OCS Report
MMS 98-0032

Outer Continental Shelf

Estimated Proved and Unproved Oil and Gas Reserves, Gulf of Mexico, December 31, 1996

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Abstract

Remaining proved reserves in the Gulf of Mexico Outer Continental Shelf (OCS) as of December 31, 1996, have been estimated to be 2.74 billion barrels of oil* and 29.4 trillion cubic feet of gas. These reserves are recoverable from 749 proved active fields. Unproved reserves as of December 31, 1996, have been estimated to be 1.00 billion barrels of oil and 3.7 trillion cubic feet of gas. These reserves are associated with 52 unproved active fields. There are 33 unproved active fields not studied. This makes a total of 834 active fields located in Federal waters.

Original proved reserves are estimated to have been 12.79 billion barrels of oil and 151.9 trillion cubic feet of gas from 920 proved fields in the same geographic area. Included in this number are 171 fields that are depleted and abandoned; not included are the 85 unproved active fields. Estimates were made for individual reservoirs based on geologic mapping and reserve evaluation.

The unproved reserves, associated with the 52 unproved active fields, are not added to proved reserves because of different levels of economic certainty and hydrocarbon assurance. For any field contained partly in State waters and partly in Federal waters, reserves are estimated for the Federal portion only.

*The term "oil" as used in this report includes crude oil and condensate.

Introduction

This report, which supersedes the Minerals Management Service (MMS) OCS Report MMS 96-0061 (Bacigalupi and others, 1996), presents original proved reserves, cumulative production, remaining proved reserves, and unproved reserves as of December 31, 1996, for the Gulf of Mexico (GOM). This report does not consider the reserves growth phenomena when addressing remaining proved reserves. A discussion of reserves growth can be found in OCS Report MMS 96-0047 (Lore and others, 1996). The estimates of reserves for this report were completed in December 1997 and represent the combined efforts of engineers, geologists, geophysicists, paleontologists, and other personnel of the MMS Gulf of Mexico Region, Office of Resource Evaluation, in New Orleans, Louisiana.

As in previous reports, standard methods of estimating reserves were used, including volumetric calculation and performance analyses.

Definition of Resource and Reserve Terms

The MMS definitions and classification schema concerning reserves reflect those of the Society of Petroleum Engineers (SPE) and the World Petroleum Congress (WPC), 1996. SPE definitions have been used since 1988. The MMS definitions and classification schema concerning resources are modified as referenced by the U.S. Department of the Interior (DOI), 1989. The MMS petroleum resource and reserve classifications are presented in figures 1 and 2.

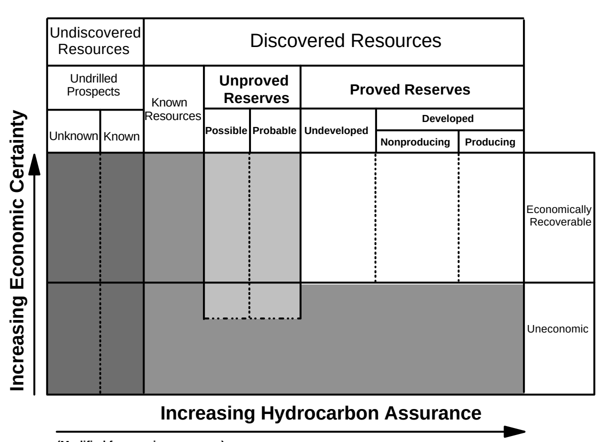

Figure 1.— MMS conventionally recoverable petroleum resource classifications.

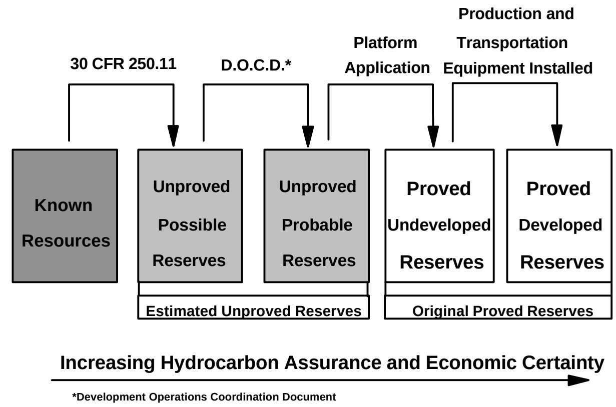

Figure 2.— Gulf of Mexico MMS reserve classifications.

Field

A field is an area consisting of a single reservoir or multiple reservoirs all grouped on, or related to, the same general geological structural feature and/or stratigraphic trapping condition. There may be two or more reservoirs in a field that are separated vertically by intervening impervious strata, or laterally by geological barriers, or both. The area may include one OCS lease, a portion of an OCS lease, or a group of OCS leases with one or more wells that have been approved as producible by the MMS pursuant to the requirements of Title 30 Code of Federal Regulations (CFR) 250.11, Determination of Well Producibility. A field is usually named after the area and block on which the discovery well is located. Field names or field boundaries may be changed when additional geologic and/or production data support such a change. Using geological criteria, the MMS designates a new producible lease as a new field or assigns it to a preexisting field. A further explanation of field naming convention can be found on page 5 and in the ***Field Naming Handbook*** available on the Gulf of Mexico Region's Internet homepage at http://www.gomr.mms.gov.

Undiscovered Resources

Hydrocarbons estimated on the basis of geologic knowledge and theory to exist outside of known accumulations are *undiscovered resources*. Undiscovered resources can exist in prospects (unleased acreage and undrilled leased acreage) or in known fields (undrilled reservoirs).

Discovered Resources

Hydrocarbons whose location and quantity are known or estimated from specific geologic evidence are *discovered resources*. Discovered resources include known resources, unproved reserves, and proved reserves depending upon economic, technical, contractual, or regulatory criteria.

Known Resources

Hydrocarbons associated with reservoirs penetrated by one or more wells that are not currently qualified under the MMS regulations as capable of producing in paying quantities pursuant to 30 CFR 250.11 are *known resources*. Known resources can exist on active, relinquished, or expired leases and fields.

Reserves

Those quantities of hydrocarbons which are anticipated to be recovered from known accumulations from a given date forward are *reserves*. All reserve estimates involve some degree of uncertainty. The uncertainty depends chiefly on the amount of reliable geologic and engineering data available at the time of the estimate and the interpretation of these data. The relative degree of uncertainty may be conveyed by placing reserves into one of two principal classifications, either unproved or proved.

Unproved Reserves

Those quantities of hydrocarbons which can be estimated with some certainty to be potentially recoverable from known reservoirs, assuming future economic conditions and technological developments, are *unproved reserves*. The MMS Gulf of Mexico Regional Field Names Committee designates a new producible lease as a new field or assigns it to a preexisting field. The reserves associated with new producible leases qualified pursuant to 30 CFR 250.11 are initially considered unproved reserves. Unproved reserves are less certain to be recovered than proved reserves and may be further subclassified as possible and probable reserves to denote progressively increasing certainty in their recoverability. This report does not present individual estimates for possible and probable reserves.

<u>Unproved possible reserves</u> are those unproved reserves which analysis of geological and engineering data suggests are less likely to be commercially recoverable than probable reserves. After a well on a lease qualifies, the reserves associated with the lease are initially classified as unproved possible because the only direct evidence of economic accumulations is a production test or electric log analysis.

<u>Unproved probable reserves</u> are those unproved reserves which analysis of geological and engineering data suggests are more likely than not to be commercially recoverable. Fields that have a Development Operations Coordination Document (DOCD) on file with the MMS would be classified as unproved probable.

Proved Reserves

Those quantities of hydrocarbons which can be estimated with reasonable certainty to be commercially recoverable from known reservoirs and under current economic conditions, operating methods, and government regulations are *proved reserves*. Establishment of current economic conditions includes consideration of relevant historical petroleum prices and associated costs and may involve an averaging period that is consistent with the purpose of the reserve estimate. Proved reserves must have either facilities operational at the time of the estimate to process and transport those reserves to market, or a commitment or reasonable expectation to install such facilities in the future. The application for a permit to install a platform is considered such a commitment. Proved reserves can be subdivided into undeveloped or developed.

<u>Proved undeveloped reserves</u> exist where there is a relatively large expenditure required to install production and/or transportation facilities and a commitment has been made by the operator to develop the field. Proved undeveloped reserves are reserves expected to be recovered from yet undrilled wells or from existing wells where a relatively large expenditure is required for field development.

<u>Proved developed reserves</u> are expected to be recovered from existing wells (including reserves behind pipe). Reserves are considered developed only after the necessary production and transportation equipment has been installed, or when the costs to do so are relatively minor. Proved developed reserves are subcategorized as producing or nonproducing. This distinction is made at the reservoir level.

PROVED DEVELOPED PRODUCING reserves are in reservoirs that have produced any time during the 12 months before the reporting date. Once the first reservoir in a field begins production, the reservoir and the field are considered proved developed producing.

PROVED DEVELOPED NONPRODUCING reserves are in reservoirs that have not produced during the 12 months prior to the reporting date. This category includes off-production reservoirs behind pipe and reservoirs awaiting workovers or transportation facilities. If all reservoirs in a field are off production, the field is considered proved developed nonproducing.

Reference Standard Conditions for Production and Reserves

Production data are the metered volumes of raw liquids and gas reported to the MMS by Federal unit and lease operators. Oil volume measurements and reserves are corrected to reference standard conditions of 60 °F and one atmosphere (14.696 pounds per square inch absolute [psia]); gas measurements and reserves are corrected to 60 °F and 15.025 psia. To convert gas volumes to 14.696 psia, multiply by 1.022 (DOE, 1989). Continuously measured volumes from production platforms and/or leases are allocated to individual wells and reservoirs on the basis of periodic well test gauges. These procedures introduce approximations in both production and remaining reserves data.

MMS Reporting of Reserve and Resource Data

OCS reserve estimates have been published by the Gulf of Mexico Region annually since 1977, presenting end-of-year totals starting with 1975. From 1977 to 1981 the estimates were published as United States Geological Survey (USGS) Open-File reports. The 1982 report was a joint publication between the USGS and the newly formed MMS, which assumed the OCS mission responsibilities at that time. The MMS has continued the reporting since 1983. The first report provided by the MMS that also includes unproved reserve estimates was published in 1995.

Figure 3 shows the relationship of evaluated data to hydrocarbon assurance. The data are progressively aggregated on both a geologic and a geographic basis at each step of the evaluation process (the reservoir level through the region level). The most detailed studies of discovered resources are MMS individual field studies. These studies are based on analysis at the reservoir level (an example being a single fault trap in a single sand) and are used as the basis for the reporting of discovered and undiscovered resources. The geologic aggregation begins at the top of the figure at the reservoir level and progresses downward through the sand, pool, play, chronozone, series, and system to the regional level. Reservoirs correlated to a specific sand are aggregated to form the sand reporting level, which becomes the basis for further aggregations of data. A play is defined primarily (though not exclusively) by depositional style, geologic age at the chronozone level, and geographic area. Pools are based on the same characteristics of a play, but are specific to an individual field. Fields may contain one or more pools, with each pool representing a separate play. The geographic aggregation begins at the bottom of the figure, also at the reservoir level, and progresses upward through the field, area, and planning area to the regional level.

This report, ***Estimated Proved and Unproved Oil and Gas Reserves***, presents reserve data from the field level up to the series level. This report is based on aggregation of MMS internal field studies completed at the reservoir

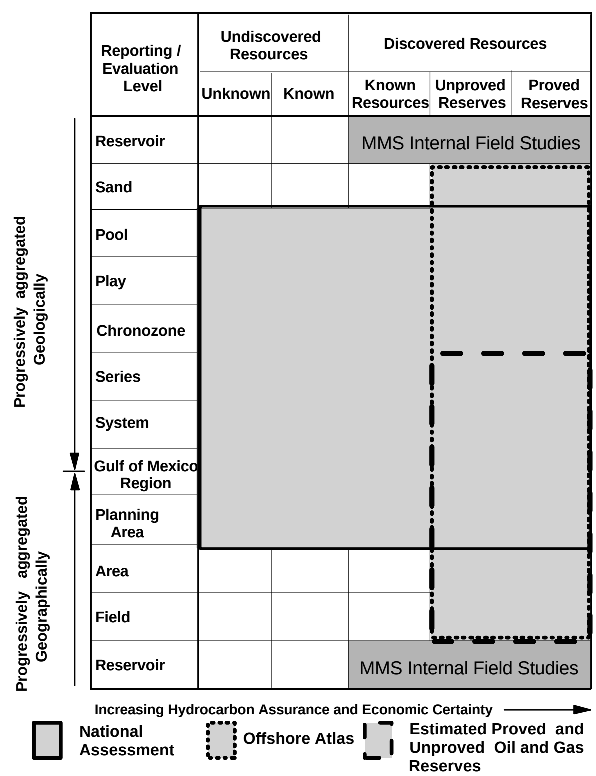

Figure 3.— MMS reporting of reserves and resources.

and sand levels. All of the reservoir level data have been linked to the sand, pool, play, chronozone, and series level to support the Offshore Atlas Project (OAP).

The ***Atlas of Northern Gulf of Mexico Gas and Oil Reservoirs, Volume 1: Miocene and Older Reservoirs*** and ***Volume 2: Plio-Pleistocene Reservoirs***, released in 1997, provide a detailed geologic reporting of oil and gas proved reserves. Reserve data on every productive sand, as of December 1994, have been placed into 72 proved geological plays in Federal waters. This was the first MMS release of such a comprehensive framework of geologic and reserve data and the associated attributes for each specific chronozone, play, pool, and sand. Series and system levels can also be evaluated with the data provided.

The MMS ***Summary of the 1995 Assessment of Conventionally Recoverable Hydrocarbon Resources of the Gulf of Mexico and Atlantic Outer Continental Shelf***, also known as the National Assessment, addresses undiscovered resources. To maintain credibility, an estimate of undiscovered resources must be based on discovered resources. The OAP supported this report by providing a framework of hydrocarbon plays that allowed for the logical extension of existing production rather than just a conceptual estimate. This summary report, made available in August 1996, contains resource estimates at the chronozone, series, system, and province (era) levels by planning area, water depth, and region. A more detailed report with resource estimates at the play level will be released in 1998.

For information on these reports, contact the Gulf of Mexico Region's Public Information Office at 1-800-200-GULF or 504-736-2519, or visit the GOM Region's Internet homepage at http://www.gomr.mms.gov.

Methods Used for Estimating Reserves

Reserve estimates from geological and engineering analyses have been completed for the 920 proved fields. Reserves accountability is dependent on the drilling and development phases of fields. When a field is in the unproved category, geophysical mapping and limited well data are the basis for defining reservoir limits. Once a field is moved into the proved category and more data become available, the reserve estimate is re-evaluated. Well logs, well file data, seismic data, and production data are continually analyzed to improve the accuracy of the reserve estimate. As a field is depleted and abandoned, the original proved reserves are assigned a value equal to the amount produced. Currently, there are 171 depleted and abandoned fields.

Estimation of reserves is done under conditions of uncertainty. The method of estimation is called *deterministic* if the estimate is a single "best estimate" based on known geological, engineering, and economic data, and *probabilistic* when the known geologic, engineering, and economic data are analyzed probabilistically and the estimate determined from continuous probability distributions (SPE/WPC, 1996). Reserve estimates in this report are deterministic.

Methods used for estimating reserves can be categorized into three groups: analog, volumetric, and performance. The accuracy of the original proved reserve estimate improves as more reservoir data become available to geoscientists and engineers. Resources are based on analogy with similar fields, reservoirs, or wells in the same area. Reserve estimates in this report are based primarily on volumetric and performance methods.

Analog

In the estimation of resources by analogy, geoscientists use seismic data to generate pictures of the size and shape of subsurface formations. Before any wells have been drilled on a prospect, estimates of undiscovered resources are based on analogy with similar fields, reservoirs, or wells in the same area. The seismic data help geoscientists identify prospects, but do not provide enough direct data to estimate resources. The effective pore space, water saturation, net hydrocarbon thickness, pressure, volume, and temperature data, necessary to complete resource estimates for prospects, come from nearby field and reservoir well data. After one or more wells are drilled and found productive, a volumetric estimate is done. Resource estimates are not included in this report.

Volumetric

In a volumetric reserve estimate, data from drilled wells and seismic surveys are used to develop geologic interpretations. The effective pore space (porosity), water saturation, and net hydrocarbon thickness of the subsurface formations are calculated through evaluation of well logs, core analysis, and formation test data. Subsurface formations are mapped to determine area and net hydrocarbon thickness for each reservoir. Reservoir pressure, fluid volume, and temperature data from formation fluid samples are used to determine the change in volume of oil and gas that flow from higher pressure conditions deep underground to lower pressure conditions at the surface. All of these data are compiled, analyzed and applied to standard equations for the calculation of hydrocarbons in place within the reservoirs. Standard recovery factor equations are then applied to the hydrocarbon in place estimates to calculate original proved and unproved reserves.

Performance Methods

In performance-technique methods, reserves are estimated using mathematical or graphical techniques of production decline curve analysis and material balance. These techniques are used throughout the oil industry in assessing individual well, reservoir, or field performance and in forecasting future reserves. In decline analysis, a plot of daily production rate against time is most frequently used. Once a well or reservoir can no longer produce at its maximum capacity, the production rate declines. This production rate plotted against time can be extrapolated into the future to predict the remaining reserves. Another type of decline analysis is daily production rate plotted against cumulative oil production, which can also be used to predict remaining reserves. The declining daily rate is extrapolated to predict remaining reserves.

Another performance method, material balance, is used to estimate the amount of hydrocarbons in place. Given the premise that the pressure-volume relationship of a reservoir remains constant as hydrocarbons are produced, it is possible to equate expansion of reservoir fluids with reservoir voidage caused by fluid withdrawal minus any water influx. For depletion-drive gas reservoirs, a plot of the pressure/gas compressibility factor (P/Z) versus cumulative gas production gives a good estimate of original gas-in-place. Original recoverable gas reserves are extrapolated to an abandonment reservoir pressure.

Reserves and Related Data Reported by Area

The Gulf of Mexico has been divided into three planning areas for administrative purposes; these planning areas (Western, Central, and Eastern) are shown in figures 4, 5, and 6, respectively. Each planning area is subdivided into smaller areas, which in turn are divided into numbered blocks. Fields in the Gulf of Mexico are identified by the smaller area name

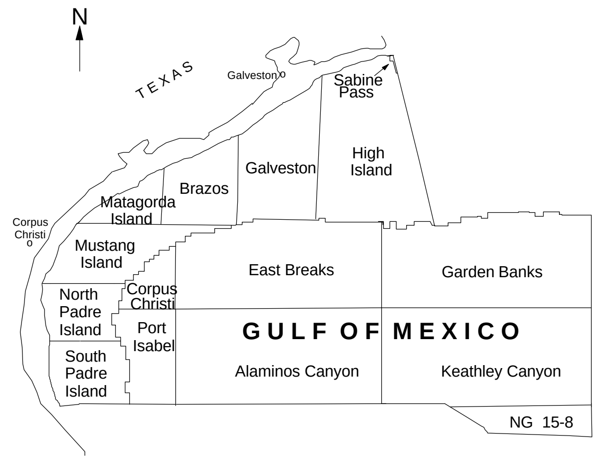

Figure 4.—Western Planning Area, Gulf of Mexico, Outer Continental Shelf.

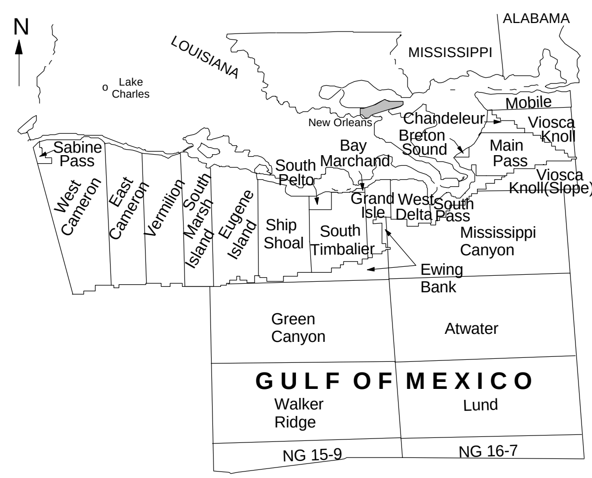

Figure 5.—Central Planning Area, Gulf of Mexico, Outer Continental Shelf.

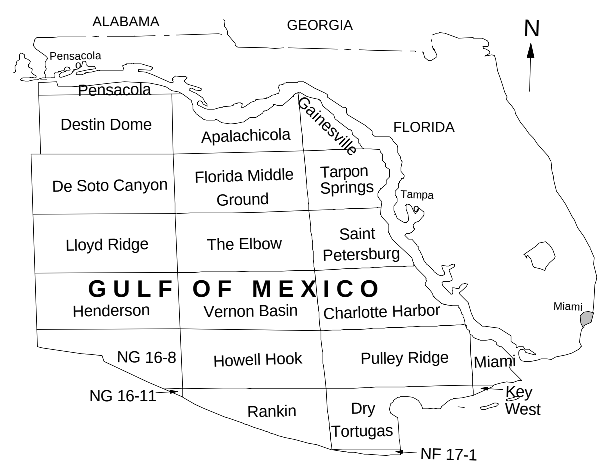

Figure 6.—Eastern Planning Area, Gulf of Mexico, Outer Continental Shelf.

and block number of discovery — for example, East Cameron Block 271 Field. As the field is developed, the limits often expand into adjacent blocks and areas. These adjacent blocks are then identified as part of the original field and are given that field name. Statistics in this report are presented as area totals compiled under each field name. All of the data associated with East Cameron Block 271 Field are therefore included in the East Cameron totals, although part of the field extends into the adjacent area of Vermilion. There are four exceptions to the above field-naming techniques: Tiger Shoal and Lighthouse Point, included in South Marsh Island; Coon Point, included in Ship Shoal; and Bay Marchand, included in South Timbalier.

There were 834 active fields in the federally regulated part of the Gulf of Mexico, as listed in the ***Field Names Master List (October 1997)***. An updated list can be found on the GOM Region's Internet homepage. For this report, 749 proved active fields and 52 unproved active fields were studied. Also included were 171 proved depleted fields (abandoned with production) to give a complete record of cumulative oil and gas production. Not studied were 130 fields expired, relinquished, or terminated without production and 33 unproved active fields. In 1996 thirty-two proved fields were depleted and 8 unproved fields expired.

Reserves data and various classifications of fields, leases, boreholes, and completions are presented as area totals in tables 1 and 2, and the table 3 series. Dashes on these tables are used to preserve the proprietary nature of data. (The table 3 series will be discussed in the section "Reserves Reported by Geologic Age," beginning on page 8.) Figure 7 provides a geographical representation of

Table 1.—Estimated oil and gas reserves for 920 proved and 52 unproved fields by area, Gulf of Mexico, Outer Continental Shelf, December 31, 1996.

(Reserves: oil expressed in millions of barrels at 60 ºF and 1 atmosphere, gas in billions of cubic feet at 60 ºF and 15.025 psia.)

Area(s) (Figs. 4, 5, and 6)	Number of fields						Original proved reserves		Cumulative production through 1996		Remaining proved reserves		Estimated unproved reserves	
	Proved active prod	Proved active nonprod	Proved expired depleted	Unproved active	Unproved studied	Expired nonprod	Oil	Gas	Oil	Gas	Oil	Gas	Oil	Gas
Western Planning Area														
Brazos	28	1	8	0	0	3	14	3,464	8	2,414	6	1,050	-	-
Galveston	23	0	19	1	0	4	42	1,820	31	1,385	11	435	-	-
High Island and Sabine Pass	83	2	31	4	1	15	367	13,615	278	11,448	89	2,167	-	-
Matagorda Island	28	0	0	2	1	2	21	4,837	16	3,618	5	1,219	-	-
Mustang Island	20	0	6	1	0	6	8	2,000	4	1,199	4	801	-	-
N. & S. Padre Island	6	0	2	0	0	2	0	485	0	382	0	103	-	-
Western Slope*	14	0	0	13	11	10	336	2,151	109	883	227	1,268	231	1,433
Western Planning Area Subtotal	***202***	***3***	***66***	***21***	***13***	***42***	***788***	***28,372***	***446***	***21,329***	***342***	***7,043***	***231***	***1,433***
Central Planning Area														
Chandeleur	8	0	2	0	0	0	0	389	0	289	0	100	-	-
East Cameron	42	1	17	3	2	3	312	10,193	260	8,867	52	1,326	-	-
Eugene Island	59	1	9	0	0	9	1,513	17,767	1,277	15,185	236	2,582	-	-
Grand Isle	12	0	2	2	2	2	927	4,197	857	3,782	70	415	-	-
Main Pass and Breton Sound	48	0	8	9	0	7	975	5,339	792	4,261	183	1,078	-	-
Mobile	20	2	0	0	0	4	0	2,472	0	589	0	1,883	-	-
Ship Shoal	45	0	11	5	1	7	1,255	11,135	1,116	9,952	139	1,183	-	-
South Marsh Island	40	1	6	0	0	3	838	13,811	717	11,820	121	1,991	-	-
South Pass	12	1	0	0	0	1	1,012	4,100	902	3,221	110	879	-	-
South Pelto	6	1	1	0	0	0	140	839	120	686	20	153	-	-
South Timbalier	35	1	6	5	2	5	1,374	8,205	1,229	6,576	145	1,629	-	-
Vermilion	63	1	13	0	0	6	504	15,595	415	13,613	89	1,982	-	-
Viosca Knoll	10	2	0	3	3	2	0	181	0	66	0	115	-	-
West Cameron and Sabine Pass	72	2	23	4	3	8	170	17,345	145	15,367	25	1,978	-	-
West Delta	19	0	5	0	0	2	1,329	4,914	1,197	4,360	132	554	-	-
Central Slope**	32	8	2	29	22	28	1,651	7,069	578	2,511	1,073	4,558	769	2,227
Central Planning Area Subtotal	***523***	***21***	***105***	***60***	***35***	***87***	***12,000***	***123,551***	***9,605***	***101,145***	***2,395***	***22,406***	***769***	***2,227***
Eastern Planning Area Subtotal***	***0***	***0***	***0***	***4***	***4***	***1***	-	-	-	-	-	-	-	-
GOM Total	***725***	***24***	***171***	***85***	***52***	***130***	***12,788***	***151,923***	***10,051***	***122,474***	***2,737***	***29,449***	***1,000***	***3,660***
		920												

*Western Slope includes Alaminos Canyon, Corpus Christi, East Breaks, Garden Banks, Keathley Canyon, and Port Isabel.
**Central Slope includes Atwater Valley, Ewing Bank, Green Canyon, Lund, Mississippi Canyon, Viosca Knoll (slope), and Walker Ridge.
***Eastern Planning Area includes Charlotte Harbor, Destin Dome, Pensacola and others. Unproved reserves data are included with Central Planning Area.

locations for the 920 proved fields in the Gulf of Mexico. Estimates of proved reserves for these fields, both producing and nonproducing, are presented as area totals in table 1. Figure 8 provides a geographical representation of the 85 unproved active fields in the Gulf of Mexico. Estimates of unproved reserves are presented as planning area subtotals. The Eastern Planning Area totals for unproved reserves are included in the Central Planning Area subtotals.

The status of Gulf of Mexico OCS Federal oil and gas leases as of December 31, 1996, is presented in table 2. There are 5,864 active leases (1,876 proved active, 99 unproved qualified, and 3,889 unproved active) and 8,189 relinquished leases (667 proved depleted and 7,522 expired).

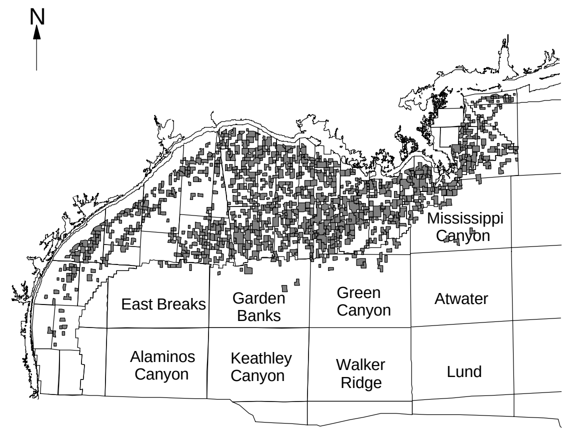

Figure 7.—Gulf of Mexico, 920 proved fields (749 active and 171 depleted).

Table 2.—Status of oil and gas leases, boreholes, and completions by area, Gulf of Mexico, Outer Continental Shelf, December 31, 1996.

(All statistics associated with fields are presented within area totals compiled under each field name.)

Area(s) (Figs. 4, 5, and 6)	**Number of leases**					**Number of boreholes**		**Number of active completions**
	Proved active	Proved depleted	Unproved qualified	Unproved active	Expired	Drilled	Abandoned	
Western Planning Area								
Brazos	51	17	0	65	227	482	294	191
Galveston	44	31	1	83	432	554	443	148
High Island and Sabine Pass	173	73	3	189	716	2,566	1,470	1,142
Matagorda Island	61	11	2	19	116	520	236	322
Mustang Island	37	7	1	48	313	344	206	160
N. & S. Padre Island	9	5	0	32	245	136	103	54
Western Slope*	31	2	21	684	766	454	271	139
Western Planning Area Subtotal	***406***	***146***	***28***	***1,120***	***2,815***	***5,056***	***3,023***	***2,156***
Central Planning Area								
Chandeleur	12	3	0	6	23	65	38	27
East Cameron	108	59	2	148	399	1,773	1,060	790
Eugene Island	193	62	0	106	347	3,960	2,173	1,903
Grand Isle	52	9	2	34	102	1,327	885	602
Main Pass and Breton Sound	125	38	6	91	283	2,016	904	1,355
Mobile	34	0	0	26	53	101	41	50
Ship Shoal	150	43	4	105	338	3,057	1,730	1,526
South Marsh Island	102	33	0	74	219	2,260	1,137	1,163
South Pass	51	5	0	24	63	1,931	964	1,034
South Pelto	16	3	0	6	23	330	197	149
South Timbalier	111	28	5	135	318	2,558	1,434	1,375
Vermilion	153	74	0	157	389	2,463	1,471	1,063
Viosca Knoll	15	0	5	69	98	70	30	26
West Cameron and Sabine Pass	185	137	4	275	603	2,814	1,851	1,016
West Delta	65	24	0	45	136	2,112	1,305	1,003
Central Slope**	98	3	37	1,318	985	1,447	860	498
Central Planning Area Subtotal	***1,470***	***521***	***65***	***2,619***	***4,379***	***28,284***	***16,080***	***13,580***
Eastern Planning Area Subtotal***	***0***	***0***	***6***	***150***	***328***	***47***	***41***	***0***
GOM Total	***1,876***	***667***	***99***	***3,889***	***7,522***	***33,387***	***19,144***	***15,736***

*Western Slope includes Alaminos Canyon, Corpus Christi, East Breaks, Garden Banks, Keathley Canyon, and Port Isabel.
**Central Slope includes Atwater Valley, Ewing Bank, Green Canyon, Lund, Mississippi Canyon, Viosca Knoll (slope), and Walker Ridge.
***Eastern Planning Area includes Charlotte Harbor, Destin Dome, Pensacola and others. Unproved reserves data are included with Central Planning Area.

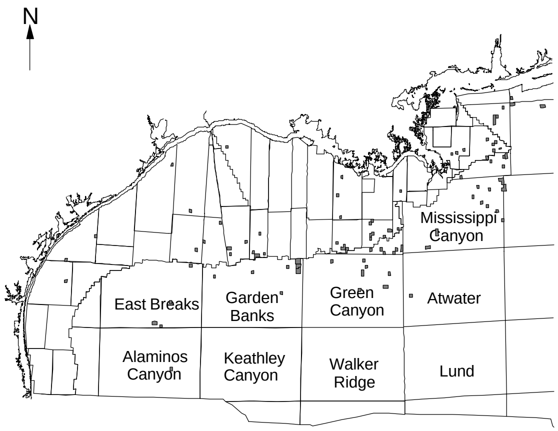

Figure 8.—Gulf of Mexico, 85 unproved active fields (52 studied and 33 not studied).

Definitions of the table 2 subgroups follow:

Proved Active — Leases within the designated 749 proved active fields presented in table 1.

Proved Depleted — Leases relinquished after oil and gas production. The leases associated with the 171 depleted fields are represented here along with other produced, relinquished leases that are part of currently active fields.

Unproved Qualified — Leases associated with the 85 unproved active fields. The leases have qualified as producible under 30 CFR 250.11, but the operators have not established a commitment to produce. These fields may be classified as unproved possible or unproved probable.

Unproved Active — Active exploratory leases not yet qualified as producible or associated with any field.

Expired — Leases relinquished by the operator without having produced any oil or gas, although some were once qualified as producible under 30 CFR 250.11. There are 130 expired fields with no production.

The total number of boreholes drilled and the number of boreholes plugged and abandoned are also shown i n table 2. There were 1,059 boreholes spudded during 1996, compared with 959 during 1995, and 918 during 1994. The last column of table 2 presents the total number of active completions per area. Active completions are defined as those with perforations open to the formation and not isolated by permanent plugs; service wells (injection, disposal, or water source) are included. The presence or absence of production or injection is not considered. The number of boreholes and the number of active completions as of December 31, 1996, are based on reports received by the MMS at the time the count was made in 1997. These numbers may change when all data have been received, processed, and edited.

Reserves Reported by Geologic Age

In this report the 920 proved and 52 unproved fields have been classified at the geologic series level. The different geologic age classifications in use by MMS are shown in figure 9. Paleontological examinations of borehole cuttings, along with regional analysis of geological and geophysical data, were used in determining the age classifications. Table 3 shows the distribution of reserves and production data by geologic age and planning area. Tables 3a through 3d also show the distribution of reserves and production data by geologic age, but further subdivide the planning areas as area totals. Unproved reserves are not reported as area totals to maintain the confidential nature of unproved fields.

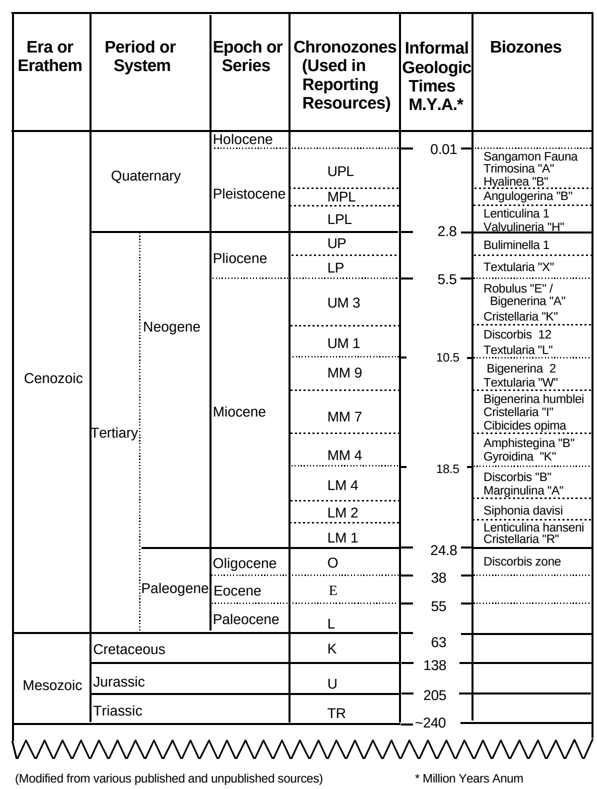

Figure 9.—Gulf of Mexico MMS geologic time scale.

Table 3.—Estimated oil and gas reserves for 920 proved and 52 unproved fields by geologic age, Gulf of Mexico, Outer Continental Shelf, December 31, 1996.

(Reserves: oil expressed in millions of barrels at 60 ºF and 1 atmosphere, gas in billions of cubic feet at 60 ºF and 15.025 psia.)

Geologic Age	Number of proved reservoirs	Original proved reserves		Cumulative production through 1996		Remaining proved reserves		Number of unproved reservoirs	Estimated unproved reserves	
		Oil	Gas	Oil	Gas	Oil	Gas		Oil	Gas
Western Planning Area										
Pleistocene	1,453	561	11,417	312	8,849	249	2,568	63	176	1,142
Pliocene	2	102	202	44	92	58	110	10	55	282
Miocene	2,152	124	16,712	90	12,386	34	4,326	2	0	5
Oligocene, Cretaceous, and Jurassic	8	1	41	0	2	1	39	3	0	4
Western Planning Area Subtotal	***3,615***	***788***	***28,372***	***446***	***21,329***	***342***	***7,043***	***78***	***231***	***1,433***
Central Planning Area										
Pleistocene	8,218	4,126	49,442	3,278	41,209	848	8,233	52	87	284
Pliocene	5,984	3,532	23,830	2,944	19,276	588	4,554	42	206	272
Miocene	6,092	4,342	48,125	3,383	40,248	959	7,877	40	475	952
Oligocene, Cretaceous, and Jurassic	16	0	2,154	0	412	0	1,742	1	1	719
Central Planning Area Subtotal	***20,310***	***12,000***	***123,551***	***9,605***	***101,145***	***2,395***	***22,406***	***135***	***769***	***2,227***
Eastern Planning Area Subtotal*	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***5***	***0***	***0***
GOM Total	***23,925***	***12,788***	***151,923***	***10,051***	***122,474***	***2,737***	***29,449***	***218***	***1,000***	***3,660***

***Eastern Planning Area includes Charlotte Harbor, Destin Dome, Pensacola and others. Unproved reserves data are included with Central Planning Area.

Table 3a.—Estimated oil and gas reserves for Pleistocene reservoirs in 478 proved and 23 unproved fields by area, Gulf of Mexico, Outer Continental Shelf, December 31, 1996.

(Reserves: oil expressed in millions of barrels at 60 ºF and 1 atmosphere, gas in billions of cubic feet at 60 ºF and 15.025 psia.)

Area(s)	Number of proved reservoirs	Original proved reserves		Cumulative production through 1996		Remaining proved reserves		Number of unproved reservoirs	Estimated unproved reserves	
		Oil	Gas	Oil	Gas	Oil	Gas		Oil	Gas
Western Planning Area										
Galveston	23	2	84	1	71	1	13	0	-	-
High Island and Sabine Pass	1,267	325	9,380	246	7,983	79	1,397	4	-	-
Western Slope*	163	234	1,953	65	795	169	1,158	59	-	-
Western Planning Area Subtotal	***1,453***	***561***	***11,417***	***312***	***8,849***	***249***	***2,568***	***63***	***176***	***1,142***
Central Planning Area										
East Cameron	648	228	5,270	187	4,363	41	907	3	-	-
Eugene Island	1,750	958	11,653	794	10,112	164	1,541	0	-	-
Grand Isle	108	10	1,387	6	1,257	4	130	0	-	-
Main Pass and Breton Sound	22	48	129	33	98	15	31	0	-	-
Ship Shoal	1,418	776	6,765	703	6,090	73	675	0	-	-
South Marsh Island	780	510	3,539	431	2,921	79	618	0	-	-
South Pass	201	154	1,262	129	1,062	25	200	0	-	-
South Pelto	77	22	22	19	16	3	6	0	-	-
South Timbalier	990	340	4,892	280	3,984	60	908	1	-	-
Vermilion	810	171	3,482	124	2,619	47	863	0	-	-
Viosca Knoll	1	0	0	0	0	0	0	0	-	-
West Cameron and Sabine Pass	812	29	7,298	22	6,415	7	883	7	-	-
West Delta	169	197	754	175	604	22	150	0	-	-
Central Slope**	432	683	2,989	375	1,668	308	1,321	41	-	-
Central Planning Area Subtotal	***8,218***	***4,126***	***49,442***	***3,278***	***41,209***	***848***	***8,233***	***52***	***87***	***284***
Eastern Planning Area Subtotal*	-	-	-	-	-	-	-	-	-	-
GOM Total	***9,671***	***4,687***	***60,859***	***3,590***	***50,058***	***1,097***	***10,801***	***115***	***263***	***1,426***

*Western Slope includes Alaminos Canyon, Corpus Christi, East Breaks, Garden Banks, Keathley Canyon , and Port Isabel.
**Central Slope includes Atwater Valley, Ewing Bank, Green Canyon, Lund, Mississippi Canyon, Viosca Knoll (slope), and Walker Ridge.
***Eastern Planning Area includes Charlotte Harbor, Destin Dome, Pensacola and others. Unproved reserves data are included with Central Planning Area.

Table 3b.—Estimated oil and gas reserves for Pliocene reservoirs in 262 proved and 15 unproved fields by area, Gulf of Mexico, Outer Continental Shelf, December 31, 1996.

(Reserves: oil expressed in millions of barrels at 60 ºF and 1 atmosphere, gas in billions of cubic feet at 60 ºF and 15.025 psia.)

Area(s)	Number of proved reservoirs	Original proved reserves		Cumulative production through 1996		Remaining proved reserves		Number of unproved reservoirs	Estimated unproved reserves	
		Oil	Gas	Oil	Gas	Oil	Gas		Oil	Gas
Western Planning Area										
High Island and Sabine Pass	1	0	4	0	4	0	0	0	-	-
Western Slope*	1	102	198	44	88	58	110	10	-	-
Western Planning Area Subtotal	***2***	***102***	***202***	***44***	***92***	***58***	***110***	***10***	***55***	***282***
Central Planning Area										
Chandeleur	2	0	15	0	9	0	6	0	-	-
East Cameron	154	14	925	10	736	4	189	0	-	-
Eugene Island	1,091	413	2,819	364	2,271	49	548	0	-	-
Grand Isle	343	344	1,023	310	875	34	148	5	-	-
Main Pass and Breton Sound	338	168	1,191	125	1,000	43	191	0	-	-
Ship Shoal	650	322	2,322	280	2,046	42	276	7	-	-
South Marsh Island	607	140	4,509	121	3,904	19	605	0	-	-
South Pass	774	740	2,338	666	1,723	74	615	0	-	-
South Pelto	159	66	257	58	223	8	34	0	-	-
South Timbalier	494	258	1,694	216	1,201	42	493	1	-	-
Vermilion	518	183	3,128	156	2,692	27	436	0	-	-
West Cameron and Sabine Pass	156	3	963	2	829	1	134	0	-	-
West Delta	578	497	1,147	439	958	58	189	0	-	-
Central Slope**	120	384	1,499	197	809	187	690	29	-	-
Central Planning Area Subtotal	***5,984***	***3,532***	***23,830***	***2,944***	***19,276***	***588***	***4,554***	***42***	***206***	***272***
Eastern Planning Area Subtotal*	-	-	-	-	-	-	-	-	-	-
GOM Total	***5,986***	***3,634***	***24,032***	***2,988***	***19,368***	***646***	***4,664***	***52***	***261***	***554***

*Western Slope includes Alaminos Canyon, Corpus Christi, East Breaks, Garden Banks, Keathley Canyon , and Port Isabel.
**Central Slope includes Atwater Valley, Ewing Bank, Green Canyon, Lund, Mississippi Canyon, Viosca Knoll (slope), and Walker Ridge.
***Eastern Planning Area includes Charlotte Harbor, Destin Dome, Pensacola and others. Unproved reserves data are included with Central Planning Area.

The Pleistocene production trend is presented in figure 10 and corresponds to the *Sangamon Fauna* and *Trimosina* "A" through *Valvulineria* "H" biozones. Production within the Pleistocene extends from the Galveston area to east of the modern-day mouth of the Mississippi River. Pleistocene productive sands are limited to the east and west because of a lack of sediment influx at the edge of the depocenter. Downdip deepwater Pleistocene production occurs in the East Breaks through Mississippi Canyon areas, and well control suggests sands continue beyond the Sigsbee Escarpment. As of December 31, 1996, the Pleistocene produced from 478 fields. Original proved reserves were 4.69 billion barrels (Bbbl) and 60.9 trillion cubic feet (Tcf). Remaining proved reserves were 1.10 Bbbl and 10.8 Tcf.

The Pliocene production trend is presented in figure 11 and corresponds to the *Buliminella* 1 through *Textularia* X biozones. Production within the Pliocene extends

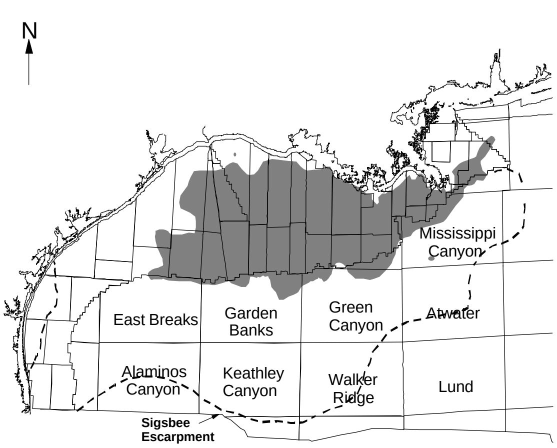

Figure 10.—Pleistocene production trend.

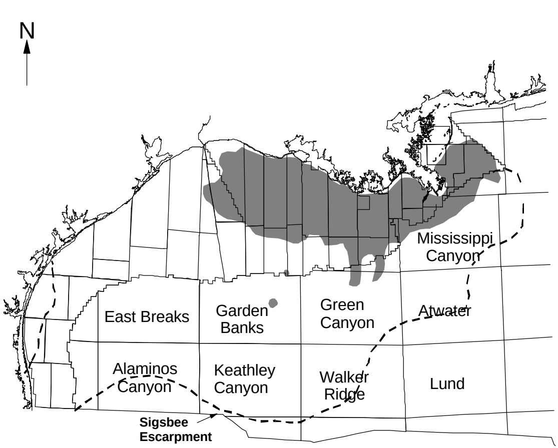

Figure 11.—Pliocene production trend.

Table 3c.—Estimated oil and gas reserves for Miocene reservoirs in 466 proved and 23 unproved fields by area, Gulf of Mexico, Outer Continental Shelf, December 31, 1996.

(Reserves: oil expressed in millions of barrels at 60 ºF and 1 atmosphere, gas in billions of cubic feet at 60 ºF and 15.025 psia.)

Area(s)	Number of proved reservoirs	Original proved reserves		Cumulative production through 1996		Remaining proved reserves		Number of unproved reservoirs	Estimated unproved reserves	
		Oil	Gas	Oil	Gas	Oil	Gas		Oil	Gas
Western Planning Area										
Brazos	427	14	3,464	8	2,414	6	1,050	0	-	-
Galveston	387	40	1,736	30	1,314	10	422	0	-	-
High Island and Sabine Pass	479	42	4,231	32	3,461	10	770	0	-	-
Matagorda Island	435	21	4,837	16	3,618	5	1,219	2	-	-
Mustang Island	335	7	1,959	4	1,197	3	762	0	-	-
N. & S. Padre Island	89	0	485	0	382	0	103	0	-	-
Western Slope*	0	0	0	0	0	0	0	0	-	-
Western Planning Area Subtotal	***2,152***	***124***	***16,712***	***90***	***12,386***	***34***	***4,326***	***2***	***0***	***5***
Central Planning Area										
Chandeleur	22	0	374	0	280	0	94	0	-	-
East Cameron	283	70	3,998	63	3,768	7	230	0	-	-
Eugene Island	437	142	3,295	119	2,802	23	493	0	-	-
Grand Isle	475	573	1,787	541	1,650	32	137	1	-	-
Main Pass and Breton Sound	850	759	4,019	634	3,163	125	856	0	-	-
Mobile	26	0	318	0	177	0	141	0	-	-
Ship Shoal	451	157	2,048	133	1,816	24	232	0	-	-
South Marsh Island	405	188	5,763	165	4,995	23	768	0	-	-
South Pass	218	118	500	107	436	11	64	0	-	-
South Pelto	198	52	560	43	447	9	113	0	-	-
South Timbalier	594	776	1,619	733	1,391	43	228	2	-	-
Vermilion	503	150	8,985	135	8,302	15	683	0	-	-
Viosca Knoll	23	0	181	0	66	0	115	2	-	-
West Cameron and Sabine Pass	963	138	9,084	121	8,123	17	961	2	-	-
West Delta	590	635	3,013	583	2,798	52	215	0	-	-
Central Slope**	54	584	2,581	6	34	578	2,547	33	-	-
Central Planning Area Subtotal	***6,092***	***4,342***	***48,125***	***3,383***	***40,248***	***959***	***7,877***	***40***	***475***	***952***
Eastern Planning Area Subtotal*	-	-	-	-	-	-	-	***4***	-	-
GOM Total	***8,244***	***4,466***	***64,837***	***3,473***	***52,634***	***993***	***12,203***	***46***	***475***	***957***

*Western Slope includes Alaminos Canyon, Corpus Christi, East Breaks, Garden Banks, Keathley Canyon , and Port Isabel.
**Central Slope includes Atwater Valley, Ewing Bank, Green Canyon, Lund, Mississippi Canyon, Viosca Knoll (slope), and Walker Ridge.
***Eastern Planning Area includes Charlotte Harbor, Destin Dome, Pensacola and others. Unproved reserves data are included with Central Planning Area.

Table 3d.—Estimated oil and gas reserves for Oligocene, Cretaceous, and Jurassic reservoirs in 12 proved and 3 unproved fields by area, Gulf of Mexico, Outer Continental Shelf, December 31, 1996.

(Reserves: oil expressed in millions of barrels at 60 º F and 1 atmosphere, gas in billions of cubic feet at 60 ºF and 15.025 psia.)

Area(s)	Number of proved reservoirs	Original proved reserves		Cumulative production through 1996		Remaining proved reserves		Number of unproved reservoirs	Estimated unproved reserves	
		Oil	Gas	Oil	Gas	Oil	Gas		Oil	Gas
Western Planning Area										
Mustang Island and N. & S. Padre	8	1	41	0	2	1	39	0	-	-
Western Slope*	0	0	0	0	0	0	0	3	-	-
Western Planning Area Subtotal	***8***	***1***	***41***	***0***	***2***	***1***	***39***	***3***	***0***	***4***
Central Planning Area										
Main Pass and Breton Sound	1	0	0	0	0	0	0	0	-	-
Mobile	15	0	2,154	0	412	0	1,742	0	-	-
Viosca Knoll	0	0	0	0	0	0	0	1	-	-
Central Planning Area Subtotal	***16***	***0***	***2,154***	***0***	***412***	***0***	***1,742***	***1***	***1***	***719***
Eastern Planning Area Subtotal*	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***1***	***0***	***0***
GOM Total	***24***	***1***	***2,195***	***0***	***414***	***1***	***1,781***	***5***	***1***	***723***

*Western Slope includes Alaminos Canyon, Corpus Christi, East Breaks, Garden Banks, Keathley Canyon , and Port Isabel.
***Eastern Planning Area includes Charlotte Harbor, Destin Dome, Pensacola and others. Unproved reserves data are included with Central Planning Area.

from south of Mobile Bay in the east to North Padre Island in the west. Upper Pliocene productive sands also extend into the deepwater areas of Garden Banks, Green Canyon, Ewing Bank, and Mississippi Canyon. Well control suggests Pliocene sands extend at least as far as the Sigsbee Escarpment. As of December 31, 1996, the Pliocene produced from 262 fields. Original proved reserves were 3.63 Bbbl and 24.0 Tcf. Remaining proved reserves were 0.65 Bbbl and 4.7 Tcf.

The Miocene production trend is presented in figure 12 and corresponds to the *Robulus* "E" / *Bigenerina* "A" through *Cristellaria* "R" biozones. Production within the Miocene extends from east of the Mississippi River to as far west as North Padre Island. Miocene productive sands also extend into deep waters in Viosca Knoll and Mississippi Canyon. Well control suggests sands continue beyond the Sigsbee Escarpment. As of December 31, 1996, the Miocene produced from 466 fields. Original proved reserves were 4.47 Bbbl and 64.8 Tcf. Remaining proved reserves were 0.99 Bbbl and 12.2 Tcf.

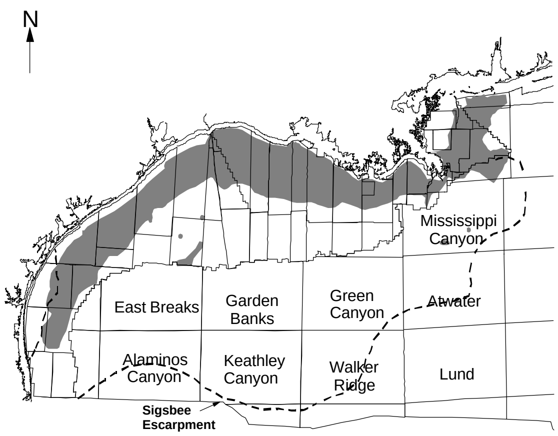

Figure 12.—Miocene production trend.

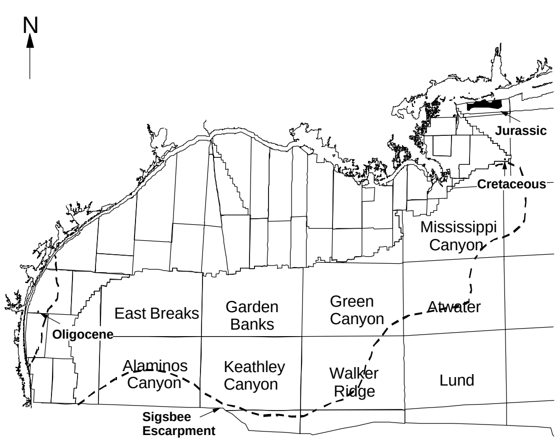

Figure 13.—Oligocene, Cretaceous, and Jurassic production trends.

The Oligocene, Cretaceous, and Jurassic production trends are presented in figure 13. These reservoirs are almost entirely Jurassic Norphlet sands. Production within the Jurassic is limited to east of the Mississippi River in the Mobile area. Well control suggests reservoir sands continuing eastward into Destin Dome. As of December 31, 1996, these trends produced from 12 fields. Original proved reserves were 0 Bbbl and 2.2 Tcf. Remaining proved reserves were 0 Bbbl and 1.8 Tcf.

Figure 14 shows the percentages of reserves and production data by geologic age. There is a fairly even distribution of oil reserves; however, the Pliocene has a significantly lower percentage of gas reserves than the Miocene and Pleistocene.

Age	Original Proved Reserves		Cumulative Production		Remaining Proved Reserves	
	Oil	Gas	Oil	Gas	Oil	Gas
Pleistocene	37 %	40 %	36 %	41 %	40 %	37 %
Pliocene	28 %	16 %	30 %	16 %	24 %	16 %
Miocene	35 %	43 %	34 %	43 %	36 %	41 %
Oligocene, Cretaceous, and Jurassic	--	1 %	--	--	--	6 %

Figure 14.—Distribution of reserves and production data by geologic age.

Historical Exploration and Discovery Pattern and Trends

In large part, the following section was taken from ***An Exploration and Discovery Model: a Historic Perspective - Gulf of Mexico Outer Continental Shelf*** by Gary Lore. The information presented has been updated to reflect the current database.

It is informative to review the historic exploration and development activities that resulted in the world-class hydrocarbon-producing basin that is the Gulf of Mexico. Each of the four decades of activity will be examined by reviewing the status of exploration and development activity and the number of fields and quantities of proved reserves discovered during each decade. The discovery year is defined as the year in which the first well encountering significant hydrocarbons reached total depth. This date may differ from the year in which the field discovery was announced.

Figure 15 shows the locations of the proved fields discovered prior to December 31, 1959. As expected, initial development was in shallower, nearshore waters concentrated mainly in the areas off central and western Louisiana. This development primarily reflected the gradual extension of existing inland drilling and development technologies into the open-water marine environments, and the infancy of marine seismic acquisition activities. Early exploratory drilling in very shallow water on the shelf utilized barges and platforms. The mid-1950's witnessed the introduction of submersible and jack-up drilling rigs. During this period, 248 exploratory wells were drilled, culminating in the discovery of 67 proved fields. It was also during this period that 8 of the top 10 fields in the Gulf of Mexico, based on original proved reserves, were discovered.

Figure 16 shows the location of the proved fields discovered in the 1960's. These discoveries were still concentrated offshore central and western Louisiana. Though still confined to the shelf (600 feet [ft] or less), field discoveries advanced seaward into deeper waters. The introduction of drillships and semi-submersibles for exploratory drilling provided the basis for the deepwater drilling seen today. During this decade, 2,019 exploratory wells were drilled and 136 proved fields discovered. The ninth largest field in the Gulf of Mexico, SS 208, was discovered in the sixties.

Figure 17 shows the location of the proved fields discovered in the 1970's. This period reflects continued drilling and development on the shelf, with an increase in field discoveries on the seaward portion of the shelf, predominantly in the Pleistocene depocenter. The introduction of dynamic positioning systems, used on drillships and semi-submersible drilling rigs, further opened up deepwater exploration. Frontier drilling on the shelf-slope margin led to discoveries of new fields that have been termed the *Flexure Trend*. During this decade 2,934 exploratory wells were drilled, resulting in the discovery of 273 proved fields. The largest field in the Gulf of Mexico, EI 330, was discovered in 245 ft of water during this decade. Another significant field discovery was MC 194, the first field in over 1,000 ft of water.

During the 1980's, development activities occurred over practically the entire central and western Gulf of Mexico

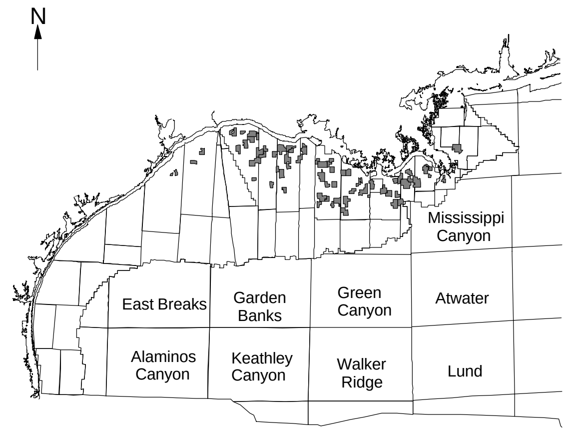

Figure 15.—Location of proved fields discovered 1947-1959, Gulf of Mexico OCS.

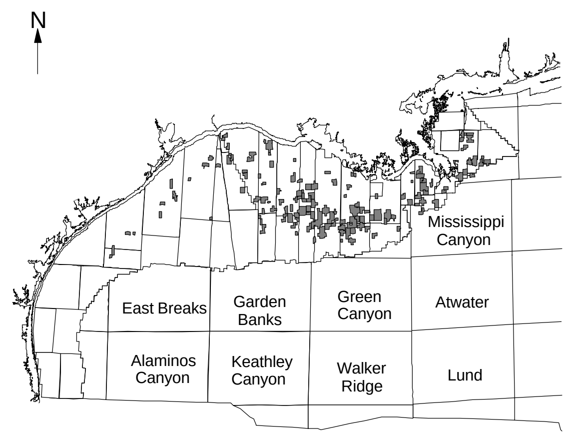

Figure 16.—Location of proved fields discovered 1960-1969, Gulf of Mexico OCS.

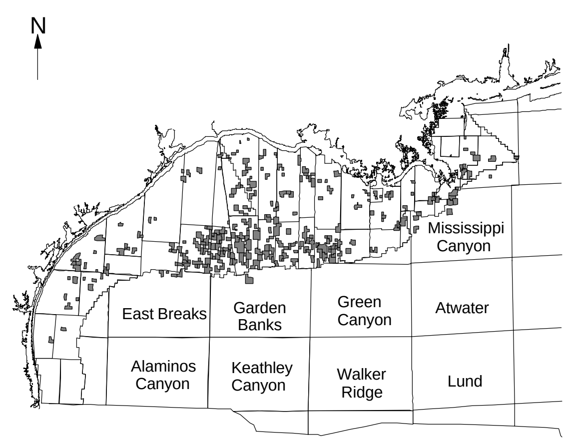

Figure 17.—Location of proved fields discovered 1970-1979, Gulf of Mexico OCS.

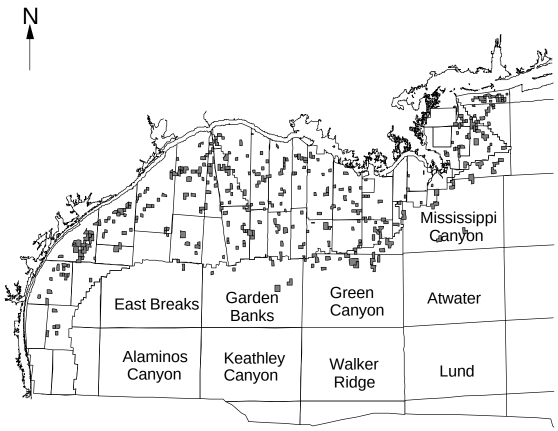

Figure 18.—Location of proved fields discovered 1980-1989, Gulf of Mexico OCS.

shelf, as well as on the upper slope, as can be seen in figure 18. In addition, the first Norphlet fields and a Miocene shallow bright spot play were discovered in the eastern Central Gulf of Mexico planning area. Exploratory drilling had now reached water depths beyond 6,000 ft, putting the slope within reach. In this decade, 17 proved fields were discovered in water depths greater than 1,000 ft.

From 1990 to 1996 (figure 19), 2,440 exploration wells were drilled, resulting in the discovery of 98 proved fields. The 1990's have seen the refinement and reduction in cost of tension leg platform design, and a much expanded use of subsea completions. Available production histories have documented high production rates for deepwater fields. The expanding use of horizontal drilling is also increasing productivity of specific reservoirs. Computer workstation technology using three-dimensional seismic data sets has allowed for

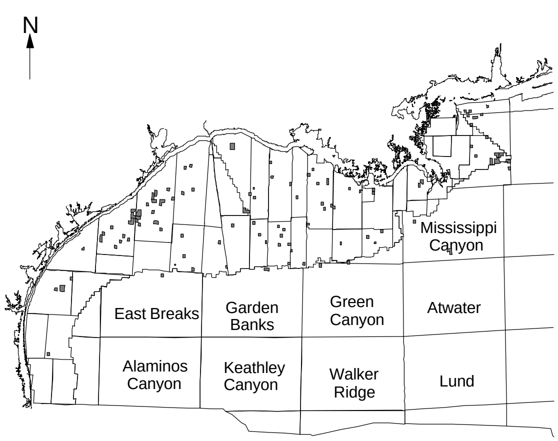

Figure 19.—Location of proved fields discovered 1990-1996, Gulf of Mexico OCS.

reduced risk and greater geologic assurance in both exploration and field development. This has also allowed for exploration of new plays, such as the *Subsalt Play*. Reserve estimates for individual fields discovered in the 1990's are generally conservative and will experience significant reserves appreciation.

Figure 20 shows annual field discoveries by geologic age for the 920 proved fields. Figure 21 shows annual field discoveries of original proved reserves by geologic age for the 920 proved fields. These two figures show several trends over the last 50 years. From the mid-1940's through the 1960's the largest number of fields discovered were of Miocene age and these fields contributed the largest reserves additions. This trend reflected a continuation of the nearshore operating environment. The decade of the 1970's saw a large peak in discoveries of Pleistocene fields and a correspondingly large addition of Pleistocene age reserves. Technological

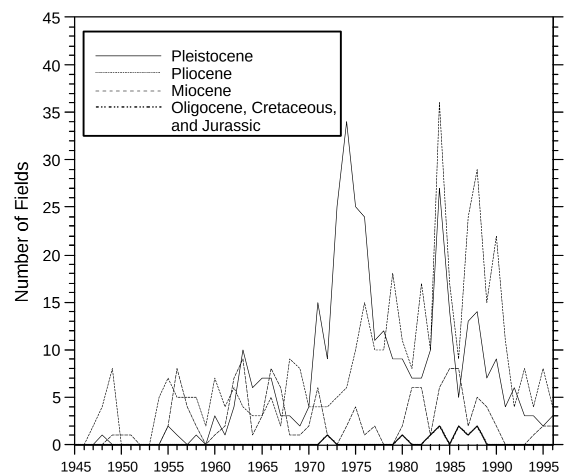

Figure 20.—Annual number of field discoveries by geologic age, 920 proved fields.

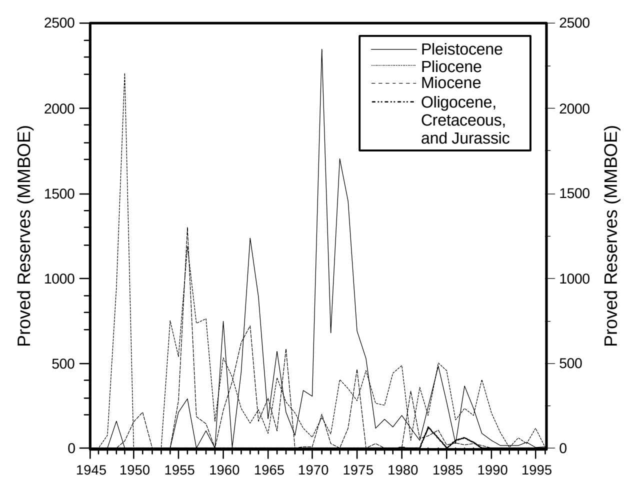

Figure 21.—Annual discoveries of original proved reserves by geologic age, 920 proved fields.

advances in seismic data and deeper drilling accounted for the resurgence of Miocene field discoveries and reserve additions in the decade of the 1980's. This decade also saw the first Jurassic Norphlet discoveries. Completing an evaluation of the 1990's is premature, but the large discoveries in Pleistocene, Pliocene, and Miocene deepwater reservoirs will surely play a major role in future production.

Field-Size Distribution

Reserve sizes are expressed in terms of barrels of oil equivalent (BOE) and added to the liquid reserves. The conversion factor of 5,620 standard cubic feet of gas equals 1 BOE is based on the average heating values of domestic hydrocarbons. A geometric progression, developed by the USGS (Drew and others, 1982), was selected for field-size distribution ranges (figure 22).

Class	Deposit -size range *	Class	Deposit -size range *	Class	Deposit -size range *
1	0 to 0.006	8	0.38 to 0.76	14	24.3 to 48.6
2	0.006 to 0.012	9	0.76 to 1.52	15	48.6 to 97.2
3	0.012 to 0.024	10	1.52 to 3.04	16	97.2 to 194.3
4	0.024 to 0.047	11	3.04 to 6.07	17	194.3 to 388.6
5	0.047 to 0.095	12	6.07 to 12.14	18	388.6 to 777.2
6	0.095 to 0.190	13	12.14 to 24.3	19	777.2 to 1554.4
7	0.190 to 0.380	* Million barrels of oil equivalent (MMBOE)			

Figure 22.—Description of deposit-size classes.

For the field-size distribution, deposit-class sizes 1 through 7 were combined. In this report, fields are classified as either oil or gas; however, some fields do produce both products, making a field type determination difficult. Generally, fields with a gas/oil ratio (GOR) less than 9,700 standard cubic feet per stock tank barrel (SCF/STB) are classified as oil.

The field-size distribution based on original proved reserves for 920 proved fields is shown in figure 23(a). Of the 920 proved oil and gas fields, there are 164 proved oil fields represented in figure 24(a) and 756 gas fields shown in figure 25(a). The Western Gulf of Mexico field-size distributions are displayed on figures 23(b), 24(b), and 25(b). Figures 23(c), 24(c), and 25(c) present the Central Gulf of Mexico field-size distributions of original proved reserves. The field-size distribution based on estimated unproved reserves for 52 unproved fields is shown in figure 26(a). There are 26 unproved oil fields in figure 26(b) and 26 unproved gas fields in figure 26(c). Another 33 unproved active fields were not studied.

Analysis of the 920 proved oil and gas fields indicates that the Gulf of Mexico is currently a gas-prone basin. Figure 27 summarizes the total reserves, the median (exceeded by 50%), and the mean (arithmetic average) from the field-size distributions. This figure also provides information on the largest two field-size ranges of the proved fields. The GOR (original gas divided by original oil) of the 164 proved oil fields is 3,156 SCF/STB. The GOR of the 26 unproved oil fields is 1,677 SCF/STB. The average yield (original condensate divided by original gas) for the 756 proved gas fields is 19.3 barrels of condensate per million cubic feet (MMcf) of gas. The average yield of the 44 unproved gas fields is 45.7 barrels of condensate per MMcf.

Figure 28 shows the cumulative percent distribution of original proved reserves in billion barrels of oil equivalent (BBOE), by field rank. All 920 proved fields in the Gulf of Mexico OCS are included in this figure. A characteristic often observed in hydrocarbon-producing basins is a rapid dropoff in size from the largest known field to the smaller ones. Twenty-five percent of the original proved reserves are contained in the 24 largest fields. Fifty percent of the original proved reserves are contained in the 74 largest fields. Ninety percent of the original proved reserves are contained in the 352 largest fields.

Figure 29 shows the distribution of the number of fields and original proved reserves by water depth. The water depth ranges used in this figure, 651-1,300 ft, 1,301-2,600 ft, and greater than 2,600 ft, closely approximate the 200-400 meter, 400-800 meter and greater than 800 meter water depths used in the OCS Deepwater Royalty Relief Act (DWRRA). Original proved reserves, reported in million barrels of oil equivalent (MMBOE), are associated with the 920 proved fields. The 52 unproved active fields are presented to show current interest and development. Sixty-seven percent of the original proved reserves in the Gulf of Mexico are located in less than 200 ft of water. The shelf, generally considered as less than 650 ft of water, accounts for 92 percent of the original proved reserves. Development of the slope, generally considered greater than 650 ft of water, reflects a sizable amount of original proved reserves associated

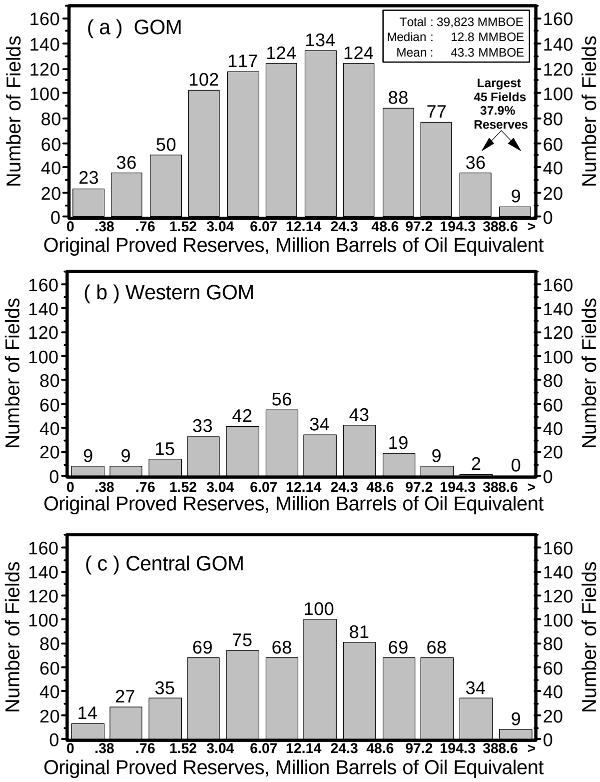

Figure 23.—Field-size distribution of proved fields: (a) 920 fields, GOM; (b) 271 fields, Western GOM; (c) 649 fields, Central GOM.

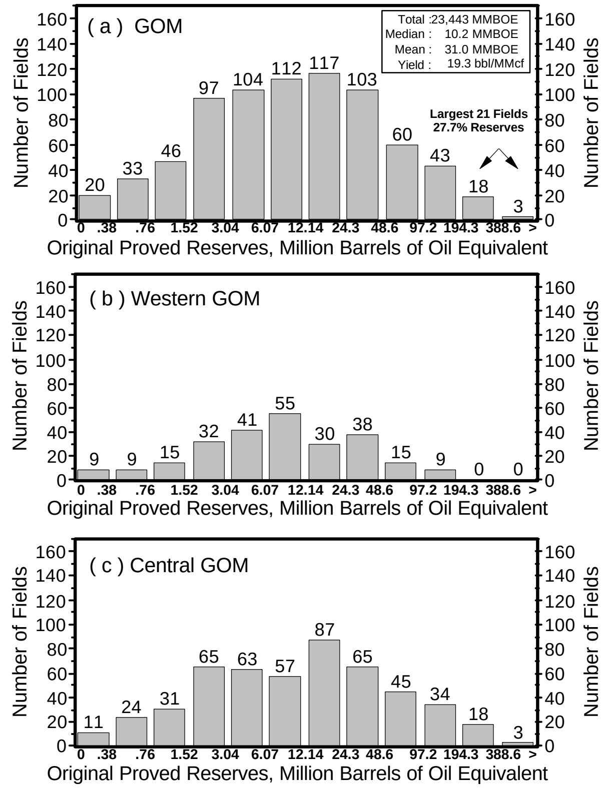

Figure 25.—Field-size distribution of proved gas fields: (a) 756 fields, GOM; (b) 253 fields, Western GOM; (c) 503 fields, Central GOM.

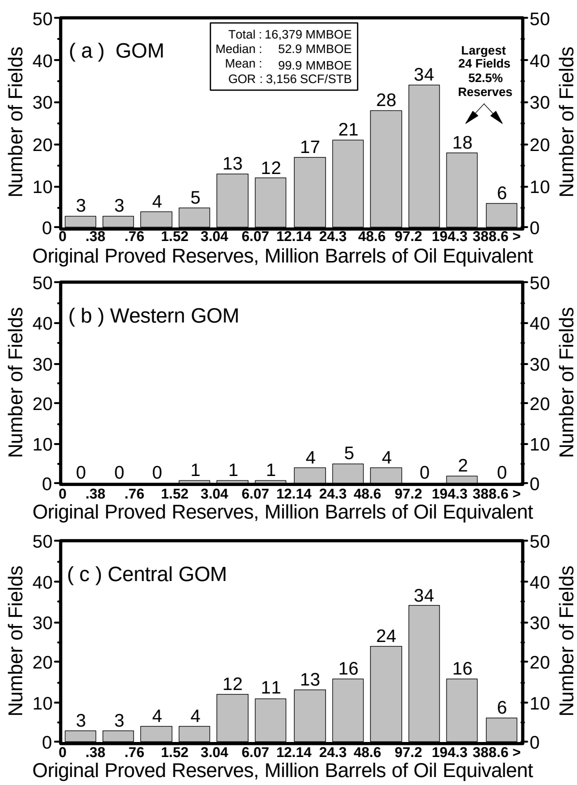

Figure 24.—Field-size distribution of proved oil fields: (a) 164 fields, GOM; (b) 18 fields, Western GOM; (c) 146 fields, Central GOM.

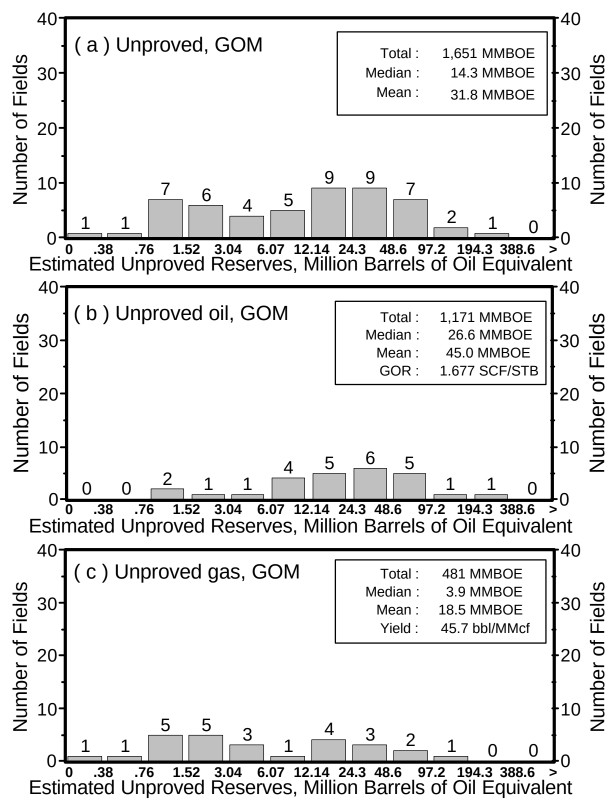

Figure 26.—Field-size distribution of unproved fields: (a) 52 fields, GOM; (b) 26 oil fields, GOM; (c) 26 gas fields, GOM.

Description of Fields	Figure Number	Median *	Mean *	Largest Fields	
				Number	Reserves
920 Proved	Fig. 23a	12.8	43.3	45	38 %
164 Proved Oil	Fig. 24a	52.9	99.9	24	53 %
756 Proved Gas	Fig. 25a	10.2	31.0	21	28 %
52 Unproved	Fig. 26a	14.3	31.8		
26 Unproved Oil	Fig. 26b	26.6	45.0		
26 Unproved Gas	Fig. 26c	3.9	18.5		
* Million barrels of oil equivalent (MMBOE)					

Figure 27.—GOM field-size distribution.

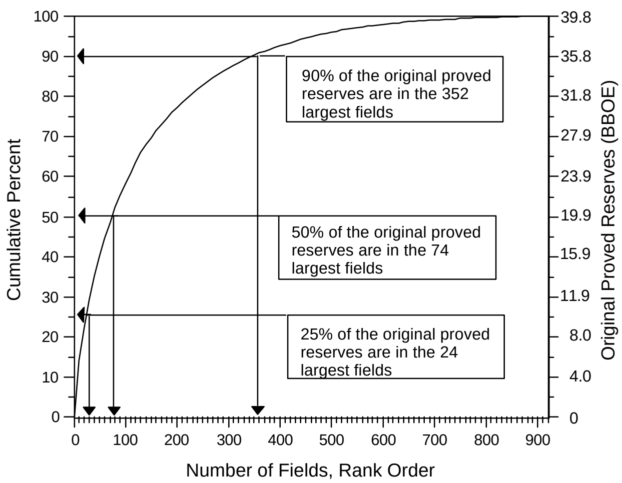

Figure 28.—Cumulative percent total reserves versus rank order of field size for 920 proved fields.

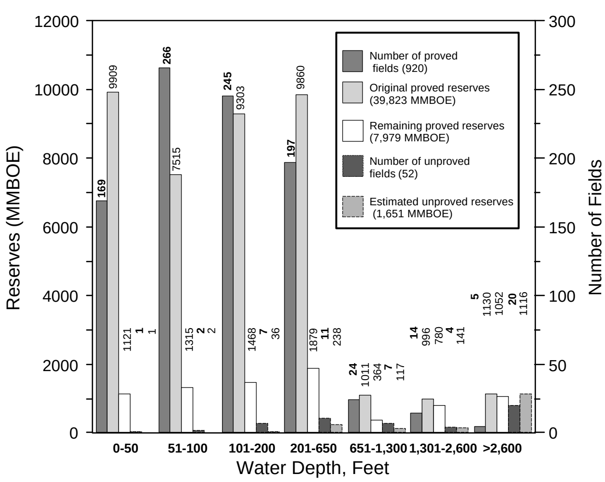

Figure 29.—Field and reserves distribution by water depth.

with a few fields. The mean original proved reserves per proved field in the Gulf of Mexico is 43.3 MMBOE. For fields in water depths between 651 and 1,300 ft, the mean original proved reserves per proved field is 46.3 MMBOE. For fields in water depths greater than 1,300 ft, the mean original proved reserves per proved field is 111.9 MMBOE. This is expected, given the economics associated with deepwater drilling and development.

Figure 30 shows the largest 20 fields based on remaining proved reserves. The top seven fields lie in water depths of greater than 1,300 ft and account for 17 percent of the remaining proved reserves in the Gulf of Mexico.

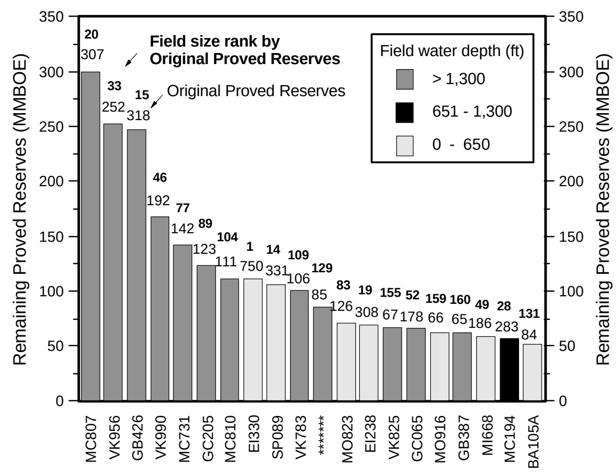

Figure 30.—Largest 20 fields based on remaining proved reserves.

Estimates of original proved reserves on the slope are increasing. This trend is expected to continue in the future due to additional exploration and development. Of the 43 proved fields in water depths greater than 650 ft, 34 are producing, 2 are depleted, and 7 are undeveloped. Included in these totals are 8 new proved fields containing original proved reserves of 412 MMBOE. There are 31 unproved active fields in water depths greater than 650 feet. These fields contain 1,374 MMBOE of estimated unproved reserves representing 83 percent of the Gulf of Mexico total. An additional 7 unproved active fields have not been studied.

Planned deepwater development in the Gulf of Mexico will likely help slow the trend of declining domestic production and rising oil imports. Exploration and development are expected to increase with technological advances, expansion of the infrastructure, and the enactment of the OCS DWRRA. This act gives industry the incentive to explore and produce deepwater resources.

Table 4 lists the 60 largest proved fields ranked by original proved reserves based on BOE. Rank, field name, new discoveries, discovery year, water depth, field type, field GOR, original proved reserves, cumulative production through 1996, and remaining proved reserves are presented. For fields discovered in 1995 and 1996, the names are replaced with asterisks to preserve the proprietary nature of the data. In the column labeled "New Disc", the 40 new fields proved in 1996 are identified by an asterisk; however, none are in the top 60. Reserve data for unproved fields will not be listed. A complete listing of all 920 proved fields, ranked by original proved reserves, is available on the Gulf of Mexico Region's Internet homepage or by contacting the MMS at 1-800-200-GULF.

Reservoir-Size Distribution

The size distributions of the proved reservoirs are shown in figures 31, 32, and 33. The size ranges, which are based on original proved reserves, are presented on a geometrically progressing, horizontal scale. These sizes also correspond with the USGS deposit-size ranges shown in figure 22; however, for figures 32 and 33, the proved reserves are presented in MMbbl and Bcf, respectively. The number of reservoirs in each size grouping, shown as percentages of the total, is presented on a linear vertical scale. For the combination reservoirs (saturated oil rims with associated gas caps), shown in figure 31, gas is converted to BOE and added to the liquid reserves. Proved uneconomic reservoirs are excluded from these distributions, but are included in the table 3 series.

Figure 31 shows the reservoir-size distribution, based on original proved BOE, for 1,562 proved combination reservoirs. The median is 1.1 MMBOE and the mean is 3.4 MMBOE. The GOR for the oil portion of the reservoirs is 1,477 SCF/STB, and the yield for the gas cap is 19.6 barrels of condensate per MMcf of gas.

Figure 32 shows the reservoir-size distribution, based on original proved oil, for 6,944 proved undersaturated oil reservoirs. The median is 0.3 MMbbl, the mean is 1.2 MMbbl, and the GOR is 1,410 SCF/STB.

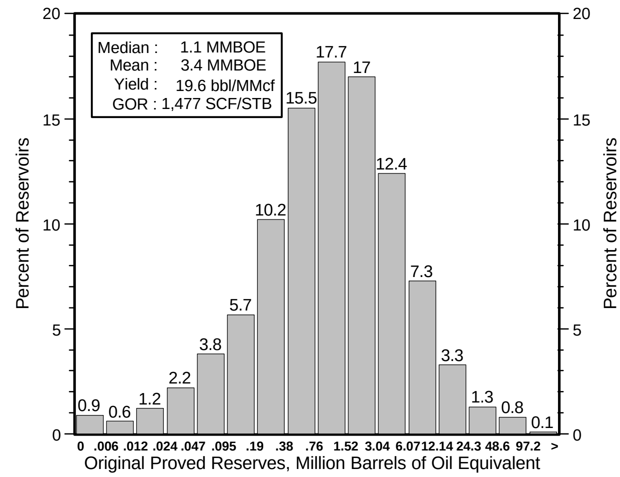

Figure 31.—Reservoir-size distribution, 1,562 proved combination reservoirs.

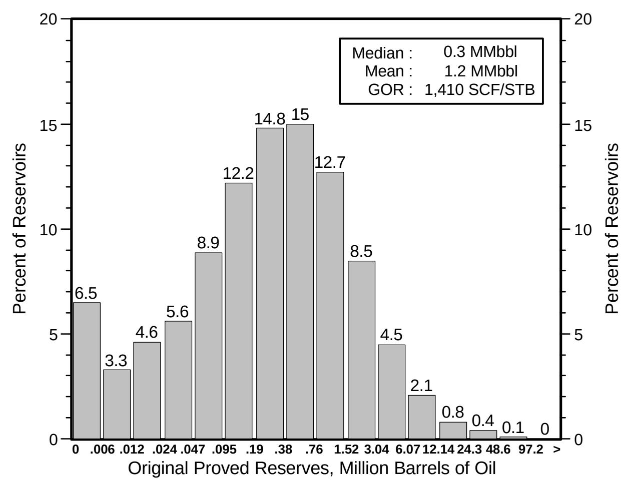

Figure 32.—Reservoir-size distribution, 6,944 proved oil reservoirs.

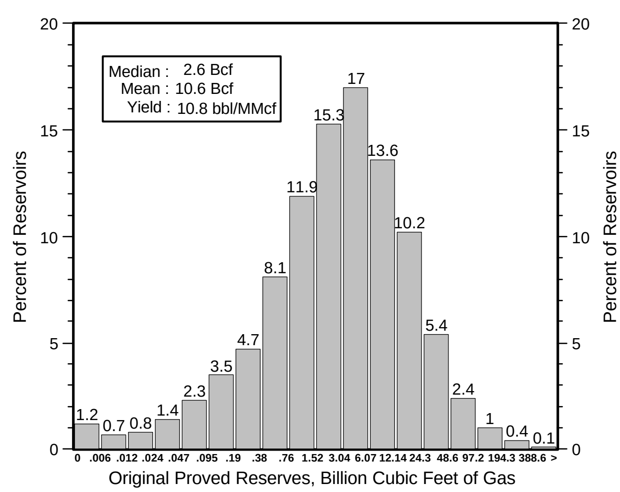

Figure 33.—Reservoir-size distribution, 12,029 proved gas reservoirs.

Table 4.—Gulf of Mexico fields by rank order, based on original proved BOE reserves, top 60 fields.

Rank	Field name	New disc	Disc year	Water depth (feet)	Field type	Field GOR (SCF/STB)	Original proved reserves BOE (MMbbl)	Original proved reserves Oil (MMbbl)	Original proved reserves Gas (Bcf)	Cumulative production through 1996 Oil (MMbbl)	Cumulative production through 1996 Gas (Bcf)	Remaining proved reserves Oil (MMbbl)	Remaining proved reserves Gas (Bcf)
1	EI 330		1971	245	O	4600	750.4	412.6	1898.3	353.1	1608.7	59.6	289.6
2	WD 030		1949	49	O	1493	685.2	541.3	808.4	508.6	744.5	32.7	64.0
3	GI 043		1956	139	O	4206	630.2	360.4	1515.9	336.4	1373.9	24.0	142.0
4	TS 000		1958	13	G	88400	617.3	36.9	3261.9	35.5	3039.9	1.4	221.9
5	BM 002		1949	50	O	1062	609.4	512.5	544.4	492.9	490.9	19.6	53.5
6	VR 014		1956	25	G	63092	604.6	49.5	3120.0	46.6	2904.7	2.9	215.3
7	VR 039		1948	38	G	76472	471.2	32.3	2466.7	29.0	2352.8	3.3	113.9
8	MP 041		1956	41	O	5673	469.8	233.8	1326.3	222.4	1222.8	11.4	103.5
9	SS 208		1960	105	O	5878	423.3	206.9	1216.3	195.8	1153.0	11.2	63.3
10	GI 016		1948	53	O	1249	357.4	292.4	365.2	284.3	345.7	8.1	19.5
11	WD 073		1962	179	O	1990	340.0	251.0	499.7	232.8	443.2	18.3	56.5
12	ST 172		1963	98	G	174237	338.2	10.6	1841.5	8.5	1608.1	2.0	233.5
13	SP 061		1967	224	O	1969	331.8	245.7	483.9	219.0	398.4	26.7	85.6
14	SP 089		1969	425	O	4566	331.5	182.9	835.1	148.8	432.1	34.1	403.0
15	GB 426		1987	2864	O	3393	317.6	198.1	672.1	50.9	112.8	147.2	559.3
16	EC 271		1971	171	G	20565	316.1	67.9	1395.4	59.1	1170.2	8.8	225.2
17	EI 292		1964	217	G	91036	315.5	18.3	1669.9	14.9	1487.7	3.4	182.1
18	ST 021		1957	46	O	1598	315.1	245.3	392.1	231.3	362.1	14.0	29.9
19	EI 238		1964	147	G	17356	308.3	75.4	1309.0	54.1	1038.7	21.3	270.3
20	MC 807		1989	2958	O	1164	306.7	254.1	295.8	5.6	6.5	248.5	289.3
21	WC 180		1961	47	G	170379	302.1	9.6	1643.7	9.2	1577.1	0.4	66.6
22	SM 048		1961	100	G	54706	299.7	27.9	1527.6	24.5	1376.1	3.4	151.5
23	SS 176		1956	100	G	21986	291.5	59.3	1304.8	55.9	1199.7	3.5	105.1
24	WC 587		1971	210	G	121264	290.0	12.8	1557.7	11.4	1356.6	1.5	201.1
25	SP 027		1954	63	O	5001	287.8	152.3	761.5	143.7	695.9	8.6	65.6
26	EC 064		1957	49	G	58062	287.6	25.4	1473.5	23.7	1409.5	1.6	64.0
27	WD 079		1966	125	O	3785	287.3	171.7	649.9	155.7	589.1	16.0	60.8
28	MC 194		1975	1023	O	3484	283.0	174.7	608.6	155.5	396.4	19.1	212.2
29	EI 296		1971	214	G	68636	275.3	20.8	1429.9	19.9	1357.7	0.9	72.2
30	SS 169		1960	62	O	5232	262.9	136.2	712.3	113.2	653.4	23.0	59.0
31	ST 176		1963	127	G	13588	259.7	76.0	1032.4	66.0	850.9	10.0	181.5
32	ST 135		1956	130	O	3144	253.6	162.6	511.2	153.0	422.0	9.6	89.3
33	VK 956		1985	3251	O	6990	252.3	112.4	785.9	0.0	0.0	112.4	785.9
34	HI 573 A		1973	341	O	7913	240.3	99.8	789.6	86.5	660.3	13.3	129.3
35	SM 130		1973	215	O	1457	239.6	190.3	277.3	167.1	206.0	23.2	71.3
36	SM 066		1963	124	G	236083	235.6	5.5	1293.2	4.6	1152.5	0.9	140.6
37	SM 023		1960	82	G	38224	224.7	28.8	1100.8	26.7	976.2	2.1	124.6
38	GI 047		1955	87	O	3459	221.4	137.1	474.1	127.4	452.7	9.6	21.4
39	WC 192		1954	57	G	59427	221.2	19.1	1135.8	17.0	1063.9	2.1	71.9
40	PL 020		1951	31	O	5637	213.4	106.5	600.5	93.3	511.5	13.3	89.0
41	SS 222		1966	142	G	12904	211.9	64.3	829.4	59.2	776.0	5.1	53.4
42	VR 076		1949	32	G	208020	210.4	5.5	1151.2	4.3	1036.2	1.2	114.9
43	SP 078		1972	205	G	12506	204.3	63.3	792.1	49.0	694.9	14.3	97.2
44	WC 071		1955	40	G	55358	200.3	18.5	1022.0	17.1	958.8	1.3	63.2
45	SS 113		1955	41	O	3976	196.6	115.2	457.9	105.0	408.5	10.2	49.4
46	VK 990		1981	1448	O	1195	192.7	158.9	189.9	21.2	20.5	137.8	169.4
47	EI 032		1949	12	G	16969	190.5	47.4	804.2	40.4	783.0	7.0	21.2
48	SP 062		1965	331	O	1491	190.0	150.2	224.0	137.5	195.4	12.7	28.6
49	MI 668		1980	95	G	386577	186.1	2.7	1031.0	1.9	707.0	0.8	324.0
50	MI 623		1980	82	G	89925	185.0	10.9	978.6	7.9	728.2	3.0	250.4
51	SS 207		1967	103	O	4336	183.0	103.3	448.0	97.8	363.4	5.5	84.5
52	GC 065		1983	1330	O	1446	178.3	141.8	205.0	88.8	130.7	53.0	74.3
53	WC 533		1973	171	G	19307364	178.1	0.1	1000.8	0.0	895.2	0.0	105.5
54	SS 230		1962	118	O	2863	176.6	117.0	335.0	108.8	280.5	8.2	54.6
55	SM 128		1974	219	O	2149	174.1	126.0	270.7	108.4	223.7	17.5	47.0
56	MP 299		1962	209	O	743	171.7	151.7	112.7	109.4	68.7	42.2	44.0
57	EI 175		1956	84	O	3358	171.1	107.1	359.7	93.7	271.9	13.4	87.8
58	EI 266		1962	163	G	199919	169.5	4.6	926.3	2.9	832.5	1.8	93.9
59	SS 028		1949	13	G	37479	169.4	22.1	828.1	19.6	745.0	2.5	83.1
60	WC 045		1949	33	G	38166	168.2	21.6	824.1	19.9	792.0	1.6	32.1

There are no New Discoveries (New Disc) in the Top 60 Fields. A complete listing of all proved fields is available in digital format.

Figure 33 shows the reservoir-size distribution, based on original proved gas, for 12,029 proved nonassociated gas reservoirs. The median is 2.6 billion cubic feet (Bcf) of gas, the mean is 10.6 Bcf, and the yield is 10.8 barrels of condensate per MMcf of gas.

Production Rates and Discovery Trends

The mean daily production in the Gulf of Mexico OCS during 1996 was 823,000 bbl of crude oil, 186,000 bbl of gas condensate, 1.68 Bcf of casinghead gas, and 12.23 Bcf of gas-well gas. The mean GOR of oil wells was 2,039 SCF/STB, and the mean yield from gas wells was 15.22 barrels of condensate per MMcf of gas.

Figures 34 and 35 show the frequency distribution of monthly production for completions active during 1996. Since the number of completions within a given range changes from month to month, the completion numbers presented are means of the 1996 monthly completion totals for each production range. The numbers shown in parentheses are also means of monthly counts for completions considered to be on continuous production. Completions off production for more than two days a month are not counted as continuously producing completions.

Figure 36 summarizes the data from monthly distributions of oil and gas production rates. The highest reported monthly oil production volume was from a Miocene reservoir with a subsea depth of 16,500 ft, during the month of September. The highest reported monthly gas production volume was from a Pleistocene reservoir with a subsea depth of 11,980 ft, during the month of March. The mean number of oil completions producing more than 1,000 bbl per day was 132, and the mean number of gas completions producing more than 10 MMcf per day was 303.

Annual production in the Gulf of Mexico OCS is shown in figure 37. The oil plot includes condensate, and the gas plot includes casinghead gas. Annual oil production is trimodal, reaching 376 MMbbl per year in 1971, and 350 to 356 MMbbl per year from 1984 through 1986. From 1986 through 1990 annual oil production declined 23 percent. From 1990 through 1996 annual oil production rose from 275 MMbbl to 368 MMbbl, a 34 percent increase. Annual gas production is also trimodal, reaching 4.9 Tcf per year in 1981 and 1990. From 1990 through 1993 gas production declined 6 percent.

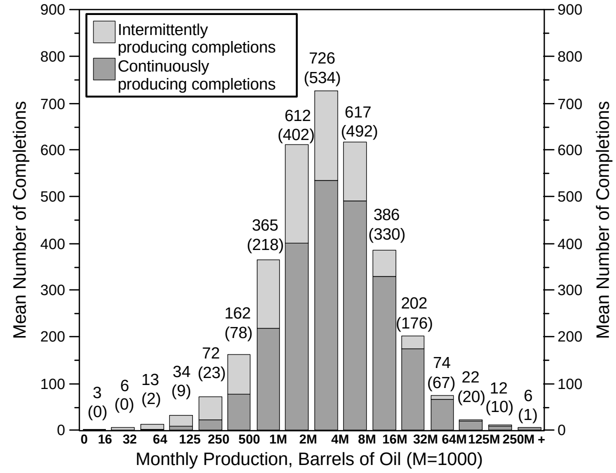

Figure 34.—Monthly distribution of oil production, 3,313 completions, (2,367) continuously producing completions.

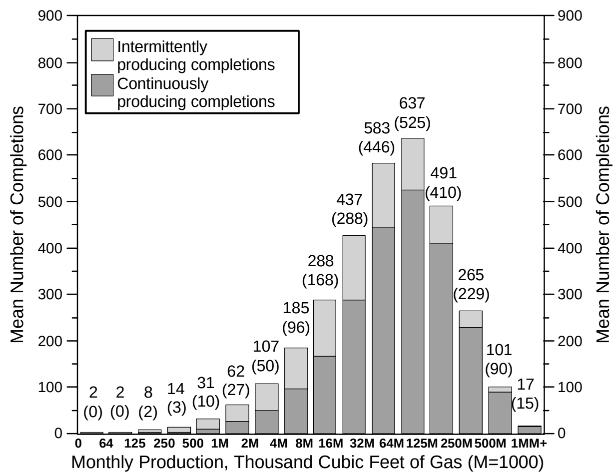

Figure 35.—Monthly distribution of gas production, 3,230 completions, (2,359) continuously producing completions.

1996	Oil	Gas
Mean Number of Producing Completions	3,313	3,230
Mean Number of Continuously Producing Completions	2,367	2,359
Highest Monthly Mean Number of Producing Completions	3,341 (June)	3,249 (September)
Lowest Monthly Mean Number of Producing Completions	3,291 (April)	3,189 (November)
Mean Production	7,549 bbl (248 bbl per day)	114 MMcf (3.8 MMcf per day)
Median Production	2,898 bbl (116 bbl per day)	57.3 MMcf (2.1 MMcf per day)
Highest Producing Rate for a Completion	655,585 bbl (21,656 bbl per day)	3,212 MMcf (105.7 MMcf per day)

Figure 36.—Monthly completion and production data.

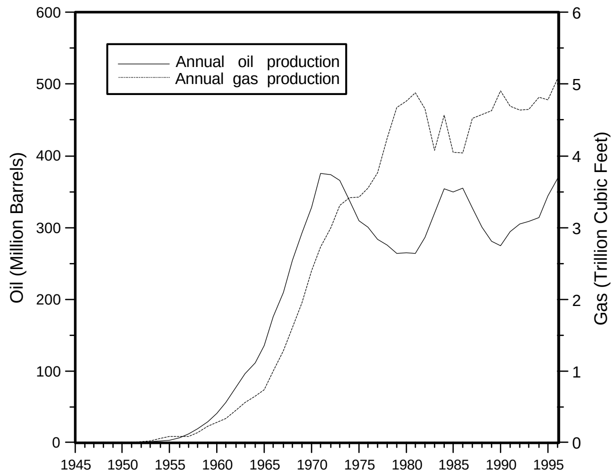

Figure 37.—Annual oil and gas production.

From 1993 through 1996 annual gas production rose from 4.6 Tcf to a peak of 5.1 Tcf, an 11 percent increase.

Figure 38 presents original proved reserves, cumulative production, and remaining proved reserves in BBOE as of December 31, 1996, summed according to field discovery year. Field depletion may be estimated by the relative positions of the cumulative production curve and the remaining proved reserves curve. For example, if the value of the remaining proved reserves is higher than the value of cumulative production for a given year, the aggregate depletion for fields discovered that year is less than 50 percent. The plot demonstrates that fields discovered after 1983, with the exception of 1988, are less than 50 percent depleted. The current trend is showing that overall field sizes are decreasing.

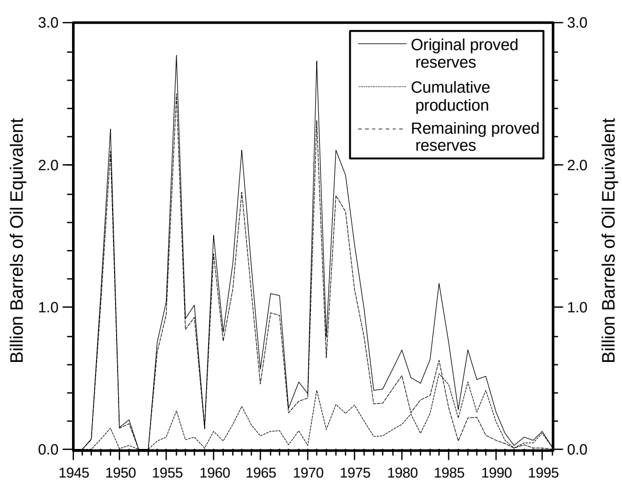

Figure 38.—Proved reserves and production by field discovery year.

Figure 39 is a plot of the number of proved gas and oil fields by discovery year. The annual number of gas fields discovered has been steadily increasing, while the number of oil fields discovered has not varied much from year to year, never exceeding 13 and averaging only about 3.3 discoveries per year. Through 1959, 39 percent of all fields discovered were oil. This percentage declined steadily as more gas fields were discovered until only 13 percent of the fields discovered during the 1980's were oil fields. This reflects an industry change from oil production to gas production. The shift from oil to gas emphasis was fueled by several factors, including optimism concerning higher anticipated gas prices, realization of the inevitable decline in the size of oil fields being discovered, and the introduction of new seismic technologies that dramatically lowered the risk in identifying gas reservoirs (Lore, 1994).

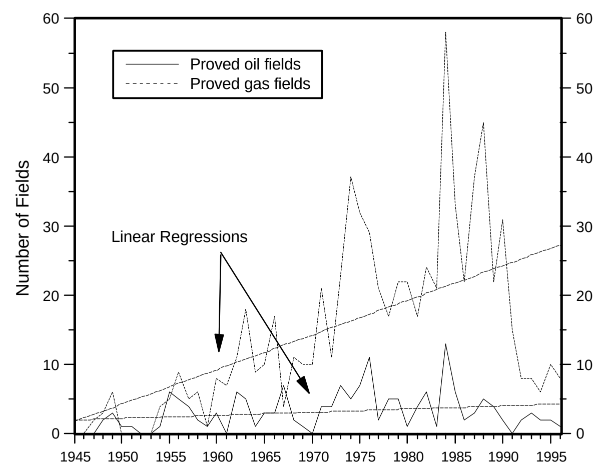

Figure 39.—Annual number of proved oil and gas field discoveries.

Figure 40 presents the number of proved fields and the mean field size by field discovery year. This plot shows that, though the number of discovered fields has typically been increasing from year to year, the mean size of the fields has been getting smaller. The mean field size discovered for the last few years is expected to increase due to reserves growth in proved fields and reserves additions in unproved fields discovered in recent years.

Figure 41 presents the number of proved and unproved fields and the average water depth of the fields discovered in each year. Clearly, exploration and resulting production are moving into deeper water, and this trend is expected to continue.

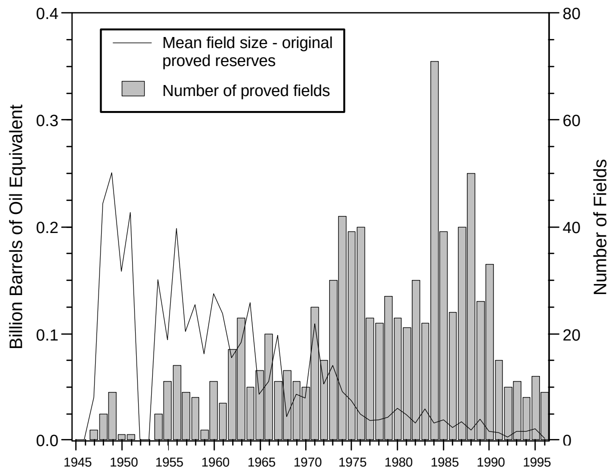

Figure 40.—Number of proved fields and mean field size by field discovery year.

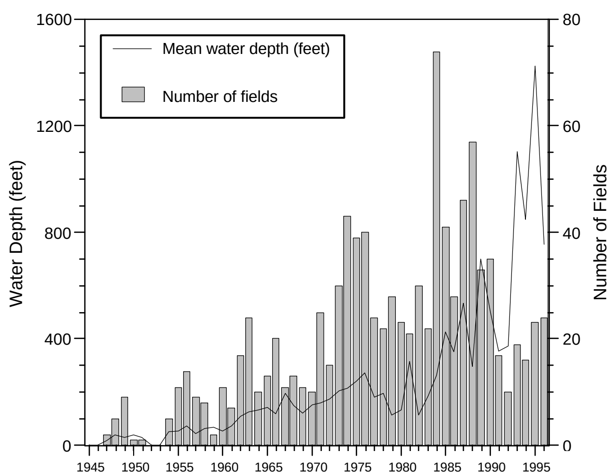

Figure 41.—Number of fields and mean water depth by field discovery year.

Figures 42 and 43 show original proved oil and gas reserves and annual production by reservoir discovery year. All data presented in figure 42 include crude oil and condensate, and all data presented in figure 43 include associated and nonassociated gas. The year of discovery assigned to a reservoir is the year in which the first well encountering hydrocarbons penetrated the reservoir. For comparison with the rate of discoveries, the annual production of oil and gas is also shown. Since 1984 new proved reservoir discoveries, except for 1989 oil discoveries, are no longer offsetting annual production, indicating a decreasing trend in remaining proved reserves. Because of reserves growth, the original proved reserves curve in both figures is expected to increase over what is shown.

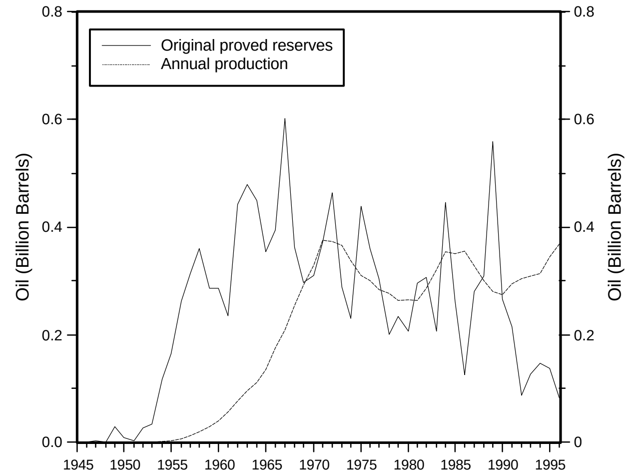

Figure 42.—Proved oil reserves by reservoir discovery year and annual oil production.

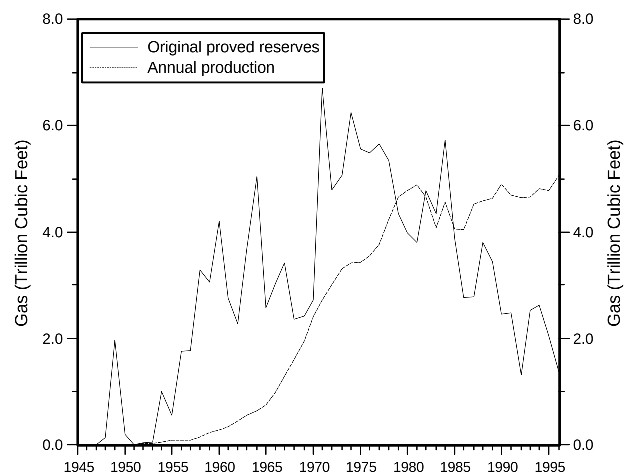

Figure 43.—Proved gas reserves by reservoir discovery year and annual gas production.

Figure 44 presents the total footage drilled, the total number of wells drilled, and the number of exploratory and development wells drilled in the Gulf of Mexico OCS each year. All curves show a decline after the 1986 collapse in oil prices. A second decline occurred in 1991-92. Drilling has increased since 1992, reflecting stable energy prices and improvements in exploration and production technology.

Figure 45 presents the number of exploratory wells drilled each year by water depth. The plot shows the move toward drilling in deeper water, but also illustrates continued drilling on the shelf.

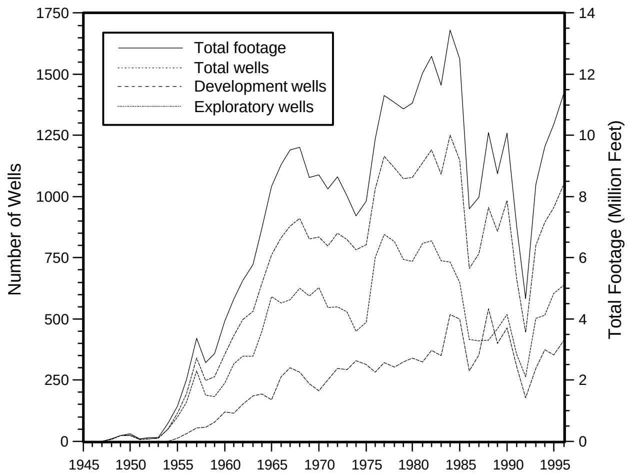

Figure 44.—Wells and footage drilled.

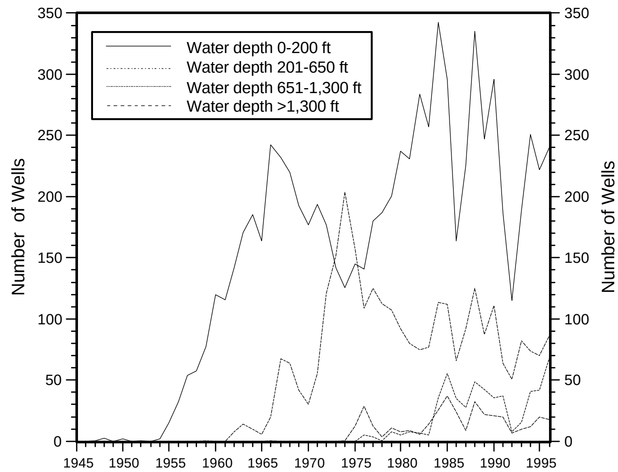

Figure 45.—Number of exploratory wells drilled by water depth.

Summary and Comparison of Proved Reserves

A summary of proved reserve estimates during the year and a comparison with estimates from last year's report (December 31, 1995) are shown in table 5. Recent proved field discoveries (10 oil fields and 30 gas fields) are summarized and tabulated as increases to original proved reserves. For further clarification, recent field discoveries are identified as new fields added in the last year, even though some were discovered before 1996. Proved reserve estimates are revised as needed, resulting in increases as additional wells are drilled and new leases are added to existing fields, and decreases as reservoirs are depleted and leases relinquished. Complete reevaluations of existing field studies are conducted based upon changes in field development and/or production history. Increases and decreases of proved reserves are summarized and presented as changes due to revisions. Based on periodic reviews and revisions of field studies

Table 5.—Summary and comparison of proved oil and gas reserves as of December 31, 1995, and December 31, 1996.

	Oil (billion bbl)			Gas (trillion cu ft)		
Original proved reserves:						
Previous estimates, as of 12/31/95*	**12.01**			**144.9**		
Discoveries		+0.33			+1.5	
Revisions		+0.45			+5.5	
Adjustments		0.00			0.0	
Net change		**+0.78**			**+7.0**	
Estimate, as of 12/31/96 (this report)			**12.79**			**151.9**
Cumulative production:						
Previous estimates, as of 12/31/95*	**9.68**			**117.4**		
Adjustments		0.00			0.0	
Production during 1996		+0.37			+5.1	
Net change		**+0.37**				
Estimate, as of 12/31/96 (this report)			**10.05**			**122.5**
Remaining proved reserves:						
Previous estimates, as of 12/31/95*	**2.33**			**27.5**		
Discoveries		+0.33			+1.5	
Revisions		+0.45			+5.5	
Adjustments		0.00			0.0	
Production during 1996		-0.37			-5.1	
Net change		**+0.41**			**+1.9**	
Estimate, as of 12/31/96 (this report)			**2.74**			**29.4**

*Bacigalupi and others, 1996

conducted since the 1995 report, the revisions for original proved oil and gas reserves have resulted in a net increase. A net change in the original proved oil and gas reserves is a result of combining both the discoveries and the revisions.

Table 5 demonstrates that the 1996 proved oil and gas discoveries, adjustments, and field revisions did exceed production. The remaining proved oil and gas reserves have increased since 1995.

Table 6 presents all previous reserve estimates by year. Due to adjustments and corrections to production data submitted by Gulf of Mexico OCS operators, the difference between historical cumulative production for successive years does not always equal the annual production for the latter year. No comparisons will be made for unproved reserves.

Table 6.—Proved oil and gas reserves and cumulative production at end of year, Gulf of Mexico, Outer Continental Shelf and Slope.

Oil expressed in billions of barrels; gas in trillions of cubic feet. "Oil" includes crude oil and condensate; "gas" includes associated and nonassociated gas. Remaining proved reserves estimated as of December 31 each year.

Year	Number of fields included	Original proved reserves		Historical cumulative production		Remaining proved reserves	
		Oil	Gas	Oil	Gas	Oil	Gas
1975	255	6.61	59.9	3.82	27.2	2.79	32.7
1976	306	6.86	65.5	4.12	30.8	2.74	34.7
1977	334	7.18	69.2	4.47	35.0	2.71	34.2
1978	385	7.52	76.2	4.76	39.0	2.76	37.2
1979*	417	7.71	82.2	4.83	44.2	2.88	38.0
1980	435	8.04	88.9	4.99	48.7	3.05	40.2
1981	461	8.17	93.4	5.27	53.6	2.90	39.8
1982	484	8.56	98.1	5.58	58.3	2.98	39.8
1983	521	9.31	106.2	5.90	62.5	3.41	43.7
1984	551	9.91	111.6	6.24	67.1	3.67	44.5
1985	575	10.63	116.7	6.58	71.1	4.05	45.6
1986	645	10.81	121.0	6.93	75.2	3.88	45.8
1987	704	10.76	122.1	7.26	79.7	3.50	42.4
1988	678	10.95	126.7	7.56	84.3	3.39	42.4
1989	739	10.87	129.1	7.84	88.9	3.03	40.2
1990	782	10.64	129.9	8.11	93.8	2.53	36.1
1991	819	10.74	130.5	8.41	98.5	2.33	32.0
1992	835	11.08	132.7	8.71	103.2	2.37	29.5
1993	849	11.15	136.8	9.01	107.7	2.14	29.1
1994	876	11.86	141.9	9.34	112.6	2.52	29.3
1995	899	12.01	144.9	9.68	117.4	2.33	27.5
1996	920	12.79	151.9	10.05	122.5	2.74	29.4

*Gas plant liquids dropped from reporting system.
Basis of reserves changed from API demonstrated to SPE proved.

Conclusions

The 920 proved oil and gas fields in the federally regulated part of the Gulf of Mexico OCS contained original proved reserves estimated to be 12.79 billion barrels of oil and 151.9 trillion cubic feet of gas. Remaining proved reserves, as of December 31, 1996, are estimated to be 2.74 billion barrels of oil and 29.4 trillion cubic feet of gas. Estimated remaining proved oil reserves have increased 17.6 percent and estimated remaining proved gas reserves have increased 6.9 percent from last year’s report.

The 52 unproved oil and gas fields studied in the federally regulated part of the Gulf of Mexico OCS contained unproved reserves estimated to be 1.00 billion barrels of oil and 3.7 trillion cubic feet of gas. There are an additional 33 unproved active fields not included in this estimate. Included are unproved reserves of 0.09 billion barrels of oil and 2.4 trillion cubic feet of gas from 26 fields in water depths greater than 1,000 feet. Estimated unproved oil reserves are 2.7 times annual oil production, and estimated unproved gas reserves represent 73 percent of annual gas production. Estimated remaining proved oil reserves are expected to increase in future years due to significant moves of unproved reserves into the proved category.

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This report includes contributions from the following Gulf of Mexico Region, Office of Resource Evaluation, personnel.

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