

OIL SPILL INTELLIGENCE REPORT INTERNATIONAL OIL SPILL DATABASE: TRENDS IN OIL SPILL VOLUMES AND FREQUENCY¹

Dagmar Schmidt Etkin and Jeff Welch
Oil Spill Intelligence Report
37 Broadway, Suite 1
Arlington, MA 02174

ABSTRACT: *The Oil Spill Intelligence Report International Oil Spill Database contains records of more than 4100 major oil spill incidents (involving at least 10,000 gallons) that have occurred worldwide since Oil Spill Intelligence Report began publication in 1978. The database tracks the date, source, owner, gallons spilled, location, causes, and type of oil spilled. This poster also presents graphs that illustrate various trends in spill patterns over the 1978–1995 period. The OSIR research staff updates the database weekly after contact with various sources from around the world.*

Discussion

Data indicating reduced oil spillage, both in terms of volume and the number of incidents, may lead observers to conclude that there is a downward trend in spillage rates, especially in light of an apparently dramatic reduction in spills from 1991 to 1995, as shown in Figure 1. An apparent downward trend might lead to speculation that improved spill prevention efforts have had a significant effect on reducing the number and size of spill incidents. But viewed over a longer time frame, this appears not to be the case.

There are several indications why a downward trend is probably not occurring. As shown in Figure 1, spill volumes have fluctuated widely every year since 1978. The 1995 data may just represent a temporary downward fluctuation that is part of erratic cycling over the long term. Another indicator is that, in any one year, one or more very large spills (more than 10 million gallons) can dramatically skew the data (Table 1), while the *actual* number of incidents does not change significantly (Table 2 and Figure 2).

Although the *annual volume* of all the spills in the smallest range depicted (10,000–100,000 gallons each) appears insignificant when stacked against the volume contributions from larger categories, the *incidence* of spills in this group is consistently the highest out of the four categories shown. Figure 2 depicts the annual number of incidents in each of the size categories shown in Figure 1.

As is typical of frequency distributions, Figure 2 illustrates how the annual number of oil spills in a given size range increases in the smaller categories, since these are more likely to occur. The U.S. Coast Guard estimates that spills of 1000 gallons or more (a wider subset than those represented here) represent less than 4% of the *total* number of oil spills in the United States. Based on this, we can assume that if our database was expanded to include all oil spills (instead of starting with a floor of 10,000 gallons) the lines representing frequency of even smaller spills would occupy continually higher regions on the chart as the depicted size range decreased. But it is also likely that the *total amounts* spilled by these smaller categories would not affect the pattern of annual volumes depicted in Figure 1, for the reason explained earlier, namely, the

tendency of a small number of high-volume spills to have the greatest influence on the total volume spilled.

For every year since 1978, *Oil Spill Intelligence Report (OSIR)* data indicate more spills from nonvessel sources than from vessels. Several major nonvessel oil spills in recent years have helped increase public awareness of their severity, for example, the Uzbekistan well blowout in 1992 and the 1994 Usinsk spill, as well as the San Jacinto, Texas, spills due to line pressure from record floods. But public opinion and policy developments continue to suggest that the perceived threat from vessels is greater.

The effects of spills from nonvessel sources have more recently begun to attract some publicity through the ongoing discovery of cumulative slow leaks. These spills are not necessarily reflected in the statistics, since they often continue for years or sometimes decades and frequently involve multiple sources and locales rather than single, isolated events. Reliable data on these spills are difficult to obtain and verify given the nature of the events.

Even when information on a spill is readily available, there can still be inconsistencies in the records. Reports of spill volumes often vary because of problems estimating the amount of oil actually spilled or how much oil was on board a vessel or within a storage tank at the time of the spill. To the fullest extent possible, *OSIR* attempts to verify details about a spill.

The spill volumes listed in the accompanying figures and tables refer to the amount of oil spilled and not necessarily the net amount released into the environment. Spills in certain settings, such as tank farms with containment areas, often have high recovery rates and release minimal amounts of product into local waterways or soil. We base our figures on the original amount spilled to provide a more complete picture of the likelihood of accidental releases, so that subsequent prevention and control efforts can be as thorough and comprehensive as possible.

Updated weekly, the database currently contains records on more than 4000 oil spills involving at least 10,000 gallons or that were classified as major by the reporting agency, if no spill data were available. In addition, the database now contains records of significant spills prior to 1978 for which information is available.

Biography

Dagmar Etkin has a Ph.D. in biology from Harvard University and has been the research editor for the *Oil Spill Intelligence Report* since 1989. She is the author of numerous reports on oil spills.

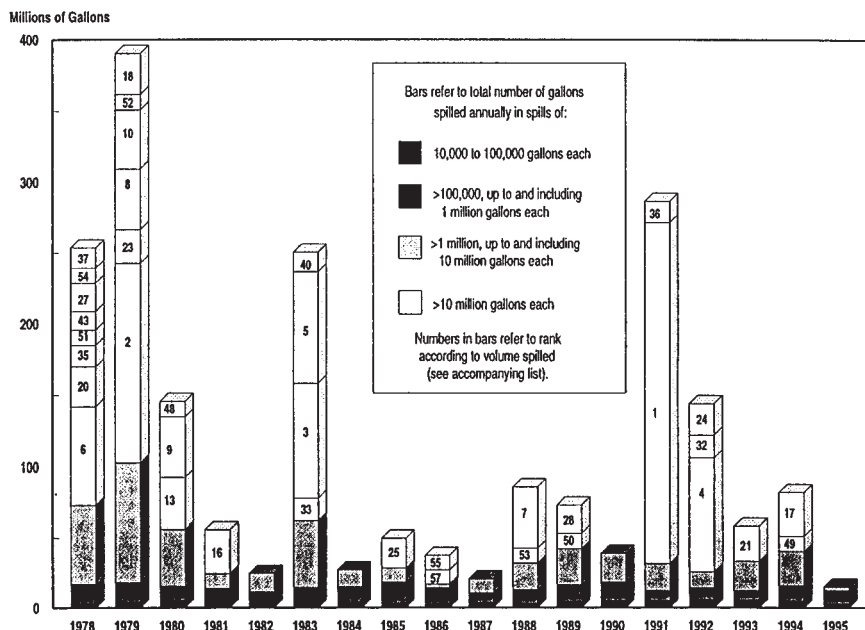


Figure 1. Gallons spilled annually according to size range (see text for a roster of major oil spills corresponding to the numbers on chart)

Table 1. Oil spills involving more than 10 million gallons,

1. January 26, 1991; terminals, tankers; 8 sources total Sea Island installations; Kuwait; off coast in Persian Gulf and in Saudi Arabia (240.0)
2. June 3, 1979; Ixtoc I well; Mexico; Ciudad del Carmen (140.0)
3. February 4, 1983; platform No. 3 well; Nowruz Field, Arabian Gulf (80.0)
4. March 2, 1992; oil well; Uzbekistan; Fergana Valley approximately 500 km from Namangan (80.0)
5. August 6, 1983; tanker *Castillo de Bellver*; South Africa; 110 km northwest of Cape Town (78.5)
6. March 16, 1978; tanker *Amoco Cadiz*; France; off Portsall, Brittany (68.7)
7. November 10, 1988; tanker *Odyssey*; Canada; 730 miles northeast of St. Johns, Newfoundland, North Atlantic (43.1)
8. July 19, 1979; tanker *Atlantic Empress*; 32 km northeast of Trinidad-Tobago (42.7)
9. August 1, 1980; production well D-103 concession well; 800 km southeast of Tripoli, Libya (42.0)
10. August 2, 1979; tanker *Atlantic Empress*; 450 km east of Barbados (41.5)
11. March 18, 1967; tanker *Torrey Canyon*; United Kingdom (38.2)
12. December 19, 1972; tanker *Sea Star*; Gulf of Oman (37.9)
13. February 23, 1980; tanker *Irenes Serenade*; Greece; Pilos (36.6)
14. December 7, 1971; tanker *Texaco Denmark*; Belgium (31.5)
15. February 23, 1977; tanker *Hawaiian Patriot*; United States; Pacific Ocean 593 km west of Kauai Island, Hawaii (31.2)
16. August 20, 1981; storage tanks; Kuwait; Shuaybah (31.2)
17. October 25, 1994; pipeline; Russia; Usinsk (in area that was closed to foreigners before USSR collapse) (30.7)
18. November 15, 1979; tanker *Independentza*; Turkey; Bosphorus Strait near Istanbul (28.9)
19. February 11, 1969; tanker *Julius Schindler*; Portugal; Azores Islands (28.4)
20. May 25, 1978; No. 126 well and pipeline; Iran; Ahvazin (28.0)
21. January 5, 1993; tanker *Braer*; United Kingdom; Garth Ness, Shetland Islands (25.0)
22. January 29, 1975; tanker *Jakob Maersk*; Portugal; Porto de Leisoes (24.3)
23. July 6, 1979; storage tank #6; Nigeria; Forcados (23.9)
24. December 3, 1992; double-bottom tanker *Aegean Sea*; Spain; La Coruña harbor (21.9)
25. December 6, 1985; tanker *Nova*; 140 km south of Kharg Island, Arabian Gulf (21.4)
26. February 27, 1971; tanker *Wafra*; Atlantic Ocean south of South Africa (20.2)
27. December 11, 1978; fuel storage depot n/a; Zimbabwe (then Rhodesia); Salisbury (20.0)
28. December 19, 1989; tanker *Khark 5*; Atlantic Ocean, 100 nautical miles from Moroccan coast (20.0)
29. March 20, 1970; freighter *Othello*; Sweden; Tralhavet Bay east of Vaxholm (18.0)
30. May 13, 1975; tanker *Epic Colocotronis*; Puerto Rico; Caribbean Sea, 111 km northwest of Puerto Rico (18.0)
31. December 6, 1960; tanker *Sinclair Petrolore*; Brazil (17.6)
32. April 17, 1992; tanker *Katina P.*; Mozambique; Maputo Bay (later broke in two while under tow 180 km from coast of South Africa) (16.0)
33. January 7, 1983; tanker *Assimi*; Ras al Hadd, 58 miles from Muscat, Oman, in the Gulf of Oman (15.8)
34. November 9, 1974; tanker *Yuyo Maru No. 10*; Japan; Tokyo Bay; Honshu Island (15.8)
35. June 12, 1978; storage tanks; Japan; Sendai, offshore Miyagi prefecture (15.0)
36. May 28, 1991; tanker *ABT Summer*; Angola; open water 700–800 miles off coast in the Atlantic Ocean (15.0)
37. December 31, 1978; tanker *Andros Patria*; Spain; Bay of Biscay off Cape Villano (14.6)
38. June 13, 1968; tanker *World Glory*; South Africa; Durban, Indian Ocean (14.2)

Table 1. (continued)

39. <i>January 13, 1975; tanker British Ambassador; Japan; Pacific Ocean, 333 km west of Iwo Jima Island (14.2)</i>	48. December 29, 1980; tanker <i>Juan A. Lavalleja</i> ; Algeria; Arzew Harbor (11.0)
40. December 9, 1983; tanker <i>Pericles GC</i> ; Qatar; 30 km east-north-east of Doha in the Persian Gulf (14.0)	49. October 21, 1994; tanker <i>Thanassis A.</i> ; Hong Kong; 700 km off coast in international waters (10.9)
41. <i>August 9, 1974; tanker Metula; Chile; Straits of Magellan; Satellite Bank (13.9)</i>	50. March 24, 1989; tanker <i>Exxon Valdez</i> ; United States; Prince William Sound, Valdez, Alaska (10.8)
42. <i>June 1, 1970; tanker Ennerdale; Indian Ocean, near Seychelles (13.8)</i>	51. October 19, 1978; pipeline; Turkey; Mardin (10.7)
43. December 7, 1978; tanker <i>Tadotsu</i> ; Indonesia; Strait of Malacca, near Dumai (13.2)	52. November 1, 1979; tanker <i>Burmah Agate</i> ; United States; Galveston Bay, Texas (10.7)
44. <i>February 29, 1968; tanker Mandoil II; United States; Atlantic Ocean off east coast (12.6)</i>	53. April 22, 1988; tanker <i>Athenian Venture</i> ; Canada; international waters 350–400 miles SE of Cape Race, Newfoundland (10.6)
45. <i>June 10, 1973; tanker Napier; Chile; Southeast Pacific Ocean off west coast of Chile (11.3)</i>	54. December 14, 1978; storage tank; United States; Benuelan, Puerto Rico (10.5)
46. <i>June 11, 1972; tanker Trader; Greece; Mediterranean Sea off east coast Greece (11.0)</i>	55. October 23, 1986; production well Abkatun 91; Mexico; Bahí de Cempeche, 40 miles NW of Ciudad del Carmen (10.4)
47. <i>August 18, 1974; refinery Mizushima Refinery; Japan; Japan Seto Inland Sea (11.0)</i>	56. <i>February 6, 1976; tanker St. Peter; Colombia; Pacific Ocean, 56 km west of Punta Manglares (10.3)</i>
	57. April 27, 1986; storage tank n/a; Panama; Colón, Las Minas Bay (10.1)

1. Ranked by volume; number in parentheses refers to millions of gallons spilled. Incidents listed in italics occurred before 1978 and are not represented in accompanying charts.

Table 2. Gallons spilled annually according to size range

	10,000–100,000 gallons each		>100,000 gallons, ≤1 million gallons		>1 million, ≤10 million gallons		>10 million gallons		Total	
	Spills	Gallons	Spills	Gallons	Spills	Gallons	Spills	Gallons	Spills	Gallons
1978	73	3,281,000	43	13,778,000	17	56,152,000	8	180,662,000	172	253,873,000
1979	98	4,202,200	46	13,964,000	19	84,498,000	6	287,715,000	219	390,379,200
1980	149	5,268,600	42	10,411,000	14	40,212,000	3	89,560,000	287	145,451,600
1981	117	3,887,000	35	10,040,000	2	10,593,000	1	31,165,000	193	55,685,000
1982	101	2,744,000	33	8,736,000	5	13,281,000	0	0	191	24,761,000
1983	120	3,539,000	31	11,222,000	13	47,494,000	4	188,300,000	203	250,555,000
1984	131	4,086,000	48	11,177,000	6	11,914,000	0	0	198	27,177,000
1985	110	3,372,500	52	15,031,000	2	9,900,000	1	21,352,000	171	49,663,500
1986	98	2,650,800	31	11,793,000	2	2,562,000	2	20,454,000	193	37,459,800
1987	126	3,659,100	24	7,243,000	5	9,852,000	0	0	186	20,763,100
1988	108	3,111,900	32	9,928,000	7	18,957,000	2	53,702,000	154	85,698,900
1989	154	4,435,400	42	12,266,800	7	25,577,000	2	30,800,000	208	73,079,200
1990	152	5,086,800	41	13,197,700	7	20,500,000	0	0	208	38,784,500
1991	202	5,163,500	27	7,414,200	6	19,094,000	2	255,000,000	254	286,691,700
1992	221	6,100,300	37	8,443,800	4	11,308,000	3	117,900,000	277	143,767,100
1993	209	5,841,700	27	6,744,400	7	20,753,000	1	25,000,000	257	58,345,100
1994	171	5,009,600	41	11,234,000	7	24,181,000	2	41,600,000	243	82,051,000
1995	111	3,248,200	30	9,502,600	2	2,573,100	0	0	152	15,324,700

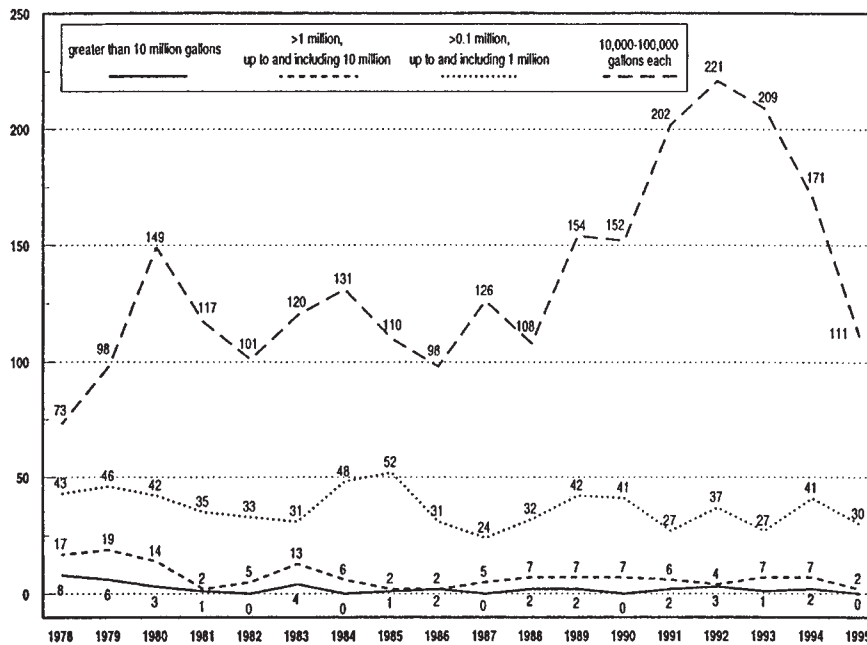


Figure 2. Annual number of oil spills by size range, 1978–1995