

INTERSPILL 2015

White Paper Submission

Conference stream: Future Risk / Future Requirements

Title: Are post-spill environmental studies becoming the norm?

Author: Kelly Reynolds – ITOPF

Abstract

Statistics generated from ITOPF's database on marine oil spills show a distinct decline in the number of large spills (over 700 tonnes) as well as the quantity of oil being spilled from tankers since the 1970's. ITOPF now attends more bunker spills from non-tankers than tanker spills. Despite the reduction in both the number of large spills and volume spilled, ITOPF has observed a trend for an increasing number of incidents to include some form of post-spill environmental study, signalling how smaller spills of oil are growing in relative importance.

The breadth of research on the environmental impact of oil spills over the past few decades means that the short term effects of oil spills on marine species and communities are reasonably well known and predictable. Nevertheless, concerns are often raised about possible medium to long term population and ecosystem effects, and this, combined with a more environmentally aware general public who demand a greater response to ever smaller incidents, means that governments often need to be able to demonstrate that possible effects of a spill on the marine environment have been studied. However, is necessary or appropriate to conduct a post-spill study following every single oil spill incident?

This paper will use information from ITOPF attended incidents to look at trends in conducting post-spill studies, and offer a number of possible reasons for these trends; including a general heightened awareness of environmental issues leading to a shift in attitudes and expectations as well as legislative changes. The paper will also look at the implications of these trends for those involved with such studies and re-examine the ideal drivers for scientifically robust post-spill studies.

Introduction

The International Tanker Owners Pollution Federation (ITOPF) has collected data on oil spills over the past 40 years based on information gathered whilst attending incidents and from various published sources such as the shipping press, other specialist publications and from information provided by ship owners and their insurers.

According to ITOPF maintained statistics, the amount of oil lost as a result of tanker incidents between the years 1970-2014 was approximately 5.74 million tonnes. However, a closer inspection of this headline figure clearly shows a downward trend in the number of large spills (> 700 MT/>5,000 bbls) from tankers, from over 25 large tanker spills per year in the 1970's to around 2 per year in the last 5 years (as shown in Figure 1).

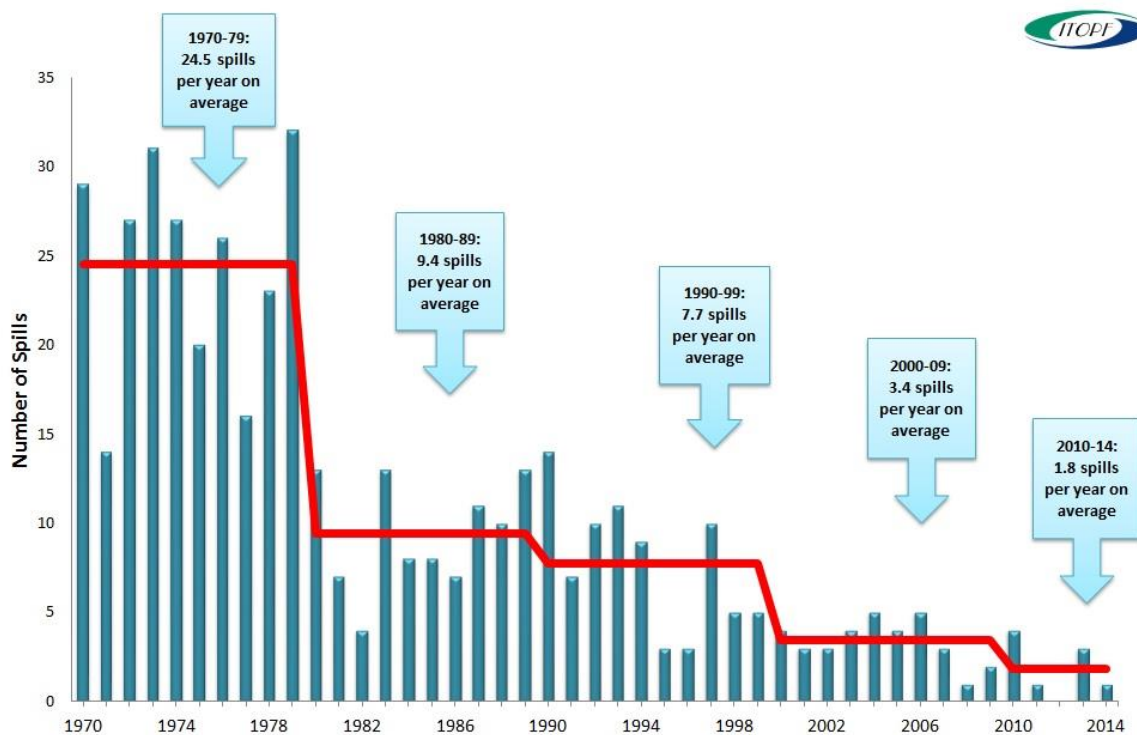


Figure 1. Number of large spills (>700 tonnes) from 1970 to 2014

Despite this reduction in spills from tankers, the average number of incidents attended by ITOPF remains at around 20-25 per year, which reflects that over the last 30 years, there has been a change

in the typical profile of incident attended by ITOPF. As shown in Figure 2, since early 2000 we have more frequently attended bunker spills from non-tankers than those involving tankers and cargo. However, that is not to say that there has been an increase in the number of bunker spills occurring. From February 1999, owners of ships other than tankers became eligible to be Associates of ITOPF with access to our technical services, including the provision of advice on site during an incident. This will undoubtedly have influenced the spill data.

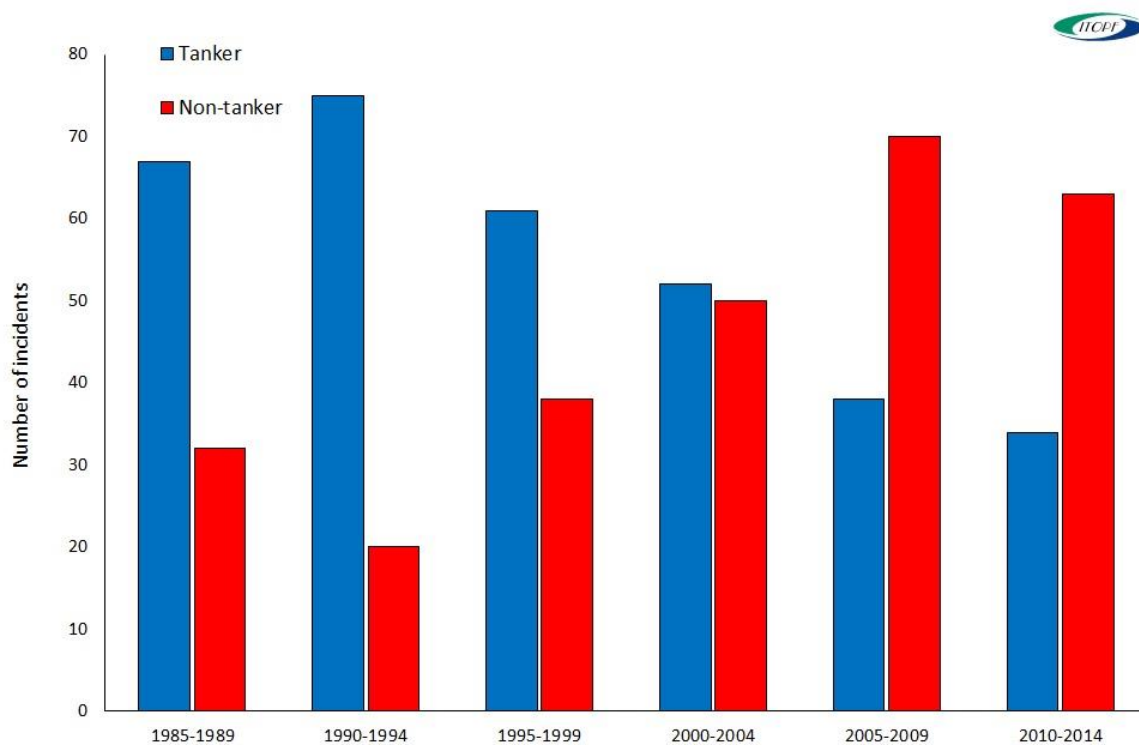


Figure 2. ITOPF attended tanker and non-tanker incidents from 1985 to 2014.

Whilst we are typically attending smaller bunker spills, our involvement in incidents beyond the initial response phase appears to be lasting longer, reflecting the fact that incident responses themselves are generally getting more complex. If we consider the average incident that ITOPF was mobilised to 30 years ago, it would have typically been to a spill of oil at sea requiring some form of at-sea response and we may have only remained on site until the at-sea response had been completed and any shoreline clean-up was underway. More recently however, depending on the circumstances, even a small spill of less than 10 tonnes in a port or harbour area could mean our attendance on site for a

number of weeks, and may well involve providing advice on the merits of sampling and monitoring efforts.

Frequency of post-spill studies following ITOPF attended incidents

ITOPF has reviewed cases where post-spill studies were conducted following incidents we have attended over the last 30 years, including cases where ITOPF was actively involved in such studies and cases where ITOPF had no involvement but is aware that there were government led efforts in this regard. For ITOPF, a post-spill study is where there has been some aspect of chemical, biological and/or water quality sampling and monitoring through to more comprehensive, longer term, impact assessment studies. In the context of this paper, any cases where sampling work was limited to 'fingerprinting' oil samples purely to establish the origin of the oil have not been considered.

In examining the number of post-spill studies conducted following ITOPF attended incidents, it is possible to observe an increase in the number of post-spill studies conducted from the mid-1990's onwards. Preliminary investigations show that from 1985-1994, we are aware of post-spill studies being conducted in just over 10% of incidents ITOPF attended. However, from 1995 onwards, approximately 40% of the incidents we attend involve some aspect of post-spill study. It should be noted however that, especially for the earlier cases, information on the conduct of such work is not as comprehensive as it could be, and therefore the above information should be considered as indicative of general trends as opposed to precise statistics. The level of information available in itself reflects the change in the associated level of importance of this area of work.

The apparent increase in carrying out post-spill studies from the mid-1990's onwards was at a time when the amount of oil being spilled from large tanker incidents was declining rapidly, and therefore signals the growing relative importance of smaller spills. Clearly, the size of spills was not the driving force behind the need for such studies. This in part is due to the fact that the environmental impact caused by a spill is influenced by a number of factors including oil type, local geography, seasonality,

sensitivity of the species and communities present in the affected area and the clean-up work conducted.

If we look at some of the spills that ITOPF attended between 1985-1995, there were a number of fairly significant tanker incidents. For example, the tanker KHARK 5, that lost approximately 70,000 MT of oil following an explosion and fire nearly 150nm off the coast of Morocco as well as the incident involving the tanker NOVA, that lost in the region of 70,000 MT of crude in 1985 in the Gulf of Iran. However, ITOPF is not aware of post-spill studies conducted in relation to any of these cases. This reinforces the principle that the environmental impact of a spill is not proportionate to the size of the spill, and that a number of circumstances and factors combine to dictate the actual level of impact caused.

What has caused this increase in studies from the mid-1990's?

In looking for reasons behind this increase in the conduct of studies, in ITOPF's opinion, we need to look more generally at the growth in the general public's awareness of environmental issues and the supporting paradigm shift in associated international legislation. Worldwide, since the late 19th century, there have been a number of movements and events that have helped shaped the general public's attitude towards a whole range of environmental issues. Although many environmental issues can be traced back to before the industrial revolution, clear identification of these problems and solutions only began in the mid to late 1960's (Hoffman, A. J, 1999). The 1970's saw a rise in the number of environmental pressure groups and increased popularity of 'green' political parties. The United Nations Conference on Human Environment held in Stockholm in 1972 is viewed by many as being the first international conference to draw worldwide public attention to the immensity of environmental problems, and because of that it has been credited for ushering in the modern era of environmental studies (Kemp, 1994). In the 1980's, high profile incidents such as Bhopal and Chernobyl increased the public's awareness of the potential consequences of industrial activities, and

it is generally acknowledged that there was a new wave of environmentalism in the 1990's (Kemp, 1994), culminating in the 1992 Rio Declaration on Environment and Development.

Looking specifically at the shipping community, soon after its establishment, the International Maritime Organization (IMO) assumed responsibility for pollution issues and, largely through the work of its Marine Environmental Protection Committee, has been successful in adopting over 20 treaty instruments related to environmental protection, such as MARPOL that was adopted in 1973. The shipping industry has achieved much in the last few decades to mitigate risks and impacts to the environment, but efforts are on-going and more recently, issues such as ballast water and emissions from ships are key topics for the shipping community and the IMO (IMO and the Environment, 2011).

Taking a historical perspective can give us an appreciation of how a governments' overall response policy, including attitudes towards studies, has developed; often it is shaped by experiences gained from previous pollution incidents. For example, in the US prior to Natural Resource Damage Assessment (NRDA) Regulations being adopted in 1996, equivalent NRDA activity was routinely being conducted under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) which was developed as a result of a number of contaminated land cases and the Clean Water Act of 1972. Indeed, over 50% of the studies carried out for incidents attended by ITOPF between the years 1985 – 1995 were in relation to spills in the US, but this is despite the number of spills in the US accounting for less than 10% of the total number of incidents attended by ITOPF during those 10 years.

Even a country that has one of the longest histories of conducting studies has seen a number of developments and changes in attitude in this area over recent decades. Although there are differences between the IXTOC-1 wellblow out/ spill in 1979 and the MACONDO wellblow out/spill over 30 years later in 2010 (such as the depth at which the oil was being released and the general level of preparedness to deal with a large scale pollution response), in essence they are similar in that, as

noted by Dokken (2011), relative to chronic inputs of hydrocarbons in the Gulf of Mexico, both events released significant volumes of oil into the environment in a short period of time (an estimated 3.3 million barrels and 4.9 million barrels respectively). Although IXTOC 1 affected the coastlines of Mexico more than US coastlines, it is interesting to note that compared to the Macondo incident, there were comparatively few studies conducted for the IXTOC-1 spill. Tunnell (2011), notes how fewer scientific assessments of the IXTOC 1 disaster's effects were published simply because the spill happened years earlier and outside of the U.S.

Are post-spill studies becoming the norm?

Information maintained by ITOPF indicates an increase in the number of studies conducted from the mid-1990's onwards. However, despite the fact that for each of the periods 1995-2004 and 2005-2014, over 40% of the incidents attended by ITOPF have resulted in some form of study, it is not possible to reach a universal conclusion that conducting such studies is becoming the 'norm'. It is important to remember that every spill is unique and that so many factors contribute to the potential impact of an incident (and therefore the need to study potential impacts), so it is not appropriate, to only look at frequency of cases over the years where such work was conducted in an effort to identify a trend in such studies becoming the norm. A more in-depth analysis of the actual level of impact of each incident attended, taking into account the many variables such as geographic location, type of environment, in comparison to whether or not such studies were conducted would be required in order to conclude whether such studies are becoming the norm.

Whilst it may not be appropriate to make a sweeping conclusion for incidents in general, using past experience it is possible to identify trends, or the 'norm', for particular countries and their approach to post-spill studies. This in itself has benefits since simply being aware of this fact means that early efforts can be made to work with the government authorities to try and maximise the productiveness of such work.

It is also possible to identify a trend for an increasing number of post-spill studies to be conducted on small spills (<7 MT). During the period 1985-1994, it was rare for ITO PF to be involved in cases where studies were conducted for spills of less than 7MT, the vast majority were in relation to spills of over 700 MT. However, for the decade 2005-2014, less than 10% of studies were for spills >700 MT, with the remaining studies split equally between spills of <7 MT and spills of 7-700 MT. This represents a significant increase in the conduct of post-spill studies on spills of less than 7 MT over a 30 year period.

ITOPF's recent experience of post-spill studies

Over the last few decades, governments have come under increasing pressure to demonstrate to stakeholders, including the general public, an understanding of the possible environmental effects associated with every incident. Examining the main drivers for the post-spill studies conducted following ITO PF attended incidents over the last 30 years reveals that the overall rationale remains the same i.e. there is often a need to assess potential impacts on commercial resources. Such studies are usually conducted in relation to concerns regarding seafood safety and the need to gather information on which to manage the need for fishing bans, or the need to establish the level of impact on mangrove areas and other habitats that act as nurseries for commercial fishery species. However, there is often a strong desire by the scientific community and governments for comprehensive impact assessments addressing all components of the marine environment.

Over the last 30 years there has been much research into the impacts of oil spills, and thus for a number of habitats, such as rocky shores, the scope of probable damage is already well known and it is possible to use this past experience to help assess and determine the need for, and scope of, studies.

In the US, under various regulations, as a pre-requisite or initial stage of the Natural Resource Damage Assessment (NRDA) process, government Trustees are required to carry out some form of pre-assessment or 'screen' to establish whether injury has occurred to natural resources. Outside of the US, other countries conduct post-spill studies under the framework established by the IMO's international liability and compensation conventions. In their Claims Manual, the International Oil Pollution Compensation Fund, acknowledge that 'studies are sometimes required to establish the nature and extent of environmental damage caused by an oil spill and to determine whether or not reinstatement measures are necessary and feasible' (IOPC Fund Claims Manual, October 2013). The international regime recognises that every incident is different and encourages a flexible approach to post-spill studies to ensure that studies provide reliable and usable information. As highlighted in the Guidelines produced as part of the PREMIAM programme, there are a number of possible drivers for conducting post-spill studies such as: when species/habitats of nature conservation importance are likely to be impacted, when commercial fish and shellfish stocks are likely to be impacted or for cases where there might be human health implications, such as contamination of the human food chain. It is therefore generally recognised that there is no need to conduct a study after every single incident.

It is worth highlighting that, whilst the rationale for post-spill studies is often in relation to one of the above listed drivers, ITOPF has regularly been involved in cases where, in accordance with national regulations, environmental damage claims are presented based purely on theoretical assumptions rather than scientific studies, and are therefore punitive in nature. In such cases, it often appears that the goal is to generate revenue as opposed to increasing the scientific understanding of the environmental impact of an incident.

A growing number of countries have taken the step of making it a legal requirement for studies to be conducted. In Korea for example, the Korean Marine Pollution Prevention Act 2002 stipulates that the ship-owner is required to carry out environmental studies within three months of an incident if it results in a spill of more than 50 m³ and has, or is likely to, spread out to an area of 100 000 square

metres or more. The Act details the requirements of such studies and stipulates that the work should be carried out using one of the research institutes designated by the Minister of Marine Affairs and Fisheries. ITO PF also understands that under the Taiwan Marine Pollution Control Act promulgated in 2000, there is a legislative requirement after an oil spill incident, for a one month of environmental monitoring programme consisting of the collection of four sets of data.

ITOPF has attended many incidents in China where studies have been carried out in accordance with national laws, regulations and standards. Amongst other things, this legal framework includes regulations on methods for calculating fishery damages relating to water pollution and defines the types of measurements that are to be undertaken in order to determine water quality. Whilst the regulations/ standards include numerous parameters which may be useful indicators of overall water quality, they also include other parameters, such as the study of pH, E.coli and salinity, which are not internationally recommended for assessing the impact of an oil spill.

In terms of designing and implementing a successful post-spill study, there is more required than simply legislating its requirement and having the resources available to carry out such work. Whilst there are a number of very useful guides outlining best practice on how to actually conduct studies, there are several approaches to how studies are organised and co-ordinated.

If ever more countries continue to mandate the need to conduct post-spill studies into legislation, depending on how prescriptive it is, there may be less opportunity to tailor a study to the incident in question and therefore an expectation for the shipowner and their insurer to pay for studies that according to the principles set out in the IOPC Fund Claims Manual, might ultimately not be considered admissible. If national authorities wish to seek compensation for such studies then, ITO PF would typically recommend open dialogue and early engagement with those potentially funding the work, with a view to conducting impact assessment studies on a collaborative basis. Experience has shown that this is often the most effective and efficient way of carrying out such work.

Within the US, since the mid-1990's there has been increased emphasis on trustees and the responsible party working cooperatively in NRDA's. For example, in 1995 a forum involving a number of federal and state trustees and various oil company representatives stationed or operating along the US west coast established the West Coast Joint Assessment Team (JAT). The JAT was formed so that those parties who might find themselves involved in a NRDA could work together outside of a response 'to enhance the cooperative assessment process, work through conflicts that have plagued many previous cooperative assessments, and lay the groundwork for conducting successful cooperative assessments for future oil spills' (Cramer, 2008). As noted in the 1995 International Oil Spill Conference Proceedings paper titled 'Key NRDA issues', 'in most cases, cooperation is not only cost effective, but can lead to increased effectiveness of restoration and can decrease the period of time between the insult and restoration of services if natural recovery is not selected as the alternative and promote the proper use of science.'

In observing the changing attitudes towards post-spill studies, it is worth highlighting that this also extends to cases where there has been no oil spill but where other potential impacts may have occurred; in coral reef grounding cases for example. Looking forward, as more countries seek to ratify the HNS Protocol, part of preparing for responses to such incidents is to consider capabilities to monitor the fate and behaviour of chemicals in the marine environment. Since there is often a lack of information and research on the fate and behaviour of chemical substances in the marine environment, and given how such information is typically used to inform response strategies, this could be an area that sees increased attention in the future. Another area that will likely see more focus in future years is with regard to the European Liability Directive (ELD). The ELD was adopted in 2004 and establishes a framework for environmental liability based on the "polluter pays" principle, with a view to preventing and remedying environmental damage. The ELD is very similar to the US NRDA system in terms of the scope of compensation allowed. Whilst Articles 4(2) and 4(3) state that the ELD does not apply to environmental damage arising from shipping incidents that are within the

scope of the IMO liability and compensation conventions, there is still a degree of uncertainty as to how the ELD may be applied to future shipping incidents.

Conclusions

Since the mid-1990s ITOPF has observed an apparent increase in the number of post-spill studies being carried out. Whilst it may not be appropriate to make a universal conclusion on whether post-spill studies are becoming the norm, compared to 20 years ago, more of the incidents attended by ITOPF include some form of study, and now occur in over 40% of the cases attended. For certain countries, mainly due to legislative requirements, it is possible to say that post-spill studies are the norm. In ITOPF's opinion, it is not that we are attending an increased number of spills that are potentially more environmentally damaging, but that there is now a stronger demand to demonstrate an understanding of possible impacts. Given the frequency with which such studies are conducted, and possible future developments with the Environmental Liability Directive and ratification of the HNS Protocol, it is even more important to remember the drivers for robust, well designed studies.

Furthermore, in order to maximise the productiveness of studies it is important that national authorities reflect on their level of preparedness to carry out the work prior to an incident occurring. Whilst many countries are fortunate enough to have suitably qualified organisations/ institutes capable of conducting the work, as noted by Kirby *et al* (2014), there are many factors over and above the skills and knowledge required to conduct the work that contribute to a successful study. National authorities should therefore give prior consideration to how efforts will be coordinated and identify available funding mechanisms so that work can start in a timely manner.

References

Cramer, M. (2008). Collaborative Development of Recommendations for a Cooperative NRDA. 2008 *International Oil Spill Conference Proceedings*.

Dokken, Q, (2011). IXTOC I versus Macondo Well Blowout: Anatomy of an Oil Spill Event Then and Now. *International Oil Spill Conference Proceedings 2011*.

Hoffman, A. J, (1999). Institutional evolution and change: Environmentalism and the US chemical industry. *Academy of Management Journal*, 42 (4), 351-371.

ISOC. KEY NRDA ISSUES. *International Oil Spill Conference Proceedings: December 1994*, Vol. 1995, No. TR2, pp. 31-38.

IMO, (2011). IMO and the Environment. IMO's response to current environmental challenges. *IMO*.

International Oil Pollution Compensation Fund 1992, (2013). Claims Manual October 2013 Edition. *IOPC Fund*.

Kemp, D. D, (1994). Global environmental issues: a climatological approach. 2nd edition. *Routledge, London*.

Kirby, M. F, Gioia, R, Law, R.j, 2014. The principles of effective environmental monitoring in marine environments and their application to preparedness assessment. *Marine Pollution Bulletin* 82 (2014) pg, 11-18.

Law, R.J., Kirby, M.F., Moore, J., Barry, J., Sapp, M. and Balaam, J., 2011. PREMIAM – Pollution Response in Emergencies Marine Impact Assessment and Monitoring: Post-incident monitoring guidelines. *Science Series Technical Report, Cefas, Lowestoft*, 146: 164pp

Tunnell, J. W, 2011. An expert opinion of when the Gulf of Mexico will return to pre-spill harvest status following the BP Deepwater Horizon MC 252 oil spill. *Harte Research Institute for Gulf of Mexico Studies Texas A&M University*.