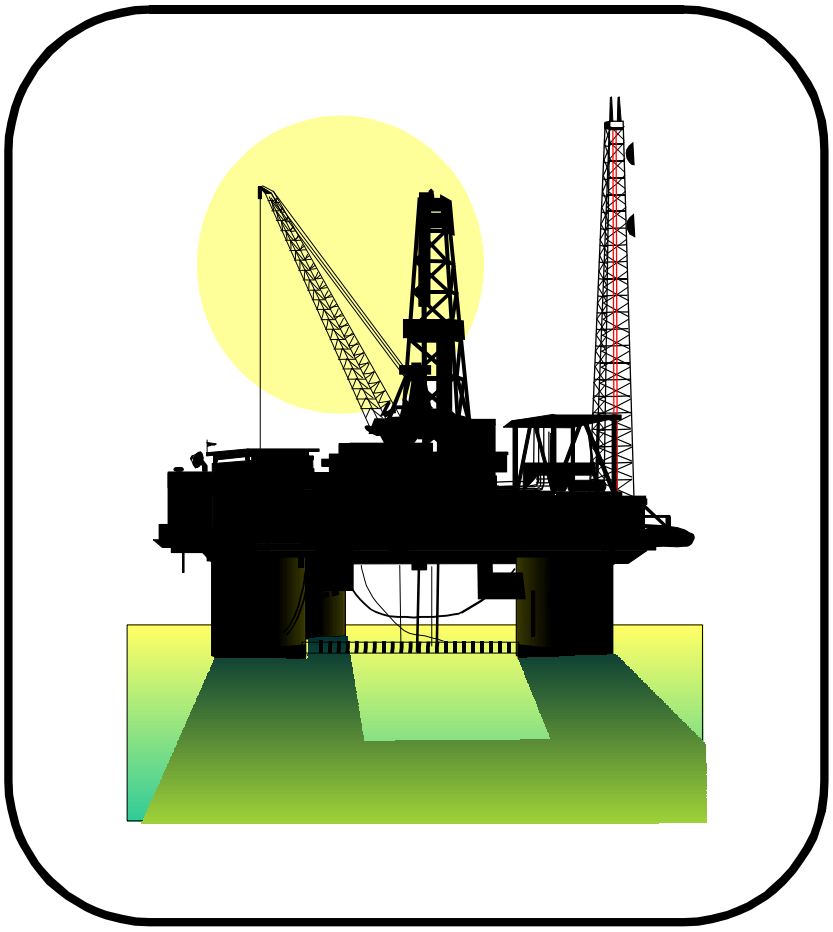
Gulf of Mexico Outer Continental Shelf Daily Oil and Gas Production Rate Projections From 1999 Through 2003



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Gulf of Mexico Outer Continental Shelf Daily Oil and Gas Production Rate Projections From 1999 Through 2003

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Table of Abbreviations

BCFPD	Billion cubic feet per day
DOCD	Development Operations Coordination Document
DWRR	Deepwater royalty relief
GOM	Gulf of Mexico
MBOPD	Thousand barrels of oil per day
MMCFPD	Million cubic feet per day
MMS	Minerals Management Service
OCS	Outer Continental Shelf
POE	Plan of Exploration

Introduction

This paper provides daily oil and gas production rate projections for the Gulf of Mexico (GOM) Outer Continental Shelf (OCS) for the years 1999 through 2003. These projections represent daily oil and gas production estimates at calendar yearend.

In this report, daily oil production rates include both oil and condensate production, and daily gas production rates include both associated and nonassociated gas production. Deepwater fields are defined as those with an average water depth greater than or equal to 1,000 feet.

Similar to last year's report, all figures and text use December average daily production rates for past years (as opposed to calendar year averages). Utilizing yearend rates for historical production is consistent with future production projections, which are based on calendar yearend rates (December).

In addition to providing daily oil and gas production rate projections, we have included one figure and one table pertaining to leasing history and one table concerning exploration and development plan approvals. These are provided as supportive background information for our projections as well as information indicative of current interest and activity in the GOM.

Daily Production Rate Projections

The production rate projections presented in this report include high- and low-range estimates of future daily oil (oil and condensate) and gas (associated and nonassociated) production for the GOM during the years 1999-2003.

Methodology

We determined shallow-water production rates for this report using the same method used in preparing last year's report—a decline analysis of historical, shallow-water GOM production rates. We also determined deepwater production rates for this report using the same method used in preparing last year's report—a survey of operators.

The following assumptions are integral to the validity of this methodology:

1. We assume that the same factors that have influenced the cumulative shallow-water production rates over the past 20 years will similarly affect the production rates over the next 5 years. These factors include but are not limited to

- Rate of reserves replacement.
- Availability of pipelines and processing facilities to handle production.
- Ability of operators to obtain necessary equipment and personnel to develop new reserves.
- The effect that new technology has on finding and developing reserves.

2. Once again this year, the high-case scenarios for both oil and gas assume that new technology (such as 3-D seismic data and horizontal wells) will offset decline rates in currently producing shallow-water fields. Thus, shallow-water GOM production will remain constant at the December 1997 daily rates of 833 MBOPD and 12.6 BCFPD through the year 2003. This is a reasonable assumption considering that shallow-water oil and gas production rates have remained fairly constant over the last 20 years.

3. For the low-case oil projections, we assume that shallow-water oil production rates decline at the same rate as observed during the last period of declining oil rates (7.9% from 1986 through 1989, Melancon and Roby, 1998). Note that last year we reported this as an 8.2 percent decline rate, whereas we should have referred to this as an 8.2 percent exponential decline constant (which corresponds to a 7.9% decline rate). For the low-case gas projections we similarly assume a 7.9 percent decline (even though the cumulative shallow-water gas production rate has not shown a period of sustained decline over the last 20 years).

4. We assume that all discovered deepwater fields that will begin production prior to 2004 were reported in our operator survey, and that the operators accurately predicted future production rates for these fields.

Low-case Production Rate Projections

The average daily low-case, shallow-water oil and gas production rates for December 1999 to 2003 were calculated using the actual

average daily production rates for oil and gas in December 1997 and the decline rate determined above.

We ranged the deepwater production rate projections this year, as opposed to single-point estimates used in last year's report. We compared operator predictions on deepwater fields reported the past two years. We found operator predictions on the same fields varied an average 7 percent for oil and 11 percent for gas.

The projected low-case, deepwater rates were calculated by subtracting 7 percent (oil) or 11 percent (gas) from estimated production rates for deepwater projects obtained from a survey of operators.

The total projected average daily low-case production rates for December 1999 to 2003 were calculated by adding low-case shallow-water production rates to the low-case deepwater production rates.

High-case Production Rate Projections

The average daily high-case shallow-water production rates for December 1999 to 2003 were held constant at December 1997 levels. The average daily high-case, deepwater production rates were calculated by adding 7 percent (oil) or 11 percent (gas) to estimated production rates for deepwater projects obtained from a survey of operators. The total high-case production rate projections were then obtained by adding the high-case shallow-water and deepwater estimates.

Table 1 presents a listing of 53 deepwater fields on production or projected to begin production through the year 2003, including the water depth and date of first production in those cases where this information may be released to the public. Note that some fields listed in last year's report are absent because the average field water depth dropped below 1,000 feet (average field water depth is an arithmetic average of all wells within the field), the project was cancelled or delayed, or the operator was unwilling to release the information. Note also that some fields in this table include multiple prospects but are combined according to the manner reported by operators.

Table 2 and Figures 1 and 2 provide the high- and low-range daily oil and gas rate projections in tabular and graphical forms, respectively.

Undiscovered or unreported fields in any water depth coming on production by the year 2004 will further increase these daily production totals.

Our office received numerous requests to separate shallow- and deepwater production rate projections. Therefore, Table 3 and Figures 3 and 4 provide this information.

The most noticeable difference between previous reports and this report is the projected decreasing production rate trends, beginning in 2002, for both oil and gas.

Some reasons for this phenomenon are associated with revised deepwater development plans as follows:

- One deepwater field, Seattle Slew, ceased production sooner than expected.

- Shell and Mariner were the only operators to report deepwater projects not found in last year's report.

- Four projects expected to come online in 1998 were delayed. Three projects came online, as expected, in 1998.

- Three projects expected to come online in 1999 are cancelled, two projects are delayed, eight projects are on schedule, and two new projects are added.

- One project expected to come online in 2000 is unreported (either cancelled or delayed), two projects are delayed, five projects are on schedule, and one new project is added.

- One project expected to come online in 2001 is unreported (either cancelled or delayed), and two projects are on schedule.

Table 1. — Deepwater Fields on Production or Expected to Begin Production by Yearend 2003

Operator	Field Nickname	Block	Water Depth	Year of First Production
Amerada Hess	Baldpate	GB 260	1,605 ft	1998
Amoco Production	King's Peak	DC 133	6,608 ft	Unreleasable
Amoco Production	King	MC 084	5,315 ft	Unreleasable
Amoco Production	Marlin	VK 915	3,238 ft	Unreleasable
BP Exploration	Troika	GC 244	2,681 ft	1997
BP Exploration	AmberJack	MC 109	1,029 ft	1991
BP Exploration	Pompano/Pompano II	VK 990	1,445 ft	1994
British-Borneo	Morpeth/Klamath	EW 921	1,680 ft	1998
Chevron	Genesis	GC 205	2,599 ft	1999
Conoco	Jolliet	GC 184	1,722 ft	1989
EEX	Cooper	GB 387	2,163 ft	1995
Elf	Virgo	VK 823	1,154 ft	1999
Exxon	Hoover	AC 25	4,795 ft	Unreleasable
Exxon	Diana	EB 945	4,679 ft	Unreleasable
Exxon	Lena	MC 281	1,017 ft	1984
Exxon	Zinc	MC 354	1,478 ft	1993
Flextrend	Sunday Silence	EW 958	1,460 ft	2001
Marathon	Arnold	EW 963	1,752 ft	1998
Mariner	Black Widow	EW 966	1,850 ft	2000
Mariner	Dulcimer	GB 367	1,120 ft	1999
Mariner	Pluto/Blood Sweat & Tears	MC 718	2,786 ft	1999
Oryx	Diamond	MC 445	2,095 ft	1993
Oryx	Neptune/Thor	VK 825	1,871 ft	1997
Reading & Bates	East Boomvang	EB 688	3,755 ft	Unreleasable
Shell Deepwater Dev. Inc.	Serrano	GB 516	3,153 ft	Unreleasable
Shell Deepwater Dev. Inc.	Macaroni	GB 602	3,600 ft	Unreleasable
Shell Deepwater Dev. Inc.	Angus	GC 113	1,465 ft	Unreleasable
Shell Deepwater Dev. Inc.	King Kong	GC 472	3,817 ft	Unreleasable
Shell Deepwater Dev. Inc.	El Toro	GC 69	1,430 ft	Unreleasable
Shell Deepwater Dev. Inc.	Ariel	MC 429	6,274 ft	Unreleasable
Shell Deepwater Dev. Inc.	Herschel	MC 520	6,739 ft	Unreleasable
Shell Deepwater Dev. Inc.	Fourier	MC 522	6,950 ft	Unreleasable
Shell Deepwater Dev. Inc.	East Anstey	MC 607	6,590 ft	Unreleasable
Shell Deepwater Dev. Inc.	King	MC 764	3,265 ft	Unreleasable
Shell Deepwater Dev. Inc.	Keppler	MC 783	5,800 ft	Unreleasable
Shell Deepwater Prod. Inc.	Auger	GB 426	2,864 ft	1994
Shell Deepwater Prod. Inc.	Rocky	GC 110	1,621 ft	1996
Shell Deepwater Prod. Inc.	Popeye	GC 116	2,067 ft	1996
Shell Deepwater Prod. Inc.	Brutus	GC 158	2,877 ft	1999
Shell Deepwater Prod. Inc.	Mensa	MC 731	5,330 ft	1997
Shell Deepwater Prod. Inc.	Mars	MC 807	2,958 ft	1996
Shell Deepwater Prod. Inc.	Ursa	MC 810	3,885 ft	1999
Shell Deepwater Prod. Inc.	Europa	MC 935	3,883 ft	2000
Shell Deepwater Prod. Inc.	Tahoe/Tahoe II	VK 783	1,465 ft	1994
Shell Deepwater Prod. Inc.	Ram Powell	VK 956	3,247 ft	1997
Shell Offshore Inc.	Bullwinkle	GC 65	1,330 ft	1989
Shell Offshore Inc.	Cognac	MC 194	1,023 ft	1979
Walter Oil & Gas	UNNAMED	EW 1006	1,882 ft	1999
Walter Oil & Gas	UNNAMED	VK 862	1,043 ft	1995
Unreleasable	Unreleasable	GC	3,200 ft	Unreleasable
Unreleasable	Unreleasable	GC	4,300 ft	Unreleasable
Unreleasable	Unreleasable	MC	3,700 ft	Unreleasable
Unreleasable	Unreleasable	VK	1,800 ft	Unreleasable

Table 2. — Daily Oil and Gas Production Rate Projections - GOM

	1999	2000	2001	2002	2003
Low Oil MBOPD* (Decline Used)	1,488	1,514	1,537	1,434	1,381
High Oil MBOPD* (No Decline Used)	1,731	1,825	1,910	1,846	1,836
Low Gas BCFPD** (Decline Used)	13.15	12.78	12.27	11.56	10.91
High Gas BCFPD** (No Decline Used)	15.66	16.26	16.59	16.60	16.61

Table 3. — Daily Oil and Gas Production Rate Projections Separated into Deepwater and Shallow-water Fields.

	1999	2000	2001	2002	2003
Low-case Deepwater Oil MBOPD*	781	862	937	881	872
High-case Deepwater Oil MBOPD*	898	992	1,078	1,013	1,003
Low-case Shallow-water Oil MBOPD*	707	651	600	553	509
High-case Shallow-water Oil MBOPD*	833	833	833	833	833
Low-case Deepwater Gas BCFPD**	2.43	2.91	3.17	3.18	3.19
High-case Deepwater Gas BCFPD**	3.03	3.63	3.96	3.97	3.98
Low-case Shallow-water Gas BCFPD**	10.72	9.87	9.10	8.38	7.72
High-case Shallow-water Gas BCFPD**	12.63	12.63	12.63	12.63	12.63

*Oil in MBOPD includes condensate.

**Gas in BCFPD includes associated or casinghead gas.

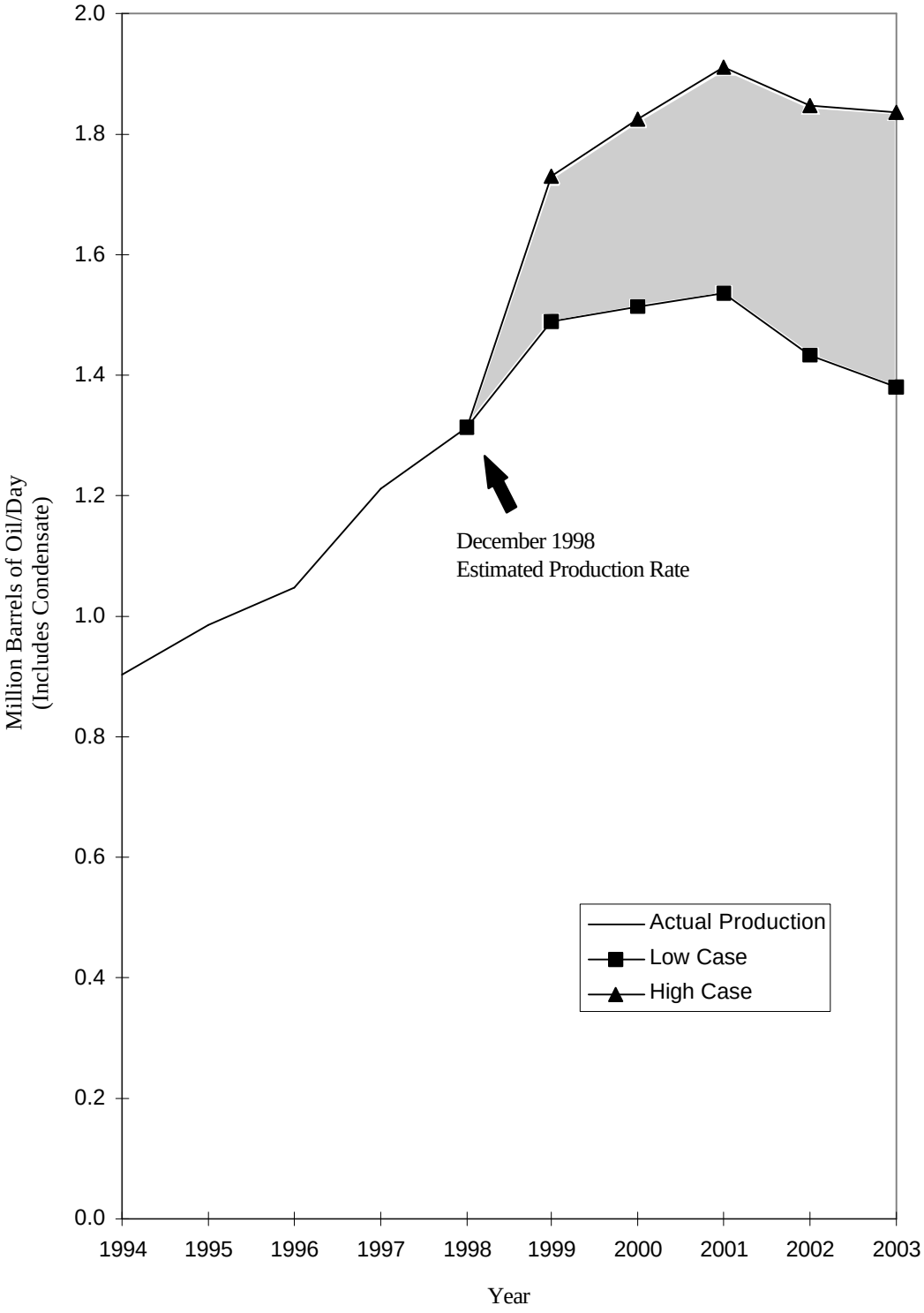

Figure 1. – Oil Production Rate Projections, Gulf of Mexico Region

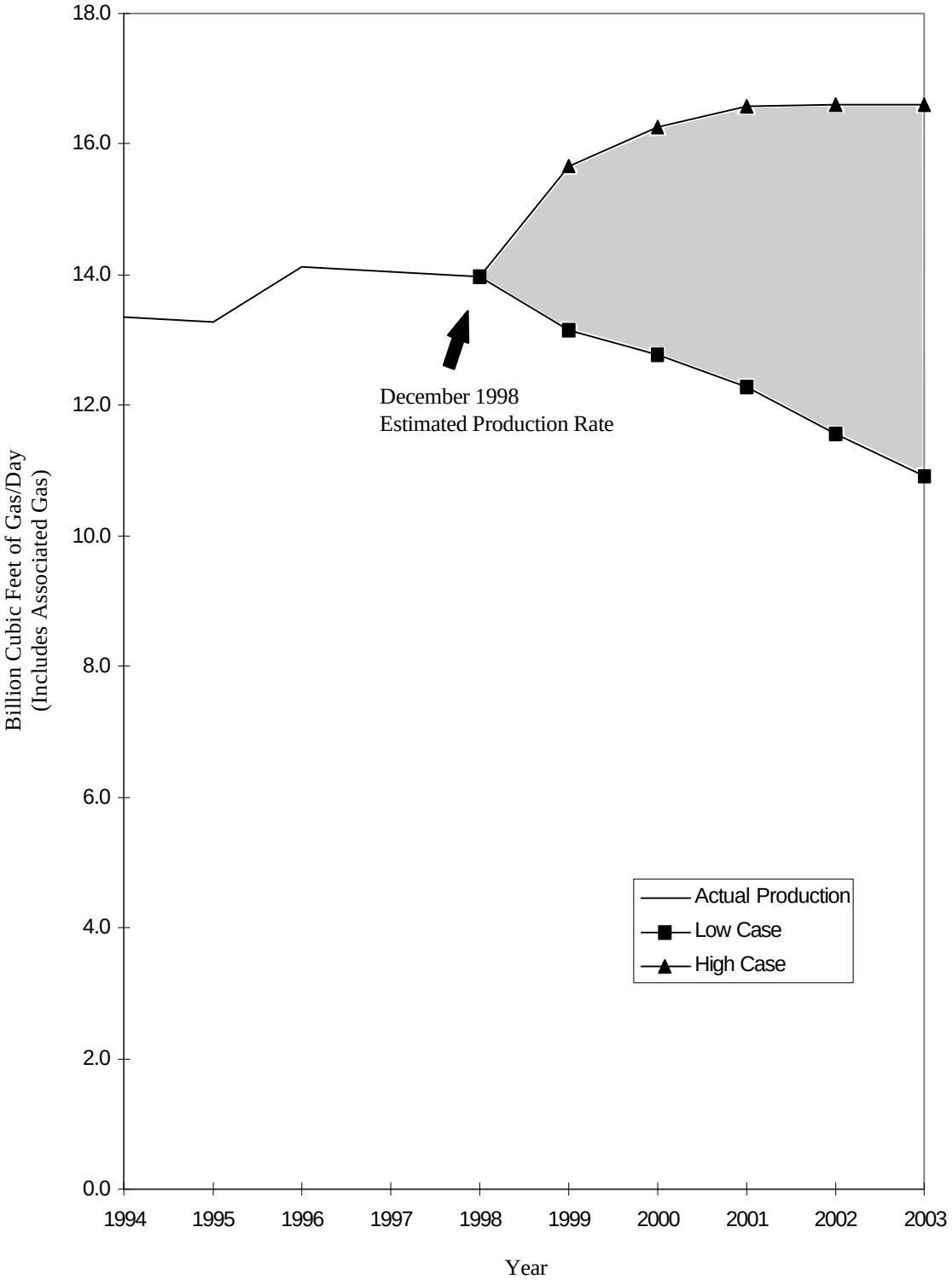

Figure 2. – Gas Production Rate Projections, Gulf of Mexico Region

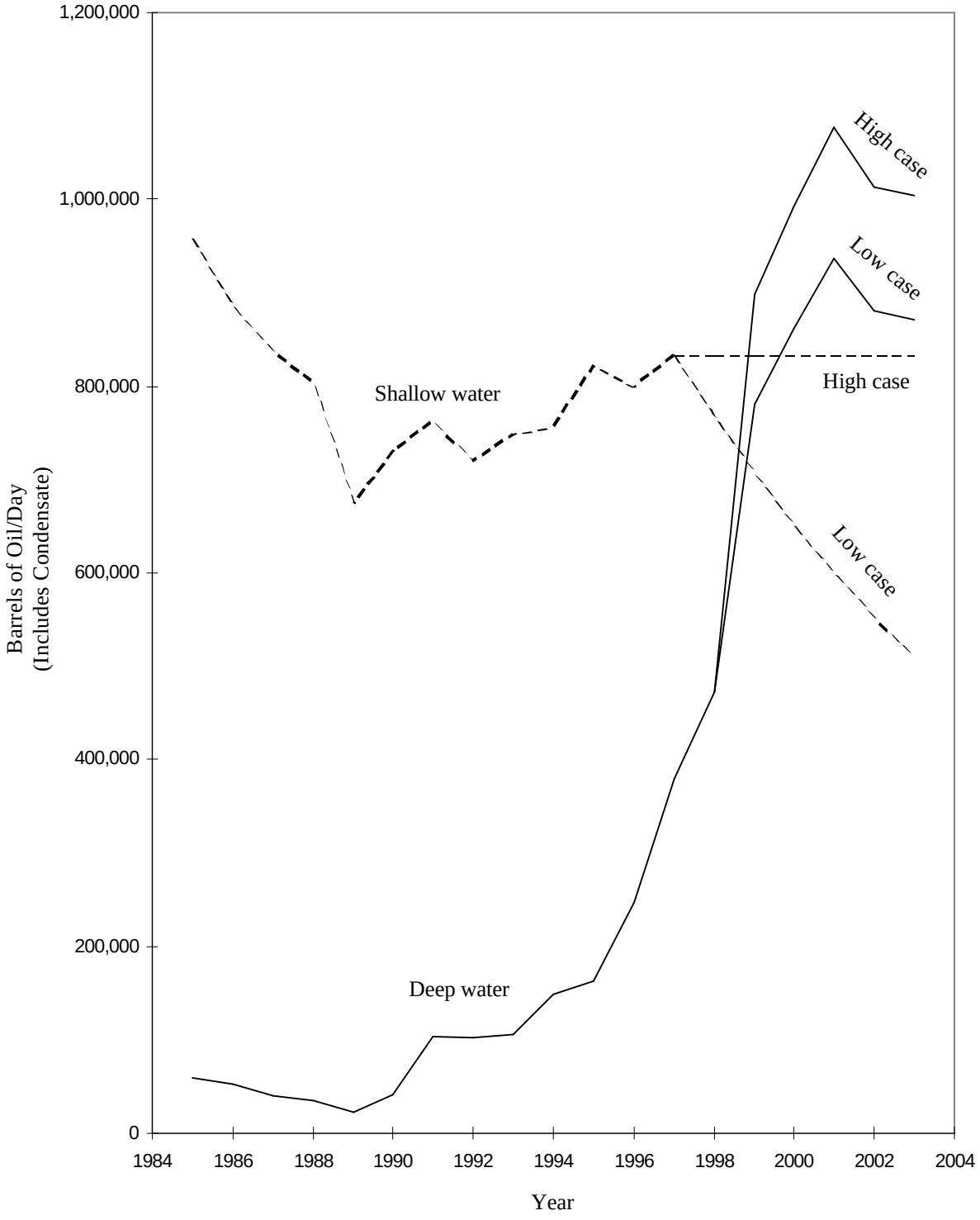

Figure 3. – Historical and Projected Oil Production Rates for Shallow and Deep Water

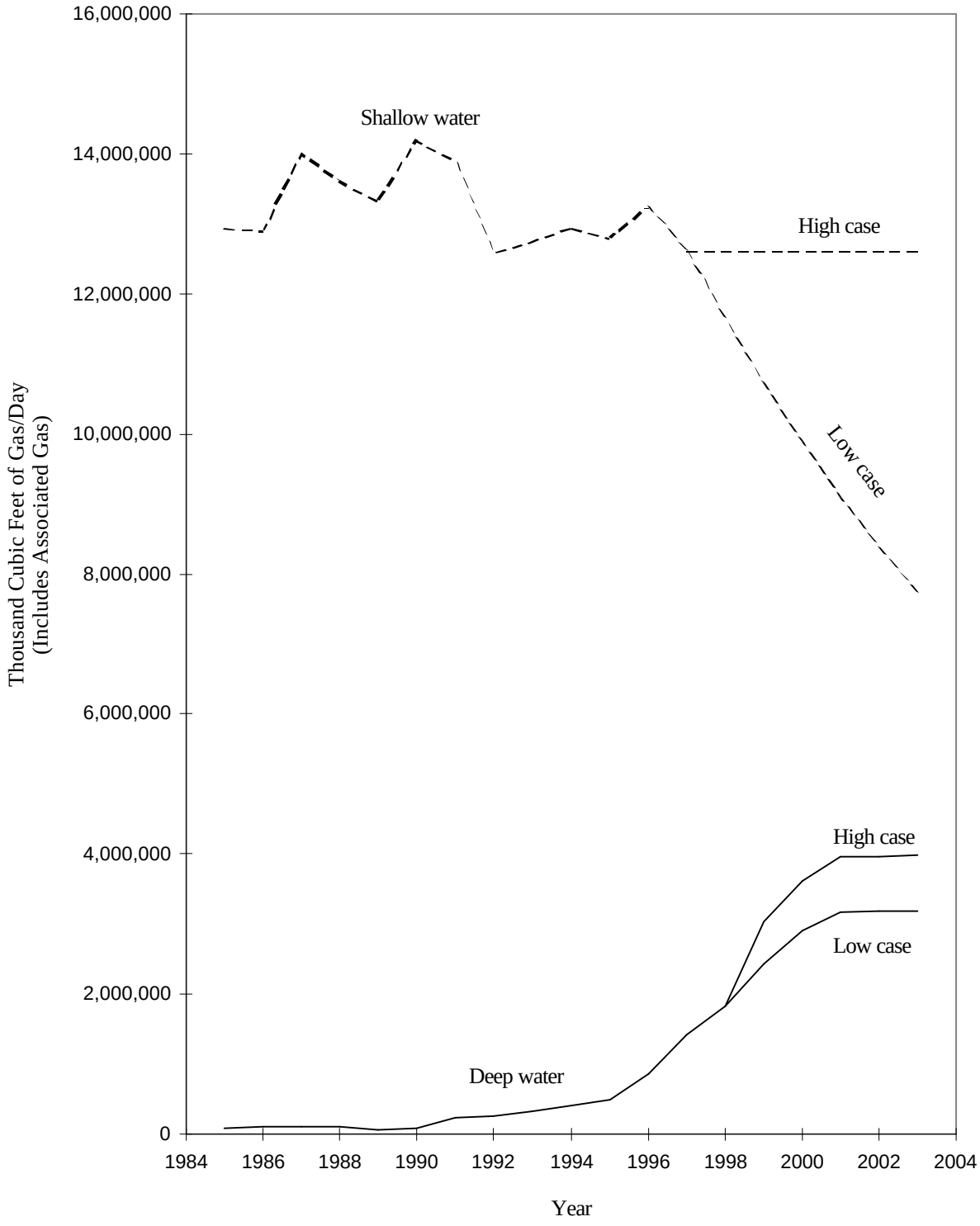

Figure 4. – Historical and Projected Gas Production Rates for Shallow and Deep Water

Analysis

Last year's report, MMS 98-0013 (January 1998), projected yearend 2002 daily production rates of between 1,666 MBOPD and 1,976 MBOPD for oil and between 12.43 BCFPD and 17.54 BCFPD for gas. Ranging projections in this manner was necessary to account for the uncertainties in future production projections for currently producing fields. Our future production projections for the hundreds of currently producing fields are ranged because decline analysis alone may not accurately represent the effects of recompletions, new wells, workovers, etc., in offsetting field decline rates. Our projections for new fields (beginning production in 1999, 2000, etc.) are similarly ranged by applying error estimates (±7% oil and ±11% gas) to operator predictions.

When this report was being formulated, August 1998 was the latest complete available month of production. Therefore, we cannot compare December 1998 actual production to the December 1998 projections in last year's report, which were between 1,226 and 1,347 MBOPD for oil and between 13.27 and 15.26 BCFPD for gas. However, the actual daily production rates for the latest month, August 1998, are 1,284 MBOPD for oil and 13.91 BCFPD for gas. Additionally, Morpeth/Klamath and Baldpate began production between September and December 1998. When preliminary rates for these fields are added to the August 1998 actual production data, an approximation of December 1998 actual rates is 1,313 MBOPD and 13.97 BCFPD if production from August is comparable to December, all other things being constant. A similar analysis in last year's report yielded December 1997 approximations within 57 MBOPD and 0.06 BCFPD.

These estimated 1998 yearend production rates are within the predicted ranges in both of our previous reports. Figures 5 and 6 provide a graphical presentation comparing the daily oil and gas production projections from the January 1997 and 1998 reports and this report.

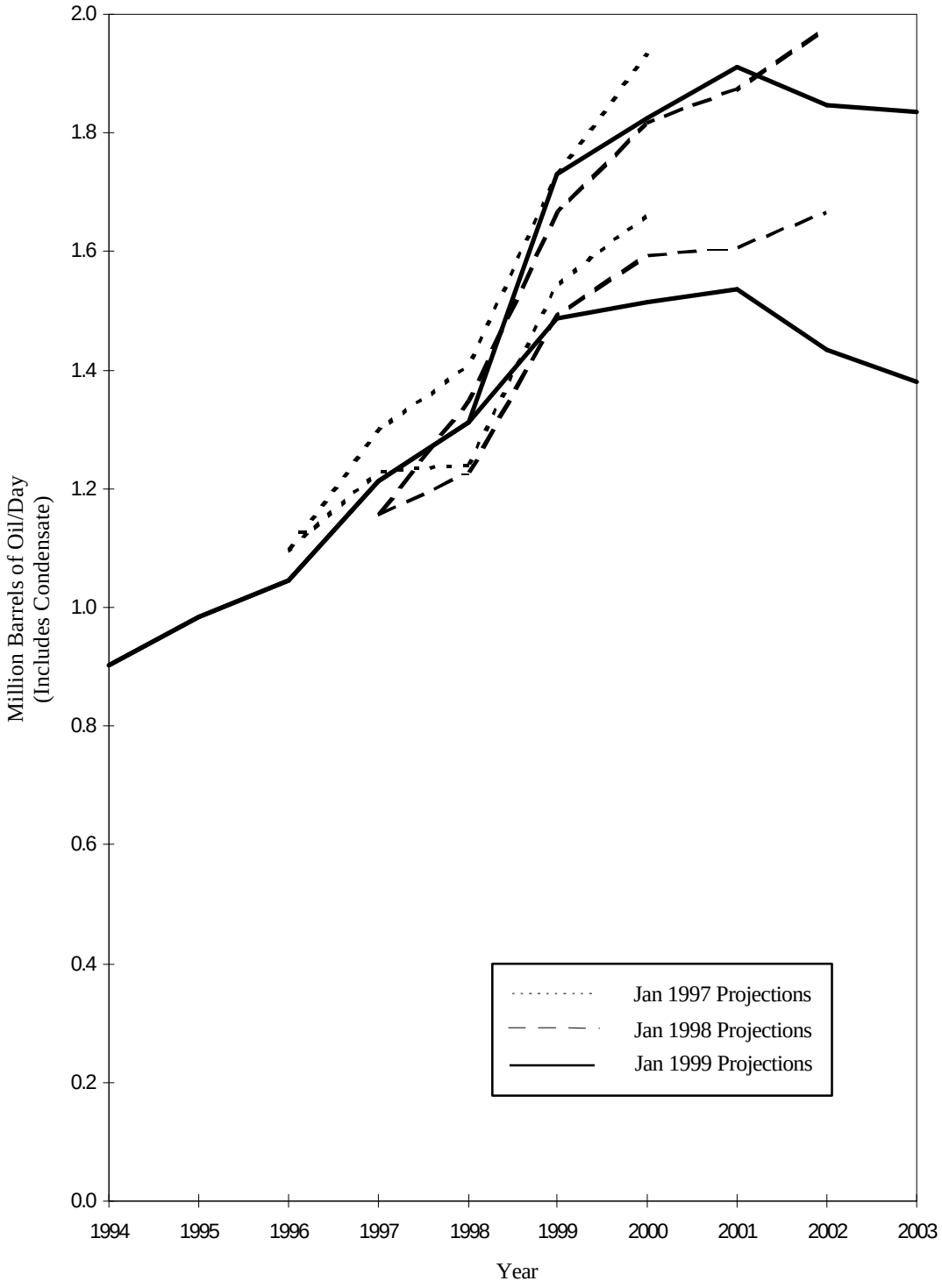

Figure 5. – Comparison of Current (January 1999) and Previous Oil Production Rate Projections, Gulf of Mexico Region

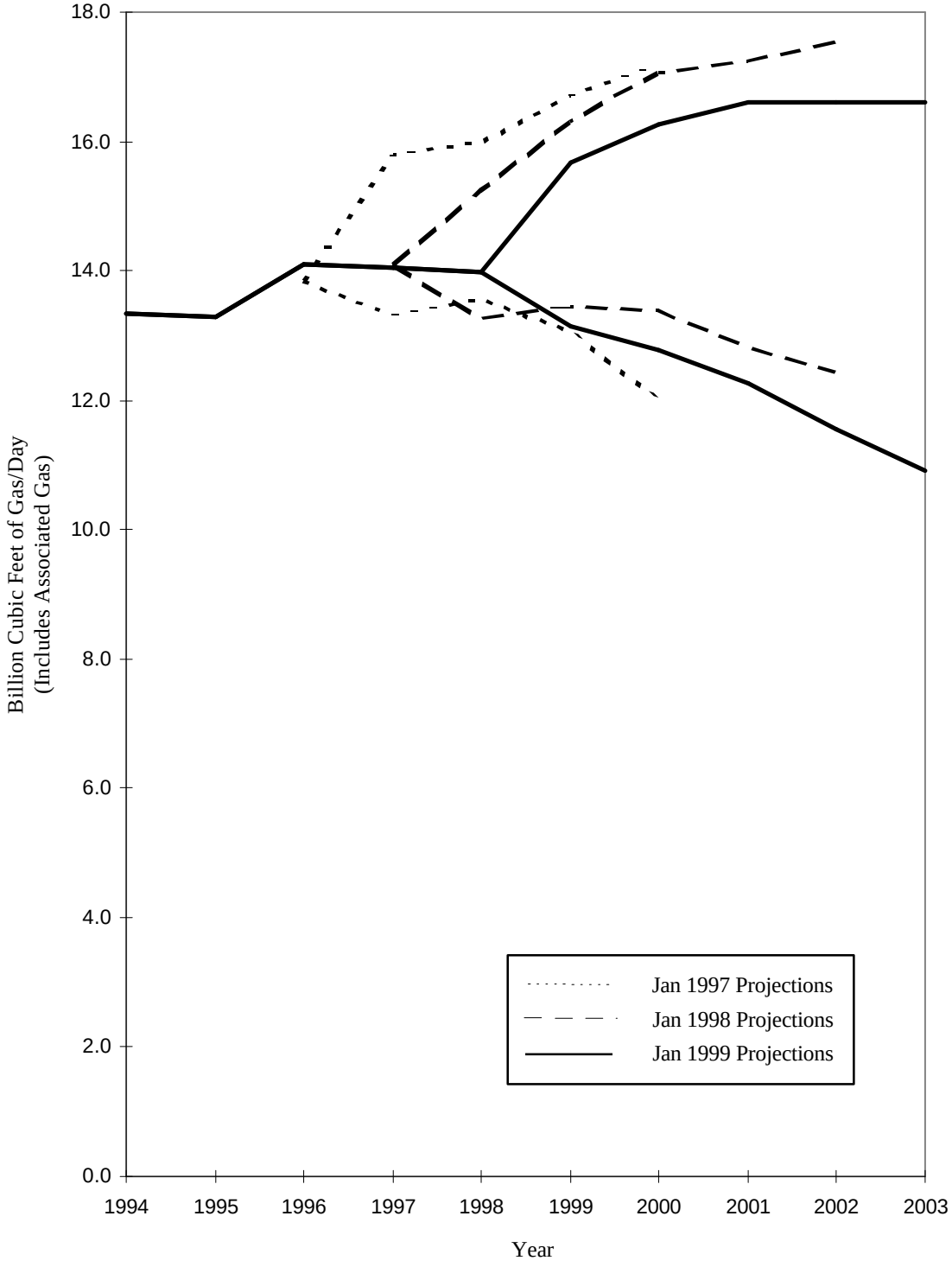

Figure 6. – Comparison of Current (January 1999) and Previous Gas Production Rate Projections, Gulf of Mexico Region

Leasing and Development Plan Activity

The total number of tracts receiving bids in the Gulf of Mexico OCS over the last 10 years demonstrates a dramatic increase since 1995. This increase is evident in Figure 7, which indicates that 863 tracts were bid upon in 1995, 1,541 in 1996, 1,836 in 1997, and 1,196 in 1998. Total tracts bid upon during these four years total 5,436 as opposed to 4,639 bid upon during the previous seven years.

The large increase in bidding activity beginning in 1996 is partly attributable to the passage of Public Law 104-58, Title III, the OCS Deepwater Royalty Relief (DWRR) Act, signed on November 25, 1995. It is apparent from Table 4 that the largest increase by far was in water depths > 800 meters. Although slumping oil prices in 1998 led to diminished bidding activity, the interest in water depths > 800 meters remained strong.

It should be pointed out that, in addition to the positive effects of the OCS Deepwater Royalty Relief Act upon industry bidding strategies, several other factors such as high oil and gas production rates from deepwater reservoirs, the evolvement of economic deepwater development technology, and the reduced risk of deepwater exploratory and development drilling, among other factors, also had a significant impact.

Development plan approvals increased substantially from 1993 through the end of 1997, but decreased in 1998, as illustrated in Table 5. In calendar year 1996, exploratory plan approvals (420) increased 29 percent and development plan approvals (347) increased 37 percent over calendar year 1995 totals. Calendar year 1997 exploratory plan approvals (450) and development plan approvals (372) represent increases of 38 percent and 47 percent over calendar year 1995 totals and increases of 7 percent each over calendar year 1996 totals. Low oil prices in 1998 resulted in a mild 8 percent drop in exploratory plan approvals (450 to 413), and a more significant 24 percent reduction in development plan approvals (372 to 282).

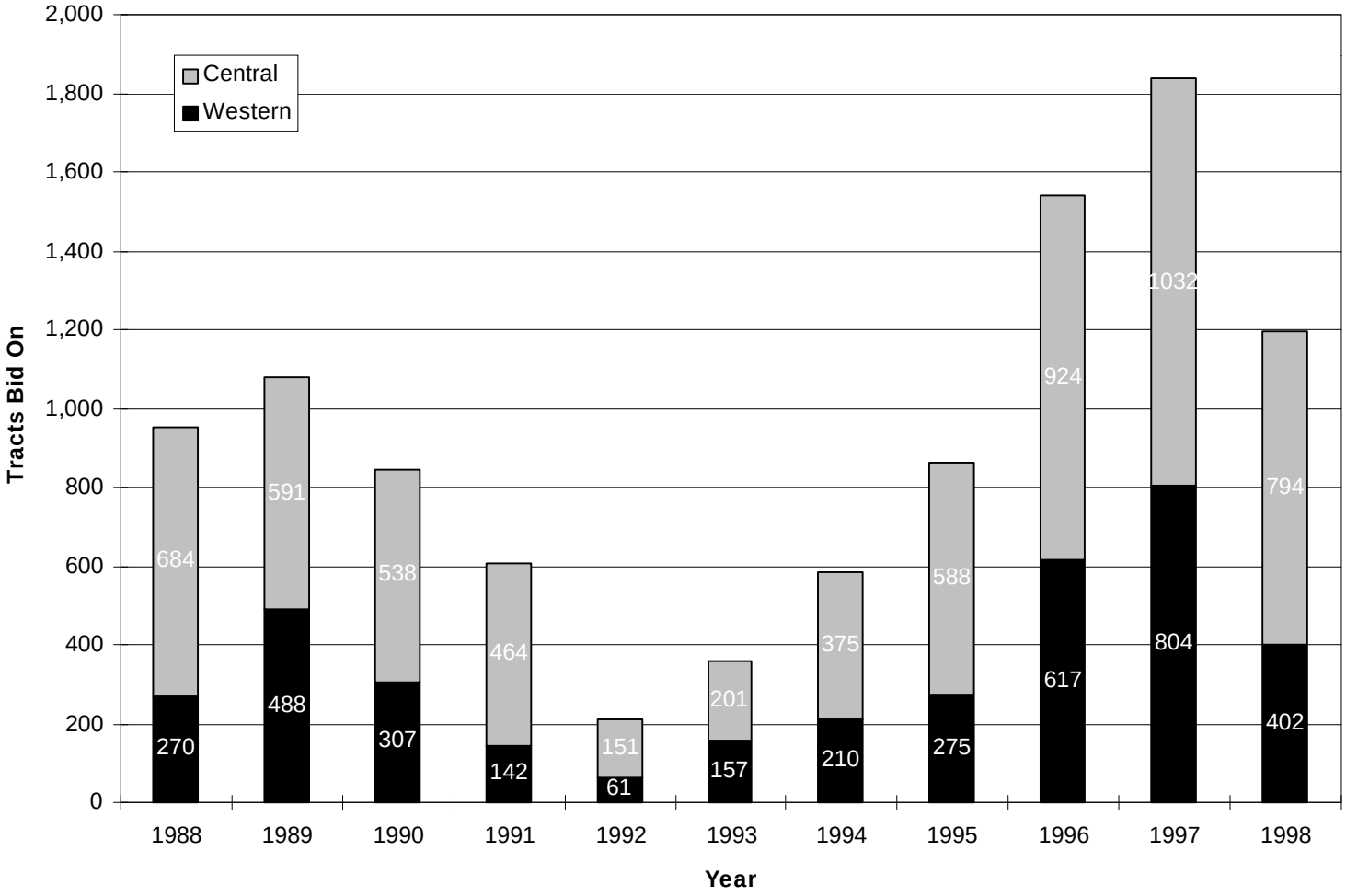

Figure 7. – 10-Year Bidding Trend in the Gulf of Mexico

Table 4. — Gulf of Mexico OCS Bids 1994-1998; Before and After Royalty Relief (Sales 157 through 171 Include Royalty Relief)

Water Depth	1994 Sales 147 & 150	1995 Sales 152 & 155	1996 Sales 157 & 161	1997 Sales 166 & 168	1998 Sales 169 & 171
<200M	490	516	637	542	280
200-400M	18	50	69	52	38
400-800M	28	83	113	104	61
>800M	49	214	722	1,138	817
	585	863	1,541	1,836	1,196

Table 5. — Plans of Exploration (POE) and Development Operations Coordination Documents (DOCD) by Calendar Year

Calendar Year	POE'S Approved	DOCD's Approved
1990	485	223
1991	365	179
1992	250	128
1993	318	187
1994	345	282
1995	325	253
1996	420	347
1997	450	372
1998	413	282

Conclusions

The Gulf of Mexico OCS should increase its 1995 daily oil production from 945 MBOPD to a range between 1,537 MBOPD and 1,910 MBOPD by yearend 2001 and between 1,381 MBOPD and 1,836 MBOPD by yearend 2003. The 1995 daily gas production rate of 13.09 BCFPD should change to a range from 12.27 BCFPD to 16.59 BCFPD by yearend 2001 and between 10.91 BCFPD and 16.61 BCFPD by yearend 2003. Given that gas reservoirs are less expensive to develop and that it is currently economical to subsea-complete some isolated gas wells with tiebacks, our gas production rate projections may prove conservative. Stated another way, this report may not account for several future gas development projects, the sum of which may be significant. By yearend 2003, production from deepwater fields (greater than or equal to 1,000 feet) will account for 63 percent of the daily oil production and 29 percent of the daily gas production in the low case and 55 percent of the daily oil production and 24 percent of the daily gas production in the high case.

Contributing Personnel

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References

Melancon, J.M., and D.S. Roby, 1998, *Gulf of Mexico Outer Continental Shelf Daily Oil and Gas Production Rate Projections From 1998 Through 2002*, U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, OCS Report MMS 98-0013, New Orleans, 16 p.

Notice

Please contact the Regional Supervisor, Production and Development, Gulf of Mexico OCS Region, Minerals Management Service, 1201 Elmwood Park Boulevard, New Orleans, Louisiana 70123, to communicate any questions you have or ideas for consideration in our next report. The telephone number is (504) 736-2675.