PAJ OIL SPILL SYMPOSIUM '96

INTEGRATED OIL SPILL RESPONSE MEASURES DURING THE SEA PRINCE INCIDENT, YOSU, REPUBLIC OF KOREA, JULY, 1995

by

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Introduction

Effective response to a major marine oil spill occasionally calls for specialised equipment, personnel and expertise that is beyond the capability of the country or company concerned. The International Convention on Oil Pollution Preparedness Response and Co-operation (OPRC Convention) , which entered into force in May, 1995, provides an international framework for co-operation in combating major oil pollution incidents by requiring Parties to develop national and regional contingency plans. The Convention also promotes the idea of collaboration between Parties and the oil and shipping industries in these processes.

In July, 1995, a major pollution incident occurred off the southern coast of the Republic of Korea when the M/T SEA PRINCE, a part-laden VLCC, grounded near Yosu during a typhoon. In order to respond to the oil spilled from the tanker and the threat of a further major release, the tanker owner and his P&I insurers mobilised clean-up resources from Singapore and Japan to supplement local and national resources in South Korea.

This paper describes the clean-up measures undertaken in response to this incident, with particular emphasis on the use of the international resources which were mobilised, and highlights the benefits and some of the practical problems that need to be overcome when national resources are supplemented with those from abroad.

Circumstances of the Incident

On 23rd July, 1995, the Cypriot tanker .92A PR.INCE (275,782 DWT), part-laden with between 80-86,000 tonnes of mixed Arabian crude oils and carrying some 1,400 tonnes of bunker fuel, grounded on the southern tip of Sori do, a small island to the south of Yosu, Republic of Korea (see Fig 1) , during attempts to avoid damage from Typhoon "Faye". Shortly after the grounding there were a number of explosions in the engine room and a fire broke out which spread to the accommodation area but did not extend to the cargo tanks. Although attempts to fight the fire were hampered by dense fog and a heavy swell, it was finally extinguished some 24 hours after the grounding.

A Japanese salvage company was engaged by the tanker owners under Lloyds Open Form 95, and during the period 6th - 22nd August, the bulk of the oil was transferred to another tanker via barges, leaving some 630 tonnes onboard. The residual quantity of crude and fuel oil was dosed with dispersant to ensure rapid dispersion should the oil be lost during subsequent salvage operations or bad weather. A Dutch salvage company subsequently removed the remaining oil without further spillage prior to refloating the tanker on 26th November, 1995 and towing it out of Korean waters.

It is believed that some 700 tonnes of bunker fuel and an unknown quantity of crude oil cargo was spilled shortly after the grounding. During the following weeks, whilst the main oil transfer operation was in progress, further quantities of crude and fuel oil spilled from the half-submerged section of tanker. Most of the oil spread to the shores of Son do and other nearby islands to the north, but some was carried eastwards by currents and eventually affected shorelines along the south and east coasts of the Korean peninsular. Small quantities also reached the Japanese island of Tsushima and the vicinity of island of Okinishima.

Characteristics of the Area and Resources Threatened by the Spill

The south coast of Korea is heavily indented with an archipelago of islands, islets and rocks. Son do, the island on which the tanker grounded, lies at the southern end of Yosu Haeman, an extensive inlet between Tolsan do and Yosu pando on the west, and

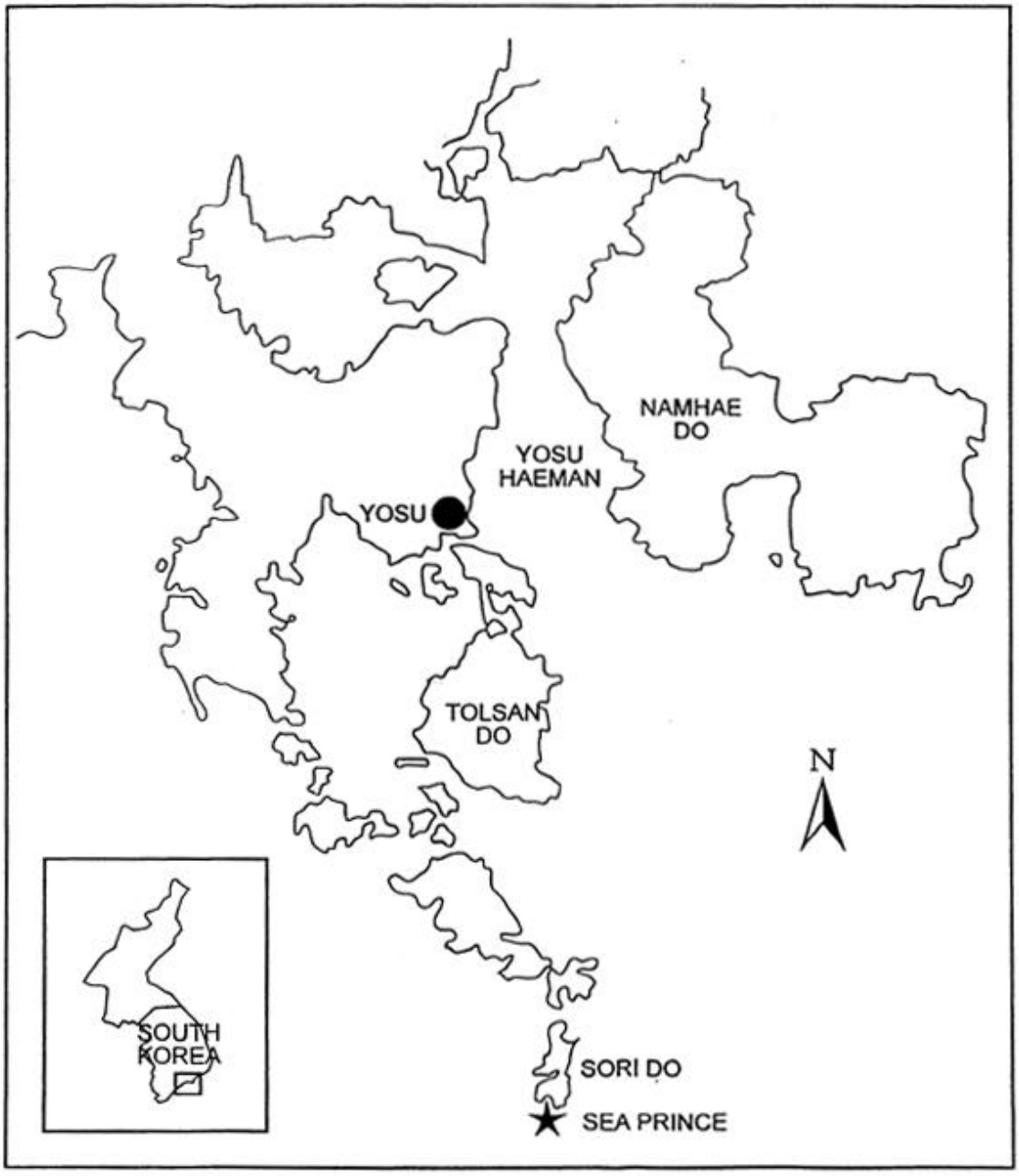

Fig 1 SEA PRINCE - Grounding Location

Namhae do on the east (see Fig 1). There are numerous small islands between Tolsan do and Son do, many of which are inhabited by small communities which are primarily engaged in farming and fishing. The islands are generally rocky with steep cliffs but there are also coves and inlets which serve as natural harbours for fishing boats. The shorelines are predominantly composed of shingle, pebbles and large boulders, most of which were affected to some degree by the spill.

The shorelines and near-shore waters are fully exploited for a variety of marine products such as shellfish and algae which inhabit the inter-tidal and sub-tidal zones to depth of about 12 metres. Species found in the sub-littoral zone are usually collected by women divers. The more sheltered coves and inlets and channels between adjacent islands are used extensively for the artificial cultivation of marine products such as oysters, mussels, clams, abalone and a variety of seaweed. However, the greatest threat posed by the spilled oil was to floating cages used for rearing a variety of fish such as halibut, sea bream, sea bass, yellow tail, and rockfish. Some 10,000 individual cages are located amongst the island chain between Son do and Tolsan do.

On the east side of Yosu Haeman is Namhae do, one of the largest islands on the south coast of Korea. The south and west coasts of the island, which were threatened by the oil, are also used extensively for mariculture and there are a number of major fish hatcheries which, although shore based, use seawater for there activities. There are also a number of large sandy bays along the south coast which support a major tourist industry during the months of July and August.

Local and National Response Measures

The lead agency for dealing with spills of oil and hazardous substances affecting Korean waters is the Korean Maritime Police. It normally confines its own activities to combating oil on water using dispersants and oil recovery systems, using its own resources supplemented by equipment and materials provided by a network of commercial contractors. However, it is normal practice in Korea for the spiller to take over responsibility for the management of the response operation under the direction

and control of the Maritime Police. For shoreline cleaning, reliance is placed on local labour, usually drawn from the affected communities, with equipment, materials and supervision being provided by commercial contractors.

In view of the seriousness of the incident and the potential for a major release of oil, a Counter Measures Committee was established to co-ordinate the response. Chaired by the Director of the Yosu Maritime Police Headquarters, the Committee comprised the Governor of Yeochon County and senior representatives from the Maritime and Port Authority, Fishery Department of Jeon la nam-do Province, Yosu Fishery Co-operative Union and the tanker owner. Following the initial meeting of the Committee on 25th July, the tanker owner assumed responsibility for the management of the spill, including the funding of the clean-up operations.

Upon notification of the spill from the SEA PRINCE by the vessel's owners, the Maritime Police mobilised oil recovery units from its bases in Yosu, Taean, Mokpo, Togryong, Pusan and Ulsan. Some 80 fishing boats and other craft were also engaged to apply dispersants and sorbent pads. Defensive booms were deployed at a number of locations to protect floating fish cages and tourist beaches.

Shoreline impact by oil, although widespread, was mainly light to moderate, with predominantly small stretches on rocky coasts, sea wall defences and isolated pebble beaches being affected. Four local clean-up contractors were engaged to provide equipment and materials to the local communities on the affected islands who undertook the cleaning of beaches using mainly manual methods. Some 2,000 people were involved in this work which, with the exception of one or two heavily oiled shorelines, was completed by the end of August, 1995. A local waste disposal contractor arranged for the transportation and storage of all wastes generated from the incident to a licensed incineration and landfill facility near Yosu.

International Response Measures

The International Tanker Owners Pollution Federation Ltd. (ITOPF) was engaged jointly by the tanker owner's third party insurers and the International Oil Pollution Compensation Fund (IOPC Fund) to give technical advice to those undertaking these operations and monitor the clean-up operations.

In view of the potential for a major release of oil, several response options were considered, including the aerial application of dispersant, in-situ burning and offshore recovery.

Aerial application of dispersant

Since the primary offshore response technique required by law within the Republic of Korea is the application of dispersant, the tanker owner decided to mobilise a C-130 Hercules aircraft and ADDSPACK dispersant spraying system from East Asia Response Limited (EARL) in Singapore. EARL is an oil industry-owned stockpile of equipment which provides a response capability, principally for its members, within the Asia-Pacific region.

The ADDSPACK comprises a portable tank of 5,500 US gallons (20,818 litres) , spray arms which are extended during flight via the rear door of the aircraft, and a pump and control package. When flying over oil slicks at a speed of between 150 and 170 mph, the system has the potential to treat up to 300 tonnes of oil per dispersant load. The aircraft, together with a payload of dispersant and a team of eight ground support staff arrived in Pusan on 26th July. Entry formalities for the aircraft and equipment were very straightforward, although import duty and value added tax had to be paid on the dispersant. The decision was made to base the aircraft in Pusan, some 150 km east of the wreck position, since its international airport had better facilities, including a plentiful supply of fuel, and a runway long enough to allow the aircraft to take off with a full payload of dispersant. These advantages outweighed the benefit of using Yosu airport which was much closer to the spill location.

On 27th July, the aircraft made two spray sorties on offshore slicks of oil to the east of Son do. A further two sorties were conducted on 29th July in the same general area. The spraying operations were undertaken under the instructions of the Maritime Police and were deemed to have been successful by observers onboard Maritime Police vessels on-site. However, it is very difficult to control aerial spraying operations from surface vessels and ideally, the Maritime Police should have used either a fixed-wing aircraft or helicopter to guide the spraying aircraft on to the heaviest concentrations of the oil.

No offshore slicks of sufficient size were observed after the 29th July but the aircraft remained on stand-by in Pusan until 22nd August, when the bulk of the oil had been removed from the wreck and there was no further risk of a major spill. All the dispersant which was brought in from Singapore with the EARL aircraft was used up during the spray runs on the first day and stocks of Korean products were staged at Pusan airport to support further operations. A total of 176 tonnes of chemical was available, most of which was supplied by the manufacturers in either 16 litre cans or 200 litre drums. The chemical was transferred into 2.0 tank trucks for storage in order to facilitate the rapid loading and turn around of the aircraft. The amount of chemical available would have been sufficient to treat about 3,500 tonnes of oil, although it would have been necessary to undertake a minimum of 6 sorties per day to disperse this amount of oil before it became too weathered to be amenable to dispersant treatment.

In-situ burning

It was recognised that the large-scale use of dispersants would only be appropriate if a major slick drifted offshore and away from sensitive resources such as mariculture facilities. Consideration had therefore to be given to alternative response strategies. The Federation, in consultation with the tanker owner and its oil pollution insurers, invited an expert on the in-situ burning of oil to join the Federation's technical staff on-site to assess the potential for using the technique in the event of a large oil spill.

The expert arrived in Yosu on 27th July and commenced site surveys for the purpose of identifying' options for burning. Specifically, he focused on sourcin9 fire-proof boom and aerial i3nition devices, safety considerations, identifying sea bed resources which could be at risk from sunken burn residues, and preparing detailed plans for potential burn sites. Regular meetings were held with the Maritime Police regarding the progress of the above assessment and although they expressed their approval for staging the necessary equipment, they could not offer any guarantee that, if the technique was assessed to be appropriate, the government would endorse its use.

The nearest fire-proof boom was located in Shekou, Peoples Republic of China but the owners were unwilling to make it available. The Alyeska Pipeline Service Company in Alaska agreed to make 800 metres of boom available, the terms of which were that there would be no charge if the boom was not deployed, but full replacement with new boom would be required if the boom was put into the water, irrespective of whether or not it was used to contain burning oil. A helicopter-mountable igniter was found to be available from a manufacturer in the USA which was offered at the purchase price.

It was agreed that while a significant amount of oil remained onboard the wreck, any attempt to burn oil on the water would have to take place at a considerable distance from the grounding location but soon enough after release to ensure that the oil was not too weathered and emulsified to prevent ignition. It would also be necessary to isolate the burning oil from any slicks trailing back to the source to prevent 'flash- back'. The prevailing heavy swell conditions south of Son do were such that booming operations were at best only likely to be partially successful. It was also reported that ark shell, cockle and pen shell farms were located on the sea bed to the south of Son do which could have been impacted by any burn residues that sunk.

Consideration was also given to burning oil in one or more of the coves and inlets near the wreck, where it tended to concentrate under the influence of the prevailing winds. However, in addition to the risk of 'flash-back' to the tanker, most of the identified coves were close to village communities and farm land under cultivation which could have been affected by smoke and atmospheric fallout.

In view of the above considerations the Federation decided to recommend not to pursue the option of burning any further.

Offshore and shoreline clean-up equipment

In view of the fact that dispersant application would not be expected to work in every situation, it was decided that the local and national mechanical recovery capability should be supplemented by resources from overseas. The Federation therefore approached the Petroleum Association of Japan (PAJ) with a view to borrowing some

equipment from one of its stockpiles in Japan. The PAJ was very responsive to the request and offered to send equipment from their Setouchi Base at the Mizushima Refinery, Kurashiki City.

The equipment was loaned in accordance with a special agreement drawn up between the PAJ and signed by the P&I insurer of the SEA PRINCE. Under the terms of the agreement the equipment was loaned free of charge, subject to it being returned after use in as good a condition as it was when it left the stockpile. The shipowner was responsible for the costs of transporting the equipment to Yosu and, since the PAJ do not provide trained operators, reliance had to be placed on local contractors to deploy the equipment. Unfortunately, none of the Korean clean-up contractors were familiar with the items of equipment provided from the stockpile. However, EARL in Singapore maintains the same types of equipment in its stockpile and the Federation therefore requested EARL to make available some of their team members (who were at the time based in Pusan to support the ADDSPACK unit) to check the equipment and assist in training local contractor personnel in its use.

Seven containers of equipment comprising offshore boom, weir skimmers, vacuum skimmers and portable storage tanks were transported by road from Kurashiki to Shimonoseki where they were loaded on to a ferry bound for Pusan. On arrival in Pusan, the containers were taken by road to Yosu, arriving at the port on the morning of 3rd August. Prior to the arrival of the equipment in Yosu, a local contractor was engaged to provide the necessary logistic support which comprised two flat-top barges for carrying the equipment, two tugs for barge and boom towing and two coastal tanker5 to receive any collected oil.

Before the equipment could be taken out of its containers, the customs authorities in Yosu imposed import duties and value added tax (VAT) on all the items even though the equipment had been brought in on a temporary basis and was to be returned to Japan at the end of the incident. Furthermore, the authorities indicated that whilst the VAT would be refundable after the equipment was returned to Japan, the import duty would not. Despite attempts to persuade a representative of the national government that the equipment constituted international aid and therefore should not attract a levy, there appeared to be no mechanism in place to facilitate this and the owners of the SEA PRINCE had no option but to pay the import duty and VAT in full.

The containers of equipment were finally loaded on to the barges, one of which was towed to Son do whilst the other remained in Yosu port. Once the training programme was completed, most of the equipment was returned to its containers, ready for deployment in the event of a major spill.

Although shoreline impact of oil was mostly light to moderate, one beach on Sari do, adjacent to the grounding site, was heavily inundated with up to 1,000 tonnes of emulsified crude and fuel oil. It was therefore decided to deploy the two vacuum skimmers and eight portable storage tanks from the PAJ stockpile on this beach. Operators from EARL assisted with the deployment and maintenance of the equipment which was used to very good effect in removing bulk oil from this shoreline. The oil was pumped into the portable storage tanks by means of the vacuum units and then transferred using a screw pump and a floating hose to a barge anchored just off the beach. Over a three week period some 700 tonnes of bulk oil was removed from the beach in this way.

The bulk of cargo from the SEA PRINCE was transferred by 22nd August and the unused PAJ equipment was returned to its base in Japan on 13th September. The remaining equipment was cleaned and returned to Japan in October. Although some minor damage occurred to the containers, all the equipment was returned in good working order and no items needed to be replaced.

Conclusions

1. The SEA PRINCE incident was the first in the Republic of Korea in which clean-up resources tram abroad were used to supplement those available in the country. Despite some shortcomings in the national spill response arrangements in Korea and the lack of a fully integrated contingency plan, the additional resources were effectively incorporated into the overall clean-up operation.

2. The arrangements which were put in place in support of a large-scale aerial spraying operation, although not fully put to the test, appeared to address most of the logistic problems which occur when undertaking such a large-scale response.

3. Had it proved necessary to mount a full-scale dispersant spraying procedure, the arrangements for controlling and monitoring the operation were inadequate and would probably have resulted in considerable wastage of chemical.

4. Although the decision was made not to recommend in-situ burning of oil, mainly for practical and safety reasons, had the circumstances of the incident been more suited to burning, there was no guarantee that the authorities would have permitted the technique to be used. A policy on in-situ burning, including criteria for its use, should be agreed as part of the national contingency planning process. The availability of fire-proof boom and igniters should also be investigated so that arrangements can be put in hand without delay when the technique is deemed appropriate.

5. The PAJ stockpile proved to be a valuable and effective resource in supplementing the local and national response capability. The equipment was well maintained and easily transported and the logistic support necessary to utilise the resources was rapidly identified and mobilised by local contractors in Korea.

6. The lack of skilled operators from the PAJ facility to maintain the equipment on-site and to train local manpower in its use could prove a disadvantage in future incidents. Without the assistance of EARL in providing this essential service on this occasion, the equipment could not have been used to its maximum potential and it may not have been returned in good working order. Nevertheless, the response highlighted the benefits of major international stockpiles and the advantages to be gained from good co-operation between the various industry organisations which own and operate them.

7. The intransigence of the Korean authorities in refusing to waive import duty and value added tax on the temporary import of the PAJ equipment could serve as a disincentive to tanker owners and insurers to bring in outside resources in the future. Experience suggests that similar problems would be encountered in other countries.

8. Article 7 of the OPRC Convention, which came into force in May, 1995, calls upon each Party to take necessary legal and or administrative measures to facilitate the expeditious arrival, use and departure of resources required and required for an incident. Urgent attention needs to be given to ensuring that these issues are addressed.

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ITOPF, 31st January, 1996

Joseph A Nichols

Biographica1 Summary

Joe Nichols is the Technical Manager of the International Tanker Owners Pollution Federation, based in London. He holds a degree in Chemistry and prior to joining the Federation in 1978 he worked for a UK government research laboratory where he was responsible for investigating the fate of spills of oil and hazardous substances in the marine environment and developing materials and techniques for combating such spills. During his time at the Federation he has attended over 70 oil spills world-wide on behalf of tanker owners and their insurers, providing technical advice on appropriate response measures and damage assessment.