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Developments in legislation and technological advances in dispersant application in the United Kingdom

New Legislation

The United Kingdom adopted the International Convention on Oil Pollution Preparedness Response and Co-operation,1990 (OPRC) during 15th May 1998, the statutory instruments to enact its powers were put in place on and the deadline 15th August 1999. As a result of the changes in legislation a number of new requirements were placed on both Port operators and those working in the offshore environment. This paper will particularly deal with the impact in respect of the oil spill response requirements for offshore operators within the United Kingdom Continental Shelf, (UKCS) and how the industry responded to them in a operationally effective and cost efficient manner. It will also provide details of a number of developments in aerial spray technology, which are in the process of development within the United Kingdom.

UK Response Strategy

Aerial dispersant application has been a key response strategy for the United Kingdom, the length of the coastline, intensity of marine traffic and typical prevailing sea conditions inhibit the effective use of containment and recovery systems. Dispersant application from aircraft is therefore one of the most appropriate strategies, provided that the local environmental conditions and the oil type are suitable. The government has recently re-tendered its contract to provide the aerials services and in the process has upgraded the capability to respond to oil spills using larger more modern aircraft. This has led to the development of a new spray system that is described in the second section of the presentation.

United Kingdom Offshore operations.

As part of the implementation of the OPRC convention, the United Kingdom Department of Trade and Industry (DTI) reviewed the response requirements for exploration and production operators in the UKCS. The Government was keen to provide response guidelines to ensure that all operators maintained an appropriate standard of response to cover offshore operations. These guidelines were expressed in terms of response capability and response time, dependant upon the nature of the oil and the nature of the environment in which the spill occurred. Details of the requirements are provided in Table 1 below :-

Table 1 Offshore Spill Response Times

Production Facilities, Development Wells and E & A Wells				
Spill Quantity (Tonnes)	Seabird Vulnerability = Level 1		All Other Offshore Environmental Sensitivities	
	Oil Types	Response Time	Oil Types	Response Time
R1-Up to 25t	2, 3, 4	1 hour	No response requirement	
R2-Up to 100t	3, 4	2 hours	3, 4	2 hours
R3-Up to 500t	2, 3, 4	6 hours	2, 3, 4	6 hours
R4-Up to 10,000t	2, 3, 4	18 hours	2, 3, 4	18 hours

Response times

The response levels and times based on an assessment of the size of the spill, the nature of the environment and the persistence of the type of oil involved. The most critical response level, R1, is aimed at dealing with a small (25T) spill of persistent oil in a high vulnerability area. The typical response requirement, R2, is generally provided by dispersants placed offshore. The key problem area arises at the R3 response level, it is this level that the new aerial provisions were targeted. R4 was provided for by the use of the Hercules and ADDs pack system.

Oil Type

The persistence of a spill is a function of the type of oil involved, amongst other factors. For simplicity, and to avoid establishing any other measure, the oil classifications as described in the ITOPF Technical Information Papers can be used as a guide to the level of response required. Generally speaking light oils such as condensates, diesel and light crudes require minimal intervention, whilst the heavier oils require a response. To predict this, some simple models have been developed based on oil type. Oils have been classified into groups roughly according to their density - generally, oils with a lower density will be less persistent. However some apparently light oils can behave more like heavy ones due to the presence of waxes. Table 2 shows the relationship between the density and the oil group.

Table 2 Oil Characteristics

Oil Characteristics		
Group	Density	Examples
Group I	less than 0.8	Gasoline, Kerosene
Group II	0.8 - 0.85	Gas Oil, Abu Dhabi Crude
Group III	0.85-0.95	Arabian Light Crude, North Sea Crude Oils (e.g. Forties)
Group IV	greater than 0.95	Heavy Fuel Oil, Venezuelan Crude Oils
Although simple models such as this cannot predict the changes an oil undergoes very precisely, they can provide clues about whether an oil is likely to dissipate naturally or whether it will reach the shoreline.		

Environmental criteria

The sensitivity of the operating environment is another factor that is considered when assessing the response criteria, areas which have a high vulnerability and sensitive require early intervention. To measure this sensitivity, seabird vulnerabilities are assessed and these can be found in UKDMAP, 3rd Edition, July 1998, a CD-ROM published by the Natural Environment Research Council. In essence seabird vulnerability level 1 is given to the most at risk species.

Aerial surveillance

One of the key tools for ensuring an effective response is the provision of aerial surveillance. There has always been a requirement for offshore operators to provide aerial surveillance of pollution incidents as prescribed in the Pollution Oil Notice 1 (PON1). During 2000 the Department of Trade and industry rejected a number of plans on the grounds that inadequate aerial surveillance provisions had been made, and required operators to do more.

Interim response solutions

The new guidelines meant that some UKCS operators had to review the way they provided response. Oil Spill Response Limited had previously used the L382 Hercules and ADDs pack to meet the response requirements of North Sea operators. The reduction in response times required the repositioning of the ADDs pack to improve mobilisation times and a limitation being placed on the use of the Hercules aircraft, the solution was at best an interim arrangement until a better technical solution could be developed. To meet the requirements of the DTI for aerial surveillance, OSRL utilised hand held thermal imaging systems operated by skilled observers from OSRL whilst a fully integrated response solution was established.

New services

Co-operative solutions

To provide the most cost effective solution to the problem it was clear that a co-operative approach would provide the service to the industry at a minimum cost, competition within the response industry would lead to duplication of resources and escalating costs. Oil Spill Response Limited, Briggs Marine Environmental Services and Atlantic Reconnaissance Limited agreed to work together to develop a technical solution to providing aerial surveillance and dispersant capability.

Aerial Surveillance

The aerial surveillance system that was provided for the offshore industry is provided from a Cessna 402B aircraft, the aircraft has a speed of 160 knots and a flight endurance of 8.3 hours. The systems carried on the aircraft permit the surveillance of spills using infra red and visual sensors. This level of equipment is adequate for the tactical response to oil spills since operators will only mobilise the aircraft once a spill has been reported. The information gathered by the aircraft can be relayed back to the relevant command centre using a data link system.

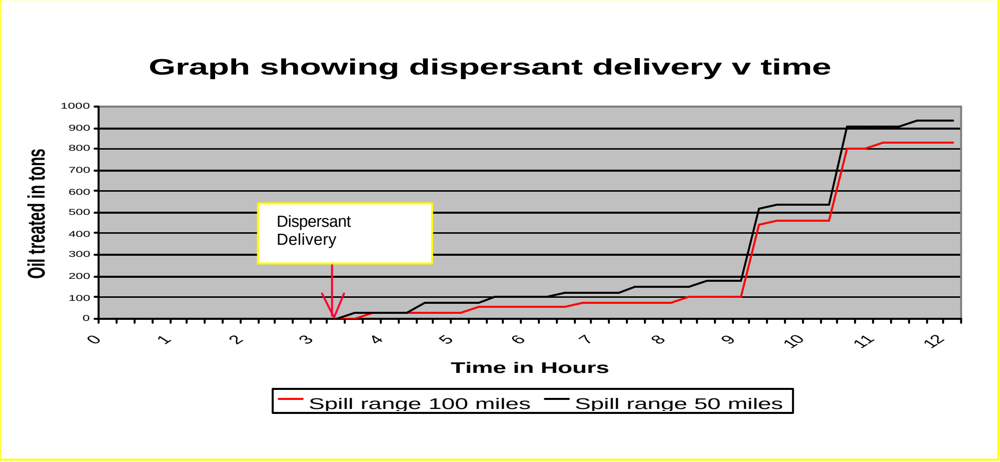
The aircraft will be based in Inverness Scotland on 90 minutes notice to fly during daylight hours or on 120 minutes during out of hour periods.

New technology

Aerial Dispersant delivery

To meet the DTI requirement for aerial dispersant response, a small dispersant application system was required to provide a rapid response prior to the arrival on scene of the L382 Hercules. The preferred route was to use a non-dedicated aircraft for the role, as his would represent the most cost-effective solution, provided that the response time could be met. Air Atlantique agreed to develop a small dispersant system for attachment to their Cessna 406 aircraft that are typically used to carry cargo freight or passengers from their bases in Inverness or Coventry. The system had to permit a rapid role change to a dispersant application mode to meet the DTI response time of six hours.

The original prototype pod was fabricated from aluminium and incorporated an electric dispersant pump driven from aircraft power system. Once the design had been developed, flight-tested and approved by the authorities production subsequent models of the pod are to be constructed of Kevlar reinforced fibreglass. The pods are attached to the aircraft by a series of bolts and installation is achieved in less that one hour. The aircraft has a transit speed of 200 knots to the spill site and is able to depart to an incident within three hours of notification. Using the dispersant pods, the industry is able to meet the response requirements of the DTI. The rate of delivery of dispersant is significant and when combined with the capability of the L382 Hercules is well in excess of the stated response arrangements in the guidelines and is shown in the table below.



Lockheed Electra aerial dispersant system.

As part of the re-design of the UK Government aerial dispersant response system their was a desire to update the service to provide a larger dispersant capability using more modern turbine aircraft. Air Atlantique were successful in the bid to provide this service and began the development of a spray system to be installed in a Lockheed Electra aircraft. The system has a capacity of 13 tons, the dispersant is carried in tanks on a number of conventional 88'' x125''pallets which can be quickly installed into the aircraft. The dispersant is pumped using a diesel driven pump that delivers the material to the spray arms, which are mounted at the tail of the aircraft.

NimbusÔ Aerial dispersant system.

One of the most recent innovations in the dispersant application field is the development of the Nimbus systems by Ayles Fernie for Oil spill response Limited. Since 1984 the Aerial dispersant Delivery system has been a key component of the Oil Industry response framework. The system has a capacity of 17 tons and is designed for use in conjunction with the Hercules L382 aircraft. The system has demonstrated its value in a number of incidents, however one significant drawback is the reliance on the Hercules aircraft to transport the system to the spill site. The aircraft is designed as a tactical theatre transport aircraft and is not suited to long range deployments. Having a transit speed of approximately 300 knots the aircraft will be required to crew stop when undertaking transatlantic flights. To overcome this the Nimbus concept was conceived, the system being a modularised spray unit with a capacity of 12 tons, capable of deployment in a jet transport aircraft to the spill site. The system would then be installed in a Hercules aircraft that would be deployed to the site form the SAFAIR fleet of aircraft. The unit would be shipped along with a stock of dispersant and spray capable trained crews despatched from either the UK or Singapore.

Summary

The developments in legislation and technology reflected above represent a significant improvement in capability to respond to an oil spill incident. The technical solutions in response to the changes also demonstrate cost-effective means for the industry to meet the response requirements. The response industry has seen dispersant application as a key strategy in the response to oil spills, the latest technical developments add significant capability to the response tool box to achieve this.