RECENT ACTIVITIES OF ITOPF
THE 'AMORGOS' INCIDENT AND CONSIDERATION OF NEBA

By

Dr. Karen Purnell, ITOPF

INTRODUCTION

Learning from previous oil spill experiences is very important if predictions are to be made about the possible outcomes of following a particular response strategy in the aftermath of a new incident. Fortunately, major incidents, like the 'ERIKA' do not occur often. Nevertheless, regular occurrences of smaller oil spills worldwide ensure that a great deal of information and knowledge continues to accumulate.

Net Environmental Benefit Analysis (NEBA) has been seen by some as a means of 'calculating' the benefits obtained by choosing one response option over another. Consequently, the basic principle of NEBA is in danger of becoming theoretical and unnecessarily complicated. In simple terms, NEBA is a means of utilising the experience gained from previous oil spills to make sensible decisions regarding the response whilst taking into account the importance of social, economic and environmental factors.

In this paper the incidents attended by ITOPF since the beginning of last year are briefly reviewed. The incidents are categorised according to their cause, type of ship, oil spilt, and location so as to highlight the interesting points. The lessons learned following the 'AMORGOS' incident in Taiwan are used to illustrate the practical application of NEBA during spill response.

RECENT INCIDENTS ATTENDED BY ITOPF

Since the beginning of last year, ITOPF has attended seventeen significant oil spills. The busiest months were January, May and September, which between them, accounted for about two thirds of the spills. Half resulted from ships grounding and about a third were caused by collisions. A smaller number of oil spills resulted from hull or equipment

failure, human error and an explosion followed by sinking. Tankers accounted for ten of the incidents and non-tankers accounted for seven. However, it is interesting to note that only one incident involved a spill of crude oil. Intermediate fuel oil or heavy fuel oil (either being carried as fuel or as cargo) accounted for three-quarters of the spills. The remainder were spills of non-persistent oils, such as gasoline. It is also pertinent to note that a large number of the incidents took place in the Asia-Pacific region (Taiwan, Korea, Japan, China, Vietnam, Thailand). One of these incidents involved the iron ore carrier, M.V. 'AMORGOS'.

TAIWAN – THE 'AMORGOS'

The M.V. 'AMORGOS' (65,205 DWT) was en-route to northern China from India carrying a cargo of about 60,000 tonnes of iron ore when she lost power and grounded about one nautical mile from the southern tip of Taiwan on 14th January 2001. Because of the dangerous weather conditions at the time of the grounding, it was not possible for salvors to remove the fuel oil before the ship began to break up. During the night of the 18th January about 1,000 tonnes of IFO 180 spilled from the fuel tanks. While some of this oil dissipated at sea, much of it stranded along approximately 4 kilometres of fossilised coral shoreline within the Kenting National Park.

The Kenting National Park extends over some 32,631 hectares of land and sea and includes an 'IUCN Category V' protected area. This area is defined as being managed mainly for landscape or seascape conservation and recreation. The protected area is primarily terrestrial and is recognised as being an area of distinct character with significant aesthetic, ecological and/or cultural value, and often with high biological diversity. Although, some conflicting practices are tolerated within the protected area, entry to the shoreline by tourists is restricted and is mainly confined to educational visits.

MANAGEMENT OF THE RESPONSE

Once oil has spilt, decisions on the most appropriate response need to be made quickly. These decisions are made more easily if they have been considered before an oil spill actually occurs. Although no contingency plan existed for responding to an oil spill in the Park, recently enacted legislation identified the Taiwanese Environmental Protection Authority (EPA) as having the ultimate responsibility for matters relating to an oil spill. The legislation called for the owner of the ship causing the pollution to initiate the response, in the first instance. The EPA is expected to take over if the owner is unable or unwilling to do this.

The 'AMORGOS' grounded at the start of the Chinese New Year celebrations making it difficult for the ship owner to initiate a response. However, eventually a hybrid system developed in which the incident was managed by the Taiwanese EPA utilising the shipowner's contractors assisted by ITOPF's technical guidance.

RESPONSE OFF-SHORE

Given the extreme weather conditions brought on by the northeast monsoons, there was little that could be done in the way of shoreline protection or response at sea. Booms deployed against the shoreline by China Petroleum Corporation required constant maintenance and were eventually destroyed by the strong winds and seas. The remote location coupled with heavy sea swells also precluded the use of offshore recovery vessels. Nevertheless, as a possible contingency measure, the use of chemical dispersants was considered.

NEBA has been described as the practice of weighing up the advantages and disadvantages of different response options and comparing them with the benefits of natural processes {IPIECA, (2000)}. The deliberations involved in making the decision to use dispersants are a good example of NEBA in practice. Of primary concern were the coral reefs. The reefs in the Kenting National Park are of national and international

importance for the conservation of terrestrial and marine biodiversity and for scientific research, as well as tourism {UNEP-IUCN (1988)}. The most important coral reefs are located inside Nan Wan Bay where it is more sheltered, rather than along the exposed eastern shoreline where the 'AMORGOS' had grounded. Nevertheless, the potentially damaging effects of chemically dispersed oil on the coral in the area needed to be balanced against the consequences of allowing the oil to strand on the shoreline.

During the first few days of the incident, the extent of coral coverage in the immediate vicinity of the ship was not known. Given this uncertainty and the known sensitivity of coral to chemically dispersed oil, it was decided that dispersants would not be used. However, after a few days, dive surveys revealed that the coral cover around the 'AMORGOS' was less than 5% and was better defined as a 'hardground community'. Thus, chemical dispersants were accepted as an appropriate response to fresh oil off-shore provided that the dispersed oil plume was unlikely to travel into the near-shore area where the coral cover was higher, reaching about 85%.

Contingency plans were put in place to prepare to treat the oil using locally available dispersants. Although no spraying capability previously existed, a temporary spray boom was constructed using bamboo poles and spray nozzles. This was mounted at the front of the boat and, when tested with water, was found to very effective. In practice, however, the location of the ship relative to the shoreline and the harsh environmental conditions meant that the spilled oil stranded before any offshore response could be mounted. Although, the spray booms were maintained as a contingency in case some oil remaining in the tanks escaped, chemical dispersants were not actually used.

SHORELINE CLEAN UP – BULK OIL REMOVAL

The ultimate aim of choosing a particular response option is to mimimise damage to the environment and socio-economic resources. Obviously and where possible, careful removal of heavy or moderate concentrations of oil will, with few exceptions, provide a net environmental benefit by reducing the time for recovery.

Following the break up of the 'AMORGOS', heavy concentrations of oil accumulated in the deep channels along the shoreline. Oil had also been thrown over the fossilised coral rock up to 70 metres from the shore following a storm that occurred a few days after the initial stranding.

The Taiwanese authorities divided the shoreline clean up operation into three phases: Phase I) bulk oil removal, Phase II) removal of residual oil and debris, and Phase III) monitoring of the recovery of the marine environment. At the peak of the clean up, the workforce reached 1,500 and for long periods averaged 400.

The hostile conditions and remote area where the oil had stranded made clean up particularly difficult. No vehicular access to the shoreline was possible and much of the clean up was carried out manually using the Taiwanese army with assistance from local villagers. Walking and carrying equipment was made treacherous by the deep channels and jagged coral rocks and it was necessary to construct a wooden walkway, which eventually, extended over most of the 4 kilometres of oiled shoreline. This was constructed above the high water level to minimise damage to the marine fauna and flora in the inter-tidal area. Only small, lightweight and robust equipment could be used, as this had to be manually carried from the top of the cliff to the place where it was needed. Bulk oil was removed using buckets and then moved along a human chain to temporary storage barrels. The oil was then filtered and moved to 'staging areas' at the base of the cliffs. Portable generators placed at strategic locations enabled pumps to be run in series to transfer the oil from the staging areas into more drums and barrels at the top of the cliff. From here, the oil was transported off-site to China Petroleum Corporation's facilities in Kaohsiung for re-processing. By the end of phase I of the clean up, some 600 barrels and almost 400 drums (representing about 535m^3 of oil) had been filled and taken for re-processing.

A further complication was the vast quantity of oiled driftwood that needed to be removed from the channels and shoreline. This was very labour intensive work which

involved using human chains again to transport the piles of wood to a track that had been widened to allow a tracked excavator to gain access to the back of the shoreline. Eventually some 3,800m^3 of oiled driftwood was collected. In attempt to reduce the volume of waste for disposal, some of this wood was chipped and small amounts were used to prevent the walkway from becoming slippery following rainfalls. The remainder was transported to a local incinerator.

SHORELINE CLEAN UP – SECONDARY OIL REMOVAL

The final stages of the clean up are frequently the most difficult. Whilst it is easy to agree that heavy accumulations of oil should be removed, deciding 'how clean is clean' and, thus, when to stop is more difficult. This is because the decision will involve striking a balance between the environmental and socio-economic concerns. Unless these concerns have been expressed and addressed in a contingency plan prior to an oil spill occurring, conflicts frequently arise as each party attempts to satisfy their different priorities during the incident when emotions, naturally, run high.

The application of NEBA may assist in these situations. Trying to determine the most balanced approach will require taking into account the circumstances of the incident, the practicalities of the clean up, scientific understanding of the relative impacts of the oil and clean up options, and a value judgement of the relative importance of the social, economic and environmental factors {IPIECA (2000)}. Valuable lessons have been learnt about the effectiveness and consequences of different oil spill clean up methods from previous incidents and are well documented. These experiences allows oil spill responders to predict the likely outcome of their choice of clean up method, compared with natural processes, and should be used to assist in achieving this balance of priorities.

Recognising the importance and sensitivity of the oiled shoreline within the Kenting National Park, ITOPF endeavored to assist the Taiwanese authorities to achieve the delicate balance between the desire to remove as much oil as possible and the need to protect the vulnerable inter-tidal area from aggressive clean up measures. Arguably, once

the heavy accumulations of oil had been removed, the shoreline could have been left to clean naturally, especially given the exposed nature of the shoreline. Experience from many oil spills has shown that natural cleaning is not only the most effective option, but also the least damaging. However, the shoreline is also a tourist attraction and the Taiwanese authorities were reluctant to wait for the thick deposits of oil that had become trapped in the pitted rock to be removed naturally. Part of the NEBA process involves accepting that, whatever clean up option is chosen, it is not always possible to avoid all of the disadvantages. In accepting that some degree of secondary cleaning was required, it was necessary for the Taiwanese authorities to accept that some 'trade-offs' would also have to be made.

It was relatively easy to agree that shoreline cleaning agents would not achieve a net environmental benefit even if it would make the shoreline 'look' cleaner for the sake of the visitors to the park. The extremely pitted and convoluted surface of the fossilised coral rock made application of any cleaning agent very difficult. It would also be almost impossible to collect the run-off from these chemicals and prevent it from being carried into the sensitive inter-tidal area. However, identifying an effective alternative was more difficult. The use of sawdust generated from the piles of oiled debris collected during the first phase of the clean up was considered as a potential adsorbent and as a means of recycling the waste {SAN JORGE, Uruguay, 1997}. However, the wood chips were too large and were not effective as an adsorbent on the weathered IFO 180 spilt from the 'AMORGOS'. It was also found impractical to apply uniformly to the rocks or to recover afterwards. Eventually, high pressure steam cleaning was identified as being the technique most likely to achieve the desired results. Recognising that this is an aggressive clean up method for a productive shoreline, especially one that is fringed by coral, only the oiled rocks in the splash zone and upper inter-tidal area were cleaned. This necessitated careful delineation of the shoreline and supervision to avoid over-cleaning the coral rock or damaging the sensitive lower shore. To collect the oily run-off, sorbent booms and pompoms were strung across the rocks and entrances to the channels. As these pompoms were not readily available, local villagers shredded packing material from

telegraph poles and sewed them together to make their own. Mesh screens were also used to prevent oily spray from contaminating other areas.

At the end of May 2001, representatives of the ship-owner and the Taiwanese authorities carried out a joint inspection of the oiled shoreline and agreed that the clean-up was complete.

NEBA IN PRACTICE

The examples of balancing different priorities that have been taken from the 'AMORGOS' incident demonstrate that, in practice, NEBA is a simple process. It is also not a new concept. Responding to an oil spill normally involves consideration of factors such as the type of oil spilled, degree of oiling, location, weather conditions and the environmental and socio-economic sensitivities. All of these are balanced when weighing up whether some damage is justifiable in order to achieve the desired goal or whether natural cleaning is the best response option.

Evaluation of the different offshore response options during the 'AMORGOS' incident initially indicated that chemical dispersants should not be used because of concerns about the presence of corals. However, after realising that the coral cover in the vicinity of the ship was low, dispersants then became a viable option. In a future incident, and provided that the oil is sufficiently far from the shore to prevent the dispersed oil plume from affecting corals in the near-shore area, chemical dispersants could be used.

Removal of bulk oil and oiled driftwood using manual labour helped to limit damage to the shoreline. During the secondary cleaning, careful delineation of the areas to be cleaned and the use of a small number of labourers under close supervision ensured that damage to the lower inter-tidal area was also minimised. Accepting that it was necessary to permit vehicular access to the back of the shoreline and the cliff top (in order to transport pumps and remove the waste) also meant that some dirt tracks had to be

widened. Although some damage to the surrounding vegetation resulted, the tracks are now being repaired and new vegetation planted.

In deciding to take some action to address the spilt oil, acceptance that some damage would occur was necessary. However, the response actions used were chosen and implemented in a way that meant that any damage would be limited. Both the goals of protecting the environment and the socio-economic concerns were addressed to the satisfaction of the Taiwanese authorities, and the cleaning that was carried out should not delay the ecological recovery of the shoreline. Indeed, the Kenting National Park was re-opened in October 2001 and our observations indicate that the coral has not been damaged by the oil or the clean up.

CONCLUSION

Previous oil spill experiences provide excellent opportunities to learn about the response techniques that worked well and those that did not. Important information regarding the impact of different clean up methods on various environments, relative to natural clean up, is also obtained. Utilising this information in contingency plans enables those lessons to be transferred effectively to a new incident. It also reduces the chances of conflict and delays during the response. The selection of appropriate response measures during the 'AMORGOS' incident illustrated due consideration of the environmental and socio-economical benefits. Sometimes this is called NEBA but, most importantly, it is a process of using 'common-sense' and the lessons learned from previous experiences to arrive at the most sensible solution.

REFERENCES

IPIECA (2000), IPIECA report series, Volume 10, Choosing Spill Response Options To Minimize Damage – Net Environmental Benefit Analysis.

IUCN-UNEP. 1988. Coral reefs of the world. Volume 3: Central and Western Pacific, edited by Susan M. Wells and Martin D. Jenkins. Taiwan section Compiler, Dr. Lee-Shing Fang, National Sun Yat-San University, Kaohsuing, Taiwan: 271 – 287.

'SAN JORGE ', Incident at Punta del Este, Uruguay, 1997, ITOPF.