OCS Oil Spill Facts

1 barrel = 42 gallons; 1 billion is 10^9

NRC's "Oil in the Sea"

In 2002, the National Research Council (NRC) of the National Academy of Sciences completed "Oil in the Sea III", its third examination of petroleum inputs into marine waters worldwide. Although direct comparisons between the 1975, 1985, and 2002 reports are difficult due to use of differing computational techniques, it is clear that petroleum inputs from other than natural sources have decreased significantly over three decades. Total petroleum input estimates decreased from 43 million barrels per year (MMbbl/yr) to 23 MMbbl/yr between the 1975 and 1985 reports, a 47-percent decrease. In the 2002 report, total petroleum inputs continued to decrease to 9 MMbbl/yr, a 61-percent decrease from the 1985 report estimate (Fig. 1.)

In the 2002 report, worldwide offshore oil and gas development is responsible for only 4 percent of the petroleum in the world's marine environment (Fig. 2). Offshore oil and gas petroleum development inputs per annum decreased from 0.56 MMbbl in the 1975 report to 0.35 MMbbl in the 1985 and 2002 reports. At the same time, annual offshore oil production increased from 2.3 billion barrels (Bbbl) to 4.6 Bbbl, to 7.0 Bbbl between the three reporting periods. This demonstrates a significant reduction in petroleum inputs per Bbbl of production from offshore oil and gas development between the three reporting periods—from 243,000 bbl/Bbbl in the 1975 report, to 76,000 bbl/Bbbl in the 1985 report, to 50,000 bbl/Bbbl in the 2002 report—despite large increases in production. So, even though worldwide production increased 52 percent, petroleum inputs were approximately the same (0.35 MMbbl per annum) between the 1985 and 2002 reports. The 2002 report also made estimates for North America, where offshore oil and gas development was found to be responsible for only 2 percent of the petroleum inputs in North America's marine environment.

In the 2002 NRC report**, natural seepage was the largest single source of petroleum in the worldwide marine environment, contributing over 4 MMbbl/yr, 47-percent of total inputs. In North America, natural seepage is the largest input, contributing 63 percent of total inputs to the marine environment. Municipal and industrial waste is responsible for 12 percent of worldwide petroleum inputs and 22 percent of petroleum inputs in North American marine waters. Marine transportation is responsible for 33 percent of worldwide petroleum inputs and only 3 percent of inputs in North American marine waters.

Fig. 1

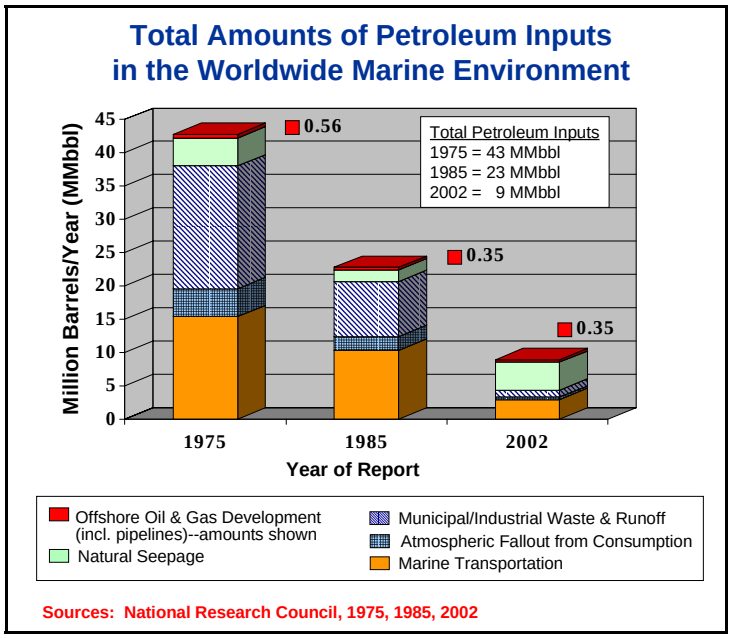
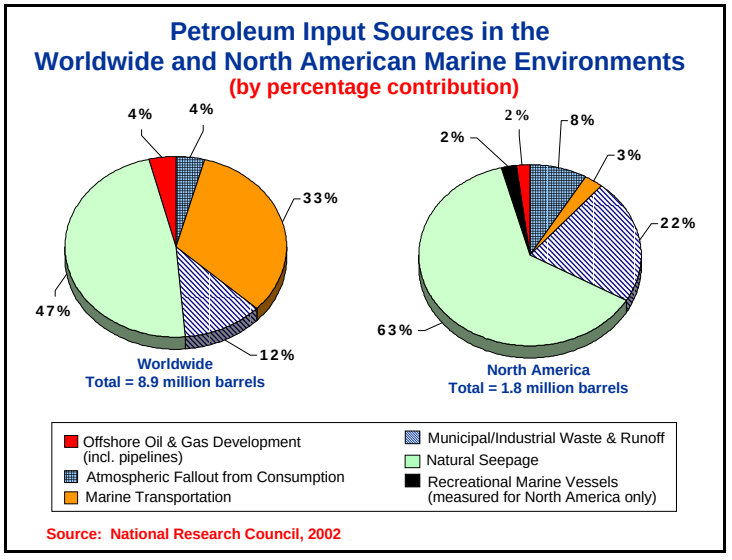


Fig. 2



**In its 2002 report, the NRC concludes that it most likely underestimated worldwide natural seepage at less than 2 MMbbl/yr in the 1985 NRC report, so that the change should not be viewed as an increase. There is a minimal amount of data on natural seepage which requires broad extraction to develop worldwide estimates. However, the majority of the available research focuses on the U.S. Gulf of Mexico, Southern California, and some areas in Alaska.

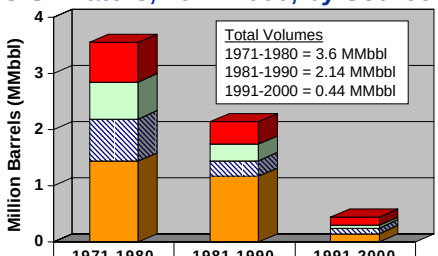
Oil Pollution Incidents in U.S. Waters: 1971-2000

The U.S. Coast Guard produces the publication "Pollution Incidents In and Around U.S. Waters, A Spill Release Compendium, 1969-2000." Figure 3 shows the spillage by source for oil spills occurring in U.S. waters between 1971 and 2000.

- Between 1971 and 2000, the U.S. Coast Guard identified more than 250,000 oil spills in U.S. waters totaling 6.18 MMbbl. Total spillage declined significantly between the decades from 94,714 spills totaling 3.60 MMbbl (1971-1980), to 67,260 spills totaling 2.14 MMbbl (1981-1990), to 88,197 spills totaling 0.44 MMbbl (1990-2000). The number of spills increased in the last decade due to better reporting of spills less than 100 gallons..
- Between 1971 and 2000, tankers and barges were responsible for 45 percent of the volume of oil spilled in U.S. waters. However, spillage from tankers and barges in U.S. waters has declined dramatically over the three decades, with their spillage during 1991-2000 having declined to one-tenth of the spillage during 1971-1980.
- Between 1971 and 2000, pipelines were responsible for 16 percent of the volume of oil spilled in U.S. waters. This includes both onshore and offshore pipelines. Onshore, not offshore, spills are the source of most of the pipeline spillage into U.S. waters—92 percent or more in each decade.
- Between 1971 and 2000, U.S. OCS offshore facilities and pipelines accounted for only 2 percent of the volume of oil spilled in U.S. waters.

Fig. 3

Volumes (MMbbl) of Oil Spills in U.S. Waters, 1971-2000, by Source



	1971-1980	1981-1990	1991-2000
*Other Sources	0.71	0.4	0.14
Offshore & Onshore Pipelines	0.66	0.29	0.05
Facilities	0.75	0.28	0.1
Tankers& Barges	1.44	1.17	0.15

* "Other Sources": other vessels, facilities, exploration & production, trucks/rail, and unknown.

Source: U.S. Coast Guard, 2002 (www.uscg.mil/hq/g-m/nmc/response/stats/aa.htm)

OCS Background

The Nation's record for safe and clean offshore natural gas and oil operations is excellent. To maintain and improve upon this excellent record, MMS continually seeks operational improvements that will reduce the risks to offshore personnel and to the environment. MMS constantly re-evaluates its procedures and regulations to stay abreast of technological advances that will ensure safe and clean operations, as well as to increase awareness of their importance.

On the U.S. Outer Continental Shelf (OCS), there are more than 80,000 workers in offshore and related support activities. The infrastructure includes more than 4,000 oil and gas production facilities and 33,000 miles of pipeline.

The MMS regulatory program prevents accidents and pollution on the Federal OCS by:

- ensuring that every OCS operator's exploration or development and production plan has an associated oil-spill contingency plan that identifies response equipment, key personnel, and response procedures;
- requiring operators to use the best and safest technologies on all new and, wherever practical, existing operations;
- inspecting safety devices and systems;
- conducting oil-spill drills;
- enforcing its regulations with a civil and criminal penalties program; and
- conducting accident investigations.

In Fiscal Year 2002, MMS spent about $6 million for research on oil-spill prediction, prevention and response technology, oil-detection systems, oil-collection methods, ocean-circulation modeling, and oil-transport simulation.

The MMS manages Ohmsett, the National Oil Spill Response Test Facility. Ohmsett is an integral part of MMS's oil-spill response research effort. The facility directly supports MMS's goal of ensuring that the best available oil-spill detection, containment, and removal technologies are available to protect the U.S. coastal and ocean environment from spills. Ohmsett is a large, above-ground test tank, which has the unique ability to tow full-sized oil-spill containment and clean-up equipment, such as booms and skimmers, in the presence of waves and a variety of test crude oils and refined petroleum products. Ohmsett has recently added the capability to conduct cold-water testing and training, including operation with broken-ice conditions in the tank. For further information on the Ohmsett facility, please visit the Ohmsett website at http://www.ohmsett.com/.

Federal OCS Oil Spills: 1985–2001

Since 1985, OCS operators have produced over 7 Bbbl of oil. The amount of oil spilled totaled about 68,500 bbl (0.001% of that produced) or about 1 bbl spilled for every 102,000 bbl produced.

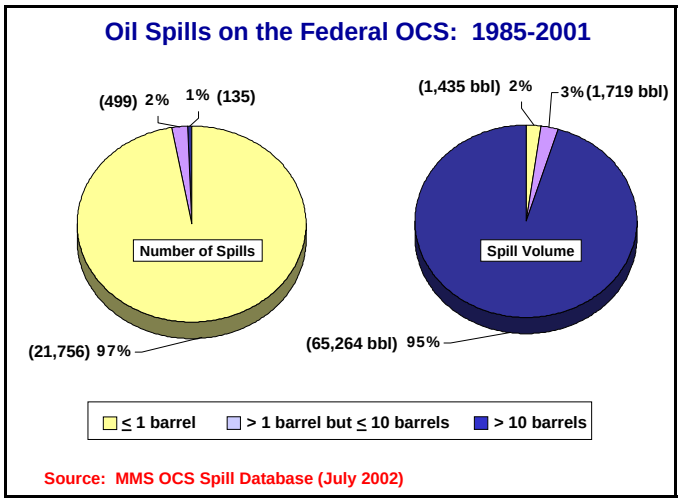
About 97 percent of the OCS spill events are 1 bbl or less in size. However, most of the oil spilled comes from spills that are greater than 10 bbl (about 1% of the spills, but 95% of the spill volume). (Fig. 4.)

Loss of well control from drilling exploratory wells accounted for only two spills that were greater than 5 bbl—a 100-bbl blowout in 1992 and a 200-bbl blowout in 2000.

The largest OCS platform spill during 1985-2001 was 643 bbl (1985). OCS pipelines accounted for nine spills greater than or equal to 1,000 bbl during this period.

Even after Hurricane Andrew in the Gulf of Mexico in 1992, where about 2,000 OCS platforms were exposed to the hurricane force winds and seas, oil spillage totaled less than 2,500 bbl. There were only two significant spills from Hurricane Andrew: a 37-bbl leak from a wellhead when the well jacket was damaged, and a 2,000-bbl pipeline spill caused by anchor damage from a drilling rig that broke loose during the storm.

Fig. 4



Federal OCS Spills: 1971-1980, 1981-1990, 1991-2000

The OCS spill history for spills greater than 1 bbl over three decades is displayed in a series of four charts (Figures 5 through 8). In each chart, OCS platform and OCS pipeline spill incidents have been displayed separately.

- OCS production increased from 3.32 Bbbl (1971-1980), to 3.41 Bbbl (1981-1990), to 4.31 Bbbl (1991-2000).
- Between 1971 and 2000, there were about 2,200 OCS oil spills greater than 1 bbl. Approximately 77 percent of these spills were from OCS platforms, and 23 percent from OCS pipelines. The total number of OCS spills decreased each decade, from 1,259 spills (1971-1980), to 592 spills (1981-1990), to 321 spills (1991-2000). Three consecutive declines also were shown for platform and pipeline spills (Fig. 5).
- The total volume spilled declined each decade, from 64,967 bbl (1971-1980), to 48,478 bbl (1981-1990), to 27,814 bbl (1991-2000). Volume spilled from platform spills declined dramatically each decade (Fig. 6). However, volume from pipeline spills increased from 36,489 bbl spilled (1971-1980) to 41,053 bbl (1981-1990), before declining significantly to 23,201 bbl (1991-2000).

Fig. 5

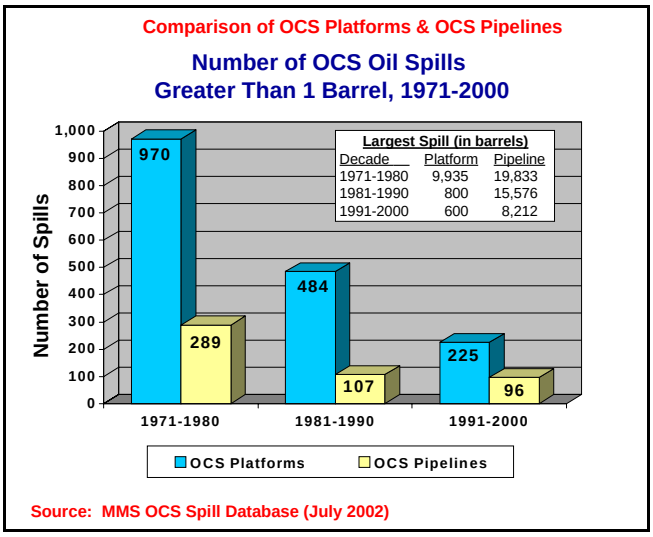
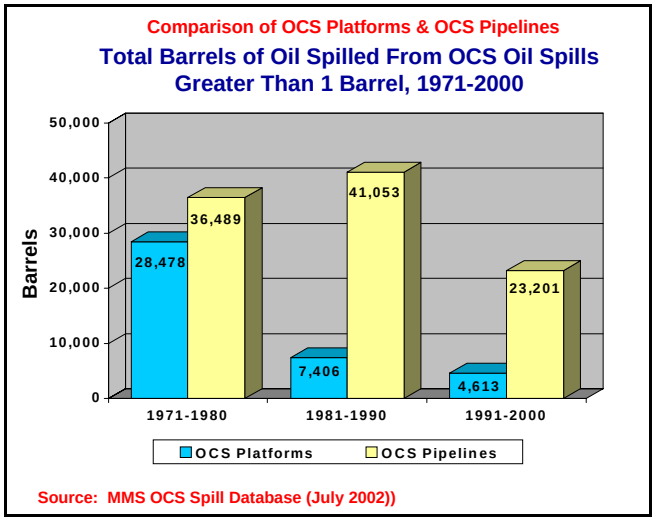


Fig. 6



- Oil-spill occurrences are distributed inversely to spill size—the larger the spill size, the fewer the spill observations. Between 1971 and 2000, 41 percent of the spills (greater than 1 bbl) were less than 3 bbl in size, 81 percent were less than 10 bbl, and 96 percent were less than 100 bbl. The cumulative spill size occurrence by spill-size distribution chart (Fig. 7) shows spill size on the x-axis with a logarithmic scale, with the percent of spills less than that spill size on the y-axis. The cumulative distribution for platform spills is shifted slightly to the left of the "All Spills" distribution, and the pipeline cumulative distribution is shifted slightly to the right of "All Spills." This is because there are more platform spills, and since 1980, all the large spills (spills greater than or equal to 1,000 bbl) have been pipeline spills. Thus, the cumulative distribution for pipelines is stretched over a wider range of spill volumes, with few observations to cluster at the lower end.

- The average spill size for the entire three decades was 65 bbl. The average spill size increased slightly over the decades, from 52 (1971-1980), to 82 (1981-1990), to 87 (1991-2000). Similar to the cumulative spill size distribution, the fact that the first decade has so many more spills, and that spills cluster at the lower spill sizes, causes its average spill size to be lower than the more recent decades. Also, the third decade having the highest average spill size does not indicate that OCS spills are getting larger. Observe total spillage and number of spills for each spill size category over the decades to see improvements or declines. Averages are a little more useful in reviewing oil-spill data within size intervals. (See Table 1 and Figure 8 showing average spill sizes for spills greater than or equal to 1 bbl and 50 bbl, respectively.)

Table 1

OCS Oil-Spill Counts, Volume Spilled, and Average Spill Sizes for Spills Greater Than 1 Barrel, by Size Category, 1971-2000

1971-1980	ALL SPILLS			PLATFORM SPILLS			PIPELINE SPILLS		
Spill Size (bbl)	No.	bbl	Avg.	No.	bbl	Avg.	No.	bbl	Avg.
All Spills	1,259	64,967	51.6	970	28,478	29.4	289	36,489	126.3
>1 - <10	1,054	3,269	3.1	834	2,591	3.1	220	678	3.1
10 - <50	154	2,535	16.5	102	1,646	16.1	52	889	17.1
50 - <100	18	1,198	66.6	12	808	67.3	6	390	65.0
100 - <1,000	25	5,741	229.6	18	3,542	196.8	7	2,199	314.1
1,000 - <5,000	4	10,456	2,614.0	2	2,956	1,478.0	2	7,500	3,750.0
5,000+	4	41,768	10,442.0	2	16,935	8,467.5	2	24,833	12,417.0

1981-1990	ALL SPILLS			PLATFORM SPILLS			PIPELINE SPILLS		
Spill Size (bbl)	No.	bbl	Avg.	No.	bbl	Avg.	No.	bbl	Avg.
All Spills	592	48,477	81.9	484	7,406	15.3	107	41,053	383.7
>1 - <10	473	1,512	3.2	392	1,246	3.2	81	267	3.3
10 - <50	78	1,433	18.4	61	1,158	19.0	16	256	16.0
50 - <100+	20	1,245	62.3	17	1,035	60.9	3	210	70.0
100 - <1,000	17	4,619	271.7	14	3,967	283.4	3	652	217.3
1,000 - <5,000	1	4,569	4,569.0	0	0	0.0	1	4,569	4,569.0
5,000+	3	35,099	11,700.0	0	0	0.0	3	35,099	35,099.0

1991-2000	ALL SPILLS			PLATFORM SPILLS			PIPELINE SPILLS		
Spill Size (bbl)	No.	bbl	Avg.	No.	bbl	Avg.	No.	bbl	Avg.
All Spills	321	27,813	86.6	225	4,613	20.5	96	23,201	241.7
>1 - <10	233	711	3.1	165	505	3.1	68	206	3.0
10 - <50	56	1,108	19.8	41	906	22.1	15	203	13.5
50 - <100+	11	731	66.5	7	475	67.9	4	256	64.0
100 - <1,000	15	3,868	257.9	12	2,727	227.3	3	1,140	380.0
1,000 - <5,000	5	13,184	2,636.8	0	0	0.0	5	13,184	2,636.8
5,000+	1	8,212	8,212.0	0	0	0.0	1	8,212	8,212.0

Source: MMS OCS Spill Database (July 2002).

Fig. 7

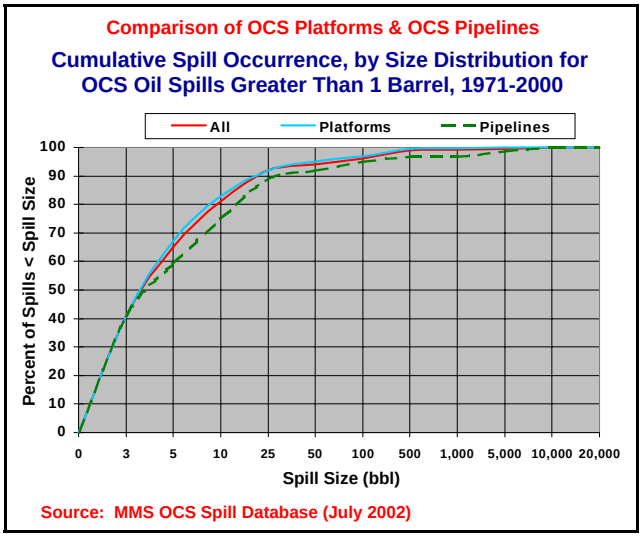
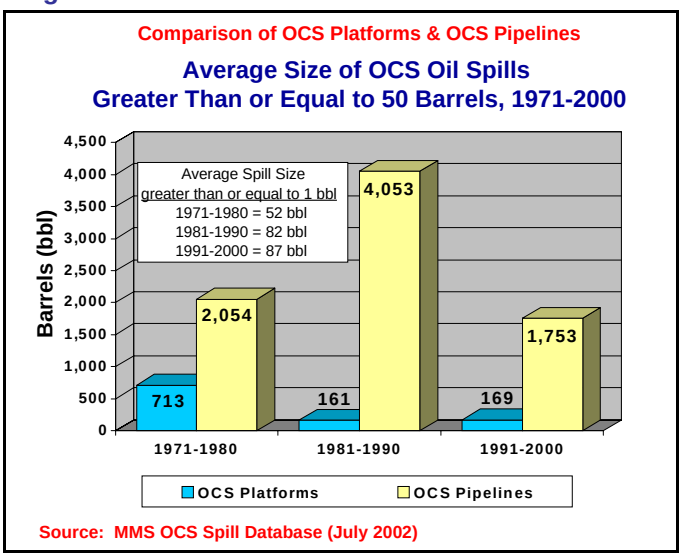
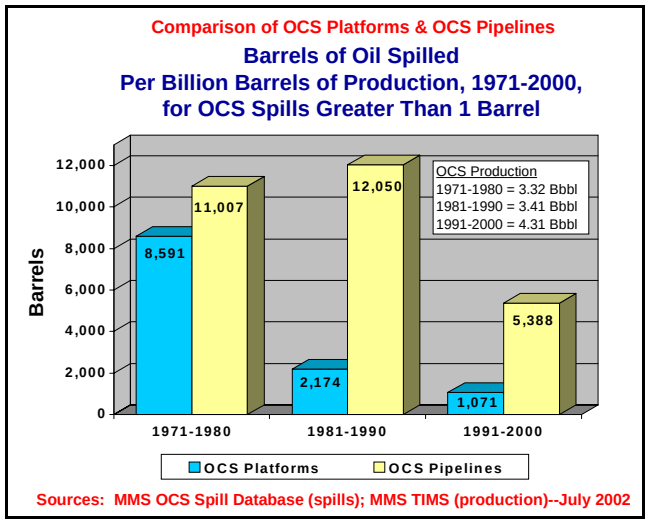


Fig. 8



- Most of the OCS oil spills greater than 1 bbl are small. The median spill size for the entire 3 decades was 3.0 bbl. The median spill size was 3.0 bbl for each of the first two decades, and 3.5 bbl in the most recent decade reported (1991-2000).
- Total barrels spilled per billion barrels produced (bbl/Bbbl) was 12,800 bbl/Bbbl over all three decades. The spillage per Bbbl production improved over the three decades from 19,600 bbl (1971-1980), to 14,200 bbl (1981-1990), to 6,500 bbl (1991-2000) (Fig. 9).
- There have been 11 OCS platform spills greater than or equal to 1,000 bbl since 1964. Most of the large platform spills occurred prior to 1971. The last one (1,456 bbl) occurred in 1980 (see Table 2).
- There have also been 17 OCS pipeline spills greater than or equal to 1,000 bbl since 1964. Pipeline spills have persisted throughout OCS history. However, the largest spill sizes have declined from one decade to the next (see Table 2).

Fig. 9



Federal OCS Activities and U.S. Natural Oil Seeps

Natural hydrocarbon seeps are common in the Gulf of Mexico and offshore southern California and coastal Alaska. Seeps are found where oil and/or natural gas-bearing strata intersect the earth's surface, or where they are tapped by faults and fractures. An estimated 1,700 bbl of oil seep naturally each day from the seabed or coastal areas into U.S. marine waters (NRC, 2002). Natural seeps introduce 150 times more oil into U.S. marine waters than do OCS oil and gas activities.

Table 2

Spills Greater Than or Equal to 1,000 Barrels From OCS Oil & Gas Operations

Year	Type of Accident	Spillage (bbl)	Location
	Pre-1971		
1964	Platform freighter collision, fire	2,559	Eugene Island
1964	5 platforms destroyed by hurricane 3 platform blowouts 5,180 bbl 1 platform blowout 5,100 bbl 1 platform storage oil loss 1,589 bbl	11,869	Eugene Island Ship Shoal Ship Shoal
1965	Platform blowout	1,688*	Ship Shoal
1967	Pipeline kinked, corrosion	160,638	West Delta
1968	Pipeline anchor damage	6,000	South Timbalier
1969	Platform blowout, platform destroyed	80,000	Santa Barbara Channel
1969	Pipeline anchor damage	7,532	Main Pass
1969	Platform blowout, storm & vessel collision	2,500	Ship Shoal
1970	Platform blowout, fire, platform destroyed	30,000	Main Pass
1970	Platform blowout, fire, platform destroyed	53,000	South Timbalier
	1971-1980		
1973	Platform, storage tank structural failure	9,935	West Delta
1973	Platform, rough seas, storage barge sank	7,000	South Pelto
1973	Pipeline leak, corrosion	5,000	West Delta
1974	Pipeline anchor damage	19,833	Eugene Island
1974	Pipeline hurricane damage	3,500	Main Pass
1976	Pipeline trawl damage	4,000	Eugene Island
1979	Platform hurricane, vessel collision	**1,500	Main Pass
1980	Platform hurricane, tank overflow	1,456	High Island
	1981-1990		
1981	Pipeline anchor damage	5,100	South Pass
1988	Pipeline anchor damage	15,576	Galveston
1990	Pipeline trawl or anchor damage	*14,423	Ship Shoal
1990	Pipeline trawl damage	4,569	Eugene Island
	1991-2000		
1992	Pipeline hurricane, anchor damage	2,000	South Pelto
1994	Pipeline trawl damage	*4,533	Ship Shoal
1998	Pipeline anchor damage	*1,211	East Cameron
1998	Pipeline hurricane damage, mudslide	8,212	South Pass
1999	Pipeline damage from jackup barge	3,200	Ship Shoal
2000	Pipeline anchor damage	2,240	Ship Shoal

*Condensate spill
** Diesel spill

Between 1970 and 2001 in the offshore southern California region, 1 Bbbl of oil were produced, while less than 1,000 bbl were spilled, from 23 active OCS platforms and their pipelines in the region (less than 175 bbl were spilled in any year). In comparison, almost 140,000 bbl of oil seep annually from sites in the southern California region, or about an estimated 4.5 MMbbl of total seepage since 1970.

Federal OCS Activities and Tankers

How oil is transported depends on the available infrastructure. In some cases, tankers are the only practical means of transporting production (e.g., from the Alaskan North Slope).

Tanker spills tend to be larger events than those from OCS pipelines, and the majority of tanker spills occur in port or near shore where the potential environmental impact is more severe.

From 1985 to 2000, for every billion barrels of oil delivered by tanker, about 9,800 bbl of domestic and imported crude oil spilled into U.S. waters (from spills greater than or equal to 1,000 bbl). This estimate does not account for spills outside U. S. waters from imported oil destined for the United States. During this same period, tankers worldwide spilled about 53,000 bbl per billion barrels delivered.

From 1985 to 2001, for every billion barrels delivered by OCS pipeline, about 8,000 bbl spilled into U.S. waters. More than 75 percent of oil spills greater than or equal to 1,000 bbl from OCS pipelines have been caused by anchor damage from marine vessels or trawler drag.

Any comparison of relative risks of oil spills between OCS production and tanker movements of oil also must recognize that about 60 percent of OCS energy production is natural gas, which poses little risk of pollution.

Oil-Spill Occurrence Rates for Spills Greater than or Equal to 1,000 Barrels

MMS uses oil-spill occurrence rates (spill rates) along with trajectory analyses to estimate the potential for spills occurring and contacting sensitive resources, and in environmental analyses for pre- and postlease activities. MMS's spill rates are based on the key assumption that spills occur in direct proportion to the volume of oil handled. The spill rates are expressed as number of spills per billion barrels of oil handled (spills/Bbbl). In 2000, MMS revised its spill rates for spills of 1,000 bbl or greater. Two spill rates were calculated for each spill source: one based on the entire data series (1964-99 for OCS platforms and pipelines, 1974-99 for tankers) and one based on the most recent 15 years (1985-99). The 15-year spill rate more strongly reflects recent trends (see Fig. 10).

The OCS platform spill rate has dropped sharply. The historical record for OCS platform spill occurrences shows a statistically significant decline in the rate since 1973. The revised rates were based on data from 1973 to 1999. The revised OCS platform spill rate (based on 1973-99 data) dropped to 0.32 spills/Bbbl produced (compared to the previous spill rate of 0.45 spills/Bbbl based on 1973-92 data). In the last 15 years (1985-99), there were zero OCS platform spills greater than or equal to 1,000 bbl. A spill rate of 0.13 spills/Bbbl was calculated based on 20 years of data (1980-99) in order to capture the last OCS platform spill, which occurred in 1980. The 0.13 spills/Bbbl is an over estimate, but is preferable to using a spill rate of zero for an event that could occur.

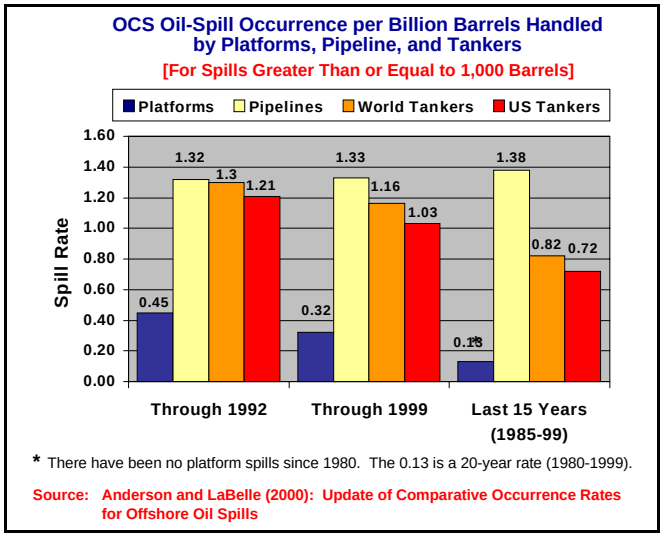
The OCS pipeline spill rate is essentially unchanged. The eight OCS pipeline spills that occurred between 1988 and 1999 eliminated a previously identified decline in spill occurrence rates between 1974 and 1987. The revised OCS pipeline spill rate of 1.33 spills/Bbbl transported (based on the entire 1964-99 spill record) reflects no significant change (compared to the previous spill rate of 1.32 spills/Bbbl based on 1964-92 data). The 15-year OCS pipeline spill rate showed a slight increase to 1.38 spills/Bbbl transported.

Tanker spill rates based on 1974-99 data decreased dramatically for tanker spills worldwide and for tanker spills in U.S. waters (compared to previous spill rates based on 1974-92 data). The spill rates for tankers worldwide decreased from 1.30 to 1.16 spills/Bbbl transported, and even further to 0.82 spills/Bbbl transported when only the most recent 15-year (1985-99) data are considered. Similarly, spill rates from tankers in U.S. waters have dropped from 1.21 to 1.03 spills/Bbbl transported, and even further to 0.72 spills/Bbbl transported (based on most recent 15-year data).

Spill Sizes

Spill size varies by spill source. The last two OCS platform spills greater than or equal to 1,000 bbl (1979 and 1980) were about 1,500 bbl each. Between 1985 and 1999, average spill sizes were 6,700 bbl for OCS pipelines, 70,100 bbl for tankers worldwide, and 22,800 bbl for tankers in U.S. waters.

Fig. 10



Oil Spills Worldwide: 1971-2000

Between 1971 and 2000, the *Oil Spill Intelligence Report* identified over 67 MMbbl spilled in approximately 7,000 spills (greater than 238 bbl). Total spillage declined dramatically each decade from 37.3 MMbbl (1971-1980), to 18.5 MMbbl (1981-1990), and 11.9 MMbbl (1991-2000). (See Fig. 11.)

Tankers and barges were responsible for 61 percent of the spillage over the three decades. Spillage from tankers and barges was reduced from 25.4 MMbbl (1971-1980), to 9.5 MMbbl (1981-1990), to 6.6 MMbbl (1991-2000). The reductions in tanker and barge spillage represent about 85 percent of the reduction in total oil spillage between the first and second decade, and were responsible for half of the reduction in total spillage between the second and third decades.

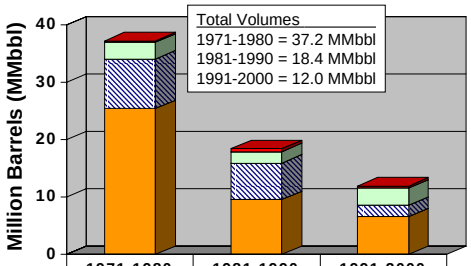
Facilities were responsible for one-fourth of the spillage over the entire 30-year period. Spillage from facilities declined significantly between the decades from 8.7 MMbbl (1971-1980), to 6.4 MMbbl (1981-1990), to 2.0 MMbbl (1991-2000).

Spillage from pipelines remained relatively constant across the decades at 2 to 3 MMbbl. Since the volume of pipeline spillage remained relatively constant across the decades while spillage from the other primary sources declined, pipelines became responsible for a larger share of the total spillage, from 8 percent (1971-1980), to 11 percent (1981-1990), to 25 percent (1991-2000).

Fig. 11

Volume (MMbbl) of Oil Spills Worldwide, 1971-2000

(Spills Greater Than 10,000 Gallons [238 Barrels])



	1971-1980	1981-1990	1991-2000
Other Sources	0.21	0.54	0.4
Offshore & Onshore Pipelines	2.91	1.97	3.01
Facilities	8.72	6.41	1.96
Tankers&Barges	25.409	9.535	6.564

* "Other Sources": other vessels, facilities, exploration & production, trucks/rail, and unknown.

Source: Oil Spill Intelligence Report "International Oil Spill Statistics: 2000"