OFFSHORE OPERATIONS FOLLOWING THE *ERIKA* OIL SPILL

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ABSTRACT: *On December 12, 1999, the Maltese tanker* Erika, *loaded with 30,000 tons of heavy fuel oil and sailing from Dunkirk (France) to Livorno (Italy), broke up into two parts in bad weather and sank 40 miles off the Brittany coast in the northern part of the Biscay Bay. The very first assessment of the situation revealed that between 5,000 and 7,000 tons of Fuel Oil No. 6 had been released into the sea. French Customs remote-sensing aircraft revealed many black and thick slicks drifting southwards at a speed of 1.2 knots.*

On December 15, a French oil recovery vessel (ORV) called Ailette *arrived on-site equipped with a Transrec 250 skimmer in very rough seas and was followed a few days later by four other ORVs:* Alcyon *(French) and three other ships belonging to the European fleet,* British Shield *(United Kingdom),* Neuwerk *(Germany), and* Arca *(Netherlands). Finally, after 2 weeks at sea, but only a few days during which conditions permitted the recovery operation to proceed, more than 1,100 tons were retrieved by the five ORVs.*

This paper describes the cleanup operation at sea, and analyses problems and difficulties encountered because of bad weather, the way the slick evolved, the way subsequent floating slicks behaved and the difficulty in detecting them, and the limitations of the equipment available in the event of this major oil spill.

Introduction

On December 12, 1999, the 12,800 horsepower tug boat *Abeille Flandres* was standing by, sheltering from bad weather in a bay on Ushant Island, and waiting for a tow. At 0610 hours (LT), a VHF call from Corsen MRCC located on the west coast of Brittany ordered the tug to proceed as quickly as possible towards the northern part of the Biscay Bay following an emergency broadcast sent by the Maltese tanker *Erika*. The *Erika's* current position was 47°10'N-004°36'W, 85 nautical miles from Ushant. The wind was blowing at 60 knots from 300°.

At 0810 hours, the *Erika* broke in two. This is the start point for the *Erika* oil spill, an event that will remain firmly stamped in the collective Breton mind as an environmental disaster of the same order as the *Amoco Cadiz*.

French action plan to combat pollution at sea

In the event of pollution at sea, or even a risk of pollution at sea, mobilizing preventative or curative action is the responsibility of the Préfet Maritime, the acting Naval Admiral in charge of the Atlantic zone. To fulfill this mission, the Préfet Maritime reports to the French Prime Minister and has at his disposal the capacities of various administrations (Customs, Navy, Maritime Affairs, Police, MRCC) that are placed under his authority provisionally. On December 12, 2000 at 1900 hours, 10 hours after the *Erika* had broken into two parts, the Préfet Maritime put into action the Polmar Plan (Sea).

Requirement for additional vessels

Under the terms of the Bonn Agreement, which defines cooperation between contracting countries around the North Sea (Belgium, Denmark, Germany, France, Netherlands, Norway, Sweden, United Kingdom) in the event of a marine spill (of hydrocarbons or chemicals), contact has to be made with all established national focal points and representatives of the European Commission. On December 13, confronted with a major threat to the French coastline, the Préfet Maritime decided to make an appeal for assistance from these other European countries under the terms of the Bonn Agreement.

Following recommendations by CEntre de Documentation de Recherche et d'Expérimentations sur les pollutions accidentelles des eaux (CEDRE) to "Action de l'Etat en Mer," the technical requirements were defined and drawn up by the Civil Division of the Préfet Maritime in Brest, and presented to the contracting countries with the aim of coordinating a group effort to recover the oil at sea. After some negotiation, the French Navy, acting for the government, hired the following three oil recovery vessels (ORVs):

- *M/V British Shield* belonging to Briggs Offshore through their French agent, Abeilles International
- *M/V Arca* owned by the Ministry of Transport, Public Works, and Water Management, The Netherlands
- *M/V Neuwerk* owned by the Bundesanstalt für Wasserbau, Germany

Two other ORVs also were included in the framework of the Biscay Plan, a cooperation agreement between France and Spain, which was instigated in view of the potential threat to the Spanish coastline. These vessels were the *Alonso de Chaves* and *Ibaizabl II*, both owned by Sociedad de Salvamento y Seguridad Maritima, Spain. In addition to these five vessels, the French Navy sent the following craft:

- *Alcyon* and *Ailette*, ORVs owned by the company Surf and hired from them by the French Navy
- Two tug boats
- One frigate acting as the On-Scene Command Centre (OSCC)

Requisite characteristics for recovery vessels. The ships were chosen in accordance with a wide range of oil recovery characteristics, but especially for their equipment and design characteristics (Table 1). The vessels had to be:

- Able to cope with rough seas
- Rapidly available on-site
- Endowed with capacious storage facilities
- Equipped with heating tanks to store, settle, and discharge viscous oils

Chronology of events

The first ORV to arrive on-site was *Ailette* on December 13. At nightfall, however, the wave height exceeded 6 m (Beaufort scale 8 to 9), making deployment of any equipment hazardous.

First recovery attempts started on December 15, but were interrupted by very poor weather conditions and the rupture of the high seas containment boom.

On December 19, five ORVs were on location, waiting for a break in the rough weather to be able to continue working.

On December 23, recovery in the open sea was halted because of the arrival of pollution on the shoreline and the inability to detect floating slicks by aerial surveys.

First attempts: December 15–18. Having arrived on location 3 days after the shipwreck, *Ailette* deployed 300 m of sea boom and a Transrec 250 weir skimmer. The skimmer was unable to recover any oil because of the thickness of the slick and the sticky and quasi-solid quality of the water-in-oil emulsion (30–50 % water) for Fuel Oil No. 6.

The internal diameter (5 inches) and length (80 m) of the hose hindered recovery because of extensive pressure losses. When it was decided to deploy Transrec 250, responders were aware of this risk but hoped that free water would be recovered and pumped with the oil, thereby enabling pumping to proceed. However, even with free water, the slick was too thick to allow pumping to occur.

On December 18, 200 meters of boom were lost in bad weather and working conditions deteriorated to an unacceptably low level from the point of view of safety.

Despite the apparent setbacks, this first trial constituted a useful rehearsal for subsequent operations.

Recovering oil from the *Erika* spill at sea: December 20–23. After the failure of the Transrec system, *Ailette* and *Alcyon* were both equipped with the Foilex TDS 250 weir skimmer, which includes a screw pump (5-inch outlet diameter). Using a concentrating boom was inappropriate because of the thickness of the slicks (50 cm) and their still quasisolid and cohesive texture.

The *Neuwerk* started to use her gripper, but this attempt failed because of the difficulty of removing the sticky paste from the gripper and transferring it into the deck tank. Moreover, waves and a huge swell made the hanging gripper an unwieldy and dangerous tool for both crew and vessel.

Finally, *Arca* and *Neuwerk* chose to use sweeping arms and direct pumping. *British Shield* used a Sea Devil skimmer. All recovery boats were at this point working without any boom, and this, it should be emphasized, is a very rare occurrence.

Oil recovered

After a few days of difficult pumping conditions interrupted by long periods of bad weather, the following volumes were recovered representing a total volume of 1,100 m^3:

- *Ailette*: 120 m^3
- *Alcyon*: 100 m^3
- *Arca*: 630 m^3
- *British Shield*: 135 m^3
- *Neuwerk*: 120 m^3

Lessons learned and suggestions for improvement

The conditions at sea combined with the viscous and sticky nature of the emulsion rendered this recovery operation dangerous and unbelievably tough for all crews. Despite the modest volumes recovered, they must be thanked and congratulated. Thanks to their efforts, 1,100 tons of emulsion will not reach the coastline to add to the already painful process of coastline cleanup and the quantities of oily wastes that cannot be eradicated.

Table 1. Main characteristics of boats available on-site.

	Nationality	Length (m)	Storage capacity (m^3)	Heating	Anti-pollution equipment
Ailette *Alcyon*	F	57	500	yes	Transrec 250 (weir skimmer) Foilex 250 300 m high sea booms
Neuwerk	G	79	1,000	yes	Two Jafo sweeping arms (15 m each) Suction pumps 320 m^3/h (water) Gripper 2 × 200 m high sea booms on reels Deck storage tank
Arca	NL	83	1,000	yes	Two sweeping arms (15 m each) 400 m high sea booms (Ro boom) Marflex pump 450 m^3/h (water)
British Shield	U.K.	98	3,800	yes	Foxtail Mop 400 m Ro Boom Terminator skimmer (Desmi) Sea Devil Skimmer (Vikoma) Two work boats 3 screw pumps (385 m^3/h each) CCN 150 transfer pump
Alonso de Chaves	E	64	—	—	Booms

As far as recovery at sea of sticky and viscous emulsions is concerned, the following points should be borne in mind:

- The availability of oil recovery vessels within a regional framework should be increased.
- Boom characteristics and their deployment specification should be better adapted to rough seas.
- Skimmers and pumps would be more efficient if they had higher outlet diameters (8 inches) and rigid and short hoses to limit pressure losses.
- Aerial reconnaissance should give information to the OSCC vessel in real time.
- Tools for detecting partly submerged oil need to be developed.
- Equipment must be available on all vessels to decrease friction and pressure losses. Water injection and addition of hot water have proved to be efficient in this area.
- Sweeping arms and weir skimmers equipped with screw pumps are well adapted to such spills, even though the authors could suggest some improvements.

In the event of an oil spill, even in adverse conditions, oil recovery at sea should *always be a priority consideration* because of the following:

- Weather and sea conditions may change.
- The characteristics of the spill can evolve.
- Technical solutions can be found.
- One m^3 collected means 10 or 20 m^3 of oiled debris avoided on the shoreline.