Oil Spills from Floating Production & Storage Craft: Contingency & Response Considerations

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As exploitation of undersea oil moves further offshore floating production and storage systems offer a cost-effective alternative to conventional fixed platforms and seabed pipelines. Floating systems come in a variety of designs depending on the requirements of the oil field, but due to their versatility, FPSO's (Floating Production, Storage and Offloading units) are a particularly popular choice.

Whilst the number of spills from FPSO's and other floating systems are few, their popularity is increasing and it seems prudent to plan for such an event. Bearing in mind the varying arrangements between different governments and offshore operators in oil producing countries, this article considers the response options for dealing with a large-scale spill from one of these offshore craft.

What Are The Risks?

Based on industry investigations, the likelihood of a large-scale loss of oil from offshore production and storage units is relatively small. Operators pride themselves on the safety of their FPSO's and are expected to comply with MARPOL 73/78 regulations. Nevertheless, these systems often have to endure harsh weather and sea conditions and manoeuvring shuttle tankers pose a risk during offloading operations. In a recent report on FPSO safety, the UK Health and Safety Executive found that releases of oil, loss of position or damage due to adverse weather were the most frequent accidents. Collisions and stability problems also accounted for some recorded incidents. Although spills from FPSO's are mainly small in size, the potential for a large-scale loss of oil from a floating offshore vessel exists, and past oil spills have demonstrated that preparedness is one of the key elements of an effective response.

Decision-Making for an Effective Response

In many countries a mechanism exists for cooperation between government authorities and operators of offshore craft in the event of an oil spill. Operators may be expected to mount the initial response, but then hand over to the authorities should the spill escape the vicinity or be too large to handle with their limited resources. However, in some countries the operators may be held responsible for the entire response under government supervision.

As with all marine oil spills the initial action should be to gain as much information as possible on the scale of the release and the trajectory of the slick. The most appropriate means of obtaining this critical overview of the situation is through aerial surveillance with experienced observers. The use of computer models can provide some assistance with predicting the fate and trajectory of the release, although they should not be relied upon and offer no substitute for high-quality real-time information.

Once the likely fate and trajectory of the spilled oil has been determined, the next task is to select an appropriate response. If the spill is likely to dissipate naturally at sea without posing a threat to sensitive resources then it may not be necessary to conduct any form of response other than tracking the slicks with aerial surveillance. In support of this approach the UK government actively discourages unnecessary responses to offshore spills.

Should the oil pose a threat to sensitive resources, it may be appropriate to mount an at-sea response operation to try to mitigate damage. Broadly speaking, there are two main approaches for responding to oil at sea: spraying dispersant chemicals and containment and recovery of oil using booms and skimmers. The latter is often seen as the ideal solution to a spill since, if effective, it would remove the oil from the marine environment. However, because of the natural tendency of oil to spread, fragment and disperse with the wind, waves and currents, it is rare that more than 10 - 15% is recovered, particularly in rough seas. Operators need to consider the practicality of containment and recovery as a suitable response technique in light of the properties of the oils they handle and characteristics of the local area.

If the oil is amenable to chemical dispersion then a well-controlled spraying operation offers the most likely means of mitigating damage to sensitive resources, although it is not usually suitable for shallow nearshore waters for environmental reasons. Aerial spraying provides for a more rapid application rate and a greater range of coverage than vessel-based systems. This is particularly advantageous as there is normally only a brief ‘window of opportunity’ before weathering of the oil renders the chemicals ineffective and the slick reaches the shoreline. Therefore, it is essential to continually monitor spraying activities to ensure that the treatment is still effective and be prepared to terminate operations once they cease to be of benefit. Close cooperation with local authorities will be necessary in order to plan operations, and in some cases governments grant dispensation to allow for rapid initial response.

Unfortunately, despite best efforts to tackle oil at sea, the likelihood is that if the oil field is close to shore then coastal resources will be affected and a clean-up response will be required. In some cases it may be possible to protect certain sites with the strategic deployment of booms. However, it is generally only feasible to protect relatively small sections of coastline. Therefore, priority should always be given to resources which are particularly sensitive to oil pollution (e.g. fish farms and marinas). The scale of clean-up and the most effective method will depend on a number of different factors, not least the quantity and state of the oil and the type of shoreline affected. There are many different methods to remove oil from shorelines but the golden rule is to take care that the clean-up does not do more harm than the oil alone. Despite its simplicity, often the most effective and least damaging approach to shoreline clean-up is manual collection of oil with well-organised teams of workers.

The final hurdle is to agree on an appropriate termination point. From a technical perspective this should be the point when the response ceases to be effective or is likely to cause unacceptable additional damage to resources. The ‘law of diminishing returns’ applies and eventually the costs far exceed any possible benefit. However, strong pressures are frequently placed on those in charge of the response to use excessive and inappropriate resources and to prolong activities beyond what is required in order to convince politicians, the

media and the public that ‘everything is being done’. As a matter of principle the technical merit of a response should always be the primary justification for undertaking the work.

Preparing for the Worst

Choosing the approach that is most likely to be effective can be made easier through contingency planning, whereby preparations are based on likely scenarios and typical environmental conditions. From this perspective, decision-makers have a considerable advantage when planning for a spill from offshore craft when compared with tankers and other ships. Firstly, the physical and chemical properties of the oil are known in advance. Secondly, unless the unit breaks free of its moorings, the location of the source of the spill is also known. Using this information, planners can predict the likely fate of a release and identify resources at risk from a spill and pre-determine a range of appropriate response measures. Generally speaking, this responsibility falls to the oil company that owns the field or the operator of the offshore craft. However, these actions are dependent on approval by the authorities, and in some cases governments enforce practical trials to ensure that response measures function as intended. For example, in Norway it is essential that chemical dispersants have been tested on the field’s crude oil before they are permitted for use. This is clearly good practice and there is little doubt that contingency planning of this sort is likely to result in a more effective response in the event of a spill. Nevertheless, even the best prepared contingency plans have limited benefit without frequent testing in the form of response drills.

Despite all of the best efforts of those responsible for planning it is often the case that unexpected issues will come into play. After all, it is not practically possible to plan for every eventuality. However, past oil spills have demonstrated that with a common sense approach to decision-making and a focus on technical considerations positive results are achievable. Furthermore, effort spent building a good working relationship between offshore operators and government authorities is likely to improve the chances of an effective response should the worst happen.

Further Reading

- International Tanker Owners Pollution Federation http://www.itopf.com
- United Kingdom Offshore Operators Association http://www.ukooa.co.uk
- International Association of Oil & Gas Producers http://www.ogp.org.uk