system.

Another point to note is that in December 2013, EMSA launched a new procurement procedure for contracting additional oil recovery vessels; the areas concerned are the Atlantic Coast, the Northern Black Sea, the Channel, the North Sea and the Norwegian Sea.

Testing the Lamor LWS 1300 system at sea, now fitted on the oil tanker Monte Arucas (Source: EMSA)

EMSA currently has18 vessels on stand-by for simultaneous mobilisation, with a total combined storage capacity of over 67,000 m^3.

Finally, in autumn 2013, EMSA awarded a contract to the UK company Vikoma International Ltd to provide an oil spill recovery and containment system Weir Boom 180, which will be fitted to the *Enterprise* - a service vessel based in the Bulgarian port of Varna on the Black Sea. This recovery boom is designed to be deployed in a "J" trawling configuration, made up of a 4-tube boom[27] forming a 70 m long weir in which the floating oil is recovered, attached to a 300 m 2-tube boom.

For further information
http://emsa.europa.eu/oil-recovery-vessels/vessel-inventory/183-vessels-details/1918-brezzamare.html
http://emsa.europa.eu/oil-recovery-vessels/vessel-inventory/183-vessels-details/1919-monte-arucas.html

[27] 2 air tubes for buoyancy, 1 water ballast tube and 1 recovered oil discharge tube equipped with vane pumps driven by an ATEX hydraulic system on board the response vessel.

IMO and lessons from the *Deepwater Horizon* spill: guide on the management of international assistance

During the Interspill 2012 international conference (London, March 2012) a presentation[28] given by a representative from the US Coast Guard (USCG) called our attention to a gap exposed in response organisation following the *Deepwater Horizon* platform disaster (see LTML n°29-30 - in French), namely the management of international offers of assistance. Solutions to this problem were defined in the course of the 2010 disaster as problems arose, not without some difficulties and concerns of incompatibility. Afterwards, debates at the IOSC 2011[29] were the opportunity to confirm the need for practical guides on the subject and in July 2011 the USCG submitted the idea during the 12th IMO OPRC/HNS Technical Group meeting, who immediately accepted it. Under the supervision of the USA, this project has been under development since 2012 by an Ad Hoc Coordinating Group[30], and the practical guide is scheduled to be submitted at the 17th OPRC/HNS TG meeting in September 2014. The work has been divided into 2 sub-groups:

- *Equipment Typing and Inventory Sub-Group*, focused on the need for harmonised typing and a common language related to the means linked to various response techniques (recovery, ISB, dispersion etc.), an acceptable classification for all response equipment and a database which is as complete as possible;
- *Practical Parameters and Operating Procedures Sub-Group*, based more on the implementation of effective international cooperation, correcting issues revealed during the *Deepwater Horizon* disaster, including the definition of procedures on (i) communication between governments (as well as their international and/or regional representatives), (ii) evaluating offers and also (iii) management of accepted offers.

• Legislation/prosecutions

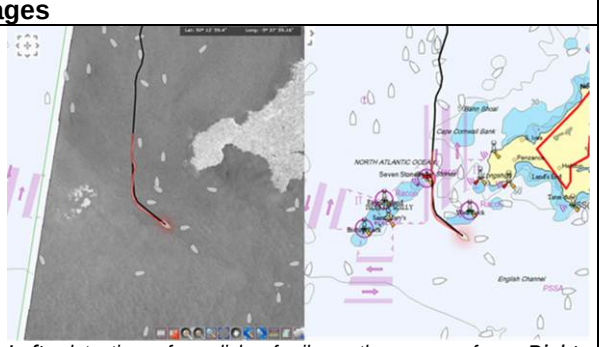
USA: inclusion of non-tank vessels in oil spill response preventative measures

Under the 1990 Oil Pollution Act (OPA 90, US legislation on the prevention of ship-source pollution adopted following the *Exxon Valdez* incident in 1989), in 2008 the US Coast Guard (USCG) ordered a regulatory requirement to pre-contract salvage companies (Rule for Salvage and Marine Firefighting - SMFF). Applying to all liquid cargo vessels transporting oil (i.e. oil tankers and tank barges), the requirement was officially broadened in October 2013 to include vessels not transporting oil with a gross tonnage of over 400 barrels. The entry into force of the OPA 90 Non-Tank Vessel Response Plan Final Rule is set for January 2014 and concerns over 16,000 vessels whose owners are required to update their Vessel Response Plans (controlled by the USCG), pre-contracting one or more qualified companies in line with specific criteria in the legislation. Vessels transporting over 40 m^3 of bunker fuel should have similar plans to those of tankers, detailing sections on towing, lightering, salvage and firefighting; for vessels transporting less than 40 m^3 a salvage plan is the only requirement.

Prosecution for pollution based on satellite images

In October 2013, the owner of the Singaporean-registered chemical tanker *Maersk Kiera* was fined £22,500 (around €27,000) by Truro Magistrates Court, Cornwall following the detection in February 2012, by the EMSA CleanSeaNet network, of a discharge of oil in the wake of the vessel while it was sailing between Land's End and the Isles of Scilly.

A red alert was reported to the UK MCA.



Left: detection of a slick of oil on the sea surface; Right: information (AIS data) identifying vessels present in the area (SafeSeaNet) (Source: EMSA)

The MCA then contacted the vessel to ask whether tank cleaning operations were being

[28] **Parker H. and Pond B., 2012.** *International offers of assistance,* during a session entitled Response Logistics.
[29] International Oil Spill Conference 2011.
[30] Uniting representatives from the USCG, the Canadian Coast Guard, IMO, EMSA and OSRL.

undertaken. The captain confirmed operations, the vessel was indeed discharging palm oil residue, but (based on satellite images) was in breach of regulations as operations were being carried out within 12 nautical miles of the coast (Annex II of the MARPOL Convention on the Control of Pollution by Noxious Liquid Substances).

The MCA stressed how this case was “the first time satellite imagery [had] been successfully used as primary evidence in a maritime pollution prosecution” illustrating the headway this technique offers in the monitoring of illegal discharge due to shipping.

Sinking of the *Prestige:* verdict

In November 2013 the High Court of La Coruña issued its judgement after an 8-month trial on the *Prestige* sinking. The incident took place off the coast of Galicia on the 13th November 2002 after 6 days roaming at sea following the refusal of neighbouring countries to offer a place of refuge to the oil tanker in difficulty.

Eleven years after the sinking, the captain, chief engineer and the head of the Spanish Merchant Navy at the time were acquitted, having been accused of damage to the environment and to protected natural areas. The court was unable to assign formal criminal liability to the captain or chief engineer (it could not be proven that they had knowledge of the degraded state of the vessel) or the head of the Spanish Merchant Navy (whose refusal to offer refuge to the *Prestige* could not be formally linked to the spill). Only the captain, having refused to have the ship towed out to sea at the time of the incident, was sentenced to 9 months in prison for "serious disobedience of authority"; due to his age (78), he will not serve his sentence.

In the absence of criminal liability, the Spanish court rejected the demand for compensation from the French and Spanish states for damages. In terms of civil liability the London insurance company established a €22 million fund. On the 22nd November the French State lodged an appeal against this ruling in order (i) for the Spanish Supreme Court to recognise the existence of a criminal offence against the environment as a result of acts committed by the captain and the crew and (ii) to contest the decision of the La Coruña court in terms of civil liability. The estimated costs for French victims amount to €110 million, €68 million of which was borne by the State for pollution response. The Spanish government is also lodging an appeal.