FEBRUARY 2017

THE INTERNATIONAL TANKER OWNERS POLLUTION FEDERATION LIMITED

OIL TANKER SPILL STATISTICS 2016

Background

ITOPF maintains a database of oil spills from tankers, combined carriers and barges. This contains information on accidental spillages of persistent and non-persistent oil since 1970, except those resulting from acts of war.

The data held includes the type of oil spilt, the spill amount, the cause and location of the incident and the vessel involved. For historical reasons, spills are generally categorised by size, <7 tonnes, 7–700 tonnes and >700 tonnes (<50 bbls, 50–5,000 bbls, >5,000 bbls), although the actual amount spilt is also recorded. Information is now held on over 10,000 incidents, the vast majority of which (81%) fall into the smallest category i.e. <7 tonnes.

Information is gathered from both published sources, such as the shipping press and other specialist publications, as well as from vessel owners, their insurers and from ITOPF's own experience at incidents. Unsurprisingly, information from published sources generally relates to large spills, often resulting from collisions, groundings, structural damage, fires or explosions, whereas the majority of individual reports relate to small, operational spillages. Reliable reporting of this latter category of spill is often difficult to achieve.

It should be noted that the figures for the amount of oil spilt in an incident include all oil lost to the environment, including that which burnt or remained in a sunken vessel. There is considerable annual variation in both the incidence of oil spills and the amounts of oil lost. While we strive to maintain precise records for all spill information, we cannot guarantee that the information taken from the shipping press and other sources is complete or accurate. The number of incidents and volumes of oil spilt are based on the most up to date information. From time to time, data is received after publication and, in which case, adjustment to previous entries may be made. Consequently, the figures in the following tables, and any averages derived from them, should be viewed with a degree of caution.

Major Oil Spills

A brief summary of the top 20 major spills that have occurred since the TORREY CANYON in 1967 is given in Table 1 and the locations are shown in Figure 1; it is of note that 19 of the 20 largest spills recorded occurred before the year 2000. A number of these incidents, despite their large size, necessitated little or no response as the oil was spilt some distance offshore and did not impact coastlines. It is for this reason that some of the names listed may be unfamiliar. EXXON VALDEZ and HEBEI SPIRIT are included for comparison although these incidents fall some way outside the group.

Position	Shipname	Year	Location	Spill size (tonnes)
1	ATLANTIC EMPRESS	1979	Off Tobago, West Indies	287,000
2	ABT SUMMER	1991	700 nautical miles off Angola	260,000
3	CASTILLO DE BELLVER	1983	Off Saldanha Bay, South Africa	252,000
4	AMOCO CADIZ	1978	Off Brittany, France	223,000
5	HAVEN	1991	Genoa, Italy	144,000
6	ODYSSEY	1988	700 nautical miles off Nova Scotia, Canada	132,000
7	TORREY CANYON	1967	Scilly Isles, UK	119,000
8	SEA STAR	1972	Gulf of Oman	115,000
9	IRENES SERENADE	1980	Navarino Bay, Greece	100,000
10	URQUIOLA	1976	La Coruna, Spain	100,000
11	HAWAIIAN PATRIOT	1977	300 nautical miles off Honolulu	95,000
12	INDEPENDENTA	1979	Bosphorus, Turkey	95,000
13	JAKOB MAERSK	1975	Oporto, Portugal	88,000
14	BRAER	1993	Shetland Islands, UK	85,000
15	AEGEAN SEA	1992	La Coruna, Spain	74,000
16	SEA EMPRESS	1996	Milford Haven, UK	72,000
17	KHARK 5	1989	120 nautical miles off Atlantic coast of Morocco	70,000
18	NOVA	1985	Off Kharg Island, Gulf of Iran	70,000
19	KATINA P	1992	Off Maputo, Mozambique	67,000
20	PRESTIGE	2002	Off Galicia, Spain	63,000
35	EXXON VALDEZ	1989	Prince William Sound, Alaska, USA	37,000
131	HEBEI SPIRIT	2007	South Korea	11,000

Table 1: Major oil spills since 1967 (quantities have been rounded to nearest thousand)

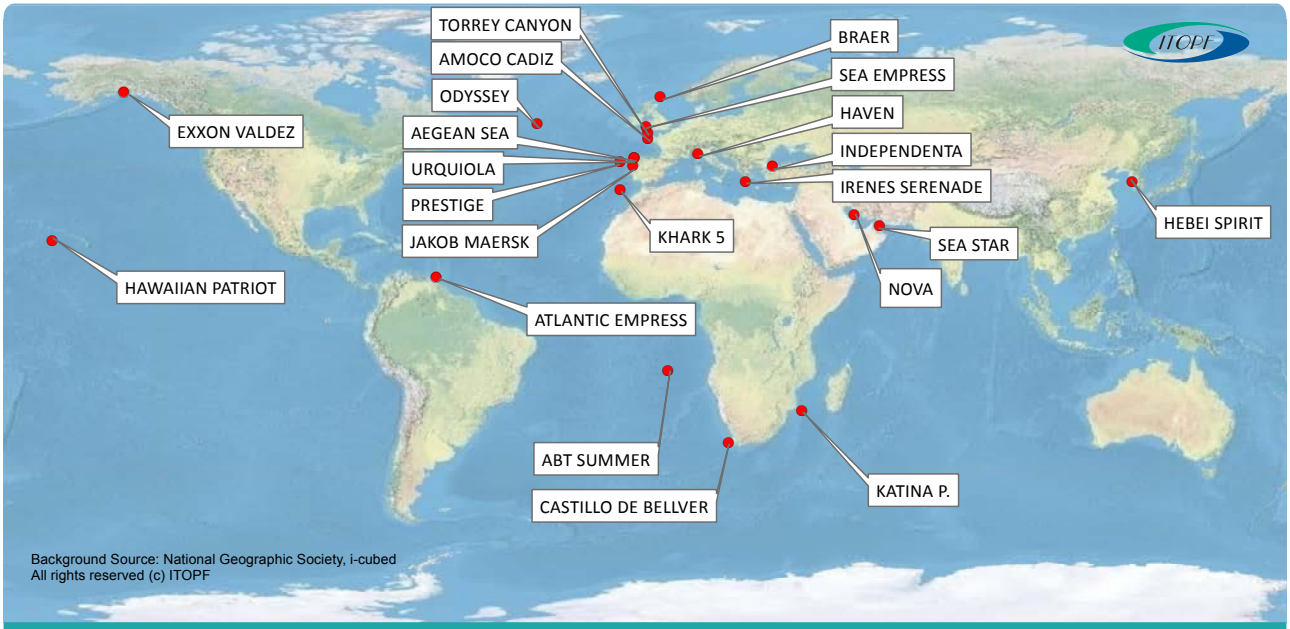


Figure 1: Location of major spills

Number of Incidents and Quantity Spilt

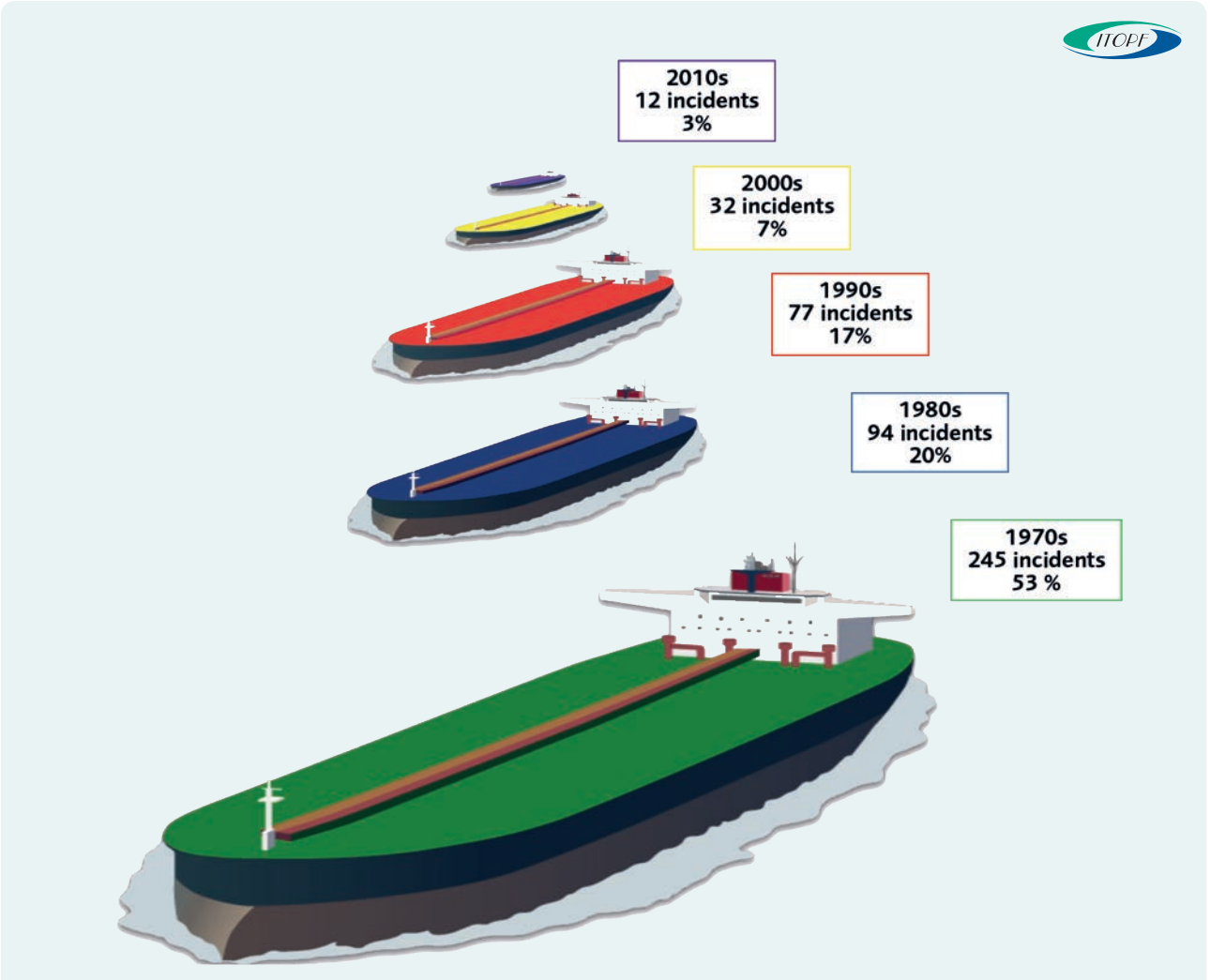


Figure 2: Large spills (>700 tonnes) as a percentage of those recorded from 1970 to 2016 per decade

Number of Oil Spills

The incidence of large spills (>700 tonnes) is relatively low and detailed statistical analysis is rarely possible. Consequently emphasis is placed on identifying trends. Thus, it is apparent from Table 2 that the number of large spills has decreased significantly in the last 47 years during which records have been kept. Over the last few decades, the average number of spills greater than 700 tonnes has progressively reduced and since 2010 averages 1.7 per year. Looking at this downward trend from another perspective, 53% of the large spills recorded occurred in the 1970s, and this percentage has decreased each decade (Figure 2).

It is interesting to note that the progressive reduction in number of large spills is significant when data is analysed per decade rather than annually as demonstrated in Figure 3. Data recorded from 1970 to 2016 show there can be fluctuations in the yearly values within a decade.

A decline can also be observed with medium sized spills (7–700 tonnes) as shown in Figure 4 and Table 2. Here, the average number of spills per year in the 1990s was 28.1, reducing to 14.9 in the 2000s and is currently 5 for the 2010s (not a complete decade).

We have recorded one large spill (>700 tonnes) for 2016 which occurred in the Gulf of Mexico in September. Approximately 5,500 tonnes of gasoline and diesel was burnt in the explosion which sparked a fire.

Four medium-sized spills (7–700 tonnes) were also reported in 2016. The first was recorded in January at a port in South America, where crude oil was spilt during loading operations. The second incident was recorded in Malaysia in August and involved marine fuel oil which was also spilt during loading operations. The remaining two, which both resulted from fires, were reported in the last quarter of the year in the USA and China.

Year	7–700 Tonnes	>700 Tonnes
1970	7	29
1971	18	14
1972	48	27
1973	28	31
1974	90	27
1975	96	20
1976	67	26
1977	70	16
1978	59	23
1979	60	32
Total	**543**	**245**
Average	**54.3**	**24.5**

Year	7–700 Tonnes	>700 Tonnes
1980	52	13
1981	54	7
1982	46	4
1983	52	13
1984	26	8
1985	33	8
1986	27	7
1987	27	11
1988	11	10
1989	32	13
Total	**360**	**94**
Average	**36**	**9.4**

Year	7–700 Tonnes	>700 Tonnes
1990	50	14
1991	30	7
1992	31	10
1993	31	11
1994	26	9
1995	20	3
1996	20	3
1997	28	10
1998	25	5
1999	20	5
Total	**281**	**77**
Average	**28.1**	**7.7**

Year	7–700 Tonnes	>700 Tonnes
2000	21	4
2001	18	3
2002	11	3
2003	19	4
2004	20	5
2005	22	3
2006	12	4
2007	12	3
2008	7	1
2009	7	2
Total	**149**	**32**
Average	**14.9**	**3.2**

Year	7–700 Tonnes	>700 Tonnes
2010	5	4
2011	4	1
2012	7	0
2013	5	3
2014	4	1
2015	6	2
2016	4	1
Total	**35**	**12**
Average	**5.0**	**1.7**

Table 2: Annual number of oil spills (>7 tonnes)

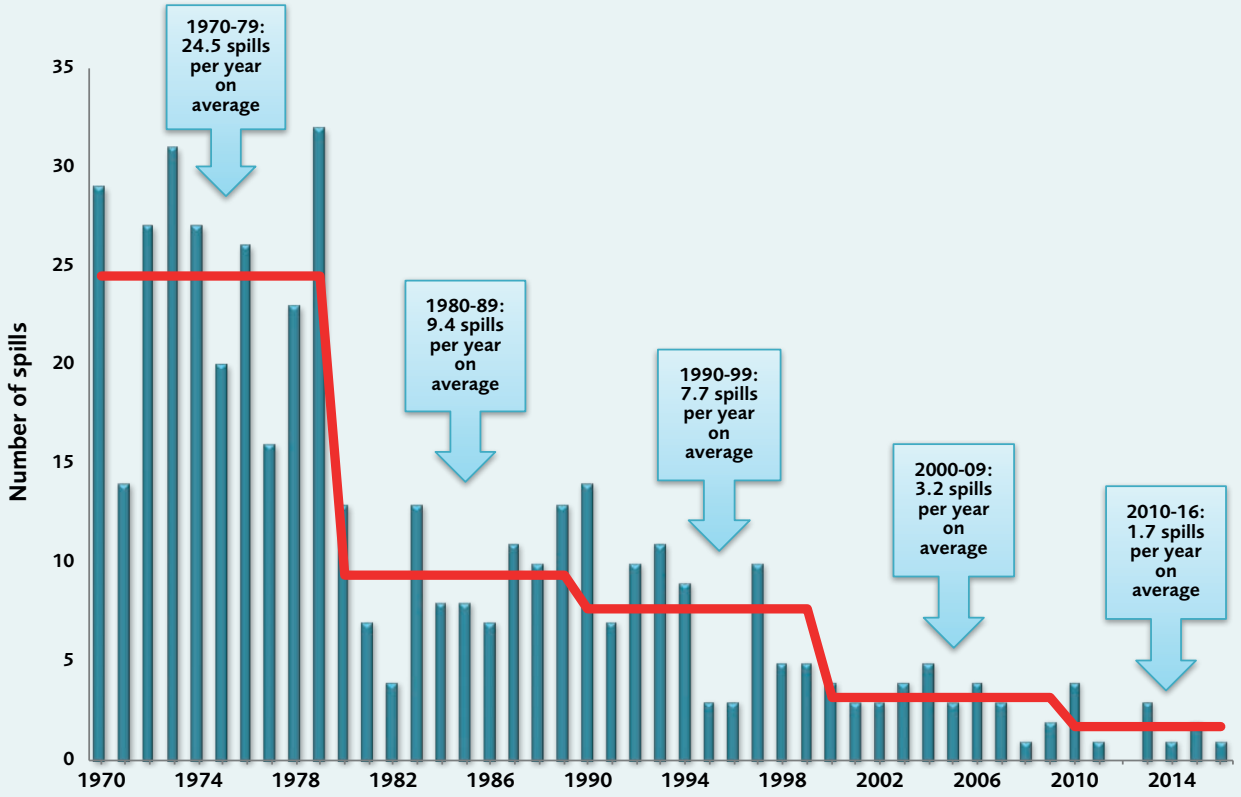


Figure 3: Number of large spills (>700 tonnes) from 1970 to 2016

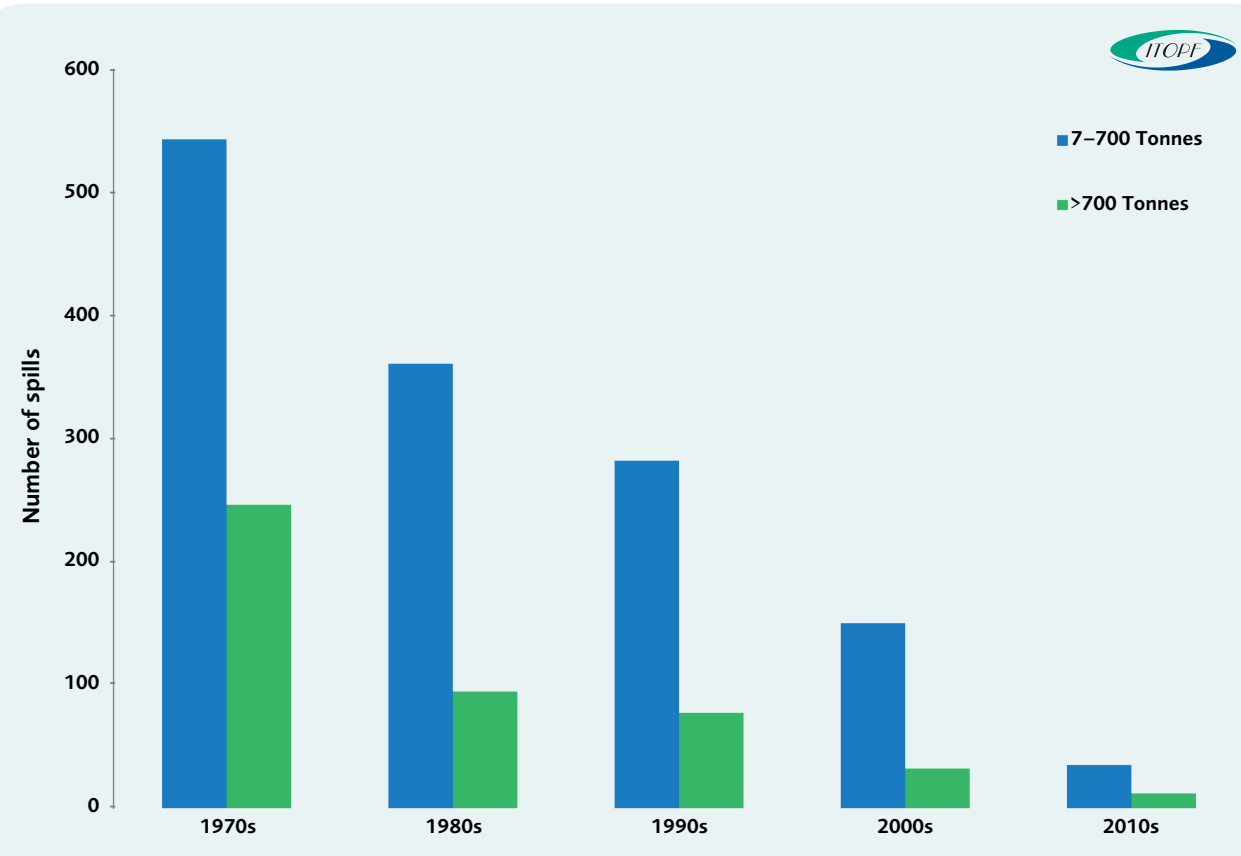


*Figure 4: Number of medium (7–700 tonnes) and large (>700 tonnes) spills per decade from 1970 to 2016**

* Only 7 years of data for the period 2010–2016

Quantities of Oil Spilt

The vast majority of spills are small (i.e. less than 7 tonnes) and data on the number of incidents and quantity of oil spilt is incomplete due to the inconsistent reporting of smaller incidents worldwide.

Reports on spills of 7 tonnes and above tend to be more reliable and information from these is included in the database to give a series of annual estimates of the total quantity spilt for the years 1970-2016. These quantities are rounded to the nearest thousand. Inconsistencies may occur between the sums of each year and the totals. However, all percentages and averages have been calculated using unrounded figures.

Approximately 5.73 million tonnes of oil was lost as a result of tanker incidents from 1970 to 2016. However, as Figures 5 and 6 indicate, the volume of oil spilt from tankers demonstrates a significant reduction through the decades. As can be seen from the volume of oil spilt in the decade to date, there has been a hundredfold reduction since the 1970s. Now, the volume of oil lost in accidents is a tiny fraction of the volume that is delivered safely to its destination each year. From Table 3 it is interesting to observe that an amount greater than the total quantity of oil spilt in the decade 2000 to 2009 (196,000 tonnes) was spilt in several single years in earlier decades.

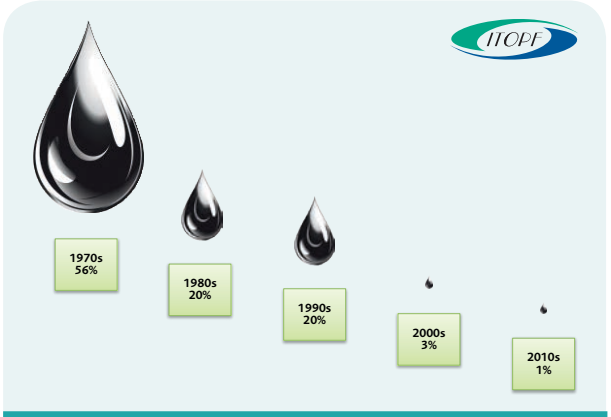


Figure 5: Oil spilt per decade as a percentage of the total spilt between 1970 and 2016

The total volume of oil lost to the environment recorded in 2016 was approximately 6,000 tonnes, the vast majority of which can be attributed to the large spill (>700 tonnes) recorded in September (Table 3 and Figure 6).

Year	Quantity (Tonnes)
1970	383,000
1971	144,000
1972	313,000
1973	159,000
1974	173,000
1975	351,000
1976	364,000
1977	276,000
1978	393,000
1979	636,000
Total	**3,192,000**

Year	Quantity (Tonnes)
1980	206,000
1981	48,000
1982	12,000
1983	384,000
1984	29,000
1985	85,000
1986	19,000
1987	38,000
1988	190,000
1989	164,000
Total	**1,174,000**

Year	Quantity (Tonnes)
1990	61,000
1991	431,000
1992	167,000
1993	140,000
1994	130,000
1995	12,000
1996	80,000
1997	72,000
1998	13,000
1999	28,000
Total	**1,133,000**

Year	Quantity (Tonnes)
2000	14,000
2001	9,000
2002	66,000
2003	43,000
2004	17,000
2005	15,000
2006	12,000
2007	15,000
2008	2,000
2009	3,000
Total	**196,000**

Year	Quantity (Tonnes)
2010	12,000
2011	2,000
2012	1,000
2013	7,000
2014	4,000
2015	7,000
2016	6,000
Total	**39,000**

Table 3: Annual quantity of oil spilt

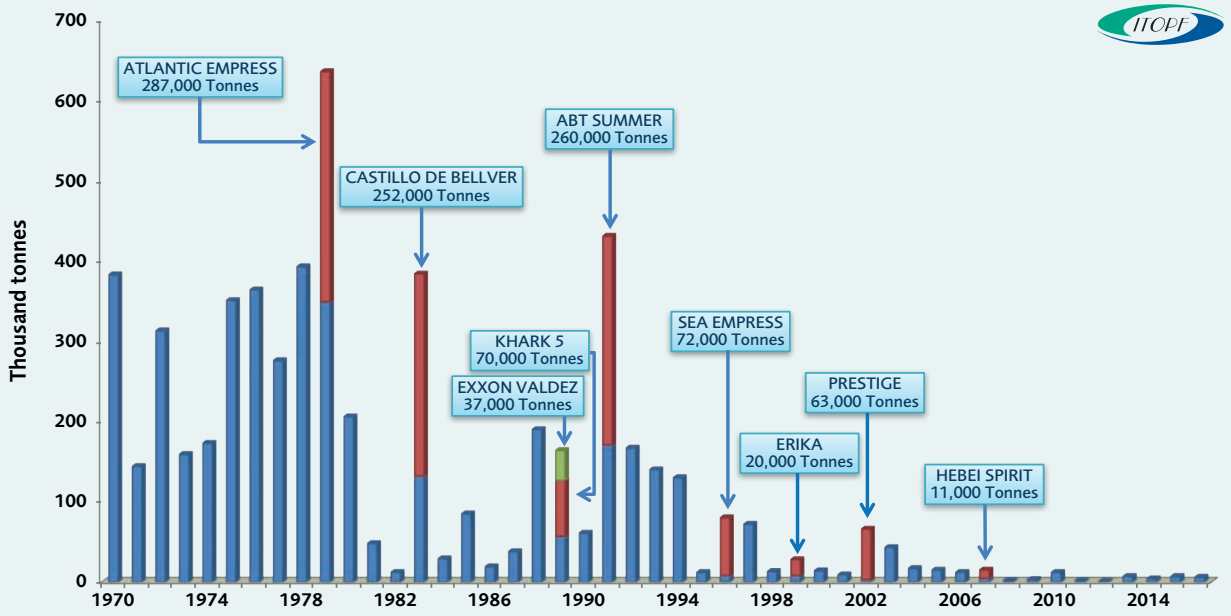


Figure 6: Quantities of oil spilt 7 tonnes and over (rounded to nearest thousand), 1970 to 2016

Large Spills

As demonstrated in Figures 6 and 7, when looking at the frequency and quantities of oil spilt, it should be noted that a few very large spills are responsible for a high percentage of oil spilt. For example, in more recent decades the following can be seen:

- In the 1990s there were 358 spills of 7 tonnes and over, resulting in 1,133,000 tonnes of oil lost; 73% of this amount was spilt in just 10 incidents.
- In the 2000s there were 181 spills of 7 tonnes and over, resulting in 196,000 tonnes of oil lost; 75% of this amount was spilt in just 10 incidents.
- In the seven year period 2010–2016 there have been 47 spills of 7 tonnes and over, resulting in 39,000 tonnes of oil lost; 85% of this amount was spilt in just 10 incidents.

In terms of the volume of oil spilt the figures for a particular year may be severely distorted by a single large incident. This is clearly illustrated by incidents such as ATLANTIC EMPRESS (1979), 287,000 tonnes spilt; CASTILLO DE BELLVER (1983), 252,000 tonnes spilt and ABT SUMMER (1991), 260,000 tonnes spilt (Figure 6).

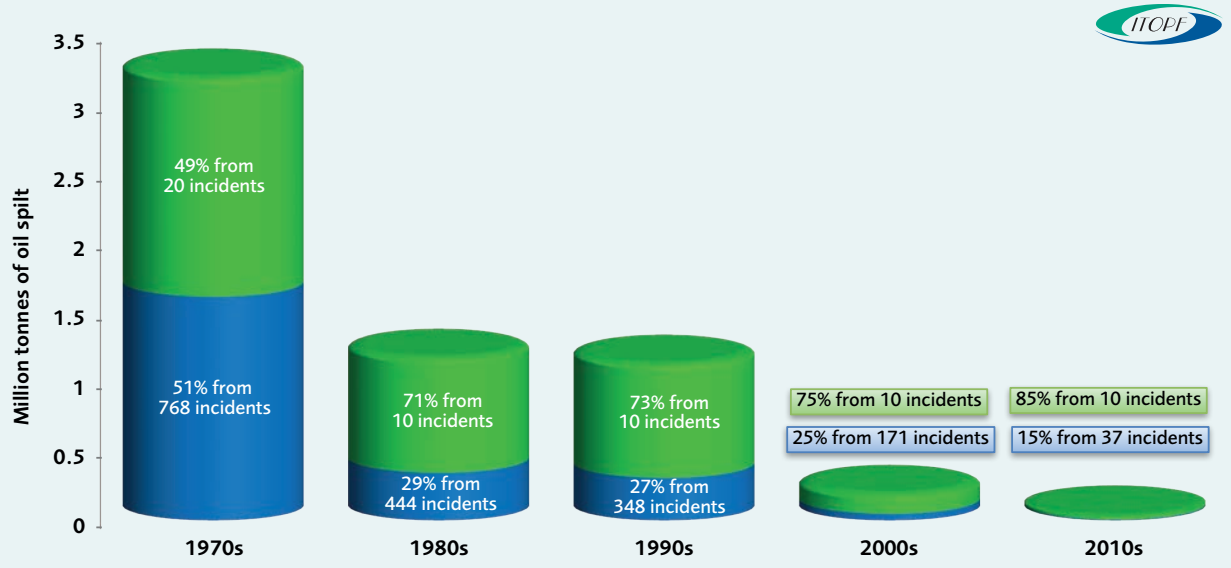


Figure 7: Spills 7 tonnes and over per decade showing the influence of a relatively small number of comparatively large spills on the overall figure

Seaborne Oil Trade

Apart from a fall in the early 1980s during the worldwide economic recession, seaborne oil trade has grown steadily from 1970 (Figure 8). While increased movements might imply increased risk, it is encouraging to observe however that downward trends in oil spills continue despite an overall increase in oil trading over the period.

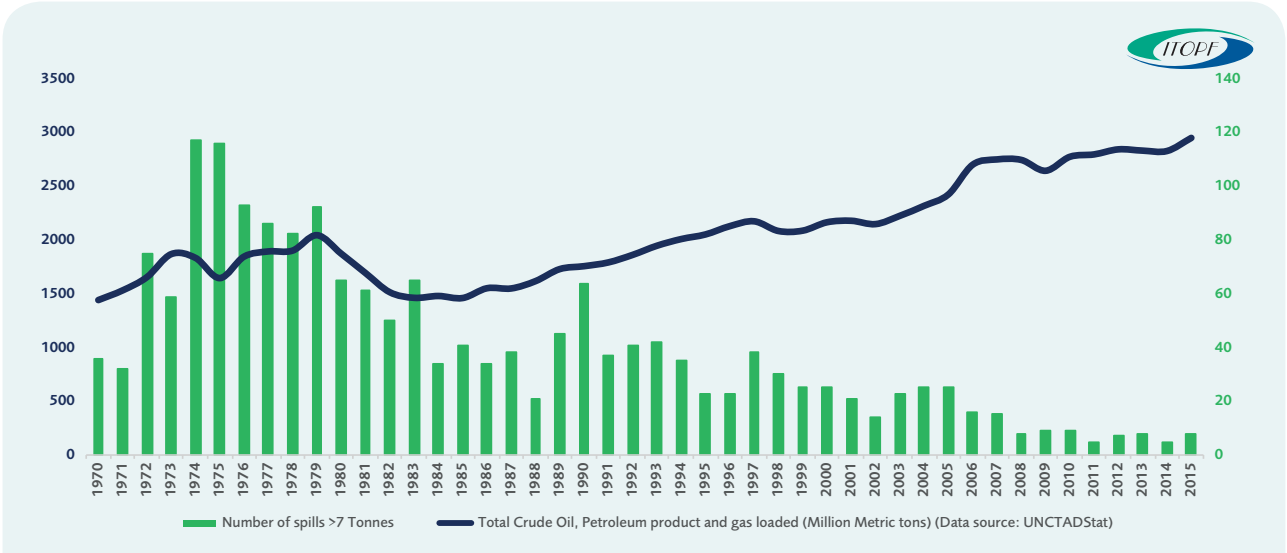


Figure 8: Decline in number of tanker spills vs growth in crude, petroleum and gas loaded

Causes of Spills

The causes and circumstances of oil spills are varied, but can have a significant effect on the final quantity spilt. The following analysis explores the incidence of spills of different sizes in terms of the operation that the vessel was undertaking at the time of the incident and the primary cause of the spill. For small and medium sized spills, operations have been grouped into Loading/Discharging, Bunkering, Other Operations and Unknown Operations. Other Operations includes activities such as ballasting, de-ballasting, tank cleaning and when the vessel is underway.

Reporting of larger spills tends to provide more information and greater accuracy, which has allowed further breakdown of vessel operations. Therefore, operations for larger spills have been grouped into Loading/Discharging, Bunkering, At Anchor (Inland/Restricted waters), At Anchor (Open water), Underway (Inland/Restricted waters), Underway (Open water), Other Operations and Unknown Operations. The primary causes have been designated to Allisions/Collisions, Groundings, Hull Failures, Equipment Failures, Fires and Explosions, and Others/Unknown. Other causes include events such as heavy weather damage and human error. Spills where the relevant information is not available have been designated as Unknown.

Small and medium sized spills account for 95% of all the incidents recorded. While the cause of these spills is largely unknown, a large percentage; 40% and 29% respectively, occurred during loading and discharging operations which normally take place in ports and oil terminals (Figures 9 and 12). It can be seen that equipment and hull failures account for approximately 46% of these incidents for both size categories (Figures 11 and 14). Nevertheless, when considering Other Operations there is a significant difference in the percentage of allisions, collisions and groundings between these two size groups where we see the percentage increasing from 2% for smaller spills to 47% for medium spills (Figures 11 and 14).

Large spills account for the remaining 5% of all the incidents recorded and the occurrence of these incidents has significantly decreased over the past 47 years. From Figure 15, it can be seen that 50% of large spills occurred while the vessels were underway in open water; allisions, collisions and groundings accounted for 59% of the causes for these spills (Figure 17). These same causes account for an even higher percentage of incidents when the vessel was underway in inland or restricted waters, being linked to some 99% of spills. Restricted waters include incidents that occurred in ports and harbours.

Perhaps unsurprisingly, activities during loading or discharging result in significantly more small or medium sized spills than large spills. However, large spills do still occur during loading and discharging, and from Figure 17 and Table 6, it can be seen that 57% of these incidents were caused by fires, explosions and equipment failures.

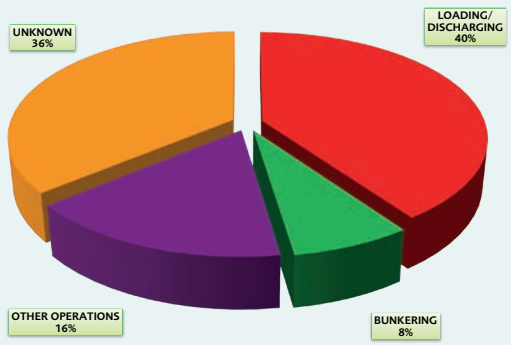


Figure 9: Incidence of spills <7 tonnes by operation at time of incident, 1974–2016

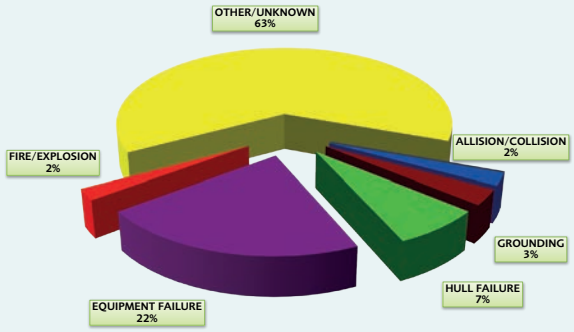


Figure 10: Incidence of spills <7 tonnes by cause, 1974–2016

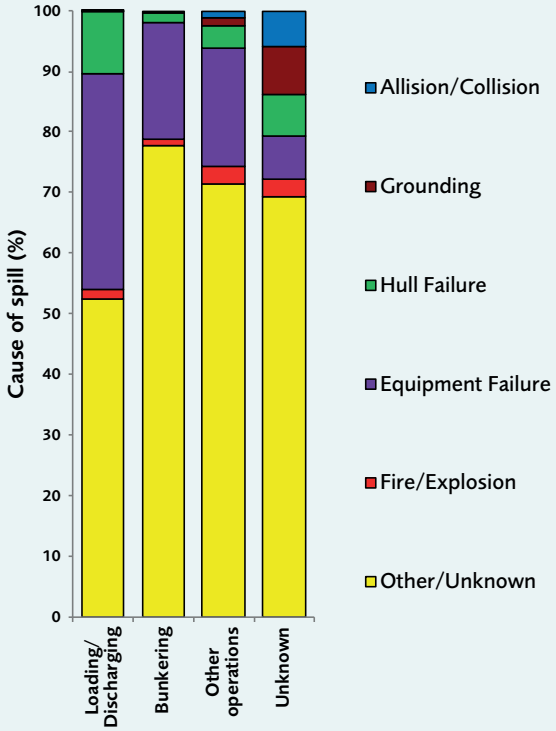


Figure 11: Incidence of spills <7 tonnes by operation at time of incident and primary cause of spill, 1974–2016

	Operations				
	Loading/ Discharging	Bunkering	Other Operations	Unknown	Total
	3,178	**582**	**1,290**	**2,848**	**7,898**
Causes					
Allision/Collision	3	2	16	169	**190**
Grounding	2	0	15	223	**240**
Hull Failure	325	10	47	195	**577**
Equipment Failure	1,134	112	253	203	**1,702**
Fire/Explosion	50	5	36	83	**174**
Other	843	291	518	164	**1,816**
Unknown	821	162	405	1,811	**3,199**
Total	**3,178**	**582**	**1,290**	**2,848**	**7,898**

Table 4: Incidence of spills <7 tonnes by operation at time of incident and primary cause of spill, 1974–2016

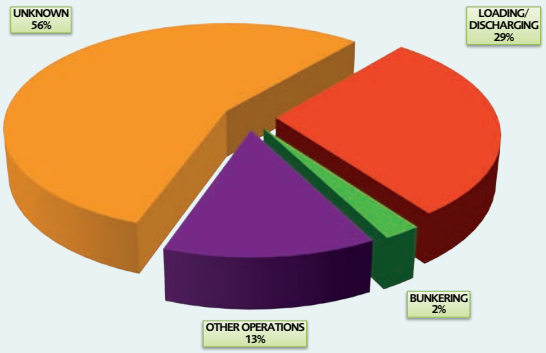


Figure 12: Incidence of spills 7–700 tonnes by operation at time of incident, 1970–2016

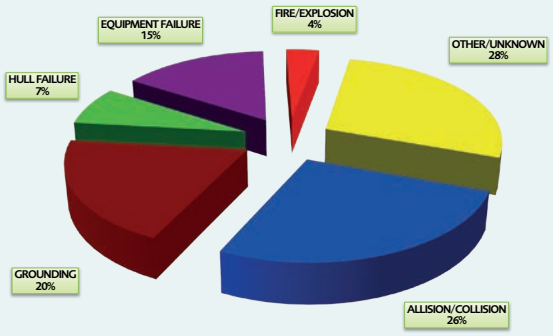


Figure 13: Incidence of spills 7–700 tonnes by cause, 1970–2016

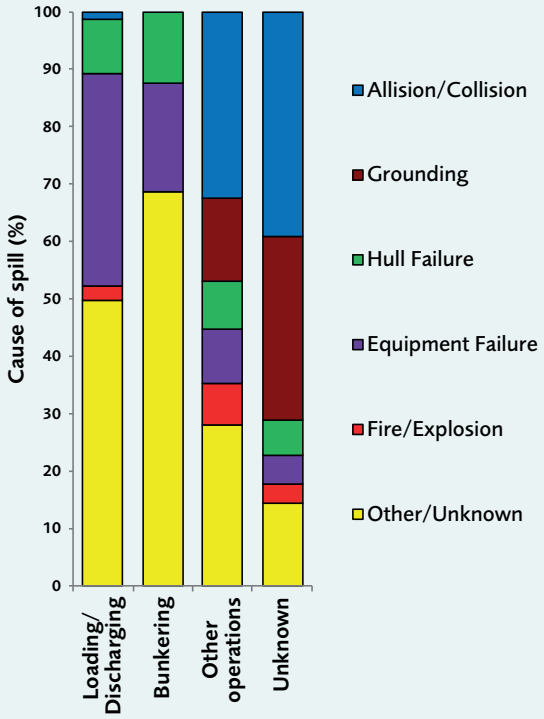


Figure 14: Incidence of spills 7–700 tonnes by operation at time of incident and primary cause of spill, 1970–2016

	Operations				
	Loading/ Discharging	Bunkering	Other Operations	Unknown	Total
	395	**32**	**179**	**762**	**1,368**
Causes					
Allision/Collision	5	0	58	299	**362**
Grounding	0	0	26	244	**270**
Hull Failure	37	4	15	45	**101**
Equipment Failure	147	6	17	39	**209**
Fire/Explosion	9	0	13	26	**48**
Other	98	13	36	28	**175**
Unknown	99	9	14	81	**203**
Total	**395**	**32**	**179**	**762**	**1,368**

Table 5: Incidence of spills 7–700 tonnes by operation at time of incident and primary cause of spill, 1970–2016

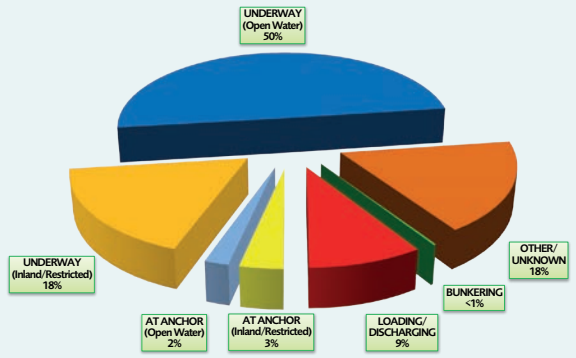


Figure 15: Incidence of spills >700 tonnes by operation at time of incident, 1970–2016

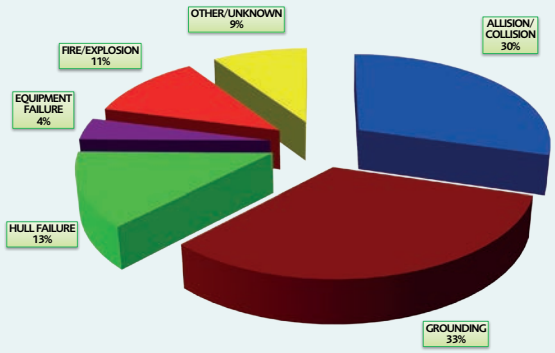


Figure 16: Incidence of spills >700 tonnes by cause, 1970–2016

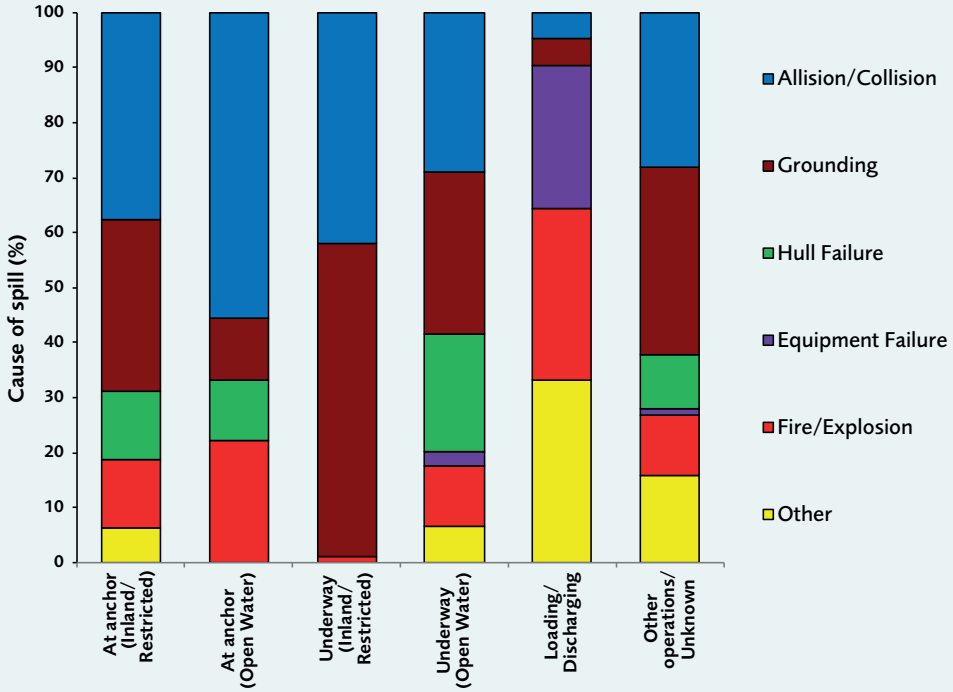
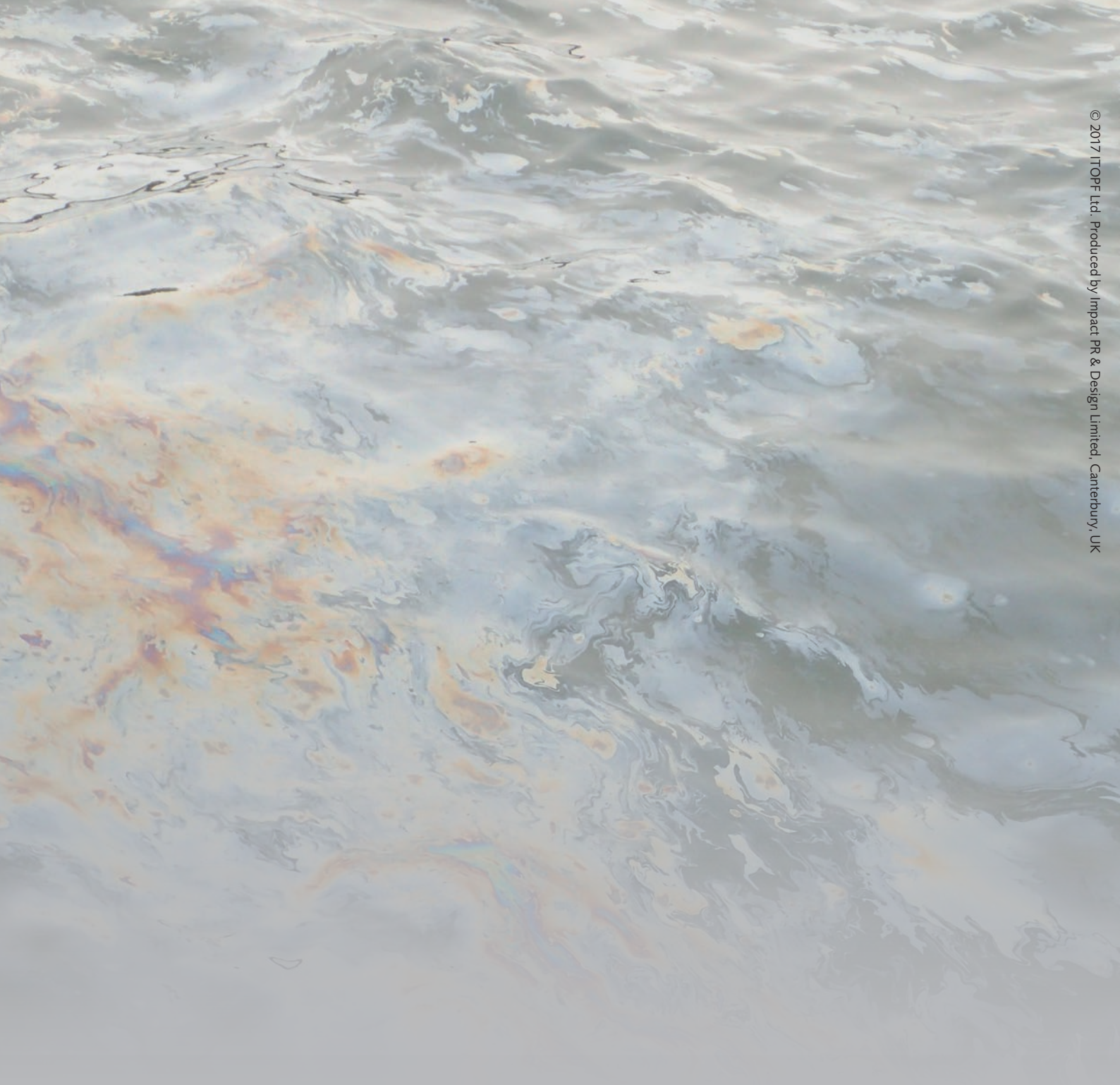


Figure 17: Incidence of spills >700 tonnes by operation at time of incident and primary cause of spill, 1970–2016

	Operations							
	At Anchor (Inland/ Restricted)	At Anchor (Open Water)	Underway (Inland/ Restricted)	Underway (Open Water)	Loading/ Discharging	Bunkering	Other Operations/ Unknown	Total
	16	**9**	**81**	**229**	**42**	**1**	**81**	**459**
Causes								
Allision/Collision	6	5	34	66	2	0	23	**136**
Grounding	5	1	46	68	2	0	28	**150**
Hull Failure	2	1	0	49	0	0	8	**60**
Equipment Failure	0	0	0	6	11	0	1	**18**
Fire/Explosion	2	2	1	25	13	1	9	**53**
Other	1	0	0	14	8	0	7	**30**
Unknown	0	0	0	1	6	0	6	**13**
Total	**16**	**9**	**81**	**229**	**42**	**1**	**82**	**460**

Table 6: Incidence of spills >700 tonnes by operation at time of incident and primary cause of spill, 1970–2016



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