The Incidence of Tanker Spills and Factors Affecting their Cost

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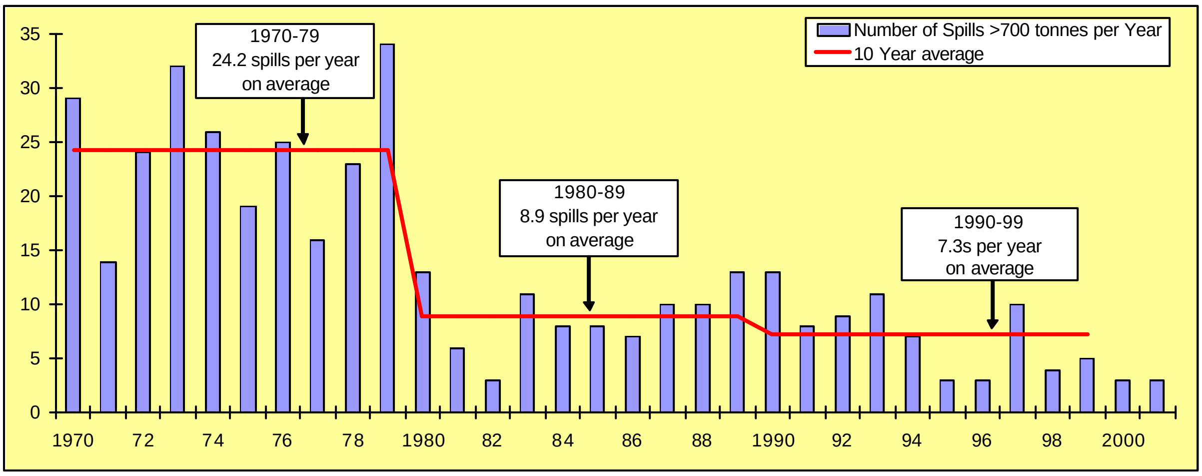
Introduction

The NAKHODKA and ERIKA oil spills in Japan and France respectively, and more recently the PRESTIGE incident in Spain, have once again focused attention on the potentially high cost of such events and the adequacy of the current international compensation arrangements. As will be explained another speakers, this has led to a proposal for a Supplementary Fund that would offer additional compensation to that provided under the enhanced limits of the 1992 Civil Liability Convention (CLC) and Fund Convention that will come into effect in November 2003. Questions remain as to the appropriate level of this Supplementary Fund and whether or not there is a need for a more fundamental revision of the 1992 CLC, amongst other things to ensure continued equitable sharing of the costs of compensation under the international regime between tanker owners (and their P&I Clubs) and oil receivers.

The aim of this paper is to provide some relevant facts on the incidence and causes of tanker spills, the cost of past events and the factors that can cause great variation between the costs of individual incidents.

Incidence of Tanker Spills

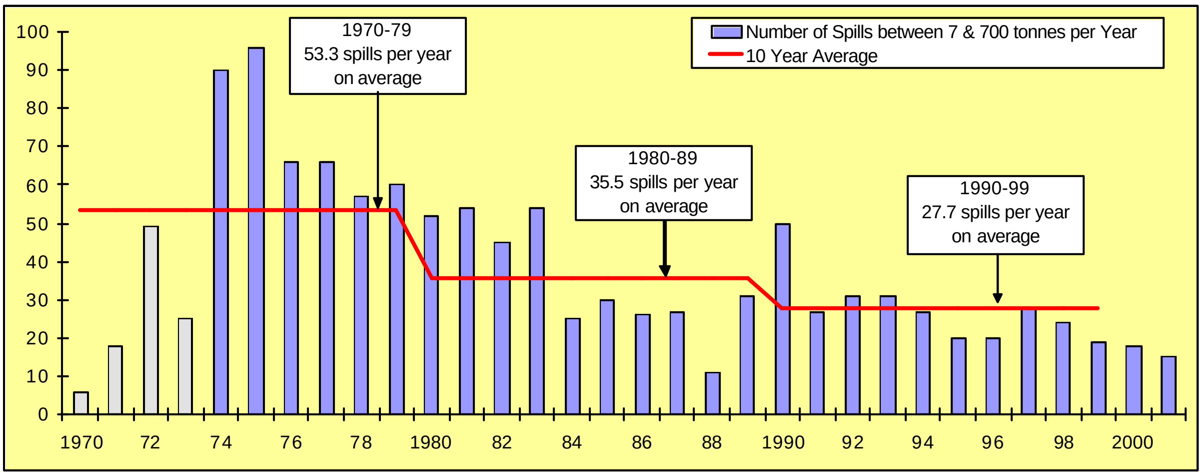
As the two graphs below derived from the ITOPF database illustrate, much has been achieved in the field of tanker spill prevention over the past two decades. It is believed that a whole range of factors, through the efforts of governments, inter governmental organisations (eg IMO) and industry, have contributed to the dramatic improvement, that began long before double hulls became common.



Whilst the relatively small number of spills each year over 700 tonnes and the considerable annual variations preclude detailed statistical analysis, the overall trend

* The views expressed in this discussion paper are those of the author and do not necessarily represent those of ITOPF or of its Directors and Members.

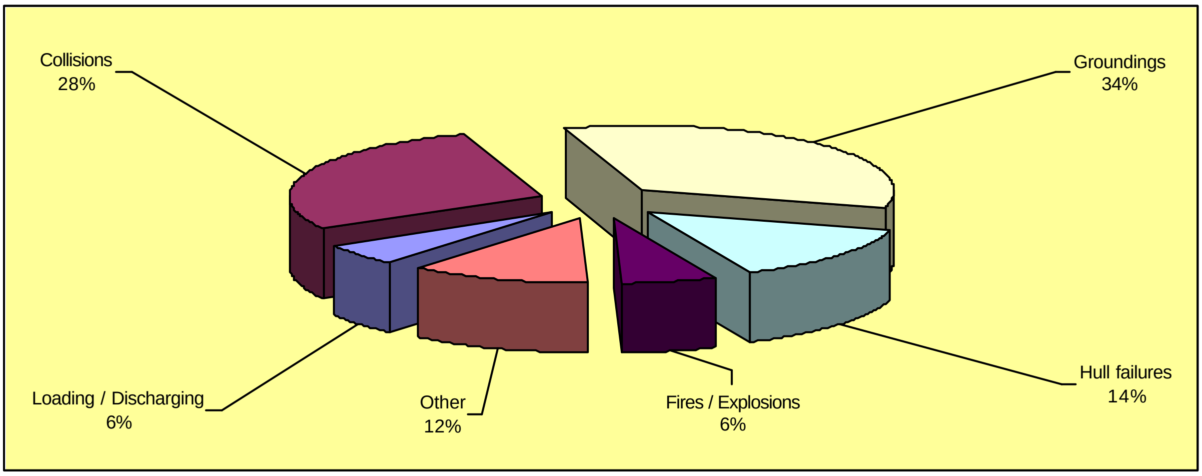
is clear. Thus, the average number of spills of this size each year in the 1980s and 1990s was about one-third of that experienced in the 1970s. This is significant in relation to compensation under the 1992 CLC and Fund Convention since, in general terms, these larger spills (which historically make up about 3% of the total number of tanker spills) are the ones that give rise to the most expensive compensation payments.



The pattern of spill incidence over the past three decades is very similar for smaller spills in the size range 7 – 700 tonnes (see above graph, for which data prior to 1974 is largely lacking), although not surprisingly the number of such events each year is greater. The same applies to spills of less than 7 tonnes. Although the statistics relating to this smallest size category are less reliable, the ITOPF database indicates that the total number of spills less than 7 tonnes constitutes at least 85% of the total number of tanker spills of all sizes. It would be unusual for the costs of compensation resulting from spills of less than 700 tonnes to exceed the applicable limit of the 1992 CLC, although this is possible in the event of a 'difficult' oil spilt from a small tanker. It is highly improbable, however, that compensation for established claims from these smaller spills would, in the foreseeable future, exceed the current 1992 Fund limit, let alone the 2003 increased limit.

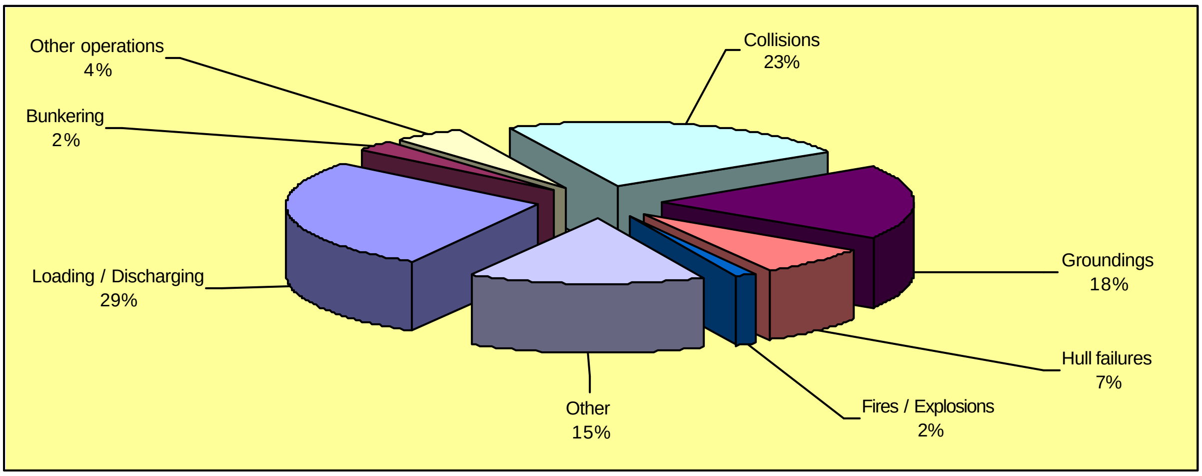
Causes of Tanker Spills

Given the above, it is interesting to explore the causes of spills greater than 700 tonnes since these are the events that could conceivably result in claims against the Supplementary Fund.

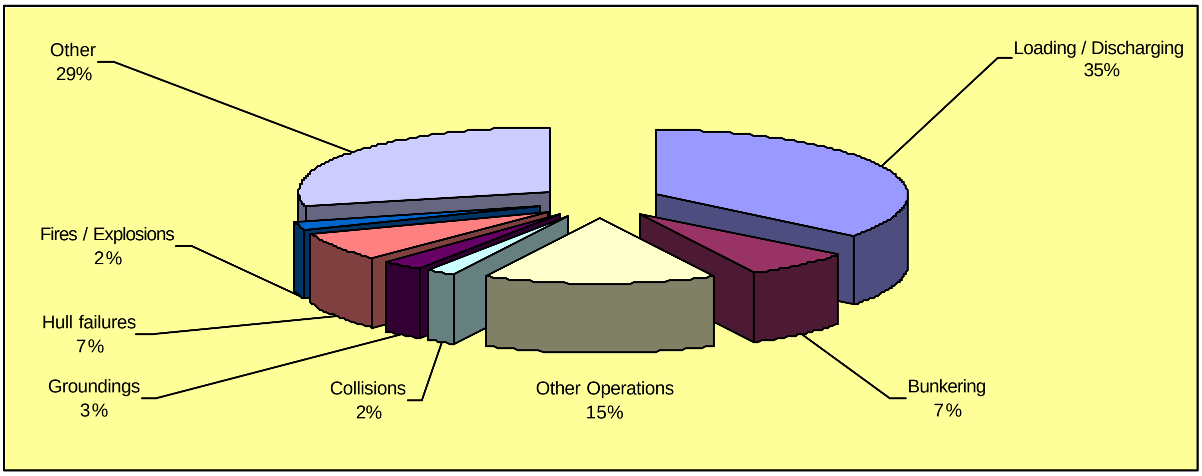


Causes of spills > 700 tonnes, 1974-2001

It can be seen from the above pie chart that 62% of all the spills in this largest size category have historically resulted from collisions and groundings. Another 20% of the spills greater than 700 tonnes have been caused by hull failures and fires/explosions. It could possibly be argued that the increasing number of double-hulled tankers might reduce the number of spills in this size category resulting from low energy collisions and groundings. Similarly, other measures including enhanced ship inspections and the ISM code, might have a beneficial effect. This could all help reduce further the number of expensive claims against the 1992 Fund and, potentially, the Supplementary Fund. However, major spills are unpredictable events and any such predictions are likely to prove unreliable.



Causes of spills 7 - 700 tonnes, 1974-2001

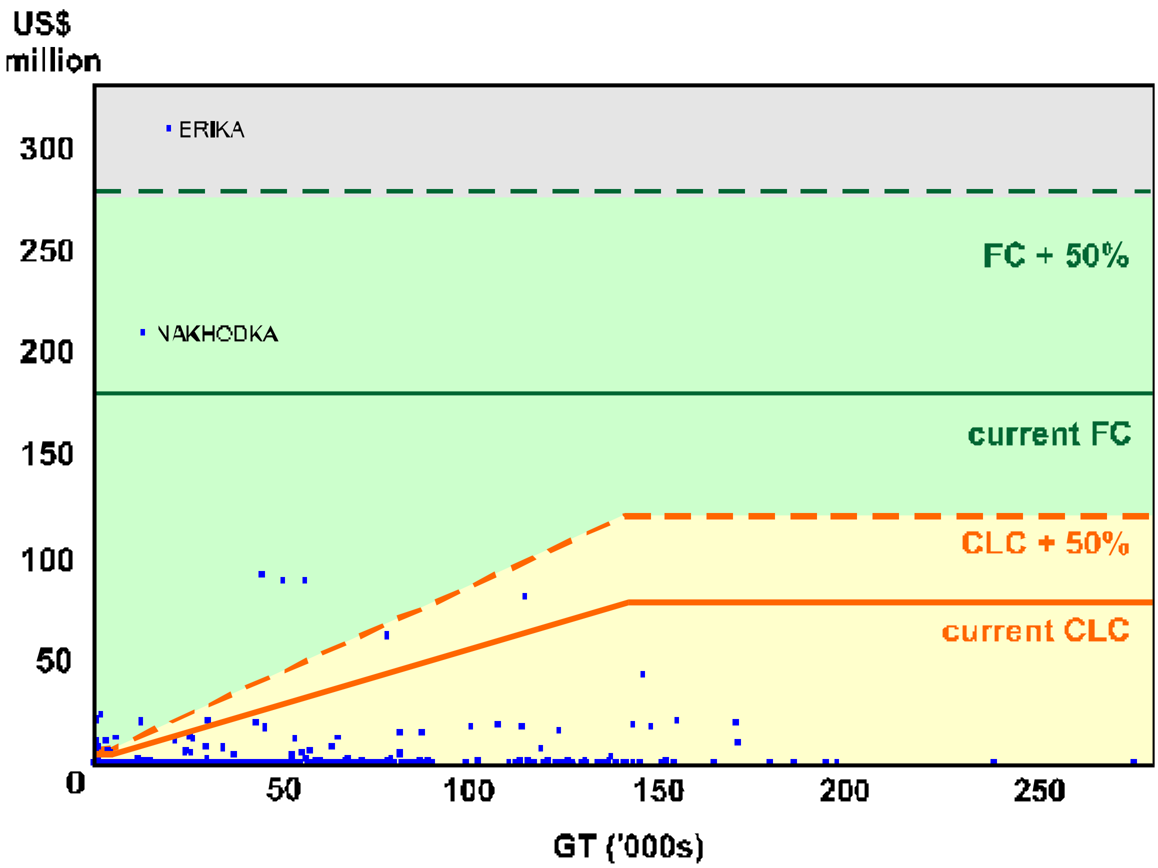


Causes of spills < 7 tonnes, 1974-2001

By way of comparison, the above pie charts demonstrate that operational causes become increasingly more significant as the size of spill decreases. Thus, loading/discharging, bunkering or other operations constitute some 80% of all the spills less than 7 tonnes where the cause is recorded. As previously noted, these smaller operational spills are unlikely to result in expensive compensation settlements.

STUDY OF THE COST OF OIL SPILLS, 1990 - 1999

For the purpose of a study conduct by the International Group of P&I Clubs and ITOPF, data on the cost of clean-up and damage in 360 tanker spills occurring outside the USA between 1990 and 1999 were obtained from individual P&I Clubs, the IOPC Funds and Cristal Limited. All cost data was converted into US dollars according to published exchange rates. In cases where not all claims had been settled a "best estimate" was used. The resulting costs were incorporated into a database which allowed various analyses to be carried out. The results of one such analysis, comparing the costs of individual incidents outside of the USA to the limits of liability under the 1992 Civil Liability and Fund Conventions, and to the 50% increased limits that will come into effect on 1st November 2003, is shown below in graphic form.



Cost of non-US tanker spills (1990-1999) in relation to
1992 and 2003 CLC and Fund limits

It is evident from the above graph that the estimated total cost of only two incidents during the 10-year period covered by the study - the NAKHODKA and ERIKA - exceeded the current limits of the 1992 Civil Liability and Fund Conventions, although the NAKHODKA would have fallen below the 2003 increased limits. (The PRESTIGE incident falls out of the study period though its costs are widely anticipated to be greater than the current 1992 Fund limit). The vast majority (95%) of the other 358 cases would have been fully compensated under the terms of the 1992 Civil Liability Convention alone. This percentage increases to 96% if the 2003 increased limits are applied. Raising the minimum amount of compensation for small tankers to, say, SDR 20 million (about US$26 million), as proposed voluntarily by the International Group of P&I Clubs, would increase the percentage of CLC cases still further, to around 98%.

Interestingly, analysis of the total costs of all 360 incidents over the ten-year period demonstrates that they would have been shared equally (51:49) between shipowners under the 1992 CLC and by oil receivers under the 1992 Fund Convention. If the ERIKA is removed from this analysis, the percentage becomes 59:41. The additional removal of the NAKHODKA makes the percentage 71 CLC : 29 Fund, illustrating that one or two highly expensive incidents has a marked effect on the whole pattern of cost distribution. This illustrates the impossibility of predicting future cost sharing since it will depend upon whether or not another highly costly major spill occurs and, if it does, whether or not it is in a State that is party to the 1992 Fund and Supplementary Fund.

Factors that Determine the Cost of Tanker Spills

Various technical factors, in combination, determine the cost of tanker spills, some of the most important of which are summarized below.

Type of Oil

Of the various individual factors that determine the seriousness and therefore the ultimate cost of an oil spill, one of the most important is the type of oil.

In general, light crude oils do not persist on the surface of the sea for any significant time due to rapid evaporation of the volatile components and the ease with which they disperse and dissipate naturally, especially in rough seas. This is well illustrated by the BRAER incident in the Shetland Isles, UK in January 1993. A combination of light crude oil and severe weather conditions resulted in the entire cargo of 85,000 tonnes being dispersed naturally with minimal shoreline contamination, even though the tanker was stranded on the coast. Clean-up costs in this case were therefore very low, especially relative to the quantity of oil involved.

At the other end of the spectrum of oil types are heavy crudes and heavy fuel oils. These oils are highly persistent when spilt and therefore have the potential to travel great distances from the original spill location. As a consequence, the clean-up of heavy oil spills can be extremely difficult, extend over large areas and be costly. This is illustrated by two of the most expensive tanker spills of all time - ERIKA and NAKHODKA in France and Japan, respectively. The PRESTIGE also spilled heavy fuel oil and clean up costs are anticipated to be very high. All involved relatively small amounts of oil (some 7,500 tonnes in the case of the NAKHODKA, and estimated 20,000 tonnes each for the ERIKA and PRESTIGE) spilled some distance from the coast, maximising the opportunity for spreading and widespread coastal contamination.

The nature of the damage caused by a spill will also vary according to the type of oil. Light crude oils may constitute a fire and explosion hazard if spilled in confined situations, leading to a wide variety of third party claims due, for example, to temporary closure of port areas and nearby industry or temporary evacuation of local communities. Such oils also tend to be more toxic than heavier oils. This can lead to mortalities of marine plants and animals if high concentrations of oil enter the water column through wave action and are not rapidly diluted by natural sea movements. Similarly, such oils may bring about the tainting of edible fish, shellfish and other marine products, as occurred in the BRAER where the main affected product was high-value farmed salmon. All such effects will, however, usually be highly localised and short-lived as the toxic components are also the ones that evaporate most rapidly. Fish and shellfish also rapidly lose the oil components that cause taint once clean water conditions return.

Heavy crude, emulsified crude and heavy fuel oils, whilst generally of lower toxicity, will constitute a threat to seabirds and other wildlife (for example on shorelines) that become physically coated or smothered. Amenity areas, fishing gear, mariculture facilities and other structures can also be contaminated, sometimes over very extensive lengths of coastline due to the highly persistent nature of the oil. Further problems can arise if the already high density of the heavy oil increases further (for example due to the incorporation of sediment in coastal waters) to the extent that residues sink. This can result in the prolonged contamination of the sea bed, forming a reservoir for the fouling of bottom fishing gear and repeated re-oiling of cleaned amenity areas as the sunken oil is remobilised after storms. All these problems can result in large third party damage claims for economic loss, as illustrated by the spills of heavy fuel oil cargo from the NAKHODKA and ERIKA.

Amount Spilled and Rate of Spillage

The amount of oil spilled is clearly an important factor in determining costs. Thus, given no variation in other factors such as type of oil, location and economic resources at risk, a 100,000 tonnes spill will result in far wider contamination, will require a far more extensive clean-up response and cause greater damage than, say, a 10,000 tonnes spill. On the other hand, the three largest tanker spills of all time - ATLANTIC EMPRESS off Tobago, West Indies in 1979 (287,000 tonnes), ABT SUMMER off Angola in 1991 (260,000 tonnes) and CASTILLO DE BELLVER off South Africa in 1983 (252,000 tonnes) resulted in very low clean-up and damage costs because none of the spilled oil contaminated coastlines.

The rate of spillage can be important. For example, the clean-up operation required in response to a single large release of oil may be considerable but may be completed in a matter of weeks. The associated damage to marine resources and amenities may also be short-term. However, the same quantity of oil lost over several months from a damaged vessel close to the coast may require the maintenance of a major clean-up effort, repeated cleaning of amenity areas and long-term effects on fishery resources and tourism.

Clean-up Response

As a general rule, considerable effort and money is devoted to trying to deal with oil spills at sea, in a laudable attempt to prevent the damage and public outcry associated with extensive pollution of inshore waters and shorelines. Unfortunately, however, there are fundamental limitations on the effectiveness of the two main techniques of containment and recovery, and chemically-enhanced dispersal. The main limitation results from the fact that oil spilt on to the surface of the sea spreads very rapidly and is soon spread over an area that is too great to be countered by available techniques. Added to this are the limitations on containment and collection systems imposed by winds, waves and currents, and the problems posed for the effective use of chemical dispersants by high viscosity oils and the rapid formation of "mousse". In a major spill these technical realities frequently mean that it is impossible to prevent the contamination of coastal waters and resources. These fundamental limitations on at-sea response do not always deter those in charge from deploying numerous oil recovery ships or dispersant spraying vessels and aircraft in order to satisfy the criterion that they must be "seen to be doing something". In extreme cases such a response may be continued for a long period, leading to unnecessarily high clean-up costs for little or no benefit.

In contrast to offshore clean-up, which requires considerable amounts of expensive equipment, vessels, aircraft and trained operators (often obtained from distant sources), shoreline clean-up usually relies on manual recovery methods and locally-available equipment. The main factor determining cost is therefore usually the extent to which cleaning is required before the contaminated area will be considered acceptable. The removal of bulk oil from a heavily contaminated shoreline is relatively straightforward and can often be accomplished quickly, subject to the type of shoreline (e.g. rock, sand, mud) and ease of access. The type and amount of oil involved, the time of year, prevailing weather conditions (e.g. ice) and other factors will also influence the ease with which bulk oil can be removed. However, as the degree of contamination is progressively reduced more and more effort is required to effect a significant improvement. The operation therefore becomes one of diminishing returns with costs escalating rapidly as the amount of remaining oil decreases. The overall cost of shoreline clean-up therefore depends to a large extent on when the operation is terminated.

There are well-established procedures that seek to balance environmental sensitivities against socio-economic factors (e.g. fisheries, tourism) in order to determine the most appropriate techniques and level of cleanliness on a site-by-site basis. However, those in charge of response operations frequently bow to pressure to adopt non-technical criteria to decide the nature and extent of a response. In such instances the inappropriateness of cleaning certain types of shoreline will be ignored and as many resources as possible deployed in an attempt to persuade politicians, the media and public that everything possible is being done to deal with the problem. The fact that the operations may be ineffective or more damaging to the environment than the oil is often not a persuasive argument. Equally, the requirement that every trace of oil must be removed to assuage public anger is neither possible nor environmentally sound.

Failure to adopt technical criteria for determining when the shoreline clean-up operations should be terminated will invariably prolong the clean-up, increase the amount of material for disposal (a major problem now in most spills) and result in exorbitant clean-up costs.

Effective spill combat demands a high level of pre-spill planning, as well as informed and decisive leadership at the time of a spill so that a response consistent with the contingency plan is initiated promptly. The individual or small command team in charge will need to be supported by experienced technical and scientific advisors that are part of a larger management team that looks after individual parts of the operation, as well as logistic support, record keeping and financial control. These last two aspects are vital in connection with cost recovery from other parties.

The provision of sufficient experienced and knowledgeable people to direct the clean-up response and to provide expert technical advice will be a specific problem facing some government authorities and other groups. The infrequency of spills and the regular reassignment of personnel in some organisations can mean that those who are called upon to deal with a spill will have never seen one before and so have to learn 'on the job'. This is fine if they are willing to listen to advice from experts so that due account is taken of the extensive experience and technical knowledge that is available nationally or internationally. All too often this is not the case, with those in charge preferring to learn their own lessons and thereby repeat the mistakes of past spills, leading to ineffective clean-up and unnecessary damage, both of which can greatly increase the costs.

Location

The location of a spill will inevitably have a considerable bearing on the costs since it will determine the requirement for and extent of the clean-up response, as well as the degree of damage to the environment and economic resources. All oils, if they remain at sea long enough, will dissipate through natural processes. When a tanker spills oil far from the coast the response will therefore normally be confined to aerial surveillance of the slick to monitor its movement and dissipation in order to check that the predictions are correct. The cost of responding to oil spills under these circumstances can therefore be low, as was the case in the previously-mentioned incidents of ATLANTIC EMPRESS, ABT SUMMER and CASTILLO DE BELLVER.

The physical characteristics of the spill site (e.g. prevailing winds, tidal range, currents, water depth) as well as its distance from the coast are important since they have a considerable bearing on the feasibility of mounting both a clean-up response at sea and a successful salvage operation. They will also help determine the extent of coastal contamination, which is one of the most important factors in determining clean-up costs. The high cost of the shoreline clean-up in both the ERIKA and NAKHODKA incidents was due in large part to the extensive coastal impact (some 400 km in the ERIKA and over 1,000 km in the NAKHODKA).

Socio-economic factors and resources at risk vary both within and between countries. Some areas will be of high national or even international importance for fishing, mariculture, tourism and other industries, whereas others will only rank as locally important. The sensitivity of these resources to oil pollution will also vary, often depending upon the time of the year. Claims for compensation resulting from physical damage and economic loss can be very high and in many cases will greatly exceed clean-up costs. Damage to the environment will also generate concerns, possibly leading to post-spill studies and reinstatement measures.

CONCLUSIONS

1. Any predictions about the future incidence of major tanker spills and their causes are likely to prove unreliable, although the phase out of older, single–hulled tankers, as well as enhanced ship inspections and various other measures, are likely to prove beneficial in maintaining the incidence of major tanker spills at a low level. This could reduce the likelihood of expensive claims settlements that reach or exceed the 1992 Fund limit or the enhanced 2003 limit.

2. The sharing of the cost of compensation between tanker owners (and their P&I Clubs) under the 1992 CLC and oil receivers under the 1992 Fund will depend to a very large extent upon whether or not one of more very expensive incidents occur in States party to the 1992 Fund. The cost of such an incident(s) could balance the cost of the numerous smaller incidents that are likely to continue to fall under the 1992 CLC alone, especially with the enhanced 2003 limits and proposed voluntary increase in minimum limit for small tankers.

3. Various factors in combination will determine the actual costs of any particular incident, with type of oil, location of the spill and the characteristics of the affected area being the most important technical factors since they will influence the costs of both clean-up and damage. In the cases of the NAKHODKA, ERIKA and PRESTIGE, fuel oil of a very persistent nature was spilled some distance from the shore leading to extensive at sea operations, long lengths of coastal contamination and high associated clean up costs.