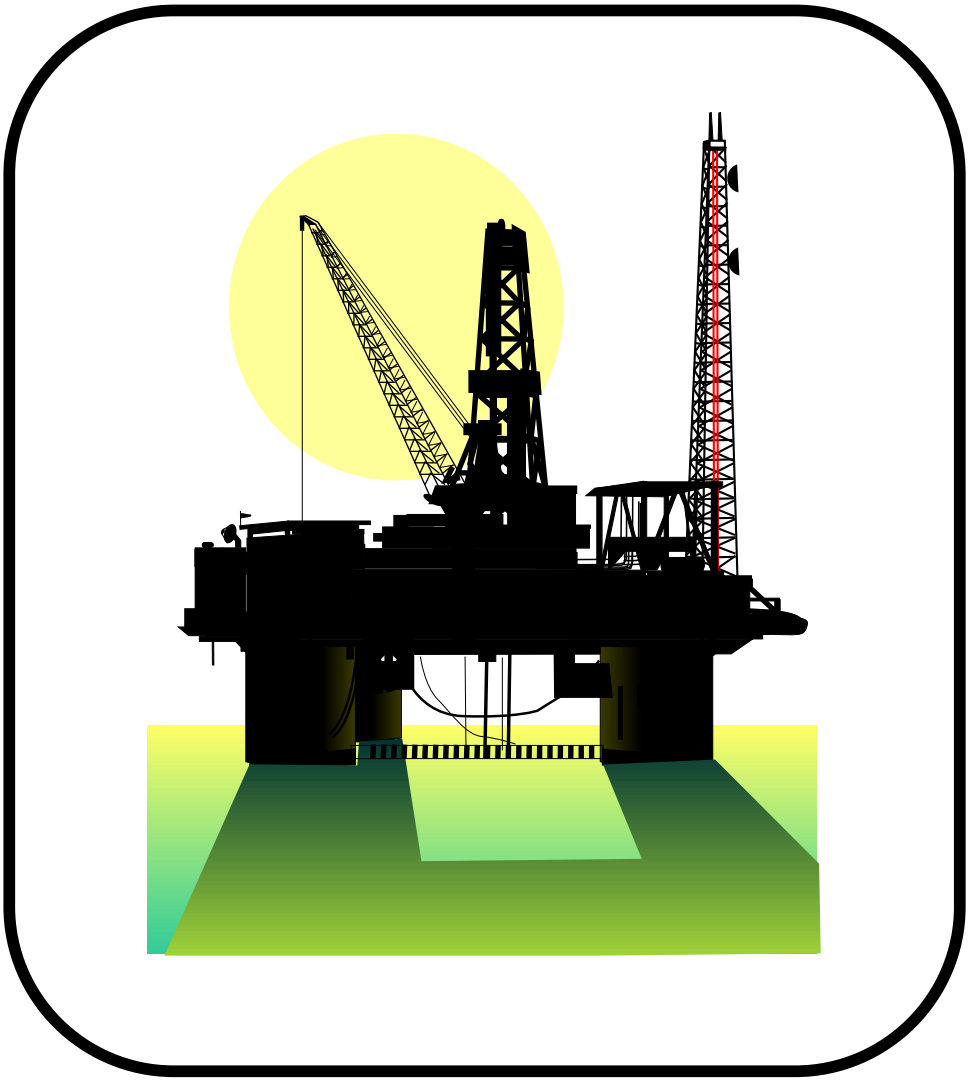
OCS Report
MMS 2001-044

Gulf of Mexico Outer Continental Shelf Daily Oil and Gas Production Rate Projections From 2001 Through 2005



May 2001

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

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

New Orleans
May 2001

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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 2001 through 2005. These projections represent average daily oil and gas production estimates for each calendar year.

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.

Our previous reports used December average daily production rates for historical and projected figures. In this report, however, we use calendar year averages for both historical and projected rates. This method is consistent with other Minerals Management Service reports, reduces the historical year-to-year variance, and reduces the error bars on our future projections.

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 2001-2005.

Methodology

We determined shallow-water production rates for this report using a decline analysis of historical, shallow-water GOM production rates. This decline analysis differs slightly from last year's method. We 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. Unlike previous reports, the high-case scenarios for oil and gas assume that shallow-water production may increase at the same rate as observed during the last period of sustained shallow-water increase. This results in a 2.8 percent increase for shallow-water oil production (similar to the 1992-1997 increase) and a 4.2 percent increase for shallow-water gas production (similar to the 1986-1990 increase).

3. For the low-case oil and gas projections, we assume that shallow-water production rates will decline at the same rate as observed during the last period of sustained shallow-water declines. This results in a 6.1 percent decline for oil (1997-2000) and a 5.2 percent decline for gas (1996-2000).

4. We assume that all discovered deepwater fields that will begin production prior to 2006 were reported in our operator survey, and that the operators accurately predicted future production rates (within 7 to 8 percent) for these fields.

Low-case Production Rate Projections

The average daily low-case, shallow-water oil and gas production rates for 2001 to 2005 were calculated using the estimated average daily production rates for oil and gas in 2000 and the decline rate determined above.

We ranged the deepwater production rate projections by assuming an error range of 7 percent for oil and 8 percent for gas (Melancon and Baud, 2000).

The total projected average daily low-case production rates for 2001 to 2005 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 2001 to 2005 were calculated using the average daily production rates for oil and gas in 2000 and the increase rate determined above. 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 72 deepwater fields on production or projected to begin production through the year 2005, 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 or the manner in which MMS defines fields.

Nine new fields were added to the report this year, and two projects were cancelled. 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.

Undiscovered or unreported fields in any water depth coming on production by the year 2006 will further increase these daily production totals.

Table 1. — Deepwater Fields on Production or Expected to Commence Production by Yearend 2005

Operator	Field Nickname	Block	Water Depth	Year of First Production
Shell Offshore Inc.	Cognac	MC 194	1,023 ft	1979
Exxon/Mobil	Lena	MC 281	1,017 ft	1984
Conoco	Jolliet	GC 184	1,722 ft	1989
Shell Offshore Inc.	Bullwinkle	GC 65	1,330 ft	1989
BP-Amoco	AmberJack	MC 109	1,058 ft	1991
Exxon/Mobil	Zinc	MC 354	1,478 ft	1993
BP-Amoco	Pompano/Pompano II	VK 990	1,445 ft	1994
Shell Deepwater Prod. Inc.	Auger	GB 426	2,864 ft	1994
Shell Deepwater Prod. Inc.	Tahoe/Tahoe II	VK 783	1,492 ft	1994
Walter Oil & Gas	UNNAMED	VK 862	1,043 ft	1995
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.	Mars	MC 807	2,958 ft	1996
BP-Amoco	Troika	GC 244	2,681 ft	1997
Kerr-McGee	Neptune/Thor	VK 825	1,866 ft	1997
Shell Deepwater Prod. Inc.	Mensa	MC 731	5,330 ft	1997
Shell Deepwater Prod. Inc.	Ram Powell	VK 956	3,247 ft	1997
AGIP	Morpeth/Klamath	EW 921	1,706 ft	1998
Amerada Hess	Baldpate	GB 260	1,605 ft	1998
Marathon	Arnold	EW 963	1,752 ft	1998
Shell	Salsa/Enchilada	GB 83	1,074 ft	1998
AGIP	Allegheny	GC 254	3,186 ft	1999
Chevron	Genesis	GC 205	2,599 ft	1999
Elf	Virgo	VK 823	1,154 ft	1999
Mariner	Dulcimer	GB 367	1,124 ft	1999
Shell Deepwater Dev. Inc.	Macaroni	GB 602	3,600 ft	1999
Shell Deepwater Dev. Inc.	Angus	GC 113	1,465 ft	1999
Shell Deepwater Prod. Inc.	Ursa	MC 810	3,885 ft	1999
Texaco	Gemini	MC 292	3,745 ft	1999
Walter Oil & Gas	UNNAMED	EW 1006	1,832 ft	1999
Amerada Hess	Northwestern	GB 200	1,471 ft	2000
Amerada Hess	Conger	GB 215	1,461 ft	2000
BP-Amoco	Marlin	VK 915	3,238 ft	2000
Chevron	North Gemini	MC 248	3,290 ft	2000
Exxon/Mobil	Hoover	AC 25	4,795 ft	2000
Exxon/Mobil	Diana	EB 945	4,679 ft	2000
Mariner	Black Widow	EW 966	1,850 ft	2000
Mariner	Pluto/Blood Sweat & Tears	MC 718	2,786 ft	2000
Shell Deepwater Prod. Inc.	Europa	MC 935	3,883 ft	2000
Texaco	Petronius	VK 786	1,751 ft	2000
BP-Amoco	Nile	VK 914	3,534 ft	2001
Chevron	Typhoon	GC 237	2,005 ft	2001
Shell Deepwater Prod. Inc.	Brutus	GC 158	2,877 ft	2001
Shell Deepwater Prod. Inc.	Oregano	GB 559	3,400 ft	2001
Sonat	Prince/Sunday Silence	EW 958	1,464 ft	2001
Unreleasable	Unreleasable	Unreleasable	Unreleasable	2001
Unreleasable	Unreleasable	Unreleasable	Unreleasable	2001
Unreleasable	Unreleasable	Unreleasable	Unreleasable	2001
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Unreleasable	Unreleasable	Unreleasable	Unreleasable	2002
Shell Deepwater Dev. Inc.	Ariel/Nakika	MC 429	6,274 ft	2003

Table 1. (Continued) — Deepwater Fields on Production or Expected to Commence Production by Yearend 2005

Operator	Field Nickname	Block	Water Depth	Year of First Production
Shell Deepwater Dev. Inc.	Herschel/Nakika	MC 520	6,739 ft	2003
Shell Deepwater Dev. Inc.	Fourier/Nakika	MC 522	6,950 ft	2003
Shell Deepwater Dev. Inc.	East Anstey/Nakika	MC 607	6,590 ft	2003
Shell Deepwater Dev. Inc.	Keppler/Nakika	MC 783	5,800 ft	2003
Unreleasable	Unreleasable	Unreleasable	Unreleasable	2003
Unreleasable	Unreleasable	Unreleasable	Unreleasable	2004
Unreleasable	Unreleasable	Unreleasable	Unreleasable	2004
Unreleasable	Unreleasable	Unreleasable	Unreleasable	2004
Unreleasable	Unreleasable	Unreleasable	Unreleasable	2004
Unreleasable	Unreleasable	Unreleasable	Unreleasable	2004
Unreleasable	Unreleasable	Unreleasable	Unreleasable	2005

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
Oryx	Unnamed	GC 75	2,172 ft	1988-1989
Placid	Unnamed	GC 29	1,554 ft	1988-1990
Tatham	Seattle Slew	EW 914	1,019 ft	1993-1997

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

	2001	2002	2003	2004	2005
Low Oil MBOPD* (Decline Used)	1,376	1,498	1,440	1,437	1,526
High Oil MBOPD* (No Decline Used)	1,547	1,753	1,749	1,805	1,967
Low Gas BCFPD** (Decline Used)	12.86	12.94	12.29	11.77	11.10
High Gas BCFPD** (No Decline Used)	14.34	15.51	15.82	16.28	16.54

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

	2001	2002	2003	2004	2005
Low-case Deepwater Oil MBOPD*	732	894	872	903	1,025
High-case Deepwater Oil MBOPD*	842	1,028	1,003	1,039	1,179
Low-case Shallow-water Oil MBOPD*	644	605	568	533	501
High-case Shallow-water Oil MBOPD*	686	705	745	766	787
Low-case Deepwater Gas BCFPD**	2.76	3.36	3.21	3.17	2.93
High-case Deepwater Gas BCFPD**	3.24	3.95	3.77	3.72	3.46
Low-case Shallow-water Gas BCFPD**	10.10	9.58	9.08	8.61	8.16
High-case Shallow-water Gas BCFPD**	11.10	11.57	12.06	12.56	13.09

*Oil in MBOPD includes condensate.

**Gas in BCFPD includes associated or casinghead gas.

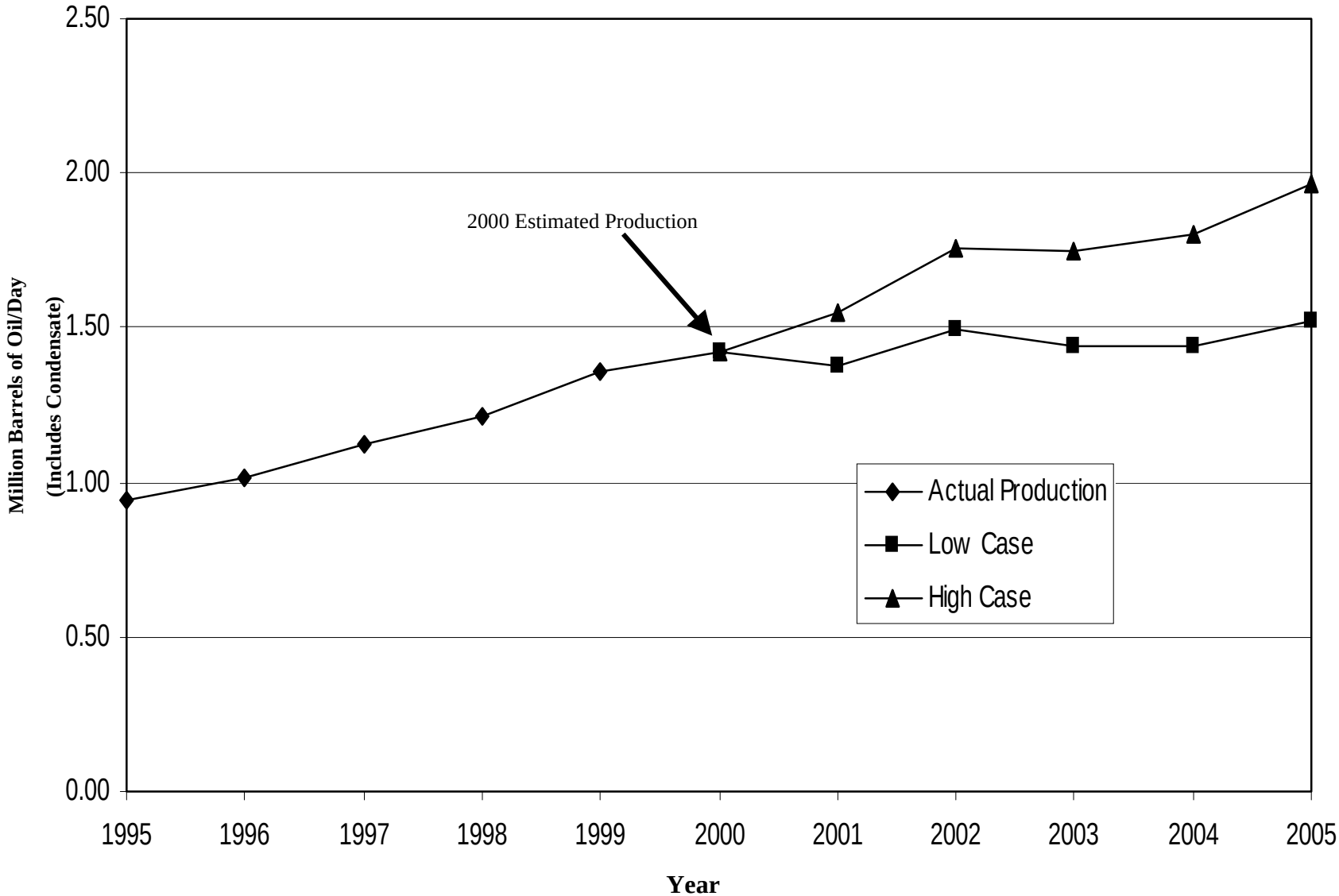

Figure 1. - Oil Production Rate Projections, Gulf of Mexico Region

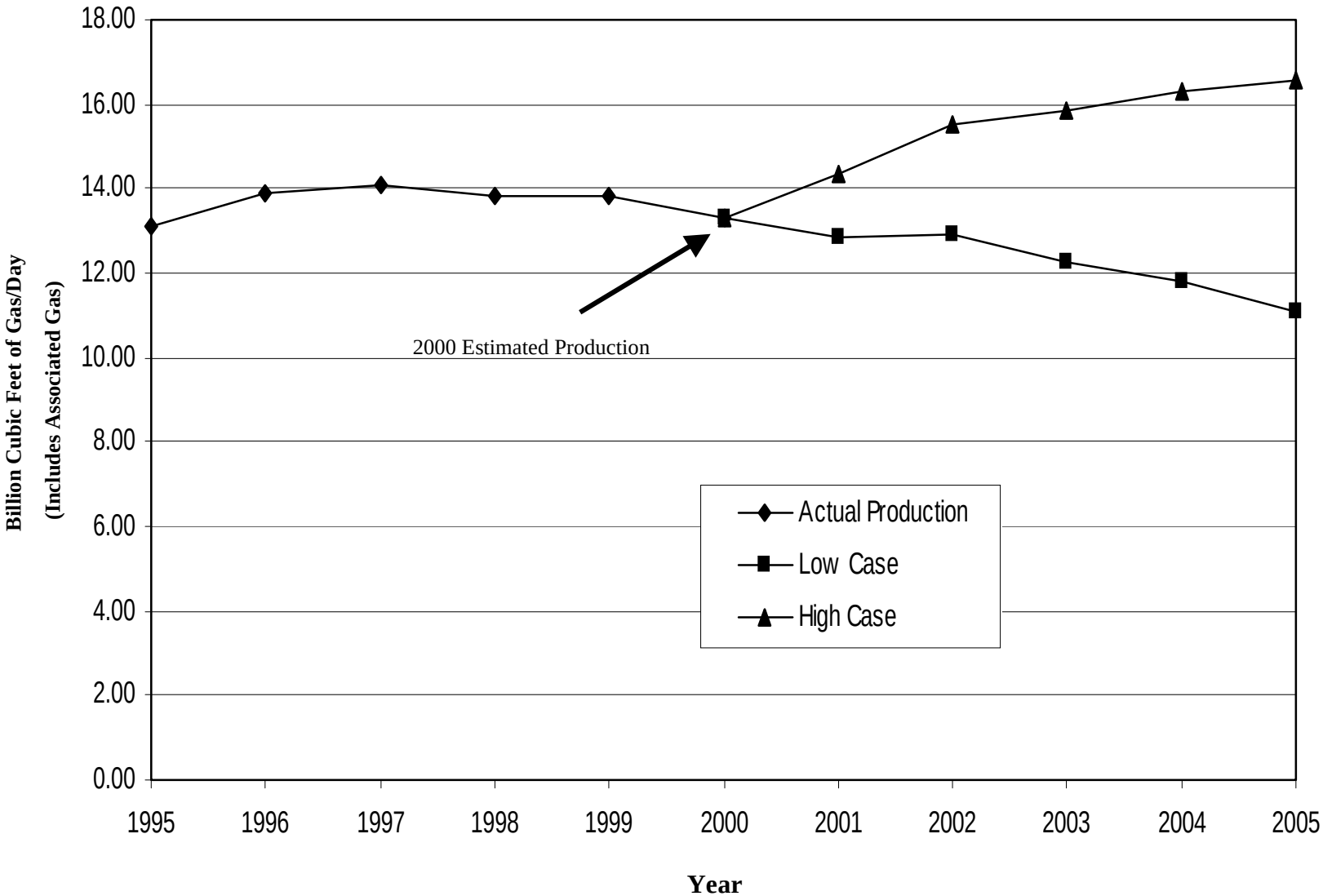

Figure 2. - Gas Production Rate Projections, Gulf of Mexico Region

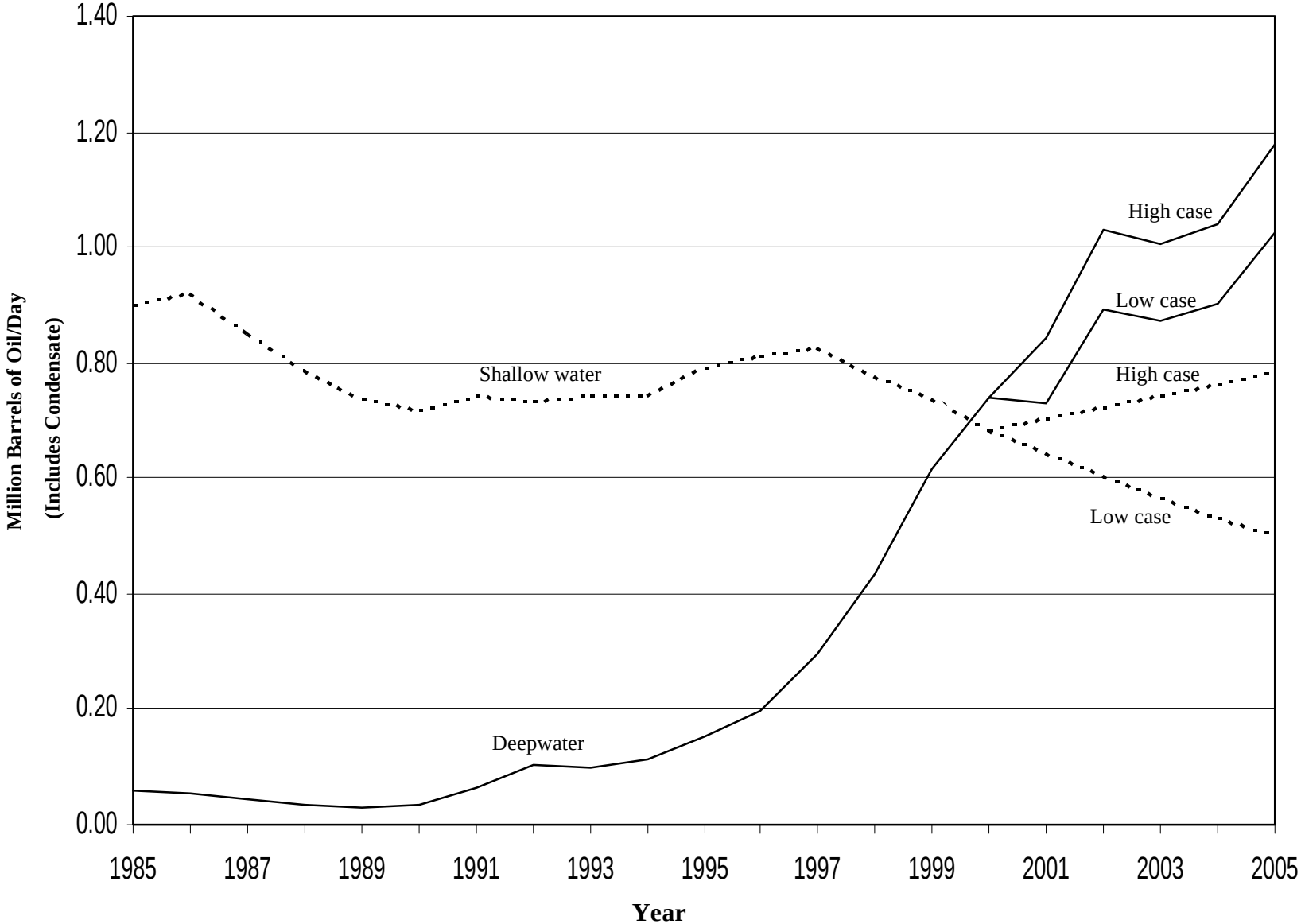

Figure 3. - Historical and Projected Oil Production Rates for Shallow and Deepwater

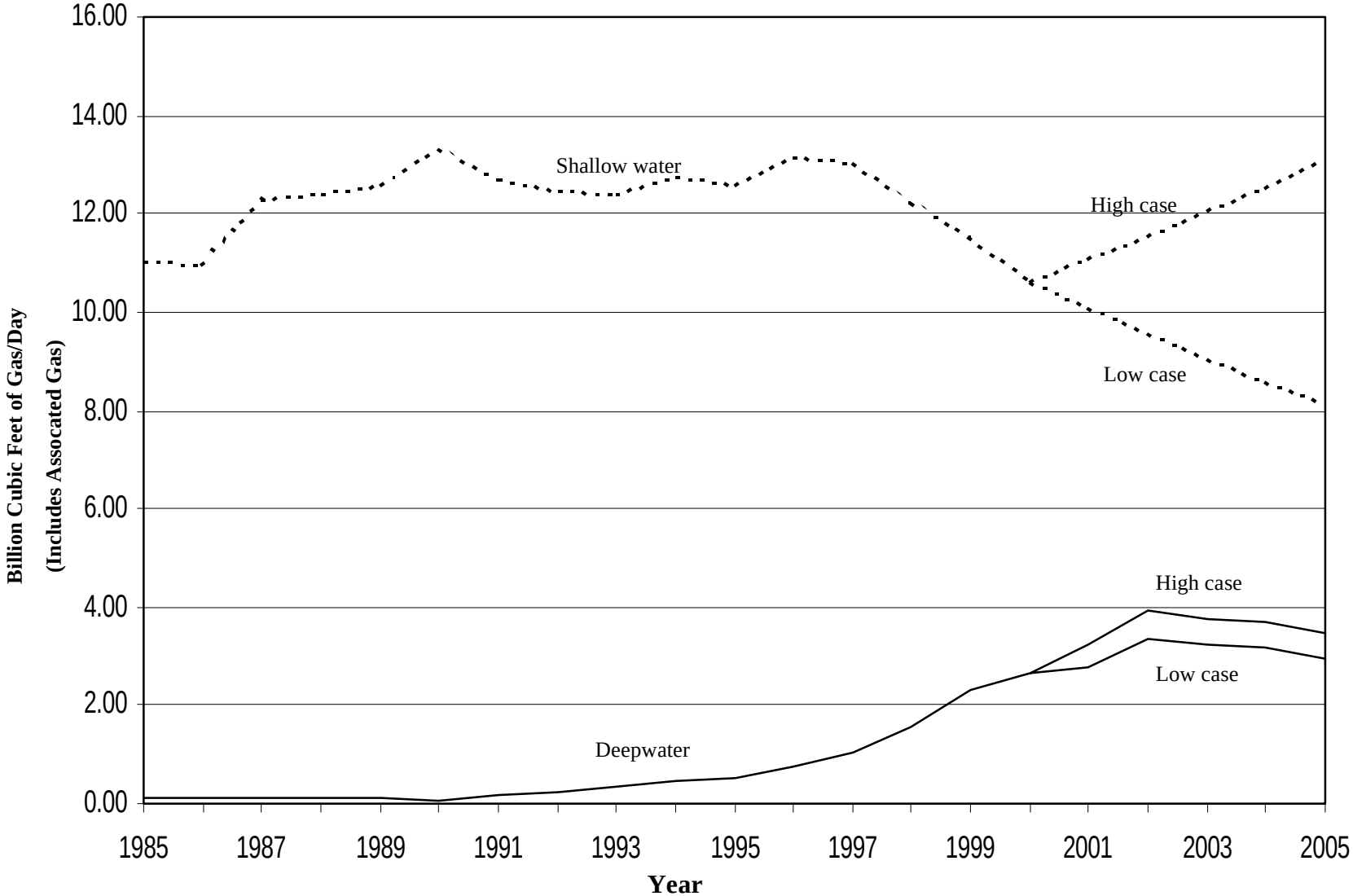

Figure 4. - Historical and Projected Gas Production Rates for Shallow and Deepwater

Analysis

Last year's report, MMS 2000-0012 (January 2000), projected yearend 2004 daily production rates of between 1,315 MBOPD and 1,733 MBOPD for oil and between 10.80 BCFPD and 16.06 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 2001, 2002, etc.) are similarly ranged by applying error estimates (±7% oil and ±8% gas) to operator predictions.

When this report was formulated, August 2000 was the latest complete available month of production. Therefore, we cannot compare December 2000 actual production to the December 2000 projections in last year's report, which were between 1,428 and 1,660 MBOPD for oil and between 13.02 and 15.33 BCFPD for gas. However, estimated Year 2000 total GOM production is 1,426 MBOPD for oil and 13.31 BCFPD for gas. (These estimates assume that September 2000 through December 2000 shallow-water production remained constant at August 2000 rates. These estimates also assume that deepwater production rates for September 2000 through December 2000 linearly increased from actual August 2000 production rates to the December 2000 estimates provided by operators.)

Figures 5 and 6 provide a graphical presentation comparing the daily oil and gas production projections from the January 2000 report and this report. The estimated 2000 yearend production rates generally fall within the predicted range for both oil and gas of last year's report.

This comparison is less direct than in previous years. Last year's report projected December rates, whereas this report depicts calendar year averages.

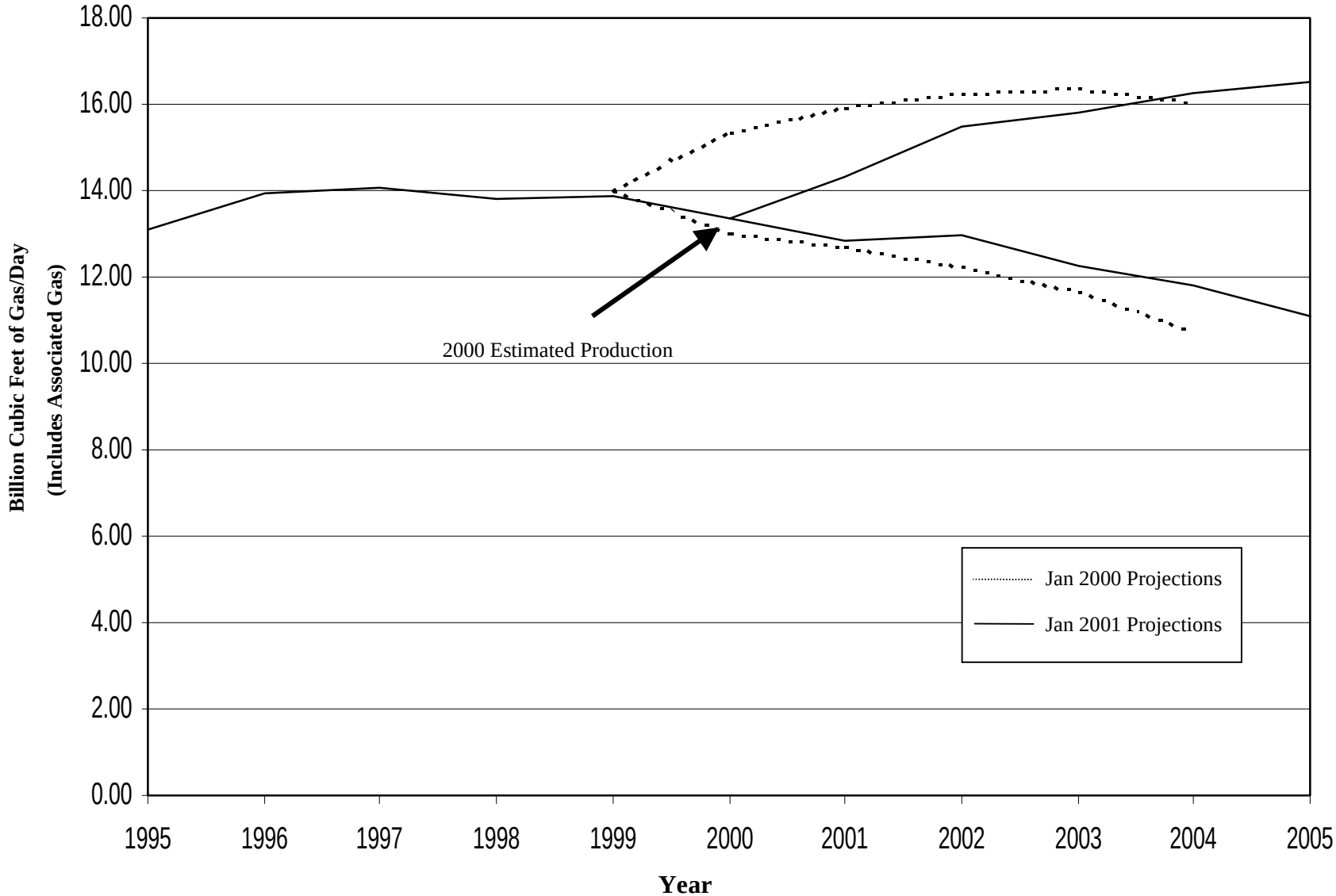

Figure 6. - Comparison of Current (January 2001) and Previous Gas Production Rate Projections, Gulf of Mexico

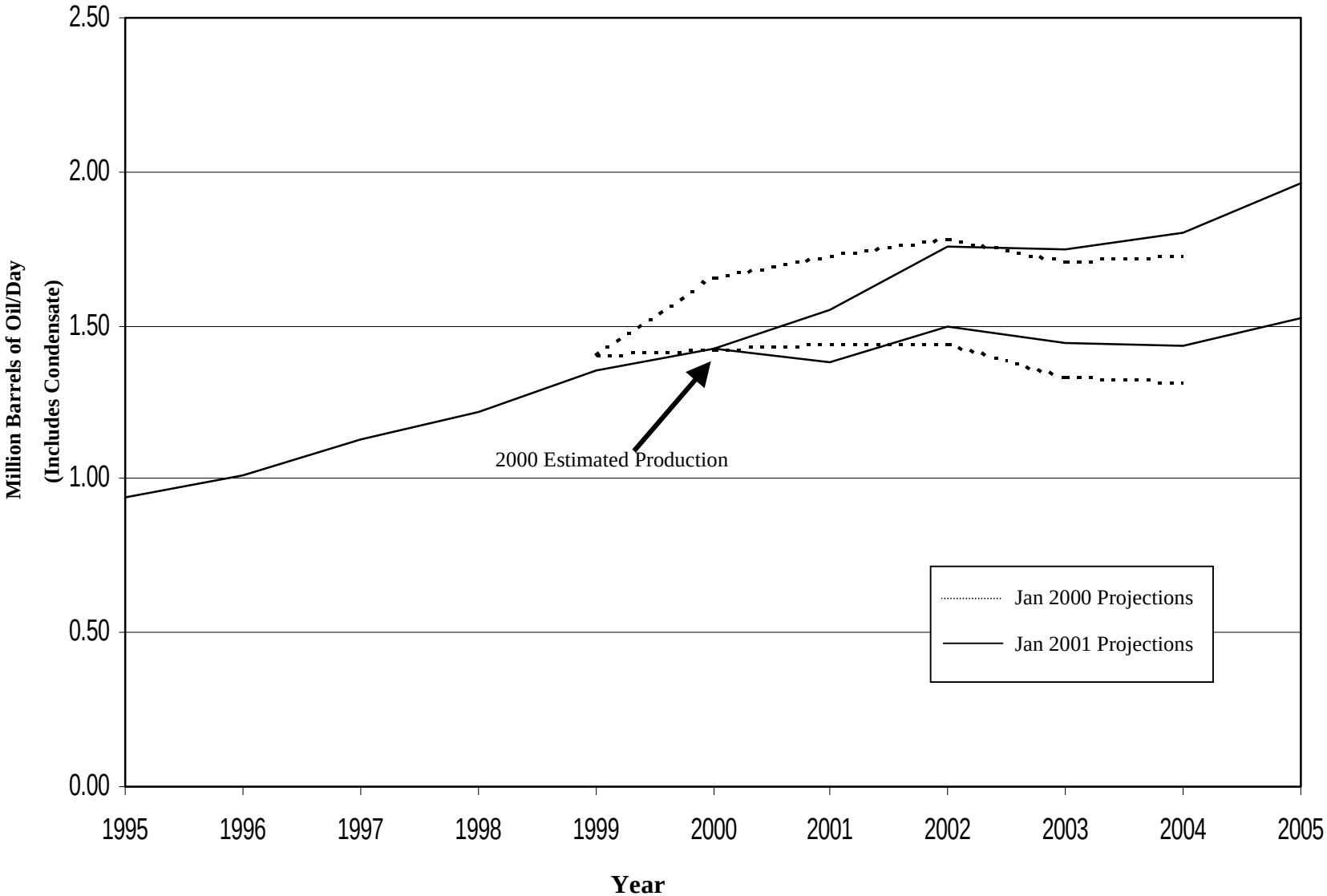

Figure 5. - Comparison of Current (January 2001) and Previous Oil Production Rates Projections, Gulf of Mexico Region

Leasing and Development Plan Activity

The total number of tracts receiving bids in the Gulf of Mexico OCS over the last 12 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, with only a moderate recovery in 2000.

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. In 1999 and 2000, however, the trend reversed.

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. Development and Exploratory Plan approvals increased in 2000.

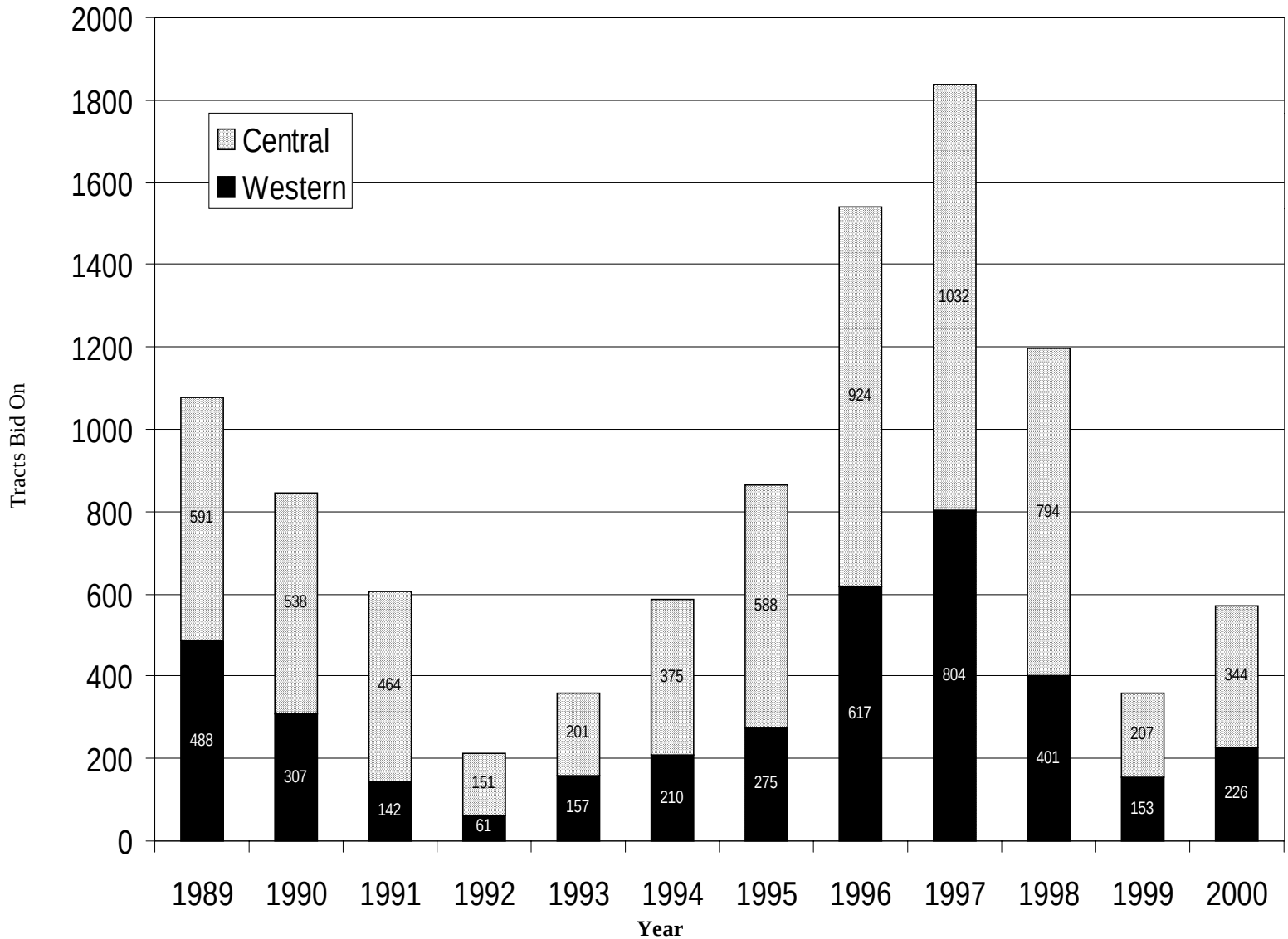

Figure 7. - 12-Year Bidding Trend in the Gulf of Mexico

Table 5. — Gulf of Mexico OCS Bids 1994-2000; Before and After Royalty Relief (Years 1996 through 2000 include Royalty Relief)

Water Depth	1994	1995	1996	1997	1998	1999	2000
<200M	490	516	637	542	279	173	331
200-400M	18	50	69	52	38	16	14
400-800M	28	83	113	104	61	18	28
>800M	49	214	722	1,138	817	153	197
	585	863	1,541	1,836	1,195	360	570

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
2000	424	364

Conclusions

Deepwater oil and gas production rates were at an all-time high in 2000. Deepwater oil production grew enough to surpass shallow-water production for the first time in history.

The Gulf of Mexico OCS should increase its daily oil production from 945 MBOPD in 1995 to a range between 1,526 MBOPD and 1,967 MBOPD by yearend 2005. The 1995 daily gas production rate of 13.09 BCFPD should change to a range between 11.10 BCFPD and 16.54 BCFPD by yearend 2005.

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 2005, production from deepwater fields (greater than or equal to 1,000 feet) will account for 67 percent of the daily oil production and 26 percent of the daily gas production in the low case scenario, and 60 percent of the daily oil production and 21 percent of the daily gas production in the high case scenario.

Contributing Personnel

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

Joan Lowenhaupt
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Janice M. Todesco
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References

Melancon, J. M., and Baud, R. D., 2000, *Gulf of Mexico Outer Continental Shelf Daily Oil and Gas Production Rate Projections From 2000 Through 2004*, U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, OCS Report MMS 2000-012, 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.