OCS Report
BOEM 2016-082

Outer Continental Shelf

Estimated Oil and Gas Reserves Gulf of Mexico OCS Region December 31, 2015

U.S. Department of the Interior
Bureau of Ocean Energy Management
Gulf of Mexico OCS Region

ON COVER- Production begun at Anadarko's Lucius Prospect in deepwater U.S. Gulf of Mexico in January 2015. Photo courtesy youtube.com.

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ABBREVIATIONS AND ACRONYMS

AL	Alabama
Bbbl	Billion barrels
Bbl	barrels
BBO	billion barrels of oil
BBOE	billion barrels of oil equivalent
Bcf	billion cubic feet
BOE	barrels of oil equivalent
BOEM	Bureau of Ocean Energy Management
DOI	U.S. Department of the Interior
^{0}F	degrees Fahrenheit
FL	Florida
ft	feet
GOM	Gulf of Mexico
GOMR	Gulf of Mexico Region
GOR	gas oil ratio
LA	Louisiana
MMbbl	million barrels
MMBOE	million barrels of oil equivalent
MMcf	million cubic feet
MMS	Minerals Management Service
MS	Mississippi
N	north
OCS	Outer Continental Shelf
psia	pounds per square inch absolute
P/Z	pressure/gas compressibility factor
RE	Resource Evaluation
SCF/STB	standard cubic feet per stock tank barrel
SPE-PRMS	Society of Petroleum Engineers Petroleum Resources Management System
Tcf	trillion cubic feet
TX	Texas
U.S.	United States
USGS	United States Geological Survey

ABSTRACT

This publication presents the Bureau of Ocean Energy Management (BOEM) estimates of oil and gas reserves in the Gulf of Mexico Outer Continental Shelf. As of December 31, 2015, it is estimated that the *Original Reserves* are 23.06 billion barrels of oil and 193.8 trillion cubic feet of gas from 1,312 fields. *Original Reserves* are the total of the *Cumulative Production* and the *Reserves*. This number includes six fields that moved from *Resources* to *Reserves* during 2015. It also includes 743 fields that have produced and expired. C*umulative Production* from all fields accounts for 19.58 billion barrels of oil and 186.5 trillion cubic feet of gas.

Reserves are estimated to be 3.48 billion barrels of oil and 7.3 trillion cubic feet of gas. These reserves are recoverable from 569 active fields. *Reserves* in this report are proved plus probable (2P) reserves estimates. The reserves must be discovered, recoverable, commercial and remaining. *Reserves*, starting with the 2011 report, now include *Reserves Justified for Development.*

The estimates of reserves for this report represent the combined efforts of engineers, geoscientists, paleontologists, petrophysicists, and other personnel of the BOEM Gulf of Mexico Region, Office of Resource Evaluation, in New Orleans, Louisiana. Reserves estimates are derived for individual reservoirs from geologic and engineering calculations. For any field spanning State and Federal waters, reserves are estimated for the Federal portion only.

INTRODUCTION

This report supersedes the *Estimated Oil and Gas Reserves, Gulf of Mexico OCS Region, December 31, 2014* (Kazanis et al., 2016)**.** It presents estimated Original Reserves, Cumulative Production, and Reserves as of December 31, 2015, for the Gulf of Mexico (GOM). **Figure 1** represents the percentages of Cumulative Production and Reserves in the GOM. Contingent and Undiscovered Resources are not included in this report.

As of December 31, 2015, the 1,312 oil and gas fields in the federally regulated part of the Gulf of Mexico Outer Continental Shelf (GOM OCS) contained Original Reserves estimated to be 23.06 billion barrels of oil (BBO) and 193.8 trillion cubic feet (Tcf) of gas. Cumulative Production from the fields accounts for 19.58 BBO and 186.5 Tcf of gas. Reserves are estimated to be 3.48 BBO and 7.3 Tcf of gas for the 569 active fields. Oil Reserves have increased 4.2 percent and the gas Reserves have decreased 0.4 percent since the 2014 report.

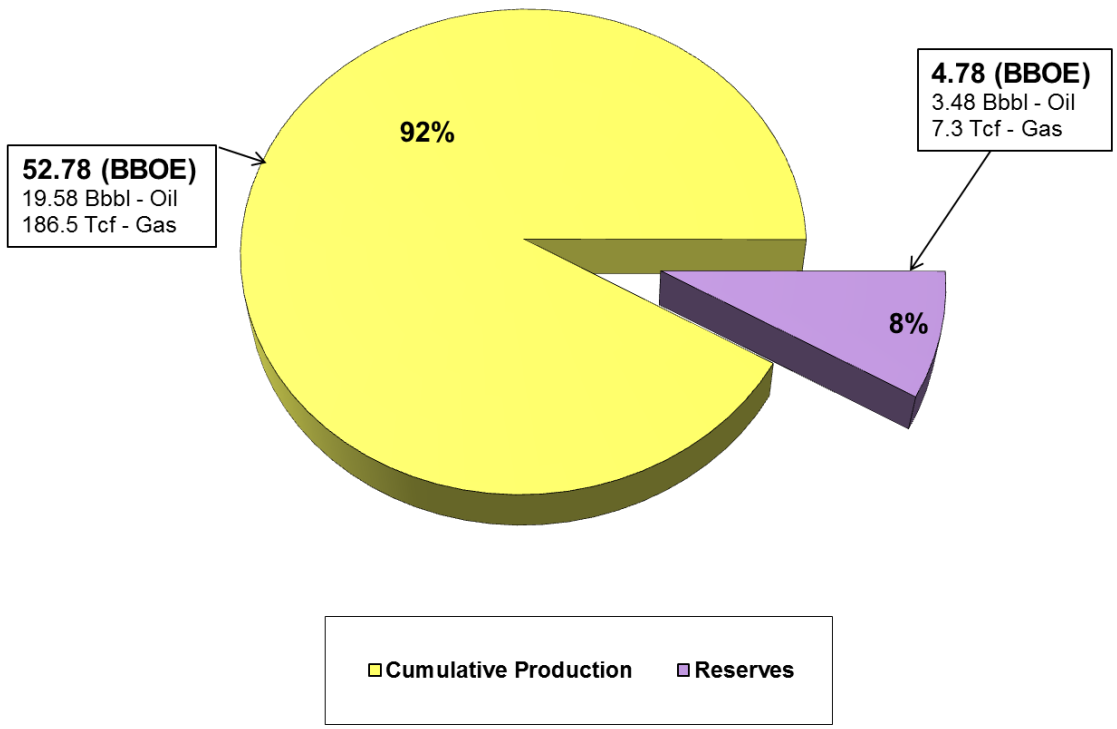

Figure 1. BOEM GOM Production and Reserves

BACKGROUND

Classification of Resources and Reserves

The BOEM resource classification framework is shown in **Figure 2**. Definitions for each resource class are presented in **Appendix A**. At the point in time a discovery is made, the identified accumulation of hydrocarbons is classified as a Contingent Resource, since a development project has not yet been identified. When the lessee makes a formal commitment to develop and produce the accumulation, it is classified as a Reserves Justified for Development. During the period when infrastructure is being constructed and installed, the accumulation is classified as Undeveloped Reserves. After the equipment is in place the accumulation is classified as Developed Non-Producing Reserves, and when production of the accumulation has begun, the status becomes Developed Producing Reserves. If an accumulation goes off production, for a year or more, for any reason, the classification changes back to Developed Non-Producing. *Reserves* in this report are proved plus probable (2P) reserves estimates. The reserves must be discovered, recoverable, commercial and remaining. *Reserves*, starting with the 2011 report, now include *Reserves Justified for Development*. All hydrocarbons produced and sold are included in the Cumulative Production category. Should a project be abandoned, at any phase of development, any estimates of remaining hydrocarbon volumes could be re-classified to Contingent Resources.

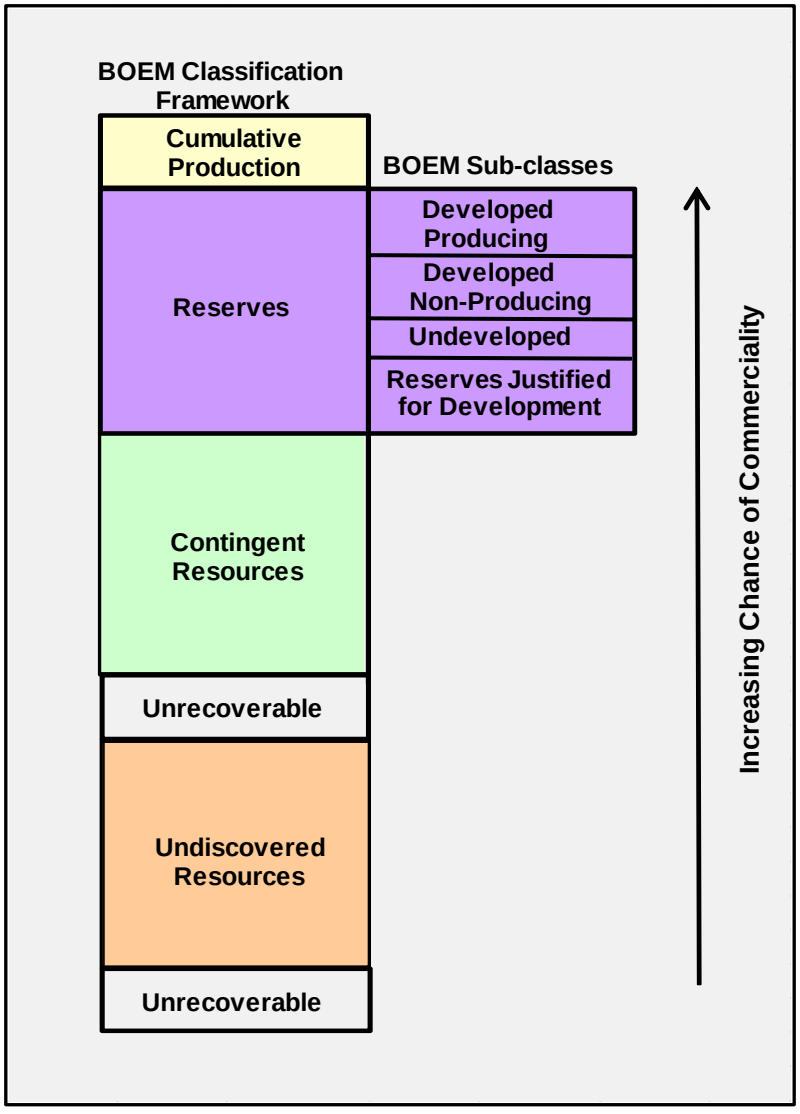

Figure 2. BOEM resource classification framework.

Methods Used for Estimating Reserves

The Reserves inventory component of the Resource Evaluation (RE) Program assigns new producible leases to fields and establishes field limits**.** The RE Program also develops independent estimates of natural gas and oil in previously discovered OCS fields by conducting field reserve studies and reviews of fields, sands, and reservoirs. The Program periodically revises the estimates of natural gas and oil volumes to reflect new discoveries, development, and annual production. This report, *Estimated Oil and Gas Reserves, Gulf of Mexico OCS Region, December 31, 2015*, is based on field studies completed at the reservoir 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).

Additional reports address GOM reserves and undiscovered resources on the OCS. Minerals Management Service (MMS) OCS Report, *Atlas of Gulf of Mexico Gas and Oil Sands as of January 1, 1999* (Bascle et al., 2001) provides a detailed geologic reporting of oil and gas reserves. A brief summary of the Atlas is available on the BOEM's Web site at http://www.boem.gov/BOEM-Newsroom/Library/Publications/2001/2001-086.aspx. The BOEM Report, *Assessment of Undiscovered Technically Recoverable Oil and Gas Resources of the Nation's Outer Continental Shelf, 2016*, summarizes the results of the Bureau of Ocean Energy Management 2016 assessment of the undiscovered oil and gas resources for the U.S. Outer Continental Shelf. For more information visit BOEM's Web site at https://www.boem.gov/National-Assessment-2016/.

Reserve estimates from geological and engineering analyses have been completed for the 1,312 fields. The accuracy of the reserve estimate improves as additional reservoir data becomes available to geoscientists and engineers. Well logs, well file data, seismic data, and production data are periodically analyzed to improve the accuracy of the reserve estimate. As a field is depleted and/or abandoned, the Reserves of productive reservoirs are assigned a value equal to the amount produced and any unrecovered reserve volumes may be converted to Contingent Resources. Currently, there are 743 expired, depleted fields.

Methods used for estimating reserves can be categorized into three groups: analog, volumetric, and performance. Reserve estimates in this report are based primarily on volumetric and performance methods. Reserve estimates are reported deterministically, providing a single "best estimate" based on known geological, engineering, and economic data.

Production data are the metered volumes of raw liquids and gas reported to BOEM (from ONRR, Office of Natural Resources Revenue) by Federal OCS unit and lease operators. Metered 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 volumes.

Oil and gas volume measurements and reserves are corrected to reference standard conditions of 60°F and one atmosphere (14.73 pounds per square inch absolute [psia]). Prior to September 1998, gas was reported at 15.025 psia. BOEM has converted all historical gas production volumes to the 14.73 pressure base.

RESERVES AND RELATED DATA BY PLANNING AREA

The GOM OCS is divided into three planning areas for administrative purposes (**Figure 3**). Each planning area is subdivided into protractions, which in turn are divided into numbered blocks. Fields in the GOM are identified by the protraction area name and block number of discovery – for example, East Cameron Block 271 (EC 271) Field. As the field is developed, the limits may expand into adjacent blocks and planning areas. These adjacent blocks are then identified as part of the original field and are added to that field. Statistics in this report are presented as area totals compiled under each field name. All of the data associated with EC 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: Tiger Shoal and Lighthouse Point, included in South Marsh Island; Coon Point, included in Ship Shoal; and Bay Marchand, included in South Timbalier.

As of December 31, 2015, there were 569 fields active in the federally regulated part of the GOM. A list, updated quarterly, of the active and expired fields can be found in the *OCS Operations Field Directory*. Included are the 743 expired, depleted and/or abandoned fields that produced 19.0 percent barrels oil equivalent (BOE) of the total cumulative GOM oil and gas production. One hundred twenty eight fields expired, relinquished, or terminated without production. These fields may be included in the *Indicated Hydrocarbon List*. Reserves data are presented as area totals in **Table 1.**

Table 1. Estimated oil and gas reserves by area, December 31, 2015.

Area(s) (Fig. 3)	Number of fields				Original Reserves			Cumulative Production through 2014			Reserves		
	Active prod	Active nonprod	Expired depleted	Expired nonprod	Oil (MMbbl)	Gas (Bcf)	BOE (MMbbl)	Oil (MMbbl)	Gas (Bcf)	BOE (MMbbl)	Oil (MMbbl)	Gas (Bcf)	BOE (MMbbl)
Western Planning Area													
Alaminos Canyon	5	0	0	5	394	545	491	204	336	264	190	209	227
Brazos	4	0	34	3	10	3,729	674	10	3,709	670	0	20	4
East Breaks	11	2	8	5	273	2,231	670	258	2,136	638	15	95	32
Galveston	7	1	42	3	67	2,230	463	65	2,206	457	2	24	6
Garden Banks	1	0	6	2	42	336	102	36	323	93	6	13	9
High Island and Sabine Pass	30	6	93	10	426	15,539	3,191	416	15,428	3,161	10	111	30
Matagorda Island	4	1	24	2	24	5,276	963	24	5,258	959	0	18	4
Mustang Island	2	0	27	5	8	1,791	327	8	1,779	325	0	12	2
N.& S.Padre Island	1	1	17	0	0	625	112	0	625	112	0	0	0
Port Isabel	0	0	0	1	0	0	0	0	0	0	0	0	0
West Cameron and Sabine Pass	5	1	20	1	35	2,925	556	35	2,917	554	0	8	2
Western Planning Area Subtotal	***70***	***12***	***271***	***37***	***1,279***	***35,227***	***7,549***	***1,056***	***34,717***	***7,233***	***223***	***510***	***316***
Central Planning Area													
Atwater Valley	3	0	3	6	48	606	156	34	586	138	14	20	18
Chandeleur	1	0	13	0	0	383	68	0	383	68	0	0	0
Desoto Canyon	2	2	2	2	14	541	110	4	505	93	10	36	17
Destin Dome	0	0	0	1	0	0	0	0	0	0	0	0	0
East Cameron	22	3	42	0	365	11,055	2,332	352	10,951	2,301	13	104	31
Eugene Island	42	2	45	4	1,769	20,564	5,428	1,700	20,178	5,291	69	386	137
Ewing Bank	14	0	4	2	390	751	524	351	684	473	39	67	51
Garden Banks	18	1	13	4	829	4,395	1,611	750	4,031	1,467	79	364	144
Grand Isle	11	0	12	1	1,031	5,254	1,966	995	4,992	1,884	36	262	82
Green Canyon	33	3	9	28	3,271	4,239	4,025	2,120	3,289	2,705	1,151	950	1,320
Keathley Canyon	2	0	0	2	169	443	248	23	104	41	146	339	207
Lloyd Ridge	1	0	3	1	0	349	62	0	330	59	0	19	3
Main Pass and Breton Sound	37	7	48	4	1,197	7,132	2,466	1,163	6,939	2,398	34	193	68
Mississippi Canyon	40	5	14	10	3,973	10,916	5,915	2,955	8,910	4,540	1,018	2,006	1,375
Mobile	8	1	25	2	0	2,443	435	0	2,295	409	0	148	26
Pensacola	0	0	1	0	0	8	1	0	8	1	0	0	0
Ship Shoal	40	1	28	3	1,508	12,958	3,814	1,448	12,588	3,688	60	370	126
South Marsh Island	30	6	15	0	995	15,146	3,690	956	14,759	3,582	39	387	108
South Pass	8	0	5	1	1,122	4,594	1,940	1,100	4,501	1,901	22	93	39
South Pelto	6	0	3	0	161	1,192	373	158	1,168	366	3	24	7
South Timbalier	24	4	35	3	1,626	10,455	3,487	1,590	10,250	3,414	36	205	73
Vermilion	32	4	49	1	592	16,820	3,585	576	16,625	3,535	16	195	50
Viosca Knoll	16	2	34	8	651	3,737	1,316	596	3,559	1,230	55	178	86
Walker Ridge	4	3	0	4	436	105	454	46	10	48	390	95	406
West Cameron and Sabine Pass	31	1	62	0	197	18,698	3,524	194	18,472	3,480	3	226	44
West Delta	16	1	7	3	1,438	5,832	2,476	1,413	5,719	2,431	25	113	45
Central Planning Area Subtotal	***441***	***46***	***472***	***90***	***21,782***	***158,616***	***50,006***	***18,524***	***151,836***	***45,543***	***3,258***	***6,780***	***4,463***
Eastern Planning Area													
Destin Dome	0	0	0	1	0	0	0	0	0	0	0	0	0
Eastern Planning Area Subtotal*	***0***	***0***	***0***	***1***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***
GOM Total:	***511***	***58***	***743***	***128***	***23,061***	***193,843***	***57,555***	***19,580***	***186,553***	***52,776***	***3,481***	***7,290***	***4,779***
		1,312											

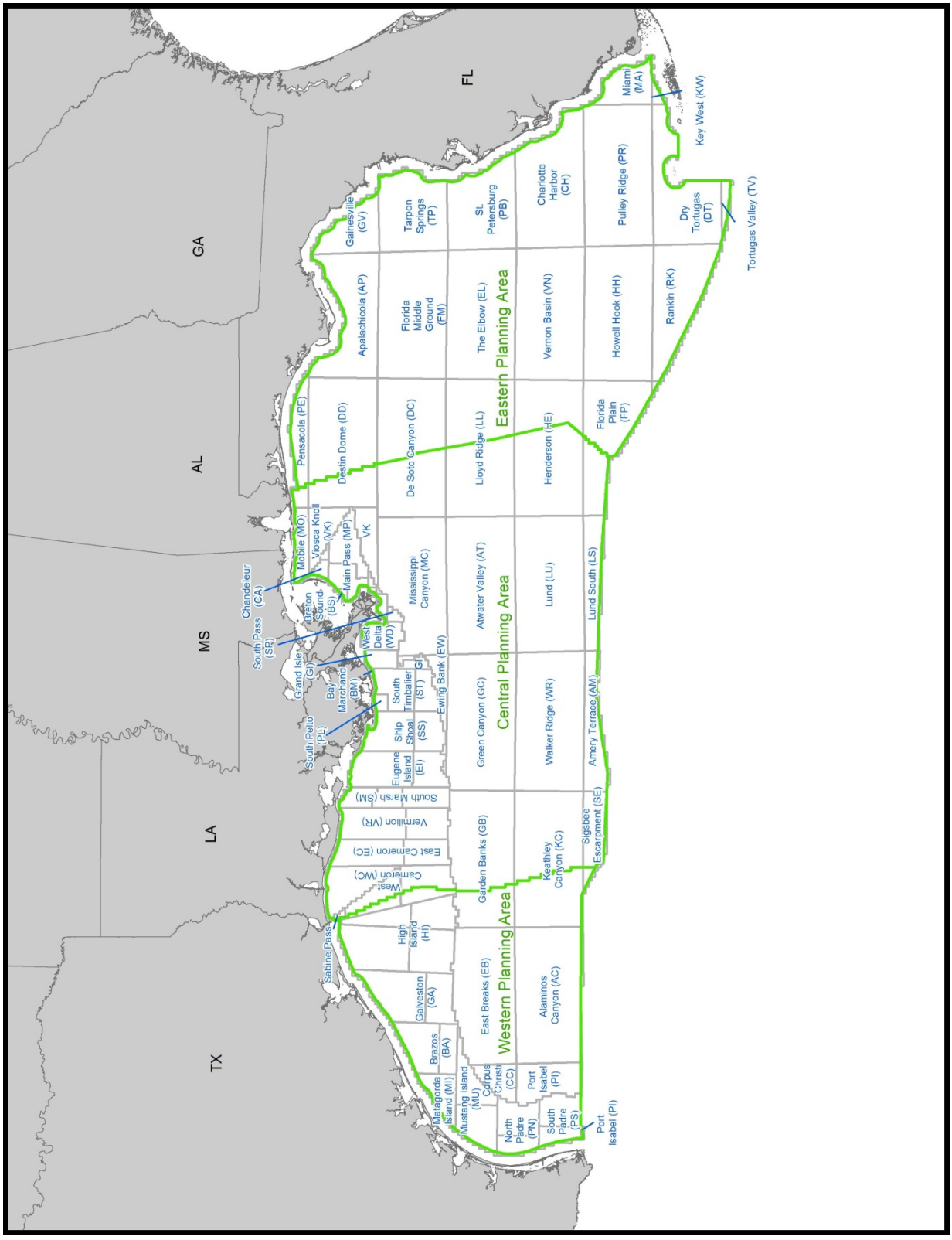

Figure 3. BOEM GOM OCS Planning Areas and Protraction Areas.

FIELD-SIZE DISTRIBUTION

Field Reserve volumes are expressed in terms of BOE. Gas reserves are converted to BOE and added to the liquid reserves for the convenience of comparison. 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 United States Geological Survey (USGS) (Attanasi, 1998), was selected for field-size (deposit-size) distribution ranges (**Table 2**).

In this report, fields are classified as either oil or gas; 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 producers.

Table 2. Description of deposit-size classes.

Class	Deposit-size range*	Class	Deposit-size range*	Class	Deposit-size range*
1	0.031 - 0.062	10	16 - 32	18	4,096 - 8,192
2	0.062 - 0.125	11	32 -64	19	8,192 - 16,384
3	0.125 - 0.25	12	64 - 128	20	16,384 - 32,768
4	0.25 - 0.50	13	128 - 256	21	32,768 - 65,536
5	0.50 - 1.00	14	256 - 512	22	65,536 - 131,072
6	1 - 2	15	512 - 1,024	23	131,072 - 262,144
7	2 - 4	16	1,024 - 2,048	24	262,144 - 524,288
8	4 - 8	17	2,048 - 4,096	25	524,288 - 1,048,576
9	8 - 16	*Million Barrels of Oil Equivalent (MMBOE)			

The field-size distribution based on Original Reserves (in BOE) for 1,312 fields is shown in **Figure 4,** along with the planning area distributions. Of the 1,312 oil and gas fields, there are 260 oil fields represented in **Figure 5** and 1,052 gas fields shown in **Figure 6**. These figures also display the planning area distributions.

Analysis of the 1,312 oil and gas fields indicates that the GOM is historically a gas-prone basin. The GOR, based on original reserves of the 260 oil fields, is 2,473 SCF/STB. The yield (condensate divided by gas), based on original reserves for the 1,052 gas fields, is 26.0 barrels (Bbl) of condensate per million cubic feet (MMcf) of gas.

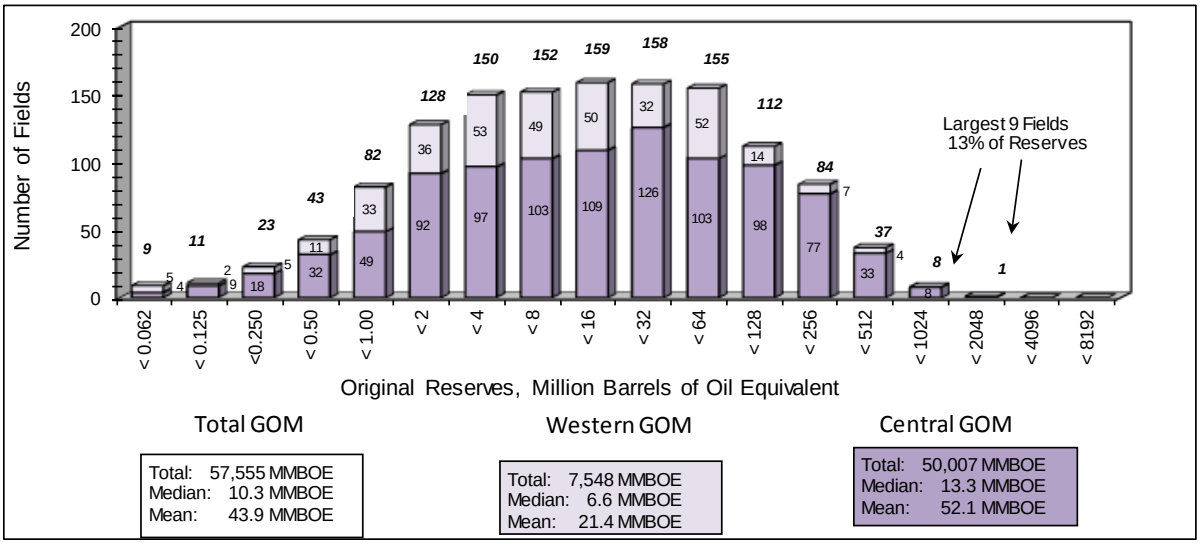

Figure 4. Field-size Distribution of all GOM Fields by Planning Area

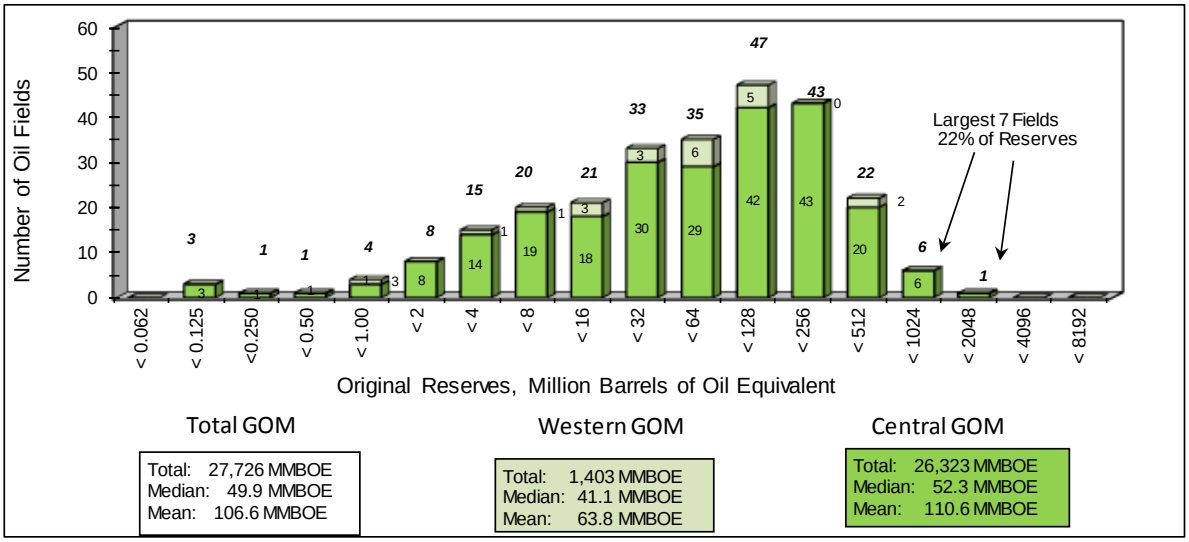

Figure 5. Field-size Distribution of GOM Oil Fields by Planning Area

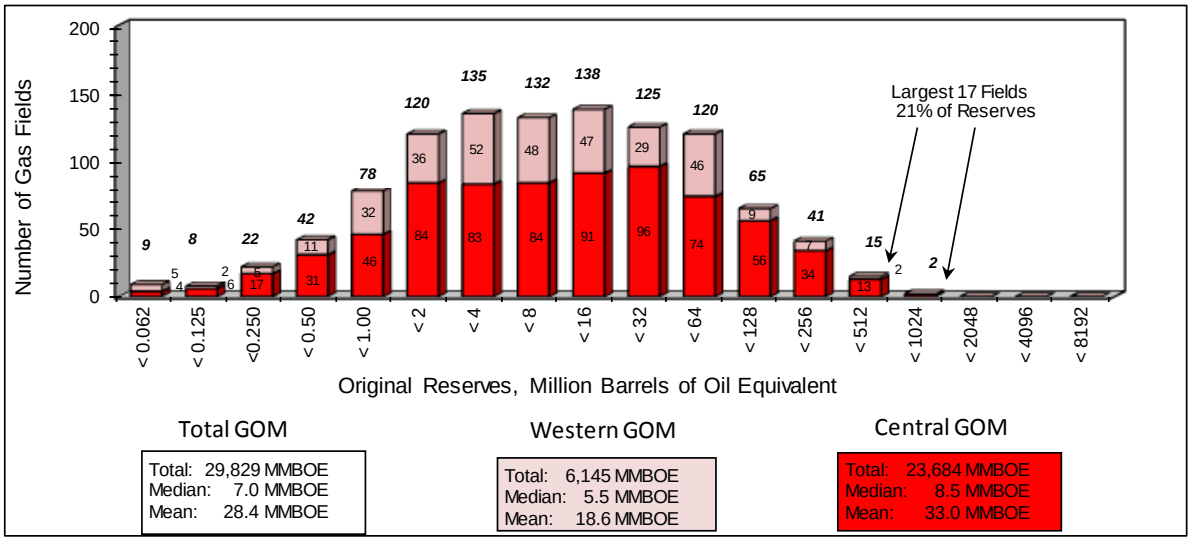

Figure 6. Field-size Distribution of GOM Gas Fields by Planning Area

Figure 7 shows the cumulative percent distribution of Original Reserves in billion barrels of oil equivalent (BBOE), by field size rank. All 1,312 fields in the GOM OCS are included in this figure. A phenomenon often observed in hydrocarbon-producing basins is a rapid drop-off in size from that of largest known field to smallest. Twenty-five percent of the Original Reserves are contained in the 28 largest fields. Fifty percent of the Original Reserves are contained in the 93 largest fields. Ninety percent of the Original Reserves are contained in the 438 largest fields.

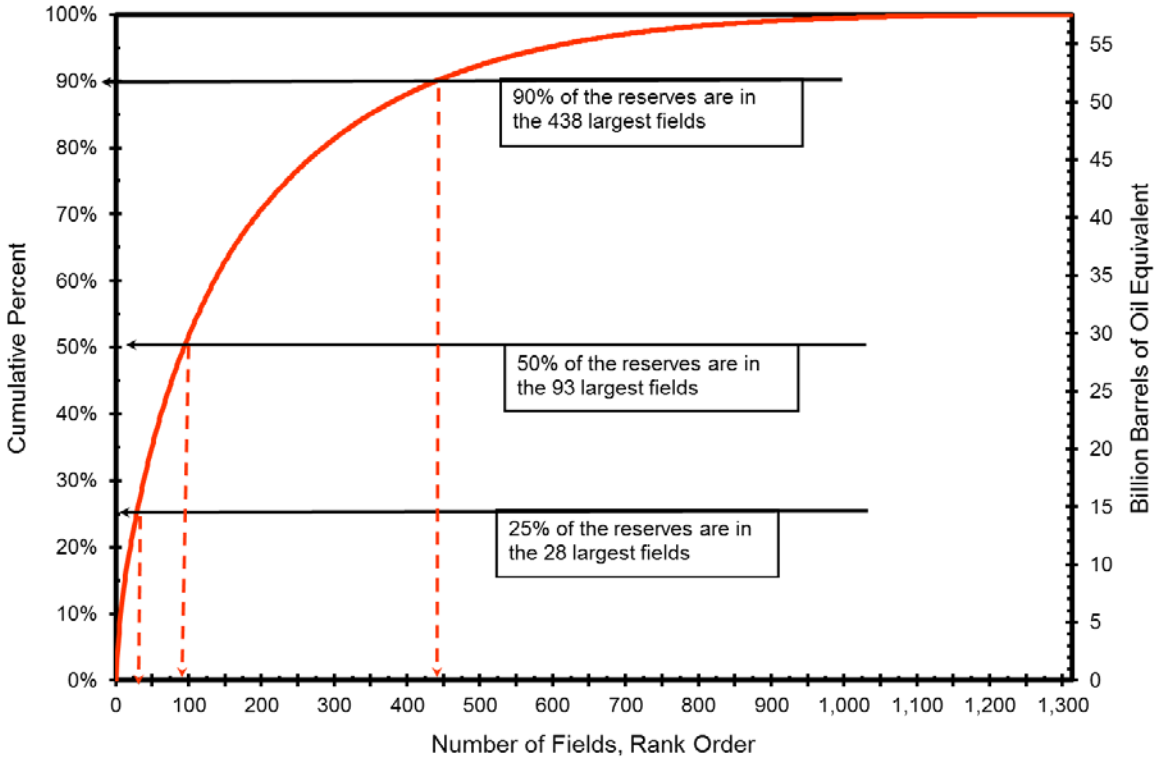

Figure 7. Cumulative percent total reserves versus rank order of field size.

Table 3 shows the distribution of the number of fields and reserves by water depth. A field's water depth is determined by averaging the water depth where the wells are drilled in the field. Reserves and production, reported in MMBOE, are associated with the 1,312 fields. Reserves located in greater than or equal to 1,500 ft of water accounts for 78 percent of the total GOM Reserves.

Table 3. Field and reserves distribution by water depth.

Water Depth Range (Feet)	Number of Fields	Cumulative Production (MMBOE)	Reserves (MMBOE)
< 500	1,082	41,331	899
500 - 999	54	1,260	33
1,000 - 1,499	26	1,388	98
1,500 - 4,999	97	6,431	1,993
5,000 - 7,499	35	1,883	1,403
>= 7,500	18	483	353
Totals:	1,312	52,776	4,779

Figure 8 shows the largest 20 fields ranked in order by Reserves. All 20 of the fields lie in water depths of greater than or equal to 1,500 ft and account for 56.5 percent of the Reserves in the GOM. Of the 230 fields in water depths greater than 500 ft, 143 are producing, 77 are depleted or expired, and 10 have yet to produce.

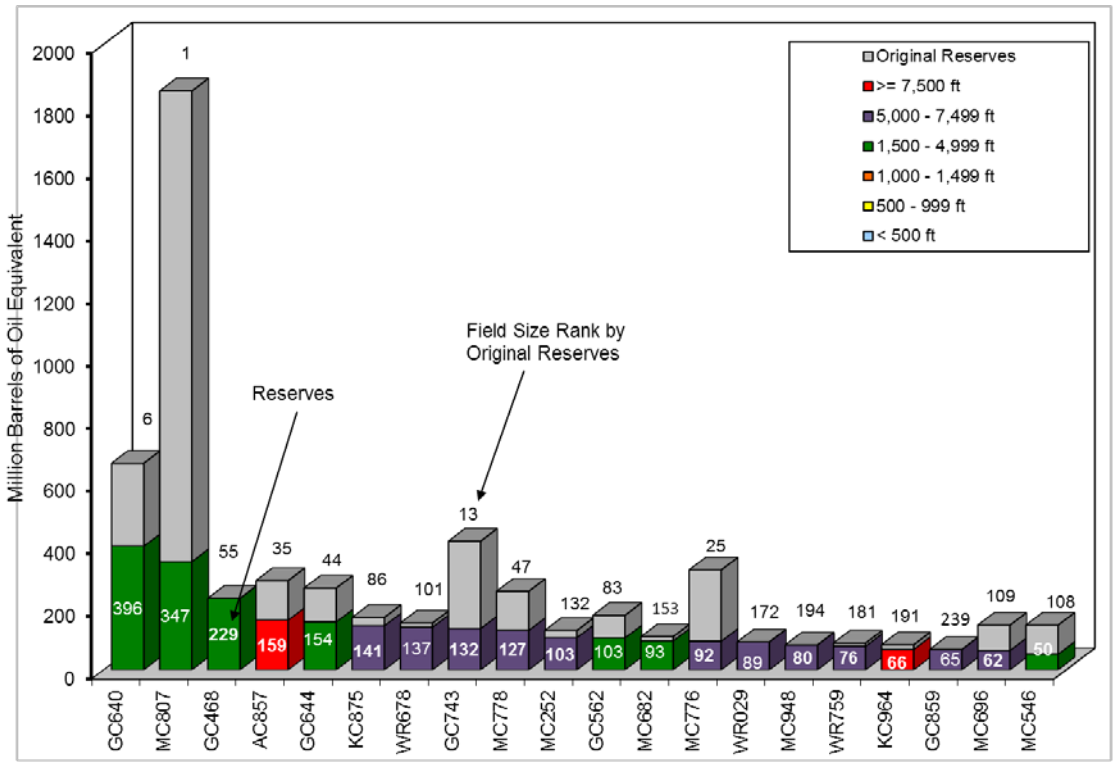

Figure 8. Largest 20 fields, with associated water depths, ranked by Reserves and compared to Original Reserves.

Table 4 ranks the 50 largest fields based on Original Reserves expressed in BOE. Rank, field name, field nickname, discovery year, water depth, field classification, field type, field GOR, Original Reserves, cumulative production through 2015, and Reserves are presented. A complete listing of all 1,312 fields is available on the BOEM Web site at: http://www.data.boem.gov/homepg/data_center/field/estimated2015.asp.

Table 4. Fields by rank order, based on Original BOE reserves, top 50 fields

Table 4. A listing of Gulf of Mexico fields by rank order, based on Original BOE reserves, top 50 fields.

Field class: P (PDP - Developed Producing, PDN - Developed Non-Producing and PU - Undeveloped) ; J (RJD- Reserves Justified for Development)

Field type: O - Oil; G - Gas

Rank	Field name	Field Nickname	Disc year	Water depth (feet)	Field class	Field type	Field GOR (SCF/STB)	Original Reserves			Cumulative Production through 2015			Reserves		
								Oil (MMbbl)	Gas (Bcf)	BOE (MMbbl)	Oil (MMbbl)	Gas (Bcf)	BOE (MMbbl)	Oil (MMbbl)	Gas (Bcf)	BOE (MMbbl)
1	MC807	MARS-URSA	1989	3,347	P	O	1,380	1486.0	2050.9	1851.0	1225.2	1569.3	1504.5	260.8	481.6	346.5
2	EI330		1971	248	P	O	4,141	460.2	1902.3	798.6	448.5	1879.7	782.9	11.7	22.6	15.7
3	WD030		1949	48	P	O	1,659	593.9	987.2	769.5	587.1	965.9	758.9	6.8	21.3	10.6
4	GI043		1956	140	P	O	4,416	399.1	1753.2	711.1	376.7	1647.2	669.8	22.4	106.0	41.3
5	TS000		1958	13	P	G	78,976	47.2	3727.8	710.6	44.5	3581.0	681.7	2.7	146.8	28.9
6	GC640	TAHITI/CAESAR/TONGA	2002	4,326	P	O	542	602.4	326.6	660.5	238.7	147.8	265.0	363.7	178.8	395.5
7	BM002		1949	50	P	O	1,059	546.7	578.9	649.7	541.1	572.1	642.9	5.6	6.8	6.8
8	VR014		1956	26	P	G	65,255	47.9	3126.5	604.2	47.9	3126.5	604.2	0	0.0	0
9	MP041		1956	43	P	O	5,754	271.8	1563.8	550.0	268.6	1546.7	543.8	3.2	17.1	6.2
10	VR039		1948	38	P	G	80,605	32.3	2607.5	496.3	32.0	2603.6	495.3	0.3	3.9	1.0
11	SS208		1960	102	P	O	6,187	230.2	1429.6	484.6	224.2	1393.8	472.2	6.0	35.8	12.4
12	GB426	AUGER	1987	2,847	P	O	3,554	264.9	941.2	432.4	251.2	894.5	410.4	13.7	46.7	22.0
13	GC743	ATLANTIS	1998	6,304	P	O	660	364.1	267.0	411.6	250.4	162.0	279.2	113.7	105.0	132.4
14	WD073		1962	177	P	O	2,488	279.2	699.3	403.6	273.8	682.0	395.2	5.4	17.3	8.4
15	EI238		1964	147	P	G	15,859	102.2	1580.3	383.4	94.0	1526.3	365.6	8.2	54.0	17.8
16	GI016		1948	54	P	O	1,300	309.0	401.3	380.4	306.2	394.8	376.4	2.8	6.5	4.0
17	SP061		1967	220	P	O	1,955	281.1	549.3	378.8	271.0	528.9	365.1	10.1	20.4	13.7
18	SP089		1969	421	P	O	4,434	197.3	875.0	353.0	195.4	871.4	350.5	1.9	3.6	2.5
19	ST172		1962	98	P	G	158,376	12.0	1898.9	349.9	12.0	1898.9	349.9	0.0	0.0	0.0
20	WC180		1961	48	P	G	139,707	13.2	1848.3	342.2	13.2	1845.8	341.7	0.0	2.5	0.5
21	ST021		1957	46	P	O	1,651	259.4	428.3	335.7	257.9	425.2	333.6	1.5	3.1	2.1
22	SS169		1960	63	P	O	5,283	172.1	909.4	334.0	166.8	894.6	326.0	5.3	14.8	8.0
23	ST176		1963	127	P	G	13,916	92.6	1289.1	322.0	89.2	1266.8	314.6	3.4	22.3	7.4
24	EI292		1964	214	P	G	65,538	25.2	1655.6	319.9	23	1648	316	2.7	7.2	4.0
25	MC776	N.THUNDER HORSE	2000	5,672	P	O	950	273.2	259.7	319.5	194.9	184.6	227.8	78.3	75.1	91.7
26	MC194	COGNAC	1975	1,022	P	O	4,152	183.6	762.3	319.3	180.5	756.9	315.2	3.1	5.4	4.1
27	EC064		1957	50	P	G	55,518	29.1	1613.5	316.2	27.4	1605.0	313.0	1.7	8.5	3.2
28	EC271		1971	172	P	G	17,801	75.8	1349.3	315.9	71.3	1343.3	310.4	4.5	6.0	5.5
29	SM048		1961	100	P	G	52,499	30.3	1595.5	314.3	28.8	1557.2	305.9	1.5	38.3	8.4
30	MC084	KING/HORN MT.	1993	5,299	P	O	1,096	254.0	309.3	309.1	219.3	240.3	262.1	34.7	69.0	47.0
31	SS176		1956	101	P	G	19,332	68.8	1330.7	305.6	67.8	1315.2	301.8	1.0	15.5	3.8
32	GC654	SHENZI	2002	4,304	P	O	396	283.3	112.1	303.2	237.7	94.0	254.4	45.6	18.1	48.8
33	WC587		1971	210	P	G	118,508	13.4	1583.3	295.1	13.4	1580.9	294.7	0.0	2.4	0.4
34	SP027	EAST BAY	1954	64	P	O	5,168	152.9	791.3	293.8	151.9	783.5	291.4	1.0	7.8	2.4
35	AC857	GREAT WHITE	2002	7,918	P	O	1,714	231.2	305.8	285.6	96.3	168.2	126.2	134.9	137.6	159.4
36	WD079		1966	123	P	O	3,880	168.5	650.4	284.2	164.9	638.3	278.4	3.6	12.1	5.8
37	ST135		1956	129	P	O	3,717	170.6	634.2	283.5	168.7	623.8	279.7	1.9	10.4	3.8
38	EI296		1971	214	P	G	71,230	20.6	1464.0	281.1	20.6	1464.0	281.1	0.0	0.0	0.0
39	WC192		1954	57	P	G	60,168	23.6	1420.5	276.3	23.3	1415.9	275.2	0.3	4.6	1.1
40	HI573A		1973	341	P	O	7,449	118.1	879.4	274.5	115.1	875.3	270.8	3.0	4.1	3.7
41	MI623		1980	83	P	G	102,524	13.8	1412.4	265.1	13.8	1409.3	264.5	0.0	3.1	0.6
42	GB171	SALSA	1984	1,195	P	G	3,961	155.3	615.1	264.7	129.7	523.1	222.7	25.6	92.0	42.0
43	GI047		1955	88	P	O	3,834	157.1	603.6	264.4	152.9	588.1	257.5	4.2	15.5	6.9
44	GC644	HOLSTEIN	1999	4,341	P	O	1,182	216.3	255.5	261.7	91.9	90.2	107.9	124.4	165.3	153.8
45	GC244	TROIKA	1994	2,795	P	O	1,900	192.9	378.6	260.3	179.5	342.6	240.5	13.4	36.0	19.8
46	VK956	RAM-POWELL	1985	3,238	P	O	9,039	98.9	893.7	257.9	96.7	890.6	255.2	2.2	3.1	2.7
47	MC778	THUNDER HORSE	1999	6,094	P	O	770	221.0	170.2	251.2	109.6	85.4	124.7	111.4	84.8	126.5
48	SP078		1972	202	P	G	11,041	84.2	929.0	249.5	81.5	923.8	245.9	2.7	5.2	3.6
49	SM023		1960	82	P	G	39,519	29.8	1176.3	239.1	29.8	1176.3	239.1	0.0	0.0	0.0
50	SM130		1973	214	P	O	1,351	190.8	257.7	236.6	188.0	254.4	233.3	2.8	3.3	3.3

RESERVOIR-SIZE DISTRIBUTION

The size distributions of the reservoirs are shown in **Figures 9, 10, and 11**. The size ranges are based on Original Reserves and are presented on a geometrically progressing horizontal scale. These sizes correspond with the USGS deposit-size ranges shown in **Table 2,** with a modification to subdivide small reservoirs into finer distributions. In **Figure 9**, the Original Reserves are presented in million barrels of Oil Equivalent (MMBOE). For the combination reservoirs (saturated oil rims with associated gas caps), shown in **Figure 9**, gas is converted to BOE and added to the liquid reserves. **Figures 10 and 11** are presented in million barrels of Oil (MMBbl) and billion cubic feet (Bcf), respectively. The number of reservoirs in each size grouping, shown as percentages of the total, is presented on a linear vertical scale.

Figure 9 shows the reservoir-size distribution, on the basis of Original BOE, for 2,367 combination reservoirs. The median is 0.9 MMBOE and the mean is 3.0 MMBOE. The GOR, based on Original Reserves, for the oil portion of the reservoirs is 1,205 SCF/STB, and the yield, based on Original Reserves, for the gas cap is 20.2 Bbl of condensate per MMcf of gas.

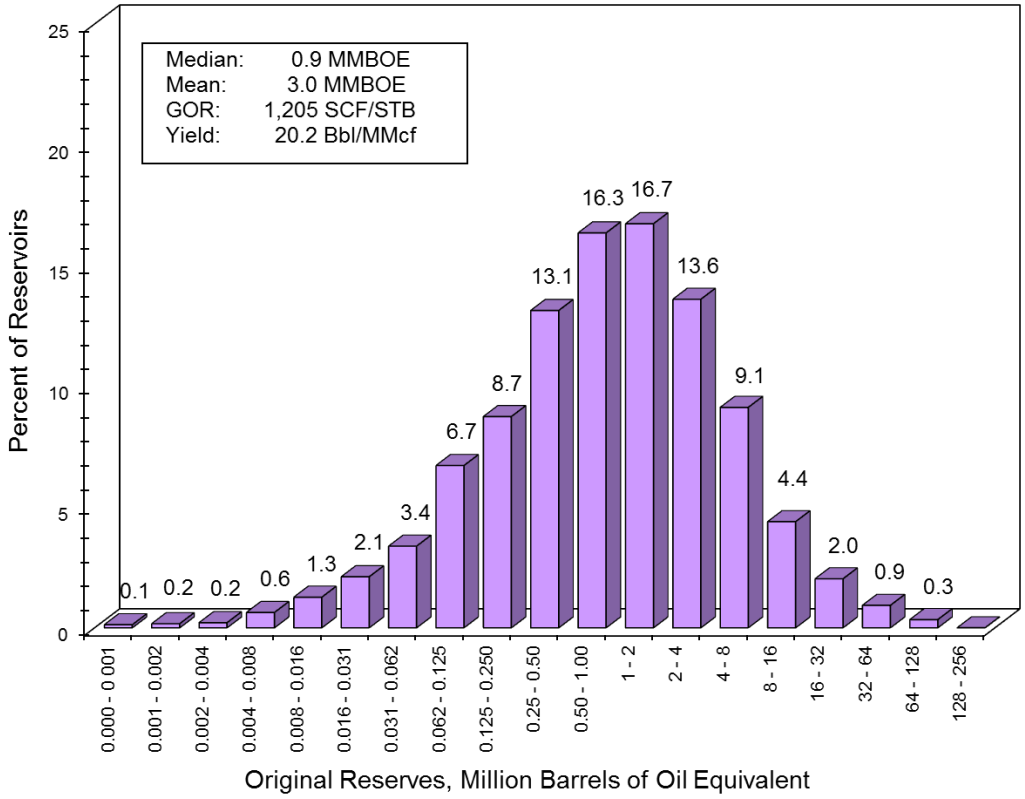

Figure 9. Reservoir-size distribution, combination reservoirs.

Figure 10 shows the reservoir-size distribution, on the basis of Original Oil reserves, for 8,905 undersaturated oil reservoirs. The median is 0.3 MMbbl, the mean is 1.9 MMbbl, and the GOR, based on Original Oil reserves, is 1,212 SCF/STB. **Figure 11** shows the reservoir-size distribution, on the basis of Original Gas reserves, for 18,734 gas reservoirs. The median is 2.0 Bcf of gas, the mean is 8.4 Bcf, and the yield, based on Original Reserves, is 12.3 Bbl of condensate per MMcf of gas.

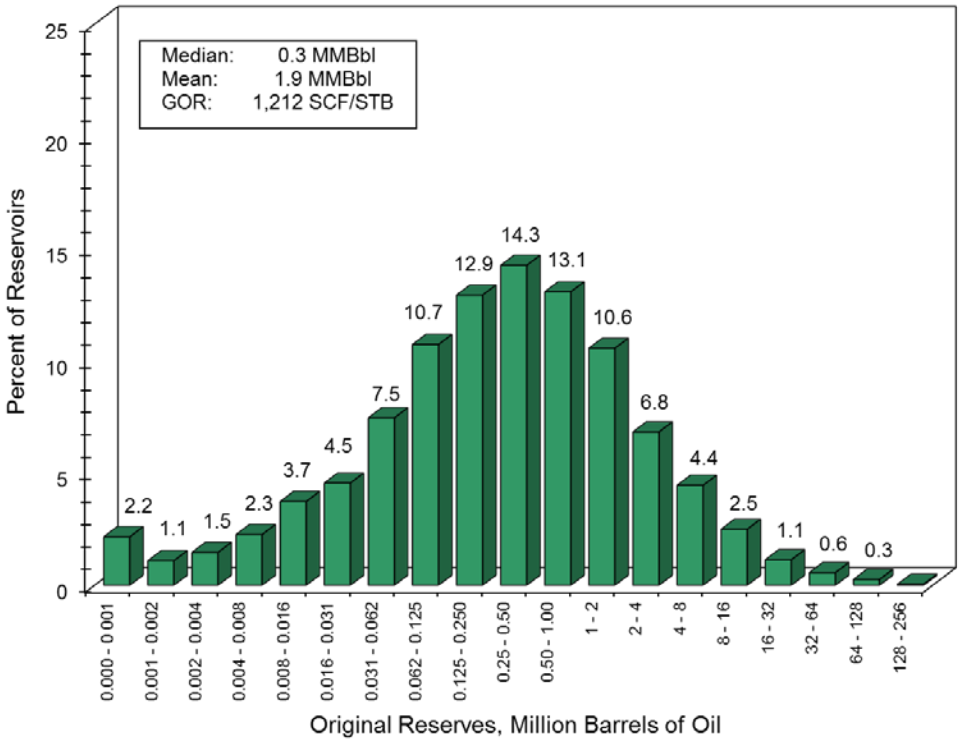

Figure 10. Reservoir-size distribution, oil reservoirs.

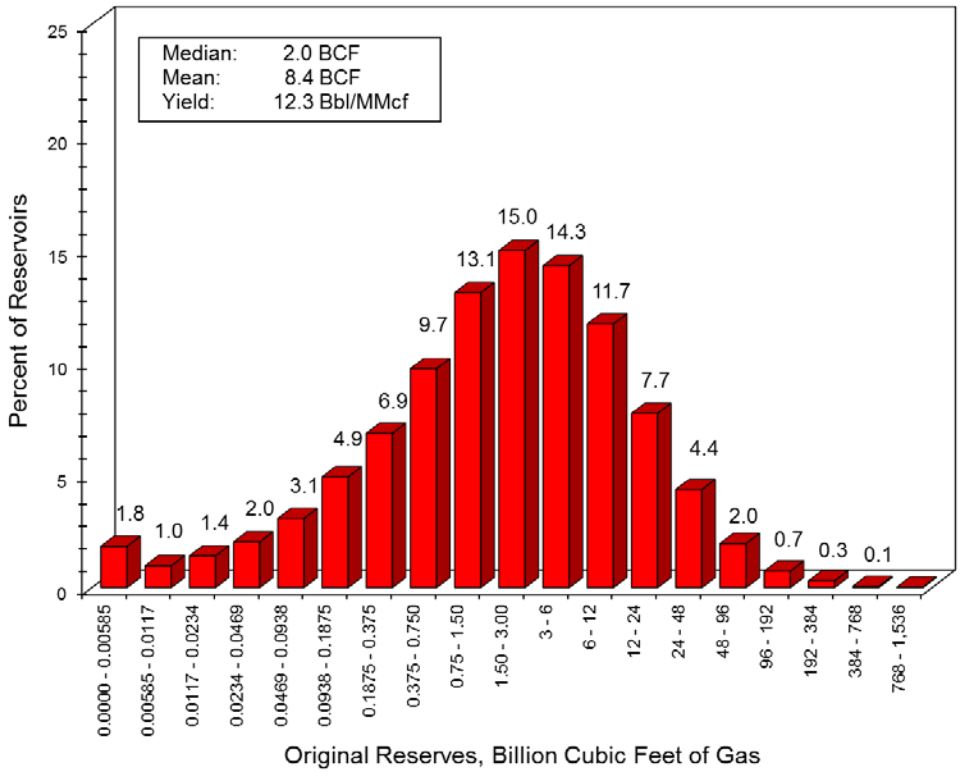

Figure 11. Reservoir-size distribution, gas reservoirs.

DRILLING AND PRODUCTION TRENDS

Figure 12 presents the number of exploratory wells drilled each year by water depth category. The total footage drilled in 2015 was 2.35 million feet, compared to 2.19 million feet in 2014.

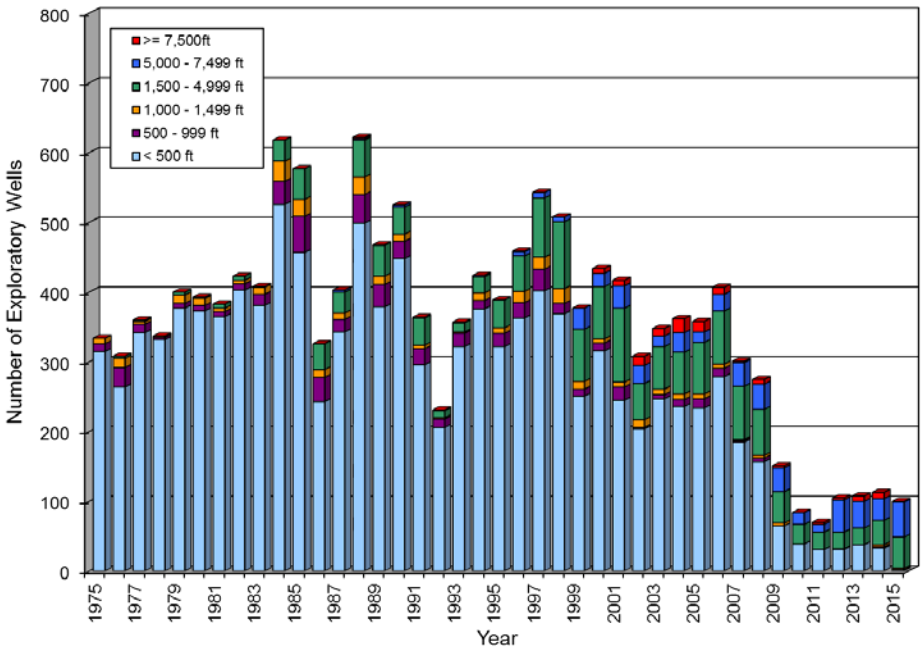

Figure 12. Number of exploratory wells drilled by water depth.

Figure 13 presents the number of development wells drilled each year by water depth category. The total footage drilled in 2015 was 1.78 million feet, compared to 2.64 million feet in 2014.

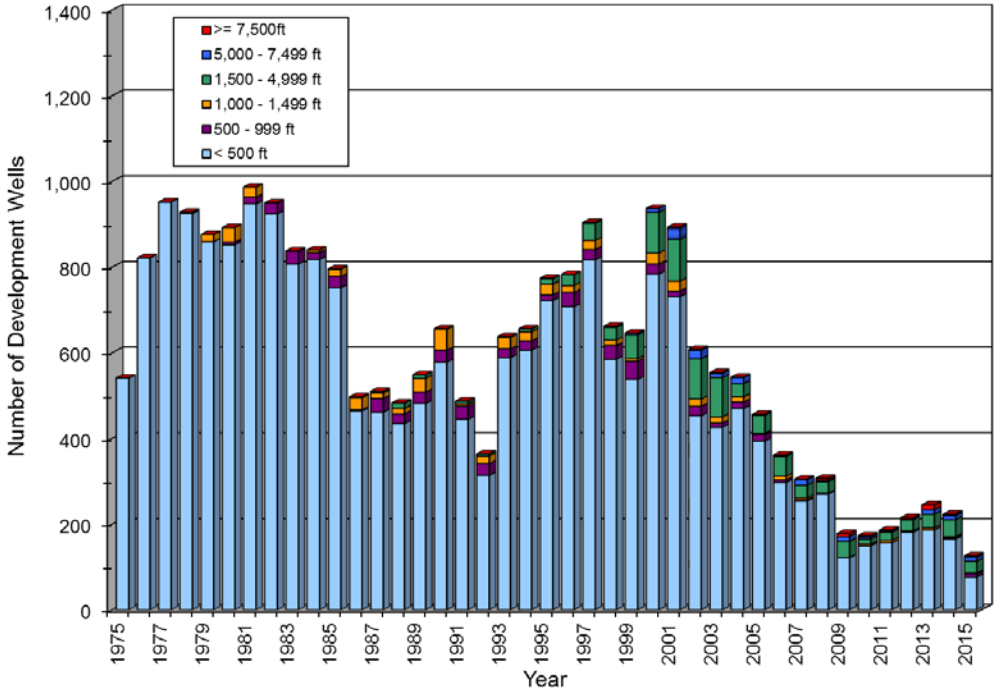

Figure 13. Number of development wells drilled by water depth.

Original Reserves in BBOE for water depth categories by reservoir discovery year are presented in **Figure 14**.

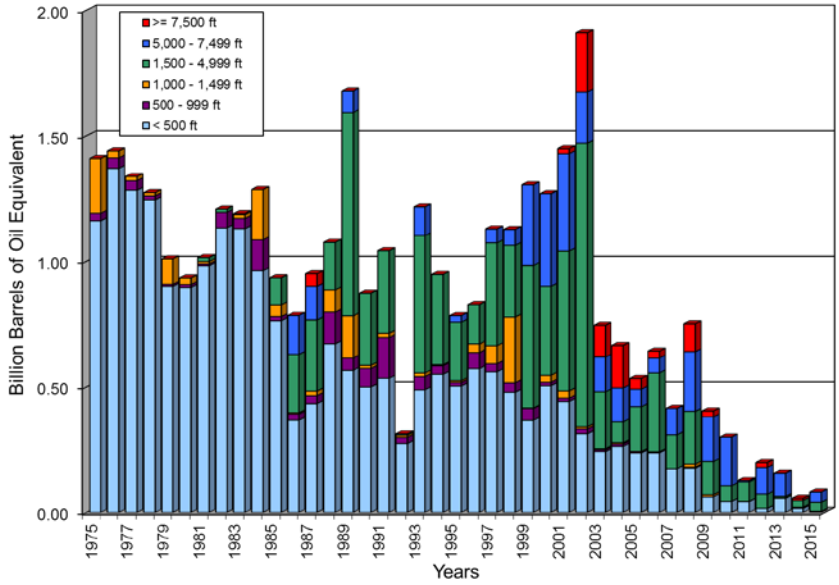

Figure 14. Original Reserves categorized by water depth and reservoir discovery year.

Annual production in the GOM is shown in **Figure 15**. The oil plot includes condensate and the gas plot includes casinghead gas. Annual production for oil and gas is presented as a total, in shallow water (less than 1,000 ft), and in deepwater (greater than 1,000 ft). From 2014 to 2015, annual oil production increased 8.0 percent to 551 MMbbl and annual gas production increased 2.3 percent to 1.3 Tcf. The mean daily production in the GOM during 2015 was 1.39 MMbbl of crude oil, 0.12 MMbbl of gas condensate, 1.61 Bcf of casinghead gas, and 1.97 Bcf of gas-well gas. The mean GOR of oil wells was 1,156 SCF/STB, and the mean yield from gas wells was 60.5 Bbl of condensate per MMcf of gas.

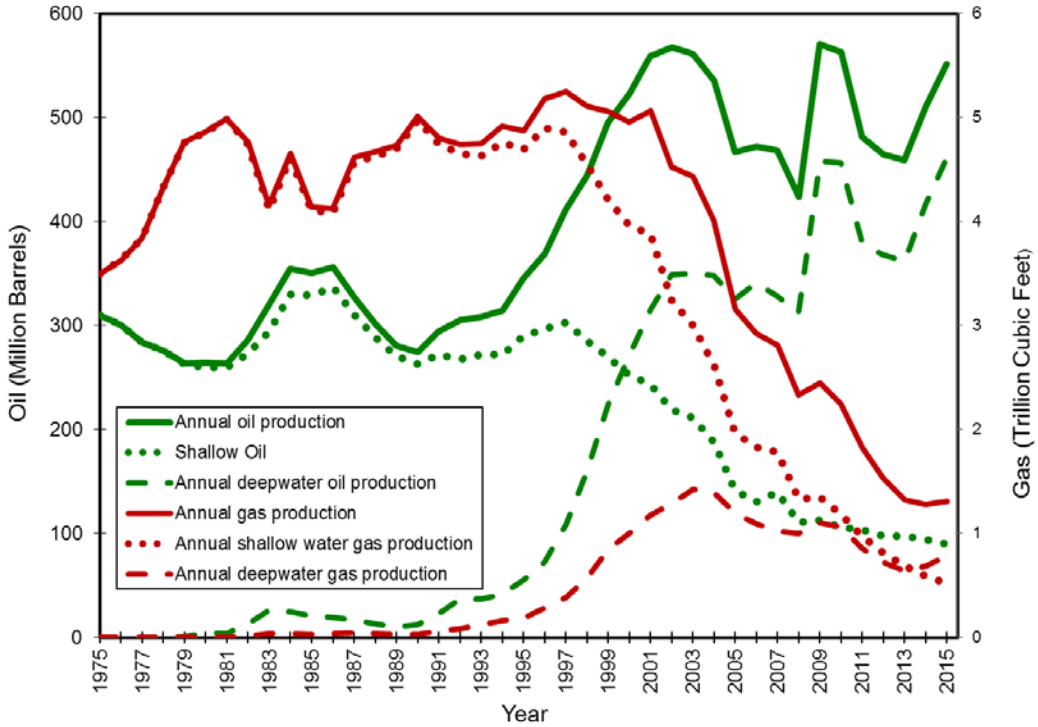

Figure 15. Annual oil and gas production.

SUMMARY AND CONCLUSIONS

A summary of the Reserve estimates for 2015 and a comparison with estimates from the previous year's report (December 31, 2014) are shown in **Table 5**. Six fields were added for this report (3 oil fields and 3 gas field), which are tabulated and summarized as increases to Original Reserves. One of the fields added was discovered in 1994 (MC026), one was discovered in 2006 (GC468), three in 2013 (MC214, MC782, ST311) and one in 2014 (MC079).

Comparison of Reserves

A net change in the reserve estimates is a result of combining the discoveries and the revisions. Reserve estimates may increase or decrease with additional information (e.g., additional wells are drilled, leases are added or expire, and/or reservoirs are depleted). Re-evaluations of existing field studies are conducted using field development and/or production history to capture the changes in reserve estimates. Revisions of Original Reserves are presented as changes in **Table 5**. Based on periodic reviews and revisions of field studies conducted since the 2014 report, the reserves revisions have resulted in a slight increase in Original Reserves.

The table also demonstrates that the volumes from fields added in 2015 and the field revisions did not exceed production, resulting in a net decrease in Reserves. The Reserves increased 4.2 percent for oil and decreased 10.7 percent for gas, since the 2014 report.

Table 5. Summary and comparison of GOM oil and gas reserves as of December 31, 2014 and December 31, 2015.

	Oil (Bbbl)	Gas (Tcf)	BOE (Bbbl)
Original Reserves:			
Previous estimate, as of 12/31/2014*	**22.37**	**193.4**	**56.79**
Fields Added in 2015	0.26	0.2	0.30
Revisions	0.43	0.2	0.47
Estimate, as of 12/31/2015 (this report)	**23.06**	**193.8**	**57.56**
Cumulative production:			
Previous estimate, as of 12/31/2014*	**19.03**	**185.2**	**51.99**
Revisions	0.00	0.0	0.01
Production during 2015	0.55	1.3	0.78
Estimate, as of 12/31/2015 (this report)	**19.58**	**186.5**	**52.78**
Reserves:			
Previous estimate, as of 12/31/2014*	**3.34**	**8.2**	**4.80**
Fields Added in 2015	0.26	0.2	0.30
Revisions	0.43	0.2	0.46
Production during 2015	-0.55	-1.3	-0.78
Estimate, as of 12/31/2015 (this report)	**3.48**	**7.3**	**4.78**

Table 6 presents all previous reserve estimates by year. Because of 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.

Table 6. Oil and gas reserves and cumulative production at end of year, 1975-2015.

"Oil" includes crude oil and condensate; "gas" includes associated and nonassociated gas. Reserves estimated as of December 31 each year.

Year	Number of fields included	Original Reserves			Historical Cumulative Production			Reserves		
		Oil (Bbbl)	Gas (Tcf)	BOE (Bbbl)	Oil (Bbbl)	Gas (Tcf)	BOE (Bbbl)	Oil (Bbbl)	Gas (Tcf)	BOE (Bbbl)
1975	255	6.61	59.9	17.27	3.82	27.2	8.66	2.79	32.7	8.61
1976	306	6.86	65.5	18.51	4.12	30.8	9.60	2.74	34.7	8.91
1977	334	7.18	69.2	19.49	4.47	35.0	10.70	2.71	34.2	8.80
1978	385	7.52	76.2	21.08	4.76	39.0	11.70	2.76	37.2	9.38
1979 (1)	417	7.71	82.2	22.34	4.83	44.2	12.69	2.88	38.0	9.64
1980	435	8.04	88.9	23.86	4.99	48.7	13.66	3.05	40.2	10.20
1981	461	8.17	93.4	24.79	5.27	53.6	14.81	2.90	39.8	9.98
1982	484	8.56	98.1	26.02	5.58	58.3	15.95	2.98	39.8	10.06
1983	521	9.31	106.2	28.21	5.90	62.5	17.02	3.41	43.7	11.19
1984	551	9.91	111.6	29.77	6.24	67.1	18.18	3.67	44.5	11.59
1985	575	10.63	116.7	31.40	6.58	71.1	19.23	4.05	45.6	12.16
1986	645	10.81	121.0	32.34	6.93	75.2	20.31	3.88	45.8	12.03
1987	704	10.76	122.1	32.49	7.26	79.7	21.44	3.50	42.4	11.04
1988 (2)	678	10.95	126.7	33.49	7.56	84.3	22.56	3.39	42.4	10.93
1989	739	10.87	129.1	33.84	7.84	88.9	23.66	3.03	40.2	10.18
1990	782	10.64	129.9	33.75	8.11	93.8	24.80	2.53	36.1	8.95
1991	819	10.74	130.5	33.96	8.41	98.5	25.94	2.33	32.0	8.02
1992	835	11.08	132.7	34.69	8.71	103.2	27.07	2.37	29.5	7.62
1993	849	11.15	136.8	35.49	9.01	107.7	28.17	2.14	29.1	7.32
1994	876	11.86	141.9	37.11	9.34	112.6	29.38	2.52	29.3	7.73
1995	899	12.01	144.9	37.79	9.68	117.4	30.57	2.33	27.5	7.22
1996	920	12.79	151.9	39.82	10.05	122.5	31.85	2.74	29.4	7.97
1997	957	13.67	158.4	41.86	10.46	127.6	33.17	3.21	30.8	8.69
1998	984	14.27	162.7	43.22	10.91	132.7	34.52	3.36	30.0	8.70
1999	1,003	14.38	161.3	43.08	11.40	137.7	35.90	2.98	23.6	7.18
2000	1,050	14.93	167.3	44.70	11.93	142.7	37.32	3.00	24.6	7.38
2001	1,086	16.51	172.0	47.11	12.48	147.7	38.77	4.03	24.3	8.35
2002	1,112	18.75	176.8	50.21	13.05	152.3	40.15	5.71	24.6	10.09
2003	1,141	18.48	178.2	50.19	13.61	156.7	41.49	4.87	21.5	8.70
2004	1,172	18.96	178.4	50.70	14.14	160.7	42.73	4.82	17.7	7.97
2005	1,196	19.80	181.8	52.15	14.61	163.9	43.77	5.19	17.9	8.38
2006	1,229	20.30	183.6	52.97	15.08	166.7	44.74	5.22	16.9	8.23
2007	1,251	20.43	184.6	53.28	15.55	169.5	45.71	4.88	15.1	7.57
2008	1,270	21.24	188.4	54.76	15.96	171.8	46.53	5.28	16.6	8.23
2009 (3)	1,278	21.20	190.2	55.03	16.53	176.8	47.99	4.67	13.3	7.04
2010	1,282	21.50	191.1	55.50	17.11	179.3	49.01	4.39	11.8	6.49
2011 (4)	1,292	21.91	192.4	56.15	17.59	181.1	49.81	4.32	11.3	6.34
2012	1,297	22.11	193.0	56.46	18.06	182.6	50.56	4.05	10.4	5.90
2013	1,300	22.19	193.0	56.53	18.52	184.0	51.25	3.67	9.0	5.28
2014	1,306	22.37	193.4	56.79	19.03	185.2	51.99	3.34	8.2	4.80
2015	1,312	23.06	193.8	57.56	19.58	186.5	52.78	3.48	7.3	4.78

(1) Gas plant liquids dropped from system
(2) Basis of reserves changed from demonstrated to SPE proved.
(3) Conversion of historical gas production to 14.73 pressure base.
(4) Includes Reserves Justified for Development

Conclusions

As of December 31, 2015, the 1,312 oil and gas fields in the federally regulated part of the Gulf of Mexico Outer Continental Shelf (GOM OCS) contained Original Reserves estimated to be 23.06 billion barrels of oil (BBO) and 193.8 trillion cubic feet (Tcf) of gas. Cumulative Production from the fields accounts for 19.58 BBO and 186.5 Tcf of gas. Reserves are estimated to be 3.48 BBO and 7.3 Tcf of gas for the 569 active fields. Oil Reserves have increased 4.2 percent and the gas Reserves have decreased 10.7 percent since the 2014 report.

CONTRIBUTING PERSONNEL

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

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APPENDIX A: Definitions of Field, Resource and Reserves Terms

The following definitions as used in this report have been modified from SPE-PRMS and other sources where necessary to conform to requirements of the BOEM Reserves Inventory Program.

Field

A *Field* is an area consisting of a single reservoir or multiple reservoirs all grouped on, or related to, the same general geologic structural feature and/or stratigraphic trapping condition. There may be two or more reservoirs in a field that are separated vertically by impervious strata, laterally by local geologic barriers, or by 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 BOEM (see New Producible Lease). A field is usually named after the area and block on which the discovery well is located. Field names and/or field boundaries may be changed when additional geologic and/or production data initiate such a change. Using geological criteria, BOEM designates a new producible lease as a new field or assigns it to an existing field. http://www.boem.gov/BOEM-Newsroom/Offshore-Stats-and-Facts/Gulf-of-Mexico-Region/Field-Naming-Handbook---March-1996.aspx.

New Producible Lease

A lease that contains at least one well which an operator has requested a well producibility determination, and BOEM has determined that well meets the criteria of producible hydrocarbons defined by 30 CFR 550.115 or 30 CFR 550.116, or a lease that has begun producing.

Project

A *Project* represents the link between the petroleum accumulation and the decision-making process, including budget allocation. A project, for BOEM's classification of Resources and Reserves, is the Field (see also Field).

Resources

Resources encompass all quantities of petroleum (recoverable and unrecoverable) naturally occurring on or within the Earth's crust, discovered and undiscovered, plus those quantities already produced. Further, it includes all types of petroleum whether currently considered conventional or unconventional.

Undiscovered Resources

Resources postulated, on the basis of geologic knowledge and theory, to exist outside of known fields or accumulations. Included also are resources from undiscovered pools within known fields to the extent that they occur within separate plays. BOEM assesses two types of undiscovered resources, *Undiscovered Technically Recoverable Resources (UTRR)* and *Undiscovered Economically Recoverable Resources (UERR).*

Discovered Resources

Hydrocarbons whose location and quantity are known or estimated from specific geologic evidence are *Discovered Resources*. Included are *Contingent Resources* and *Reserves* depending upon economic, technical, contractual, or regulatory criteria.

Contingent Resources

Those quantities of petroleum estimated, as of a given date, to be potentially recoverable from known accumulations by application of development projects but which are not currently considered to be commercially recoverable due to one or more contingencies.

Reserves

Reserves are those quantities of petroleum anticipated to be commercially recoverable by application of development projects to known accumulations from a given date forward under defined conditions. *Reserves* must further satisfy four criteria: They must be discovered, recoverable, commercial, and remaining (as of a given date) based on the development project(s) applied. *Reserves* are further sub-classified based on economic certainty.

Original Reserves	*Original Reserves* are the total of the *Cumulative Production* and *Reserves*, as of a specified date.
Proved plus Probable Reserves (2P)	The sum of the estimated proved reserves and any additional probable reserves (2P). *Proved Reserves* are commonly defined as those quantities of petroleum which, by analysis of geoscience and engineering data, can be estimated with reasonable certainty to be commercially recoverable, from a given date forward, from known reservoirs and under defined economic conditions, operating methods, and government regulations. *Probable Reserves* are commonly defined as those additional reserves which analysis of geoscience and engineering data indicate are less likely to be recovered than proved reserves but more certain to be recovered than possible reserves.
Reserves Justified for Development	The lowest level of reserves certainty. Implementation of the development project is justified on the basis of reasonable forecast commercial conditions at the time of reporting and that there are reasonable expectations that all necessary approvals/contracts will be obtained.
Undeveloped Reserves	*Undeveloped Reserves* are those *Reserves* that are expected to be recovered from future wells and facilities, including future improved recovery projects which are anticipated with a high degree of certainty in reservoirs which have previously shown favorable response to improved recovery projects.
Developed Reserves	*Developed Reserves* can be expected to be recovered through existing wells and facilities and by existing operating methods. Improved recovery reserves can be considered as *Developed Reserves* only after an improved recovery project has been installed and favorable response has occurred or is expected with a reasonable degree of certainty. Developed reserves are expected to be recovered from existing wells, including reserves behind pipe. Improved recovery reserves are considered developed only after the necessary equipment has been installed, or when the costs to do so are relatively minor. *Proved Developed Reserves* may be sub-categorized as *Producing* or *Non-producing*.
Developed Non-producing Reserves	*Developed Non-producing Reserves* are precluded from producing due to being *shut-in* or *behind-pipe*. *Shut-in* includes (1) completion intervals which are open at the time of the estimate, but which have not started producing, (2) wells which were shut-in for market conditions or pipeline connections, or (3) wells not capable of production for mechanical reasons. *Behind-pipe* refers to zones in existing wells which will require additional completion work or future re-completion prior to the start of production. In both cases, production can be initiated or restored with relatively low expenditure compared to the cost of drilling a new well.
Developed Producing Reserves	*Developed Producing Reserves* are expected to be recovered from completion intervals that are open and producing at the time of the estimate. Improved recovery reserves are considered producing only after the improved recovery project is in operation.
Cumulative Production	*Cumulative Production* is the sum of all produced volumes of oil and gas prior to a specified date.
Un-recoverable	The portion of discovered or undiscovered petroleum-initially-in-place quantities which are estimated, as of a given date, not to be recoverable. A portion of these quantities may become recoverable in the future as commercial circumstances change, technological developments occur, or additional data are acquired.

Notice

This report, *Estimated Oil and Gas Reserves, Gulf of Mexico OCS Region, December 31, 2015,* has undergone numerous changes over the last few years. We are continually striving to provide meaningful information to the users of this document. Suggested changes, additions, or deletions to our data or statistical presentations are encouraged so that we can publish the most useful report possible. Please contact the Reserves Section Chief, Grant L. Burgess, at (504) 736-2948 at the Bureau of Ocean Energy Management, 1201 Elmwood Park Boulevard, MS GM773E, New Orleans, Louisiana 70123-2394, to communicate your ideas for consideration in our next report. An overview of the Reserves Inventory Program is available on BOEM's Website.

For free publication and digital data, visit the Gulf of Mexico Web site. The report can be accessed as an Acrobat .pdf (portable document format) file, which allows you to view, print, navigate, and search the document with the free downloadable Acrobat Reader. Digital data used to create the tables and figures presented in the document are also accessible as Excel 2010 spreadsheet files (.xlsx; using Microsoft's Excel spreadsheet viewer, a free file viewer for users without access to Excel). These files are made available in a zipped format, which can be unzipped with the downloadable WinZip program.

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