



Telephone: (212) 867-0052

**Petroleum Industry Research Foundation, Inc.**

**122 EAST 42nd STREET**

**New York, N. Y. 10168**

**THE ROLE OF THE MAJORS IN  
OIL AND GAS EXPLORATION & PRODUCTION**

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## I. Summary and Background

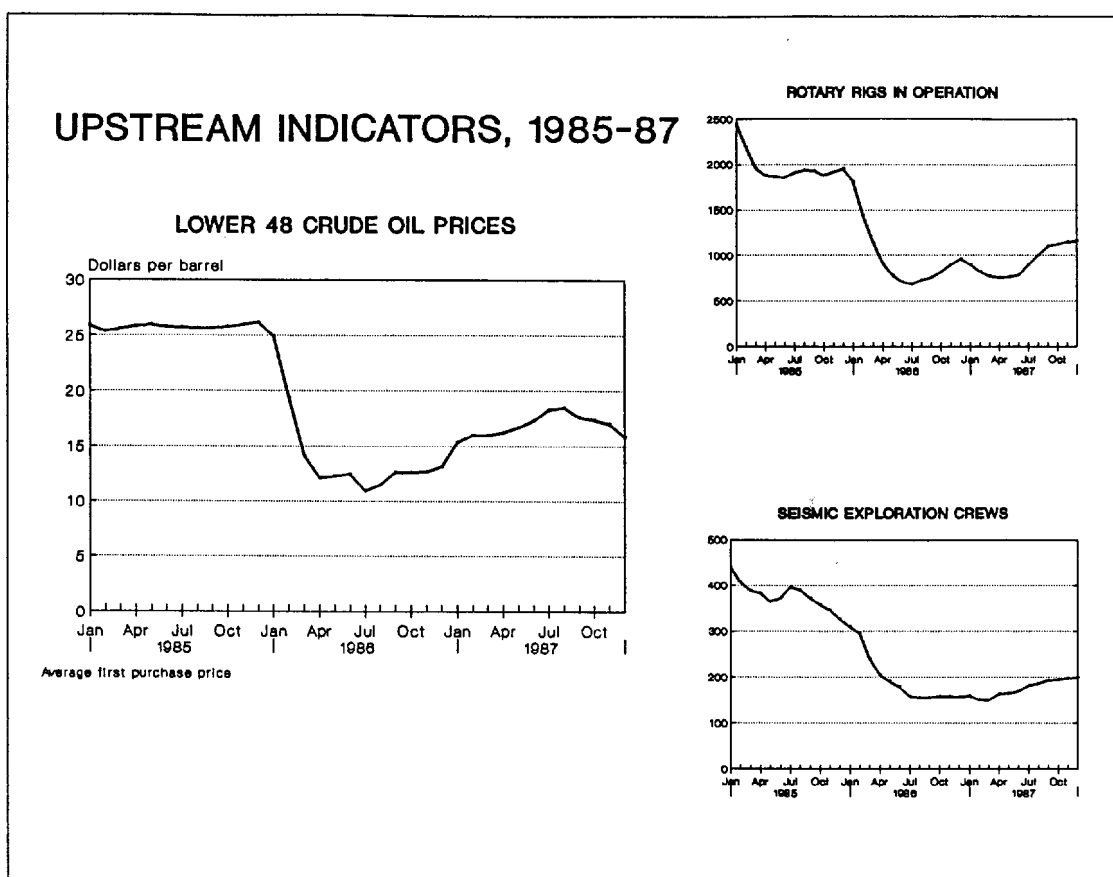
*In 1987 the large integrated companies' share of finding oil and gas in the U.S. was again disproportionately larger than their share of drilling wells--they drilled 17% of all U.S. wells and booked 31% of all oil and gas reserves (exploratory additions and net revisions/improved recovery). Excluding the extraordinary writedown of one large company's non-commercial gas reserves in Alaska, the 16 companies in this group booked 57% of all oil and gas reserves, replacing 93% of their oil and gas production, about the same replacement rate as the industry as a whole. The oil reserves they booked in 1987, 2.1 billion barrels, were well above the average 1980-87 level of 1.6 billion barrels. Only in one year, 1984, did the companies book a higher volume. Excluding the ANS gas writedown, and including their royalty owners' volumes, the large companies booked 580,000 barrels of oil and gas equivalent per well drilled in 1987, more than three times the U.S. industry average of about 170,000 barrels per well. The companies also accounted for more than half of U.S. oil and gas production in 1987 and at year-end 1987 held over two-thirds of U.S. proved oil reserves and nearly half of U.S. proved gas reserves. The shifting emphasis to foreign upstream activities, begun with the 1986 price break, continued in 1987, when a record 46% of their total exploration and development expenditures were spent abroad. (The companies' shares of U.S. totals give the large companies credit for the volumes they find, hold and produce on behalf of their royalty owners).*

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PIRINC has been following the exploration and production activities of the large integrated petroleum companies (broadly referred to as the majors) for over a decade, comparing their performance to published data on industry-wide activities in the upstream sector. U.S. drilling data come from the American Petroleum Institute; U.S. reserves data, published in September, come from the Department of Energy's Energy Information Administration (EIA). The activities of the non-majors (broadly referred to as independents) are calculated by difference. Data for the majors come from their annual reports, using information disclosed under Securities and Exchange Commission requirements. Restructuring, mergers and acquisitions have dictated that the comparisons be based on an increasingly smaller group of large companies; 16 companies are included in the 1987 data. Data for earlier years have been adjusted as necessary to assure year-to-year consistency.

The shock of the oil price collapse of 1986 caused drilling activity to plunge by 50% in that year, and well completions to fall 45%. Reserve additions from exploratory drilling were the lowest in a decade, as companies were concerned that prices were too low to justify classifying new discoveries as commercial.

**FIGURE I**



The price recovered some in 1987, reaching more than \$18 per barrel in the third quarter, and the 1987 results reflect a new optimism: rig activity's high point, at 1,162 rigs in operation in December, had regained 40% of the 1986 loss. Oil reserve additions from exploratory drilling rose 30% and upward revisions of oil reserves reached their highest level in a decade, as firms reevaluated their earlier discoveries, especially those from 1986. Price disappointments jolted the industry again in 1988, however, and many companies were using \$14-15 prices for planning purposes rather than \$18 or an even larger price recovery, dampening upstream activities anew.

Revisions are an important part of the process of proving oil and gas reservoirs. As properties are drilled for production, new information allows a reevaluation of volumes available. In the 1980's, for instance, net revisions from improved information as well as improved recovery have added some 50% more to the U.S. oil reserve base than discoveries. Aggressive exploration provided an inventory of discoveries to reevaluate, to develop.

As exploration flags, so will revision opportunities, prolonging the impact of curtailed drilling. A choice to reduce exploration wells now of necessity hampers development drilling later. If and when prices rise, therefore, the expected pick-up in development activity will be stalled until successful exploratory work proves developable properties.

## II. Reserves

At the end of 1987 the large companies accounted for 68% of U.S. proved oil reserves and 46% of proved gas reserves.\* The majors have traditionally held a higher share of oil reserves, since historically their emphasis has been on finding oil to supply their integrated refineries. A more important reason for the difference is that while in the oil producing sector most of the rest of the industry consists of much smaller "independent" producers, in the gas producing sector the rest of the industry includes not only some very large and many small "independents," but also pipeline companies with large integrated gas producing facilities.

The majors' share of oil and gas reserves has been declining in the 1980's. Their share of oil reserves has remained stable since the early 1980's while their share of gas reserves has continued to fall. The biggest factor in the gas reserve share was the downward revision of the Alaska reserves. Even adjusted for these revisions, however, the share declined, the result of the gas drilling boom among independents in the early part of the period.

The companies active in the producing areas of the Alaskan North Slope (ANS) are all classified as majors. The proved natural gas reserves in the region account for about 13% of the national total. Because these reserves have no economically accessible market, the North Slope operators have each taken the decision to exclude them from their reserves estimates: ARCO in 1985, BP America in 1986, and Exxon in 1987. The U.S. Department of Energy, in constructing its estimate of total U.S. reserves, has continued to include the ANS gas volumes. Throughout the discussion of the data, we generally specify the companies' data as reported by them as well as adjusted to the DOE's basis. If the DOE's data are adjusted to exclude the North Slope reserves (the operating companies' view), the majors' share of U.S. gas reserves rises to 53%. This reflects approximately their share in the Lower-48 producing region.

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\* These shares, like others shown throughout the report, credit the companies with their royalty owners' volumes, estimated to be 1/7 of total volumes. Company data exclude these volumes, while data for U.S. totals include them. We adjust the company figures when comparing them to U.S. totals to give consistent treatment.

In 1987 the large companies added 2.1 billion barrels to their proved oil reserves by exploratory drilling, revisions and improved recovery. This was just slightly below the 1984 record of 2.2 billion barrels for the 1980-87 period. Revisions contributed more than half of this total; reestimates of ANS oil reserves (in particular those in Prudhoe Bay) were the biggest single factor, but two-thirds of the revisions were scattered throughout the Lower-48. The willingness to revise earlier estimates in 1987 is partly a reflection of smoldering optimism after the 1986 price shock. It also reflects the ongoing company emphasis on development projects and activities, a kind of inventory of prospects which are economic even at relatively low prices. See Appendix Table I.

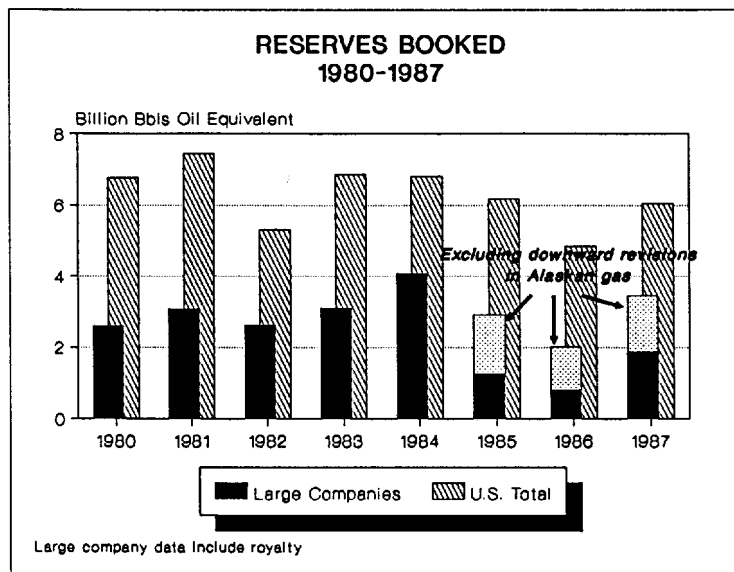
Improved recovery has been even more important to oil reserves than revisions, contributing more than 30% of the large companies' reserves booked from 1980 to 1987. Over the eight-year period, the companies' improved recovery projects added 3.9 billion barrels of oil reserves, about 500 million barrels per year. The peak year so far for improved recovery additions was 1984, when they were boosted by projects in California and Alaska. Additions in each year since have been progressively lower, but remain above the level prevailing at the beginning of the decade. Aggressive development of the technology for enhanced recovery began after the 1979-80 price increases. Although the low prices on which companies now plan will be an impediment, reserve additions from projects already begun or in an advanced stage of planning will continue, especially in the short term.

Analogous data are not available for the rest of the industry, as the Department of Energy combines additions from improved recovery with revisions. The American Petroleum Institute, however, has estimated that the 20 largest petroleum companies (i.e., the 20 companies with the highest lease revenue) account for 85-90% of the industry's improved recovery spending.

### III. Reserves Replacement

For the period 1980-87 the majors' combined oil and gas reserve replacement rate lags that of the rest of the industry. A major factor here is the *aforementioned write-off* of their North Slope gas reserves. Taking oil and gas "reserves booked"--the sum of positive and negative revisions, improved recovery and additions from exploratory drilling--in comparison to production volume, we see that the large companies replaced less than two-thirds of their

FIGURE II



production from 1980-87, while the whole U.S. industry replaced more than 90%. See Appendix Table II.

The downward revisions of the ANS gas are not revisions based on new information or technical reevaluation, but rather recognition of the known reality that under current conditions these reserves have no market. (In choosing not to write these reserves down, the DOE pointed out that existence of a transportation system is not a requirement for the classification of reserves as "proved." DOE agreed with the companies, however, that the reserves were unmarketable without either a transportation system or other alternative). Excluding the Alaska downward revisions from the large companies' data -- i.e. taking the DOE's view -- shows a 75% combined oil and gas replacement rate over the eight year period, well above the 62% unadjusted rate, but still well below the rest of the industry.

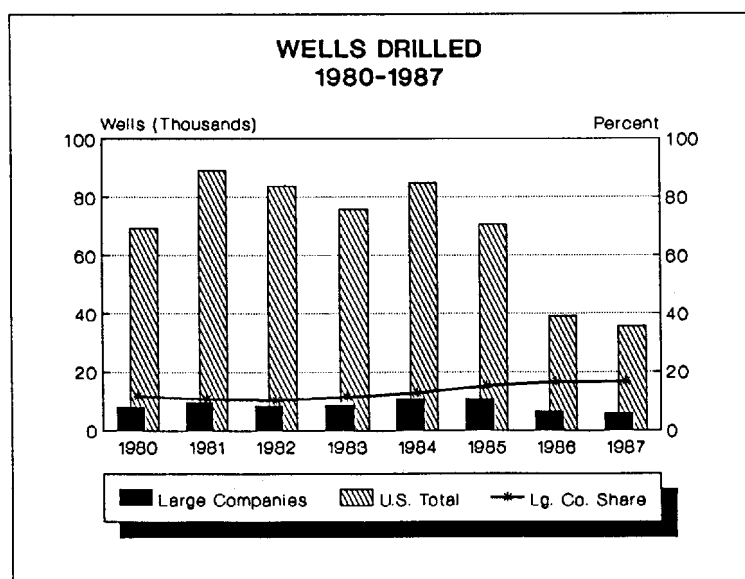
In 1987 the 16 majors replaced 93% of their combined oil and gas production if the data are adjusted to exclude the downward revision in Alaskan gas, a substantially higher rate than their recent average, and equal to the 1987 rate for the industry as a whole. (For liquids alone, the large companies, like the rest of the industry, replaced slightly more than 100% of their production volume.

#### IV. Drilling Activity

The large companies' drilling data show lower completions in 1987 than in 1986, the same pattern shown in the U.S. total drilling data. The higher completions in 1986 are a reflection of the momentum of 1985--wells begun and drilling commitments made at high prices at the end of 1985 and the beginning of 1986 inflated first quarter upstream activity. In 1987, by contrast, the industry was faced with a full year of the new price levels. See Appendix Table III and Figure III.

The majors' share of 1987 total U.S. well completions was 17%, the same as in 1986 and higher than in earlier years. The share was maintained by development drilling which, after a 40% drop between 1985 and 1986, declined only about 6% in 1987. Exploration drilling, however, continued to fall for the large companies: a 40% drop from 1985 to 1986, and a 23% drop from 1986 to 1987. In earlier years the majors put a somewhat greater emphasis on exploration wells than the rest of the industry. However, in 1987 84% of their wells were development wells compared to 80% for the rest of the industry. The recent flight from risk--the

FIGURE III



shift from exploration to development wells--is an expected reaction to the lower prices prevailing now and projected in the near- to mid-term.\*

In our earlier reports on this subject, we have made the point that the large companies tend to focus on high risk, high reward plays, a focus that would make their exploration programs particularly vulnerable in a period of unstable or low prices. This may help explain why the majors' exploration drilling has been cut back more than the rest of the industry's in the last few years.

The majors' success rate is consistently higher than the rest of the industry's. For instance, 86% of their exploration and development wells completed in 1987 were productive, while for the rest of the industry, the rate was 68%. See Table III. The majors' greater reliance on geological and geophysical work is one factor helping to explain the greater success. According to American Petroleum Institute data, the 20 companies with the highest lease revenue spend 70% of the industry's total expenditures for geological and geophysical work.

Under standard lease agreements, companies leasing acreage must drill, generally within five years, or surrender the property. These terms may thus require some *minimum* level of activity in the short term, with the specifics determined by the vintage of the acreage inventory and the terms attached to it. Over time, however, years of low leasing activity will reduce the amount of maturing acreage under lease. Acreage holding has already declined, by some 25-30% since 1985. Virtually all of the drop has been in undeveloped acreage, not producing properties.

## V. Reserves per Well

The large companies routinely find considerably more oil and gas per well than the rest of the industry, more than three times as much as the U.S. industry average from 1980-87. For each well drilled over the period, the majors booked an average of 280,000 barrels of oil equivalent reserves (exploratory additions plus revisions/improved recovery), including the volumes held by their royalty owners. Excluding their downward revisions in ANS gas, they booked an average of 345,000 barrels of oil equivalent per well. By comparison, the U.S. industry as a whole booked 92,000 barrels per well. Figure IV.

With respect to this measure of upstream success, 1987 was a very good year for both the majors and the rest of the industry. The large companies reported additions per well which were well above the 8-year average, and excluding the downward revisions in Alaskan natural gas, they booked 580,000 barrels of oil equivalent well, a record for the 1980's. The

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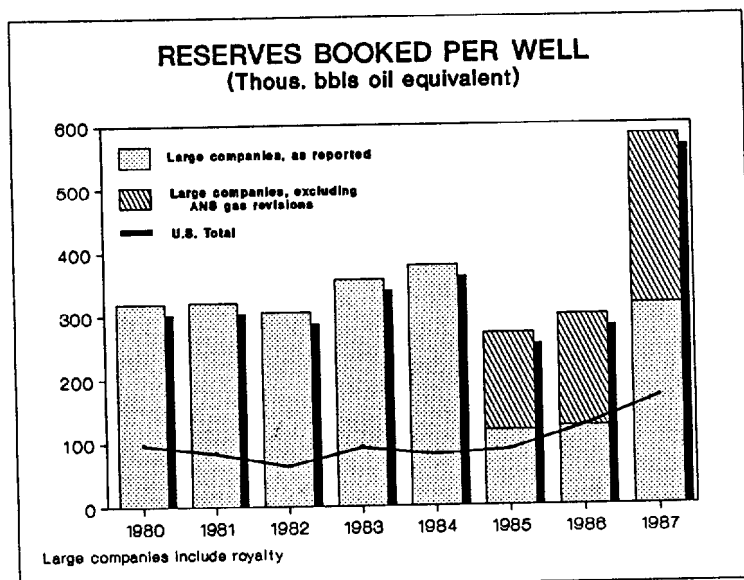
\* Throughout the period under study, the companies have followed SEC requirements in classifying their drilling as "exploration" versus "development," while the API uses an older approach based on the "Lahee" categorization of wells. The definitional bias is subtle, and cannot be quantified. The SEC system, however, may tend to result in fewer development wells and consequently more exploratory wells than the Lahee system.

upward revisions in Alaskan oil reserves are an important factor, but the record-high-per-well exists without this particular revision.

For the whole domestic industry, 1987 also represented a record high, with reserve additions per well approaching twice the volume of the eight-year average. The 1986 rate had been the previous record. While this could be at least partially a statistical fluke, one would expect that lower prices would bring more care in the choice of drilling prospects, and thus, higher additions per well.

Because of inconsistencies in the classifications of certain plays between the EIA and the companies' annual reports, it is inappropriate to compare the "reserves booked per well" for exploratory success alone--exploratory additions per exploratory well. One example of the disparate treatment were the additions in Northern Alaska several years ago which the companies classified as exploratory additions and the EIA counted as revisions.

**FIGURE IV**



## VI. Costs Incurred in Oil and Gas Producing Activities

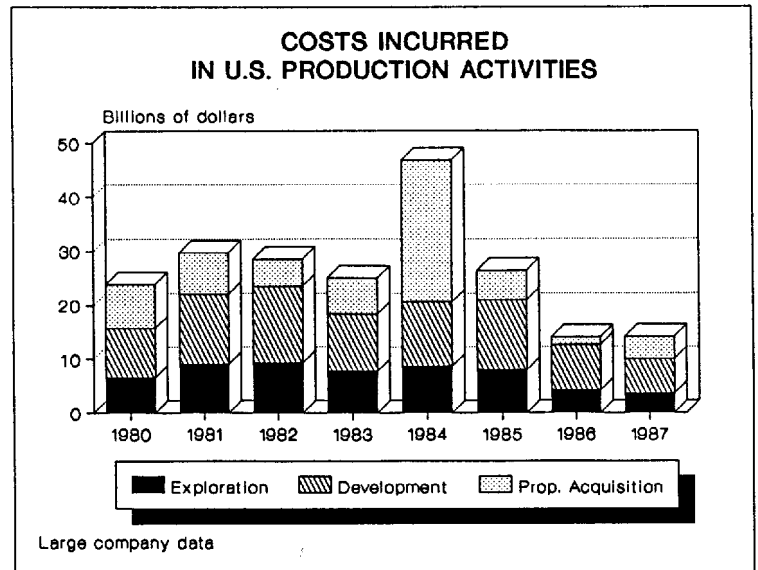
The large companies spent an average of \$20 billion per year for U.S. exploration and development activities from 1980 to 1985. After the price collapse of 1986, the companies have spent an average of \$11 billion per year in 1986 and 1987. (These data exclude all property acquisitions, whether for proved or unproved acreage, and include both capitalized and expensed items.) Over the period, exploration expenditures accounted for about 40% of the total. See Figure V and Appendix Table V.

Like so many of the upstream indicators, the costs incurred for exploration and development peaked in the early 1980's when the new high prices caused a drilling boom.



**FIGURE V**

Property acquisition costs (both proved and unproved) averaged \$8.1 billion over the eight-year period. Acquisition costs fluctuate widely from year to year: 1984 was \$26 billion and 1986 was \$1.4 billion. The 1984 data are due to large company acquisitions: Mobil acquired Superior, Chevron included its Gulf purchase, and Texaco its Getty acquisition.



Although the companies do not always separate acquisition of proved from unproved property, the accounting firm of Arthur Andersen & Co. estimates unproved property expenditures in its annual compilation, *"Oil & Gas Reserve Disclosures."*

From 1983 to 1987, the large companies in our sample spent \$3.7 billion annually on unproved property acquisition, according to Andersen. Excluding 1984, when proved property acquisitions were extraordinary, unproved property acquisition accounted for about two-thirds of the property expenditures reported by the companies. The share can be expected to remain lower (it fell to 40% in 1987) while exploration is dampened by price expectations.

The American Petroleum Institute annually publishes its *"Survey of Oil and Gas Expenditures."* It provides estimates of the spending patterns of the domestic upstream industry as a whole as well as the 20 companies with the highest lease revenue (in further discussion here, "20 largest companies"), a group that substantially overlaps the large company sample used throughout this report.

The data quantify some of the differences in how the large companies' operations contrast with those of the independents. The cost of drilling and equipping wells (including site preparation and labor as well as drilling platforms, pipe and other tangible items) represents a smaller share of the 20 largest companies' budgets. In 1987, for instance, drilling and equipping wells accounted for 24% of the 20 largest companies' exploration expenditures compared to 40% for the rest of the industry. The reason is not that the smaller companies drill more expensive wells; the opposite is true. Rather, the 20 largest companies are spending relatively more on other items in the budget. Geological and geophysical work (G&G), at 21% of their 1987 exploration expenditures, approaches equal importance with actual well drilling. For the rest of the industry, G&G accounts for only 10% of the expenditures.

In development activities, too, drilling and equipping costs account for a lower share of expenditures for the 20 largest companies (48% in 1987) than for the rest of the industry (75%). Expenditures for other (non-drilling) equipment, such as production platforms, flow

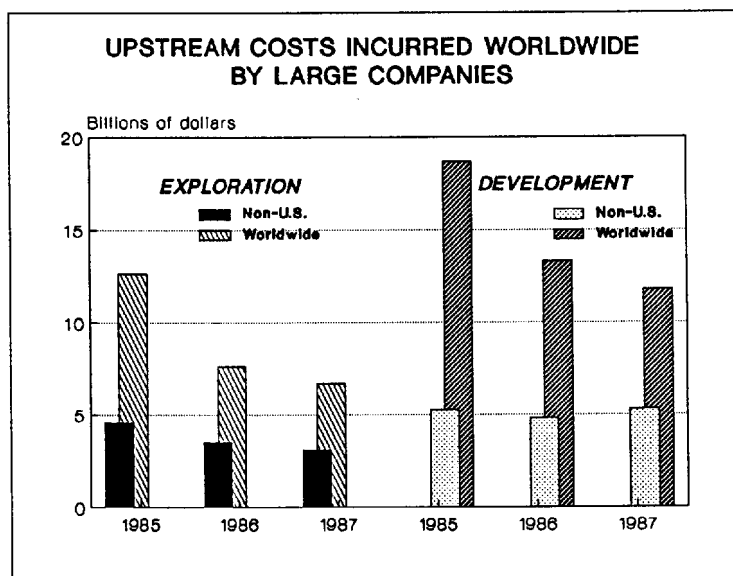
lines and field separators, are much more important for the 20 largest companies, for which they represent 26% of the 1987 development budget, than for the rest of the industry (11%). The 20 largest companies, of course, are the ones which produce most of the oil, and are dominant in high cost areas, such as offshore. Also more important in these companies' development activities are fluid injection and improved recovery programs, as already mentioned. These programs accounted for 10% of the 20 largest companies' development expenditures and only 1% of the rest of the industry's expenditures.

## VII. Worldwide Activity

After the price collapse the major oil companies immediately began to increase their share of upstream expenditures abroad. In the period 1983-85 about 35% of their worldwide exploration and development expenditures were invested abroad. By 1987 the foreign share of exploration expenditures had risen to 47% and foreign development to 45%.<sup>\*</sup> Overall, the 16 companies registered a decline in these foreign upstream expenditures in 1987 compared to their 1983-85 averages but several among them actually had increases (in dollars as well as in share). As in the U.S., exploration expenditures declined more than development expenditures. In fact, the latter increased in 1987, slightly surpassing the 1985 level.

The reason for the shift to foreign regions following the price break is of course the much higher foreign finding rate and consequently, lower cost per barrel of reserves booked outside the U.S. In the 1985-87 period the majors booked 750,000 bbls of oil and gas equivalent per well drilled abroad. The three-year average in the U.S. was about 300,000 bbls, excluding the Alaskan write-downs. (Neither of these numbers includes any adjustment for volumes found on behalf of royalty owners.)

FIGURE VI



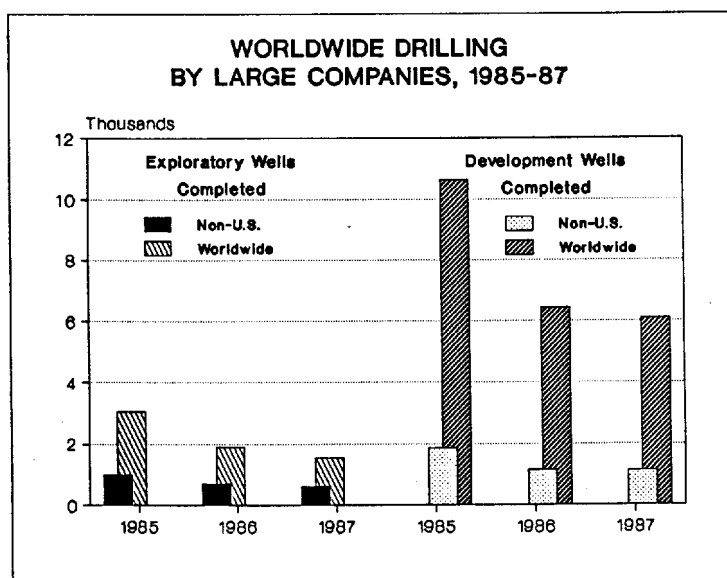
<sup>\*</sup> These data include the foreign operations of BP, the only foreign-based company in our group. The foreign share of BP's activities is not the highest among the companies in our group, and the trend toward a greater emphasis on foreign activities is evident whether BP is included or excluded.

Of course the higher foreign finding rate existed long before the 1986 price collapse. But it was partly masked by the relatively higher prices prevailing from 1973 to 1985, particularly in view of the several positive factors in the U.S. generally not existing in foreign countries with oil production or potential. These include the absence of political risks, a highly developed transport and distribution system, proximity to markets, and, most importantly, low government takes. Even the U.S. "Windfall Profit Tax" imposed in 1980 was less onerous on newly discovered oil, and hence exploration efforts, than on production from old fields. The post-collapse prices, however, have made it more important that companies move to the lower cost areas.

The shift to foreign upstream expenditures in 1986 and 1987 has also been encouraged by reduction in taxes, royalties and other forms of government takes in a number of countries to partly offset the impact of the price drop. In the U.S. almost no such measures have been taken, either at the federal or the state level. Furthermore, exploration in one of the most promising frontier areas, the Alaskan National Wildlife Refuge, is prohibited by government policy.

It is interesting that foreign well drilling by the majors has not shown the same increases as their foreign expenditures. The foreign share of exploratory wells increased only slightly in 1987 over 1985 while the foreign share of development drilling remained unchanged. Exploration expenditures are generally far more capital intensive abroad than in the U.S. and usually require larger pre-drilling investments and longer pre-drilling activities than U.S. wells in the Lower-48. The relatively low foreign drilling rate of 1986/1987 could well be corrected over the next few years when these investments move into the actual drilling stage.

FIGURE VII



## **APPENDIX**

## **LIST OF COMPANIES INCLUDED**

Amerada Hess Corporation  
Amoco Corporation  
Atlantic Richfield Company  
The British Petroleum Company p.l.c.  
Chevron Corporation\*  
Conoco (DuPont)  
Exxon Corporation  
Marathon Oil Company (USX)  
Mobil Corporation  
Pennzoil Company  
Phillips Petroleum Company  
Shell Oil Company  
Sun Company  
Tenneco Inc.  
Texaco Inc. +  
Unocal Corporation

\* Gulf included as a separate entry prior to acquisition

+ Getty included as a separate entry prior to acquisition

**APPENDIX TABLE I**

**U.S. OIL AND GAS RESERVES, 1980-87**

(See Units)

	LARGE COMPANIES			U.S. TOTAL			LARGE COMPANY SHARES (1)		
	Liquids	Gas	Total	Liquids	Gas	Total	Liq.	Gas	Total
1979 Dec 31	22807	108312	41959	36425	200997	71966	73	63	68
Revisions	412	-869	258	2365	2250	2763 }			
Improved Recovery	434	94	451	*	*	* }	44	31	38
Ext, Discov, Addns	586	5264	1517	1449	14473	4008 }			
Net Purch/(Sales)	150	649	265	-	-	-			
Production	-2087	-9104	-3697	-3706	-18699	-7012			
1980 Dec 31	22303	104345	40754	36533	199021	71725	71	61	66
Revisions	341	1277	567	1726	4226	2473 }			
Improved Recovery	355	102	373	*	*	* }	43	39	41
Ext, Discov, Addns	664	5858	1700	1925	17220	4970 }			
Net Purch/(Sales)	14	196	49	-	-	-			
Production	-2045	-8759	-3594	-3690	-18737	-7003			
1981 Dec 31	21631	102887	39824	36494	201730	72165	69	60	64
Revisions	273	1184	482	629	2833	1130 }			
Improved Recovery	266	67	278	*	*	* }	61	41	50
Ext, Discov, Addns	640	4875	1502	1627	14455	4183 }			
Net Purch/(Sales)	-15	-15	-18	-	-	-			
Production	-2022	-7845	-3409	-3671	-17506	-6766			
1982 Dec 31	20771	101334	38689	35079	201512	70711	69	59	64
Revisions	462	1726	767	2888	3075	3432 }			
Improved Recovery	595	61	606	*	*	* }	44	47	45
Ext, Discov, Addns	567	4089	1290	1414	11448	3438 }			
Net Purch/(Sales)	68	149	94	-	-	-			
Production	-2001	-6935	-3227	-3745	-15788	-6537			
1983 Dec 31	20463	99518	38060	35636	200247	71044	67	58	63
Revisions	534	694	657	2623	888	2780 }			
Improved Recovery	721	162	750	*	*	* }	60	59	60
Ext, Discov, Addns	948	6451	2089	1643	13521	4034 }			
Net Purch/(Sales)	492	2350	908	-	-	-			
Production	-2046	-7593	-3389	-3813	-17193	-6853			
1984 Dec 31	21141	101582	39103	36089	197463	71005	68	60	64
Revisions	530	-7667	-826	2615	763	2750 }			
Improved Recovery	560	124	582	*	*	* }	49	-33	21
Ext, Discov, Addns	605	4143	1338	1461	11128	3429 }			
Net Purch/(Sales)	206	235	248	-	-	-			
Production	-2099	-6981	-3333	-3805	-15985	-6632			
1985 Dec 31	21314	90256	37273	36360	193369	70552	68	54	62
Revisions	54	-4106	-672	1502	4892	2367 }			
Improved Recovery	519	55	529	*	*	* }	43	-10	17
Ext, Discov, Addns	321	2877	830	903	8935	2483 }			
Net Purch/(Sales)	148	-104	130	-	-	-			
Production	-2056	-6593	-3222	-3711	-15610	-6471			
1986 Dec 31	20298	83751	35107	35054	191586	68931	68	51	59
Revisions	1191	-5399	236	2971	4564	3778 }			
Improved Recovery	488	73	501	*	*	* }	62	-29	31
Ext, Discov, Addns	432	2428	861	998	7175	2267 }			
Net Purch/(Sales)	208	42	215	-	-	-			
Production	-2013	-6578	-3176	-3620	-16114	-6469			
1987 Dec 31	20604	74317	33745	35403	187211	68506	68	46	57

(Continued next page)

**APPENDIX TABLE II**

**RESERVE REPLACEMENT RATES**

(See Units)

	LARGE COMPANIES				U.S.		
	<u>Liquids</u>	<u>Gas</u>	<u>Total</u>	<u>Liquids</u>	<u>Gas</u>	<u>Total</u>	
<b>RESERVES BOOKED (1)</b>							
1980	1432	4489	2226	3814	16723	6771	
1981	1360	7237	2640	3651	21446	7443	
1982	1179	6126	2262	2256	17288	5313	
1983	1624	5876	2663	4302	14523	6870	
1984	2203	8766	3496	4266	14409	6814	
1985	1695	-3400	1094	4076	11891	6179	
1986	894	-1174	687	2405	13827	4850	
1987	2111	-2898	1598	3969	11739	6045	
<b>Large companies adjusted for ANS downward revisions (2)</b>							
1985	1695	4791	2517				
1986	894	4511	1668				
1987	2111	4890	2950				
<b>PRODUCTION</b>							
1980	2087	9104	3697	3706	18699	7012	
1981	2045	8759	3594	3690	18737	7003	
1982	2022	7845	3409	3671	17506	6766	
1983	2001	6935	3227	3745	15788	6537	
1984	2046	7593	3389	3813	17193	6853	
1985	2099	6981	3333	3805	15985	6632	
1986	2056	6593	3222	3711	15610	6471	
1987	2013	6578	3176	3620	16114	6469	
<b>REPLACEMENT RATE (RESERVES BOOKED AS A SHARE OF PRODUCTION)</b>							
1980	69	49	60	103	89	97	
1981	67	83	73	99	114	106	
1982	58	78	66	61	99	79	
1983	81	85	83	115	92	105	
1984	108	115	103	112	84	99	
1985	81	-49	33	107	74	93	
1986	43	-18	21	65	89	75	
1987	105	-44	50	110	73	93	
1980-87	76	41	63	97	90	94	
<b>Majors adjusted for ANS downward revisions (2)</b>							
1985	81	69	76				
1986	43	68	52				
1987	105	74	93				
Adjusted 1980-87	76	77	76				

(1) Net revisions + improved recovery + exploratory additions.

(2) Excludes all gas revisions for ARCO in 1985, BP America in 1986 and Exxon in 1987

Units: Liquids in millions of barrels, gas in billions of cubic feet, total in millions of barrels of oil equivalent.

Source: Large company data based on annual reports for 16 large integrated petroleum companies; U.S. total from U.S. Department of Energy, Energy Information Administration.

**APPENDIX TABLE III**  
**U.S. DRILLING COMPLETIONS, 1980-87**

(Wells)

	EXPLORATION & DEVELOPMENT			EXPLORATION			DEVELOPMENT		
	<u>Productive</u>	<u>Dry</u>	<u>Total</u>	<u>Productive</u>	<u>Dry</u>	<u>Total</u>	<u>Productive</u>	<u>Dry</u>	<u>Total</u>
<b>U.S. TOTAL</b>									
1980	49252	20234	69486	3862	9008	12870	45390	11226	56616
1981	62262	26972	89234	5183	12247	17430	57079	14725	71804
1982	58162	25827	83889	4653	11229	15882	53509	14598	68007
1983	51901	23837	75738	3783	10062	13845	48118	13775	61893
1984	59434	25549	84983	3922	11216	15138	55512	14333	69845
1985	49249	21459	70708	3013	9144	12157	46236	12315	58551
1986	26694	12424	39118	1744	5454	7198	24950	6970	31920
1987	24427	11289	35716	1609	5244	6853	22818	6045	28863
1980-87	381381	167591	548872	27769	73604	101373	353612	93987	447499
<b>Success Rates (% Productive)</b>									
1980-87	69			27			79		
<b>LARGE COMPANIES</b>									
1980	6877	1273	8150	871	891	1762	6006	382	6388
1981	8039	1557	9595	957	1117	2074	7082	439	7521
1982	7115	1497	8649	855	995	1850	6259	502	6799
1983	7072	1650	8722	793	944	1737	6279	706	6985
1984	8816	1969	10785	908	1120	2028	7908	849	8757
1985	8834	2010	10845	885	1192	2077	7950	818	8768
1986	5305	1204	6509	481	745	1226	4825	459	5283
1987	5056	854	5910	397	543	940	4660	311	4970
1980-87	57114	12013	69164	6146	7547	13693	50968	4466	55470
<b>Success Rates (% Productive)</b>									
1980-87	83			45			92		
<b>Large Company Share</b>									
1980	14		12	23	14		13	11	
1981	13		11	18	12		12	10	
1982	12		10	18	12		12	10	
1983	14		12	21	13		13	11	
1984	15		13	23	13		14	13	
1985	18		15	29	17		17	15	
1986	20		17	28	17		19	17	
1987	21		17	25	14		20	17	
1980-87	15		13	22	14		14	12	
<b>REST OF THE INDUSTRY</b>									
1980	42375	18961	61336	2991	8117	11108	39384	10844	50228
1981	54223	25416	79639	4226	11130	15356	49997	14286	64283
1982	51047	24330	75241	3798	10234	14032	47250	14096	61209
1983	44829	22188	67016	2990	9118	12108	41839	13069	54908
1984	50618	23580	74198	3014	10096	13110	47604	13484	61088
1985	40415	19449	59863	2128	7952	10080	38287	11497	49783
1986	21389	11220	32609	1263	4709	5972	20126	6511	26637
1987	19371	10435	29806	1213	4701	5913	18158	5734	23893
1980-87	324267	155579	479708	21623	66057	87680	302644	89522	392029
<b>Success Rates (% Productive)</b>									
1980-87	68			25			77		

Note: Large company data based on annual reports, report supplements and 10-K's for 16 large integrated companies. U.S. Total from American Petroleum Institute data. "Rest of Industry" by difference.



**APPENDIX TABLE IV**

**RESERVES BOOKED PER WELL, 1980-87**

(Thous. barrels)

	LARGE COMPANIES		U.S. <u>Total</u>
	<u>As reported</u>	Ex ANS <u>Gas Rev.*</u>	
1980	319		97
1981	321		83
1982	305		63
1983	356		91
1984	378		80
1985	118	271	87
1986	123	299	124
1987	316	582	169
1980-87	281	345	92

\* Excludes all gas revisions for ARCO in 1985, BP America in 1986, and Exxon in 1987.

Note: Large companies credited with their royalty owners' volumes. Large company data based on annual reports, report supplements and 10-K's of 16 large integrated companies.

**APPENDIX TABLE V**

**COSTS INCURRED BY LARGE COMPANIES  
IN OIL AND GAS PRODUCTION ACTIVITIES**

(millions of dollars)

	<u>Expl.</u>	<u>Property Acq.*</u>	<u>Dev.</u>	<u>Total</u>	<u>Exploration &amp; Development</u>
1980	6588	8164	9132	23884	15720
1981	9068	7591	13030	29689	22098
1982	9319	5016	14271	28606	23590
1983	7776	6705	10664	25145	18440
1984	8709	26121	11954	46783	20663
1985	8066	5557	12940	26563	21006
1986	4155	1423	8505	14083	12660
1987	3577	4170	6503	12339	10080
Avg. Annual	7157	8093	10875	25887	18032
Avg. 80-85	8254	9859	11999	30112	20253

\* Includes both proved and unproved property

Note: Based on annual reports of 16 large integrated companies