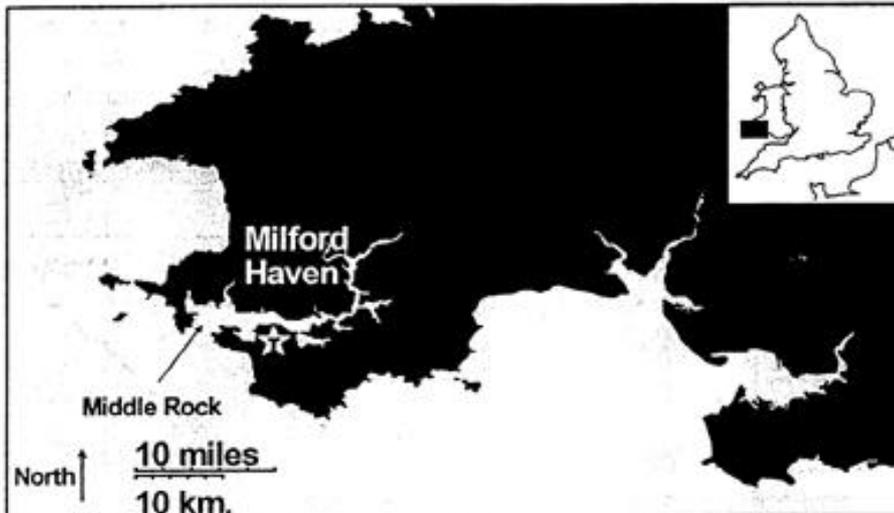


*UK GOVERNMENT AND INDUSTRY  
RESPONSE TO SEA EMPRESS INCIDENT*

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On 15th February 1996 at 2007 hours the tanker Sea Empress grounded in the approaches to Milford Haven, West Wales. The vessel was carrying 131,000 tons of Forties blend crude oil destined for the Texaco Pembroke Refinery. Immediate notification of the incident was received by Milford Haven Port Authority and the local Marine Rescue Co-ordination Centre. The vessel grounded on Middle Rock, an underwater obstruction just out of the main Channel.

**Location of Sea Empress grounding**



The vessel suffered substantial damage to the starboard side of the hull leading to a significant release of cargo. Early estimates of the release estimated the quantity of 5000 cu, m but observations at first light revised these estimates to 2000 cu. m..

The vessel adopted an 18 degree list following the grounding. At the same time the cargo pump room was flooded with crude rendering the cargo transfer system inoperable. These factors, combined with the heavy swell in the entrance to the harbour, made initial salvage plans very complex. The actual salvage operation is currently being considered by the Marine Accident Investigation Branch at the time of writing this paper. It would be inappropriate to consider this aspect of the incident until this report is officially released.

## **THE OIL SPILL**

A total of 72,000 cu. m. of Forties Blend Crude Oil was lost from the Sea Empress along with 360 cu. m. of heavy fuel oil contaminating over 100 beaches along a coastline of 200 km in length.

Initially the coastline within Milford Haven was heavily oiled and then much of the oil moved south and east affecting long stretches of the Pembrokeshire coast as far as Pendine Sands in Carmarthen Bay.

Some oil reached Skomer and Skokholm Islands and entered St. Brides Bay.

It is estimated that 70% of the total amount of oil reaching the coast occurred on 27th February when large quantities of emulsion came ashore along the western half of Carmarthen Bay.

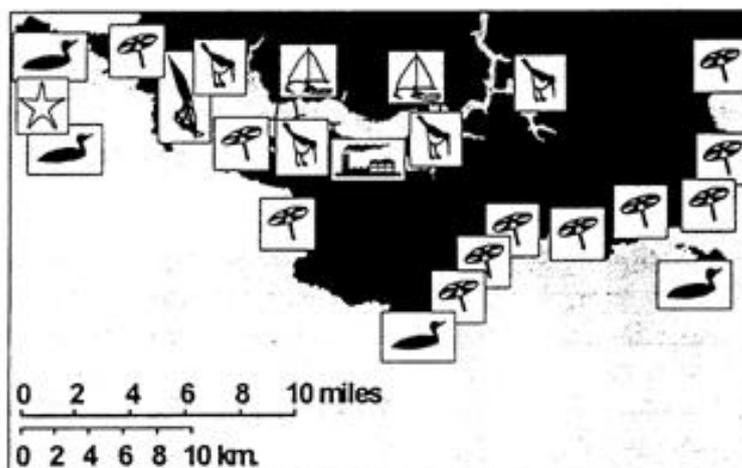
Heavy fuel oil was released on the evening of 21st February which impacted beaches within the Haven, small quantities were released when the ship was moved at later stages in the incident.

## **LOCAL ENVIRONMENTAL SENSITIVITIES**

The coastline of West Wales is an area of outstanding natural beauty and scientific interest. The rugged coastline has a wide range of habitats such as rocky shores, sand, shingle and gravel beaches, saltmarshes and mudflats. The area is rich in bird life and supports an extensive commercial fishing and shellfish industry. Tourism is a major contributor to the local economy along with visitors to the region to study the local environment.

Within the area affected by the spill there were 30 sites of Special Scientific Interest (SSI); 2 National Nature Reserves (NNR) and one of the UK's three marine Nature Reserves (MNR).

### **Environmental Sensitivities**



The islands off West Wales support the greatest concentration of seabirds in Southern Britain and there is European Special Protection status for Skomer, Skokholm and Grass Holm. There are Special Protection Areas along the Castlemartin Peninsula and many other conservation areas along the coast from Gower to St. David's Head.

The Pembrokeshire Coast National Park is one internationally recognised for its ecological richness.

## **INITIAL RESPONSE**

### ***UK Government***

Notification of the UK Government Marine Pollution Control Unit occurred through the Coastguard Marine Rescue Co-ordination Centre. A Cessna 404 aircraft was launched within 30 minutes and flown to Southampton to collect MPCU representatives. At the same time DC3 spray aircraft were mobilised to Haverfordwest Airfield. These aircraft form the primary response strategy of the UK Government, secondary response options being mechanical containment and recovery and shoreline clean-up.

### ***Industry Response***

Under the Milford Haven Standing Conference oil pollution plan it is accepted that the facility which is receiving the cargo, there being three operators within Milford Haven, will provide the initial response to an incident. In this instance, Texaco had the responsibility, and mobilised their local response. At the same time Oil Spill Response Limited, an industry co-operative based in Southampton, was activated. Five response packages were deployed to site arriving in Wales at 0300 hrs on 16th February.

## **INITIAL ASSESSMENT**

At first light an assessment of the situation was made. The initial release, which occurred on the incoming tide, was estimated at 2000 cu. m.. This oil moved into the Haven, this unfortunately precluded the use of dispersant as the oil fell within an exclusion zone set out by the Ministry of Agriculture Fisheries and Food. The use of dispersants was prohibited within 1000m. of the coastline or 750m. of any islands.

Subsequently the primary response to the oil pollution was delayed and the primary action focused on the clean up of the oil in West Angle Freshwater West and Angle Bay.

## **MARINE RESPONSE**

The Government containment and recovery equipment was mobilised from the Pollution Centre which was fortuitously located in Milford Haven. At the same time ship to ship transfer equipment was moved from the Centre to the stricken vessel.

It was determined at this time that additional marine recovery systems would be required and work commenced to mobilise a number of large scale recovery systems. These resources came from the commercial sector in the UK or as a result of

International agreements within Europe (Bonn Agreement).

***UK vessels***

Briggs Marine - Forth Explorer  
Gulf Offshore - Sefton Supporter

Both of these vessels were engaged in standby support duties in Liverpool Bay area. UK Government gave permission for these vessels to be released from their duties and mobilised to the spill. In conjunction with these major vessels two Port Authority vessels, Sea Mop and Sea Sweep were engaged in response operations within the confines of the Port area.

***European vessels***

A number of response vessels were taken from European countries within the Bonn Agreement. The Dutch provided two dredging vessels equipped with Marflex Arm recovery systems; additionally the French Navy deployed vessels from the CEPOC organisation with a recovery system.

As these vessels were being mobilised to the site a number of events were occurring at the casualty site. The vessel, due to the list, was unable to be maneuvered into a safe location. The weather also deteriorated on day 3 of the incident with a south westerly Gale Force 8-9 gale developing. This weather, and an inability to control the vessel led to subsequent groundings and further oil loss. The tidal range at this time was 7.5 metres, ultimately the vessel became lodged on a pinnacle of rock and, as the tide ebbed, a release of 20,000 cu. m. occurred from the vessel. This was repeated through the next two subsequent tidal cycles.

**AERIAL DISPERSANT APPLICATION**

By this time the oil had moved outside the dispersant exclusion zone and full scale aerial application of chemical dispersant had commenced. Forties Blend crude oil is particularly amenable to chemical dispersion and the strategy proved very effective in reducing the oil which impacted the shore. This is clearly in contrast with the oil spilled from the Nakhodka, where the oil would not disperse readily and, once the emulsions had formed, would be totally resistant to chemical response.

In total some 430 tons of dispersant was applied on the spilled oil, this strategy significantly reduced the quantity of oil reaching the shoreline.

As the operation continued the Aerial Dispersant Delivery system or Adds Pack was deployed. These units, which are operated by Oil Spill Response Limited, East Asia Response Limited and Clean Caribbean Co-operative are large-scale systems capable of delivering large quantities of dispersant chemicals.

Another successful part of the operation was the use of in-Weld monitoring of the results of the dispersant application. The availability of scientific information substantially improved the acceptance and validity of the strategy.

## **SPILL MANAGEMENT**

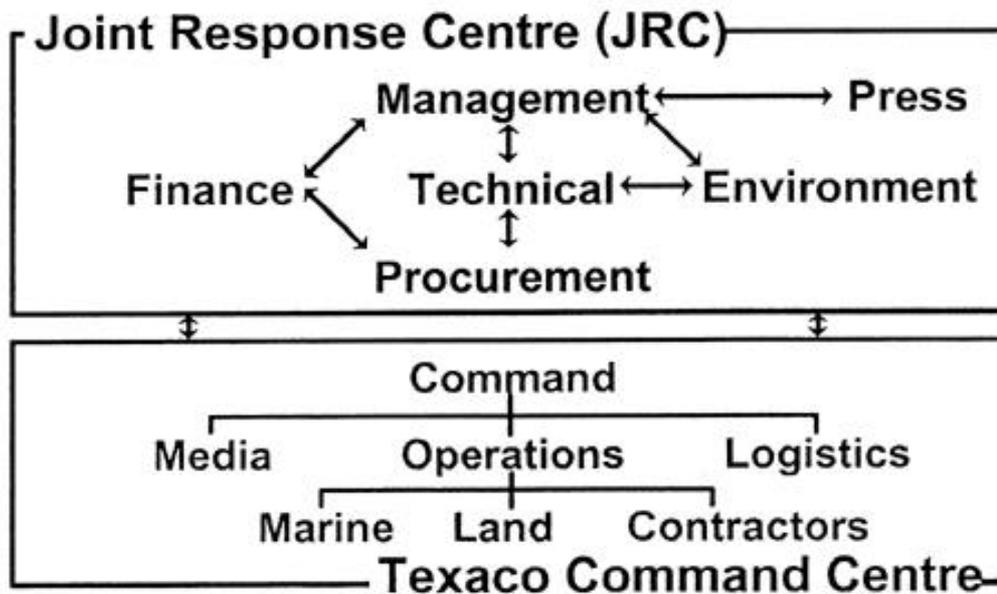
The UK Government has adopted a unified command type of approach to spill management to deal with oil which impacts the shoreline.

This team was based in the offices of the Milford Haven Port Authority and was divided functionally into several areas:-

- Management
- Technical
- Environment
- Procurement
- Support

The overall activity was supervised by the Management Team who had responsibility for setting clean-up strategy, Health and Safety and reporting to the public.

### **Response Organisation**



The technical and environment team worked closely together to assess the degree of pollution of each of the beaches and to choose the best clean-up techniques taking into account what was technically feasible and environmentally sound. Equipment to support the clean-up was provided by UK Government, OSRL or local suppliers.

**THE CLEAN-UP OPERATION**

The clean-up strategies adopted during the clean-up operation varied considerably depending upon the type of shoreline, the degree of oiling, the environmental or amenity status of the beach and the logistical practicalities of access.

All decisions on the response strategies were made in the technical and environment teams to ensure that the most appropriate and least damaging techniques were adopted.

With over 200 km of shoreline affected a whole range of shoreline types were contaminated.

The substrate type determines the technique that might be effective in removing oil. The following table shows the techniques that were applied.

CLEAN UP TECHNIQUES	Type of substrate						
	ROCKY SHORE	BOULDER	COBBLE	SHINGLE	SAND	MUD	ARTIFICIAL SURFACES
TRENCHING			X	X	X		
FLUSHING	X	X	X	X			
SCRAPING					X	X	X
HIGH PRESSURE WASH	X	X					X
LOW PRESSURE WASH	X			X	X	X	
STEAM CLEANING							X
DISPERSANT	X	X	X	X			X
OIL RELEASE AGENT	X	X	X				X
BRUSH / SCRUB / WIPE	X	X	X				
POM - POM	X	X					
SURF WASHING			X	X			
IN SITU PIT WASHING			X	X			
STONE WASHING			X	X			
HARROWING					X		
BIOREMEDIATION							

The very rugged and varied coastline made access to the shoreline difficult in some areas and virtually impossible in others. Very serious logistical challenges were presented to the response teams. In total some 950 persons were involved in the clean up efforts. These personnel were taken from the local Authority who have the responsibility for shoreline clean up, from Industry through a mutual aid agreement which has been set up within the UK and from local labour available in the region. All of these responders required logistical support in terms of protective clothing, food and drink, shelter, transportation. Each of the teams required management and supervision to ensure their safety and maintain their commitment to the task at hand.

The initial targets set in the clean up were to have the key resort beaches in a state which was acceptable for use by the Easter vacation period. His initial phase of the clean up was achieved, subsequent fine polishing of the beaches continued throughout the summer and concluded in November 96.

The period was prolonged due to patches of oil being uncovered and released during the equinoctial gales in October.

One of the interesting factors in the clean up was the continued mobility of the oil. Even in its emulsified state it did not tend to 'stick' in any particular location, it retained its mobility. This aided the clean up efforts by making the oil easy to remove, the negative side of this property was that the oil tended to move with each subsequent tide.

### **WASTE DISPOSAL**

The issue of waste disposal has always been one of the greatest problems in oil spill response, The Sea Empress incident generated about 20,000 tons of liquid waste and 11,000 tons of solid waste. A temporary storage pit of 3,000 tons for almost 3,000 tons of oiled beach material was constructed in the dunes behind the beach. Liquid waste recovered at sea was taken by sea to Milford Haven and transferred to the Texaco Refinery. Liquid waste recovered from the beaches was taken by road to the nearest of the three refineries in the Haven. In total about 20,000 tons were processed. The oiled beach material presented much more of a problem, not least because of the mixture of materials contained in the waste. The majority of this waste was treated by land farming in Texaco Refinery, the remainder being transported to a land fill site.

In this instance, by good fortune the waste disposal problem was adequately provided for. If the spill had occurred some distance either North or South of the actual spill location the problems would have been enormous.

### **CONCLUSIONS**

In summary the pollution response element of the Sea Empress incident was generally considered to be a cost effective and reasonably efficient operation. Shortfalls were identified in the plan and the management structure of the control organisation, but this is only to be expected given the amount of exposure that most people get of an oil spill situation. The media profile of the response operation was quite modest in comparison to other spill incidents, although it is recognised that the majority of the controversy was focused on the salvage operation.

The use of dispersants, the key response strategy of the UK, proved to be a great benefit in the response. This was further underlined by undertaking scientific monitoring of the dispersant operation, validating the use of the strategy and allowing a measurement of the results achieved.

The table below shows a budget mass balance for the spill and allows a number of interesting comparisons to be made. It should be noted that the relationships between costs and strategies are not fixed and can vary enormously in each case.

<b>SEA EMPRESS MASS BALANCE</b>			
	<b>OILSPILLED (t)</b>	<b>COSTS (£m)</b>	<b>%</b>
Evaporated	29,000	-	
Dissolved	7,000	-	-
Dispersed chemically	29,000	1.1	7
Recovered at sea	2,000	3.8	23
Recovered ashore	1,500	11.0	67
Other	3,500	0.5	3
	<b>72,000</b>		