Key Issues and Operational Challenges in the Use of Dispersants

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Introduction

If spilled oil is dispersible, high volume aerial dispersant application, by virtue of its large encounter rate, is one of the most effective response strategies for dealing with spills in the open marine environment. However, to enable an aerial dispersant operation to be effective, a large number of factors need to be considered in advance.

It is vital to have a comprehensive plan detailing the policy approvals for dispersant use, oil characteristics and environmental data to support their use together with the operational and logistical arrangements to enable their use. Having put all of these preparatory elements in place, the crucial component to ensure a timely and effective response is the need for leadership and rapid decision-making. There are few response strategies that are as time critical for their success as dispersant response and a lack of rapid decision-making can render all of the carefully made preparations invalid.

Over the past twelve months *Oil Spill Response* has been involved in three major international responses requiring the use of high volume aerial dispersant system and collectively they have provided lessons in decision making, technical understanding, legislative recognition, bureaucratic impact, logistics, planning and operational preparedness.

This paper will use actual experiences gained during these response operations as a backdrop to investigate the critical components within them, identify lessons learned and demonstrate the consequences and impact of the factors on overall response effectiveness.

Offshore Angola Response

Background

This response involved the deployment of a high volume aerial dispersant application to an FPSO located 130 miles NW of Luanda off the coast of Angola. The FPSO was engaged in cargo loading operations on 16 February 2008 when a problem with the in the integrity monitoring and transfer system led to a release of some 3500m³ of crude oil into the sea.

Mobilisation Issues

The initial mobilisation was prolonged as there was some doubt in the client's mind as to the benefit of the use of dispersant..

The *Oil Spill Response* Duty Manager had discussed the issue of using dispersants as a strategy with the client. The initial characteristics of the oil suggested high pour point and consequently dispersants were believed to be an ineffective response. This data was drawn from studies done some six years previously when the field was first being explored. The oil that was being produced at the time of the spill was a blend of many wells and was potentially dispersible. However, this discussion again caused a lack of clarity and urgency on the mobilisation for the response.

The initial aerial dispersant spray system was fitted into the WACAF aircraft and placed on standby but obtaining the clearances for Angola was to take a further full working day as the Government offices were not contactable.

Operations

WACAF

The WACAF aircraft arrived on the 18 February 2008 in Luanda airport and refuelled. Due to landing weight restrictions on the aircraft and the fact that the aircraft had to land prior to spraying operations to refuel anyway, the aircraft departed Sao Tome with no dispersant on board. The client granted permission to load dispersant on 19 February. The WACAF aircraft flew four spray sorties over a period of two days as directed by the client's Crisis Management Unit.

From 21 to 23 February, the WACAF aircraft acted as a spotter aircraft for the Hercules Aerial Dispersant Delivery System (ADDS) spray operations. Once the Hercules was de-mobilised, the WACAF aircraft reverted to conducting daily over-flights of the spill using OSR personnel as observers until the demobilisation on 4 March 2008.

WACAF Issues

Oil Spill Response had delays in contacting in country staff for the activation of WACAF dispersant stockpile to airport. Despite pre-planned contact arrangements, contact was not finally established until 18 February. In addition, *Oil Spill Response* had to secure a Licence for dispersant operations in Angolan air space.

ADDS Pack-Hercules L382

Oil Spill Response have three units of ADDS pack in our global equipment stockpile for high volume aerial dispersant application. This equipment includes a tank that can carry up to 5500 US Gal of type III dispersant that can be applied from an Hercules L-382. The dispersants are applied at a height of 100 feet at 140 knots and this equipment has one of the highest encounter rates making it an invaluable response option for open water spills.

The Hercules was activated by the client on 17 February and directed to fly to Luanda with the ADDS pack loaded with 14,000 litres of dispersants. Any further dispersant would be sourced locally by the client. Air clearance for the flight was secured by the collaboration of the client and *Oil Spill Response* working together.

The Hercules took off from East Midlands Airport on 18 February and arrived in Luanda on the following day. The spray team, who had arrived earlier in the day were unable to gain access 'airside' in order to prepare the aircraft for the next day's planned activities due to local controls

Dispersant spraying operations began on the morning of 20 February and continued for the next few days until 23 February. A total of four sorties were carried out.

Demobilisation authorisation for the ADDS pack was received from the client on its return to Luanda. After spraying operations on 23rd February, the Hercules then departed for the UK.

Lessons Learnt

The key lessons that arise in the response to this incident include factors such as-

- Understanding oil characteristics: the situation regarding the selection of response strategies is by no means unique. In many cases the data on the actual produced oil is out date due to field developments, this hinders decision-making and can delay response.
- Pre planning of deployments will help avoid issues which were encountered with security at both departure and arrival. Some response readiness issues arose that had been dealt with in peacetime but the 'on off' nature of this particular mobilisation led to some confusion and missed communication.

- Obtaining clearances for visas landing and spraying operations took some time due to government requirements. . This was well handled by the client but did cause some delays.

Korea Response

Background

Approximately 10,500 tons of crude oil leaked into the Yellow Sea off Taean in South Korea after a crane barge collided with a 146,000-ton Hong Kong registered tanker, Hebei Spirit, on the 7 December 2007. There was a mixture of crudes released namely the Khafji, Upper Zakuum and Arabian Heavy. The first shoreline impact started to occur less than twelve hours after the release.

The Korean Coastguard did the initial response and the actions involved manual clean up, protective booming and dispersant spraying using boats, helicopters and small aircraft. The response might have benefitted from the deployment of a high volume aerial dispersant system and one was offered on day two of the incident, however this was declined.

Mobilisation Issues

Oil Spill Response was first notified of the incident by one of the oil majors but was informed by the Authorities that no assistance was required.

However, as the incident unfolded, the response took on a different dimension due to major shoreline impact affecting the public and fisherman which subsequently changed the political environment. The government was criticised in the media for alleged inaction and several agencies began to make contact with *Oil Spill Response* including the Ministry of Maritime Affairs and Fisheries (MOMAF) and Northwest Pacific Action Plan Marine Environmental Emergency Preparedness and Response Regional Activity Centre (NOWPAP MERRAC). At one stage, there were different individuals from various agencies contacting *Oil Spill Response* to find out the same information on equipment and services. This created confusion and duplication in the information flow. Subsequently, the Korean Embassy in Singapore established contact and requested *Oil Spill Response* to mobilise the ADDS pack.

The *Oil Spill Response* Response Manager travelled to Seoul to act as a focal point of contact for technical advice and clarification of the mobilisation procedures and contracts. There was still some high level indecision at this time as a planned meeting between MOMAF and *Oil Spill Response* Response Manager was cancelled and our services were deemed unnecessary. This decision was reversed

the following day as there were already news reports detailing, "an oil spill response aircraft from Singapore will be helping in the clean up."

Finally, *Oil Spill Response* was mobilised seven days after the incident on 14 December 2007. *Oil Spill Response* expressed concern over the technical benefits of using dispersants to MOMAF and Korean Coast Guard as the window of opportunity for application of dispersants has closed but more importantly, the oil was spread so thinly that the operation would be ineffective. In spite of this, the deployment was requested.

Operations

ADDS Pack-Hercules L382

Oil Spill Response flew in the empty ADDS pack from Singapore and was on site fourteen hours after the callout. Locally approved dispersants were loaded into the ADDS tank.

The first sortie was conducted on 16 December 2007 and the aerial dispersant spraying operations were conducted successfully late in day making the monitoring of dispersant effectiveness difficult. During the second flight on the following day, limited oil targets were observed and thus no spraying operations were conducted. Limited patches of dark brown oil, silvery sheen and tar balls were observed.

Other Response Efforts and Issues

The Korean Coast Guard deployed other offshore containment and recovery equipment. The equipment had some effect but due to the severe weather conditions and ultimately, there was a large coastal impact that led to extensive shoreline cleanup operations being required.

Lessons Learnt

This dispersant response in this case ended up being politically motivated rather than technical. Due to pressure exerted by the media and public, *Oil Spill Response* was mobilized to show that drastic cleanup effort was being provided. There is no suggestion that an earlier mobilization would have solved the situation but the contribution that could have been made would have been more effective and might have helped to reduce the overall clean up costs by reducing some of the shoreline impact.

The use of dispersants was undoubtedly appropriate and the policies were in place to permit their use. The key issue was the decision-making and the time factors in deploying the resources.

Libya Response

Background

The third case study relates to an incident involving a potential uncontrolled well blowout where an existing production well had been compromised approximately 160km off the coast of Tripoli; Libya. The worst-case scenario could have resulted in the release of 20,000 bbls per day for a period of 120 days; the total volume of oil spilled would then have been approximately 380,000 m^3.

Due to the characteristics of the crude, the location of the platform and the potential size of the spill, immediate steps were taken to mobilise staff and begin preparing a response package which included the ADDS Pack and offshore equipment.

Taking account of the prevailing wind and current conditions at that time of the year, there was a risk of impact along 370km of shoreline extending from Djerba to Tripoli. Trajectory modeling indicated that there was a risk of oil impacting shore within a period of 6 to 8 days.

Mobilisation Issues

Oil Spill Response was initially notified of this incident on 17 April 2008. Even at this early stage, the problems in obtaining Libyan visas for a response team were highlighted by the client and immediate steps were taken to start the application process for twenty identified staff. There was no immediate mobilisation but technical advisors travelled to Libya to assess the locally available resources and prepare plans to mobilise a response. During the next month, *Oil Spill Response* maintained regular contact with the client to keep up-to-date with the latest developments.

This period of time also allowed for visa applications to be submitted and processed. Throughout this period, we maintained contact with the client through regular visits to their office in Tripoli whilst the DM in Southampton frequently monitored the charter aircraft market. During this time, an enhanced equipment proposal including significant dispersant stock, shoreline protection equipment and protective equipment package was submitted and approved by the client.

A request for the mobilisation of a Technical Advisor was made on 21 May 2008 with the specific task of auditing the existing in-country response capability, Matiga airport's unloading capability and equipment transportation options. The Technical Advisor subsequently arrived in country 23 May 2008 and started to assist with the development of an Emergency Organisation Plan and In-field Communications Plan.

Operations

ADDS Pack-Hercules L382

The proposed equipment packages with the ADDS Pack were mobilised by the client on 9 June 2008.

Following final arrangements to accept the equipment packages and Hercules at Matiga airport, the first team of six Spill Response Specialists and the Hercules aircraft with the ADDS pack arrived at Matiga airport on the 13 June 2008. The first of the equipment loads departed the Southampton base for East Midlands Airport on 12 June in preparation for the first of four daily Boeing 747 cargo flights.

Once all the equipment was all in country, it was divided between a port, and Matiga Airport. The ADDS pack and part of the dispersant stockpile was stored at Matiga Airport. The remaining dispersants with the offshore and shoreline equipment were positioned at a secure storage point within a local Port.

On the 19 June, the client agreed that since there was no release of oil, *Oil Spill Response* could down man to four staff, who would act as the advance aerial spray team. The teams of four staff carried out rotational duties on a two-week basis.

ADDS Pack-Hercules L382 Issues

Due to the extended period of stay in country, there were a few issues that arose. One such issue regarding the Hercules aircrew involved crew training and currency. If no flying was being conducted, the aircrew would not be able to complete their required crew currency trainings, therefore it was agreed that flights could be conducted regularly ensuring currency and testing the ADDS system at the same time. The low-level permits were organised and these flights were conducted fortnightly throughout the standby period beginning on 24 July. A report for each flight was compiled and given to the client. In addition, due to the length of deployment, there was a need for the Hercules aircraft to undertake airworthiness and line checks, these were successfully completed in country.

There was no format approved dispersant list in country so some time was taken to gain approval for specific dispersant types.

Lessons Learnt

The Southampton Hercules and the ADDS Pack were on standby in Libya for a period of approximately six months. During this period, the Southampton ADDS pack was unavailable for the other members and an alternative response solution had to be put in place.

The aircraft was on the ground for a long period of time and this created issues with the maintenance and aircrew flight recency. The importing of aircraft components and arranging for bi-weekly flights were some of the solutions created through necessity. The arrangements for the bi-weekly flights posed a challenge as the authorities could not necessarily see a need for the low level spraying when there was no oil spilled.

Lessons Learnt from all Three Incidents

The most common mobilisation issue from all three incidents is the factor of time it takes to mobilise a response. For two of the incidents where there was actual oil released, the delays in mobilisation was for different reasons and had different impacts. For the Angola incident, the window of opportunity was still available for dispersant application but the delay was logistical and bureaucratic in nature. For the Korea incident, the delay in mobilisation was more political in nature that then impacted upon the time constraints of dispersant application. The mobilisation only came about after media and public pressure had been exerted on the clients. This had an impact on the response as the window of opportunity was over when *Oil Spill Response* was activated and shoreline impact was already extensive.

Different operational issues were encountered in all three responses. The operational issues faced in Angola involved readiness issues. For Korea, it was missing the window of opportunity for dispersant effectiveness. In Libya, the difficulties faced were mostly logistical in nature as there was no actual release of oil. Getting the passes and permits to operate and conduct low level spraying operations in the airport was a constant challenge and was entirely dependent on the authorities involved. Other logistical issues included the aircraft being on ground for six months affecting the maintenance and also aircrew flight currency.

Conclusions

The actual experiences gained from each of these responses has helped *Oil Spill Response* identify many valuable lessons and has helped to improve our overall response effectiveness. The importance of having a comprehensive plan detailing the policy approvals for dispersant use, oil characteristics and environmental data, operational and logistical arrangements is highlighted in all the three case studies. The need for leadership and rapid decision making to ensure a timely and effective response is also illustrated in these case studies as there is few response strategies that are as time critical as dispersant response and a lack of rapid decision-making can render all of the carefully made preparations invalid.