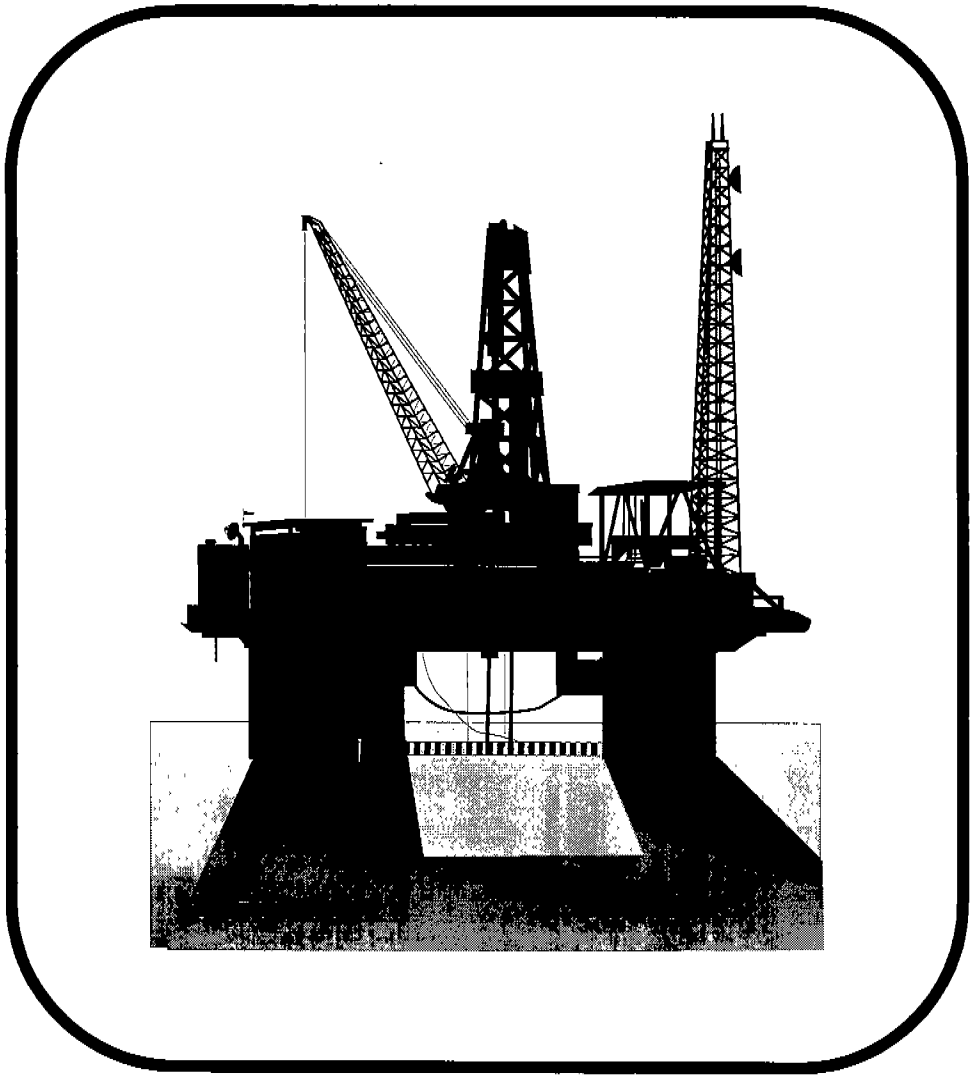
OCS Report
MMS 2000-012

Gulf of Mexico Outer Continental Shelf Daily Oil and Gas Production Rate Projections From 2000 Through 2004



January 2000

U.S. Department of the Interior
Minerals Management Service
Gulf of Mexico OCS Region

OCS Report
MMS 2000-012

Gulf of Mexico Outer Continental Shelf Daily Oil and Gas Production Rate Projections From 2000 Through 2004

J. Michael Melancon
Richie D. Baud

U.S. Department of the Interior
Minerals Management Service
Gulf of Mexico OCS Regional Office

New Orleans
January 2000

Contents

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 2000 through 2004. 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 include 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 2000-2004.

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 will offset decline rates in currently producing shallow-water fields. Thus, shallow-water GOM production will remain constant at the December 1998 daily rates of 743 MBOPD and 11.97 BCFPD through the year 2004. 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 Baud, 1999). For the low-case gas projections we similarly assume a 7.9 percent decline. (The shallow-water gas production rate declined almost 5 percent in 1997 and 1998, but there has not been a sustained decline over the last 20 years).

4. We assume that all discovered deepwater fields that will begin production prior to 2005 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 2000 to 2004 were calculated using the actual average daily production rates for oil and gas in December 1998 and the decline rate determined above.

We ranged the deepwater production rate projections by comparing 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 8 percent for gas.

The projected low-case, deepwater rates were calculated by subtracting 7 percent (oil) or 8 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 2000 to 2004 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 2000 to 2004 were held constant at December 1998 levels. The average daily high-case, deepwater production rates were calculated by adding 7 percent (oil) or 8 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- and deepwater estimates.

Results

Table 1 presents a listing of 65 deepwater fields on production or projected to begin production through the year 2004, 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 previous reports 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.

Fifteen new fields were added to the report this year, one project was cancelled, and two fields ceased production in 1999. Table 2 lists former deepwater fields that are no longer producing.

Table 3 and Figures 1 and 2 provide the high- and low-range daily oil and gas rate projections in tabular and graphical forms, respectively. Table 4 and Figures 3 and 4 separate shallow- and deepwater production rate projections. Note that the shallow-water projections diverge (into high-case and low-case) from December 1998 in Figures 3 and 4. The deepwater projections, however, diverge in 1999. This difference reflects the fact that our shallow-water data are only complete through May 1999, but operators submitted December 1999 deepwater rates for this report.

Undiscovered or unreported fields in any water depth coming on production by the year 2005 will further increase these daily production totals.

Table 1. — Deepwater Fields on Production or Expected to Commence Production by Yearend 2004

Operator	Field Nickname	Block	Water Depth	Year of First Production
Amerada Hess	Baldpate	GB 260	1,605 ft	1998
BP Amoco	King's Peak	DC 133	6,608 ft	Unreleasable
BP Amoco	King	MC 084	5,315 ft	Unreleasable
BP Amoco	Marlin	VK 915	3,238 ft	2000
BP Amoco	Troika	GC 244	2,681 ft	1997
BP Amoco	AmberJack	MC 109	1,058 ft	1991
BP Amoco	Pompano/Pompano II	VK 990	1,445 ft	1994
BP Amoco	Nile	VK 914	3,534 ft	2001
British-Borneo	Morpeth/Klamath	EW 921	1,706 ft	1998
British-Borneo	Allegheny	GC 254	3,186 ft	1999
Chevron	Genesis	GC 205	2,599 ft	1999
Chevron	North Gemini	MC 248	3,290 ft	2001
Chevron	Typhoon	GC 237	2,005 ft	2001
Conoco	Jolliet	GC 184	1,722 ft	1989
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
Exxon	Mica	MC 167	4,356 ft	Unreleasable
Kerr-McGee	Neptune/Thor	VK 825	1,866 ft	1997
Kerr-McGee	Salsa	GB 171	1,074 ft	1998
Marathon	Arnold	EW 963	1,752 ft	1998
Mariner	Black Widow	EW 966	1,850 ft	2000
Mariner	Dulcimer	GB 367	1,124 ft	1999
Mariner	Pluto/Blood Sweat & Tears	MC 718	2,786 ft	2000
Shell Deepwater Dev. Inc.	Serrano	GB 516	3,153 ft	Unreleasable
Shell Deepwater Dev. Inc.	Macaroni	GB 602	3,600 ft	1999
Shell Deepwater Dev. Inc.	Angus	GC 113	1,465 ft	1999
Shell Deepwater Dev. Inc.	King Kong	GC 472	3,817 ft	Unreleasable
Shell Deepwater Dev. Inc.	El Toro	GC 69	1,428 ft	Unreleasable
Shell Deepwater Dev. Inc.	Ariel/Nakika	MC 429	6,274 ft	Unreleasable
Shell Deepwater Dev. Inc.	Herschel/Nakika	MC 520	6,739 ft	Unreleasable
Shell Deepwater Dev. Inc.	Fourier/Nakika	MC 522	6,950 ft	Unreleasable
Shell Deepwater Dev. Inc.	East Anstey/Nakika	MC 607	6,590 ft	Unreleasable
Shell Deepwater Dev. Inc.	King	MC 764	3,265 ft	2000
Shell Deepwater Dev. Inc.	Keppler/Nakika	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	2001
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	1,492 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

Table 1. (Continued) — Deepwater Fields on Production or Expected to Commence Production by Yearend 2004

Operator	Field Nickname	Block	Water Depth	Year of First Production
Texaco	Gemini	MC 292	3,745 ft	1999
Walter Oil & Gas	UNNAMED	EW 1006	1,832 ft	1999
Walter Oil & Gas	UNNAMED	VK 862	1,043 ft	1995
Unreleasable	Unreleasable	EB	3,500 ft	Unreleasable
Unreleasable	Unreleasable	EB	3,500 ft	Unreleasable
Unreleasable	Unreleasable	EW	1,500 ft	Unreleasable
Unreleasable	Unreleasable	GB	1,500 ft	Unreleasable
Unreleasable	Unreleasable	GB	1,500 ft	Unreleasable
Unreleasable	Unreleasable	GC	4,500 ft	Unreleasable
Unreleasable	Unreleasable	MC	3,000 ft	Unreleasable
Unreleasable	Unreleasable	MC	4,000 ft	Unreleasable
Unreleasable	Unreleasable	MC	5,500 ft	Unreleasable
Unreleasable	Unreleasable	MC	6,000 ft	Unreleasable
Unreleasable	Unreleasable	MC	7,000 ft	Unreleasable
Unreleasable	Unreleasable	VK	1,000 ft	Unreleasable
Unreleasable	Unreleasable	VK	2,000 ft	Unreleasable

Table 2. — Deepwater Fields No Longer on Production

Operator	Field Nickname	Block	Water Depth	Years on Production
EEX	Cooper	GB 387	2,163 ft	1995-1999
Oryx	Diamond	MC 445	2,095 ft	1993-1999
Tatham	Seattle Slew	EW 914	1,019 ft	1993-1997

Table 3. — Daily Oil and Gas Production Rate Projections - GOM

	2000	2001	2002	2003	2004
Low Oil MBOPD* (Decline Used)	1,428	1,441	1,442	1,331	1,315
High Oil MBOPD* (No Decline Used)	1,660	1,733	1,786	1,707	1,733
Low Gas BCFPD** (Decline Used)	13.02	12.72	12.28	11.70	10.80
High Gas BCFPD** (No Decline Used)	15.33	15.91	16.26	16.38	16.06

Table 4. — Daily Oil and Gas Production Rate Projections Separated into Deepwater and Shallow- water Fields.

	2000	2001	2002	2003	2004
Low-case Deepwater Oil MBOPD*	797	860	906	837	860
High-case Deepwater Oil MBOPD*	917	990	1,043	963	989
Low-case Shallow-water Oil MBOPD*	631	581	536	493	455
High-case Shallow-water Oil MBOPD*	744	744	744	744	744
Low-case Deepwater Gas BCFPD**	2.86	3.36	3.65	3.76	3.49
High-case Deepwater Gas BCFPD**	3.36	3.94	4.29	4.41	4.09
Low-case Shallow-water Gas BCFPD**	10.16	9.36	8.62	7.94	7.32
High-case Shallow-water Gas BCFPD**	11.97	11.97	11.97	11.97	11.97

*Oil in MBOPD includes condensate.

**Gas in BCFPD includes associated or casinghead gas.

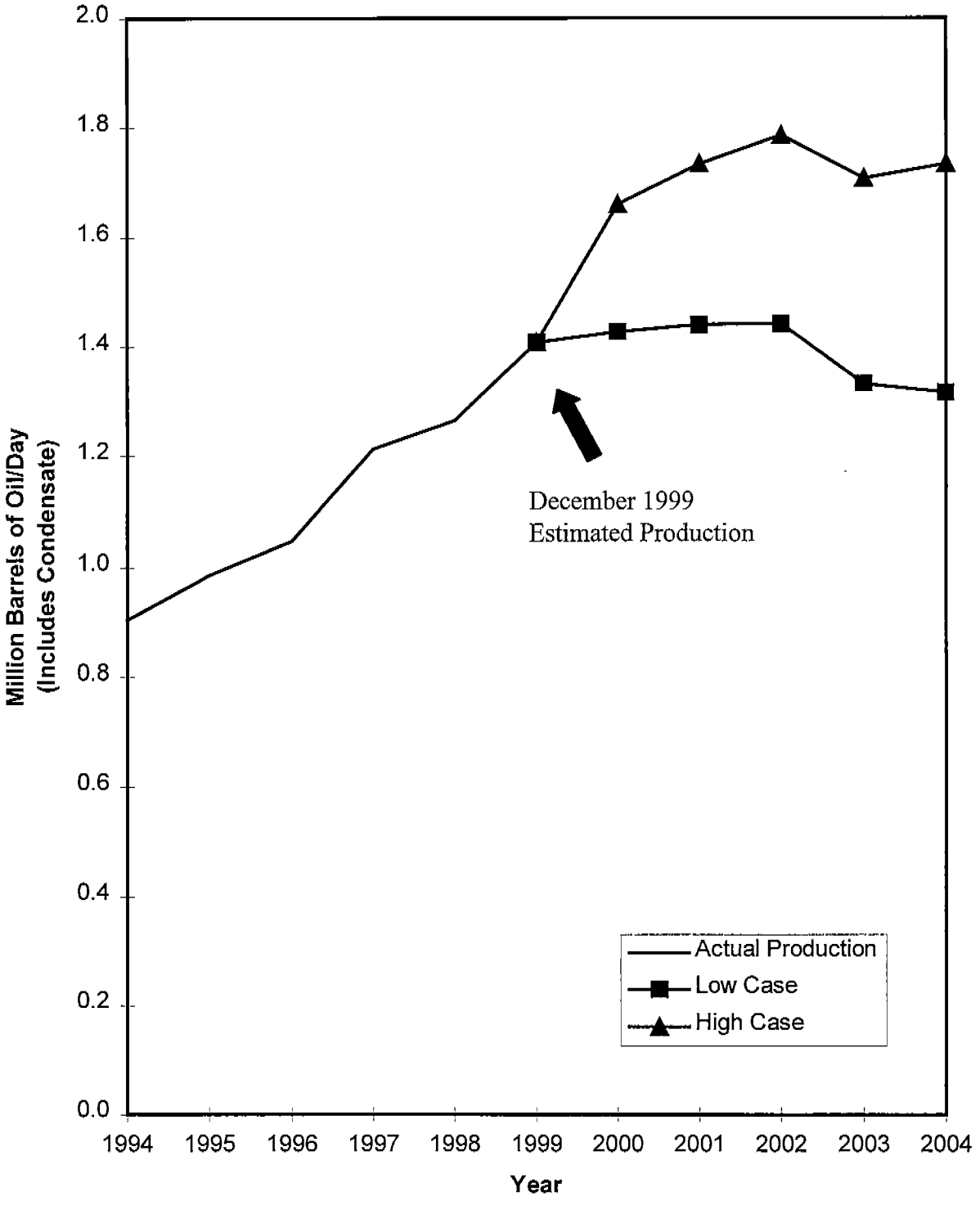


Figure 1. - Oil Production Rate Projections, Gulf of Mexico Region

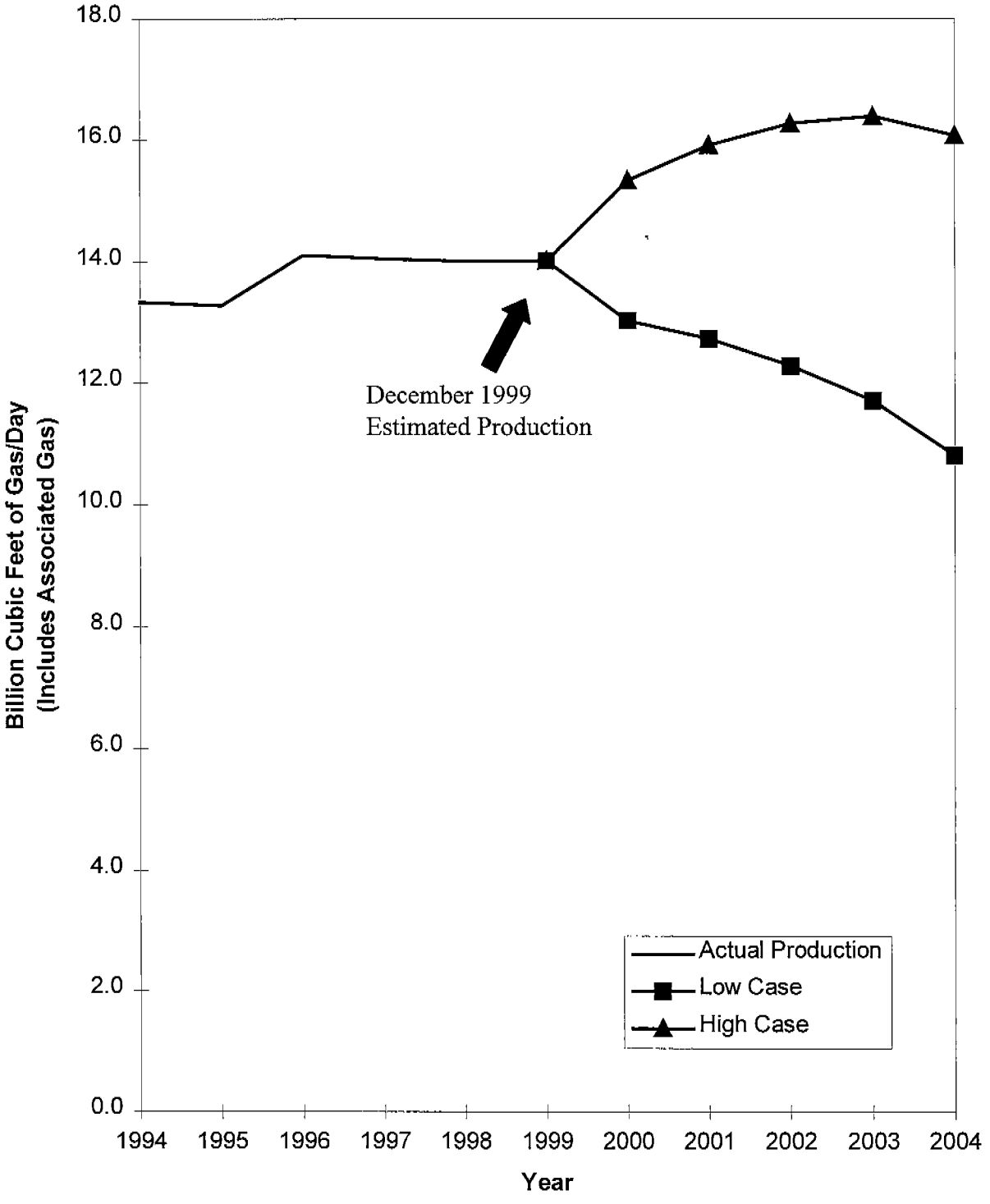


Figure 2. - Gas Production Rate Projections, Gulf of Mexico Region

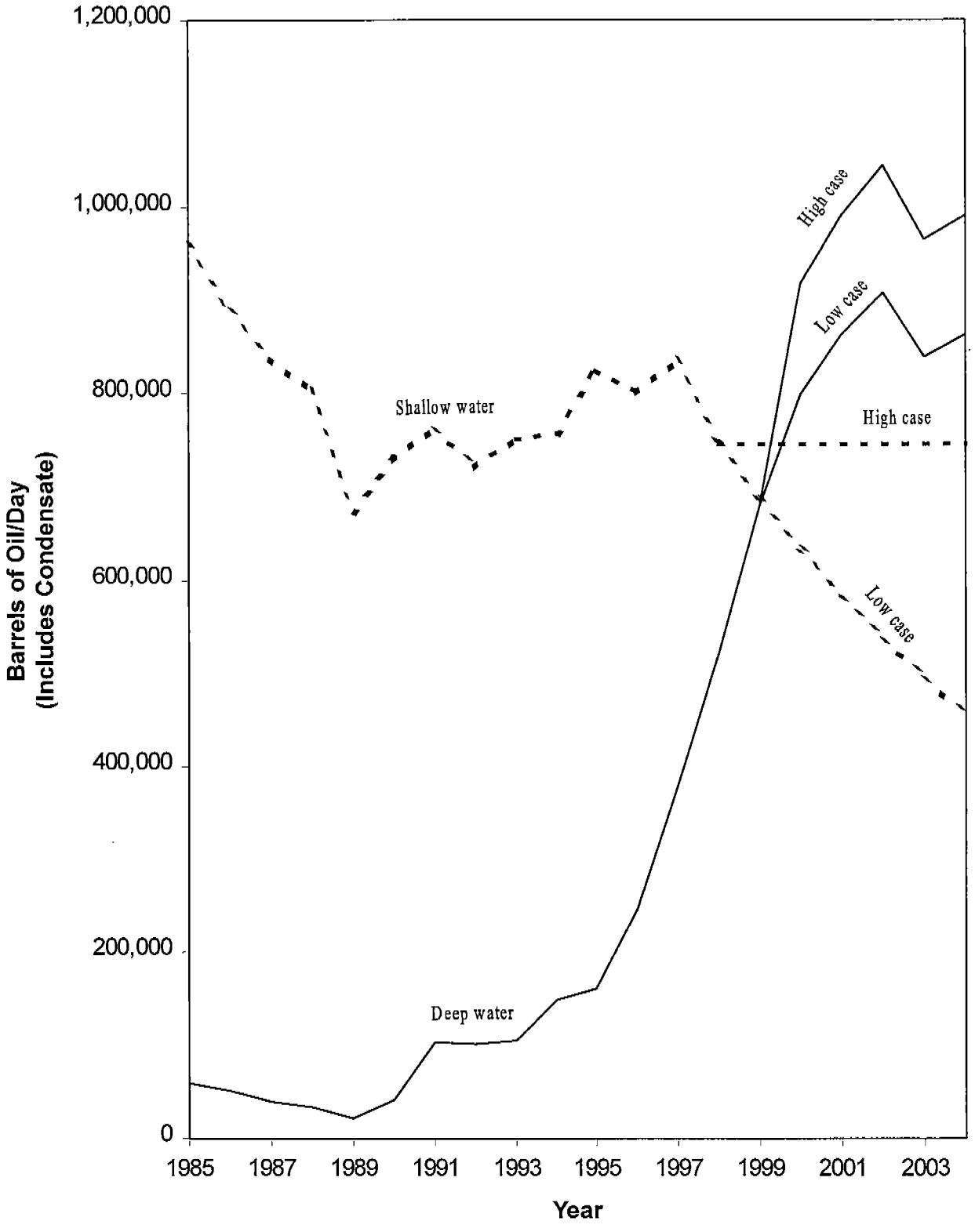


Figure 3. - Historical and Projected Oil Production Rates for Shallow and Deep Water

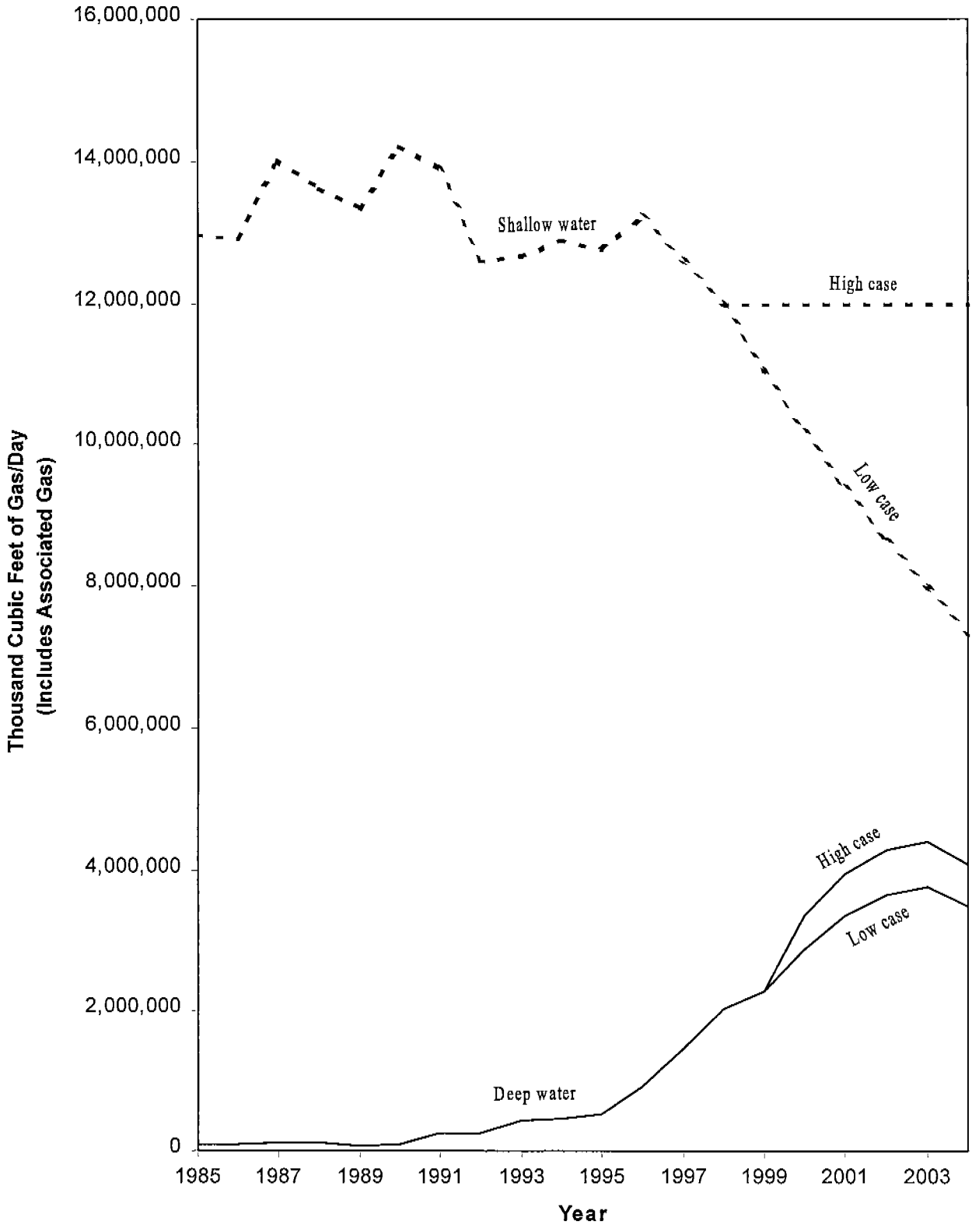


Figure 4. - Historical and Projected Gas Production Rates for Shallow and Deep Water

Analysis

Last year's report, MMS 99-0016 (January 1999), projected yearend 2003 daily production rates of between 1,381 MBOPD and 1,836 MBOPD for oil and between 10.91 BCFPD and 16.61 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 2000, 2001, etc.) are similarly ranged by applying error estimates (±7% oil and ±8% gas) to operator predictions.

When this report was formulated, May 1999 was the latest complete available month of production. Therefore, we cannot compare December 1999 actual production to the December 1999 projections in last year's report, which were between 1,488 and 1,731 MBOPD for oil and between 13.15 and 15.66 BCFPD for gas. However, the actual daily production rates for the latest month, May 1999, are 1,270 MBOPD for oil and 13.51 BCFPD for gas. Additionally, Allegheny, Virgo, Angus, and Macaroni began production between June and December 1999, and production from Ursa and Gemini increased significantly during this period. When preliminary rates for these fields are added to the May 1999 actual production data, an approximation of December 1999 actual rates is 1,408 MBOPD and 14.02 BCFPD if production from May is comparable to December, all other things being constant. A similar analysis in last year's report yielded December 1998 approximations within 49 MBOPD and 0.03 BCFPD.

Figures 5 and 6 provide a graphical presentation comparing the daily oil and gas production projections from the January 1999 report and this report. The estimated 1999 yearend gas production rate is within the predicted range of last year's report (and all of our previous reports). The estimated 1999 yearend oil production rate, however, is below previous predictions. In addition, projected oil production rates are slightly lower than last year's report. These lower oil rates reflect revised forecasts on a few large deepwater fields. Production from these fields is expected to escalate more slowly than previously anticipated.

Last year's report projected decreasing production rate trends, beginning in 2002, for both oil and gas. The current projection shows increasing oil production through 2002 and steady gas production through about 2003.

The reversal in 2002 production rate trends may be attributed to two factors. First, there are several fields (primarily gas fields) that are expected to begin producing by 2003 that were unreported last year. Second, operators significantly revised their forecasts on a few large deepwater fields. These revisions suppress production rates in 1999 through 2001, but sustain production rate increases through 2002.

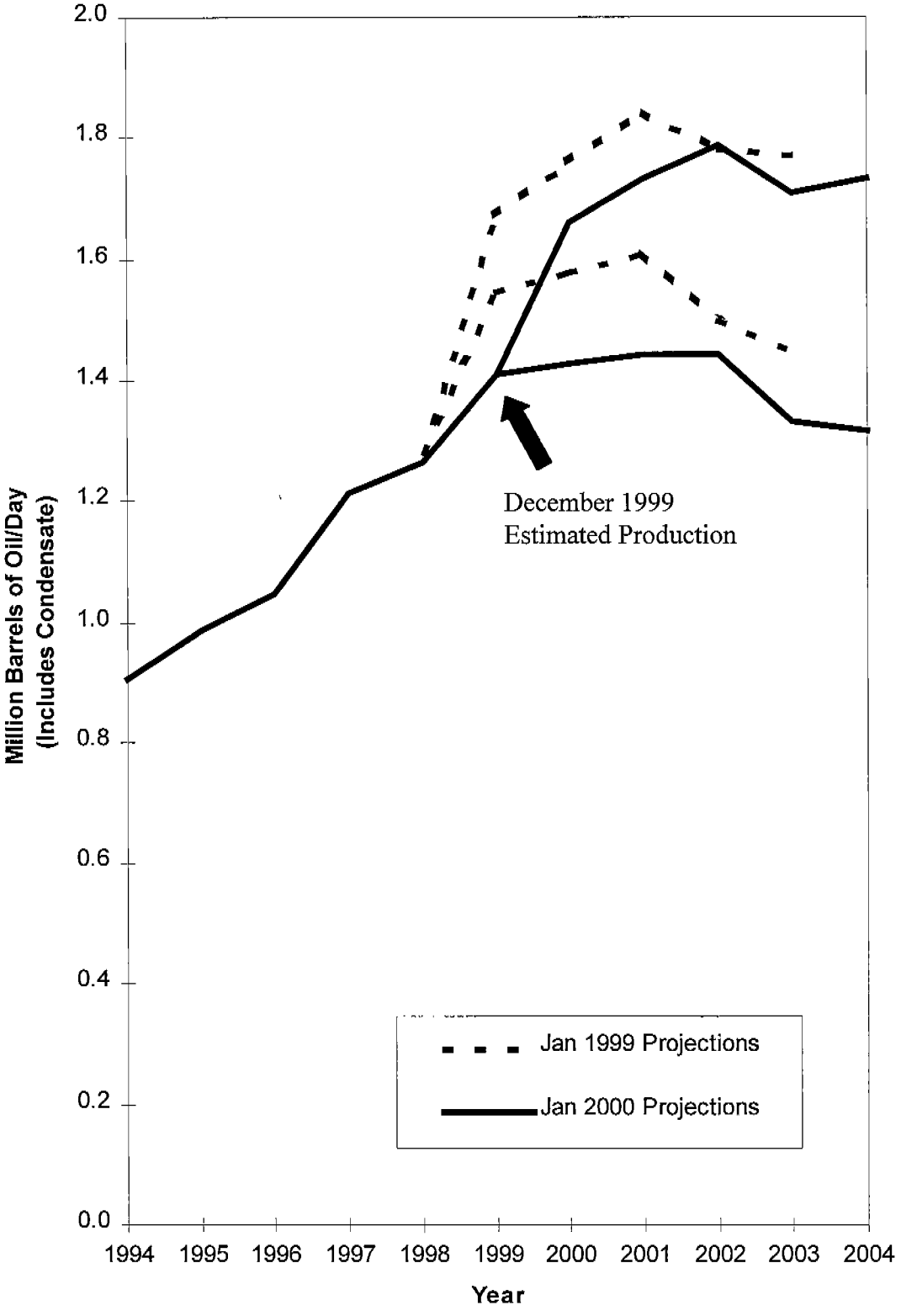


Figure 5. - Comparison of Current (January 2000) and Previous Oil Production Rate Projections, Gulf of Mexico Region

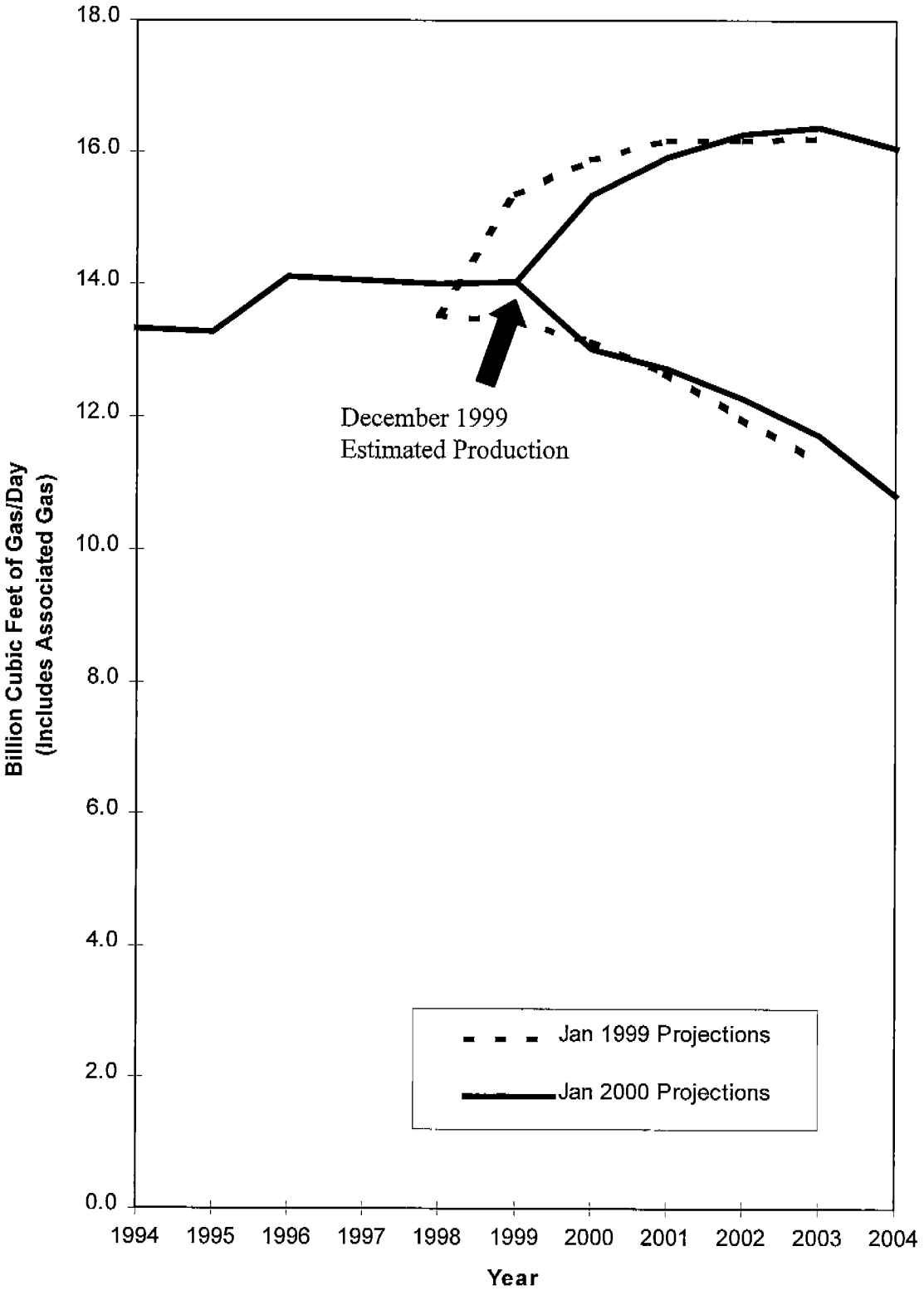


Figure 6. - Comparison of Current (January 2000) and Previous Gas Production Rate Projections, Gulf of Mexico Region

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 flurry of activity from 1996 to 1998. This activity is evident in Figure 7, which indicates that over 2.5 times as many leases received bids during this 3-year span (1996-1998) than the previous three years (1993-1995). However, leasing activity sharply declined in 1999.

The large increase in bidding activity from 1996 to 1998 was 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 5 that the largest increase by far was in water depths > 800 meters.

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 and 1999 as shown in Table 6. Exploratory plan approvals also increased from 1993 through 1997. However, the decrease in exploratory plan approvals was minimal in 1998 and 1999 when compared with the drop in development plan approvals.

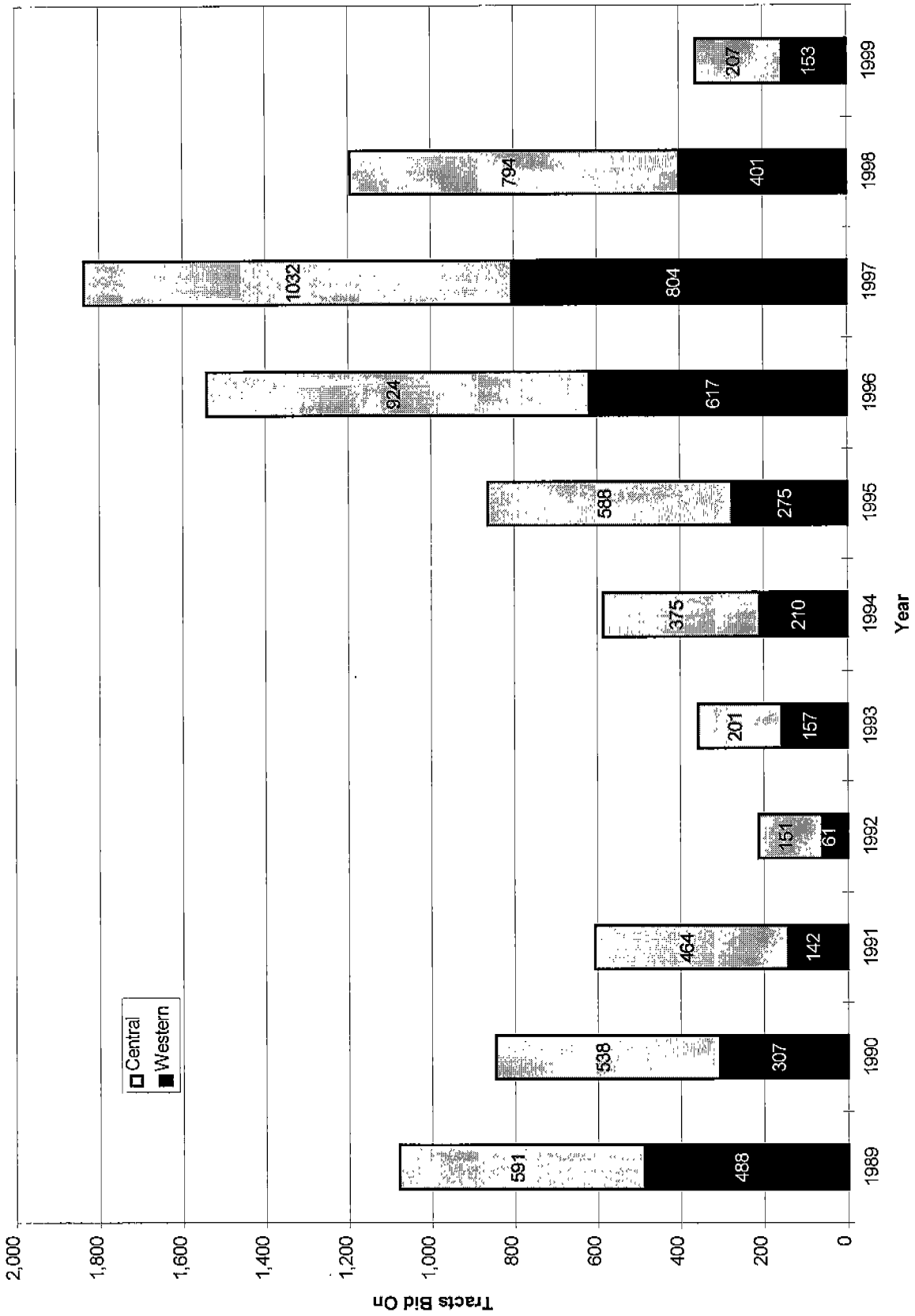


Figure 7. - 10-Year Bidding Trend in the Gulf of Mexico

Table 5. — Gulf of Mexico OCS Bids 1994-1999; Before and After Royalty Relief (Years 1996 through 1999 include Royalty Relief)

Water Depth	1994	1995	1996	1997	1998	1999
<200M	490	516	637	542	279	173
200-400M	18	50	69	52	38	16
400-800M	28	83	113	104	61	18
>800M	49	214	722	1,138	817	153
	585	863	1,541	1,836	1,195	360

Table 6. — Plans of Exploration (POE) and Development Operations Coordination Documents (DOCD) by Calendar Year

Calendar Year	POE'S Approved	DOCD's Approved
1993	337	220
1994	366	336
1995	351	301
1996	420	347
1997	439	370
1998	409	280
1999	396	265

Conclusions

Deepwater oil and gas production rates were at an all-time high in 1999. By the end of 2000, we anticipate that deepwater oil production will grow fast enough to surpass shallow-water oil production for the first time in history.

The Gulf of Mexico OCS should increase its 1995 daily oil production from 945 MBOPD to a range between 1,442 MBOPD and 1,786 MBOPD by yearend 2002 and between 1,315 MBOPD and 1,733 MBOPD by yearend 2004. The 1995 daily gas production rate of 13.09 BCFPD should change to a range from 12.28 BCFPD to 16.26 BCFPD by yearend 2002 and between 10.80 BCFPD and 16.06 BCFPD by yearend 2004.

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 2004, production from deepwater fields (greater than or equal to 1,000 feet) will account for 65 percent of the daily oil production and 32 percent of the daily gas production in the low case scenario, and 57 percent of the daily oil production and 25 percent of the daily gas production in the high case scenario.

Contributing Personnel

This report includes contributions from the following Minerals Management Service personnel:

Pat Bryars
Stephen T. Dessauer
Gilbert K. Shank
Emile H. Simoneaux
Loc Van Than
Janice M. Todesco
Mike Tolbert
Stephen T. Walsh
T. Scott Williams

References

Melancon, J. M., and Baud, R. D., 1999, *Gulf of Mexico Outer Continental Shelf Daily Oil and Gas Production Rate Projections From 1999 Through 2003*, U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, OCS Report MMS 99-0016, New Orleans, 20 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.