Paper 14: CONTINGENCY PLANNING FOR DISPERSANT USE

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Abstract

The use of dispersants in response to accidental marine oil spills has been considered since oil spill contingency planning began to be taken seriously. The limitations of mechanical systems designed to recover spilled oil and the rccogniscd need to keep thc cost of response action within reasonable bounds, have been contribution factors. The dcvclopmcnt of present day oil spill dispcrsants, which combine efficiency with acceptable toxicity has further enhanced their use.

A number of factors need to be taken into account when drawing up site specific plans for dispersant use. This paper discusses the value of pre-planning and addresses the conditions and criteria necessary for the preparation of spill contingency plans.

Introduction

Much has been written about thc use of oil spill dispcrsants (OSDs) in the past fifteen years. In fact, since their use was first considcrcd for the treatmcnt of marine spills, probably no other form of spill response has been surrounded by such dcbatc.

A large number of laboratory tests have been devised to quantify dispcrsant effectiveness and many studies have been carried out to dctcrminc thc toxicity of dispcrsants. It is acknowledged that none of the laboratory test methods or cxpcrimcnts can completely simulate conditions applying in the field. A number of test methods do howcvcr, closely simulate aspects of dispcrsant application, for example the test protocols developed by Mackay *et at.* and Martinelli[1] both compare application from surface craft. All tests have contributed to a wider knowlcdgc and understanding of what dispcrsants do. In achieving this they have promoted widespread discussion bctwccn scientists and clean-up managers alike. Conjecture continues on thc usefulness of OSDs although sufficient work appears to have been carried out in both the laboratory and thc field, to confirm that they do work on spccilic oils and their use as a technique warrants serious consideration as a response to bc considered.

Lindsvcdt-Siva *et* al. state that thc dccision as to thc USC of OSDs is one involving trade offs[2]. By dispersing a slick at one location, more oil is introduced into the water column than there would be if a

surface slick floated by. What needs to be carefully considered, therefore, is a weighing up of the effect' on the marine environment of the application of this additional pollutant against leaving the released oil to impact a coastal feature or perhaps degrade naturally.

Planning

In any area where oil is carried by ships, either as cargo or as bunker fuel, a risk of accidental pollution exists. In determining the need for, and scope of, contingency plans, a risk assessment needs to be carried out. This assessment will address factors such as weather data, navigational hazards, control of shipping in the area, types of oils carried, etc. Whilst it is generally possible, through liaison with the oil industry, to determine the type of oils, crude or fuel, carried as cargo, it is not possible to know the origin or formulation of oils carried as bunker fuels. It is well known that a number of oils are not amenable to dispersants and when spills of these occur, a response based on OSDs will be a waste of time and resources. An example of this is Bass Strait crude which, because of its high pour point and wax content cannot be dispersed using available OSDs in sea temperatures anywhere close to the pour point. The-Department of Transport, in 1986, commissioned a series of tests, using Bass Strait crude and two third generation dispersants. The results of these tests were made available to state and port authorities and to the oil industry, with the recommendation that those concerned amend their contingency plans accordingly.

In the context of navigation, Australia has a landfall coastline, ie. outside of port limits few areas are enclosed or have sheltered waters. A consequence of this is that it can be accepted that a marine pollution incident occurring in the Australian offshore area will generally occur in exposed waters.

The spill control industry has long since accepted that the recovery of oil in open waters is an operation which cannot be relied upon to be effective. Whilst developments in spill boom design have resulted in some excellent heavy duty pieces of equipment being manufactured, no oil recovery system has been produced which can boast a high or acceptable recovery efficiency in these conditions. Two options therefore remain for the oil spill manager when confronted with a spill in Australian territorial waters. The most preferred is to monitor the movement of the oil and leave it alone. The cost? - a few hours of aircraft time and an assurance to the media that natural dispersion, caused by the wind and the sea, will take care of the oil within an acceptable time.

If however onshore winds indicate that the oil slick threatens the shore, clearly a more active response is invariably required. The adage that the best boom in the world is the foreshore is not always acceptable. This is particularly so should sensitive marine mammal and bird rookery areas be threatened.

The On Scene Co-ordinator, having taken the advice provided by his Scientific Support Co-ordiriator, may well find himself with one option only, that is to apply oil spill dispersants with whatever are the most effective means at his disposal. In the Australian area this response would most probably involve aircraft fitted with appropriate spraying systems. The aerial response may be backed up with offshore

surface craft fitted with spraying gear to deal with the smaller breakaway windrows. These craft would ideally be directed to spraying locations by observer aircraft fitted with common air to surface radio frequencies.

No one will disagree that, once having decided to use the dispersant option, speed is essential. The oil should be treated within the first few hours, before weathering has a significant effect and before emulsification takes place. To assist the speed of the response, identification of local sites for aircraft to load and refuel to keep flying times to the minimum (Nichols and White[3]) is an essential part of the contingency plan.

The Response

The task force set up in the USA under the auspices of the American Society for Testing and Materials, decided that dispersants would not be considered as a "last resort" but that they should be considered along with other options[4]. To maximise response, all options should be considered together and in some cases the different strategies combined to maximise effectiveness. It is the nature of the environment under threat and the conditions applying at the time that will influence the strategy to be adopted.

A number of basic rules apply to assist the OSC in decision making:-

- the spilt oil must be of a type that is amenable to dispersants
- the area must not contain larvae or eggs of a commercial fisheries species (this is usually a seasonal consideration)
- the area must have an active water change rate
- the area must have adequate depth of water
- the area should preferably be one of the high energy input

Opinions differ as to the depth of water constraints. In Botany Bay, NSW, a minimum depth of five metres has been recommended[5]. Jones, Field and Hancock[6] state that in Western Australia, dispersant usage is not favoured within 8kms of a shoreline or in waters of less than ten metres depth.

Within the framework of the contingency plan for the general area, a sensitivity index, which assists with the identification of resources and provides a grading or sensitivity designation should be prepared. A useful table to assist with quick decision making is shown[7] below:

Sensitivity designation	Interpretation
Low	• impact on all resources ***negligible***
Sensitive	• impact on at least one resource ***slight***
Sensitive (indirect)	• impact at time of spill ***is negligible,*** but if oil is permitted to persist, impact later in season may be as great as ***slight*** on at least one resource.
Highly sensitive	• impact on at least one resource ***moderate or major***
Highly sensitive (indirect)	• impact at time of spill ***is negligible,*** but impact at later time in season ***moderate*** or ***major*** if oil is permitted to persist

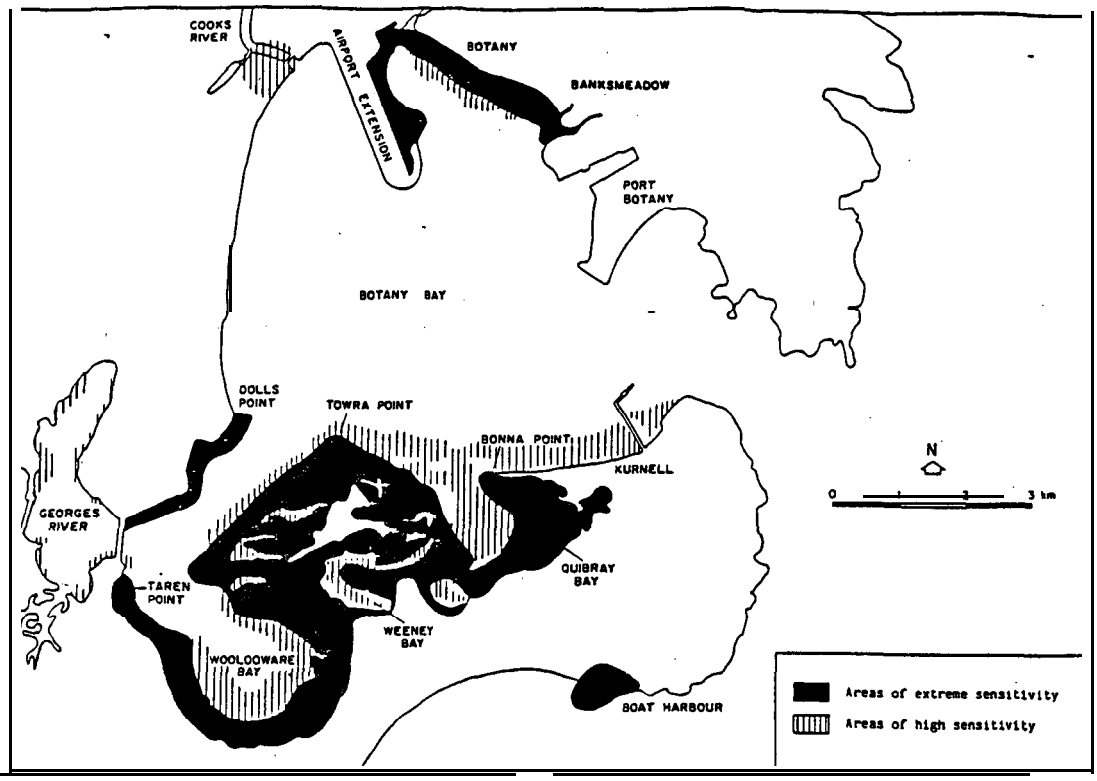

Figure 1 Areas of extreme and high sensitivity to oil pollution in Botany Bay

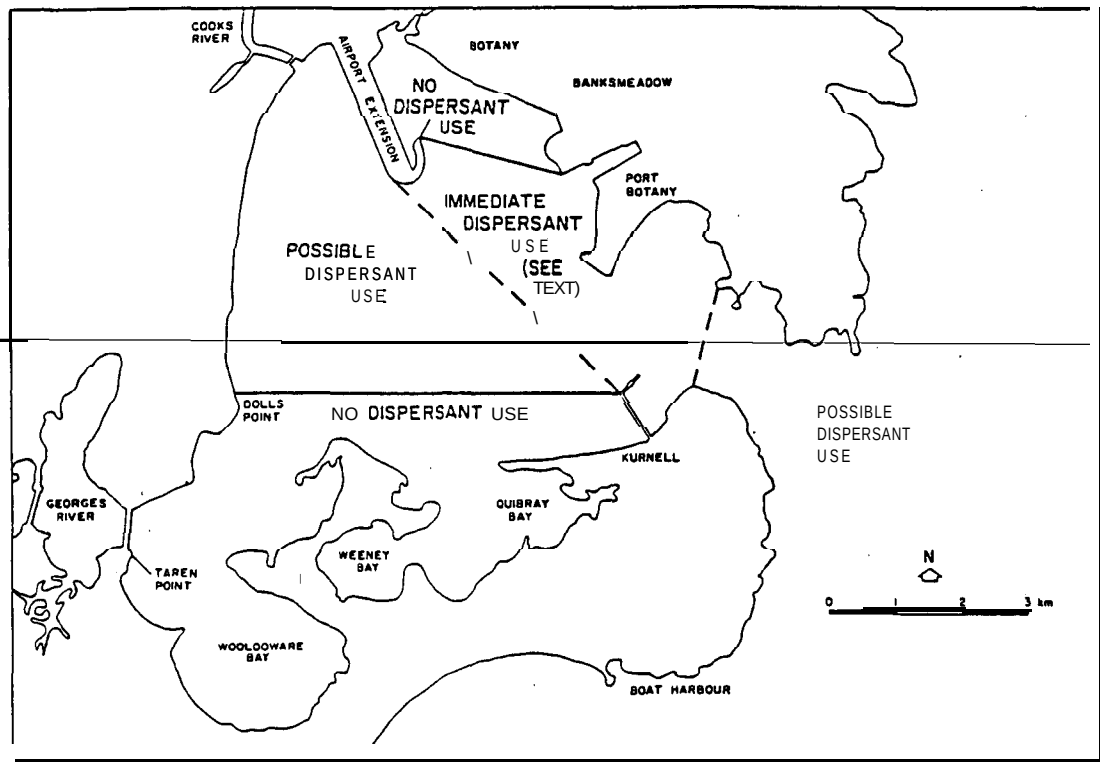

Figure 2 Areas for immediate, possible and no dispersant use in Botany Bay

(Acknowledgement to SPCC of NSW for preparation of chartlets)

Inclusion of maps containing this informalion in site specific plans provides the OSC with immediate guidance as to his response.

Dealing very generally with each habitat type, the following recommendations are made:

1. Coral Reefs: Little work appears to have been carried out to determine the affect of dispersants or dispersed oil on corals. If it is possible to disperse the oil in deeper waters this may be done; it is not recommended that dispersants should be applied in shallow water above a reef.

2. Rocky shores: These vary from those that are exposed to high wave energy, where no man-, made clean-up is necessary, to sheltered rocky shores. Thick oil deposits may be carefully removed from the latter with low pressure hosing. Dispersants are not generally recommended as they can introduce further pollutants to the marine life in the habitat.

3. Sea grass areas: These are generally areas of low energy and shallow water. Opinions vary as to effects of dispersants; generally speaking they should not be used, although the longer term effects of higher untreated oil concentrations in sediments may prove more destabilizing to the habitat as a whole (Little*).

4. Sandy beaches: In high wave energy areas these will be self cleaning. In sheltered beach areas treatment of the oil well before beaching is recommended. Application of dispersants to beached oil is not considered available as this treatment could cause the dispersant mixture to sink into the beach substrata. Mechanical or manual removal of the oil is recommended according to the degree of oiling.

The above are general guidelines. They should be finely tuned at the time of preparation of the contingency plans according to the environmental features of the area.

Conclusion

Whilst the decision to use dispcrsants rests primarily with the OSC, this decision will not generally be made without consultation with the scientific support advisor and with representatives of local authorities. It is essential that those personnel concerned with this advisory or decision making process, have briefed themselves to the extent that they have a balanced and objective view as to the value of using dispersants in the areas covered by the scope of the contingency plan.

Emotive or biased opinions about the possible effects of dispersants are not acceptable. A considerable amount of work has been carried out to determine their value as a spill control option. Most of this work has been published at authoritative seminars and conference. Documentation is readily available through State oil pollution committees. To have achieved a degree of pre-planning in the decision making process will ensure that the OSC can put into effect the agreed response in the shortest possible

time.

References

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