ERIKA OIL SPILL: RESPONDING IN DIFFICULT-TO-ACCESS COVES AND ON CLIFFS

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ABSTRACT: *Endless stretches of cliffs with deep coves and caves were coated with Heavy Fuel Oil during the Erika oil spill. Professional rope workers were called in to help clean the cliffs and the coves as most of them were located in protected reserves. This was the very first time that such a technique was used to clean up pollution and it turned out to be original if only because of the size of the job to be done. The clean-up operation lasted two and a half years, involved over 800 work sites and the rope workers cleaned up more than 50 of them. As a rule, cliffs that are hard to access are not cleaned up if only for safety and logistics reasons. There were various reasons why so many work sites had to be set up during the Erika clean-up, namely: the nature and the quantities of the HFO, the ecological, amenity and heritage importance of the area, the know how and the complementarity of the rope workers and the clean-up companies that continually improved their techniques and their efficiency as time went by. Thanks to compliance with rules and safety standards there were no accidents.*

Context

The Erika was caught in a storm and finally broke in two offshore the south Brittany coast towards the end of the month of December 1999. Several thousand tonnes of Heavy Fuel Oil (HFO) were spilled immediately and much more continued to seep out of the wreck over the ensuing six months. All in all, 20,000 tonnes were spilled and drifted out at sea only to change into 30 to 40,000 tonnes of emulsion that ended up on the coastline. Approximately 400 kilometres of coastline were oiled including areas with very steep and craggy cliffs ranging from 5 to 40 metres high. Over the first few days, the storm and the tides were so high and rough that the HFO emulsion was thrown high up on the cliff faces way above usual ranges. HFO slicks stuck to the cliff faces covering dozens of squares metres (at Poulhors on the island of Belle-Ile, HFO big patches were found 35 metres up the cliff face). Otherwise slicks were trapped in caves at the foot of the cliffs as well as in coves and were found to contain cobbles and shingle in addition to covering boulders that had fallen to the bottom of the cliffs. At the beginning of January 2000 there were hundreds of tonnes of HFO in the coves that tended to go back out to sea but as they did they simply polluted other areas such as coves and sandy beaches nearby. This situation was to last for months on end and put paid to the efforts put in by response teams on nearby beaches that were relatively easy to access and which most of the time were in fact amenity beached. The response authorities realised at an early stage that these coves which were evident source of pollution had to be cleaned up.

Coves surrounded by cliffs and the techniques used there

When access is not possible, a two or three metre rock face will take a heavy toll on any response job and slow down the evacuation process in addition to impairing the clean-up efficiency of the work site as a whole. Dedicated clean-up equipment cannot in many cases be lowered onto the beach or the foreshore and even then the equipment has to be packed up and removed at the end of the day because the area is so small and will not entertain storage at high tide for lack of space.

In areas where cliffs are low, several solutions were implemented throughout the Erika response operation, namely building rubble ramps on sites that were of no ecological or heritage importance, installing elevators such as those used by removal companies so as to lift heavy loads rather than expect response teams to negotiate a ladder with bags of recovered pollutant and materials which would jeopardise safety.

Having to clean up cliff faces that are rather high can be a problem when there is no land access and sea access is not always possible either. Sea access will require no obstacles in the vicinity in addition to being able to land safely long enough to land and remove equipment and response teams and in any case will require the appropriate craft and a place to alight not to mention good weather (swell, wind and current). This was unfortunately not the case with the Erika and sea access was only rarely envisageable.

Using helicopters can only really be entertained on exceptional occasions for reasons of cost. But using helicopters to evacuate recovered pollutant and materials can be envisaged providing matters are planned and organised suitably such as ensuring the helicopter can evacuate as much pollutant as possible from as many work sites as possible in order to make the operation cost effective. This was actually done on the island of Belle-Ile to evacuate big bags from the coves to a marshalling area inland where lorries could finish the job. There were two other occasions when helicopters were used; one was to hoist equipment to the top of a cliff in a nature reserve where there was no means of access and the helicopter just happened to be in the area at that

point in time. The other occasion was when several work sites had to be started up at the same time in the same area.

As was evidenced during the Erika clean-up operation, the characteristics of the top end of a beach will determine whether the response job can be organised from the land. If two sites look similar it will mainly depend on whether the site is in an urban setting such as near a road or a car park (such as along the coast near Guérande) or whether it is in the wilds with no means of access (such as on islands and isthmuses in the Morbihan, for instance). In the first instance, heavy duty equipment can sometimes afford access to the area: cranes parked near the top of the cliff were often used to lower skips and light duty equipment onto the beach and facilitated evacuation enormously. On other work sites cranes were used for accommodating response teams in their efforts to clean cliff faces from facade elevators. In the second instance, this technique could not be used and that is why professional rope workers were called in to help.

Including rope workers in the Erika response operation

During the first three weeks, the weather was so rough that the authorities rightly refused to allow responders onto exposed cliff areas arguing that firemen and soldiers can in some cases be asked to risk their lives to save human life but not for the purposes of recovering HFO. There were at that time others operational priorities. However, some volunteers ventured in the more accessible but risky (swell) coves arguing that the governmental Polmar responders (i.e. firemen and soldiers) were not doing anything on these sites. The issue that the authorities then had to face up to was to let the volunteers do or prevent them (the question being how ?) from risking their live. The situation was to change in the light of three events.

During the first few days of January 2000, private ropeworkers companies offering their services contacted the Prefecture in Morbihan and offered to rappel up and down the cliff faces to clean up the HFO. These offers were immediately routed to TotalFina, the cargo owner, which had announced it intended to take part in the clean-up operation. At the same time a group of volunteers from the French Alps arrived in Belle-Ile and some of them were alpinists who decided to use their know-how to climb up and down the cliffs to hoist loads or go down onto the beach in very tiny coves and evacuate the bags of pollutant. The authorities could longer afford to be onlookers locally at least and they agreed to allow the firebrigade to send its team of climbing specialists called the GRIMP (in French « grimper » means « to climb »). This was a 4 or 5 man team that managed to provide means of access to several work sites near Quiberon and thereafter Belle-Ile. Then half way through January 2000 TotalFina called in professional rope workers to open their very first difficult work site at the Grotte de l'Enfer (Hell's Grotto) on the island of Groix to recover HFO slicks and wash the rocks with HWHP washers.

Afterwards, over a two year period, these professional rope workers mandated by TotalFina and the governmental Polmar authorities were called in to clean up a number of coves that were very difficult to get to alongside other usual clean-up companies.

The rope workers cleaned up more than 45 work sites in Morbihan alone and in more than 50 per cent of the cases had to contend with cliffs ranging in height from 10 to 40 metres. They were also called in to help on other work sites involving less spectacular techniques in Finistère and Loire Atlantique. In actual fact labour law stipulates that professional rope workers have to be called on if jobs involve heights in excess of three metres particularly when scaffolding or elevators cannot be used.

The rope workers - Specifics of the work sites they cleaned

The people involved. The rope workers knew nothing about how to clean up an oil spill and the clean-up companies were not alpinists and it was only when both techniques were combined that some very hard-to-get-to places could be cleaned up. Without the rope workers, the job would never have been possible. Conversely, the alpinists alone would never have been able to implement the appropriate techniques to clean up the coves and the cliff faces.

For these professionals rappelling up or down a cliff face would be tantamount to working on the mountainous faces, something they are used to on a daily basis. However, what was new to them was the cleanup techniques and installing washing effluents recovery devices (geotextiles) at the foot of the cliff and on the cliff face itself.

Two kinds of operator were present (ill. 1 and 2) and their numbers varied depending on the job at hand and the kind of cove to be cleaned: there were the rope workers and the « pedestrian » operators who even if they were not climbers were nonetheless trained to use a lifeline. In some instances and in coves with very steep rock faces, only the professional ropeworkers were entitled to operate.

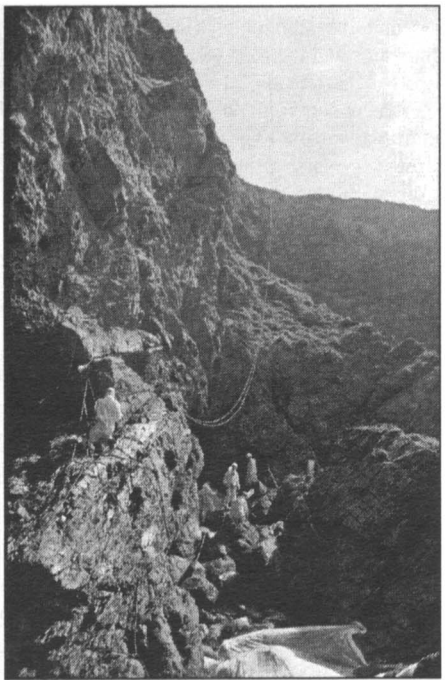
The professional climbers were responsible for making the sites secure (risk assessment, removal of unstable topsoil, installing safety nets to catch falling rocks, installing handrails and lifelines) and hoisting equipment (installation and implementation). The pedestrians operators were asked to remove the bulk of the oil and fine tune the clean-up on the rocks and boulders which involved: manual clean-up, scraping, flushing, HP washing, effluent recovery, loading waste into big bags and taking them to the marshalling area.

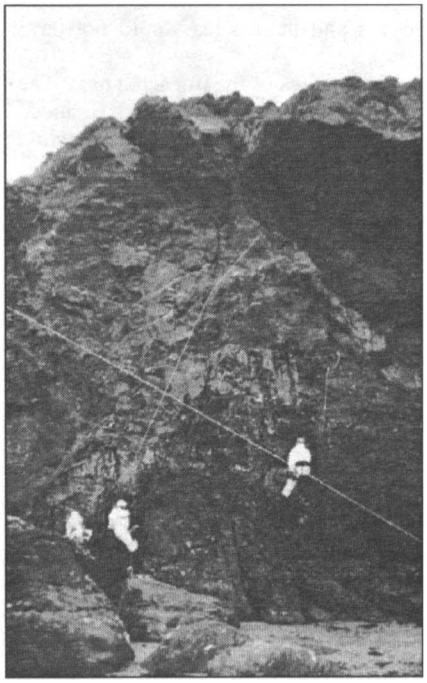
Equipment. There are two types of equipment that feature the ropeworkers sites, namely equipment with which operators (ropeworkers and pedestrians) can move around securely and hoisting equipment.

Guard rails were installed 2 to 3 metres from the cliff edge to prevent people falling off the end of a cliff (taught steel cables mounted on metal poles). The pedestrians used lifelines to move up and down the cliff faces (taught steel cables mounted on metal poles drilled into the cliff face). The rails were tried and tested to withstand weights of up to 1 tonne and included two steel poles at the top of the lifeline in case one broke.

Two hoisting capabilities (ill. 3) were used: the tyrolian traverse which is a taught steel cable mounted between two metal poles at the top of the cliff so as to straddle the cove and the zip line which is a steel cable taught obliquely from the top to the bottom of the cliff face. Cross shaped metal girders (two in cross shape or three to form a tripod) or tube shaped pylons were used as poles and were tied to metal bars drilled into the ground at variable depths depending on the kind of soil or rock and could reach 4 metres down in loose topsoil and when required be supported by concrete sinkers.

These anchoring points absorbed the load on the poles during hoisting (up to seven times the hoisted weight) and were designed with a safety ratio of 5. Hoisting operations could lift a number of big bags full of HFO and oiled materials at a time and manage





Illustrations 1 and 2. Rope workers on cliff and pedestrians in cove.

Illustration 3. Hoisting gear : tyrolean traverse.

throughputs of 15 lifts per hours and the big bags weighed between 450 and 500 kilos each (managed by the OuestAcro-LeFloch company on Belle-Ile island). Prior to being commissioned, the hoist equipment was verified and tested by an independent certification agency.

Safety. Special safety rules were in force on the work sites operated by the rope workers such as a stoppage when winds exceeded 60 kph (in fact less because of the swell) according to current regulations. People were not allowed to work alone and were compelled to stay in permanent contact, either visual or by radio, between the cove and the top of the cliff. They also had to wear protective clothing such as helmets, harnesses and ancillary equipment so as to comply with standards and the equipment could only be used by the same person.

Discussion

Why to clean the cliffs. As a rule, when there is no sea or land access to the cliffs, oil pollution is left alone for washing by wave action and response is not planned for either safety, when the cliffs are exposed, and/or logistics reasons. What was done during the Erika clean-up operation was highly original and can be explained by different facts.

The first one concerns the nature of the pollutant. It was clear during Erika oil spill that as the HFO was viscous, sticky and persistent nature would never be able to do the job alone and that the heavily polluted coves and cliffs were potential sources of pollution. If the pollutant had been lighter and far less persistent, the sea and winds and the sun would have probably cleaned most

of the difficult-to-access coves and these sites would not have been a priority.

The second one concerns the features of the impacted area. The area was of such ecological, landscape, heritage and financial importance that some coves were put on the list for cleaning. Many of the oiled cliffs were in naturally protected areas many of which had a great deal of symbolic importance for the public at large. Furthermore, these exposed locations sheltered some rare and protected birds as well as very expensive *goose barnacles*, anatife populations (crustaceans fixed on rock faces), harvested by local fishermen.

A third one concerns the specifics of the ropeworkers. This profession is relatively new: it was only towards the 60's that access, hoisting and handling techniques inspired by alpinism and potholing were actually applied from leisure and sport to the workplace. This helped solve a number of access problems that could not envisage using ladders, scaffolding, elevators, engineering, cranes, helicopters and so on. Lots of companies are now specialised in the construction, public works, cleaning and industrial maintenance businesses. This new professionals has been developing in France over the past ten years and yet is relatively unknown. That can also partially explain why no attempt had been made to call on them previously on oil spill, such that they had never had the opportunity of responding to oil pollution along the coastline.

Which sites should be cleaned and to what extent. Site selection and work designation has always required joint decisions during field trips by Polmar representatives, TotalFina (for its own work sites) and an expert from Cedre (who drafted the technical specifications for the work site to be cleaned) in addition to a botanist appointed by the Ministry of the Environment (and who listed the environmental constraints to be complied with especially the vegetation at the top end of the cliffs).

Not all coves and cliffs were cleaned up. Some were even left well alone either because the coves were not too polluted or because they were too risky (swell, rock slides, etc). Some were only surface treated by scraping and manual collection in a bid to remove the bulk of the oil that could have easily escaped elsewhere along the coast. Some coves and cliffs were scrapped and then cleaned with HWHP washers in view of their ecological and aesthetic value (no washing agent was used). In this case the sites were remarkable ones and some were of much symbolic importance. All in all the very heavily oiled rock faces and boulders that could be seen from the top of the cliffs were actually cleaned up wherever possible.

At the end of the job, the committee that visited the site prior to commencement of the clean-up operation also revisited the same site subsequently to certify the site was clean and to ensure that all the objectives had been met in addition to the recommendations and constraints laid down for each site. In some very rare cases, sites were deemed non compliant.

The decision to intervene on these difficult-to-access sites and the quality of the clean-up provided on them can be partially explained by the fact that the first coves and cliffs work sites were set up by TotalFina, the cargo owner. TotalFina never sought and never intended to refuse to clean up the very difficult sites it was asked to deal with as it knew right from the outset, during the crisis time, that the Polmar officials, the local authorities and public would never have tolerated a badly cleaned-up worksite especially since TotalFina had committed to clean-up only, at that time, a limited number of sites. The company thus sought to guarantee perfect results which initially would have been hard to ensure given the configuration of the sites and the amount of time left to do the job. The clean-up companies and the rope workers mandated by Totalfina were able to prove that the objective they had been set was feasible. The experience acquired on the job by rope workers working for TotalFina was put to good use subsequently on Polmar work sites by the very same professionals. The requested level of clean-up on comparable sites was the same.

Priority: safety. Staff safety was always the main priority and was based partly on the experience acquired by the responders and compliance with operational rules and manufacturing standards for the equipment they used in addition to factoring into the equation the fact that the sites were dangerous from the geological and also from the weather point of view (swell and wind).

The companies employing the rope workers were chosen in view of their references and their corporate policy that included training and safety. People who want to be a professional climber do not yet need an official certificate to do the job. However the professionals working for the companies employed on the Erika clean-up operation were all certified to professional standard and had diplomas that were issued to them after completing training lasting several months by a certification agency. They were also certified first aid rescue specialists. Apart from the professionals climbers, all the people that were required to work on the sites or go down and inspect them had to have at least basic training in how to use a lifeline (volunteers, inspectors and experts) that was provided on the job by an instructor. When people had to be more agile with climbing, training was longer and had to be laid on by certified training institutes.

The hoisting equipment, the equipment required to move across cliff faces (guard rails, lifelines, ropes and anchor points) and climbing gear had to be compliant with then current safety standards. They were inspected on an ongoing basis (visual inspection and functional inspection) in view of the aggressive setting of the worksite (chemical transformation after contact with seawater and oil, friction erosion on jagged cliff surfaces). The instructions for use of equipment and other safety rules were constantly repeated.

Whenever there was doubt about the geological stability of a cliff face, a geologist was called in. When geological experts, mandated by TotalFina or the Polmar authorities, filed negative findings about some cliff faces, work had to be cancelled. Once the decision had been taken to respond, a senior ropeworker, accredited by his firm, inspected the area immediately and removed unwanted soil, rocks, boulders etc with a crowbar. Sometimes the decision was not to respond in a given location of an opened site for fear of landslides, or dislodgement of rocks on account of soil or substrate erosion subsequent to the use of water jets, for example.

Thanks to all these measures, there were no accidents to deplore on the many risky worksites set up in difficult-to-access cliffs and coves during the Erika clean-up operation.

Conclusion

Responding to an oil spill in difficult-to-access sites is a very special operation requiring a great deal of care when deciding to respond and who to employ for the job. This kind of clean-up job is problematical and requires techniques and equipment that will not always be available locally and indeed hard to master.

During the Erika response operation, a plethora of techniques was used for cleaning up this kind of site: crane, elevator, removal firm ladder, ordinary ladders and helicopters. But the

most spectacular item and the most original was by far the recourse to professional rope workers.

In this field, the experience acquired during the Erika clean-up operation has shown that:

- responding on cliffs that are hard to get to is sometimes justified and in particular when large quantities of persistent HFO are involved as was the case with the Erika in a bid to eliminate an obvious source of pollution and limit the ecological and financial impact in addition to removing the visual impact of some very important sites;
- scraping and cleaning boulders and cove walls that are hard to get to is possible providing a series of measures is taken to reduce risk and enhance safety;
- professional ropeworkers alone should be considered as they are the only ones who will take the necessary precautions, cordon the site off with the appropriate measures and ensure that they and non professionals can move safely around the site;
- the association of rope workers with traditional oil spill cleaning companies enable to do the job. Their efficiency improved constantly from one site to the next over a period of just over two years. Procedures were improved constantly and appropriated quickly thus enabling responders to save time and clean better in addition to optimising response in terms of efficiency and costs. The result being that the estimated amount of time required to clean up a cove was halved after about a year of using this original technique.

Biography

Originally a marine geographer, PhD, Loïc Kerambrun joined *Cedre* in 1986, where he is now head of Pollution Follow-up Department.

His highly diversified experience in most aspects of *Cedre* activities (contingency planning, response guide, R&D) is regularly called in by the French and foreign clients of *Cedre* particularly in the case of oil spill operations on the shoreline.

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