

## FEATURE

### Plastic pellets



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- Alphonse Arzel resource centre

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^ Shoreline clean-up site in Sri Lanka

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## Cedre

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^ Cedre based at the port of Brest

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© Brest métropole

# EDITORIAL

**O**n 16 March 1978, the oil tanker *Amoco Cadiz* was travelling to Rotterdam carrying 223,000 tonnes of crude oil and 4,000 tonnes of bunker fuel when it ran ashore on the Men Goulven rocks off Portsall, spilling its cargo on the Breton coast.

This major maritime disaster, which remains engraved in people's memories, led to the creation of various organisations, including Cedre, and to the improvement of existing systems.

From this disaster, a number of leading figures emerged—women and men who held strong and never gave up, despite the scale of the spill. Among them, stands out the emblematic figure of Alphonse Arzel, who spearheaded the Breton municipalities' legal action to obtain compensation for the damage caused by the spill. His action together with that of other local councillors within the Joint Union for the Protection and Conservation of the Northwest coast of Brittany was crowned with success: they won their case in Chicago against the oil giant, thus laying the foundation stone of the 'polluter pays' principle.

Alphonse Arzel was a local councillor who defended the interests of his fellow citizens, as mayor of Ploudalmézeau and Senator for 40 and 18 years respectively. He also held numerous other positions as an elected official.

Cedre and Alphonse Arzel are bound by a shared history. To honour his memory, Cedre's resource centre has been christened the "Alphonse Arzel resource centre". His memory thus lives on in connection not only with the association, but its many publications, released in both printed and digital form.

I would like to thank Alphonse Arzel's children and grandchildren as well as Cedre's staff for this accomplishment and I hope that it will instil Cedre with the strength and determination to maintain the highest level of excellence. ■

François Cuillandre,  
President of Cedre



## Grounding of a fishing vessel on a coral reef

By **Florence Poncet**, Research Department engineer, Cedre.



*Attempt to board the YU Feng n°67 between two wave trains*

On 5 December 2022 at 7:40 am, the National Coast Guard of the Republic of Mauritius was informed that a Taiwanese 42 m steel fishing vessel, the *YU Feng n°67*, had run aground during the night on the reef bordering the lagoon at the southern end of the Saint Brandon archipelago. The crew were unharmed and were quickly evacuated. Information was obtained by the Shipping Division of the Ministry of Blue Economy, Marine Resources, Fisheries and Shipping on the vessel's contents: 70 tonnes of diesel, some 1,000 litres of lubricating oil in drums, 60 tonnes of fishing bait (frozen fish packed in plastic bags and cardboard boxes—around 12,000 boxes), as well as various chemicals such as paint, detergent, gas bottles, refrigerant, batteries and fishing gear (lines, nets). Little information was available on the condition of the vessel. No sheen was observed. Given the lack of response from both the owner and manager, the authorities took charge of operations.

**S**ituated 495 km north-west of Mauritius, the Saint Brandon archipelago is some 70 km long and comprises 30 very small islands and around 20 islets and sand banks sheltered by a long coral reef. These very low-lying coral islets can be partially submerged during tropical cyclones.

The archipelago is of particular ecological interest due to its coral reefs, significant fish stocks, numerous turtle nesting sites, nesting bird colonies (with an estimated 100,000 birds) and specific flora.

The *YU Feng n°67* ran aground at the southern tip of the archipelago, opposite the Petit Capitaine island and Ile du Sud (South Island). On South Island, the warden is the only permanent inhabitant.

### Resource mobilisation

A South African salvage company was mobilised initially for the removal, evacuation and storage in Mauritius of the pollutants on board the vessel (solids and liquids), as well as to assess the vessel to determine the feasibility of

refloating it. A tug from Mombasa (Kenya) was on site from 5 to 12 January 2023.

Faced with the imminent risk of oil pollution in the event of a cyclone, the Mauritian Ministry of Foreign Affairs requested assistance from the United Nations which mobilised two marine pollution experts—an engineer from Cedre and an engineer from the Spanish Ministry of Public Works—via the Union Civil Protection Mechanism (UCPM). The experts were supported by the team at OCHA's Regional Office for Southern and Eastern Africa (ROSEA) and UNEP (United Nations Environment Programme) experts mobilised remotely.

The role of the experts was to help the authorities identify priorities, provide advice on the implementation of any clean-up and monitoring operations, determine the precautions to be taken when removing the wreck and propose an environmental impact assessment study.

Meanwhile, the Mauritian Ministry of Environment mobilised a scientific team to initiate a programme to monitor any pollution.



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Data was collected to monitor water and sediment quality (PAHs, total hydrocarbons), fauna (birds, turtles), shoreline flora, coral (habitat identification and condition), and shoreline inspections were conducted.

### Implementation of operations and difficulties encountered

Following an initial on-site situation assessment, the authorities and the salvage company identified several options, taking into account the geographical context and weather conditions, as well as local and national constraints. The chosen strategy, deemed the most realistic and acceptable from an environmental point of view, was to remove the pollutants from the vessel before scuttling it.

Sea conditions were much less favourable than during the reconnaissance visit in December, and it was only possible to board the wreck for 2 of the 8 days of the operation due to the swell and waves breaking over its stern.

An assessment of the wreck showed that its condition had greatly deteriorated:

- given the state of the structure, the option of refloating the vessel and removing it from the reef was not workable;
- the holds and diesel tanks were flooded to a varying level depending on the tide, indicating that the hull was pierced;
- hazardous concentrations of hydrogen sulphide (H<sub>2</sub>S) of up to 100 ppm were measured when the hold containing the bait was opened. The water present together with the decomposing fish and packaging had formed a paste-like mass that could no longer be recovered;
- pumping the diesel proved impossible due to the vessel's list.

The salvage team was able to remove fishing nets, nylon lines and chemicals (paint, oil, refrigerant, grease) stored on deck and identified a very large quantity of nylon fishing lines stored below deck. These fishing lines were ultimately identified as the main threat to the marine environment, in particular to turtles and coral in the lagoon. The expected impact of the fuel was scaled down, given that it was diesel and based on the local hydrodynamic context observed, characterised

by strong currents in the lagoon and numerous channels ensuring water renewal. Following the mission, various options were discussed with the authorities. It was recommended that, at the very least, a second mission be organised quickly with the support of a helicopter to remove the fishing lines.

In March 2023, the Indian Navy, present in Mauritius for an exercise, assisted the Coast Guard by evacuating these fishing lines by helicopter.

If no further action is taken, the vessel will deteriorate over time. It will release diesel, bait and its packaging as well as debris (pieces of wreckage from other fishing vessels that have run ashore in the past are present in the lagoon). ■

## Response to plastic pellets on France's Atlantic coastline

^ *Microplastics and plastic pellets washed up on a beach on the Atlantic coast of France*

By **Kevin Tallec**, Aquatic Litter Monitoring and Studies Department engineer, Cedre

**D**uring the last quarter of 2022 and the first quarter of 2023, France's Atlantic coastline was regularly affected by plastic pellets washing ashore, from the north to the south of the Bay of Biscay. In order to assess the situation, Cedre visited the main sites affected during this period at the request of French Government departments and local authorities.

On 28 November 2022, Cedre received reports from the Finistère fire and rescue service and the association Ystopia of plastic pellets on the beaches of Kerzaud (Treffiagat, Finistère) and Kervel (Plonevez-Porzay, Finistère). On 1st December 2022, Cedre was alerted by a manager of a Natura 2000 area as to the presence of large quantities of plastic pellets on Pors Carn beach (Penmarc'h, Finistère). Following these reports, a team from Cedre visited Pors Carn beach on 2nd December to make on-site observations. The level of contamination was considered

"high" due to the continuous presence of plastic pellets across a 30 m-wide band along the entire beach (1.8 km), including pellets buried in the sediment due to trampling by walkers and sea users.

On 6 January 2023, the press reported new deposits in the Vendée area, on various beaches in the municipality of Sables-d'Olonne. The following week, the marine pollution correspondent for the Loire-Atlantique Delegation for the Sea and Shoreline called Cedre out to Saint-Nazaire to provide recommendations following deposits of plastic pellets on 14 and 15 January 2023 on several beaches in the Loire-Atlantique area (beaches in Pornic, Batz-sur-Mer and Bernerie-en-Retz). Cedre conducted two days of surveys on the various beaches affected by the deposits, but the levels of contamination were insufficient for clean-up operations to be implemented. The prevailing weather conditions on France's Atlantic coast meant that the plastic pellets were washed back out to sea very quickly after being



^ *Photo of plastic pellets on Corsen beach (Finistère) in January 2023*

deposited. Between 18 and 20 January, Cedre met with Mr Jean-Michel Brard, mayor of Pornic, and representatives of the town hall of Sables-d'Olonne to present the issue of plastic pellets and various recommendations in case of future deposits on the coast.

## Deposits of plastic pellets



Meanwhile, Cedre was also contacted by the *Parc Naturel Marin d'Iroise* on 16 January 2023 and the Morbihan authorities (Departmental Directorate for Territories and the Sea) on 20 January 2023 which reported deposits of plastic pellets on the beaches of Porspoder and Plouarzel (Finistère), and Larmor-Plage (Morbihan). A team from Cedre visited the beaches of Porspoder and Plouarzel on 17 and 18 January 2023, where they observed the presence of plastic pellets, but again at too low concentrations to be recovered. This episode of pollution continued along the Channel coastline, with deposits reported on the beaches of Querqueville (Manche) and Saint-Jouin-Bruneval (Seine-Maritime) by MRCC Jobourg on 30 January 2023 and 2nd February 2023, then on Portel beach (Pas-de-Calais) reported by the *Parc Naturel Marin Estuaires Picards et Mer d'Opale* on 23 February.

During these incidents, samples were collected directly by Cedre's teams or by local operators

and sent to Cedre by post. A series of analyses were carried out in Cedre's laboratory (morphological and chemical analyses) in order to obtain information on the source of these pellets. However, based on the results of these analyses, it was not possible to determine whether the plastic pellets collected were the same as those found on the other beaches and whether they came from a single source. In addition, the modelling carried out by Cedre did not identify any points of intersection that may have suggested a single maritime origin.

The origin and cause of these deposits currently remain unknown and a legal enquiry has been opened following various complaints filed by municipalities and the French Government.

In light of recent shipping and road accidents and of the large quantities of plastic pellets found in the environment, Cedre has launched a number of projects to improve our knowledge of this emerging pollutant in terms of spill

response. Studies on various aspects are currently in progress at Cedre's facilities. The aim is to provide data on the potential risks of plastic pellets and their behaviour in aquatic environments, in order to ensure better monitoring in the event of a spill. Tests are also being carried out to evaluate different types of equipment and assess their capacity to recover plastic pellets spilled in a water body or washed up on beaches. ■

# PLASTOIL project

## Developing knowledge to respond to a concomitant maritime spill of plastic pellets and oil

In May 2023, Cedre was granted two-year funding for the PLASTOIL project through the 2023 ITOPF Research and Development (R&D) Award, in order to research how a mixture of plastic pellets and propulsion fuel behaves and interacts when spilled in the marine environment.

By **Thomas Le Bihan**, Research Department engineer, and **Kevin Tallec**, Aquatic Litter Monitoring and Studies Department engineer, Cedre.

The sinking of the *MV X-Press Pearl* and the release of 11,000 tonnes of pre-production plastic pellets (also known as nurdles) at 10 NM off the Sri Lankan coastline in May 2021 has highlighted the need to consider plastic pellets in crisis management in a context of accidental spills. It appears that plastic pellets exhibit some similarities to oil when released at sea, but also differences in terms of behaviour, weathering, and impacts, and therefore, appropriate response techniques must be developed. The release of large amounts of plastic pellets in the environment poses several difficulties yet the challenges are even greater if we consider the risk of a concomitant spill and interaction of plastic pellets with other substances found on board such as emerging fuel oil (i.e. low sulfur fuel oil).



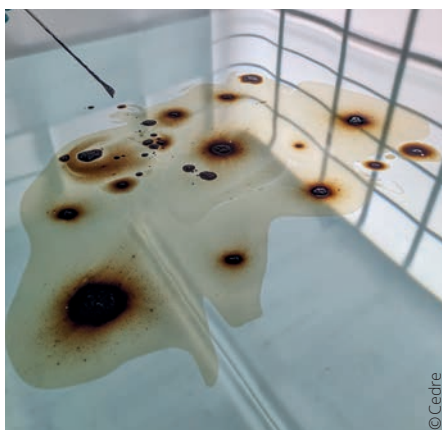
^ Floating plastic pellets in oil sheen near the X-Press Pearl wreck (Sri Lanka)

In this context, the PLASTOIL project launched in May 2023 will develop new knowledge on the behaviour and response techniques in case of a concomitant spill of fuel oil and plastic pellets. The project considers two types of fuel oil: one low sulphur fuel oil (LSFO) and one diesel, and one type of plastic pellet made of low-density polyethylene (LDPE).



^ Artificially prepared slick of an oil-plastic pellets mixture

The project will be divided into three phases or tasks conducted over two years. The first phase addresses the behaviour of pellets alone and in presence of oil, based on experimental work in the laboratory and at pilot scale. The study will also assess how the presence of pellets affects the behaviour and weathering of the two types of oil. Based on the knowledge acquired, the second phase will identify and test at pilot scale different response techniques.



^ Oil-plastic pellets mixture prepared during the PLASTOIL project

Finally, the project will also address the issue of waste treatment and will identify existing options to treat recovered pellets in presence or absence of oil (phase 3). Knowledge acquired will contribute to the elaboration of recommendations for spill responders on the appropriate response techniques to apply in case of a plastic pellet spill, in presence or absence of oil. In addition, the project results will support the development of international public policies aiming at reducing the impact of accidental spills of plastic pellets.

It is with great pleasure that we once again have the opportunity to collaborate with ITOPF\* to advance knowledge on a particularly concerning issue. ■



**\*ITOPF**

International Tankers  
Owners Pollution Federation



# Development of a test zone devoted to plastic pellets

By [Camille Lacroix](#), Aquatic Litter Monitoring and Studies Department Manager, and [Nicolas Tamic](#), Deputy Director, Cedre.

Cedre is currently developing a test zone dedicated to microplastic pollution as part of its technical facilities. This new infrastructure will help us to face emerging maritime challenges in terms of accidental and chronic microplastic pollution. This test zone is scheduled to be fully operational by the end of 2023.

Cedre's premises on the polder in Brest's port area feature one-of-a-kind technical facilities, including a man-made beach and a deep-water test tank. At these facilities, it is possible to work with real oil in controlled conditions without harming the environment. Thanks to this major asset, Cedre is able to perform experiments and run training in near-real conditions, enhancing the quality of Cedre's research work, as well as the training courses it organises for both the public and private sectors. Thanks to this new facility, it will be possible to work efficiently on microplastics, including plastic pellets, which require dedicated storage, handling and testing areas in order to address the issues specific to these pollutants while ensuring operator safety and preventing releases into the environment. Four specific tests zones will be set up at Cedre's technical facilities.



^ Overview of Cedre's technical facilities

## 1. A handling and storage zone

A specific handling and storage zone with appropriate retention systems will be set up to prevent accidents (spillage of microplastics on a hard substrate which could pose a slipping hazard) and to stop the spread of microplastics across the site and in the environment.

## 2. A zone on the man-made beach

This zone will be used to conduct tests recreating microplastics washed ashore or buried in sediment. Created on Cedre's man-made beach, it will be divided into two sections comprising sand of different grain sizes. It will be possible to completely cover the zone with tarpaulins to

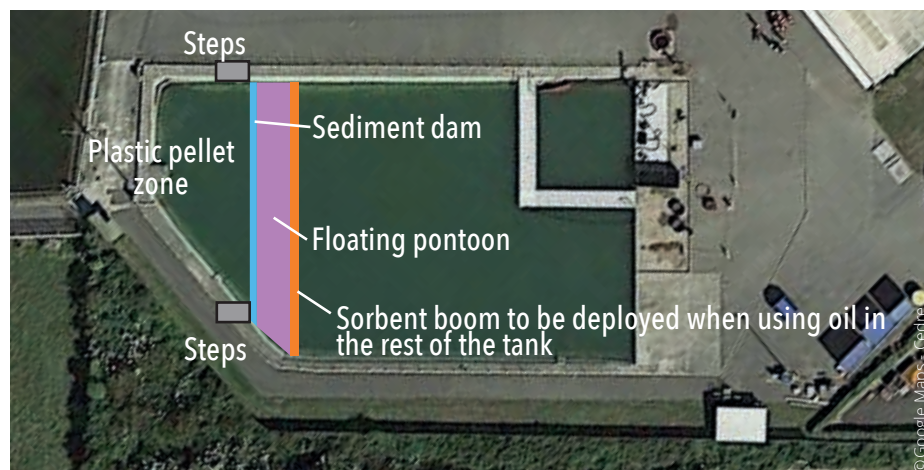
prevent the dispersion of microplastics outside the study area by the wind.

## 3. A zone in the deep-water test tank

The purpose of this zone is to carry out tests on floating microplastics. Installed in Cedre's test tank, it will be separated off with sediment dams and filtration systems to prevent the spread of microplastics into the rest of the tank and into the drainage pipes.

## 4. An above-ground zone

In order to carry out pilot-scale recovery trials on microplastics trapped in pebbles, riprap or vegetation, this zone will consist of an above-ground freestanding tank with a water outlet equipped with a filtration system, in which different types of substrate can be placed depending on requirements. ■



^ Diagram of the plastic pellet test zone in Cedre's deep-water test tank

# OSPAR action to reduce plastic pellets in the North-East Atlantic

By **Camille Lacroix**, Aquatic Litter Monitoring and Studies Department Manager, Cedre, and **Morag Campbell**, Scottish Government.

The OSPAR Convention for the Protection of the Marine Environment of the North-East Atlantic identified plastic pellet pollution as an issue for the OSPAR Maritime Area. A recommendation with guidelines was published in 2021 to support the prevention of pellet loss to the environment. As part of further action, OSPAR is working towards guidance to support the clean-up of accidental spills. As a member of the OSPAR Intersessional Correspondance Group on Marine Litter (ICG-ML), Cedre is directly contributing to this work.

OSPAR's first Regional Action Plan on Marine Litter (RAP-ML) was agreed for the period 2014-2021 in order to help address marine litter issues. It contained 55 actions to help reduce both land-based and sea-based sources of litter. Action 52, led by France, with participation from Germany, Netherlands, UK and Portugal, as well as Seas at Risk and other NGOs, aimed for zero pellet losses across the supply chain in the environment. To this end, a background document was produced introducing the issue of pellet loss, giving an overview of existing initiatives and identifying possible measures that could be taken by OSPAR.

As a result, OSPAR adopted Recommendation 2021/06 on the prevention of plastic pellet loss to the environment by promoting the timely development and implementation of effective and consistent pellet loss prevention standards and certification schemes for the entire plastic supply chain.

It is however acknowledged that accidents can happen even when precautionary measures are taken, and pellets are and will be lost to the environment. The OSPAR region has already been subject to pellet pollution incidents affecting shorelines and has no existing international guidance to assist in dealing with the aftermath. There are many lessons to be learned from other incidents, including the *X-Press Pearl* incident in 2021 off Sri Lanka.

In 2022, OSPAR adopted a second RAP-ML (RAP-ML2) which sets out the actions to support the delivery of the marine litter objectives of the North-East Atlantic Environment Strategy 2030. In this second RAP, a new action targeting pellets was adopted: "C.1.1 Prevent microplastic pollution resulting from plastic pellet, powder and flake loss".



▲ Pellets on the French coastline

This action will deliver:

- a report which will review the design of the plastics industry international pellet loss prevention certification scheme and its alignment with OSPAR requirements along with any additional measures, guidance or recommendations needed to further reduce pellet loss.
- a guidance document to support contracting parties in the management and handling of pellet loss clean-ups.

Cedre is directly contributing to the latter document by sharing knowledge and expertise on response to plastic pellet spills. ■



More info on  
[www.ospar.org](http://www.ospar.org)

# The International Maritime Organization's actions in response to plastic pellets

By **Camille Lacroix**, Aquatic Litter Monitoring and Studies Department Manager, Cedre

In recent years, a number of shipping incidents have resulted in large quantities of plastic pellets being spilled at sea, highlighting the new issues raised by these products. In 2023, Cedre was chosen, at France's suggestion, to lead an international correspondence group tasked with drawing up International Maritime Organization (IMO) best practice guidelines for the clean-up of plastic pellets lost from ships.

In 2018, IMO adopted an action plan to address the problem of plastic litter released into the marine environment from ships. The aim of this action plan is to contribute to the global solution for preventing marine plastic litter entering the oceans through ship-based activities.

Following a number of recent maritime incidents involving the spillage of large quantities of plastic pellets at sea (notably the *MSC Susannah* in South Africa, the *Transcarrier* in Norway and the *MV X-Press Pearl* in Sri Lanka), the issue of plastic pellet pollution has been included in the work carried out as part of the IMO action plan.



▲ Deposits of plastic pellets on the shoreline following the sinking of the *MV X-Press Pearl*

Feedback from past incidents has shown that large marine spills of plastic pellets are particularly difficult to treat and require appropriate response techniques. In this context, a correspondence group on plastic pellet pollution was set up in 2023 at session 10 of

the Sub-Committee on Pollution Prevention and Response. This working group, coordinated by Cedre at the suggestion of the French delegation to IMO, is tasked with developing a draft guide on clean-up of plastic pellets from ship-source spills. It involves some fifteen delegations and representatives of organisations with experience in plastic pellet clean-up following spills at sea.

The draft guide will be submitted for approval at session 11 of the Sub-Committee on Pollution Prevention and Response (PPR 11), scheduled to be held in London in April 2024. ■

## FOCUS

### MARPOL turns 50

Adopted on 2nd November 1973 by the International Maritime Organization, the MARPOL Convention (International Convention for the Prevention of Pollution from Ships) is the main international agreement on pollution of the marine environment, covering both normal ship operation and accidental spills.

The convention entered into force on 2nd October 1983 and the 1978 Protocol, adopted following a series of oil tanker incidents, was included. MARPOL was improved over time with the inclusion of a new protocol in 1977, amendments and new annexes.



▲ Presentation of Cedre's actions at IMO headquarters

## Microplastic monitoring on the French coastline

^ Deposits of small pieces of plastic, including plastic pellets, on the French shoreline

Operational losses\* of plastic pellets cause ambient pollution in the aquatic environment. Since 2019, Cedre has been developing a national monitoring programme for microplastics on the shoreline on behalf of the French Ministry for Ecological Transition and Territorial Cohesion. This work contributes to the assessment of ambient pollution by plastic pellets in French marine waters and to the development of a European monitoring protocol.

By the Aquatic Litter Monitoring and Studies Department, Cedre

Since 2017, Cedre has been commissioned by the French Water and Biodiversity Directorate (DEB) under the French Ministry for Ecological Transition and Territorial Cohesion (MTECT) to develop a monitoring programme for microplastics (plastics smaller than 5 mm) on beaches. This monitoring programme provides data for the European Marine Strategy Framework Directive (MSFD, 2008/56/EC), which aims to achieve good ecological status for European marine waters.

Like all compartments of the marine environment, European and French coastlines are exposed to the presence of microplastics. These can be divided into two main categories: primary microplastics, which are intentionally produced in the form of particles smaller than 5 mm (this includes pre-production plastic

pellets), and secondary microplastics, which result from the fragmentation of larger litter items via physical, chemical or biological processes.



^ Illustration of sorted large microplastics from a sample taken by the monitoring network

The MSFD states that in order to achieve good environmental status, the composition, quantity and spatial distribution of microplastics on the shoreline, on the water surface and in seafloor sediment must be at levels that do not cause harm to the coastal and marine environment. To determine whether this criterion is met, Member States must therefore monitor microplastics in the various compartments of the marine environment.

Following regular observations of deposits of large microplastics (between 1 and 5 mm in size) on French beaches, in 2019 Cedre began to develop a protocol for recording data on these deposits. In the same way as with macro-litter, the strategy adopted was to set up and roll out a monitoring network, led by Cedre and composed of contracted local operators who were provided with training. These operators

## FOCUS

### Contribution to the development of a European protocol for monitoring plastic pellets on beaches

France is not the only European country to be facing the issue of plastic pellet pollution along its coastline. In this context, the work conducted by Cedre has been carried out in collaboration with European partners, in particular Dutch and German experts. This collaboration has led to the development of a harmonised European monitoring protocol for plastic pellets washed up on the shoreline. A chapter is devoted to this protocol in the revised version of the Guidance on Monitoring of Marine Litter in European Seas drafted by the European Technical Group on Marine Litter (TG-ML), which was set up to support Member States in the implementation of the MSFD. The new version of this guidance document is currently in publication and will soon be available online.



© Jakob Strand

^ Sample of plastic pellets



© Cedre

apply the monitoring protocol then send the samples collected to Cedre for analysis.

Over the 2020-2022 period, a total of 66 samples were taken on the French coastline for analysis. The median abundance obtained for all the sites over the period in question was 1600 large microplastic pieces per 100 m. The three most common types of microplastics found are pre-production plastic pellets (61%), hard plastic fragments (33%) and expanded polystyrene fragments (5%). This initial assessment reveals a high abundance of microplastics washed up on the shoreline at the sites sampled, with a marked presence of plastic pellets.

Today, the monitoring network comprises 18 partner operators who perform monitoring at 24 sites along the French coastline. Cedre is currently continuing to develop the monitoring

programme on behalf of the French Ministry in charge of the environment, in collaboration with European experts and with the involvement of partner operators. In particular, we are continuing to add new monitoring sites and to



© Cedre

^ Training an operator in the monitoring protocol

develop methods to gain a better understanding of this pollution, to support the roll-out of specific reduction measures and to assess the effectiveness of measures already implemented, for instance for plastic pellets, for which several initiatives exist at international level (see pages 8 and 9 on actions by the OSPAR Commission and IMO), but also at national level in France as part of the law against waste and for a circular economy and the associated order no. 2021-461 on preventing the release of plastic pellets into the environment. ■



#### \*Operational loss

As opposed to accidental spills, plastic pellets released during industrial processes

# Study on litter in Brest's stormwater network

By [Camille Lacroix](#), Cedre, [Nicolas Dhuygelaere](#), OiEau and [Eva Russier-Picard](#), Brest Métropole

Stormwater networks have been identified as routes for transferring litter to aquatic environments, whether rivers or the marine environment. An increasing number of local authorities, like Brest Métropole, are therefore taking steps to reduce litter transfer, in particular by installing interception nets.



^ Interception net installed in Brest Métropole

In 2020, Brest Métropole installed 7 interception nets in order to determine the main types and sources of litter and to assess the nets' retention capacity. These new systems have also helped to assess the retention capacity of 6 permanent devices already in place (screens, floating sump and drainage buckets).

At the request of Brest Métropole, Cedre, with support from OiEau, characterised the litter collected in the 13 above-mentioned macro-litter retention systems, installed in four catchment basins within the metropolitan area. This study was co-funded by Brest Métropole and the European Union as part of the Franco-British Interreg Preventing Plastic Pollution (PPP) project.

As part of this study, the litter intercepted by each system over the period 2021-2022 was sent to Cedre to be sorted and characterised. On the basis of the different samples taken and the characterisation work conducted, Cedre and OiEau carried out a detailed analysis of the pollution, taking into account the materials, types of litter, size and degree of degradation.

The results obtained revealed that significant quantities of litter were intercepted by both the permanent systems in place and the nets installed in 2020. In total, for all the systems combined, some 63,105 items of litter/year, representing 93 kg/year, were intercepted over the project period. The intercepted litter was mainly plastic, in particular related to cigarette and food consumption. Cigarette butts, confectionery and biscuit packaging, cigarette pack wrapping and plastic fragments account for almost 66%, in number, of the macro-litter intercepted in all the systems.



^ Litter collected in an interception net after sorting



^ Sample collected in an interception net before sorting



the Brest Métropole area each year, and would be liable to end up in the marine environment.

Overall, the new retention systems intercepted the majority of the litter in the stormwater networks for the catchment basins studied, and intercepted a larger share than the permanent systems, which can be partly explained by the clogging of the nets by organic matter. Over the project period, the new systems intercepted 57,856 litter items/year (compared with 5,249 items/year for the permanent systems), representing 70 kg/year (compared with 23 kg/year for the permanent systems). However, these systems are high maintenance and are liable to alter the flow of materials in the catchment area. These systems are also liable to affect the local environment and cause disturbances and impacts (noise, flooding, bank erosion). A number of adaptations were made to the new systems during the project to facilitate maintenance of the nets and to reduce disturbances such as noise, overloading of the networks and the associated risk of flooding.

In parallel to the characterisation work, a review of possible treatment methods for the various types of litter collected was carried out. This review shows that the installation of retention systems generates waste that cannot be recycled unless it is sorted. Mixtures of organic matter and anthropogenic waste do not appear to be recoverable at present and are disposed of in the same way as street sweeping waste, which is buried as industrial waste. ■



▲ Confectionery wrappers collected in an interception net

It is estimated, by extrapolation, that in the absence of retention systems, almost 2.5 million litter items, representing 3.3 tonnes or 43 m<sup>3</sup>, would pass through the stormwater networks of

## ABOUT

### Future prospects for Cedre and OiEau

Creation of a thematic network to provide technical support to all local authorities in the Loire-Brittany area seeking to implement measures to reduce plastic macro-litter in their sewage and stormwater networks. The three-year project, launched in September 2023, is funded by the Loire-Brittany Water Agency as part of the French "Zero Plastic Waste at Sea" Action Plan.



# Polluting wrecks in France

## Study and mapping

By **Nicolas Tamic**, Deputy Director, Cedre.

In 2000, at the request of the French authorities, Cedre conducted a study on potentially polluting wrecks, which was followed up in 2009 with a specific focus on the Channel and the North Sea. More than a decade on, an update was called for to provide France's maritime authority with a decision-support tool for its maritime surveillance mission.

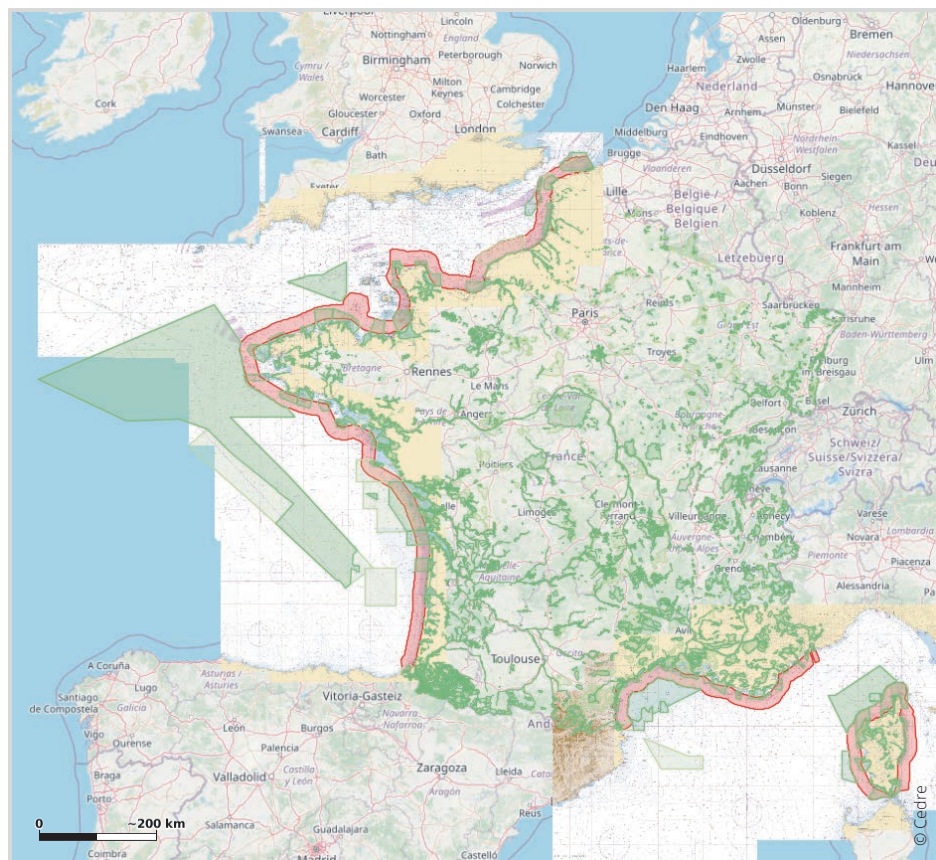
France is at the crossroads of Europe's main shipping routes. Its location with regard to transport flows, meteorological conditions and the surrounding bathymetry largely contribute to making its maritime approaches highly accident-prone areas. This distinctive situation is one of the factors that goes to explain the large number of wrecks that litter the French coastline. According to data from the French Navy's Hydrographic and Oceanographic

Service (SHOM), the exclusive economic zone of mainland and overseas France harbours around 4,700 wrecks. Some of these may contain pollutants, in their cargo and bunker tanks, that could ultimately have an impact on the marine environment.

One example is the Madagascar-registered tanker *Tanio* which suffered structural damage and broke in two in March 1980. The bow section sank with its cargo onboard, 25 nautical miles north of the island of Batz, while the stern was successfully towed to Le Havre for treatment. Despite pumping operations carried out between April 1980 and August 1981 to remove the oil contained in its sunken bow section, the wreck made the news again in 2019 with episodic releases of oil which affected seabirds.



^ Sunken wreck



Service (SHOM), the exclusive economic zone of mainland and overseas France harbours around 4,700 wrecks. Some of these may contain pollutants, in their cargo and bunker tanks, that could ultimately have an impact on the marine environment.

These releases triggered an update to two studies conducted by Cedre, the first in 2000 for all the coasts of mainland France and the second in 2009 for the Channel and North Sea coastline, in order to include new wrecks having sunk since the initial studies and to carry out a new risk assessment of the previously-listed wrecks.

A specific risk analysis matrix was designed to provide the maritime authority with a list of potentially polluting wrecks. One of the factors in this matrix is a determinant that combines, on the one hand, the expected volume of pollutant still contained in the wreck and, on the other, the distance of the wreck from the coast or a sensitive area such as a Natura 2000 protected area. This determinant was then cross-tabulated with the type of pollutant contained in the wreck. The results obtained led to the creation of an objective risk scale. An increase or

- Sites Importance Communautaire
- Zones Protection Speciale ZEE
- French 12 NM

^ The study covers all of France's territorial waters (in pink) and Natura 2000 areas (in green)





© NOAA

reduction coefficient validated by the maritime authority (France's General Secretariat for the Sea) was then applied to the objective risk rating obtained. Indeed, it appeared important to include a subjective evaluation for each wreck, designed to take into account factors indirectly linked to the ship and its cargo, such as the media or socio-economic impacts that a leak from a particular wreck would generate.

The work conducted by Cedre focused on wrecks located in French territorial waters and navigable estuaries. It covered wrecks over 40 metres long commissioned from 1914 onwards in the case of submarines and from 1920 in the case of surface vessels, which were analysed using documentary resources, drawing on databases produced by specialised organisations (in particular Lloyd's Register, historical archives and archaeological dives).

The conclusions of the study were then input into a geographic information system that is available to the maritime authority to enable it to correlate the Pollution Reports (Polreps) it receives with potentially polluting wrecks. ■

## RISK ANALYSIS MATRIX

A risk matrix is an analysis tool used to assess the criticality of a risk based on a combination of hazard and probability. The matrix used in this study was adapted to include a hazard class related to a pollutant class.

Objective factor	Objective risk assessment				SGMer weighting coefficient	Risk assessment by the maritime authority							
	Severe	Severe	Severe	Severe		Weighted classification							
4	Severe	Severe	Severe	Severe		Weighted classification							
3	Severe	Severe	Severe	Severe									
2	Severe	Severe	Severe	Severe									
3/2	Severe	Severe	Severe	Severe									
4/3	Moderate to severe	Severe	Severe	Severe									
1	Moderate to severe	Moderate to severe	Severe	Severe									
3/4	Moderate	Moderate	Severe	Severe									
2/3	Moderate	Moderate	Moderate to severe	Severe									
1/2	Minor to moderate	Moderate	Moderate to severe	Moderate to severe									
1/3	Minor	Minor to moderate	Moderate	Moderate to severe									
1/4	Minor	Minor	Minor to moderate	Moderate									
Oil type	Petrol	Diesel and similar products	Light crude oil	Fuel oil, HFO and IFO						Petrol	Diesel and similar products	Light crude oil	Fuel oil, HFO and IFO
HNS MARPOL Classification	OS	Z	Y	X						OS	Z	Y	X

△ Matrix used for the study

# Evaluation of a multiphase level detector

By **Fanny Jouannin**, engineer, Analysis and Resources Department at Cedre.

In 2022, le Cedre performed tests to assess the performance of a multiphase level measurement device that uses TDR (Time Domain Reflectometry) technology to identify the interfaces between oil, emulsion and seawater. These custom-designed tests were conducted at Cedre in a static simulator representing an industrial three-phase gravity separator. The tests were commissioned and funded by an international oil group and the detector's manufacturer. Through this project, the detector's performance was evaluated and validated and an alternative solution to the detectors traditionally used in the oil industry was put forward.

In oil industry production systems, the mixture of gas, crude oil (emulsified or not), water and sand extracted from the well is collected in gravity separators where the various components are separated by settling. The levels of the different layers formed must be measured to adjust the separator's operating parameters and minimise the presence of oil in the water discharged. Measuring these layers is complex and is difficult to implement in applications with dynamic layers. New equipment is therefore being developed to improve and facilitate the measurement of air-oil, oil-emulsion and emulsion-seawater interfaces within separators. It was within this

context that these tests were carried out to assess the performance of certain systems.

In 2020, an initial series of tests was conducted on a prototype of the Genesis Model ED1 multiphase detector by AMETEK-Magnetrol, based on Time Domain Reflectometry (TDR) technology. Following this first series of tests, the manufacturer and an international oil group commissioned Cedre once again to test the final version of the detector in the same conditions as in 2020. This second series of tests carried out in 2022 in the Cedre Experimentation Column (CEC), following the end user's test protocol, aimed to realistically reproduce the conditions in which the detector is used in order to assess its multiphase measurement capabilities.

This assessment was carried out through 3 independent tests to reproduce different situations encountered by the end user:

- Test 1: use of the detector alone;
- Test 2: use of the detector with a paraffin deposit, in the form of a block several centimetres thick, on the probe (degraded conditions of use);
- Test 3: use of the detector with a bitumen deposit along the entire length of the probe (degraded conditions of use).

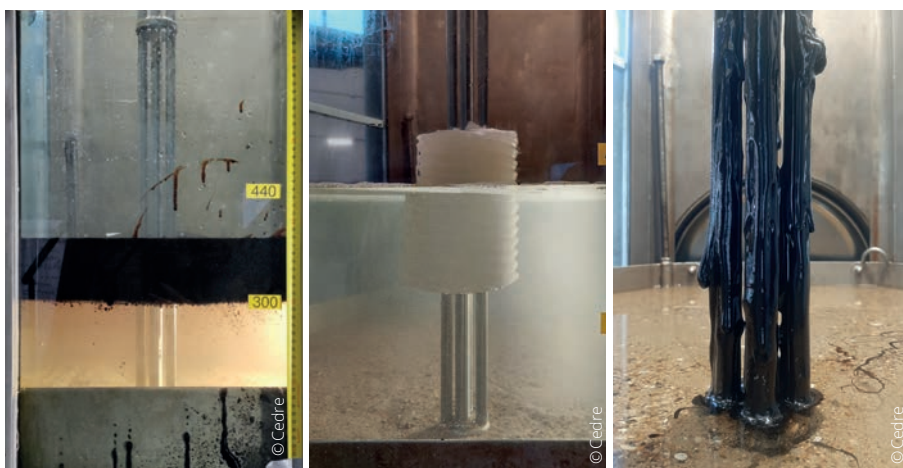
During each test, the actual and measured heights of the seawater, emulsion and

non-emulsified oil were compared. These measurements were made both dynamically and statically. The pressurised flushing system and the human-machine interface (Device Type Manager, DTM) were also qualitatively assessed.

It would appear that the modifications made between 2020 and 2022 to the Genesis ED1 multiphase detector have improved both the quality of multilayer measurements and the human-machine interface. For tests 1 and 3, the detector clearly measured the water, oil and emulsion levels. The only difficulty encountered by the detector was in measuring water during test 2 (with the thick paraffin deposit).

During the tests, the pressurised flushing system did not successfully remove the paraffin block or the bitumen. This pressurised flushing system would appear to be better suited to periodic cleaning to prevent build-up.

This project has therefore confirmed that the Genesis ED1 detector developed by AMETEK-Magnetrol meets the expectations of the industrial end-user, not only in terms of intrinsic performance and the human-machine interface, but also by taking into account the operational reality which involves degraded conditions of use. ■



▲ From left to right: Genesis Model ED1 multiphase probe, Genesis Model ED1 multiphase probe with paraffin block and Genesis Model ED1 multiphase probe coated with bitumen.

# Evolution of oil shipping traffic in the Arctic

By **Ronan Jézéquel**, Research Department engineer, Cedre.

**A** revolution in maritime routes is underway with the opening up of the Northeast Passage, linking the Atlantic and Pacific Oceans. With the increase in maritime traffic, the coastal states concerned—with Russia at the head—are adapting their response strategy to the heightened risk of accidental pollution.

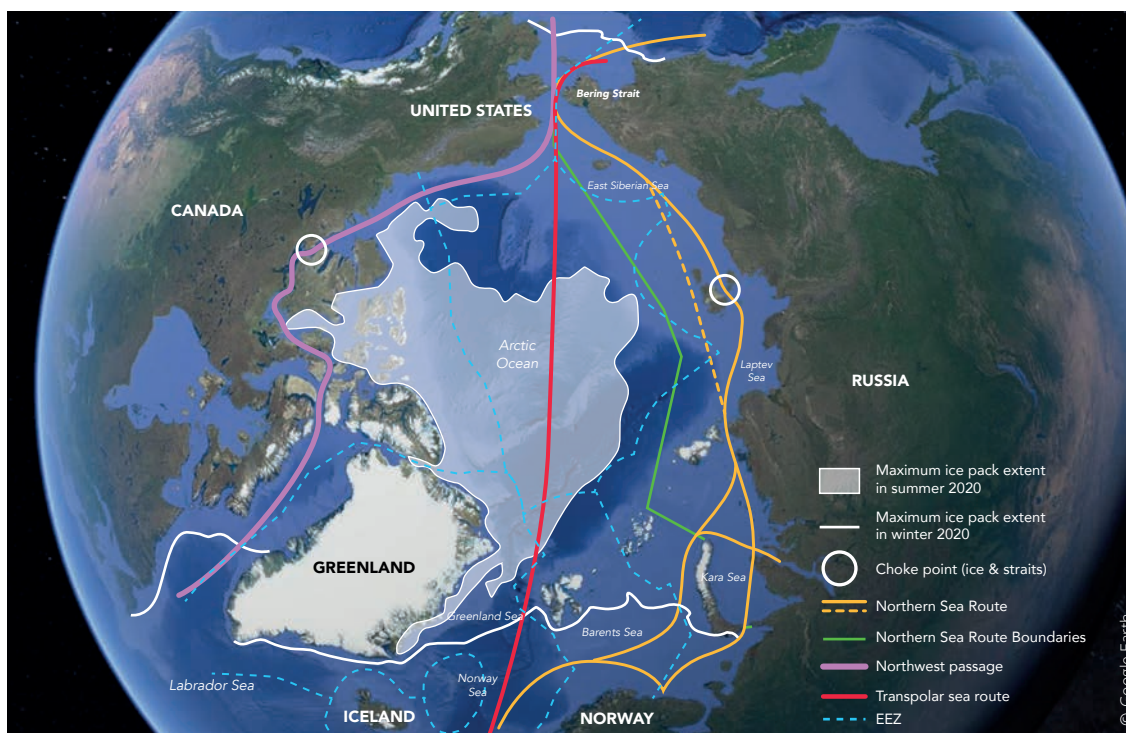
The Northern Sea Route (NSR) is a shipping route stretching from Novaya Zemlya in the west to the Bering Strait in the east. Formerly known as the Northeast Passage (NEP), it passes through five Arctic seas. Until 2009, the NSR was operated as a Russian national waterway and was closed to foreign vessels. International transit has since been authorised, and Russia is investing in the development of this route, for instance through the construction of offshore and onshore infrastructures. Legislative changes have also been made, with the Russian Government committed to amending certain federal laws and regulations in order to open up and develop this shipping

route. Russia applies its national regulations along the NSR in compliance with Article 234 of the United Nations Convention on the Law of the Sea (UNCLOS). The "Northern Sea Route zone" was defined in 2012 by a Russian federal law, adopting the limits of Russia's exclusive economic zone (200 nautical miles) and the longitudes of Novaya Zemlya to the west and the Bering Strait to the east.

Until 2022, Russia's ambitions were to develop oil exports via this route. Russian company Rosatom estimated that traffic could reach 125 million tonnes by 2030, with gas and condensate from the Yamal peninsula representing a very large share of these exports. To cope with this increase in transport, spill response strategies have gradually had to be adapted. In terms of spill response vessels, icebreakers have logically been identified as the main rescue and towing vessels. Oil spill response and recovery operations are managed by the Marine Salvage Service (MSS) (a federal state enterprise of the State Marine Rescue

Coordination Service of Russia) of the Federal Maritime and River Transport Agency under the Ministry of Transport. In terms of the location of response equipment, two centres share responsibility for the NSR territory, with the northern branch in Murmansk and the Primorsk branch in Vladivostok.

Although the conflict in Ukraine has profoundly reshaped oil transport worldwide, it is likely that trade between Russia and China will continue, or even increase, justifying the continued development of spill response infrastructures. ■



▲ Arctic shipping routes

# SAMi: innovative technology to support crisis management

By **Thomas Le Bihan**, Research Department engineer, Cedre.

In the event a chemical or oil spill in the aquatic environment, it is essential to rapidly obtain accurate information about the pollutant in order to limit environmental damage and protect the population. To meet this need, Cedre is currently developing SAMi (Smart Case for Aquatic Spill Monitoring Intervention), a comprehensive tool designed to provide decision-makers with key information in real time, thereby facilitating crisis management.

SAMi will take the form of a briefcase for *in situ* sampling and analysis containing the equipment required to collect relevant and reliable information on the pollutant's characteristics, behaviour and the extent of the pollution. The results will be sent in real time to the incident management team to help them make informed and effective decisions. The end user will not require any prior training. The use of this kit will result in the collection of representative data based on protocols validated by a panel of experts. It will thus be possible to compare and interpret all the information that can be gathered in the field during incident management.

SAMi comprises three main modules: one for water, sediment and pollutant sampling; one for *in situ* analysis; and one for assessing the oil's dispersibility. A specially developed Android application will enable reliable results to be obtained by simplifying the procedures for taking samples, analysing the environmental parameters and testing the oil.



▲ Sampling vegetable oil from a semi-rigid boat during the RAPSODI offshore experimentation off Penmarc'h, Finistère

SAMi's development is based on existing, proven technologies, which will enable us to design a solution that will be fully operational by the end of the project. SAMi will be particularly useful for petrochemical companies in the event of an oil spill, but it could also be very valuable for many public institutions, local authorities, clean-up organisations, environmental experts and private companies.

In a nutshell, the SAMi case will be an innovative, integrated tool that will facilitate incident management by providing reliable, accurate information about the pollutant. It will be simple to use, standardised and capable of sending information in real time. We believe it will help to improve environmental protection and public safety in the event of an oil or chemical spill in the aquatic environment.

The project has received strong support from the sponsors of the CITEPH-Evolen innovation programme, and has also been accredited by the Pôle Mer Bretagne Atlantique competitiveness cluster. ■



## Cedre-MOIG PARTNERSHIP

The Mediterranean Oil Industry Group (MOIG) was initiated by the International Petroleum Industry Environmental Conservation Association (IPIECA) to provide an industry network in the Mediterranean region. Its first meeting took place in Rome in 1995. Ever since, MOIG has been supporting its members in relation to oil spill preparedness and response, mainly through workshops and training courses.

By Arnaud Guéna, Deputy Deputy Director of Cedre and Houcine Mejri, Director of MOIG.

^ Houcine Mejri, Director of MOIG, on a visit to Cedre

Cedre has been supporting MOIG ever since its creation, but cooperation has been strengthened in recent years in the wake of the EU/DG-ECHO-funded project POSOW that aimed to improve response preparedness in Mediterranean countries.

In 2016, faced with the impossibility of organising the training planned in Libya as part of the POSOW 2 project, we asked MOIG to help organise a course in Zarzis, Tunisia, not far from the Libyan border. The company ECUMED then agreed to host a half-day practical exercise and a visit to its spill response stockpile, to which all MOIG members were invited.

The exercise, held on 24 November 2016 at the terminal operated by MARETAP (a MOIG member) was a success and sparked MOIG's interest in the training courses developed as part of the POSOW project. It was then decided that Cedre would deliver all the POSOW

training modules to the MOIG members. This marked the start of a training series in Tunisia comprising:

- a training course on "shoreline surveys and clean-up" on 10 and 11 October 2017 in Sfax, with a practical exercise organised at the TRAPSA oil terminal in Skhira;
- a training course on "risk management and decision-making" from 2 to 4 April 2019 in Hammamet Sud;
- a training course on "oiled waste management", in cooperation with Rempec, on 16 and 17 June 2021, organised online;
- a training course on "the role and management of volunteers in spill response inshore and onshore", on 10 and 11 May 2022, in Hammamet Sud.

Meanwhile, the regional workshops organised by MOIG from 6 to 8 November 2018 in Istanbul and then from 25 to 27 October 2022 in Opatija (Croatia) offered Cedre the chance to present the results of several of its projects to the industry and government representatives and scientists invited to these events.

During Houcine Mejri's visit to Cedre on 8 February 2023, it was confirmed that a training course would be organised in May 2024 at Cedre's facilities, in the form of practical sessions with the release of real oil, to round off the POSOW training series.

Cedre is delighted to host this course and to pursue its collaboration with MOIG and all its members. ■



For further information visit [medoilgroup.org](http://medoilgroup.org)

### ABOUT



MOIG is a voluntary non-profit making association of petroleum enterprises formed to promote continual improvement of oil spill response capabilities of the Mediterranean through mutual regional cooperation.

MOIG is designed to encourage sustainable oil spill preparedness and response in the Mediterranean region as well as to ensure industry coordination in the event of an oil spill. It is comprised of oil companies, associations, responders, manufacturers, academic

institutions that work in preventing and responding to oil spills in all countries bordering the Mediterranean sea. It also provides a regional industry interface with the Regional Marine Pollution Emergency Response Centre for the Mediterranean (REMPEC).

MOIG shares information, resources, best practices and expertise to help the Mediterranean oil and gas industry to enhance their capabilities on oil spill preparedness and response.

## PROMOTING GENDER DIVERSITY AND THE FUTURE OF THE MARITIME SECTOR:

### VISIT TO CEDRE BY WISTA FRANCE

By **Christophe Logette**, Director of Cedre.

On 2 June 2023, Cedre was delighted to welcome a delegation from WISTA France led by its President, Marie-Noëlle Tiné-Dyèvre, Deputy Director of the French Maritime Cluster (CMF), and Bénédicte Ezvan-André, Head of Professional Product and Service Development at Shom, in charge of the Brest office, for a presentation of Cedre's activities and facilities.

The Women's International Shipping & Trading Association (WISTA) is a global organisation connecting female executives and decision-makers from all sectors of the maritime industry. WISTA aims to be a major player in promoting gender diversity, supporting and assisting women in management positions and promoting the maritime sectors by making them attractive to girls.

WISTA France is one of 56 national associations in the international WISTA network, which boasts a total of 4,000 members. Founded in 2004, WISTA France has several offices across France (Paris, Marseille, Le Havre, Brest, Nantes Saint-Nazaire and Bordeaux). Its 150 members represent France's different maritime sectors, in both the public and private spheres.

Following a presentation of Cedre, its missions, and the risks and current trends in the field of accidental water pollution, the delegation was given a tour of the centre, including a visit to our response centre from which we provide a 24/7 on-call duty service for our partners and carry out an essential part of our public service mission. The visitors were then shown around the scientific and technical facilities where we carry out our research projects, spill response experiments and professional training. ■



^ Members of the WISTA France delegation during their visit to Cedre

## CHANGE OF CHAIR OF CEDRE'S STRATEGY COMMITTEE:

### DEPARTURE OF CLÉMENT LAVIGNE

Clément Lavigne became Chair of Cedre's Strategy Committee in 2021 (having previously been a member of the Committee between 2004 and 2010 and its Chair from 2006 to 2010), when he was Vice President of Crisis Management and Spill Response and Vice President of Environment and Social Expertise at TotalEnergies.

At the beginning of 2023, Clément left TotalEnergies to take on the position of Director of Ocean Policy at the The Oceanographic Institute – Albert I Prince of Monaco Foundation, leading Cedre's Board of Directors to appoint a new Chair of its Strategy Committee. Clément's successor is Nathalie Viale, Head of Support Department – Crisis Management and Oil Spill Response at TotalEnergies. Nathalie is very familiar with the workings of our Strategy Committee, having represented TotalEnergies on it since 2018. We are delighted to entrust her

with the leadership of this committee, whose strategic choices and support for our projects are essential to Cedre's smooth running.

We would like to express our deepest gratitude to Clément, with whom the Cedre team enjoyed working for many years as he held various

positions at Cedre, ITOPF and TotalEnergies. We wish him every success in his new role, and have no doubt that his new team will appreciate his skills and personal qualities. ■



^ Clément Lavigne and the members of the Strategy Committee in 2021

# Transatlantic partnerships

Cedre has been working for many years with several organisations in Canada and Quebec. Here we take a look at three of them: Transport Canada, the Canadian Coast Guard and CEGRIM (*Centre d'expertise en gestion des risques d'incidents maritimes*), which has just celebrated its fifth anniversary.

## TRANSPORT CANADA

Transport Canada is the federal department responsible for most of the transportation policies, programmes and goals of the Government of Canada. Its Environmental Response Systems division deals specifically with policies, regulations and programmes to protect the marine environment and reduce the

environmental impact of pollution incidents in the water. Several projects led by Cedre have benefited from Transport Canada's expertise and financial support, in particular the publication of an operational guide on spills of hazardous and noxious substances and the launch of an educational website on chemical spills, which

is currently being updated in collaboration with our Canadian partner. Cedre also contributes to the training of Transport Canada's staff. ■



More information at [chemical-pollution.com](https://www.chemical-pollution.com)

## THE CANADIAN COAST GUARD

The Canadian Coast Guard is a special operating agency within Fisheries and Oceans Canada which works to ensure the safety of mariners in Canadian waters and protect Canada's marine

environment. An initial letter of understanding promoting cooperation between our two organisations was signed in 2007. It is currently being updated to include new aspects such

as preparedness and response in ice-infested waters. The Canadian Coast Guard also took part in our latest information day. ■

## CEGRIM

CEGRIM is an interministerial team that aims to develop integrated maritime incident risk management for local communities, government partners and the commercial fisheries and aquaculture industry. Operating across all of Quebec's maritime regions, the CEGRIM is a centre devoted to knowledge acquisition and sharing, and stakeholder coordination and consultation. In 2020, CEGRIM invited us to take part in the 72nd Science and

Environment Forum organised by Quebec's Ministry of the Environment (*Ministère de l'Environnement et de la Lutte contre les Changements Climatiques*, MELCC). In March 2023, we also took part in an event entitled "*Le CEGRIM tourné vers l'avenir !*". During these visits, we also organised two specific training courses for the CEGRIM team. A letter of agreement between our two organisations is currently being drafted. ■



^ 72nd Science and Environment Forum

## COMPLETION OF THE EUROPEAN OCEANWISE PROJECT

Foamed polystyrene, which includes expanded polystyrene (EPS) and extruded polystyrene (XPS), is frequently found in the environment, particularly the marine environment. The Interreg Atlantic OceanWise project, launched in 2018, aimed to put forward measures to reduce the presence of this type of litter in the North-East Atlantic. The project came to a close at the end of 2022 with its final event in Lisbon.

By the Aquatic Litter Monitoring and Studies Department, Cedre



This project, led by the Portuguese Directorate-General for Natural Resources, Safety and Maritime Services (DGRM), involved 12 other partners from the 5 countries along the Atlantic coast: Ireland (MaREI Centre, BIM, REPACK and the Department of the Environment, Climate and Communications), the United Kingdom (Cefas), Spain (CETMAR and Sustainn), Portugal (FCT-NOVA University and Pontoverde) and France (Université de Bretagne Sud, Seabird and Cedre), as well as an associated partner: the OSPAR Commission.

Expanded polystyrene is used for a wide range of purposes because of its many useful properties (high mechanical resistance to compression, thermal insulation, fire retardancy, capacity to be shaped and processed, water resistance), which explain its use in many sectors such as packaging (fish boxes, cups...), leisure activities (surfboards, protective helmets...), aquaculture/ fishing (floats) and construction (insulation).

The OceanWise project was launched within the context of a transnational effort to support public policies to protect the marine

environment. It contributed to Action 49 of the OSPAR Commission's Regional Action Plan for Marine Litter, which aims to "investigate the prevalence and impact of expanded polystyrene (EPS) in the marine environment, and engage with industry to make proposals for alternative materials and/or how to reduce its impacts."

As part of this project, Cedre carried out an assessment of the pollution of Europe's Atlantic coastline by expanded and extruded polystyrene, as well as an experimental study on the potential impacts on the marine environment of these types of polystyrene as well as of certain biosourced, compostable and/or biodegradable plastic alternatives.

The results obtained by Cedre showed that between 2018 and 2020, EPS/XPS represented 13% of the total litter found on beaches in the OSPAR area, confirming that pollution by EPS/XPS was abundant and widespread along the coastline of the North-East Atlantic. EPS/XPS are fragile materials that fragment easily in the environment, resulting in the production of large quantities of light fragments of varying



^ Fragment of expanded polystyrene colonised by fauna

sizes that can be transported and spread over long distances by wind and currents.

Furthermore, the results confirmed the existence of potential impacts on the marine environment caused by EPS and XPS, but also by alternative materials, indicating that the replacement of one material with another should be considered with caution. ■



^ OceanWise project partners

More information at [oceanwise-project.eu](https://oceanwise-project.eu)



## TAIWAN'S OCEAN CONSERVATION AGENCY BACK AT CEDRE

The long-standing partnership between Cedre and the Taiwanese Ocean Conservation Agency continues to thrive. The past years have certainly had their twists and turns. After a three-year gap due to the COVID-19 pandemic, the Taiwanese OCA returned to Cedre for training. Although distance learning courses were organised (see Bulletin 42 published in December 2021 for more details), nothing can replace the interaction and discussions that take place during face-to-face training. This year, with all the restrictions lifted, the OCA took advantage of the opportunity to return to France to visit Cedre where OCA staff attended a bespoke training course. The training programme for these two weeks at Cedre focused on the management of oil and HNS spills at sea (IMO level 3 equivalent and HNS manager level equivalent). This special course was attended by a large delegation from the OCA, the Ministry of Environment, the Coast Guard, private companies, universities and many other organisations.



▲ The group of trainees and trainers on an offshore excursion

This visit was once again the opportunity to exchange views and share experiences, which is what makes these international relations so enriching. Discussions were also held on the

future of our partnership and the joint projects that are emerging for the coming years. ■

## CEDRE DELIVERS TRAINING IN ENGLISH

Whether our trainees are from public or private organisations, from France, Europe or further afield, from companies specialising in pollution or not, Cedre has always been committed to facilitating access to and the dissemination of its knowledge. Building on over 20 years of experience in spill response training, Cedre is certified by Qualiopi for all its training courses

and by the Nautical Institute for its training courses delivered to International Maritime Organization standards.

At the beginning of 2023, we had the pleasure of receiving representatives of TotalEnergies Kazakhstan, HM Coastguard from the United Kingdom, the Slovenian Maritime

Administration, OSRL and the Taiwanese Ocean Conservation Agency. All these partners took the opportunity to advance their training in spill response strategies and techniques at Cedre in English.

All of Cedre's training courses are available in this format:

- oil spill response, IMO levels 1, 2 and 3;
- HNS spill response, IMO operational and manager levels;
- sector-specific courses: ports, wind energy, inland waterways, first responders, etc.

To ensure our partners' complete satisfaction, bespoke training courses are also available in French or English. ■



▲ IMO level 2 training session run in English in March 2023

By **Loïc Harang**, Studies and Training Department engineer, Cedre.

# OUR TRAINING COURSES

[www.cedre.fr](http://www.cedre.fr)

## Standard or bespoke

- ~ 11 themes
- ~ At Cedre or at an external site in France or worldwide
- ~ IMO level 1, 2 and 3

**We offer tailor-made training!**

## E-learning

- ~ an online training platform:  
[elearning.cedre.fr](http://elearning.cedre.fr)
- ~ in French or English
- ~ 2 to 3 hours of classes
- ~ 2 themes: oil and chemicals

One-of-a-kind  
facilities!

## Our latest courses:



Pollution  
in ports

Offshore  
wind farms



For further information visit <https://www.cedre.fr/en/Training> or email us at [formation@cedre.fr](mailto:formation@cedre.fr)

**INAUGURATION OF THE ALPHONSE ARZEL RESOURCE CENTRE**

Some days are more emotionally intense than others. On 16 June, the Alphonse Arzel resource centre was inaugurated at Cedre in the presence of many of Finistère's local councillors–deputies, senators and mayors–, as well as representatives of the Region of Brittany, the Department of Finistère, the Maritime Prefect, the Finistère Prefect, MRCC Corsen and Vigipol. We would like to thank them for accepting our invitation. Proposed in association with François Cuillandre, Mayor of Brest, Chairman of Brest Métropole Océane and President of Cedre, and the family of Alphonse Arzel, first and foremost his three daughters, Cedre's resource centre was named after Alphonse Arzel. Through this choice, we honour the memory of a leading figure in the *Amoco Cadiz* spill, at the resource centre itself,

but also through Cedre's many publications and our website. Mayor of Ploudalmézeau for 41 years and senator for Finistère for 18 years, Alphonse Arzel devoted his life to serving his fellow citizens. When the *Amoco Cadiz* sank off the coast of Brittany, he united the affected municipalities and went on to win the case against Amoco, as Marguerite Lamour, who succeeded him as mayor of Ploudalmézeau, perfectly recounted.

The whole team at Cedre is very proud to help to keep the memory of Alphonse Arzel alive. The *Amoco Cadiz* disaster triggered Cedre's creation and Alphonse Arzel has a rightful place in our midst. We would especially like to thank his granddaughter, Bénédicte Morizur, who produced the striking visual portraying her grandfather. ■

The resource centre was created in 1979 at the same time as Cedre and has since been responsible for collecting, processing and providing information on accidental water pollution in France and around the world.



△ Alphonse Arzel's three daughters with Mrs Lamour at the resource centre

Open to all by appointment, this specialised documentary collection, based in Brest, contains more than 10,500 documents relating to our areas of expertise (accidental water pollution by oil, chemicals and aquatic litter) and to both maritime and inland waters.

If you're too far away to visit us, you can explore our document database online:

<https://wwz.cedre.fr> >Resources > "Library catalogue" or write to us at [documentation@cedre.fr](mailto:documentation@cedre.fr)



△ Unveiling the logo of the Alphonse Arzel resource centre



**SIX MINUTES!**

To mark its 45th anniversary, Cedre has released a new presentation video. Visit our website to watch this six-minute presentation of Cedre's six fields of activity, available in French and English. And don't miss our trailer designed for social media. A communication campaign is set to be launched to promote these new videos. Don't hesitate to share them with your contacts!



## CEDRE INFORMATION DAY

By **Arnaud Guéna**, Deputy Director, Cedre.

On 21 March 2023, the 27th Cedre Information Day was held at the French Ministry of Ecological Transition and Territorial Cohesion at the Arche de la Défense, Paris on the theme of spill response training.

The day's opening introduction was given by Patricia Charlebois from IMO, who outlined the requirements imposed by international conventions in terms of response preparedness as well as the tools developed by IMO, in particular training modules. Several speakers then outlined the needs, practices and challenges relating to public sector training in Europe (European Civil Protection Mechanism), France (DGSCGC, AEM Antilles, Pôle National d'Expertise POLMAR-Terre), the UK (Maritime and Coastguard Agency) and Canada (Coast Guard). The private sector's perspective was then presented by TotalEnergies, Iberdrola/Ailes Marines and Tanger Med Port, before moving on to the challenges of understanding compensation systems, presented by the IOPC Funds, and the question of cooperation between the national authorities and industry, by GI-WACAF. Finally, the challenges and outlook from the point of view of a training centre were shared by Cedre.

Through the different presentations and discussions, this event offered the fifty or so attendees insight into the challenges involved in maintaining the skills of responders within an international context in which certain emerging risks are considered to be of greater priority than pollution, in which staff shortages and turnover



^ Presentation by PNE

make it difficult to maintain a pool of trained responders, and in which training budgets have been cut for many organisations.

Nevertheless, it would appear that there are strong and varied training needs, particularly for organisations (authorities or industry) that cover large geographical areas bordering different oceans, including overseas territories, are affected by significant seasonal climate variations (ice cover), and are concerned with maritime and inland waterways, for which training should be tailored to each specific condition.

Within this context, it is crucial for training centres to maintain their trainers' level of expertise by drawing on technology intelligence

and research work, to have training facilities and tools to build diverse teaching scenarios and simulations, to have national and international accreditations certifying their competence and compliance with international standards, as well as to be capable of adapting training courses to meet the real needs of the different participants.

Cedre is tackling these challenges to strive to maintain the level of excellence of its training courses! ■



^ Speakers and participants at the Information Day



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# EXCERPT FROM SEA AND SHORELINE TECHNICAL NEWSLETTER #53

## FRENCH ONLY

### Coastal pollution by plastic pellets following a fire onboard a container ship (*X-Press Pearl*, Sri Lanka)

On 20 May 2021, a fire broke out onboard the container ship *X-Press Pearl* (2,756 TEU, commissioned just 3 months previously) while at anchor outside of Colombo port (Sri Lanka) where it was awaiting permission to enter. The ship was carrying more than 1,480 containers, including 81 containing dangerous goods under the IMDG code, and had nearly 300 tonnes of heavy fuel oil and around 50 tonnes of marine diesel onboard.

Preliminary investigations suggest that the fire may have been caused by a chemical reaction in the cargo, with evidence of a leak of nitric acid on board (which occurred around 11 May, even before the vessel entered territorial waters).

From the beginning of the incident, and while fire-fighting operations were being conducted by the Port Authority and the Sri Lanka Coast Guard (SLCG), the Sri Lankan Government ordered the shipowner to take the necessary measures to prevent and mitigate all risks of environmental damage. The shipowner requested technical expertise from ITOPF and commissioned OSRL and SMIT Salvage to support the response operations and examine the salvage options for the *X-Press Pearl* and its cargo.

However, on 2 June, after 13 days of fire-fighting and just a few hours after towing began, the vessel, severely damaged by the fire and flooded with firewater, sank to the seabed 11 km off the west coast of Sri Lanka, where it sat partially submerged, at a depth of around 20 m. The bunkers were believed to be intact and did not appear to have released any significant oil slicks at this stage. However, large blackish plumes, composed of a mixture of various combustion residues, firewater and possibly partially burnt fuel, were clearly visible in the water when the structure sank.

On 29 May, the SLCG took preventive measures, stationing 2 Fast Patrol Vessels, *Samudra*

*Raksha* and *Samaraksha*, off Colombo port, deploying containment booms at sensitive sites (e.g. mouth of Negombo lagoon), and conducting shoreline surveys.

No significant quantities of fuel oil reached the beaches, however litter began to wash up from 27 May, in particular plastic pellets, either intact or in the form of burnt or melted clusters, which rapidly spread across more than 80 km of coastline, a distance which later extended to 300 km. As the plastic pellets spread, they mixed with sediment, as a result of the high exposure of the sites. Thousands of responders from the Sri Lanka Army were mobilised for emergency operations to remove the pellets.

In early June, the Sri Lankan authorities requested international assistance from the United Nations, which sent an UNEP/OCHA Joint Environment Unit (JEU) to the area from 16 to 30 June. The mission included experts from ISPRA and Cedre (mobilised via DG ECHO/ERCC), and was responsible for providing technical advice to support the response, working closely with the Sri Lankan Marine Environment Protection Authority (MEPA).

It is difficult to estimate the types and quantities of cargo that were burnt, spilled or remained inside the containers lost overboard. Based on an analysis of the ship's manifest, the National Poisons Information Centre indicated that the cargo included almost 200 different products, including nitric acid, ethanol, urea and caustic soda, and 422 containers of various polymers, including around 350 of polyepoxides, 457 of polyethylene granules (high, medium and low density), and almost 30 containing raw materials used in the manufacture of bags and other plastic packaging (polypropylene, for example).

Based on mechanical and manual techniques, plastic pellet clean-up operations, of varying selectivity according to the density of deposits,

led to the collection of large quantities of sediment.

In mid-June, the Sri Lankan Ministry of Environment announced the recovery of a large proportion of the plastic pellets deposited on the shoreline, as well as a large number of containers that had come ashore (more than 50, each containing around 60 tonnes of debris).

The collected litter was stored in sacks at the top of the beach before being evacuated, in specific containers, to a storage building rented by the authorities, pending further sorting of the materials (sediment, burnt and unburnt pellets, other).

In addition to the problem of dealing with large volumes of debris, in part due to poor selectivity during recovery operations, the waste management methods appear to have generated a certain amount of secondary pollution in backshore areas, and along the routes used to evacuate waste from primary storage areas.

Following the initial recovery phase, finer collection of plastic pellets continued over the long term and, to our knowledge, was still not complete by summer 2022 according to ITOPF.

Due to the gradual spread of the plastic pellets at the surface of the beaches as well as their burial in the sediment, the techniques implemented had to be as selective as possible.

The clean-up techniques involved, in particular:

- recovery using:
  - light manual tools, such as scrapers/ brooms and dustpans, for concentrating and collecting the pellets at the substrate surface;
  - different sizes of beach cleaners (Beach Tech 2000, Beach Tech Sweep);

- portable vacuum systems to treat the densest deposits;
- the application of *in situ* techniques to separate the pellets from the sediment:
  - using rotating sieves or screens (manually or mechanically driven trommels, depending on the size/capacity of the models) and/or;
  - by gravity separation (sink-float separation of plastic pellets in basins).

Faced with the magnitude of the task to be accomplished, i.e. efficiently and selectively extracting increasingly 'diluted' concentrations of plastic pellets from the sediment, a local inventor proposed the services of a prototype of a machine designed to increase the recovery rate.

Believed to be based on freshwater gravity separation, the "Blue Machine" is, according to its inventor, capable of separating 6 distinct types of contaminant (from macro-litter and large burnt plastic agglomerates to the finest elements such as plastic pellets). It was reportedly tested on one of the worst affected sites (Sarakuwa) between August and September 2021.

For reasons that are not developed in our information sources, the authorities and experts involved in the operations were not sufficiently convinced by the system to use it systematically. ■

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## Discover the other topics addressed in Technical Newsletter #53:

- Coal ash spill in a coastal environment (Bridgeport barge, Florida)
- Inconsistencies surrounding a bitumen spill in the Yellow Sea (*A Symphony*, China)
- IOPC Funds: eligibility of a compensation claim for shoreline pollution from an unidentified source (crude oil spill, Levantine Basin)
- Heavy products versus condensates: retrospective analysis of the behaviour and fate of the *Sanchi* spill
- Mandatory reporting of lost freight containers at sea: changes to the SOLAS Convention and links with MARPOL
- Plastic Pollution Working Group (UK and Ireland Spill Association)
- Detection of buried oil: assessment of PTR-MS technology
- MARGET-II ARGOS/GPS drifter (CLS)
- Collection of macro-litter in port basins: DPOL floating pump
- The Elastec Bottle Boom, a lightweight device at the crossroads between a manufactured boom and a custom-made barrier
- FORU skimmers: medium to low capacity models
- Shoreline surface washing agents: decision support and agent selection
- Dispersant spraying using a cargo aircraft of opportunity: the Convert 400 system
- Effectiveness of mechanical recovery: analysis of past experience

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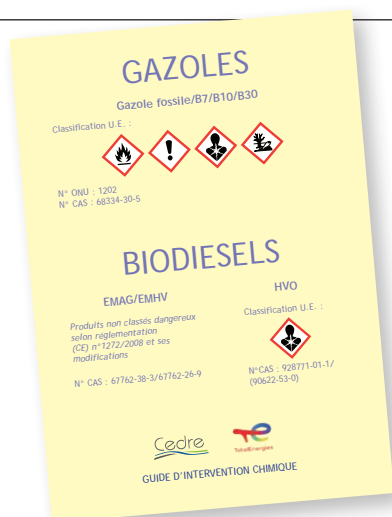
## NEW HORIZONS



Pierre Parenthoine

After training in maritime engineering, marine systems and technologies, Pierre went on to work in various maritime-related fields: oceanographic studies, MRE projects, deep water offshore installations, logistical coordination of scientific missions in the sub-Antarctic islands. Pierre joined Cedre in March 2021 as an engineer in the Research and Training Department, where he has been actively involved in organising and running training courses as well as conducting contingency planning studies in France and abroad. Drawing on his past experience in the offshore and wind energy sectors, he has developed work on issues related to offshore wind energy at Cedre and led numerous projects in this field. Pierre was also a member of Cedre's on-call duty team. In May 2023, Pierre decided to leave Cedre to pursue a professional opportunity with the French Polar Institute (IPEV), setting himself on course to return to the sub-Antarctic islands of which he is so fond. We wish him every happiness in this new adventures! ■

## NEW PUBLICATIONS

"Diesel and Biodiesel" Chemical Response Guide *(French only)*

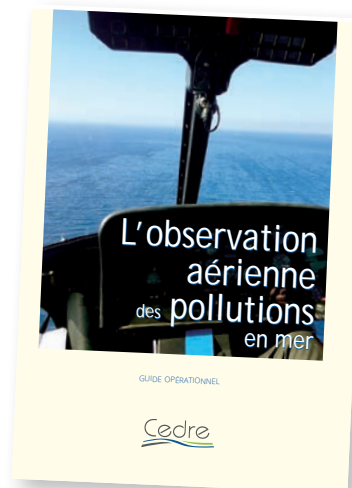
In 2023, we published a new chemical response guide aimed at operational personnel liable to be confronted with a diesel or biodiesel spill in an aquatic environment. It is designed to provide useful information on spill response and on developing contingency plans in case of such a spill in the aquatic environment.

The aim of this guide is to enable rapid access to the necessary initial information, in addition to providing relevant bibliographical sources to obtain further information.

Produced through cooperation between TotalEnergies and Cedre, this guide is intended primarily for specialists who know about the techniques to use in the event of an emergency in addition to the relevant operational response measures. ■

Operational guide on "Aerial Observation of Pollution at Sea" *(French only - translation scheduled for 2024)*

First published in 1993, this guide was updated in 2004 and again in 2009. It appeared necessary to our specialists and our operational partners (French Navy, French Customs, TotalEnergies) to update it once again, both in terms of its format, reorganising it with a more operational approach, and its content, taking into account feedback from the most recent incidents, the use of new vectors (such as drones) and new sensors, as well as the detection of new products, such as gases and very low sulphur fuel oils. The primary vocation of this operational guide is to be present onboard all aircraft liable to be involved in aerial observation of oil and chemical pollution at sea. It is also a useful tool in MRCCs, incident management centres and communications units. ■



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## Cedre AT A GLANCE



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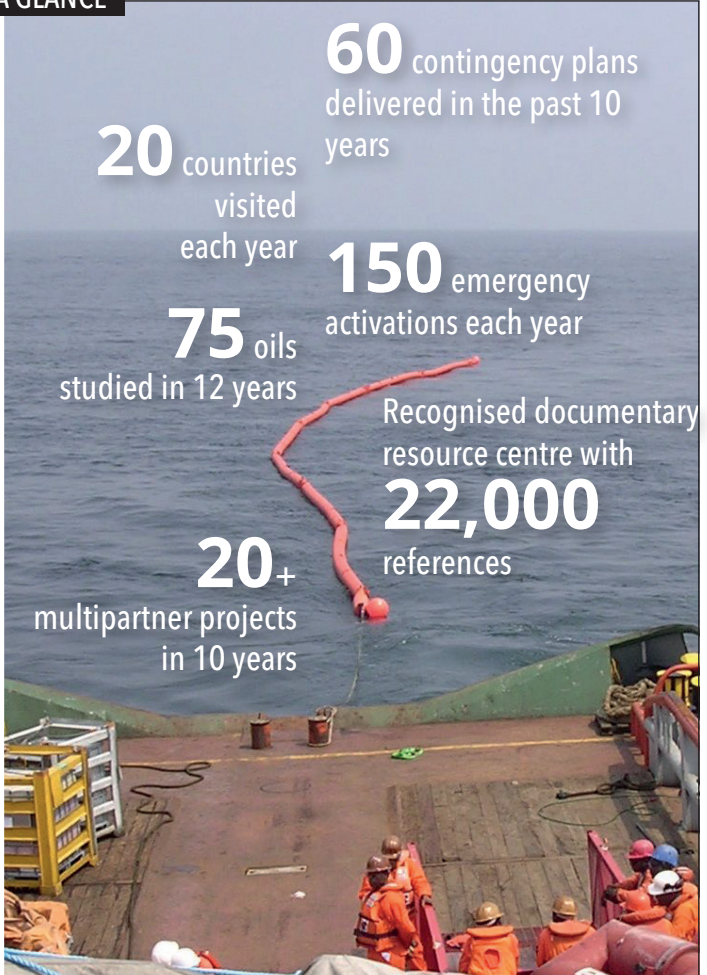


### INTERNATIONAL EXPERTS IN SPILL PREPAREDNESS AND RESPONSE

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