

HOW OIL SPILL RESPONSE HAS PROGRESSED OVER THE LAST 42 YEARS

From the *Torrey Canyon* to Today

Robin Perry, Consultant, SEACOR Environmental Services

INTRODUCTION

On 18th March 1966, the 120,000 tanker *Torrey Canyon* grounded on Pollard Rock part of the Seven Stones reef in the Scilly Isles to the far southwest of the UK. Thousands of tonnes of oil were soon spilling from the stricken vessel's ruptured tanks and, during the next 12 days, the entire cargo of 119,000 tonnes of Kuwait crude oil was lost. The era of the major oil spill began.



Torrey Canyon

As a young naval officer, I flew in support of the Royal Navy Buccaneer aircraft, which dropped 1000lb bombs onto the wreck to open the tanks to the sea. This was followed by the Royal Air Force who hit the wreck with napalm.



Royal Navy Fleet Air Arm Blackburn Buccaneer S Mk2 Aircraft

AIM

The aim of this paper is to review how spill response has progressed in the intervening 42 years and to update some of the findings of my IOSC 1999 issue paper "Myths and Realities of Oil Spill Planning and Response the Challenges of a Large Spill". What has changed in the 10 years since then and what has changed since the defining spill of the late 20th century: the Exxon Valdez, whose 20th anniversary has just passed?

SUMMARY

The paper briefly reviews strategies and techniques for spill response both at sea and on the shorelines. It notes the various compensation arrangements that grew out of the *Torrey Canyon* and were modified following later spills.

It observes that not even all rich countries have adequate plans in place, but notes that co-operation between Governments and industry have improved. It considers how developing countries can be assisted, as oil spills may be low on their priority list.

It recognises that, however much equipment may be present, response success will depend upon good planning and well trained people.

It reviews whether attitudes to spills have changed. Has the public realised that spills will continue to happen as the price of the worlds hunger for oil; hopefully less frequently, but happen they will? Does the, much reviled, media always exacerbate the situation? The current debate in the US concerning resumption of offshore drilling provides a case study into public attitudes to drilling, production and spills.

DISCUSSION

Forty two years have passed since the *Torrey Canyon* spill. Since then there have been many major spills. *Amoco Cadiz* and the *Exxon Valdez* stand out as landmarks, but more recently we could add *Erica*, *Prestige*, *Tasman Spirit*, and *Hebei Spirit*, not forgetting spills from container ships such as the *Cosco Busan*, or the *Pacific Adventurer*. There are plenty of examples to consider.

We must not forget spills from exploration and production. The second largest oil spill in history was from the Ixtoc 1 well blowout in 1979 and though much smaller, on January 28th 1969, a blowout from Union Oil's Platform A spilled crude oil onto the beaches of Santa Barbara County, California. Upward of 10,000 birds were killed and the spill caused severe damage to marine and plant life. Network news media began covering the story of an ecological disaster, the scale of which had not been seen in the United States since the advent of television. With images of the blowout's devastation beamed nightly into living rooms, many Americans and subsequently their elected representatives recognized Santa Barbara as the birthplace of the environmental protection movement. The effects are still being felt today, in the continuing debate about the restarting of US offshore exploration.

It is worth spending a few moments discussing the *Torrey Canyon* as it is the baseline against which we must measure improvements. The vessel was also owned by Union Oil. Does the world remember that Union Oil was the spiller in what were two of the seminal spills of the mid 20th century? Although the vessels' funnel was clearly marked "Union 76", she was not called the *Union Torrey Canyon* and the polluter has been forgotten.

This Liberian registered, American owned ship had an Italian crew and was on charter to British oil major BP. This is reminiscent of a headline in the British "Independent" Newspaper following the Sea Empress spill 20 years later, highlighting the fractured responsibility often found in the shipping industry.

"Built in Spain; owned by a Norwegian; registered in Cyprus; managed from Glasgow; chartered by the French; crewed by Russians; flying a Liberian flag; carrying an American cargo; and pouring oil onto the Welsh coast.

But who takes the blame?"

Some 50 miles (80 km) of French and 120 miles (190 km) of Cornish coast were contaminated. Around 15,000 sea birds were killed, along with huge numbers of marine organisms, before the 270 square miles (700 km²) slick dispersed.

Of course it is now known that bombing the *Torrey Canyon* was an ill judged move. For, though some oil burned, the fires went out as the oil thinned. Much salvageable oil was released to the sea and spread along the southwest coasts of the UK and the north coast of France. Yet in 1999, firing the fuel oil with explosives and napalm was tried within the hull of the *New Carissa*, aground in Coos Bay, Oregon. Hours later, the ship broke in half, requiring a near decade long salvage operation.

The first widespread use of chemicals in spill response took place on the *Torrey Canyon* oil. As a result of the large quantities of what were then highly toxic formulations in the shallow inshore waters, massive and long term environmental damage was caused.

There was no compensation scheme in place for those affected by the spill, leaving the only recourse for recompense to the courts. The British Government was only able to press its claim against the owners by nailing a writ to the mast of the *Torrey Canyon's* sister ship, the *Lake Palourde*, when she put in for minor provisions at Singapore, four months after the oil spill.

Let us examine various issues in more detail.

Dispersants

The main response technique was the massive use of chemicals to disperse the spill. I have avoided the use of the word dispersant, for, unlike modern dispersants, these were highly toxic. They were not dispersants as we know them now, but were a first-generation variant of products originally formulated to clean surfaces in ships' engine-rooms, with no concern over the toxicity of their components. Many observers believed that they were officially referred to as 'detergents', rather than the more accurate 'solvent-emulsifiers', to encourage comparison with much more benign domestic cleaning products. Some 42 vessels sprayed these chemicals onto the floating oil and they were also deployed against oil stranded on beaches. In total some 10,000 tons being used.

In Cornwall, they were often misused - for example, by emptying entire 45-gallon drums over the cliff top to 'treat' inaccessible coves, or by pouring a steady stream from a low-hovering helicopter. On the heavily-oiled beach at Sennen Cove, chemicals poured from drums was 'ploughed' into the sand by bulldozers over a period of several days, burying the oil so effectively that it could still be found a year or more later. Many of the detrimental impacts of the spill were undoubtedly caused by their excessive and indiscriminate use. Whilst they did reduce the amount of oil arriving ashore, they were also considerably more toxic than those in use today and were applied in far greater concentrations. This

caused considerable environmental damage and it has been reported that full environmental recovery took up to 20 years. The continuing widespread resistance to the proper use of third generation, highly effective and low toxicity dispersants dates from this operation. That such prejudices still abound today can be seen in such grossly overdramatic statements as this from a Regional Citizens Advisory Council, describing dispersant use as *"Pouring poisons into the sea"*. Just this month, a blog headlines on a Google report stated: -

"Oil Spill Surface Cleanup Ignores Fish Below: Discovery News.
The detergents used to clean up oil spills might actually be more toxic to fish than the oil spills themselves."

We know that nowadays the testing protocols applied to the approval processes and restrictions on use for modern low toxicity dispersants will prevent this from being the case. This is why we have restrictions on the use of dispersant in shallow waters. But this headline is quoted from a report by Queens University, Ontario, which, worryingly, appeared not to take any of this into account and should know better.

What is rarely reported is that when used early enough and properly, that is to say, in the right place against the right oil, with sufficient water depth and water mixing, modern dispersants are the only large scale at sea oil removal technique that exists. Adequate water exchange then ensures that rapid dilution reduces dispersed oil concentrations to safe levels and the vastly increased surface area makes the oil much more amenable to natural bacterial biodegradation. Many countries have understood this, but in many others the prejudices and misinformation about the scientific data continue to inhibit its greater use.

Insurance and Compensation

At that time, there were no compensation schemes in place for those affected by the spill, leaving the only recourse for recompense to the courts. Claims were made by the British and French Governments against the owners of the vessel. However, the British Government had great difficulty in finding a way to obtain this compensation and it requested an emergency meeting of the Inter-Governmental Maritime Consultative Organization, (the forerunner of the International Maritime Organisation). As a result, the Civil Liability Convention (CLC) was passed in 1969, to provide strict, no blame liability and compensation for the cost of spills to be placed upon the tanker owner and thus avoid the need for costly litigation. At that time the limit was set at approximately \$18m. This has been progressively raised through a series of protocols and amendments to \$76.5m.

This was followed by the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage 1971 which required cargo interests in the oil receiving countries to contribute to a compensation fund. Originally this was set at a maximum of approximately \$31m. Again the escalating costs of spill response required the passing of a new protocol in 1992 which established a completely new Fund. This with the 2000 amendments has increased the total amounts payable to \$356m. A final protocol in 2003 established a Supplementary Fund, making the total payable to Supplementary Fund signatories including CLC of somewhat over \$1000m.

Of course there is a problem in that the oil exporting countries are not keen to join the IOPC Fund, and make the payments into the fund that would be required. But this of course also means that they are not covered by the Fund and have to make alternative arrangements to recover any costs incurred which exceed the CLC limit.

Other countries, notably the US after the Exxon Valdez spill had been reluctant to sign these conventions, as the cleanup and consequential costs of spill far exceeded the compensation amounts available at the time. This led to the passage of the Oil Pollution Act of 1990 (OPA 90), which amongst other spill preparedness requirements included unlimited liability in certain circumstances, which has to be covered by all vessels visiting the US by an insurance backed Certificate of Financial Responsibility (COFR).

But in general we can judge these conventions and laws to have been a real success.

Mechanical Containment and Cleanup

Very little booming equipment was available at the *Torrey Canyon* spill. However, since that time, a massive investment has occurred in the development and provision of mechanical containment and recovery equipment. Equipment has become more capable, easily operated and more robust and stocks of equipment have increased dramatically, especially over the last 20 years. As a former very experienced colleague has noted, "the world is awash with equipment".

Indeed both OPA 90 and the International Convention on Oil Pollution Preparedness, Response and Co-operation, 1990 require that appropriate stocks of equipment are in place to deal with the relevant risk. All too often however, the provision of this equipment gives rise to the false sense of security that it will be able to clean up any spills that occur. I do not need to reiterate in this paper all the reasons why this is a false assumption. Suffice to say that the spreading and thinning of the oil, the late arrival of equipment, laws of physics relating to boat speed and current flow and bad weather often conspire to reduce the effectiveness of booms and skimmers at sea. Historically most open sea operations recover less than 10% of the spilled oil, often much less.

That is not to say that the techniques are useless, because many of the recent spills have been of heavy viscous product, upon which dispersant will have limited if any effectiveness. In that case at sea recovery is the only viable option.

This type of equipment can be very successfully employed in ports and terminals, where it is possible for it to be deployed rapidly in generally calmer waters, thus leading to a greater chance of successful containment. It can also be very effective in the protection of sensitive areas, which again are generally sheltered.

What is often very unsatisfactory is the poor standard of equipment maintenance and training of the equipment operators. Ultimate success will depend upon people. Is there a well trained response team to maintain and operate the equipment? Without that, the equipment will be virtually useless. In too many cases the answer is still no!

In Situ Burning

In situ burning using fire boom is only likely to be a niche technique. In the open ocean it will suffer from all the problems of mechanical containment, as well as requiring fire boom, which is not widely available. But it could have application in local response plans if the fears of the consequent air pollution can be overcome.

Shoreline cleanup

To quote from my 1999 IOSC paper, "Shoreline cleanup is not an exact science, and there is always room for disagreement on the best cleanup methods in a given situation. Recently, there has been a growing realisation, particularly in Europe, from an environmental benefit standpoint that, wherever possible, the shoreline should be allowed to self-clean. This has normally been the case in high-energy areas such as cliffs and exposed rock platforms and very low-energy areas such as salt marshes, where any cleaning is likely to cause unacceptable damage.

"Self-cleaning decisions are becoming more common in other lower-energy areas, especially if oil and fine particle interaction (clay oil flocculation) is occurring. In these situations, careful removal of bulk oil may be required to reduce the smothering effect (for example, in rock pools) and prevent oil migration to previously clean or more sensitive areas. Aesthetic reasons alone are no longer sufficient to require aggressive cleanup, except in amenity areas that must be cleaned to a high standard.

"At the *Sea Empress* spill, minimum shoreline cleanup was conducted. In a detailed report on the spill, the *Sea Empress* Environmental Evaluation Committee (SEEEEC, 1998) found that there were few signs of significant long-term damage. Thus it may be concluded that this was an effective shoreline cleanup response because the inevitable environmental impacts were not made worse by inappropriate or intrusive cleanup techniques." Nevertheless there are still too many occasions when use of heavy equipment not only increases dramatically the amount of waste generated, but also drives oil into the substrate where it can remain for many years. There are also many examples where over aggressive cleaning has caused more damage than good and in both these cases the principles of Net benefit analysis have not been applied.

Response Planning

The OPRC Convention, introduced after the *Exxon Valdez* spill, requires contingency plans to be put in place. The 3 Tier system has sensibly defined at what levels these are required and guidance exists from the IMO, IPIECA and ITOPF on the development of these plans. In many areas these are well produced. In many cases also, as the convention requires, there is much better co-operation between national governments and their oil industries. Certainly in the US and most of Europe, detailed planning is in place. But this good practice does not extend universally and it is not only developing countries that are the culprits.

It would be wrong to single out any one country, but there is one national plan which has not been updated since 1993, where several of the Ministries no longer exist and where the Tier 2 equipment has lain untouched for over 15 years. This is not an isolated example. In the event of a spill, I fear these countries would fare no better than the UK at the *Torrey Canyon*, 42 years ago.

Training and exercises

Response success depends upon good plans and good people. The response team must be properly trained, know their roles and be fully familiar with their duties. Regular and realistic training inculcates a team spirit and develops the relationships essential for success. It was impressive at the *Sea Empress* spill, that the Tier 2 response team at Milford Haven was well organised, through having a good plan which was regularly exercised. As a result, it was able to cope with the rapid expansion to Tier 3 required by this major spill.

Anyone with responsibility for spill response should ask themselves, "Do we have a competent management team in place? Can they react with initiative to the unexpected? If not, why not?"

International Assistance to Developing Countries

Too often it is assumed that everyone has the same priorities, but of course this is not necessarily the case for developing countries. Priorities understandably tend to revolve around poverty, clean and adequate supplies of water, feeding the population, housing education, infrastructure. Oil spill response may not be very high on the agenda in such situations and the financial and management resources just do not exist to plan or provide equipment and trained personnel.

Whilst the IMO/IPIECA Global Initiative is well meaning, it does not go far enough. The aims are laudable: to assist countries in developing a national structure for oil spill response and preparedness and to encourage the ratification and implementation of the Conventions including the International Convention on Oil Pollution, Preparedness, Response and Cooperation, 1990 (OPRC Convention and the Conventions relating to Liability and compensation 1992 Civil Liability Convention (CLC) and 1992 Fund Convention

But if we want these countries to be prepared, ways must be found to provide them with the necessary management and financial resources for a prolonged period until such time as they have developed sufficiently to take over.

Spill Prevention

MARPOL 73/78 has made great strides in the reduction of pollution from vessels, but maritime accidents will occur. Companies owning, managing and commanding large vessels fully laden with oil have a duty to exercise special care to minimise these as much as possible. The *Torrey Canyon* went aground due to a basic navigational error by its Master. Twenty two years later, the *Exxon Valdez* went aground due to an inexperienced officer being left in charge on the bridge in an area that should have required at least 2 officers on the bridge. The *Sea Empress* went aground due to a failure by the Pilot and Master to correct a drift off the leading lights in the approach to Milford Haven. The *Cosco Busan* hit the Golden Gate Bridge amongst other things due to inadvisedly

sailing in thick fog and misunderstandings between the Pilot and the Master. Other accidents have occurred due to manifestly unseaworthy vessels. Surely it is in the area of prevention of such occurrences that our greatest effort should be devoted. We cannot afford to use inadequately trained crews, sailing poorly maintained vessels. Owners, charterers, classification societies, flag state and port state control authorities all have a responsibility to ensure that only high quality vessels with well trained experienced crews sail the high seas.

However, there will still be occasions where vessels require assistance, perhaps due to equipment malfunctions. The Alyeska Pipeline Service Company established the Ship Escort/Response Vessel System (SERVS) following the *Exxon Valdez* spill. SERVS' primary role is prevention. To this end, SERVS provides two escort vessels to every laden tanker that travels through Prince William Sound. But the vessels are also equipped with an impressive response armoury. In Washington State, a tug has been stationed in Neah Bay to cover the straits of Juan de Fuca since 1999, responding to 41 ships in need of assistance since 1999. In northwest Europe, several countries maintain emergency tugs and the European Maritime Safety Agency (EMSA) has contracted a fleet of response vessels. In the Arabian Gulf and Gulf of Oman (the ROPME Sea Area), the Council of the Regional Organisation for the Protection of the Marine Environment (ROPME) has approved the establishment of the Oil Spill Response and Salvage Co-ordination Unit (ORCU), to be equipped with vessels strategically placed around the region. This is now under detailed study. These measures to prevent spills must be more widely implemented in areas of high risk, as the inability to prevent oil from coming ashore after a spill has been amply demonstrated.

Spill Response

In many ways spill responders are criticised unfairly for the inability to control the large amounts of oil spilled into hostile seas, especially as they did not cause the spill. Those in the response industry understand the difficulties and have not been able to find ways to improve our performance significantly. Although the *Exxon Valdez* proved a turning point in reinvigorating the response capabilities in the world, shorelines and sensitive areas are still being badly impacted by major spills such as the *Erica*, and *Prestige* in Europe, the *Tasman Spirit* off Karachi, the *Hebei Spirit* off Korea the *Cosco Busan* in 'Frisco Bay and the *Pacific Adventurer* off Queensland. The OPRC Convention, OPA 90 and much effort by oil companies and response organisations have resulted in many countries being better prepared, but we still cannot say that our ability to prevent or cleanup these occurrences at sea has improved significantly. In the end shoreline cleanup will be required in most cases and it will be necessary to tell the public why.

Public Opinion

As I wrote in my 1999 paper, "Whether out of fear, ignorance, or apathy, government and industry partners in response seem to have failed to inform the public effectively about the realities of oil spill response:

- Spills will continue to happen.

- Oil will come ashore.
- Aggressive shoreline cleanup in sensitive areas may be the worst response option.
- Doing minimal clean up may be preferable.

Neither politicians, government agencies dependent on public funding nor oil companies for commercial reasons, typically espouse such technically correct but unpopular views publicly". In general we tell the public what we can do and how well prepared we are, but are then surprised at their reaction when we do not always live up to the publicity.

Has public opinion regarding oil spill response improved in these 42 years? Regrettably, no! Each successive spill has reinforced public opinion that oil companies make their very large profits at the expense of the environment.

Awareness Programmes.

As I also recommended, "A sustained campaign is needed to educate the media, public, governments, and environmental interest groups about the fundamental limitations of oil spill response techniques". This has not occurred and a programme beginning in schools and extending to the general public could be helpful. At present, the environmental interest groups make all the running.

The Media

The media has a job to do. Depending upon which part of the media they work for depends upon how they report. The "UK Red Tops" tend to sensationalise events and photographs can be staged to make a point. The report quoted above from the *Sea Empress* spill was factually incorrect in that a ship registered in Cyprus could not have been flying the Liberian flag. For days the BBC was reporting that the spill from the *Erica* was a diesel spill. A picture following *Exxon Valdez* showed a dead moose upside down in a pool of oil with clean feet! Now it did not do a back flip to get there! But the same paper reported some weeks after the *Rosebay* spill in the UK "Didn't we get it wrong", having earlier reported how devastating the spill would be. The factual and fair reporting of the *Cosco Busan* spill by the San Francisco papers as seen from overseas was excellent.

There is no doubt however that media reporting by television and print journalists can influence public opinion as to the success or otherwise of a response.

The new factor, with which governments and company public relations departments have to come to terms, is the advent of the blog and social networking sites, such as Twitter. A post on a blog is likely to race round the world within hours; being picked up, commented upon and reproduced many times. Recently a report of a very small spill in Fleetwood UK appeared within 24 hours in a Chinese paper. So, in order to ensure that your message is the correct one that is spread around, as it was for print and television reports. It must be the first, or the error will be repeated again and again.

US Offshore Drilling

The blog is a powerful weapon which the opponents of renewed US offshore drilling are deploying. Never mind that many of their assertions are incorrect,

they are using the blog to raise public emotions by reminding them of the 1979 Santa Barbara blowout as well as the *Exxon Valdez* spill, the latter of course having nothing to do with offshore drilling, to generate support for their opposition.

They overlook the fact that someone else still has to produce the oil they use and transport it in tankers to their shores. This means someone else can have spills exploring for and producing the oil, often in hostile political and geographic areas. The risk of supply interruption is higher and transportation by tanker does have a higher risk than pipeline transportation. I have seen very few industry responses to these blogs.

CONCLUSIONS

The picture is not all black. In many areas of the world, preparedness has improved greatly. As a result of a series of IMO Conventions and national legislation such as OPA 90, the number of spills has fallen. Response equipment has improved. Spill recovery at local facilities is often successful, as is the protection of sensitive areas. Compensation arrangements are in place with adequate levels of funding to satisfy the majority of likely claims. The advantages and disadvantages of the various shoreline cleanup techniques are better understood, in particular the need to be minimally intrusive in sensitive soft sediment areas.

On the other hand governments and industry have not managed to ensure an evenly high standard of preparedness, either in rich or developing countries. Plans are either not in place or inadequate. Equipment lies un-maintained and personnel remain untrained. It has not been possible to stop spilled oil from coming ashore. So despite all the improvements, the population is still not convinced that enough is being done. Can anything be done to improve the situation and alter public opinion?

I believe improved performance is the only answer. As this is unlikely to come from improved offshore cleanup performance, I believe that a much greater effort is needed to prevent spills throughout the exploration, production, transportation, refining and delivery chain. Escort tugs, salvage tugs and response vessels in sensitive high risk areas can also help. Only with a demonstrably great reduction in both large and small spills will matters improve.

If this were a school report, it might read: -

"The pupil has tried hard and despite having made a good progress in many subjects he has still not learned how to prevent oil coming ashore. His performance has improved greatly since 18th March 1967, but there is no room for complacency and there is still much to be done".