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U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves 2004 Annual Report

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Energy Information Administration
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Preface

The *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves 2004 Annual Report* is the 28th prepared by the Energy Information Administration (EIA) to fulfill its responsibility to gather and report annual proved reserves estimates. The EIA annual reserves report series is the only source of comprehensive domestic proved reserves estimates. This publication is used by the Congress, Federal and State agencies, industry, and other interested parties to obtain accurate estimates of the Nation's proved reserves of crude oil, natural gas, and natural gas liquids. These data are essential to the development, implementation, and evaluation of energy policy and legislation.

This report presents estimates of proved reserves of crude oil, natural gas, and natural gas liquids as of December 31, 2004, as well as production volumes for the United States and producing States and State subdivisions for the year 2004. Estimates are presented for the following four categories of natural gas: total gas (wet after lease separation), nonassociated gas and associated–dissolved gas (which are the two major types of wet natural gas), and total dry gas (wet gas adjusted for the removal of liquids at natural gas processing plants). In addition, reserve estimates for two types of natural gas liquids, lease condensate and natural gas plant liquids, are presented. The estimates are based upon data obtained from two annual EIA surveys: Form EIA–23, "Annual Survey of Domestic Oil and Gas Reserves" and Form EIA–64A, "Annual Report of the Origin of Natural Gas Liquids Production." Also included is information on crude oil, natural gas, and lease condensate reserves in nonproducing reservoirs. A discussion of notable oil and gas exploration and development activities during 2004 is provided.

The appendices contain data by operator production size class for crude oil and natural gas reserves and production; the top 100 U.S. fields ranked within an oil or gas proved reserves group for 2004; Table 1 converted to metric units; historical State data; a summary of survey operations; a discussion of statistical considerations; methods used to develop the estimates provided in this report; maps of selected State subdivisions; and examples of the survey forms. A glossary of the terms used in this report and in survey Forms EIA–23 and EIA–64A is provided to assist readers in more fully understanding the data.

This annual reserves report was prepared by the Reserves and Production Division (located in Dallas, Texas), Office of Oil and Gas, Energy Information Administration. General information regarding preparation of the report may be obtained from Kenneth A. Vagts, Director, Office of Oil and Gas and John H. Wood, Director, Reserves and Production Division (214·720·6160).

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COVER PHOTO:

Rig drilling on the Pinedale Anticline in Wyoming, with the Wind River Mountains in the background. Photo by Bob Lynn, courtesy of Ultra Petroleum. Ultra Petroleum, headquartered in Houston, TX, is the largest lease holder on the Pinedale Anticline and third largest operator in Jonah field.

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Executive Summary

Proved reserves of natural gas increased by 2 percent in 2004, making it the sixth year in a row that U.S. natural gas reserves have increased. The U.S. total went up even though Gulf of Mexico natural gas proved reserves dropped an unusually large 15 percent primarily due to low new discoveries. Nevertheless because onshore lower 48 States total discoveries were almost 18 trillion cubic feet, total U.S. reserves additions replaced 118 percent of 2004 dry gas production.

As of December 31, 2004 proved reserves were:

Crude Oil (million barrels)	
2003	21,891
2004	21,371
Decrease	-2.4%
Dry Natural Gas (billion cubic feet)	
2003	189,044
2004	192,513
Increase	+1.8%
Natural Gas Liquids (million barrels)	
2003	7,459
2004	7,928
Increase	+6.3%

Crude oil proved reserves declined by 2 percent in 2004 owing mostly to a large 9 percent decrease in the Gulf of Mexico. Boosted by reserves additions in Wyoming, Montana, North Dakota, and Texas, the crude oil proved reserves of the onshore lower 48 States increased by 0.1 percent. However, three of the four largest crude oil reserves areas, the Gulf of Mexico, Alaska, and California, registered reserves declines. U.S. new field discoveries were the lowest in 12 years and as a result operators only replaced 71 percent of crude oil production with reserves additions.

Natural gas liquids proved reserves grew by 6 percent in 2004, rebounding from their 2003 decline.

Proved reserves are the estimated quantities which geological and engineering data demonstrate with reasonable certainty to be recoverable in future years from known reservoirs under existing economic and operating conditions. Petroleum engineering and geological judgment are required in estimating proved reserves; therefore the results are not precise measurements.

Natural Gas

Increased onshore natural gas drilling in 2004 resulted in large reserves additions to known fields. Discoveries of new gas fields, however, were the lowest in 12 years. While natural gas proved reserves have increased in ten of the past eleven years, production has not. Total U.S. dry gas production declined 1 percent in 2004.

The large proved natural gas reserves drop experienced in the Gulf of Mexico was primarily due to low new field discoveries and relatively large negative revisions to proved reserves, but Hurricane Ivan certainly didn't help. Twenty percent of U.S. dry natural gas production is from the Gulf of Mexico Federal Offshore and Ivan caused infrastructure damage that impacted oil and gas production in the Gulf in the last quarter of 2004. Ivan's damage will also reduce 2005 Gulf production from what it could have been.

Total discoveries are those reserves attributable to field extensions, new field discoveries, and new reservoir discoveries in old fields. They result from the drilling of new wells. Total discoveries of dry gas reserves were 20,163 billion cubic feet in 2004. This was 32 percent more than the prior 10-year average and 5 percent more than in 2003.

The majority of natural gas total discoveries in 2004 were from extensions to existing gas fields. There were almost 2 trillion cubic feet more reserves from extensions than in 2003 with Texas and Wyoming leading the Nation. Field extensions were 18,198 billion cubic feet, 11 percent more than extensions in 2003 and 66 percent more than the prior 10-year average of 10,976 billion cubic feet.

New field discoveries were 759 billion cubic feet, 38 percent less than the volume discovered in 2003 and 59 percent less than the prior 10-year average.

New reservoir discoveries in old fields were 1,206 billion cubic feet, down 25 percent from 2003 and 50 percent less than the prior 10-year average.

Natural gas net revisions and adjustments were 630 billion cubic feet, which is 48 percent less than the net revisions and adjustments of 2003. The net of sales and acquisitions of dry natural gas proved reserves was 1,844 billion cubic feet.

Coalbed natural gas is becoming a mature source that in 2004 accounted for 9 percent of U.S. dry gas production. Production increased 7 percent, but coalbed natural gas proved reserves decreased 2 percent to 18,390 billion cubic feet. Even so, it still accounted for almost 10 percent of 2004 U.S. dry gas proved reserves. The last reported decline of coalbed natural gas proved reserves was in 1994.

Other 2004 natural gas events of note:

- Natural gas prices were up 12 percent in 2004 to an average of $5.49 per thousand cubic feet at the wellhead, as compared to $4.88 per thousand cubic feet in 2003.
- Exploratory and developmental gas completions were up 15 percent from 2003.

Crude Oil

Operators only replaced 71 percent of crude oil production with reserves additions in 2004. U.S. crude oil proved reserves declined over 2 percent as new field discoveries reported in 2004 were the lowest in 12 years. Of the four largest crude oil proved reserves areas in the U.S. (the Gulf of Mexico, Texas, Alaska, and California) only Texas reported an increase in proved crude oil reserves in 2004 (1 percent). The Gulf of Mexico declined 9 percent, Alaska declined 3 percent, and California declined 2 percent. In the Rockies, however, Wyoming (#6 in the Nation for crude oil proved reserves), North Dakota (#9) and Montana (#10) had significant proved reserves increases.

Total discoveries of crude oil were 782 million barrels in 2004, 29 percent less than the prior 10-year average and 37 percent less than 2003's discoveries of 1,232 million barrels.

The majority of crude oil total discoveries in 2004 came from extensions to fields in Texas, Alaska, and the Gulf of Mexico Federal Offshore. Operators discovered 617 million barrels in extensions in 2004, 45 percent more than in 2003 and 22 percent more than the prior 10-year average.

New field discoveries accounted for 33 million barrels of crude oil reserves additions. Almost all of these small discoveries (27 of the 33 million) were in the Gulf of Mexico Federal Offshore. This was the lowest volume of new field discoveries in 12 years, 95 percent less than the new field discoveries of 2003, and only 8 percent of the prior 10-year average (422 million barrels).

New reservoir discoveries in old fields were 132 million barrels, 31 percent more than in 2003 and 26 percent less than the prior 10-year average.

Reserves additions are the sum of total discoveries, revisions, adjustments, sales, and acquisitions. Reserves additions in 2004 were 1,299 million barrels, 19 percent more than the 2003 volume but 32 percent less than the prior 10-year average.

Crude oil net revisions and adjustments were 494 million barrels, 92 percent more than the net revisions and adjustments of 2003. The net of sales and acquisitions of crude oil proved reserves was 23 million barrels.

Other 2004 crude oil events of note:

- The annual average domestic first purchase price for crude oil increased 33 percent from the 2003 level to $37.77 per barrel.
- The West Texas Intermediate crude oil spot price underwent significantly higher price fluctuations in late 2004 and 2005.
- Exploratory and developmental oil completions were down 2 percent from 2003.

Natural Gas Liquids

Natural gas liquids reserves are the sum of lease condensate reserves and natural gas plant liquids reserves. Lease condensate reserves increased only slightly in 2004 (less than 1 percent). Natural gas liquids proved reserves posted a 6 percent increase, recovering from the loss reported in the prior year. Texas led the Nation in natural gas liquids proved reserves additions in part because of extensions to existing fields. Operators replaced 157 percent of U.S. natural gas liquids production with reserves additions. Natural gas plant liquids reserves increased by 7 percent in 2004 because operators of natural gas processing plants produced 6 percent more natural gas plant liquids and extracted a higher average percentage of liquids from the processed gas. In total, U.S. natural gas liquids proved reserves increased by over 6 percent in 2004 to 7,928 million barrels.

Total proved reserves of liquid hydrocarbons (crude oil plus natural gas liquids) were 29,299 million barrels in 2004, a less than 1 percent decrease from the 2003 level. Natural gas liquids represented 27 percent of total liquid hydrocarbon proved reserves in 2004.

Data

These estimates are based upon analysis of data from Form EIA-23, Annual Survey of Domestic Oil and Gas Reserves, filed by 1,341 operators of oil and gas wells, and Form EIA-64A, Annual Report of the Origin of Natural Gas Liquids Production, filed by operators of 493 active natural gas processing plants. The U.S. proved reserves estimates for crude oil and natural gas are associated with sampling errors of less than 1 percent.

1. Introduction

Background

The primary focus of EIA's reserves program is providing accurate annual estimates of U.S. proved reserves of crude oil, natural gas, and natural gas liquids. These estimates are essential to the development, implementation, and evaluation of national energy policy and legislation. In the past, the Government and the public relied upon industry estimates of proved reserves. However, the industry ceased publication of reserve estimates after its 1979 report.

In response to a recognized need for credible annual proved reserves estimates, Congress, in 1977, required the Department of Energy to prepare such estimates. To meet this requirement, the Energy Information Administration (EIA) developed a program that established a unified, verifiable, comprehensive, and continuing annual statistical series for proved reserves of crude oil and natural gas. It was expanded to include proved reserves of natural gas liquids for the 1979 and subsequent reports.

Survey Overview

EIA defines proved reserves, the major topic of this report, as those volumes of oil and gas that geological and engineering data demonstrate with reasonable certainty to be recoverable in future years from known reservoirs under existing economic and operating conditions. There are other categories of reserves, but by definition they are more speculative and less precise than proved reserves. Readers who are unfamiliar with the distinctions between types of reserves or with how reserves fit in the description of overall oil and gas resources should see Appendix G.

This report provides proved reserves estimates for calendar year 2004. It is based on data filed by large, intermediate, and a select group of small operators of oil and gas wells on Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves," and by operators of all natural gas processing plants on Form EIA-64A, "Annual Report of the Origin of Natural Gas Liquids Production." The U.S. crude oil and natural gas proved reserves estimates are associated with sampling errors of less than 1 percent at a 95-percent confidence level.

Form EIA-23

On Form EIA-23, an operator is defined as an organization or person responsible for the management and day-to-day operation of oil and/or gas wells. This definition eliminates responses from royalty owners, working interest owners (unless they are also operators), and others not directly responsible for oil and gas production operations.

Operator size categories are based upon operator annual production as indicated in various Federal, State, and commercial records. Large operators are those that produced at least 1.5 million barrels of crude oil or 15 billion cubic feet of natural gas, or both, during the report year. Intermediate operators produced less than large operators, but more than 400,000 barrels of crude oil or 2 billion cubic feet of natural gas, or both during the report year. Small operators are those that produced less than intermediate operators. All data are reported on a total operated basis, encompassing all proved reserves and production associated with wells operated by an individual operator within a field. This concept is also called the "gross operated" or "8/8ths" basis.

Large operators (Category I) and most intermediate size operators (Category II) report reserves balance data on Form EIA-23 to show how and why reserves components changed during the year on a field-by-field basis. Intermediate size operators who do not keep reserves data were not asked to provide estimates of reserves at the beginning of the year or annual changes to proved reserves by component of change; i.e., revisions, extensions, and new discoveries. These volumes were estimated using statistical calculations that preserved the relative relationships between these items within each State or State subdivision, as reported by large and intermediate operators.

A sample selected from the large group of small (Category III) operators are requested to provide annual production and, if available, year ending reserves volumes. Details on the selection of these operators and the determination of the reserves volumes is found in Appendix F.

The published reserve estimates include an additional term, adjustments, calculated by the EIA, that preserves an exact annual reserves balance of the form:

Published Proved Reserves at End of Previous Report Year
+ Adjustments
+ Revision Increases
– Revision Decreases
– Sales
+ Acquisitions
+ Extensions
+ New Field Discoveries
+ New Reservoir Discoveries in Old Fields
– Report Year Production
= Published Proved Reserves at End of Report Year

Adjustments are the annual changes in the published reserve estimates that cannot be attributed to the estimates for other reserve change categories. They result from the survey and statistical estimation methods employed. For example, variations caused by changes in the operator frame, different random samples, different timing of reporting, incorrectly reported data, or imputations for missing or unreported reserve changes can contribute to adjustments.

Form EIA-64A

Form EIA-64A data were first collected for the 1979 survey year in order to develop estimates for total natural gas liquids reserves. Data on liquids recovered from natural gas, as reported by natural gas processing plant operators, are combined with lease condensate data collected on Form EIA-23 to provide the total natural gas liquids reserves estimates.

Data Collection Operations

An intensive effort is made each year to maintain an accurate and complete survey frame consisting of operators of oil and gas wells and of natural gas processing plants. The Form EIA-23 operator frame contained 20,670 probable active operators and the Form EIA-64A plant frame contained 488 probable active natural gas processing plants in the United States when the 2004 surveys were initiated. As usual, additional operators were added to the survey as it progressed, and many operators initially in the sample frame were found to be inactive in 2004. For more details on the survey process, see Appendix E, Summary of Data Collection Operations.

The 2004 survey sample consisted of 1,341 operators. EIA sampled 971 operators with certainty; 164 Category I operators, 532 Category II operators, and 275 smaller operators that were selected with certainty because of their size in relation to the area or areas in which they operated. EIA also chose 370 Noncertainty operators as a systematic random sample of the remaining operators. There were 12 Successor operators in 2004. Fifty-one (51) of the 1,341 ceased operating oil and/or gas properties (became non-operator) during the survey year. For more details on the survey response statistics, see Table E2 in Appendix E, Summary of Data Collection Operations.

EIA mailed EIA-64A forms to all known natural gas processing plant operators as of February 1, 2005. More than one form is received for a plant that has more than one operator during the year. Forms were received from 100 percent of the operators of the 491 unique active natural gas processing plants in 2004.

National estimates of the production volumes for crude oil, lease condensate, natural gas liquids, and dry natural gas based on Form EIA-23 and Form EIA-64A were compared with corresponding official production volumes published by EIA, which are obtained from non-survey based State sources. For report year 2004, the Form EIA-23 National production estimates were 1 percent higher than the comparable *Petroleum Supply Annual (PSA) 2004* volumes for crude oil and lease condensate combined, and were 1 percent higher than the comparable *Natural Gas Monthly, October 2005* volume for 2004 dry natural gas.

Accuracy in reserves reporting is EIA's first and foremost goal for this report. Because of differences in timing and data availability, the estimates of oil and gas production presented in this report may differ from those presented in other EIA reports.

2. Overview

National Summary

The United States had the following proved reserves as of December 31, 2004:

- **Crude Oil — 21,371 million barrels**
- **Dry Natural Gas — 192,513 billion cubic feet**
- **Natural Gas Liquids — 7,928 million barrels.**

This Overview summarizes the 2004 proved reserves balances of crude oil, dry natural gas, and natural gas liquids on a National level and provides historical comparisons between 2004 and prior years. **Table 1** lists the estimated annual reserve balances since 1994 for crude oil, dry natural gas, and natural gas liquids.

Crude Oil

Proved reserves of crude oil decreased by 520 million barrels in 2004. **Figure 1** shows the crude oil proved reserves levels by major region and **Figure 2** shows the components of reserves changes from 1994 through 2004.

As indicated in **Figure 1**, U.S. crude oil proved reserves decreased in 2004 in Alaska and the Federal Offshore, but remained level onshore in the lower 48 States.

The components of reserves changes for crude oil are shown in **Figure 2**. EIA tracks all components of reserves changes: adjustments, revision increases, revision decreases, sales, acquisitions, extensions, new field discoveries, new reservoir discoveries in old fields, and estimated production. These components are discussed below.

Total discoveries are those reserves attributable to field extensions, new field discoveries, and new reservoir discoveries in old fields. They result from the drilling of exploratory wells. Total discoveries of crude oil were 782 million barrels in 2004, 29 percent less than the prior 10-year average and 37 percent less than 2003's discoveries of 1,232 million barrels.

The majority of crude oil total discoveries in 2004 were extensions of existing fields in northern Rocky Mountain states and Texas.

Operators discovered 617 million barrels in extensions in 2004, 45 percent more than in 2003 and 22 percent more than the prior 10-year average.

New field discoveries accounted for 33 million barrels of crude oil reserves additions, 27 million of which were in the Gulf of Mexico Federal Offshore. This was the lowest volume of new field discoveries since 1992 and 92 percent less than the prior 10-year average.

New reservoir discoveries in old fields were 132 million barrels, 31 percent more than in 2003 and 26 percent less than the prior 10-year average.

Reserves additions are the sum of total discoveries, revisions and adjustments, and sales and acquisitions. In 2004 there were 1,299 million barrels of reserves additions, 19 percent more than the volume of reserves additions in 2003.

Crude oil net revisions and adjustments were 494 million barrels, 92 percent more than the net revisions and adjustments of 2003. The net of sales and acquisitions of crude oil proved reserves was 23 million barrels.

Production of crude oil was an estimated 1,819 million barrels in 2004 (lease condensate not included, see Natural Gas Liquids section below for condensate volumes). This was down 3 percent from 2003's level (1,877 million barrels) and down 10 percent from the prior 10-year average (2,028 million barrels). Operators replaced 71 percent of crude oil production with reserves additions in 2004.

Natural Gas

Dry natural gas proved reserves increased by 3,469 billion cubic feet in 2004. **Figure 3** shows the dry natural gas proved reserves levels by major region. It indicates that additions of gas reserves in the Lower 48 onshore are raising the National total despite declining offshore gas reserves. **Figure 4** shows the components of reserves changes from 1994 through 2004.

Total discoveries of dry gas reserves were 20,163 billion cubic feet in 2004. This was 32 percent more than the prior 10-year average and 5 percent more than in 2003. The majority of natural gas total discoveries in 2004

Table 1. Total U.S. Proved Reserves of Crude Oil, Dry Natural Gas, and Natural Gas Liquids, 1994-2004

Year	Adjustments (1)	Net Revisions (2)	Revisions[a] and Adjustments (3)	Net of Sales[b] and Acquisitions (4)	Extensions (5)	New Field Discoveries (6)	New Reservoir Discoveries in Old Fields (7)	Total[c] Discoveries (8)	Estimated Production (9)	Proved[d] Reserves 12/31 (10)	Change from Prior Year (11)
					Crude Oil (million barrels of 42 U.S. gallons)						
1994	189	1,007	1,196	NA	397	64	111	572	2,268	22,457	-500
1995	122	1,028	1,150	NA	500	114	343	957	2,213	22,351	-106
1996	175	737	912	NA	543	243	141	927	2,173	22,017	-334
1997	520	914	1,434	NA	477	637	119	1,233	2,138	22,546	+529
1998	-638	518	-120	NA	327	152	120	599	1,991	21,034	-1,512
1999	139	1,819	1958	NA	259	321	145	725	1,952	21,765	+731
2000	143	746	889	-20	766	276	249	1,291	1,880	22,045	+280
2001	-4	-158	-162	-87	866	1,407	292	2,565	1,915	22,446	+401
2002	416	720	1,136	24	492	300	154	946	1,875	22,677	+231
2003	163	94	257	-398	426	705	101	1,232	1,877	21,891	-786
2004	74	420	494	23	617	33	132	782	1,819	21,371	-520
					Dry Natural Gas (billion cubic feet, 14.73 psia, 60° Fahrenheit)						
1994	1,945	5,484	7,429	NA	6,941	1,894	3,480	12,315	18,322	163,837	+1,422
1995	580	7,734	8,314	NA	6,843	1,666	2,452	10,961	17,966	165,146	+1,309
1996	3,785	4,086	7,871	NA	7,757	1,451	3,110	12,318	18,861	166,474	+1,328
1997	-590	4,902	4,312	NA	10,585	2,681	2,382	15,648	19,211	167,223	+749
1998	-1,635	5,740	4,105	NA	8,197	1,074	2,162	11,433	18,720	164,041	-3,182
1999	982	10,504	11,486	NA	7,043	1,568	2,196	10,807	18,928	167,406	+3,365
2000	-891	6,962	6,071	4,031	14,787	1,983	2,368	19,138	19,219	177,427	+10,021
2001	2,742	-2,318	424	2,630	16,380	3,578	2,800	22,758	19,779	183,460	+6,033
2002	3,727	937	4,664	380	14,769	1,332	1,694	17,795	19,353	186,946	+3,486
2003	2,841	-1,638	1,203	1,034	16,454	1,222	1,610	19,286	19,425	189,044	+2,098
2004	-114	744	630	1,844	18,198	759	1,206	20,163	19,168	192,513	+3,469
					Natural Gas Liquids (million barrels of 42 U.S. gallons)						
1994	43	197	240	NA	314	54	131	499	791	7,170	-52
1995	192	277	469	NA	432	52	67	551	791	7,399	+229
1996	474	175	649	NA	451	65	109	625	850	7,823	+424
1997	-15	289	274	NA	535	114	90	739	864	7,973	+150
1998	-361	208	-153	NA	383	66	88	537	833	7,524	-449
1999	99	727	826	NA	313	51	88	452	896	7,906	+382
2000	-83	459	376	145	645	92	102	839	921	8,345	+439
2001	-429	-132	-561	102	717	138	142	997	890	7,993	-352
2002	62	31	93	54	612	48	78	738	884	7,994	+1
2003	-338	-161	-499	30	629	35	72	736	802	7,459	-535
2004	273	97	370	112	734	26	54	814	827	7,928	+469

[a]Revisions and adjustments = Col. 1 + Col. 2.
[b]Net of sales and acquisitions = acquisitions - sales.
[c]Total discoveries = Col. 5 + Col. 6 + Col. 7.
[d]Proved reserves = Col. 10 from prior year + Col. 3 + Col. 4 + Col. 8 - Col. 9.
NA=Not available.

Notes: Old means discovered in a prior year. New means discovered during the report year. The production estimates in this table are based on data reported on Form EIA-23, “Annual Survey of Domestic Oil and Gas Reserves” and Form EIA-64A, “Annual Report of the Origin of Natural Gas Liquids Production.” They may differ from the official EIA production data for crude oil, natural gas, and natural gas liquids for 2004 contained in the *Petroleum Supply Annual 2004*, DOE/EIA-0340(04) and the *Natural Gas Annual 2004*, DOE/EIA-0131(04).

Sources: *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves*, 1994 through 2003 annual reports, DOE/EIA-0216.

Figure 1. U.S. Crude Oil Proved Reserves, 1994-2004

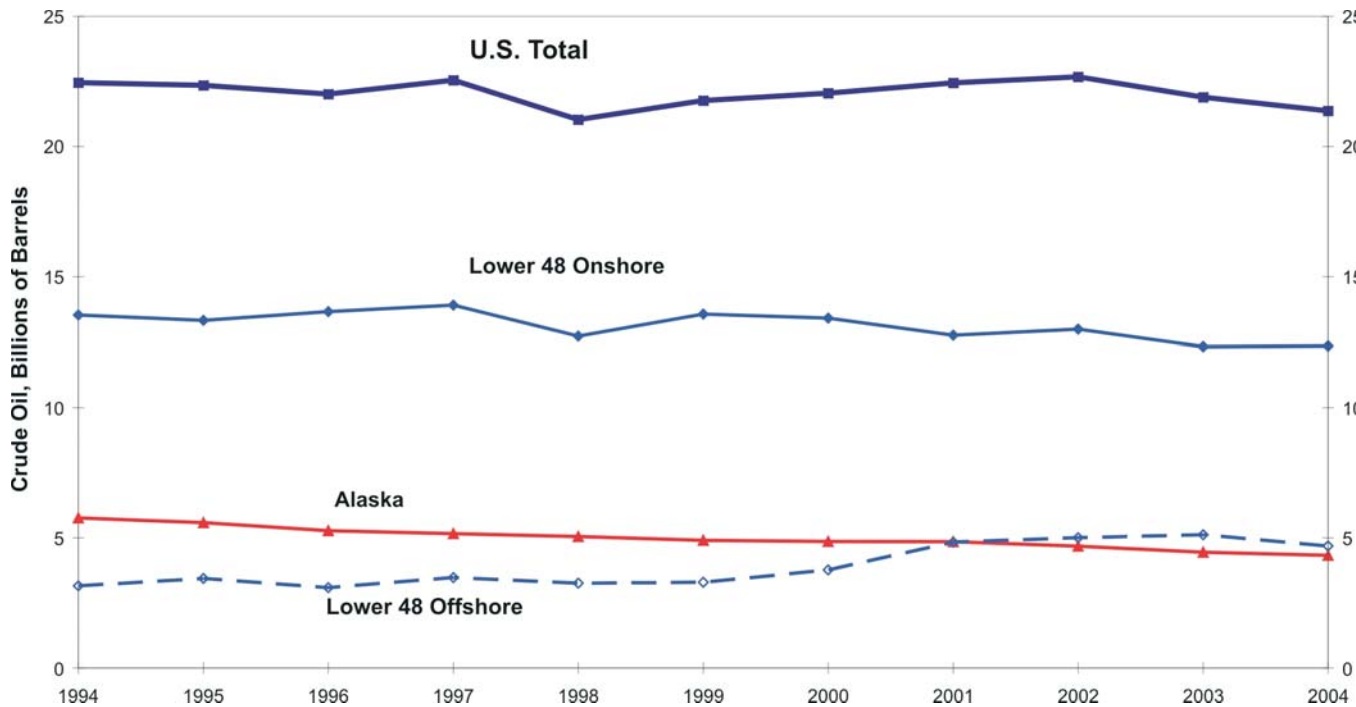
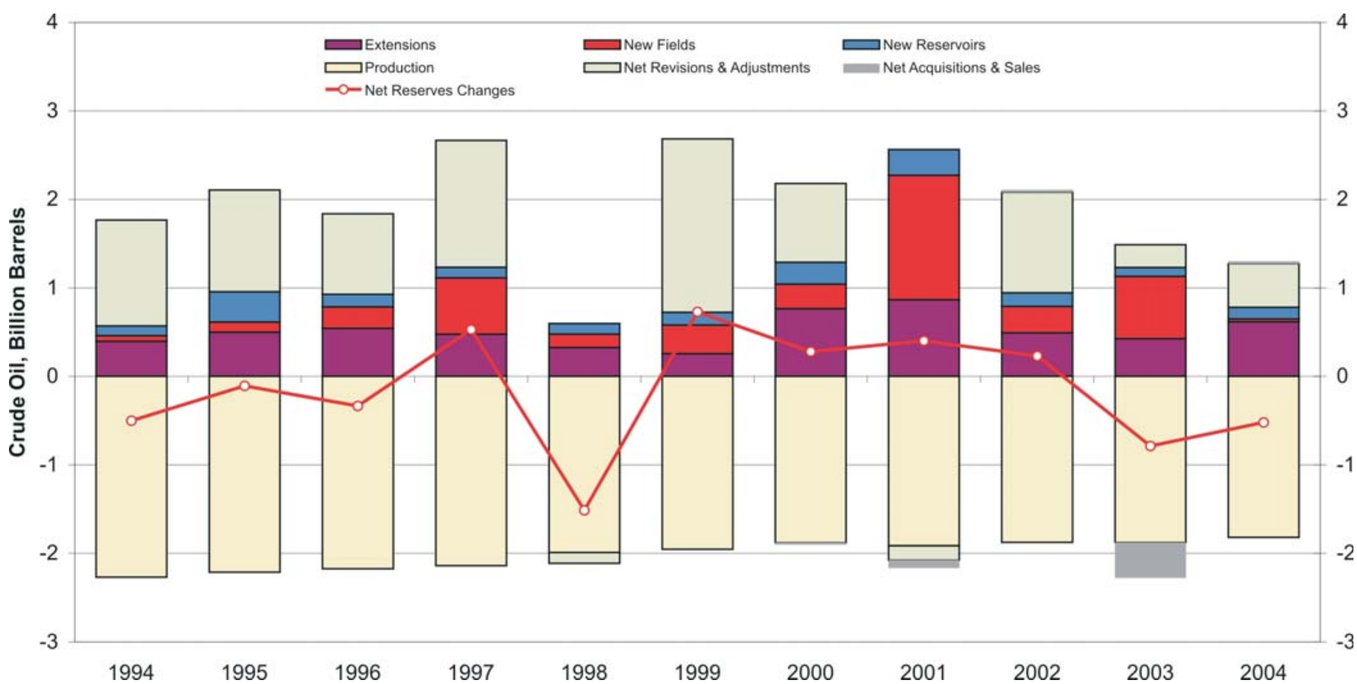


Figure 2. Components of Reserves Changes for Crude Oil, 1994-2004



Source: U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves, 1994-2003 annual reports, DOE/EIA-0216.{18-27}

Figure 3. U.S. Dry Natural Gas Proved Reserves, 1994-2004

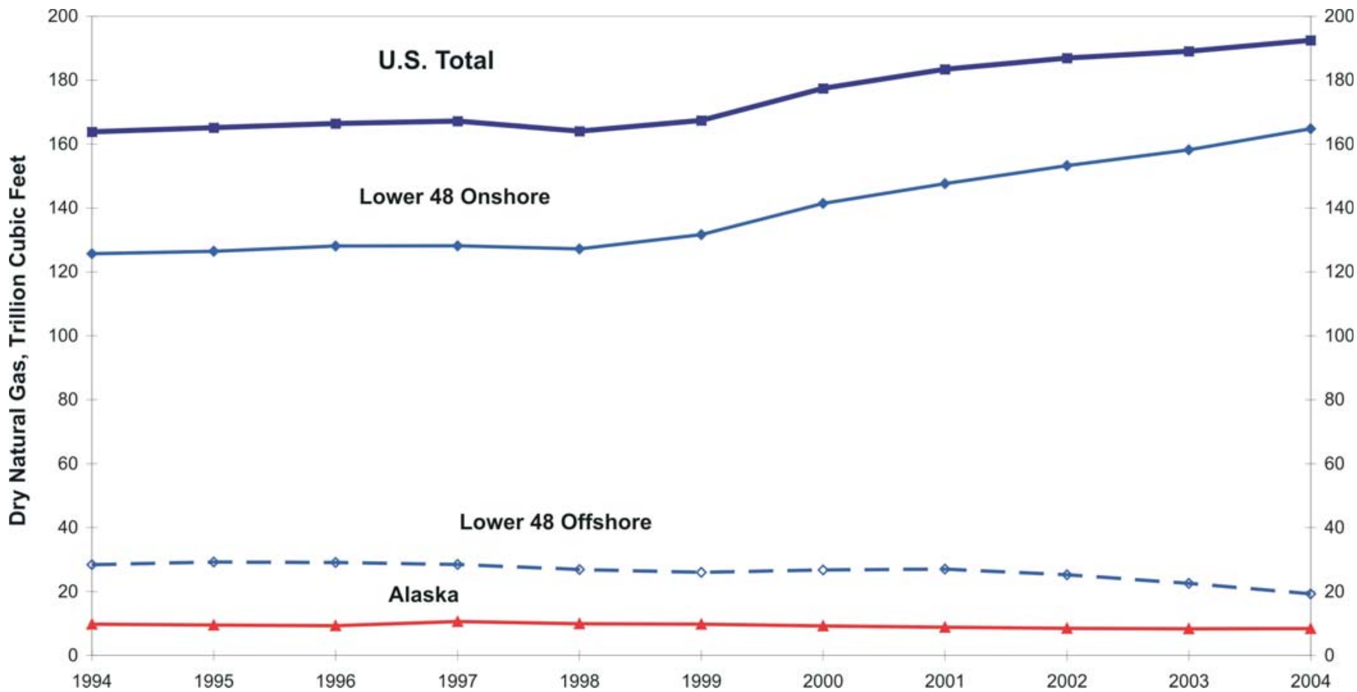
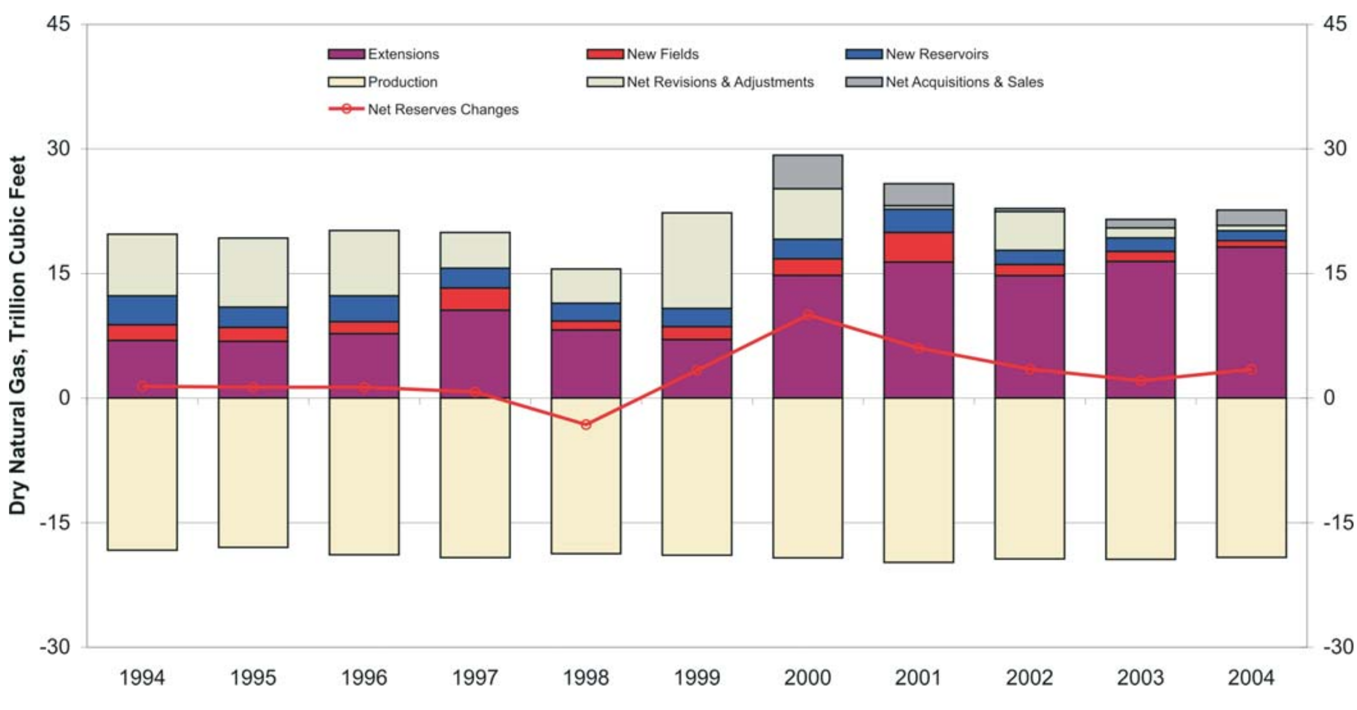


Figure 4. Components of Reserves Changes for Dry Natural Gas, 1994-2004



Source: U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves, 1994-2003 annual reports, DOE/EIA-0216.{18-27}

were from extensions of existing conventional and unconventional gas fields onshore in the lower 48 States.

Field extensions were 18,198 billion cubic feet, 11 percent more extensions than in 2003 and 66 percent more than the prior 10-year average of 10,976 billion cubic feet.

New field discoveries were 759 billion cubic feet, 38 percent less than the volume discovered in 2003 and 59 percent less than the prior 10-year average.

New reservoir discoveries in old fields were 1,206 billion cubic feet, down 25 percent from 2003 and 50 percent less than the prior 10-year average.

Natural gas net revisions and adjustments were 630 billion cubic feet, 48 percent less than the net revisions and adjustments of 2003. The net of sales and acquisitions of dry natural gas proved reserves was 1,844 billion cubic feet.

Production removed an estimated 19,168 billion cubic feet of proved reserves from the National total. Dry gas production decreased by 1 percent compared to 2003. Operators replaced 118 percent of dry natural gas production with reserves additions.

Coalbed natural gas reserves declined in 2004, while production significantly increased. Coalbed natural gas proved reserves were 18,390 billion cubic feet, a decrease of 2 percent from 2003, and accounted for 10 percent of U.S. dry gas reserves. Coalbed natural gas production increased 8 percent from 2003 to 1,720 billion cubic feet, and accounted for 9 percent of U.S. dry gas production.

Natural Gas Liquids

Proved reserves of natural gas liquids increased 6 percent in 2004 to 7,928 million barrels. This resulted from changes in the relative economics of natural gas and natural gas liquids, and in the liquid content of gas production. **Figure 5** shows the natural gas liquids proved reserves levels by major region. It indicates that reserves are increasing in the Lower 48 onshore while Alaska and the Federal offshore reserves remain level. **Figure 6** shows the components of natural gas liquids reserves changes from 1994 through 2004.

Operators replaced 157 percent of their 2004 natural gas liquids production with reserve additions. Total discoveries added 814 million barrels (primarily from extensions), net revisions and adjustments were 370 million barrels, and net sales and acquisitions added 112 million barrels in 2004.

Total proved reserves of liquid hydrocarbons (crude oil plus natural gas liquids) were 29,299 million barrels in 2004—a less than 1 percent decrease from the 2003 level. Natural gas liquids represented 27 percent of total liquid hydrocarbon proved reserves in 2004.

Reserves Changes Since 1977

EIA has collected oil and gas reserves estimates annually since 1977. **Table 2** lists the cumulative totals of the components of reserves changes for crude oil and dry natural gas from 1977 through 2004. The table has two sections, one for the lower 48 States and another for the U.S. total (which includes Alaska's contribution). Annual averages for each component of reserves changes are also listed, along with the percentage of that particular component's impact on total U.S. proved reserves. In this section, we compare these averages to the 2004 proved reserves estimates as a means of gauging the past year against history.

Crude Oil: Since 1977 U.S. operators have:

- had average annual new reserves discoveries of 900 million barrels,
- had average annual proved reserves additions of 2,065 million barrels from total discoveries, net revisions and adjustments, and net sales and acquisitions, and
- had an average annual proved reserves decline of 433 million barrels Nationwide, because production exceeded reserve additions.

Since 1977, crude oil reserves have primarily been sustained by proved ultimate recovery appreciation in existing fields rather than by the discovery of new oil fields. Only 12 percent of reserves additions since 1977 were booked as new field discoveries. Proved ultimate recovery appreciation is the sum of net revisions, adjustments, net sales and acquisitions, extensions, and new reservoir discoveries in old fields (see the Proved Ultimate Recovery section later in this chapter.) Since 1977, the 25,209 million barrels of total discoveries accounted for 44 percent of reserves additions.

Compared to the averages of reserves changes since 1977, 2004 was a down year for crude oil discoveries. Total discoveries of crude oil (782 million barrels) in 2004 were 13 percent less than the post-1976 U.S. average (900 million barrels per year).

Figure 5. U.S. Natural Gas Liquids Proved Reserves, 1994-2004

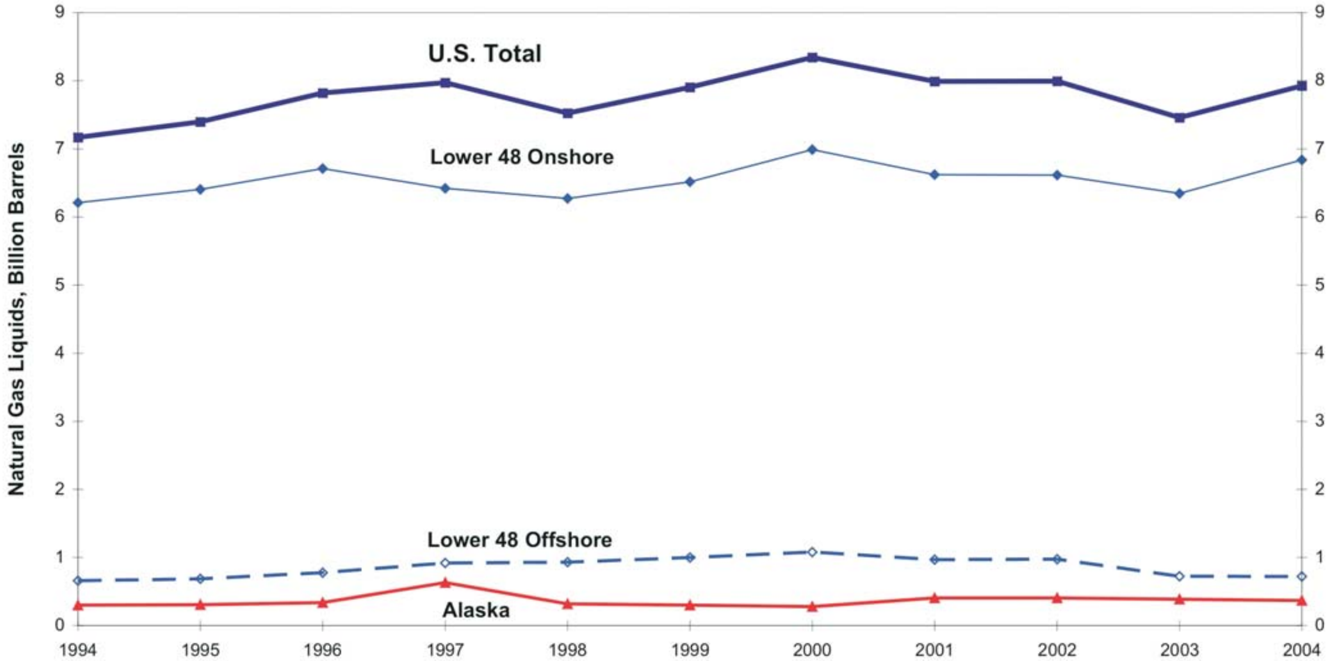
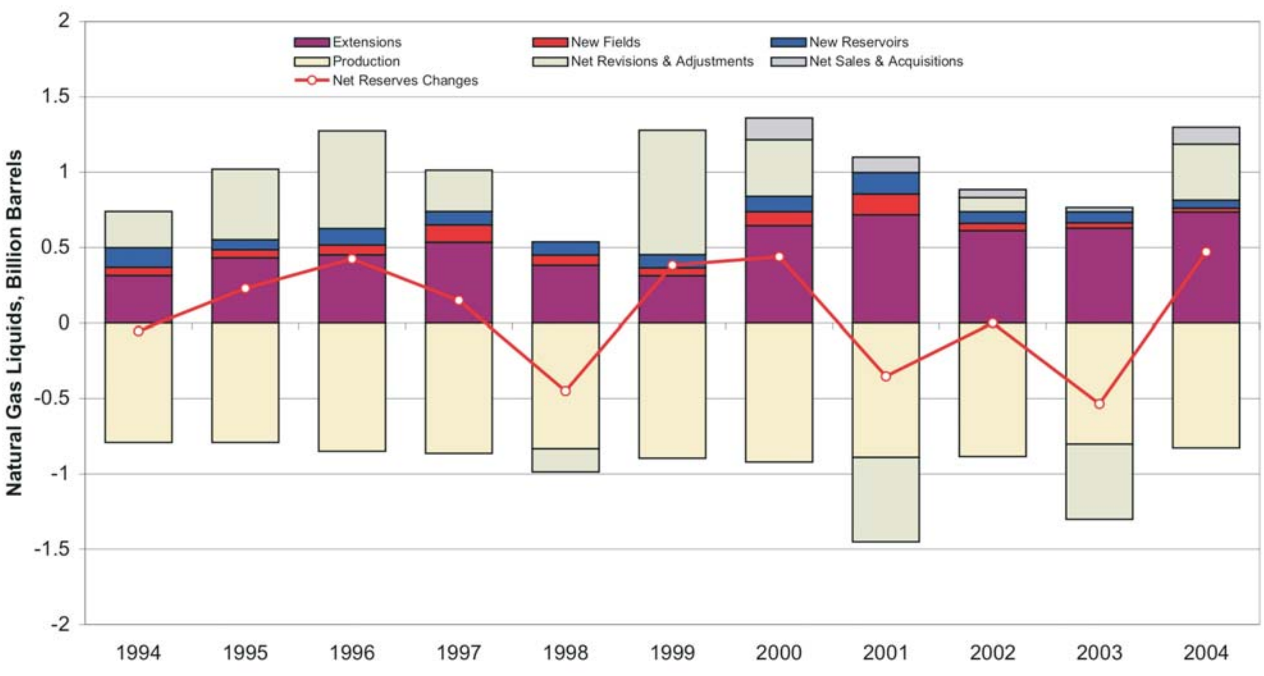


Figure 6. Components of Reserves Changes for Natural Gas Liquids, 1994-2004



Source: U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves, 1994-2003 annual reports, DOE/EIA-0216.{18-27}

Table 2. Reserves Changes, 1977-2004

Components of Change	Lower 48 States Volume	Lower 48 States Average per Year	Lower 48 States Percent of Reserves Additions	U.S. Total Volume	U.S. Total Average per Year	U.S. Total Percent of Reserves Additions
	Crude Oil (million barrels of 42 U.S. gallons)					
Proved Reserves as of 12/31/76	**24,928**	**—**	**—**	**33,502**	**—**	**—**
New Field Discoveries	5,725	204	12.1	6,676	238	11.5
New Reservoir Discoveries in Old Fields	3,914	140	8.3	4,102	147	7.1
Extensions	12,729	455	26.9	14,431	515	25.0
Total Discoveries	**22,368**	**799**	**47.3**	**25,209**	**900**	**43.6**
Revisions, Adjustments, Sales & Acquisitions[a]	24,887	889	52.7	32,614	1,165	56.4
Total Reserves Additions	**47,255**	**1,688**	**100.0**	**57,823**	**2,065**	**100.0**
Production	**55,075**	**1,967**	**116.5**	**69,954**	**2,498**	**121.0**
Net Reserves Change	**-7,820**	**-279**	**-16.5**	**-12,131**	**-433**	**-21.0**
	Dry Natural Gas (billion cubic feet at 14.73 psia and 60° Fahrenheit)					
Proved Reserves as of 12/31/76	**180,838**	**—**	**—**	**213,278**	**—**	**—**
New Field Discoveries	52,929	1,890	10.6	53,171	1,899	11.0
New Reservoir Discoveries in Old Fields	68,090	2,432	13.7	68,539	2,448	14.2
Extensions	249,592	8,914	50.1	252,803	9,029	52.2
Total Discoveries	**370,611**	**13,236**	**74.5**	**374,513**	**13,375**	**77.4**
Revisions, Adjustments, Sales & Acquisitions[a]	127,110	4,540	25.5	109,511	3,911	22.6
Total Reserves Additions	**497,721**	**17,776**	**100.0**	**484,024**	**17,287**	**100.0**
Production	**494,453**	**17,659**	**99.3**	**504,789**	**18,028**	**104.3**
Net Reserves Change	**3268**	**117**	**0.7**	**-20,765**	**-742**	**-4.3**

[a] EIA did not separately collect data on sales and acquisitions of proved reserves until the year 2000.
Source: *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves* 1977-2004 annual reports, DOE/EIA-0216.{1-27}

Looking at the components of total discoveries in 2004:

- 2004's new field discoveries (33 million barrels) were 86 percent less than the post-1976 average for crude oil and the lowest since 1992,
- Extensions in 2004 (617 million barrels) were 20 percent more than the post-1976 average, and
- New reservoir discoveries in old fields (132 million barrels) were 10 percent less than the post-1976 average for crude oil.

Revisions, Adjustments, Sales & Acquisitions were 517 million barrels in 2004. This was 56 percent less than the post-1976 average of 1,165 million barrels per year.

Dry Natural Gas: Since 1977 U.S. operators have:

- had average annual new reserves discoveries of 13,375 billion cubic feet,
- had average annual proved reserves additions of 17,287 billion cubic feet from total discoveries, net revisions and adjustments, and net sales and acquisitions, and
- had an average annual proved reserves decline Nationwide of 742 billion cubic feet.

Like crude oil reserves, natural gas reserves have primarily been sustained by proved ultimate recovery appreciation since 1977. For gas, extensions rather than net revisions and adjustments are usually the largest component. Extensions accounted for 52 percent of all reserves additions since 1977 while net revisions and adjustments accounted for only 23 percent.

Compared to the averages of reserves changes since 1977, 2004 was an up year for dry natural gas total discoveries. Operators reported 20,163 billion cubic feet of total discoveries of dry natural gas proved reserves, 51 percent more than the post-1976 average (13,375 billion cubic feet).

The net of revisions, adjustments, sales, and acquisitions was 2,474 billion cubic feet in 2004, 37 percent lower than the post-1976 U.S. average (3,911 billion cubic feet per year).

Table 3. U.S. Average Annual Domestic First Purchase Prices for Crude Oil, Wellhead Prices for Natural Gas, and the Average Number of Active Rotary Drilling Rigs, 1977-2004

Year		Crude Oil		Natural Gas		
		Current	2004 Constant	Current	2004 Constant	
		(dollars per barrel)		(dollars per thousand cubic feet)		Number of Rigs
1977		8.57	21.78	0.79	2.01	2,001
1978		9.00	21.35	0.91	2.16	2,259
1979		12.64	27.68	1.18	2.58	2,177
1980		21.59	43.29	1.59	3.19	2,909
1981		31.77	58.28	1.98	3.63	3,970
1982		28.52	49.24	2.46	4.25	3,105
1983		26.19	43.50	2.59	4.30	2,232
1984		25.88	41.45	2.66	4.26	2,428
1985		24.09	37.40	2.51	3.90	1,980
1986		12.51	19.00	1.94	2.95	964
1987		15.40	22.71	1.67	2.46	936
1988		12.58	17.94	1.69	2.41	936
1989		15.86	21.79	1.69	2.32	869
1990		20.03	26.48	1.71	2.26	1,010
1991		16.54	21.10	1.64	2.09	860
1992		15.99	19.92	1.74	2.17	721
1993		14.25	17.33	2.04	2.48	754
1994		13.19	15.72	1.85	2.20	775
1995		14.62	17.05	1.55	1.81	723
1996		18.46	21.12	2.17	2.48	779
1997		17.23	19.34	2.32	2.60	943
1998		10.87	12.05	1.96	2.17	827
1999		15.56	17.00	2.19	2.39	625
2000		26.72	28.60	3.68	3.94	918
2001		21.84	22.83	4.00	4.18	1,156
2002		22.51	23.27	2.95	3.05	830
2003	January	28.42	29.06	4.43	4.53	854
	February	31.85	32.52	5.05	5.16	907
	March	30.10	30.69	6.96	7.10	941
	April	25.45	25.95	4.47	4.56	983
	May	24.95	25.41	4.77	4.86	1,034
	June	26.84	27.30	5.41	5.50	1,067
	July	27.52	27.95	5.08	5.16	1,081
	August	27.94	28.34	4.46	4.52	1,090
	September	25.23	25.56	4.59	4.65	1,093
	October	26.53	26.84	4.32	4.37	1,102
	November	27.21	27.49	4.26	4.30	1,111
	December	28.53	28.79	4.76	4.80	1,114
2003	**Average**	**27.56**	**28.04**	**4.88**	**4.96**	**1,032**
2004	January	30.35	30.59	5.53	5.57	1,101
	February	31.21	31.42	5.15	5.18	1,119
	March	32.86	33.04	4.97	5.00	1,135
	April	33.20	33.34	5.20	5.22	1,151
	May	35.73	35.83	5.63	5.65	1,164
	June	34.53	34.57	5.85	5.86	1,176
	July	36.54	36.50	5.60	5.59	1,213
	August	40.10	39.98	5.36	5.34	1,234
	September	40.56	40.37	4.86	4.84	1,240
	October	46.14	45.84	5.45	5.41	1,240
	November	42.85	42.50	6.07	6.02	1,262
	December	38.22	37.85	6.25	6.19	1,246
2004	**Average**	**36.77**	**36.77**	**5.49**	**5.49**	**1,192**

=Revised data.

Sources: Current dollars and number of rigs: *Monthly Energy Review October 2005*, DOE/EIA-0035(2005/10). 2004 constant dollars: U.S. Department of Commerce, Bureau of Economic Analysis, Gross Domestic Product Implicit Price Deflators, October 2005.

For the sixth year in a row (and 10 out of the last 11 years, the annual change to the National total of gas reserves has been positive, not negative.

Economics and Drilling

Economics: Table 3 lists the average annual domestic wellhead prices of crude oil and natural gas from 1977 to 2004.

The U.S. crude oil first purchase price started at an average of $30.35 per barrel in January 2004, rose to a high of $46.14 in October, and ended the year at $38.22 in December. The average U.S. crude oil first purchase price increased from $27.56 in 2003 to $36.77 per barrel in 2004.

Oil prices vary by region. The average 2004 crude oil first purchase price was $38.79 per barrel in Texas, $34.47 per barrel in California, $40.38 per barrel in Colorado, $38.27 per barrel in Ohio, and $32.23 per barrel in the California Federal Offshore. The lowest average crude oil first purchase price in 2003 was $32.23 per barrel in the Federal Offshore California.{28}

The average annual wellhead natural gas price increased from $4.88 per thousand cubic feet in 2003 to $5.49 in 2004. Natural gas prices started at $5.53 per thousand cubic feet in January 2004, fluctuated between $4.86 and $5.85 until October, and then rose rapidly at end of the year to $6.25 per thousand cubic feet in December 2004. {29}

Drilling: Also listed in **Table 3** is the average number of active rotary drilling rigs from 1977 to 2004. From 2003 to 2004, the annual average active rig count rose from 1,032 to 1,192, a 16 percent increase.

Looking first at exploratory wells, there were 2,623 exploratory wells drilled in 2004 (**Table 4**). Of these, 12 percent were completed as oil wells, 36 percent were completed as gas wells, and 52 percent were dry holes. Exploratory oil and gas completions (excluding dry holes) in 2004 were 9 percent more (**Figure 7**) than the revised 2003 total.

Figures 9 and 10 show the average volume of discoveries per exploratory well for dry natural gas and oil, respectively, since 1977. The 2004 average volume of oil discoveries per exploratory well decreased 35 percent compared to 2003. The 2004 average volume of gas discoveries per exploratory well decreased 7 percent compared to 2003.

The number of successful development wells decreased 2 percent for oil and increased 15 percent for gas from their 2003 levels (**Figure 8**). Including dry holes, there were an estimated 33,813 exploratory and development wells drilled in 2004. This is 10 percent more than in 2003 and 29 percent more than the average number of wells drilled annually in the prior 10 years (26,304).

For the eleventh year in a row, the number of gas well completions exceeded the number of oil well completions in both the exploratory and development categories.

Mergers and Acquisitions

The following large mergers and acquisitions were announced in 2004 and are expected to have a major impact on the energy industry in the future:

On April 7, 2004, Kerr-McGee Corporation and Westport Resources Corporation announced that their boards of directors had unanimously approved a merger valued at approximately $3.4 billion. The merged company will be known as Kerr-McGee Corporation and will be headquartered in Oklahoma City. The addition of Westport's reserves will increase Kerr-McGee's proved reserves by nearly 30%, mainly from North American natural gas. As of December 31, 2003, Westport had 1.8 TCF equivalent of proved reserves which were 76% natural gas and primarily located in the Rocky Mountain and Texas Gulf Coast areas. Westport has an additional 1.8 TCF equivalent of identified probable and possible resources. Approximately 50% of these resources are located in and around the Natural Buttes Field in the Uinta Basin of northeast Utah. The Greater Natural Buttes area is similar to Kerr-McGee's Wattenberg Field and will allow Kerr-McGee to use its proven expertise in tight-gas and supply-chain management to maximize the efficient recovery of these resources. {30}

On May 4, 2004, Pioneer Natural Resources Company and Evergreen Resources, Inc. announced that their boards of directors had approved a merger valued at approximately $2.1 billion, in which Evergreen would become a subsidiary of Pioneer. Pioneer Natural Resources Company would continue to be headquartered in Dallas, and would retain Evergreen's Denver offices as its base of operations in the Rockies. {31}

Table 4. U.S. Exploratory and Development Well Completions,[a] 1970-2004

	Exploratory				Total Exploratory and Development			
Year	Oil	Gas	Dry	Total	Oil	Gas	Dry	Total
1970	763	478	6,193	7,434	13,043	4,031	11,099	28,173
1971	664	472	5,995	7,131	11,903	3,983	10,382	26,268
1972	690	659	6,202	7,551	11,437	5,484	11,013	27,934
1973	642	1,067	5,952	7,661	10,167	6,933	10,320	27,420
1974	859	1,190	6,833	8,882	13,647	7,138	12,116	32,901
1975	982	1,248	7,129	9,359	16,948	8,127	13,646	38,721
1976	1,086	1,346	6,772	9,204	17,688	9,409	13,758	40,855
1977	1,164	1,548	7,283	9,995	18,745	12,122	14,985	45,852
1978	1,171	1,771	7,965	10,907	19,181	14,413	16,551	50,145
1979	1,321	1,907	7,437	10,665	20,851	15,254	16,099	52,204
1980	1,764	2,081	9,039	12,884	32,639	17,333	20,638	70,610
1981	2,636	2,514	12,349	17,499	43,598	20,166	27,789	91,553
1982	2,431	2,125	11,247	15,803	39,199	18,979	26,219	84,397
1983	2,023	1,593	10,148	13,764	37,120	14,564	24,153	75,837
1984	2,198	1,521	11,278	14,997	42,605	17,127	25,681	85,413
1985	1,679	1,190	8,924	11,793	35,118	14,168	21,056	70,342
1986	1,084	793	5,549	7,426	19,097	8,516	12,678	40,291
1987	925	754	5,049	6,728	16,164	8,055	11,112	35,331
1988	855	732	4,693	6,280	13,636	8,555	10,041	32,232
1989	607	705	3,924	5,236	10,204	9,539	8,188	27,931
1990	654	689	3,715	5,058	12,198	11,044	8,313	31,555
1991	592	534	3,314	4,440	11,770	9,526	7,596	28,892
1992	493	423	2,513	3,429	8,757	8,209	6,118	23,084
1993	502	548	2,469	3,519	8,407	10,017	6,328	24,752
1994	570	726	2,405	3,701	6,721	9,538	5,307	21,566
1995	542	570	2,198	3,310	7,627	8,354	5,075	21,056
1996	483	570	2,136	3,189	8,314	9,302	5,282	22,898
1997	428	536	2,110	3,074	10,436	11,327	5,702	27,465
1998	291	504	1,647	2,442	7,064	11,144	4,840	23,048
1999	157	539	1,195	1,891	4,176	10,877	3,412	18,465
2000	R 268	R 607	1,288	R 2,163	7,358	16,455	4,025	27,838
2001	322	988	R 1,692	R 3,002	8,060	22,083	4,084	34,227
2002	R 234	R 668	R 1,253	R 2,155	6,058	16,155	R 3,581	R 25,794
2003	R 317	R 838	R 1,283	R 2,314	R 7,284	R 19,722	R 3,687	R 30,693
2004	310	946	1,367	2,623	7,165	22,673	3,973	33,813

[a]Excludes service wells and stratigraphic and core testing.
R = Revised Data.

Notes: Estimates include only the original drilling of a hole intended to discover of further develop already discovered oil or gas resources. Other drilling activities, such as drilling an old well deeper, drilling of laterals from the original well, drilling of service and injection wells, and drilling for resources other than oil and gas are excluded.

Sources: Years 1970-1972: Energy Information Administration, Office of Oil and Gas. Years 1973-2004: EIA *Monthly Energy Review October 2005*, DOE/EIA-0035(2005/10). Web Page http://www.eia.doe.gov/emeu/mer/resource.html.

Figure 7. U.S. Exploratory Well Completions, 1994-2004

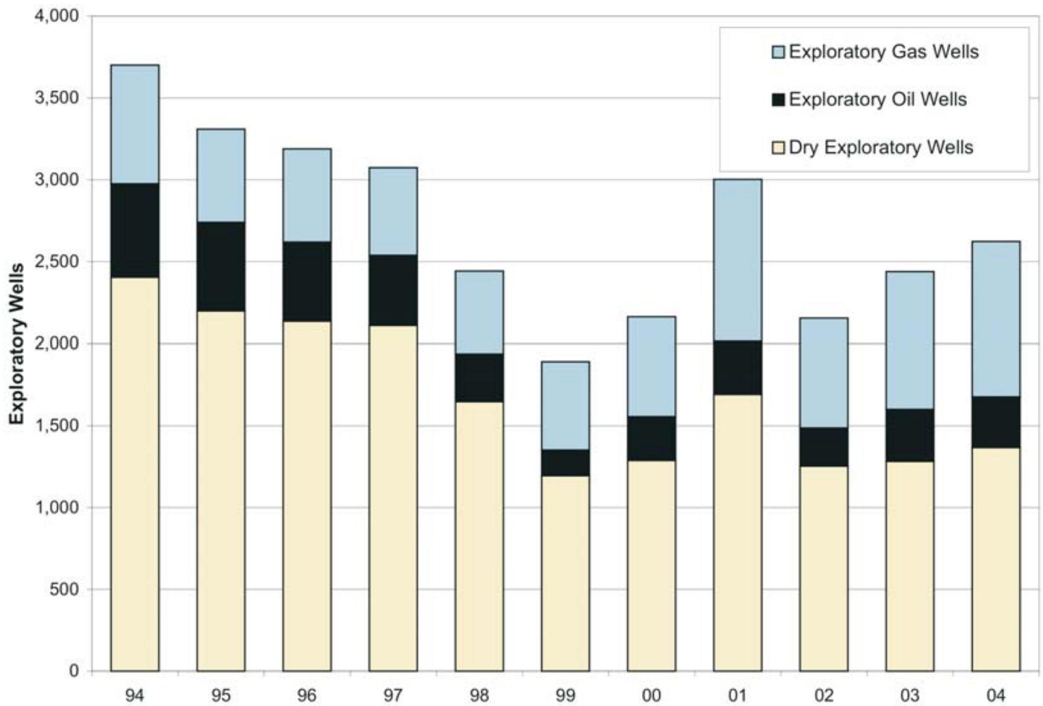
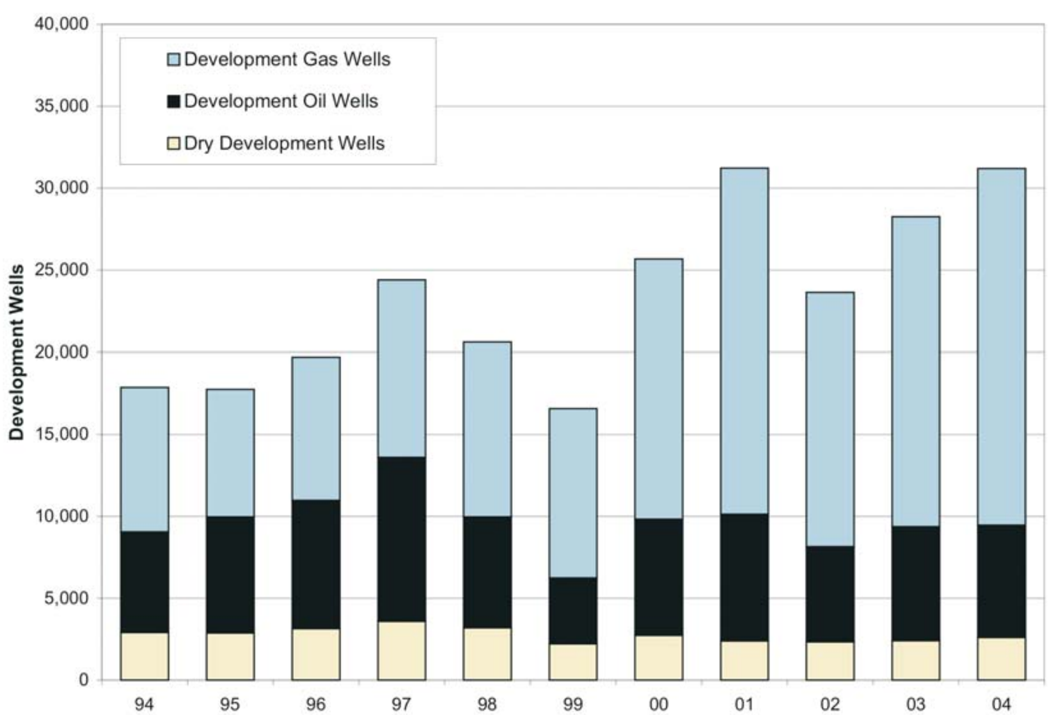


Figure 8. U.S. Development Well Completions, 1994-2004



Source: Energy Information Administration, Office of Oil and Gas.

Figure 9. U.S. Total Discoveries of Dry Natural Gas per Exploratory Gas Well Completion, 1977-2004

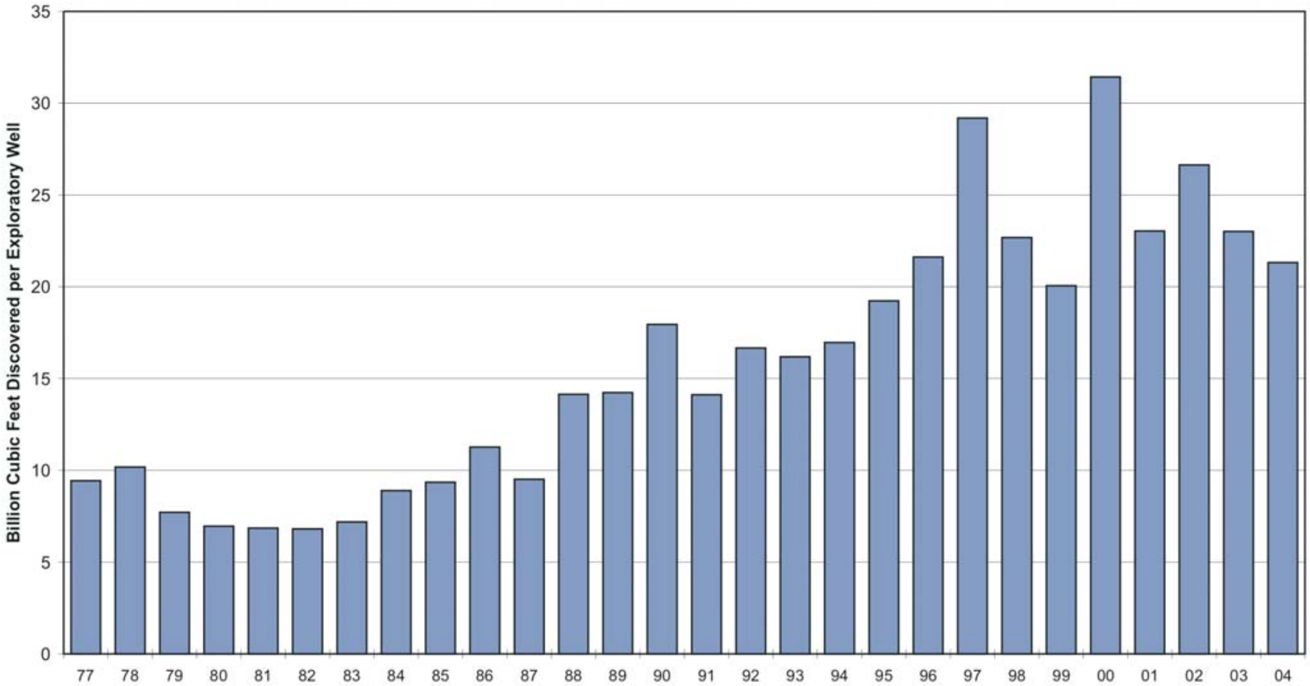
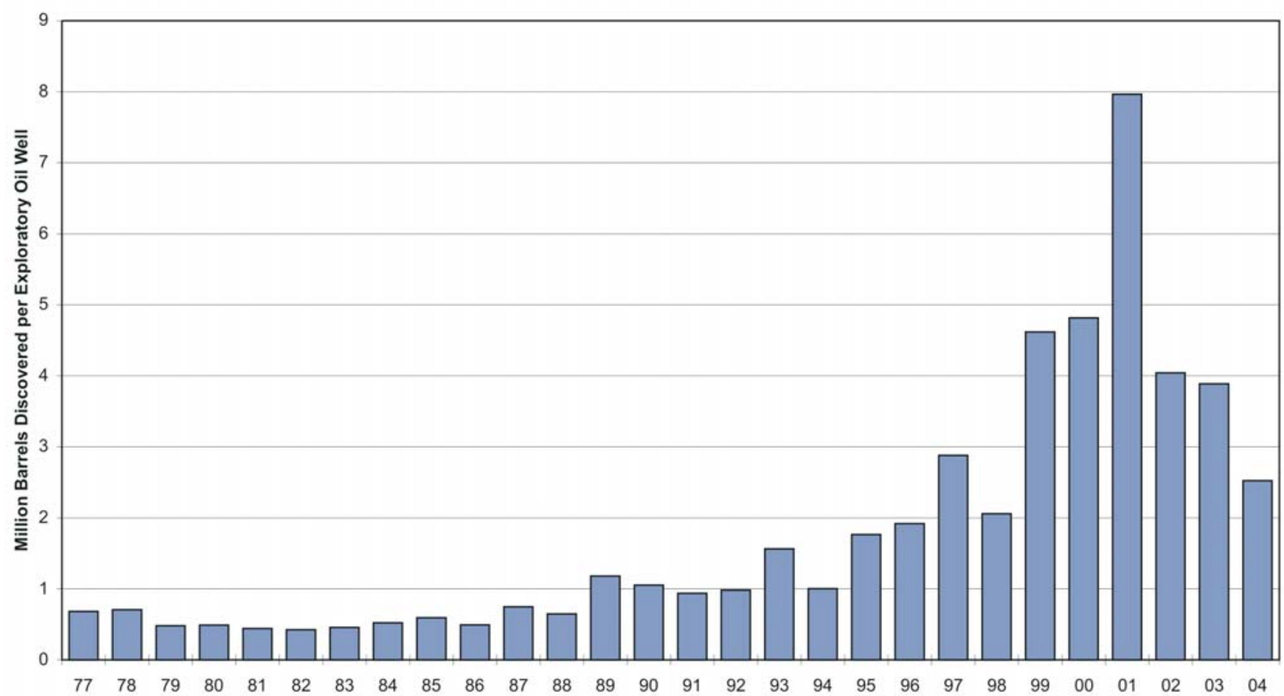


Figure 10. U.S. Total Discoveries of Crude Oil per Exploratory Oil Well Completion, 1977-2004



Source: Energy Information Administration, Office of Oil and Gas.

On May 19, 2004, EnCana Corporation completed its cash tender offer for all outstanding common shares of Tom Brown, Inc. The total value of the transaction, including debt assumption, is approximately US$2.7 billion. This acquisition of Tom Brown will add about 325 million cubic feet per day of gas equivalent production. EnCana's U.S. gas production is expected to reach 1 billion cubic feet per day. {32}

Reserve-to-Production Ratio and Ultimate Recovery

R/P Ratios

The relationship between proved reserves and production levels, expressed as the ratio of reserves to production (R/P ratio) is often used in analyses. For a mature producing area, the R/P ratio tends to be reasonably stable, so that the proved reserves at the end of a year serve as a rough guide to the production level that can be maintained during the following year. Operators report data which yield R/P ratios that vary widely by area depending upon:

- category of operator
- geology and economics
- number and size of new discoveries
- amount of drilling that has occurred.

R/P ratios are an indication of the state of development in an area and, over time, the ratios change. For example, when the Alaskan North Slope oil reserves were booked, the U.S. R/P ratio for crude oil increased because significant production from these reserves did not begin until 7 years after booking due to the need to first build the Trans Alaska pipeline. The U.S. R/P ratio for crude oil decreased from 11.1-to-1 to 9.4-to-1 between 1977 and 1982, as Alaskan North Slope oil production reached high levels.

In 2004, U.S. crude oil proved reserves and oil production decreased, increasing the National average R/P ratio slightly from 11.7 to 11.8.

Figure 11 shows the U.S. R/P ratio trend for crude oil since 1945. After World War II, increased drilling and discoveries led to a greater R/P ratio. Later, when drilling found fewer reserves than were produced, the ratio became smaller. R/P ratios also vary geographically, because of differences in development history and reservoir conditions. The 2004 National average R/P ratio for crude oil was 11.8-to-1. Areas with relatively high R/P ratios are the Permian Basin of Texas and New Mexico, and California, where enhanced oil recovery techniques such as carbon dioxide (CO_2) injection or steamflooding have improved recoverability of oil in old, mature fields. Areas that have the lowest R/P ratios, like the Mid-Continent region, usually have many older fields. There, new technologies such as horizontal drilling have helped to add reserves equivalent to the annual production, keeping the regional reserves and R/P ratio for oil relatively stable.

Figure 12 shows the historical R/P ratio for wet natural gas since 1945. Prior to 1945, R/P ratios were very high since the interstate pipeline infrastructure was not well developed. The market for natural gas grew rapidly after World War II, lowering the R/P ratio. From 2003 to 2004 the U.S. average R/P ratio for natural gas increased from 9.7 to 10.1 since proved reserves increased and production decreased.

Different marketing, transportation, and production characteristics for gas are seen when looking at regional average R/P ratios, compared to the 2003 U.S. average R/P ratio of about 10.1-to-1. Areas with a higher range of R/P ratios than the National average were the Pacific offshore and the Rockies. Several major gas producing areas have R/P ratios below the National average, particularly Texas, the Gulf of Mexico Federal Offshore, and Oklahoma.

Proved Ultimate Recovery

EIA had defined Ultimate Recovery as the sum of proved reserves and cumulative production. However, despite EIA's definition, the volume presented by EIA has often been misinterpreted as the maximum recoverable volume of resources for an area. This neglects the addition of proved reserves over time through ultimate recovery appreciation (a.k.a. reserves growth or field growth) and has led some to make overly-pessimistic resource assessments for the United States. EIA therefore introduced the term, *Proved Ultimate Recovery*:

> **Proved Ultimate Recovery** is the sum of proved reserves and cumulative production. It is expected to change over time for any field, group of fields, State, or Country. Proved Ultimate Recovery does not represent the maximum recoverable volume of resources for an area. It is instead a gauge of how much has already been produced plus proved reserves. Proved reserves of crude oil or natural gas are the estimated quantities of petroleum which geological and

Figure 11. Reserves-to-Production Ratios for Crude Oil, 1945-2004

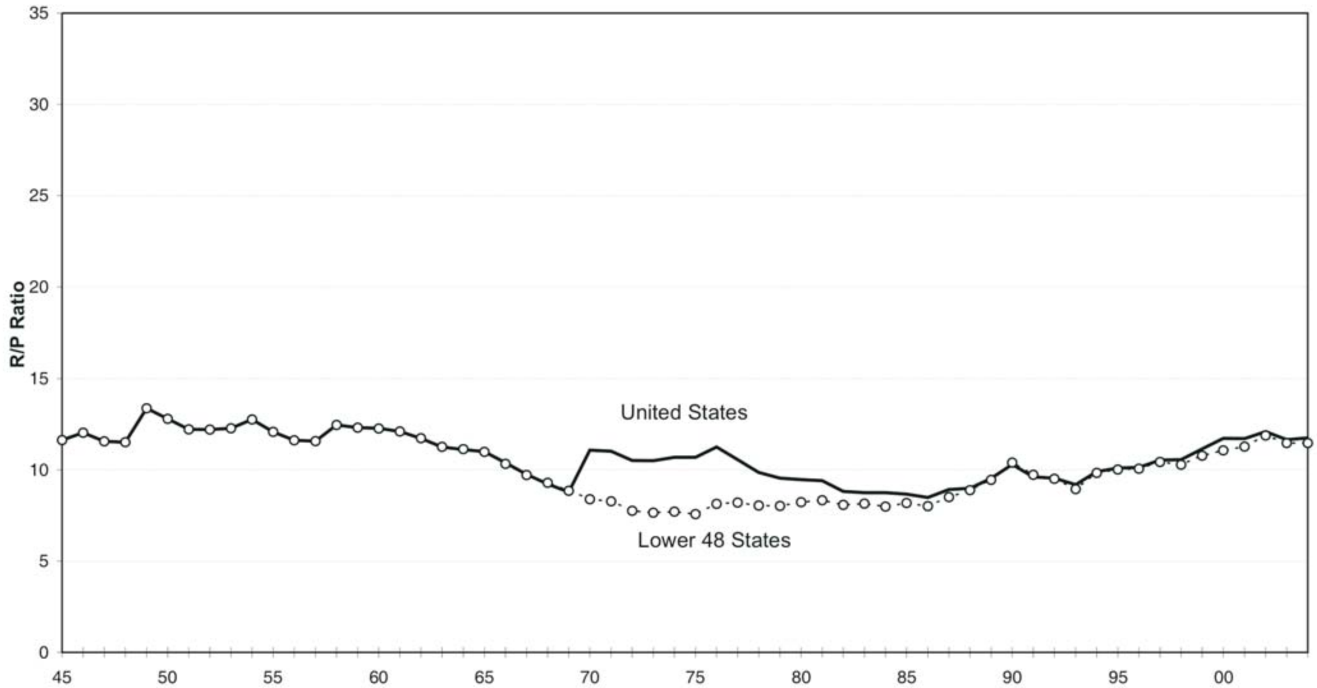
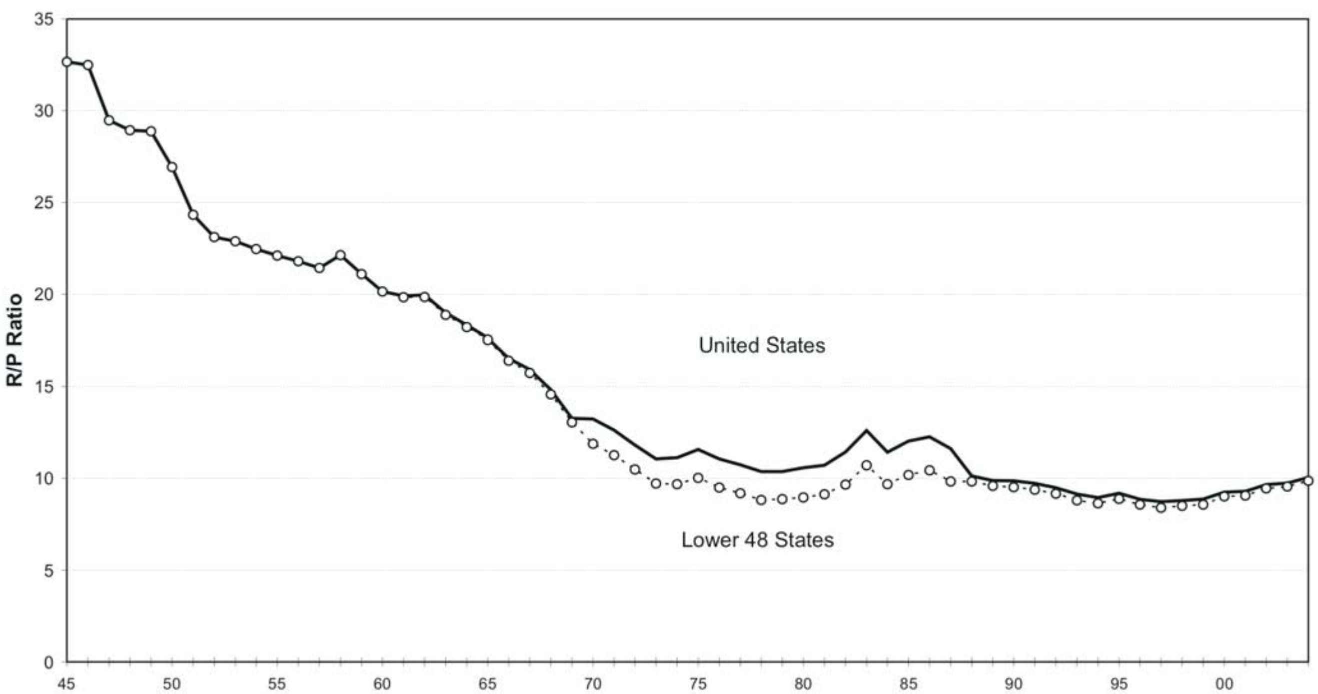


Figure 12. Reserves-to-Production Ratios for Wet Natural Gas, 1945-2004



Sources: Annual reserves and production - American Petroleum Institute and American Gas Association (1945–1976) {33} and Energy Information Administration, Office of Oil and Gas (1977–2003){1-27}. Cumulative production: *U.S. Oil and Gas Reserves by Year of Field Discovery* (1977-1988).{34}

Figure 13. Components of Proved Ultimate Recovery for Crude Oil and Lease Condensate, 1977-2004

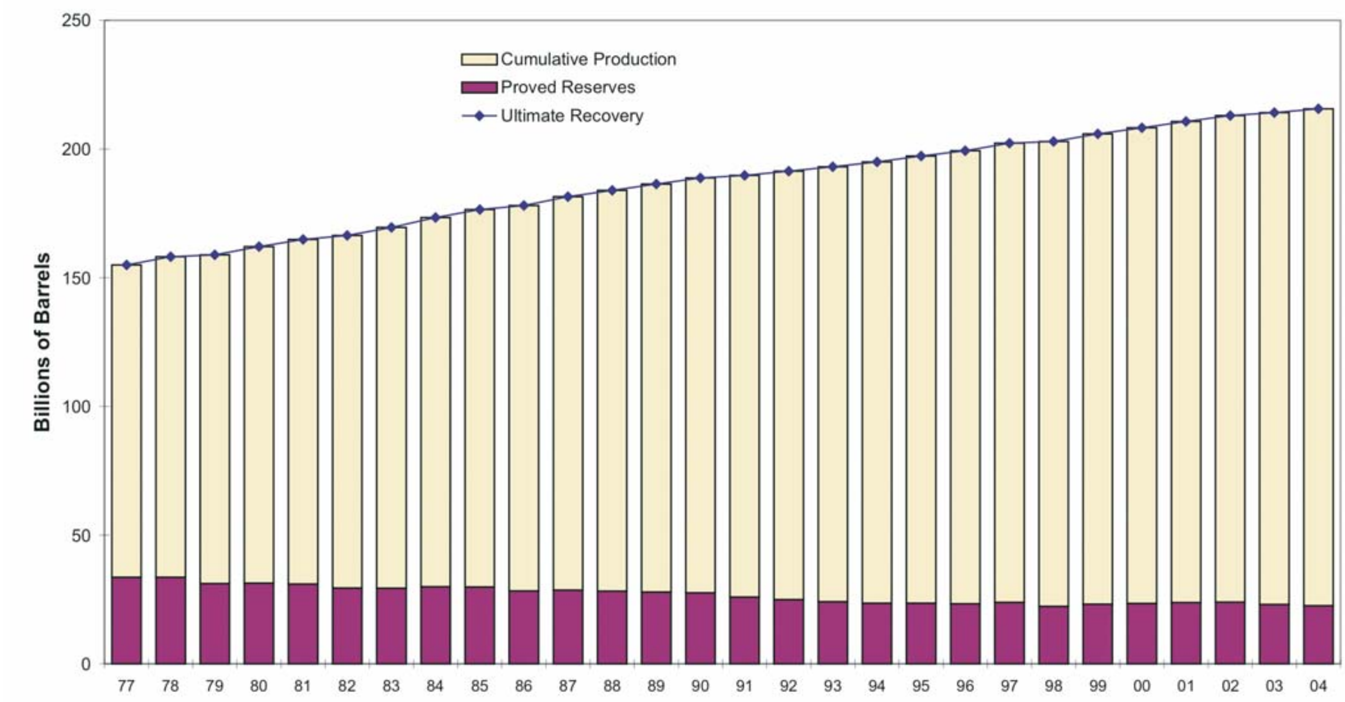
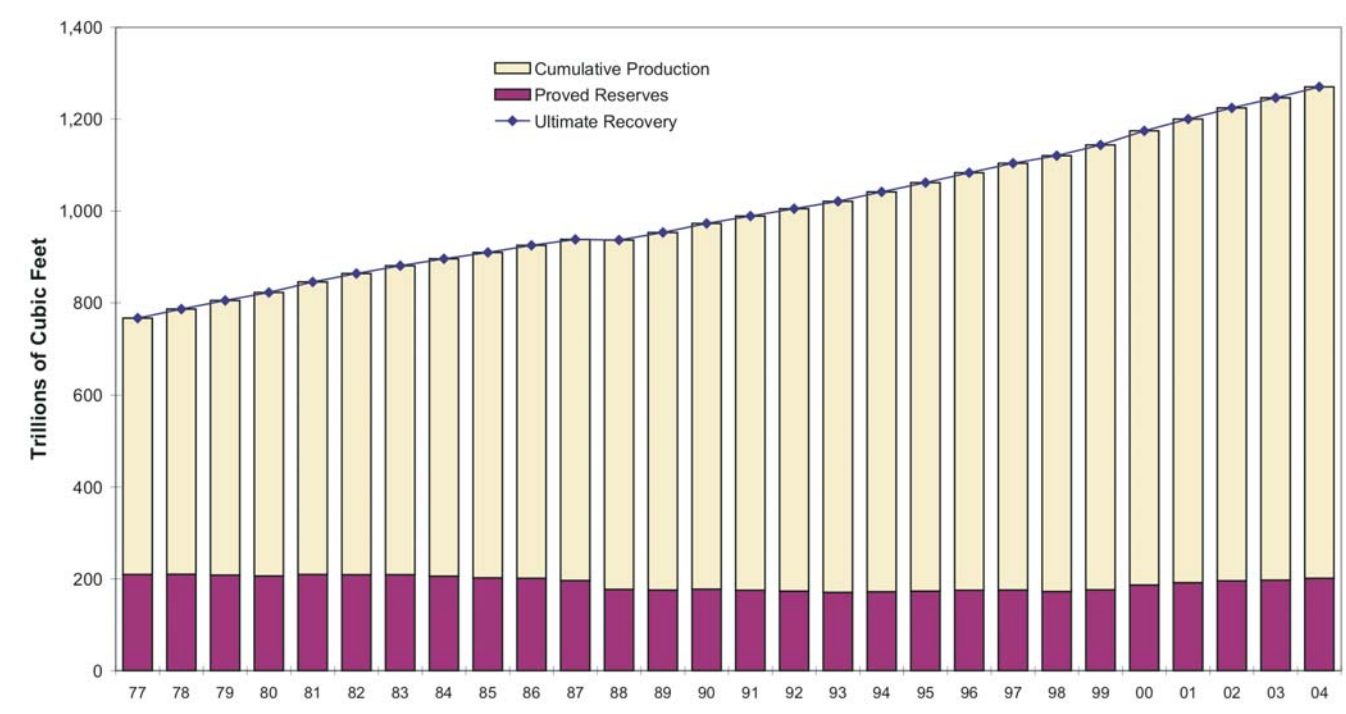


Figure 14. Components of Proved Ultimate Recovery for Wet Natural Gas, 1977-2004



Sources: Annual reserves and production - American Petroleum Institute and American Gas Association (1945–1976) {33} and Energy Information Administration, Office of Oil and Gas (1977–2003){1-27}. Cumulative production: *U.S. Oil and Gas Reserves by Year of Field Discovery* (1977-1988).{34}

Table 5. International Oil and Natural Gas Reserves as of December 31, 2004

Oil (million barrels)				Natural Gas (billion cubic feet)			
Rank[a]	Country	Oil & Gas Journal	World Oil	Rank[b]	Country	Oil & Gas Journal	World Oil
1	Saudia Arabia[c]	[d]261,900	[d]262,075	1	Russia	1,680,000	2,361,053
2	Iran[c]	125,800	130,800	2	Iranc	940,000	944,670
3	Iraq[c]	115,000	115,000	3	Qatar[c]	910,000	913,400
4	Kuwait[c]	[d]101,500	[d]99,675	4	Saudia Arabia[c]	[d]235,000	[d]238,500
5	United Arab Emirates[c]	97,800	69,910	5	United Arab Emirates[c]	212,100	204,050
6	Canada[e]	178,893	4,700	6	United States	192,513	192,513
7	Venezuela[c]	77,226	52,400	7	Nigeria[c]	176,000	180,000
8	Russia	60,000	67,138	8	Algeria[c]	160,500	171,500
9	Libya[c]	39,000	33,550	9	Venezuela[c]	151,000	150,500
10	Nigeria[c]	35,255	36,630	10	Iraq[c]	110,000	112,600
Top 10 Total		**1,077,193**	**831,305**	**Top 10 Total**		**4,737,113**	**5,468,786**
11	United States	21,371	21,371	11	Australia	90,000	142,900
12	Qatar[c]	15,207	20,000	12	Norway	74,800	84,261
13	China	18,250	15,443	13	Indonesia[c]	90,300	63,000
14	Mexico	14,600	14,803	14	Turkmenistan	71,000	-
15	Algeria[c]	11,800	15,303	15	Uzbekistan	66,200	-
16	Brazil	10,600	11,243	16	Malaysia	75,000	56,562
17	Norway	8,500	9,863	17	Kazakhstan	65,000	-
18	Kazakhstan	9,000	-	18	Egypt	58,500	66,000
19	Angola	5,412	9,035	19	Canada	59,069	60,715
20	Azerbaijan	7,000	-	20	Netherlands	62,000	55,515
21	Oman	5,506	4,803	21	Kuwait[c]	[d]55,500	[d]56,600
22	India	5,371	4,936	22	China	53,325	51,377
23	Ecuador	4,630	5,500	23	Libya[c]	46,400	51,500
24	Indonesia[c]	4,700	5,295	24	Ukraine	39,600	-
25	United Kingdom	4,487	3,908	25	Oman	29,280	24,240
Top 25 Total		**1,238,808**	**1,013,381**	**Top 25 Total**		**5,703,087**	**6,181,456**
OPEC Total		**885,188**	**840,638**	**OPEC Total**		**3,086,800**	**3,086,320**
World Total		**1,277,182**	**1,081,813**	**World Total**		**6,040,208**	**6,994,298**

[a]Rank is based on an average of oil reserves reported by *Oil & Gas Journal* and *World Oil*.
[b]Rank is based on an average of natural gas reserves reported by *Oil & Gas Journal* and *World Oil*.
[c]Member of the Organization of Petroleum Exporting Countries (OPEC).
[d]Includes one-half of the reserves in the Neutral Zone.
[E]*Oil and Gas Journal* Canadian oil reserves include heavy (low gravity) oil.

Note: The Energy Information Administration does not certify these international reserves data, but reproduces the information as a matter of convenience for the reader.

Sources: PennWell Publishing Company, *Oil and Gas Journal*, Vol. 102, No. 47 (December 20, 2004). Gulf Publishing Company, *World Oil*, Vol. 226, No. 9 (September, 2005).

engineering data demonstrate with reasonable certainty to be recoverable in future years from known reservoirs under existing economic and operating conditions. When deterministic proved reserves estimation methods are used, the term reasonable certainty is intended to express a high degree of confidence that the estimated quantities will be recovered. When probabilistic methods are used there should be at least a 90 percent probability that the actual quantities recovered will exceed the estimate.

Figures 13 and 14 show successive estimates of proved ultimate recovery and its components (proved reserves and cumulative production) for both *crude oil plus lease condensate* and *wet natural gas*, over the period 1977 through 2004. They illustrate the continued appreciation (growth) of proved ultimate recovery over time.

In 1977, U.S. *crude oil plus lease condensate* proved reserves were 33,615 million barrels. Cumulative production of *crude oil plus lease condensate* for 1977 through 2004 was 71,733 million barrels. This substantially exceeds the 1977 proved reserves, but at the end of 2004 there were still 22,592 million barrels of *crude oil plus lease condensate* proved reserves. Therefore, the Nation's estimated proved ultimate recovery of crude oil was fundamentally increased during this period owing to the *proved ultimate recovery appreciation* process (continued development of old fields). In fact, only 12 percent of proved reserves additions of crude oil were booked as *new field discoveries* from 1976 through 2004. The rest came from the proved reserves categories related to the proved ultimate recovery appreciation process.

Similarly, the 1977 *wet natural gas* proved reserves were 209,490 billion cubic feet, but more than twice this amount of gas was produced from 1977 through 2004 and there were still 201,200 billion cubic feet of *wet natural gas* proved reserves in 2004. Only 11 percent of proved reserve additions of natural gas were booked as *new field discoveries* from 1976 through 2004.

International Perspective

International Reserves

The EIA estimates domestic oil and gas reserves but does not systematically estimate worldwide reserves. As shown in **Table 5**, international reserves estimates are presented in two widely circulated trade publications. The world's total reserves are estimated to be roughly 1.2 trillion barrels of oil and 6.5 quadrillion cubic feet of gas.

The United States ranked 11th in the world for proved reserves of crude oil and 6th for natural gas in 2004. A comparison of EIA's U.S. proved reserves estimates with worldwide estimates obtained from other sources shows that the United States had 2 percent of the world's total crude oil proved reserves and 3 percent of the world's total natural gas proved reserves at the end of 2004. There are sometimes substantial differences between the estimates from these sources. The *Oil & Gas Journal* reported oil reserves for Canada at about 179 billion barrels. This is much higher than the *World Oil* estimate of 5 billion. The *Oil and Gas Journal* estimate includes heavy oil from Canadian tar sands, the *World Oil* estimate does not. Another reason (among many) for these differences is that condensate is often included in foreign oil reserve estimates.

The *Oil & Gas Journal* {35} estimate for world oil reserves increased 1 percent in 2004 owing to an increase in its estimate of Kuwait's reserves. The *World Oil* {36} estimate increased 3 percent in 2004 due to its larger estimate of Saudi Arabia and Iran's reserves. For world gas reserves, the *Oil & Gas Journal* reported a 0.5 percent increase, while *World Oil* reported a 0.3 percent increase in 2004.

Several foreign countries have oil reserves considerably larger than those of the United States. Saudi Arabian oil reserves are the largest in the world, dwarfing U.S. oil reserves. Iraqi oil reserves are almost 5 times U.S. reserves. Closer to home, Venezuela and Canada have about 3 times U.S. Reserves based on averages of the *World Oil* and *Oil & Gas Journal* estimates.

Petroleum Consumption

The United States is the world's largest energy consumer. The EIA estimates energy consumption and publishes it in its *Annual Energy Review*.{37} In 2004:

- The U.S. consumed 99,740,000,000,000,000 Btu of energy (99.7 quadrillion Btu). This was an increase of 1.43 quadrillion Btu from the 2003 level of consumption.
- 63 percent of U.S. energy consumption was provided by petroleum and natural gas—crude oil and natural gas liquids combined (40 percent), and natural gas (23 percent).

- U.S. petroleum consumption was about 21 million barrels of oil and natural gas liquids and 61 billion cubic feet of gas per day.

Dependence on Imports

The United States remains dependent on imported oil and gas. In 2004, crude oil imports made up 63 percent of the U.S. crude oil supply. Canada, Mexico, Saudi Arabia, Venezuela, Nigeria, and Iraq were the primary foreign suppliers of petroleum to the United States.{38}

Net gas imports increased from the 2003 total of 3.93 trillion cubic feet to 4.26 trillion cubic feet in 2004. Imports satisfied approximately 19 percent of consumption. Almost all of this gas was pipelined from Canada. Some liquefied natural gas was imported from Trinidad and Tobago and Algeria.

List Of Appendices

Appendix A: Operator Level Data - How much of the National total of proved reserves are owned and operated by the large oil and gas corporations? Appendix A separates the large operators from the small and presents reserves data according to operator production size classes. Table A6 in Appendix A lists the top U.S. operators by reported 2004 production.

Appendix B: Top 100 Oil and Gas Fields - What fields have the most reserves and production in the United States? The top 100 fields for oil and natural gas out of the inventory of more than 45,000 oil and gas fields are listed in Appendix B. These fields hold two-thirds of U.S. crude oil proved reserves. Two new tables have been added to this appendix for 2004, ranking the top 100 oil and natural gas fields by their 2004 production rather than their proved reserves.

Appendix C: Conversion to the Metric System - To simplify international comparisons, a summary of U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves expressed in metric units is included as Appendix C.

Appendix D: Historical Reserves Statistics - Appendix D contains selected historical reserves data presented at the State and National level. Readers interested in a historical look at one specific State or region can review these tables. We have again included Table D9, Deepwater Production and Proved Reserves of the Gulf of Mexico Federal Offshore 1994-2004, due to expressed interest from the industry regarding this area. Table D9 contains the production and proved reserves for 1994-2004 for the Gulf of Mexico Federal Offshore region by water depths greater than 200 meters, and less than 200 meters.

Appendix E: Summary of Data Collection Operations - This report is based on two EIA surveys. Proved reserves data is collected annually from U.S. oil and gas field operators on Form EIA-23. Natural gas liquids production data is collected annually from U.S. natural gas plant operators on Form EIA-64A. Appendix E describes survey designs, response statistics, reporting requirements, and sampling frame maintenance.

Appendix F: Statistical Considerations - The EIA strives to maintain or improve the accuracy of its reports. Since complete coverage of all oil and gas operators is impractical, the EIA has adopted sound statistical methods to impute data for those operators not sampled and for those data elements that smaller operators are not required to file. These methods are described in Appendix F.

Appendix G: Estimation of Reserves and Resources - Reserves are not measured directly. Reserves are estimated on the basis of the best geological, engineering, and economic data available to the estimator. Appendix G describes reserve estimation techniques commonly used by oil and gas field operators and EIA personnel when in the field performing quality assurance checks. A discussion of the relationship of reserves to overall U.S. oil and gas resources is also included.

Appendix H: Maps of Selected State Subdivisions - Certain large producing States have been subdivided into smaller regions to allow more specific reporting of reserves data. Maps of these States identifying the smaller regions are provided in Appendix H.

Appendix I: Annual Survey Forms of Domestic Oil and Gas Reserves - Samples of Form EIA-23 and Form EIA-64A are presented in Appendix I.

Glossary - Contains definitions of many of the technical terms used in this report.

3. Crude Oil Statistics

The United States had 21,371 million barrels of crude oil proved reserves as of December 31, 2004. Crude oil proved reserves declined by 2 percent in 2004 owing mostly to a large 9 percent decrease in the Gulf of Mexico.

Boosted by reserves additions in Wyoming, Montana, North Dakota, and Texas, the crude oil proved reserves of the onshore lower 48 States increased by 0.1 percent. However, three of the four largest crude oil reserves areas, the Gulf of Mexico, Alaska, and California, registered reserves declines. U.S. new field discoveries were the lowest in 12 years and as a result operators only replaced 71 percent of crude oil production with reserves additions. (**Figure 15**).

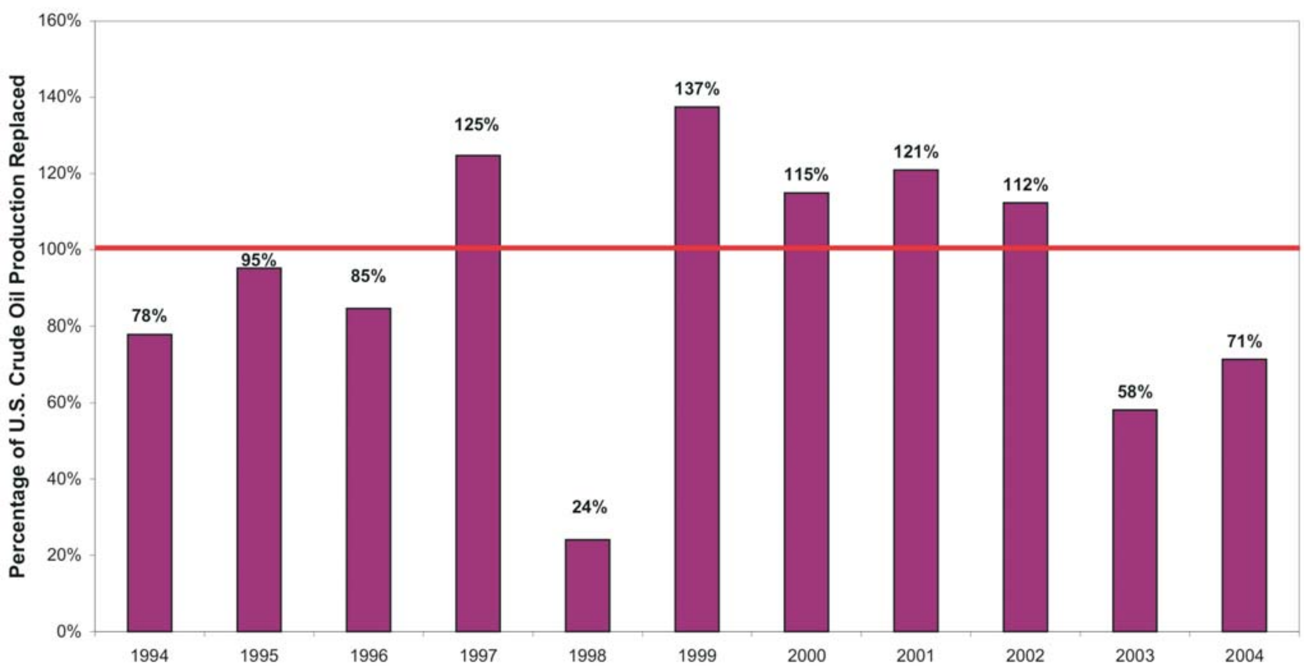
Proved Reserves

Table 6 presents the U.S. proved reserves of crude oil as of December 31, 2004, by selected States and State subdivisions.

Figure 16 maps 2004 crude oil proved reserves by area. The following four areas account for 77 percent of U.S. crude oil proved reserves:

Area	Percent of U.S. Oil Reserves
Texas	22
Alaska	20
Gulf of Mexico Federal Offshore	19
California	16
Area Total	**77**

Figure 15. Replacement of U.S. Crude Oil Production by Reserves Additions, 1994-2004.



Source: Energy Information Administration, Office of Oil and Gas.

Table 6. Crude Oil Proved Reserves, Reserves Changes, and Production, 2004
(Million Barrels of 42 U.S. Gallons)

State and Subdivision	Published Proved Reserves 12/31/03	Changes in Reserves During 2004: Adjustments (+,–)	Revision Increases (+)	Revision Decreases (–)	Sales (–)	Acquisitions (+)	Extensions (+)	New Field Discoveries (+)	New Reservoir Discoveries in Old Fields (+)	Estimated Production (–)	Proved Reserves 12/31/04
Alaska	4,446	-1	191	144	0	0	111	0	58	334	4,327
Lower 48 States	**17,445**	**75**	**1,748**	**1,375**	**937**	**960**	**506**	**33**	**74**	**1,485**	**17,044**
Alabama	52	2	0	4	0	0	8	0	0	5	53
Arkansas	50	1	4	1	0	0	1	2	0	6	51
California	3,452	3	210	97	142	147	42	0	0	239	3,376
Coastal Region Onshore	395	-5	16	23	11	17	8	0	0	17	380
Los Angeles Basin Onshore	319	4	7	50	0	0	22	0	0	16	286
San Joaquin Basin Onshore	2,565	4	154	20	114	115	10	0	0	191	2,523
State Offshore	173	0	33	4	17	15	2	0	0	15	187
Colorado	217	-1	16	4	10	13	12	0	0	18	225
Florida	68	1	0	1	0	0	0	0	0	3	65
Illinois	125	-7	11	2	25	0	0	0	0	10	92
Indiana	19	-6	2	0	2	0	0	0	0	2	11
Kansas	243	10	38	13	15	11	4	0	0	33	245
Kentucky	25	3	1	2	0	0	2	0	0	2	[a]27
Louisiana	452	0	67	71	31	29	32	2	4	57	427
North	66	3	10	14	2	1	3	0	0	9	58
South Onshore	314	-3	42	43	21	21	25	2	3	36	304
State Offshore	72	0	15	14	8	7	4	0	1	12	65
Michigan	75	-12	2	9	0	0	2	0	0	5	53
Mississippi	169	-5	32	2	4	5	0	0	0	17	178
Montana	315	-5	54	32	5	10	47	0	2	22	364
Nebraska	16	1	1	1	0	1	0	0	0	3	15
New Mexico	677	11	60	48	76	72	32	0	1	60	669
East	668	13	58	47	76	72	32	0	1	59	662
West	9	-2	2	1	0	0	0	0	0	1	7
North Dakota	353	-4	167	115	27	32	14	0	1	32	389
Ohio	66	-16	6	3	0	0	1	0	0	5	49
Oklahoma	588	23	96	104	56	58	15	0	1	51	570
Pennsylvania	13	1	1	2	0	0	1	0	0	2	12
Texas	4,583	71	401	261	229	281	125	2	0	360	4,613
RRC District 1	59	-1	9	2	4	2	2	1	0	8	58
RRC District 2 Onshore	51	9	2	4	1	1	6	0	0	8	56
RRC District 3 Onshore	190	24	50	47	16	9	3	0	0	28	185
RRC District 4 Onshore	30	1	6	7	0	0	1	0	0	4	27
RRC District 5	20	0	7	1	0	1	0	0	0	4	23
RRC District 6	189	13	8	12	1	2	4	0	0	16	187
RRC District 7B	68	4	11	2	8	6	4	0	0	10	73
RRC District 7C	205	-3	9	10	8	9	20	0	0	16	206
RRC District 8	1,513	7	120	95	81	129	67	1	0	109	1,552
RRC District 8A	2,089	9	162	56	104	112	14	0	0	136	2,090
RRC District 9	114	4	10	15	3	4	3	0	0	15	102
RRC District 10	48	1	6	9	2	5	1	0	0	5	45
State Offshore	7	3	1	1	1	1	0	0	0	1	9
Utah	221	3	14	17	27	27	7	0	0	13	215
West Virginia	13	-4	3	0	0	0	0	0	0	1	11
Wyoming	517	4	110	23	54	56	61	0	0	43	628
Federal Offshore	5,120	3	450	562	234	218	99	27	65	495	4,691
Pacific (California)	566	1	24	14	103	97	4	0	0	28	547
Gulf of Mexico (Louisiana)	4,251	2	319	448	106	119	94	27	65	404	3,919
Gulf of Mexico (Texas)	303	0	107	100	25	2	1	0	0	63	225
Miscellaneous[b]	16	-2	2	1	0	0	1	0	0	1	15
U.S. Total	**21,891**	**74**	**1,939**	**1,519**	**937**	**960**	**617**	**33**	**132**	**1,819**	**21,371**

[a]Indicates the estimate is associated with a sampling error (95 percent confidence interval) that exceeds 20 percent of the estimated value.
[b]Includes Arizona, Missouri, Nevada, New York, South Dakota, Tennessee, and Virginia.

Note: The production estimates in this table are based on data reported on Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves." They may differ from the official Energy Information Administration production data for crude oil for 2004 contained in the *Petroleum Supply Annual 2004*, DOE/EIA-0340(04).

Source: Energy Information Administration, Office of Oil and Gas.

Figure 16. Crude Oil Proved Reserves by Area, 2004

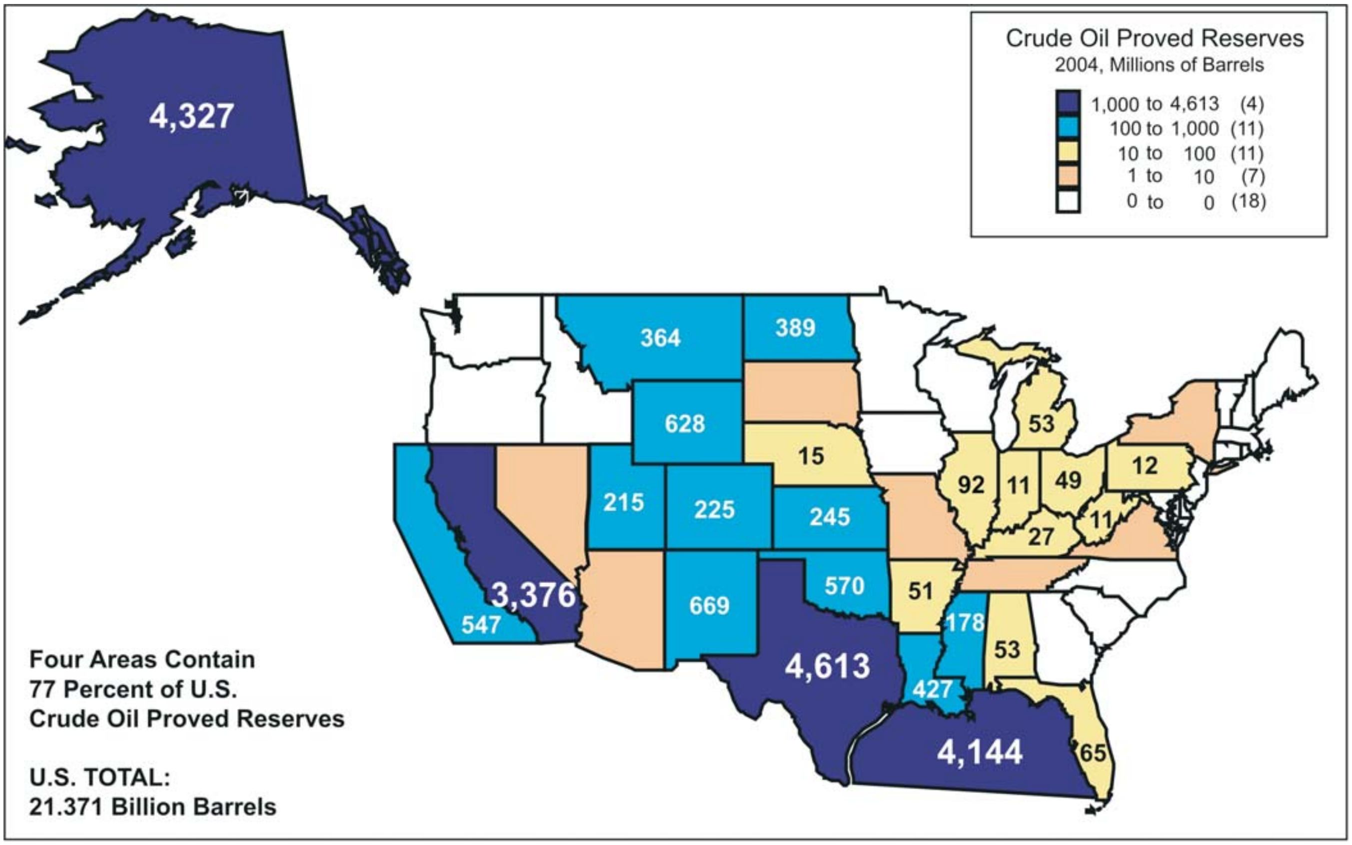
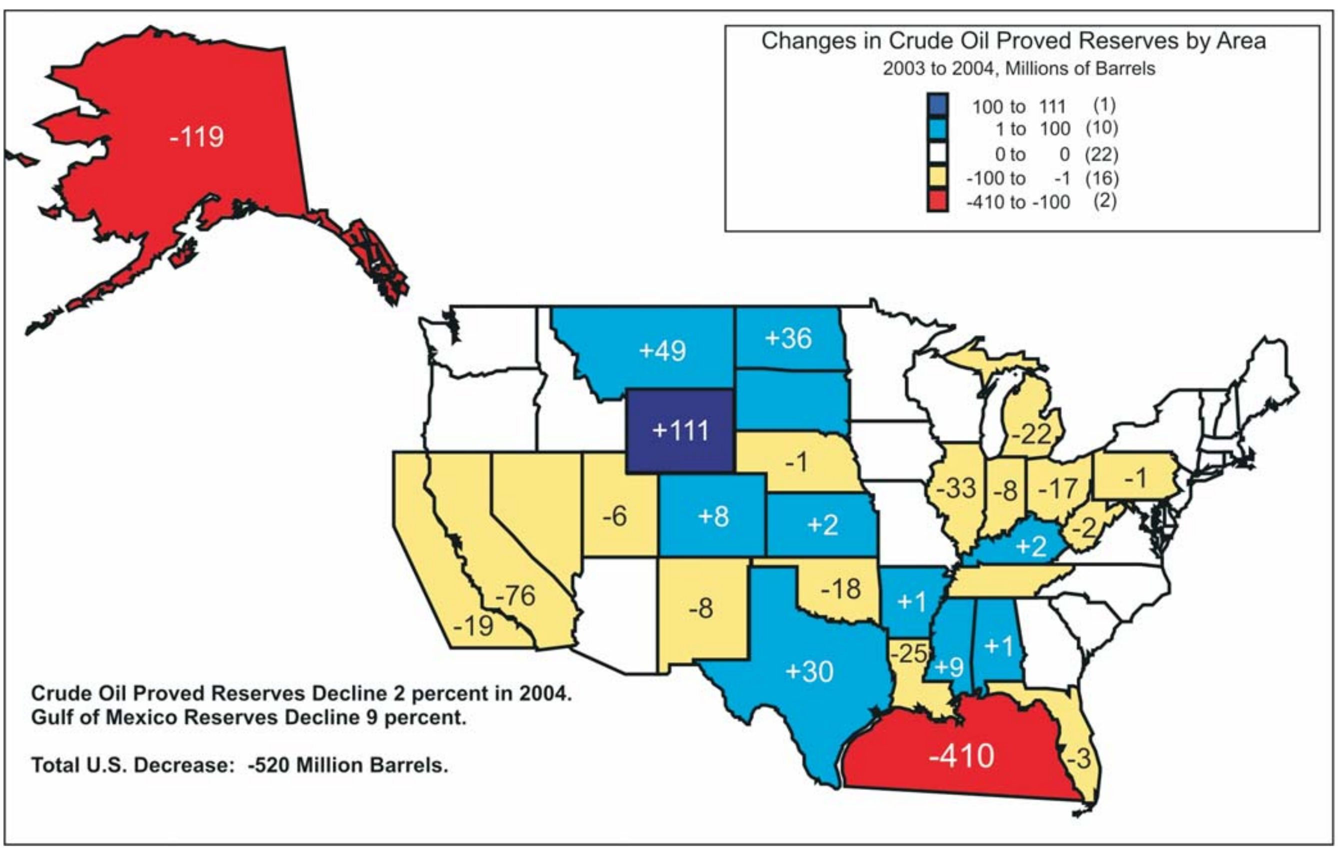


Figure 17. Changes in Crude Oil Proved Reserves by Area, 2003 to 2004



Source: Energy Information Administration, Office of Oil and Gas.

Of these four areas, only Texas had an increase in crude oil proved reserves in 2004 (less than 1 percent). The Gulf of Mexico reported a 9 percent decrease, Alaska declined 3 percent, and California declined 2 percent.

Discussion of Reserves Changes

Figure 17 maps the change in crude oil proved reserves from 2003 to 2004 by area. Here's how the top four areas fared compared to the total United States:

Area	Change in U.S. Oil Reserves (million barrels)
Texas	+30
Alaska	-119
Gulf of Mexico Federal Offshore	-410
California	-76
Area Total	**-575**
U.S. Total	**-520**

Figure 2 in Chapter 2 shows the components of the changes in crude oil proved reserves for 2004 and the preceding 10 years.

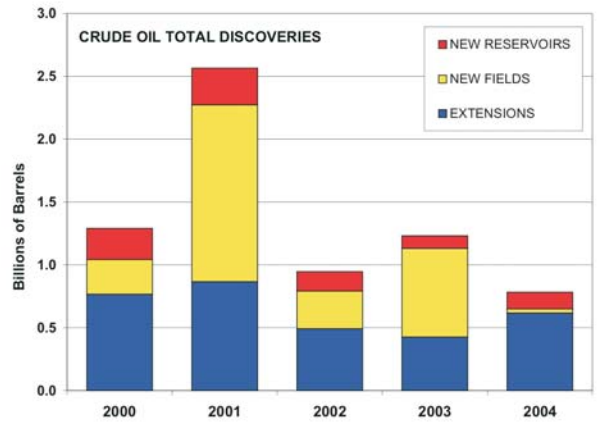
Total Discoveries

Total discoveries are those new reserves attributable to extensions of existing fields, new field discoveries, and new reservoir discoveries in old fields. They result from the drilling of new wells.

Total discoveries of crude oil were 782 million barrels in 2004, 37 percent less than those of 2003. Only four areas had total discoveries exceeding 50 million barrels in 2004:

- The Gulf of Mexico Federal Offshore had 187 million barrels of total discoveries, 24 percent of the National total.
- Alaska had 169 million barrels of total discoveries, 22 percent of the National total.
- Texas had 127 million barrels of total discoveries, 16 percent of the National total.
- Wyoming had 61 million barrels of total discoveries, 8 percent of the National total.

The United States discovered an average of 1,105 million barrels of new crude oil proved reserves per year in the prior 10 years. Total discoveries in 2004 were 29 percent lower than that average.



Extensions

Operators reported 617 million barrels of extensions in 2004, 45 percent more than in 2003. The highest volume of extensions was reported in Texas (125 million barrels). The second highest volume of extensions in 2004 was in Alaska with 111 million barrels. The Gulf of Mexico Federal Offshore reported 95 million barrels of extensions. Wyoming was fourth with 61 million barrels of extensions.

In the prior 10 years, U.S. operators reported an average of 422 million barrels of extensions per year. The 2004 extensions were 22 percent more than that average.

New Field Discoveries

There were 33 million barrels of new field discoveries of crude oil reported in 2004. This is 95 percent less than in 2003 and the lowest volume reported in twelve years. Only four areas in the United States reported any new field discoveries. The Gulf of Mexico Federal Offshore had 27 million barrels (82 percent), and Arkansas, Louisiana, and Texas each had 2 million barrels of new field discoveries.

In the prior 10 years, U.S. operators had reported an annual average of 422 million barrels of reserves from new field discoveries. Reserves from new field discoveries in 2004 were 92 percent less than that average.

New Reservoir Discoveries in Old Fields

Operators reported 132 million barrels of crude oil reserves from new reservoir discoveries in old fields in 2004. This is 31 percent more than 2003 and most of the new reservoir discoveries in old fields came from two areas: the Gulf of Mexico Federal Offshore—65 million barrels (49 percent) and Alaska --58 million barrels (44 percent). The remaining 9 million barrels (7 percent) of new reservoirs were discovered in Louisiana, Montana, New Mexico, North Dakota, and Oklahoma.

In the prior 10 years, U.S. operators reported an annual average of 178 million barrels of reserves from new reservoir discoveries in old fields. Reserves from new reservoir discoveries in old fields in 2004 were 26 percent less than that average.

Revisions and Adjustments

Thousands of positive and negative revisions to proved reserves occur each year as development wells are drilled, well performance is analyzed, new technology is applied, or economic conditions change. Adjustments are the annual changes in the published reserve estimates that cannot be directly attributed to the estimates for other reserve change categories because of the survey and statistical estimation methods employed.

There were 1,939 million barrels of revision increases, 1,519 million barrels of revision decreases, and 74 million barrels of adjustments in 2004. Combined, there were 494 million barrels of net revisions and adjustments for crude oil in 2004.

In the prior 10 years, net revisions and adjustments added an annual average of 865 million barrels. The 2004 net revisions and adjustments were 43 percent less than that average.

Sales and Acquisitions

Sales represents that volume of crude oil proved reserves deducted from an operator's total reserves by selling or transferring operations of existing oil fields or properties to another operator (not a volume of production "sold" at the wellhead). Similarly, acquisitions are that volume of proved reserves added to an operator's total reserves through purchase or operations transfer of an existing oil field or properties.

There are several reasons why sales and acquisitions volumes are not equal. Since operators have different engineering staffs and resources, or different development plans or schedules, the estimate of proved reserves for a field can change with a change in operatorship. Timing of the transfer of operations can also impact these values.

In 2004, there were 937 million barrels of sales transactions between operators and 960 million barrels of acquisitions yielding a net difference of +23 million barrels.

Production

U.S. production of crude oil in 2004 was an estimated 1,819 million barrels. This volume does not include lease condensate. This was less than 3 percent lower than 2003's production of 1,877 million barrels.

In the last quarter of 2004, Hurricane Ivan disrupted production operations in the Gulf of Mexico by damaging surface facilities and triggering underwater mudslides that destroyed sections of sea-bottom pipelines. Production from the Gulf of Mexico Federal Offshore dropped 4 percent from 2003 to 2004. Despite this, the Gulf remained the largest producing area in the United States with 26 percent of the National total (467 million barrels of production). Texas and Alaska were second and third, with 20 and 18 percent of the National production total, respectively. California was fourth with 13 percent.

The 2004 Form EIA-23 National production estimates (2,001 million barrels of crude oil and lease condensate) are 1 percent higher than the comparable Petroleum Supply Annual (PSA) 2004 volumes for crude oil and lease condensate production combined (1,983 million barrels).

Areas of Note: Large Discoveries and Reserves Additions

The following State and area discussions summarize notable activities during 2004 concerning expected new field reserves, development plans, and possible production rates as reported in various trade publications. The citations do not necessarily reflect EIA's concurrence, but are considered important enough to be brought to the reader's attention.

The following areas were the major success stories for crude oil reserves and production for 2004.

Wyoming

Wyoming led the Nation in net crude oil proved reserves additions in 2004, adding 111 million barrels to the National total.

- **Salt Creek Field**: Of particular note are the new carbon dioxide (CO_2) injection enhanced oil recovery projects begun by Anadarko Petroleum Corporation, which completed construction of a pipeline to deliver CO_2 to Salt Creek, Monell, and Sussex fields in Wyoming in early 2004. Anadarko reports that the fields' production responses have met expectations." {39}

Montana

Montana reported a net increase of 49 million barrels of crude oil proved reserves in 2004. Montana's production also increased by 16 percent to 22 million barrels in 2004.

- **Cedar Creek Anticline:** Burlington Resources is conducting two of the world's largest horizontally drilled waterflooding programs on the eastern flank of the Cedar Creek Anticline, centered in the 50-year old East Lookout Butte and Cedar Hills South fields. Burlington implemented a waterflood and 320-acre well spacing, and also extended the original horizontal wells to lateral lengths of 8,000 feet or more to improve waterflood response. These efforts have boosted the [estimated ultimate recovery] from the original 2 percent to 30 percent of the oil in place. Production has responded substantially, more than doubling in 2004. Capital investments in 2004 of $113 million included drilling 47 new producing wells and eight injection wells.{40}

North Dakota

North Dakota reported a net increase of 36 million barrels of proved oil reserves in 2004. Like Montana, this State is a beneficiary of increased activity at the Cedar Creek Anticline, which straddles the border of both States. (See **Cedar Creek Anticline** bullet, above.) North Dakota's oil production rose 6 percent in 2004.

Texas

Texas reported a net increase of 30 million barrels of proved oil reserves in 2004 and had the largest volume of extensions in 2004 (125 million barrels). The majority of these extensions were to fields located in the Permian Basin.

Other Gain Areas

Mississippi: Mississippi reported a net increase of 9 million barrels of crude oil proved reserves in 2004.

Colorado: Colorado reported a net increase of 8 million barrels of crude oil proved reserves in 2004.

Areas of Note: Large Reserves Declines

The following areas had large declines in crude oil proved reserves due to downward revisions or unreplaced production.

Gulf of Mexico Federal Offshore

The Gulf of Mexico Federal Offshore crude oil proved reserves declined 9 percent (-410 million barrels) in 2004. Operators also reported a production decrease of 4 percent (-18 million barrels) from the 2003 level. Hurricane Ivan's damage was a factor, as mentioned previously. In its aftermath, U.S. Secretary of Energy Spencer Abraham agreed to loan out 1.7 million barrels of oil from the Strategic Petroleum Reserve.

Alaska

Alaskan crude oil proved reserves declined 3 percent (-119 million barrels) in 2004. No new field discoveries were reported in Alaska in 2004 and Alaska's proved reserves additions did not offset its oil production. Alaska's estimated 2004 production of 334 million barrels decreased 6 percent (-23 million barrels) from the 2003 level.

California

There was a net decline of 2 percent (-76 million barrels) in California's crude oil proved reserves in 2004. California's crude oil production declined 3 percent (-7 million barrels) from its 2003 level.

Other Decline Areas

Discovery and development of new or existing oil fields was also outpaced by crude oil production in the following areas of the United States:

Illinois: Proved oil reserves decreased by 26 percent (-33 million barrels). A large volume of reported sales was not reported by any operator as an acquisition in 2004.

Louisiana: Proved oil reserves decreased by 6 percent (-25 million barrels).

Reserves in Nonproducing Status

Not all proved reserves of crude oil reported in 2004 were producing. Operators reported 5,143 million barrels of proved reserves in nonproducing status, 8 percent less than reported in 2003 (5,580 million barrels). Nonproducing crude oil reserves (not including lease condensate) are listed in **Table 7**.

Nonproducing reserves are those awaiting well workovers, the drilling of extensions or additional development wells, installation of production or pipeline facilities, and depletion of other zones or reservoirs before recompletion in reservoirs not currently open to production.

Table 7. Reported Reserves in Nonproducing Status for Crude Oil, 2004 [a]
(Million Barrels of 42 U.S. Gallons)

State and Subdivision	Nonproducing Crude Oil Reserves	State and Subdivision	Nonproducing Crude Oil Reserves
Alaska	707	North Dakota	52
Lower 48 States	4,436	Ohio	7
Alabama	2	Oklahoma	92
Arkansas	3	Pennsylvania	1
California	267	Texas	625
Coastal Region Onshore	16	RRC District 1	9
Los Angeles Basin Onshore	63	RRC District 2 Onshore	13
San Joaquin Basin Onshore	158	RRC District 3 Onshore	21
State Offshore	30	RRC District 4 Onshore	4
Colorado	62	RRC District 5	1
Florida	6	RRC District 6	15
Illinois	0	RRC District 7B	5
Indiana	0	RRC District 7C	14
Kansas	11	RRC District 8	218
Kentucky	5	RRC District 8A	311
Louisiana	150	RRC District 9	9
North	11	RRC District 10	5
South Onshore	115	State Offshore	0
State Offshore	24	Utah	61
Michigan	10	Virginia	0
Mississippi	79	West Virginia	0
Montana	104	Wyoming	45
Nebraska	0	Federal Offshore	2,708
New Mexico	142	Pacific (California)	55
East	142	Gulf of Mexico (Louisiana)	2,581
West	0	Gulf of Mexico (Texas)	72
New York	0	Miscellaneous[b]	4
		U.S. Total	**5,143**

[a]Includes only those operators who produced 400,000 barrels of crude oil or 2 billion cubic feet of natural gas, or both, during the report year (Category I or Category II operators).

[b]Includes Arizona, Missouri, Nevada, South Dakota, and Tennessee.

Source: Form EIA-23, “Annual Survey of Domestic Oil and Gas Reserves,” 2004.

4. Natural Gas Statistics

Dry Natural Gas

Proved Reserves

The United States had 192,513 billion cubic feet of dry natural gas reserves as of December 31, 2004, a 2 percent increase over the 2003 level (**Table 8**). All natural gas proved reserves data shown in this report exclude natural gas held in underground storage.

U.S. natural gas reserves increased for the sixth year in a row in 2004. The U.S. total went up even though Gulf of Mexico natural gas proved reserves dropped an unusually large 15 percent primarily due to low new discoveries. Discoveries of new gas fields nationwide were the lowest in 12 years. Nevertheless, because onshore lower 48 States total discoveries were almost 18 trillion cubic feet, total U.S. reserves additions replaced 118 percent of 2004 dry gas production **(Figure 18)**.

U.S. dry gas production declined 1 percent in 2004. Twenty percent of U.S. dry natural gas production comes from the Gulf of Mexico Federal Offshore which reported a 10 percent drop in production in 2004. Hurricane Ivan caused infrastructure damage that impacted oil and gas production in the Gulf in the last quarter of 2004 and will also reduce 2005 Gulf production from what it could have been.

The proved reserves by State are shown on the map in **Figure 19**. Six areas account for 74 percent of the Nation's dry natural gas proved reserves:

Area	Percent of U.S. Gas Reserves
Texas	26
Wyoming	12
Gulf of Mexico Federal Offshore	10
New Mexico	10
Colorado	8
Oklahoma	8
Area Total	**74**

Figure 18. Replacement of U.S. Dry Natural Gas Production by Reserves Additions, 1994-2004.

Source: Energy Information Administration, Office of Oil and Gas.

Table 8. Dry Natural Gas Proved Reserves, Reserves Changes, and Production, 2004
(Billion Cubic Feet at 14.73 psia and 60° Fahrenheit)

		Changes in Reserves During 2004									
State and Subdivision	Published Proved Reserves 12/31/03	Adjustments (+,–)	Revision Increases (+)	Revision Decreases (–)	Sales (–)	Acquisitions (+)	Extensions (+)	New Field Discoveries (+)	New Reservoir Discoveries in Old Fields (+)	Estimated Production (–)	Proved Reserves 12/31/04
Alaska	8,285	-1	632	207	0	0	141	0	35	478	8,407
Lower 48 States	**180,759**	**-113**	**26,261**	**25,942**	**11,106**	**12,950**	**18,057**	**759**	**1,171**	**18,690**	**184,106**
Alabama	4,301	34	162	155	29	0	131	3	0	327	4,120
Arkansas	1,663	13	200	91	24	52	170	4	18	170	1,835
California	2,450	19	440	152	128	147	100	0	5	247	2,634
Coastal Region Onshore	167	-3	32	9	3	7	8	0	0	10	189
Los Angeles Basin Onshore	187	1	4	48	0	0	40	0	0	10	174
San Joaquin Basin Onshore	2,013	26	389	94	123	138	51	0	5	220	2,185
State Offshore	83	-5	15	1	2	2	1	0	0	7	86
Colorado	15,436	-55	1,505	2,167	2,528	2,397	1,017	171	17	1,050	14,743
Florida	79	3	0	1	0	0	0	0	0	3	78
Kansas	4,819	24	750	647	140	174	47	1	0	376	4,652
Kentucky	1,889	-40	176	153	5	0	96	0	0	83	1,880
Louisiana	9,325	-11	1,089	1,229	935	592	1,940	18	121	1,322	9,588
North	5,074	-12	348	417	588	281	1,521	5	11	453	5,770
South Onshore	3,745	60	629	681	281	250	392	9	83	770	3,436
State Offshore	506	-59	112	131	66	61	27	4	27	99	382
Michigan	3,428	-97	205	360	13	14	90	0	31	207	3,091
Mississippi	746	20	48	55	18	9	27	0	7	93	691
Montana	1,059	-56	73	124	3	3	131	1	6	95	995
New Mexico	17,020	126	2,757	1,771	682	1,323	1,243	20	3	1,527	18,512
East	3,301	80	646	467	263	434	383	20	3	516	3,621
West	13,719	46	2,111	1,304	419	889	860	0	0	1,011	14,891
New York	365	-93	81	75	12	15	87	0	0	44	[a]324
North Dakota	448	-29	86	57	11	22	7	0	2	51	417
Ohio	1,126	-138	103	64	0	0	29	0	0	82	974
Oklahoma	15,401	-113	2,173	1,912	511	763	1,983	8	9	1,563	16,238
Pennsylvania	2,487	-188	657	567	28	29	123	0	3	155	2,361
Texas	45,730	674	7,442	6,397	2,780	4,137	5,891	264	312	5,318	49,955
RRC District 1	1,062	57	111	128	82	91	92	100	1	120	1,184
RRC District 2 Onshore	1,770	3	272	343	154	283	262	13	34	296	1,844
RRC District 3 Onshore	3,349	175	704	901	201	176	344	58	63	582	3,185
RRC District 4 Onshore	8,763	43	1,248	1,531	547	774	1,157	7	80	1,295	8,699
RRC District 5	5,407	68	1,068	421	295	622	509	7	48	490	6,523
RRC District 6	6,685	92	891	663	207	481	946	18	78	683	7,638
RRC District 7B	340	52	23	64	19	22	7	0	0	51	310
RRC District 7C	4,327	-21	829	458	271	293	316	0	1	348	4,668
RRC District 8	5,142	7	697	730	269	372	527	44	4	493	5,301
RRC District 8A	1,056	-4	234	37	17	46	14	4	0	108	1,188
RRC District 9	3,309	14	423	210	517	552	1,062	0	0	412	4,221
RRC District 10	4,064	184	777	705	74	345	654	3	0	375	4,873
State Offshore	456	4	165	206	127	80	1	10	3	65	321
Utah	3,516	113	475	278	946	953	299	5	11	282	3,866
Virginia	1,717	-19	39	69	0	0	146	0	0	72	1,742
West Virginia	3,306	-287	664	256	71	25	185	0	1	170	3,397
Wyoming	21,744	50	2,853	3,586	865	811	3,105	8	36	1,524	22,632
Federal Offshore[b]	22,570	-61	4,276	5,734	1,375	1,482	1,193	252	589	3,921	19,271
Pacific (California)	511	0	22	17	113	103	0	0	0	47	459
Gulf of Mexico (Louisiana)[b]	16,728	-85	2,034	3,201	998	1,177	1,110	208	514	2,802	14,685
Gulf of Mexico (Texas)	5,331	24	2,220	2,516	264	202	83	44	75	1,072	4,127
Miscellaneous[c]	134	-2	7	42	2	2	17	4	0	8	110
U.S. Total	**189,044**	**-114**	**26,893**	**26,149**	**11,106**	**12,950**	**18,198**	**759**	**1,206**	**19,168**	**192,513**

[a]Indicates the estimate is associated with a sampling error (95 percent confidence interval) that exceeds 20 percent of the estimated value.
[b]Includes Federal offshore Alabama.
[c]Includes Arizona, Illinois, Indiana, Maryland, Missouri, Nebraska, Nevada, Oregon, South Dakota, and Tennessee.

Note: The production estimates in this table are based on data reported on Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves," and Form EIA-64A, "Annual Report of the Origin of Natural Gas Liquids Production." They may differ from the official Energy Information Administration production data for natural gas for 2004 contained in the *Natural Gas Annual 2004*, DOE/EIA-0131(04).

Source: Energy Information Administration, Office of Oil and Gas.

Figure 19. Dry Natural Gas Proved Reserves by Area, 2004

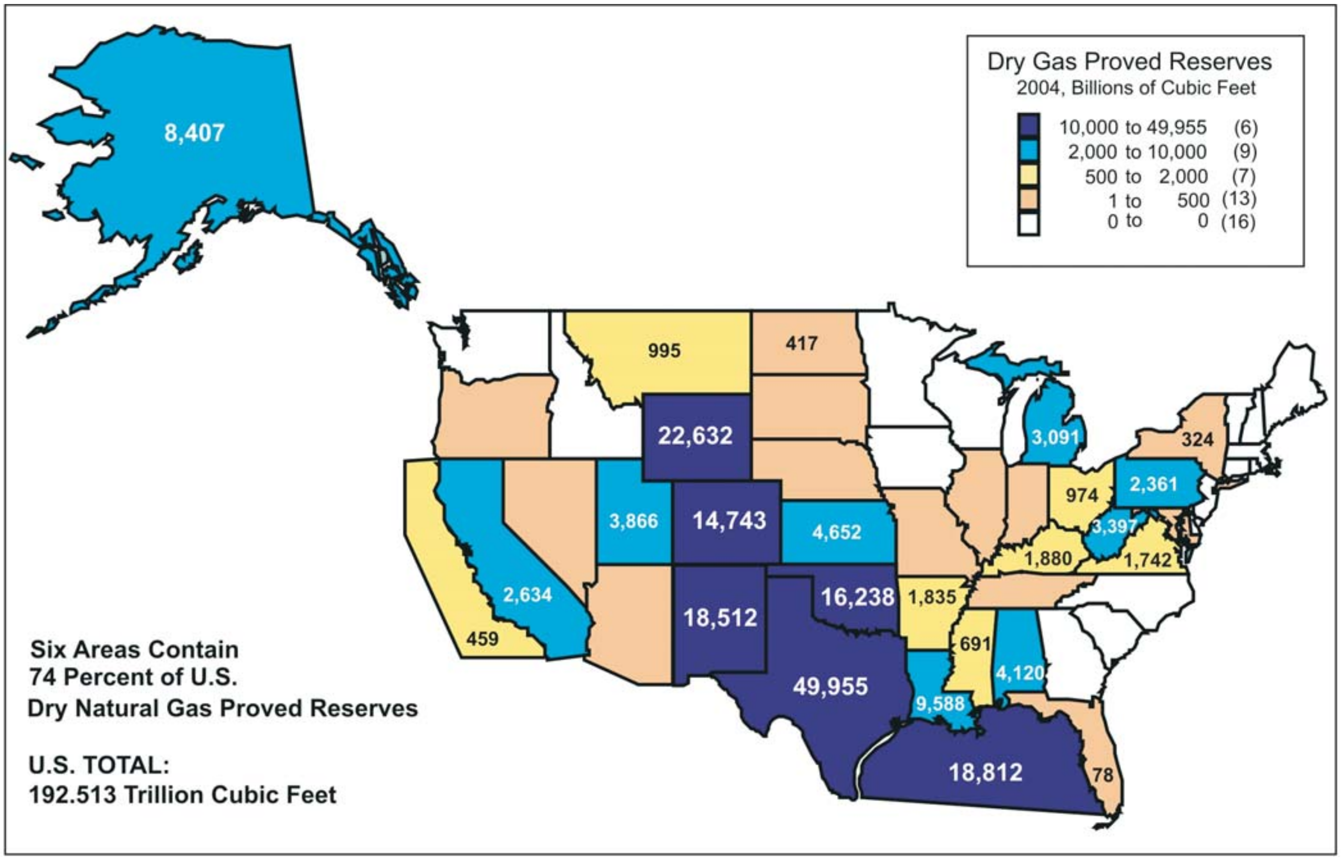
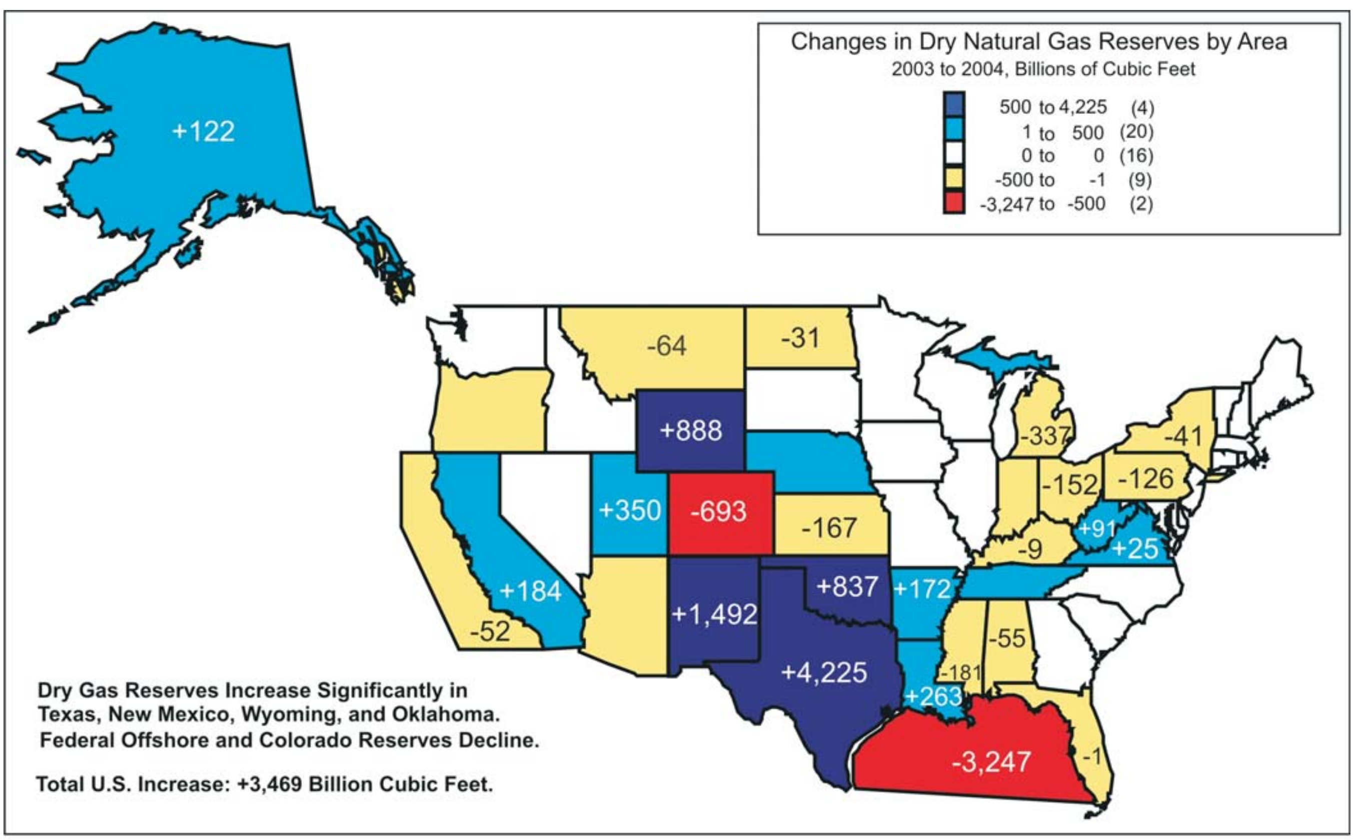


Figure 20. Changes in Dry Natural Gas Proved Reserves by Area, 2003 to 2004



Source: Energy Information Administration, Office of Oil and Gas.

Discussion of Reserves Changes

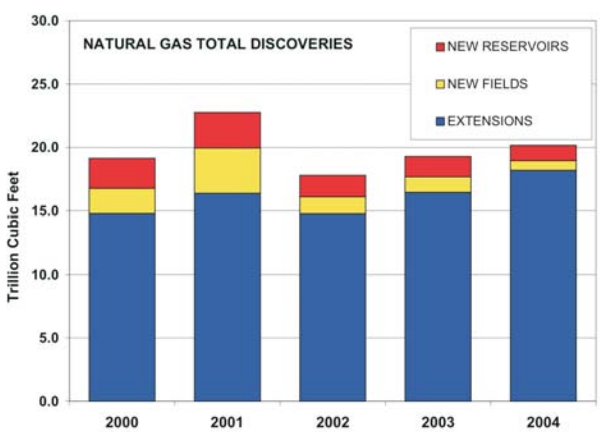
Figure 20 maps the change in dry gas proved reserves from 2003 to 2004 by area. Here's how the top six areas fared, compared to the total United States:

Area	Change in U.S. Gas Reserves (billion cubic feet)
Texas	+4,225
Wyoming	+888
Gulf of Mexico Federal Offshore	-3,247
New Mexico	+1,492
Oklahoma	+837
Colorado	-693
Area Total	**+3,502**
U.S. Total	**+3,469**

Figure 4 in Chapter 2 shows the components of change in dry natural gas proved reserves for 2004 and the preceding 10 years.

Total Discoveries

Total discoveries are those reserves attributable to field extensions, new field discoveries, and new reservoir discoveries in old fields; they result from drilling exploratory wells. Total discoveries of dry natural gas reserves were 20,163 billion cubic feet in 2004, a 5 percent increase from the level reported in 2003. About 32 percent of the total discoveries were in Texas, 16 percent were in Wyoming, 10 percent were in the Gulf of Mexico Federal Offshore, 10 percent were in Louisiana, 10 percent were in Oklahoma, and 6 percent were in New Mexico.



Extensions

The largest component of total discoveries in 2004 was extensions of existing gas fields. Extensions were 18,198 billion cubic feet, 11 percent more than 2003 and 66 percent more than the prior 10-year average (10,976 billion cubic feet). Areas with the largest extensions and their percentage of total extensions were:

- Texas had 5,891 billion cubic feet of extensions (32 percent of the total)
- Wyoming had 3,105 billion cubic feet (17 percent)
- Oklahoma had 1,983 billion cubic feet (11 percent)
- Louisiana had 1,940 billion cubic feet (11 percent)
- New Mexico had 1,243 billion cubic feet (7 percent)
- Gulf of Mexico Federal Offshore had 1,193 billion cubic feet (7 percent)
- Colorado had 1,017 billion cubic feet (6 percent).

New Field Discoveries

New field discoveries were 759 billion cubic feet in 2004—38 percent less than in 2003. The areas with the largest new field discoveries were Texas (with 264 billion cubic feet of new field discoveries; 35 percent of the total), the Gulf of Mexico Federal Offshore (252 billion cubic feet; 33 percent of the total), and Colorado (171 billion cubic feet; 23 percent of the total). In the prior 10 years, U.S. operators had reported an annual average of 1,845 billion cubic feet of reserves from new field discoveries. Reserves from new field discoveries in 2004 were the lowest since 1992 and 59 percent less than the prior 10 year average.

New Reservoir Discoveries in Old Fields

New reservoir discoveries in old fields were 1,206 billion cubic feet, 25 percent less than 2003. The areas with the largest new reservoir discoveries in old fields and their percentage of the total were:

- Gulf of Mexico Federal Offshore (589 billion cubic feet; 49 percent of the total)
- Texas (312 billion cubic feet; 26 percent of the total)
- Louisiana (121 billion cubic feet; 10 percent of the total).

Table 9. Natural Gas Proved Reserves, Reserves Changes, and Production, Wet After Lease Separation, 2004 (Billion Cubic Feet at 14.73 psia and 60° Fahrenheit)

		Changes in Reserves During 2004									
State and Subdivision	Published Proved Reserves 12/31/03	Adjustments (+,–)	Revision Increases (+)	Revision Decreases (–)	Sales (–)	Acquisitions (+)	Extensions (+)	New Field Discoveries (+)	New Reservoir Discoveries in Old Fields (+)	Estimated Production (–)	Proved Reserves 12/31/04
Alaska	8,348	0	638	208	0	0	141	0	35	481	8,473
Lower 48 States	**188,797**	**170**	**27,478**	**27,083**	**11,583**	**13,558**	**18,927**	**790**	**1,209**	**19,536**	**192,727**
Alabama	4,345	31	164	157	30	0	133	3	0	330	4,159
Arkansas	1,666	12	200	91	24	52	170	4	18	170	1,837
California	2,569	30	462	160	135	154	107	0	5	259	2,773
Coastal Region Onshore	174	-4	33	10	3	7	9	0	0	10	196
Los Angeles Basin Onshore	196	2	4	50	0	0	42	0	0	10	184
San Joaquin Basin Onshore	2,116	36	410	99	130	145	55	0	5	232	2,306
State Offshore	83	-4	15	1	2	2	1	0	0	7	87
Colorado	15,893	14	1,556	2,241	2,615	2,480	1,053	177	18	1,086	15,249
Florida	92	0	0	1	0	0	0	0	0	3	88
Kansas	5,143	66	806	695	151	187	50	1	0	404	5,003
Kentucky	1,971	-21	185	162	5	0	101	0	0	87	1,982
Louisiana	9,538	-13	1,119	1,263	954	606	1,973	18	126	1,358	9,792
North	5,137	-9	352	423	596	284	1,539	5	11	459	5,841
South Onshore	3,874	63	652	705	290	259	406	9	86	797	3,557
State Offshore	527	-67	115	135	68	63	28	4	29	102	394
Michigan	3,488	-87	209	367	14	15	91	0	31	212	3,154
Mississippi	748	19	49	55	18	8	27	0	7	93	692
Montana	1,068	-59	73	125	2	3	132	1	6	95	1,002
New Mexico	18,226	8	2,936	1,888	731	1,414	1,328	22	4	1,632	19,687
East	3,661	40	707	512	288	476	420	22	4	565	3,965
West	14,565	-32	2,229	1,376	443	938	908	0	0	1,067	15,722
New York	365	-93	81	75	12	15	87	0	0	44	[a]324
North Dakota	497	-30	96	64	12	25	8	0	2	57	465
Ohio	1,127	-138	103	64	0	0	29	0	0	82	975
Oklahoma	16,231	-37	2,302	2,026	541	808	2,100	9	10	1,656	17,200
Pennsylvania	2,497	-188	660	569	28	29	123	0	3	156	2,371
Texas	48,717	797	7,930	6,830	2,958	4,393	6,284	280	324	5,662	53,275
RRC District 1	1,095	66	115	133	85	95	95	104	1	124	1,229
RRC District 2 Onshore	1,849	13	286	360	162	296	275	13	35	311	1,934
RRC District 3 Onshore	3,548	214	751	962	214	188	367	62	67	621	3,400
RRC District 4 Onshore	9,055	126	1,301	1,595	571	806	1,205	7	83	1,350	9,067
RRC District 5	5,460	67	1,077	425	298	628	514	7	48	495	6,583
RRC District 6	6,959	110	929	692	216	502	987	19	81	713	7,966
RRC District 7B	383	79	27	76	22	25	8	0	0	60	364
RRC District 7C	4,791	-3	922	509	301	325	351	0	1	387	5,190
RRC District 8	5,835	-6	789	826	304	421	597	50	5	559	6,002
RRC District 8A	1,137	-2	252	40	18	49	16	4	0	117	1,281
RRC District 9	3,639	-53	457	226	559	596	1,146	0	0	445	4,555
RRC District 10	4,510	183	859	780	82	381	722	4	0	414	5,383
State Offshore	456	3	165	206	126	81	1	10	3	66	321
Utah	3,617	93	485	284	966	974	305	5	11	289	3,951
Virginia	1,717	-19	39	69	0	0	146	0	0	72	1,742
West Virginia	3,399	-281	686	265	73	26	191	0	1	175	3,509
Wyoming	22,716	47	2,980	3,745	904	847	3,244	8	38	1,591	23,640
Federal Offshore[b]	23,033	20	4,349	5,844	1,408	1,520	1,228	258	605	4,014	19,747
Pacific (California)	511	1	22	17	114	103	0	0	0	47	459
Gulf of Mexico (Louisiana)[b]	17,168	-5	2,098	3,301	1,029	1,214	1,145	214	530	2,890	15,144
Gulf of Mexico (Texas)	5,354	24	2,229	2,526	265	203	83	44	75	1,077	4,144
Miscellaneous[c]	134	-1	8	43	2	2	17	4	0	9	110
U.S. Total	**197,145**	**170**	**28,116**	**27,291**	**11,583**	**13,558**	**19,068**	**790**	**1,244**	**20,017**	**201,200**

[a]Indicates the estimate is associated with a sampling error (95 percent confidence interval) that exceeds 20 percent of the estimated value.

[b]Includes Federal offshore Alabama.

[c]Includes Arizona, Illinois, Indiana, Maryland, Missouri, Nebraska, Nevada, Oregon, South Dakota, and Tennessee.

Note: The prouction estimates in this table are based on data reported on Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves." They may differ from the official Energy Information Administration production data for natural gas for 2004 contained in the *Natural Gas Annual 2004,* DOE/EIA-0131(04).

Source: Energy Information Administration, Office of Oil and Gas.

Table 10. Nonassociated Natural Gas Proved Reserves, Reserves Changes, and Production, Wet After Lease Separation, 2004 (Billion Cubic Feet at 14.73 psia and 60° Fahrenheit)

		Changes in Reserves During 2004									
State and Subdivision	Published Proved Reserves 12/31/03	Adjustments (+,–)	Revision Increases (+)	Revision Decreases (–)	Sales (–)	Acquisitions (+)	Extensions (+)	New Field Discoveries (+)	New Reservoir Discoveries in Old Fields (+)	Estimated Production (–)	Proved Reserves 12/31/04
Alaska	2,081	-1	49	53	0	0	108	0	26	206	2,004
Lower 48 States	**166,512**	**192**	**24,058**	**24,068**	**10,579**	**12,571**	**18,053**	**756**	**1,121**	**17,069**	**171,547**
Alabama	4,313	28	163	157	30	0	132	3	0	325	4,127
Arkansas	1,629	13	193	91	24	52	170	3	18	166	1,797
California	759	41	84	62	115	109	23	0	5	77	767
Coastal Region Onshore	1	0	1	0	0	0	6	0	0	0	8
Los Angeles Basin Onshore	0	0	0	0	0	0	0	0	0	0	0
San Joaquin Basin Onshore	751	45	83	62	115	109	17	0	5	76	757
State Offshore	7	-4	0	0	0	0	0	0	0	1	2
Colorado	14,707	19	1,455	2,233	2,596	2,461	943	177	18	995	13,956
Florida	0	0	0	0	0	0	0	0	0	0	0
Kansas	5,058	67	795	683	147	180	48	1	0	396	4,923
Kentucky	1,946	-21	184	155	5	0	101	0	0	87	1,963
Louisiana	8,952	-12	974	1,110	912	572	1,922	13	119	1,283	9,235
North	4,998	-19	328	373	588	284	1,533	5	11	445	5,734
South Onshore	3,506	73	543	623	260	230	365	4	80	750	3,168
State Offshore	448	-66	103	114	64	58	24	4	28	88	333
Michigan	3,219	-90	204	298	14	15	88	0	31	194	2,961
Mississippi	721	21	46	53	10	3	27	0	7	90	672
Montana	956	-55	47	113	1	1	116	1	6	86	872
New Mexico	16,681	-23	2,620	1,691	609	1,309	1,202	14	3	1,397	18,109
East	2,205	9	407	322	166	371	294	14	3	338	2,477
West	14,476	-32	2,213	1,369	443	938	908	0	0	1,059	15,632
New York	365	-93	81	75	12	15	87	0	0	44	324
North Dakota	181	-4	9	29	0	0	3	0	0	15	145
Ohio	823	-60	93	55	0	0	29	0	0	63	767
Oklahoma	15,176	-76	2,103	1,711	496	756	2,052	9	8	1,520	16,301
Pennsylvania	2,333	-183	656	530	28	29	113	0	3	147	2,246
Texas	42,280	738	6,711	6,016	2,658	4,029	6,037	277	322	4,992	46,728
RRC District 1	1,047	64	106	126	84	95	94	104	0	116	1,184
RRC District 2 Onshore	1,768	8	270	355	156	295	263	13	35	283	1,858
RRC District 3 Onshore	3,044	187	542	747	177	170	355	61	67	543	2,959
RRC District 4 Onshore	8,919	127	1,232	1,572	570	805	1,203	7	82	1,331	8,902
RRC District 5	5,398	66	1,071	419	298	628	512	7	48	488	6,525
RRC District 6	6,572	111	887	662	215	470	968	19	81	667	7,564
RRC District 7B	314	66	16	72	16	21	5	0	0	46	288
RRC District 7C	3,864	-2	811	463	272	274	293	0	1	310	4,196
RRC District 8	3,032	-11	366	472	114	238	492	48	5	318	3,266
RRC District 8A	100	-4	18	10	0	1	2	4	0	16	95
RRC District 9	3,514	-72	441	191	551	587	1,142	0	0	425	4,445
RRC District 10	4,258	194	793	721	79	365	707	4	0	387	5,134
State Offshore	450	4	158	206	126	80	1	10	3	62	312
Utah	3,318	90	454	243	937	947	284	5	11	268	3,661
Virginia	1,717	-19	39	69	0	0	146	0	0	72	1,742
West Virginia	3,376	-280	685	263	73	26	191	0	1	174	3,489
Wyoming	22,266	73	2,949	3,699	889	827	3,242	8	38	1,537	23,278
Federal Offshore[a]	15,616	18	3,508	4,692	1,021	1,238	1,080	241	531	3,133	13,386
Pacific (California)	55	0	0	0	15	8	0	0	0	1	47
Gulf of Mexico (Louisiana)[a]	11,326	-7	1,483	2,376	794	1,032	999	197	456	2,235	10,081
Gulf of Mexico (Texas)	4,235	25	2,025	2,316	212	198	81	44	75	897	3,258
Miscellaneous[b]	120	0	5	40	2	2	17	4	0	8	98
U.S. Total	**168,593**	**191**	**24,107**	**24,121**	**10,579**	**12,571**	**18,161**	**756**	**1,147**	**17,275**	**173,551**

[a]Includes Federal offshore Alabama.

[b]Includes Arizona, Illinois, Indiana, Maryland, Missouri, Nebraska, Nevada, Oregon, South Dakota, and Tennessee.

Note: The production estimates in this table are based on data reported on Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves." They may differ from the official Energy Information Administration production data for natural gas for 2004 contained in the *Natural Gas Annual 2004,* DOE/EIA-0131(04).

Source: Energy Information Administration, Office of Oil and Gas.

Table 11. Associated-Dissolved Natural Gas Proved Reserves, Reserves Changes, and Production, Wet After Lease Separation, 2004 (Billion Cubic Feet at 14.73 psia and 60° Fahrenheit)

State and Subdivision	Published Proved Reserves 12/31/03	Changes in Reserves During 2004: Adjustments (+,–)	Revision Increases (+)	Revision Decreases (–)	Sales (–)	Acquisitions (+)	Extensions (+)	New Field Discoveries (+)	New Reservoir Discoveries in Old Fields (+)	Estimated Production (–)	Proved Reserves 12/31/04
Alaska	6,267	1	589	155	0	0	33	0	9	275	6,469
Lower 48 States	**22,285**	**-22**	**3,420**	**3,015**	**1,004**	**987**	**874**	**34**	**88**	**2,467**	**21,180**
Alabama	32	3	1	0	0	0	1	0	0	5	32
Arkansas	37	-1	7	0	0	0	0	1	0	4	40
California	1,810	-11	378	98	20	45	84	0	0	182	2,006
Coastal Region Onshore	173	-4	32	10	3	7	3	0	0	10	188
Los Angeles Basin Onshore	196	2	4	50	0	0	42	0	0	10	184
San Joaquin Basin Onshore	1,365	-9	327	37	15	36	38	0	0	156	1,549
State Offshore	76	0	15	1	2	2	1	0	0	6	85
Colorado	1,186	-5	101	8	19	19	110	0	0	91	1,293
Florida	92	0	0	1	0	0	0	0	0	3	88
Kansas	85	-1	11	12	4	7	2	0	0	8	80
Kentucky	25	0	1	7	0	0	0	0	0	0	19
Louisiana	586	-1	145	153	42	34	51	5	7	75	557
North	139	10	24	50	8	0	6	0	0	14	107
South Onshore	368	-10	109	82	30	29	41	5	6	47	389
State Offshore	79	-1	12	21	4	5	4	0	1	14	61
Michigan	269	3	5	69	0	0	3	0	0	18	193
Mississippi	27	-2	3	2	8	5	0	0	0	3	20
Montana	112	-4	26	12	1	2	16	0	0	9	130
New Mexico	1,545	31	316	197	122	105	126	8	1	235	1,578
East	1,456	31	300	190	122	105	126	8	1	227	1,488
West	89	0	16	7	0	0	0	0	0	8	90
New York	0	0	0	0	0	0	0	0	0	0	0
North Dakota	316	-26	87	35	12	25	5	0	2	42	320
Ohio	304	-78	10	9	0	0	0	0	0	19	208
Oklahoma	1,055	39	199	315	45	52	48	0	2	136	899
Pennsylvania	164	-5	4	39	0	0	10	0	0	9	125
Texas	6,437	59	1,219	814	300	364	247	3	2	670	6,547
RRC District 1	48	2	9	7	1	0	1	0	1	8	45
RRC District 2 Onshore	81	5	16	5	6	1	12	0	0	28	76
RRC District 3 Onshore	504	27	209	215	37	18	12	1	0	78	441
RRC District 4 Onshore	136	-1	69	23	1	1	2	0	1	19	165
RRC District 5	62	1	6	6	0	0	2	0	0	7	58
RRC District 6	387	-1	42	30	1	32	19	0	0	46	402
RRC District 7B	69	13	11	4	6	4	3	0	0	14	76
RRC District 7C	927	-1	111	46	29	51	58	0	0	77	994
RRC District 8	2,803	5	423	354	190	183	105	2	0	241	2,736
RRC District 8A	1,037	2	234	30	18	48	14	0	0	101	1,186
RRC District 9	125	19	16	35	8	9	4	0	0	20	110
RRC District 10	252	-11	66	59	3	16	15	0	0	27	249
State Offshore	6	-1	7	0	0	1	0	0	0	4	9
Utah	299	3	31	41	29	27	21	0	0	21	290
Virginia	0	0	0	0	0	0	0	0	0	0	0
West Virginia	23	-1	1	2	0	0	0	0	0	1	20
Wyoming	450	-26	31	46	15	20	2	0	0	54	362
Federal Offshore[a]	7,417	2	841	1,152	387	282	148	17	74	881	6,361
Pacific (California)	456	1	22	17	99	95	0	0	0	46	412
Gulf of Mexico (Louisiana)[a]	5,842	2	615	925	235	182	146	17	74	655	5,063
Gulf of Mexico (Texas)	1,119	-1	204	210	53	5	2	0	0	180	886
Miscellaneous[b]	14	-1	3	3	0	0	0	0	0	1	12
U.S. Total	**28,552**	**-21**	**4,009**	**3,170**	**1,004**	**987**	**907**	**34**	**97**	**2,742**	**27,649**

[a]Includes Federal offshore Alabama.
[b]Includes Arizona, Illinois, Indiana, Maryland, Missouri, Nebraska, Nevada, Oregon, South Dakota, and Tennessee.
Note: The production estimates in this table are based on data reported on Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves." They may differ from the official Energy Information Administration production data for natural gas for 2004 contained in the *Natural Gas Annual 2004*, DOE/EIA-0131(04).
Source: Energy Information Administration, Office of Oil and Gas.

In the prior 10 years, U.S. operators had reported an annual average of 2,425 billion cubic feet of reserves from new reservoirs discovered in old fields. Reserves from new reservoirs discovered in old fields in 2004 were 50 percent of that average.

Revisions and Adjustments

There were 26,893 billion cubic feet of revision increases, 26,149 billion cubic feet of revision decreases, and -114 billion cubic feet of adjustments in 2004. Combined, there were 630 billion cubic feet of net revisions and adjustments in 2004, excluding reserves additions from net sales and acquisitions. This is 89 percent less than the average volume of net revisions and adjustments of the prior 10 years (5,588 billion cubic feet).

Sales and Acquisitions

Sales represents that volume of dry natural gas proved reserves deducted from an operator's total reserves through sale or transfer of operations of an existing gas field or properties to another operator (not a volume of production "sold" at the wellhead). Similarly, acquisitions are that volume of proved reserves added to an operator's total reserves by purchase or operations transfer of an existing gas field or properties.

There are several reasons why sales and acquisitions volumes are not equal. Since operators have different engineering staffs and resources, or different development plans or schedules, the estimate of proved reserves for a field can change with a change in operatorship. Timing of the transfer of operations can also impact these values.

In 2004, there were 11,106 billion cubic feet of sales transactions between operators, and 12,950 billion cubic feet of acquisitions. The net difference of 1,844 billion cubic feet was added to the National total of dry natural gas reserves in 2004.

Production

The estimated 2004 U.S. dry natural gas production was 19,168 billion cubic feet (**Table 8**), a decrease of 1 percent from 2003. Areas with the largest production and their percentage of total production were:

- Texas produced 5,318 billion cubic feet (BCF) of dry natural gas (28 percent of the total)
- Gulf of Mexico Federal Offshore produced 3,874 BCF (20 percent)
- Oklahoma produced 1,563 BCF (8 percent)
- New Mexico produced 1,527 BCF (8 percent)
- Wyoming produced 1,524 BCF (8 percent)
- Louisiana produced 1,322 BCF (7 percent)
- Colorado produced 1,050 BCF (5 percent of the National total).

Wet Natural Gas

U. S. proved reserves of wet natural gas as of December 31, 2004 were 201,200 billion cubic feet, a 2 percent increase from the volume reported in 2003 (**Table 9**). At year-end 2004, proved wet natural gas reserves for the lower 48 States had increased by 2 percent compared to 2003, while those of Alaska had increased by 1 percent.

The volumetric differences between the estimates reported in **Table 8** (dry) and **Table 9** (wet) result from the removal of natural gas liquids at natural gas processing plants. A discussion of the methodology used to generate wet and dry natural gas reserves tables in this report appears in Appendix F.

Nonassociated Natural Gas

Proved Reserves

Proved reserves of nonassociated (NA) natural gas, wet after lease separation, in the United States increased by 3 percent (4,958 billion cubic feet) in 2004 to 173,551 billion cubic feet (**Table 10**). The lower 48 States' NA wet natural gas proved reserves increased 3 percent to a level of 171,547 billion cubic feet, while Alaska had a 4 percent decline to a level of 2,004 billion cubic feet. Those States with the largest increases in NA wet natural gas reserves were Texas, New Mexico, Oklahoma, and Wyoming.

Total Discoveries

NA wet natural gas *total discoveries* of 20,064 billion cubic feet in 2004 were 7 percent more that the 2003 total of 18,712 billion cubic feet. Areas with the most *total discoveries* in 2004 were Texas (6,636 billion cubic feet), Wyoming (3,288 billion cubic feet), Oklahoma (2,069 billion cubic feet), Louisiana (2,054 billion cubic feet), the Gulf of Mexico Federal Offshore (1,852 billion cubic feet), and New Mexico (1,219 billion cubic feet).

Production

U.S. production of NA wet natural gas decreased less than 1 percent from an estimated 17,376 billion cubic feet in 2003 to 17,275 billion cubic feet in 2004. The five leading producing areas were: Texas (29 percent), the Gulf of Mexico Federal Offshore (18 percent), Wyoming (9 percent), Oklahoma (9 percent), and New Mexico (8 percent).

Associated-Dissolved Natural Gas

Proved Reserves

Proved reserves of associated-dissolved (AD) natural gas, wet after lease separation, in the United States declined 3 percent to 27,649 billion cubic feet in 2004 (**Table 11**). Proved reserves of AD wet natural gas in the lower 48 States decreased by 5 percent to 21,180 billion cubic feet, and in Alaska increased 3 percent (202 billion cubic feet) to 6,469 billion cubic feet. The areas of the country with the largest AD wet natural gas reserves and their percentage of the total were:

- Texas (24 percent)
- Alaska (23 percent)
- Gulf of Mexico Federal Offshore (22 percent)
- California (7 percent)
- New Mexico (6 percent).

These areas logically correspond to the areas of the country with the largest volumes of crude oil reserves.

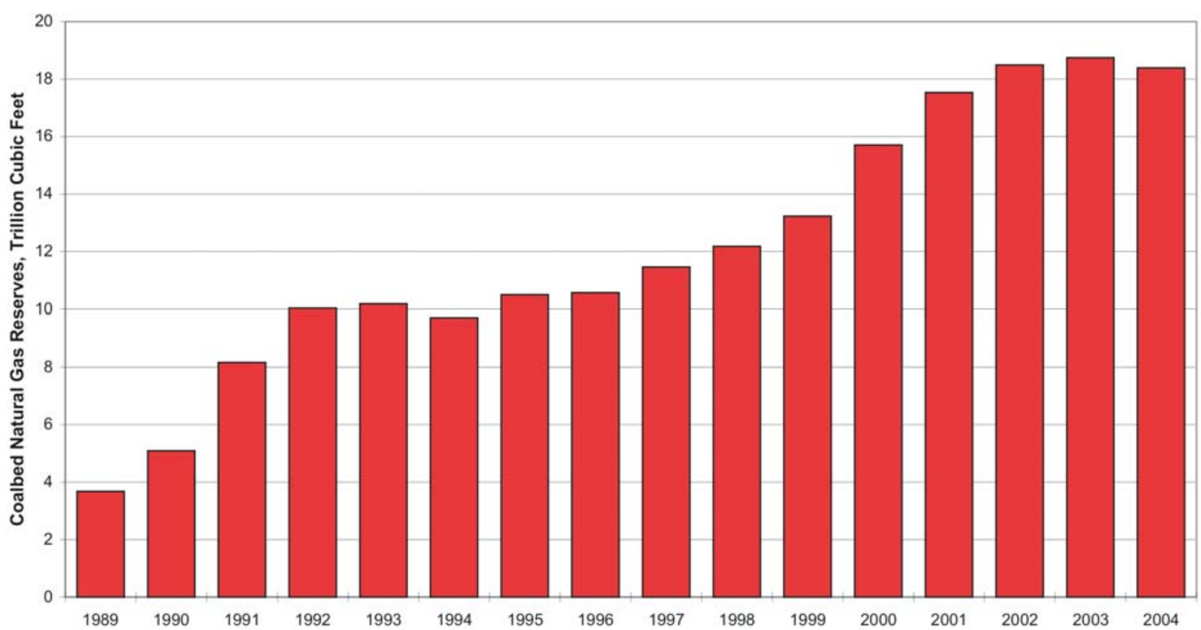
Production

U.S. production of AD wet natural gas decreased 4 percent from an estimated 2,855 billion cubic feet in 2003 to 2,742 billion cubic feet in 2004 (**Table 11**). Production of AD wet natural gas in the lower 48 States decreased from 2,579 billion cubic feet to 2,467 billion cubic feet in 2004, a decline of 4 percent. The areas of the country with the largest AD wet natural gas production and their percentage of the total were:

- Gulf of Mexico Federal Offshore (30 percent)
- Texas (24 percent)
- Alaska (10 percent)
- New Mexico (9 percent)
- California (7 percent).

Again, these areas logically correspond to the areas of the country with the largest volumes of crude oil production.

Figure 21. Coalbed Natural Gas Proved Reserves, 1989-2004



Source: Energy Information Administration, Office of Oil and Gas.

Table 12. Coalbed Natural Gas Proved Reserves and Production, 1989–2004
(Billion Cubic Feet at 14.73 psia and 60° Fahrenheit)

Year	Alabama	Colorado	New Mexico	Utah	Wyoming	Eastern States[a]	Western States[b]	Others[c]	United States
					Reserves				
1989	537	1,117	2,022	NA	NA	NA	NA	0	3,676
1990	1,224	1,320	2,510	NA	NA	NA	NA	33	5,087
1991	1,714	2,076	4,206	NA	NA	NA	NA	167	8,163
1992	1,968	2,716	4,724	NA	NA	NA	NA	626	10,034
1993	1,237	3,107	4,775	NA	NA	NA	NA	1,065	10,184
1994	976	2,913	4,137	NA	NA	NA	NA	1,686	9,712
1995	972	3,461	4,299	NA	NA	NA	NA	1,767	10,499
1996	823	3,711	4,180	NA	NA	NA	NA	1,852	10,566
1997	1,077	3,890	4,351	NA	NA	NA	NA	2,144	11,462
1998	1,029	4,211	4,232	NA	NA	NA	NA	2,707	12,179
1999	1,060	4,826	4,080	NA	NA	NA	NA	3,263	13,229
2000	1,241	5,617	4,278	1,592	1,540	1,399	41	--	15,708
2001	1,162	6,252	4,324	1,685	2,297	1,453	358	--	17,531
2002	1,283	6,691	4,380	1,725	2,371	1,488	553	--	18,491
2003	1,665	6,473	4,396	1,224	2,759	1,528	698	--	18,743
2004	1,900	5,787	5,166	934	2,085	1,620	898	--	18,390
					Production				
1989	23	12	56	NA	NA	NA	NA	0	91
1990	36	26	133	NA	NA	NA	NA	1	196
1991	68	48	229	NA	NA	NA	NA	3	348
1992	89	82	358	NA	NA	NA	NA	10	539
1993	103	125	486	NA	NA	NA	NA	18	752
1994	108	179	530	NA	NA	NA	NA	34	851
1995	109	226	574	NA	NA	NA	NA	47	956
1996	98	274	575	NA	NA	NA	NA	56	1,003
1997	111	312	597	NA	NA	NA	NA	70	1,090
1998	123	401	571	NA	NA	NA	NA	99	1,194
1999	108	432	582	NA	NA	NA	NA	130	1,252
2000	109	451	550	74	133	58	4	--	1,379
2001	111	490	517	83	278	69	14	--	1,562
2002	117	520	471	103	302	68	33	--	1,614
2003	98	488	451	97	344	71	51	--	1,600
2004	121	520	528	82	320	72	77	--	1,720

[a]Includes Indiana, Ohio, Pennsylvania, Virginia, and West Virginia.
[b]Includes Arkansas, Kansas, Montana, and Oklahoma.
[c]Includes Oklahoma, Pennsylvania, Utah, Virginia, West Virginia, and Wyoming; these states are individually listed or grouped in Eastern States and Western States for 2000-2003.
NA = Not applicable.
Source: Energy Information Administration, Office of Oil and Gas.

Coalbed Natural Gas

Proved Reserves

Proved reserves of coalbed natural gas decreased to 18,390 billion cubic feet in 2004, 2 percent lower than the 2003 level (18,743 billion cubic feet). Coalbed natural gas accounted for 10 percent of all 2004 dry natural gas reserves (**Table 12**). The last time reserves of coalbed natural gas had declined was in 1994 (**Figure 21**). Five States (Colorado, New Mexico, Wyoming, Alabama and Utah) currently have the vast majority (86 percent) of U.S. coalbed natural gas proved reserves. Three of them (Colorado, Wyoming, and Utah) reported declines in their proved coalbed natural gas reserves in 2004.

Production

U.S. coalbed natural gas production increased 8 percent in 2004 to 1,720 billion cubic feet. It accounted for 9 percent of U.S. dry gas production.

Areas of Note: Large Discoveries and Reserves Additions

The following State or area discussions summarize notable activities during the year concerning expected new field reserves, development plans, and possible production rates as extracted from various trade publications and company reports. The citations do not necessarily reflect EIA's concurrence, but are considered important enough to be brought to the reader's attention.

Texas

Texas had a 9 percent increase in dry natural gas proved reserves in 2004 (4,225 billion cubic feet), the largest of any State. Production also increased 3 percent (128 billion cubic feet). This resulted from exploration in South Texas and extensions of existing gas fields in the Permian Basin and the Newark East Field in north central Texas.

- **Newark East Field**: On August 6, 2004 Devon Energy Corporation (Devon) announced it had drilled its 100th horizontal well in the Barnett Shale, a vast underground natural gas bearing formation that meanders underneath 10 Texas counties. The new well is northwest of Fort Worth.

  Devon, the predominant driller in the "core area" of the northwest part of the formation, has also leased almost 400,000 acres south of Fort Worth and is beginning to drill in Johnson County. One Johnson County well is producing nearly 4 million cubic feet of natural gas a day, more than double the formation's average, company officers say. Devon plans to continue drilling in the Barnett Shale at the rate of 60 new wells a year for several years.

  The company estimates its natural gas reserves in the Barnett Shale are in excess of 1 trillion cubic feet. Experts estimate that every every 7 square miles of the formation contain that much natural gas. Devon soon will begin refracturing 19 of its old Barnett Shale wells, north and west of Fort Worth in Wise and Denton counties, hoping to get a little more production from them. Devon plans 50 more refracturings next year and 250 more the year after that. {41}

New Mexico

New Mexico's dry natural gas reserves increased by 9 percent (1,492 billion cubic feet) in 2004. This was the result of development in the San Juan Basin.

- **San Juan Basin Gas Area:** Measuring 7,500 square miles, the San Juan Basin Gas Area is the one of the largest natural gas producing areas and currently ranks as the leading U.S. field in both production and remaining resources. Burlington Resources (Burlington) operates 7,500 well completions, holds interests in 4,700 partner-operated completions, and has interests in 1.1 million acres. Its ongoing initiatives include applying advanced stimulation techniques to existing wells; upgrading compressors, pipelines and other infrastructure; and reducing operating costs. During 2004 Burlington participated in 361 new wells and 172 mechanical workovers of existing wells. {42}

Areas of Note: Large Reserves Declines

The following areas had large declines in dry natural gas proved reserves due to downward revisions or unreplaced production.

Gulf of Mexico Federal Offshore

Proved dry natural gas reserves in the Gulf of Mexico Federal Offshore decreased by 15 percent (-3,247 billion cubic feet) in 2004. Production also decreased by 10 percent from 4,306 billion cubic feet in 2003 to 3,874 billion cubic feet in 2004.

The large proved natural gas reserves drop experienced in the Gulf of Mexico was primarily due to low new field discoveries and relatively large negative revisions to proved reserves. As previously mentioned, Hurricane Ivan caused pipeline damage that shut in significant gas production in the Gulf in the last quarter of 2004. Ivan's damage will reduce 2005 Gulf production from what it could have been, and it remains to be seen what impact the damage from 2005 hurricanes will have on reserves and production in the Gulf.

For the latest estimates of 2005 hurricane damage effects, readers should visit our website at http://www.eia.doe.gov and select the link, *"Report on the impact of recent hurricanes on energy in the US"*.

Colorado

Colorado's proved dry natural gas reserves decreased by 4 percent (-693 billion cubic feet) in 2004. Production in Colorado decreased 8 percent (-92 billion cubic feet) in 2004.

Michigan

Michigan's proved dry natural gas reserves decreased by 10 percent (-337 billion cubic feet) in 2004. Production in Michigan decreased 6 percent (-13 billion cubic feet) in 2004.

Reserves in Nonproducing Status

Nonproducing proved natural gas reserves (wet after lease separation) of 45,996 billion cubic feet were reported in 2004, 6 percent less than the 49,068 billion cubic feet reported in 2003 (**Appendix D, Table D10**). About 28 percent of the reserves in nonproducing status are located in Texas. Another 15 percent are in the Gulf of Mexico Federal Offshore, as most new deepwater reserves are in the nonproducing category. Wells or reservoirs are nonproducing due to any of several operational reasons. These include awaiting well workovers, the drilling of extensions or additional development wells, installation of production or pipeline facilities, and depletion of other zones or reservoirs before recompletion in reservoirs not currently open to production (called "behind pipe" reserves).

5. Natural Gas Liquids Statistics

Natural Gas Liquids

Proved Reserves

U.S. natural gas liquids proved reserves increased 6 percent to 7,928 million barrels in 2004 (**Table 13**), rebounding from the decline observed in 2003. Reserve additions replaced 157 percent of 2004 natural gas liquids production.

The reserves of seven areas account for 88 percent of the Nation's natural gas liquids proved reserves.

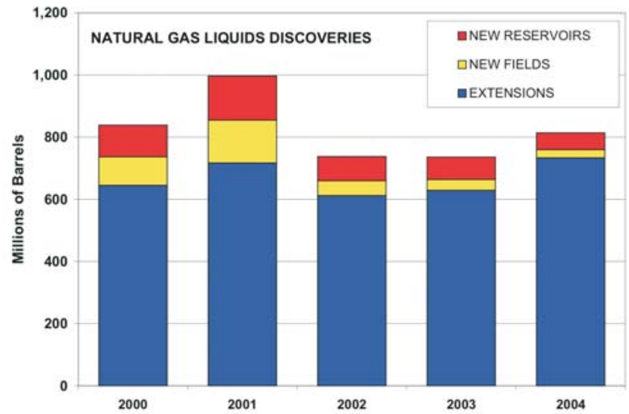
Area	Percent of U.S. NGL Reserves
Texas	35
Utah - Wyoming	12
New Mexico	11
Oklahoma	10
Gulf of Mexico Federal Offshore	9
Colorado	6
Alaska	5
Area Total	**88**

The volumes of natural gas liquids proved reserves and production shown in **Table 13** are the sum of the natural gas plant liquid volumes listed in **Table 14** and the lease condensate volumes listed in **Table 15.**

Total Discoveries

Total discoveries of natural gas liquids reserves were 814 million barrels in 2004, an increase of 11 percent from 2003 (736 million barrels). Areas with the largest total discoveries were:

- Texas (43 percent of the National total)
- Utah & Wyoming (15 percent)
- Oklahoma (12 percent)
- Gulf of Mexico Federal Offshore (10 percent)
- New Mexico (8 percent)
- Louisiana (5 percent).



Extensions

Extensions were 734 million barrels in 2004, 17 percent more than the 2003 volume of 629 million barrels. Areas with the largest extensions were Texas (43 percent of the National total), Utah & Wyoming (17 percent), Oklahoma (13 percent), and New Mexico (9 percent).

New Field Discoveries

New field discoveries in 2004 (26 million barrels) were 26 percent lower than in 2003 (35 million barrels). Areas with the largest new field discoveries were Texas (54 percent), the Gulf of Mexico Federal Offshore (27 percent), and Colorado (15 percent).

New Reservoir Discoveries in Old Fields

New reservoir discoveries in old fields in 2004 (54 million barrels) were 25 percent lower than they were in 2003 (72 million barrels). Areas with the largest new reservoir discoveries in old fields were the Gulf of Mexico Federal Offshore (59 percent of the National total), Texas (28 percent), and Louisiana (11 percent).

Revisions and Adjustments

In 2004, there were 1,232 million barrels of revision increases, 1,135 million barrels of revision decreases, and 273 million barrels of adjustments. The net of revisions and adjustments was 370 million barrels.

Table 13. Natural Gas Liquids Proved Reserves, Reserves Changes, and Production, 2004
(Million Barrels of 42 U.S. Gallons)

State and Subdivision	Published Proved Reserves 12/31/03	Changes in Reserves During 2004: Adjustments (+,–)	Revision Increases (+)	Revision Decreases (–)	Sales (–)	Acquisitions (+)	Extensions (+)	New Field Discoveries (+)	New Reservoir Discoveries in Old Fields (+)	Estimated Production (–)	Proved Reserves 12/31/04
Alaska	387	0	0	0	0	0	0	0	0	18	369
Lower 48 States	**7,072**	**273**	**1,232**	**1,135**	**442**	**554**	**734**	**26**	**54**	**809**	**7,559**
Alabama	60	-5	4	2	5	0	2	0	0	4	50
Arkansas	3	0	0	0	0	0	0	0	0	0	3
California	101	9	22	7	5	7	5	0	0	10	122
Coastal Region Onshore	15	1	3	1	0	1	1	0	0	1	19
Los Angeles Basin Onshore	8	0	0	2	0	0	2	0	0	0	8
San Joaquin Basin Onshore	78	8	19	4	5	6	2	0	0	9	95
State Offshore	0	0	0	0	0	0	0	0	0	0	0
Colorado	395	55	72	56	71	69	29	4	0	32	465
Florida	17	-5	0	0	0	0	0	0	0	0	12
Kansas	248	32	44	37	8	11	3	0	0	22	271
Kentucky	66	4	7	6	0	0	4	0	0	3	72
Louisiana	295	-8	54	57	32	23	38	0	6	56	263
North	67	-2	8	7	8	6	17	0	0	7	74
South Onshore	182	-2	34	38	17	11	18	0	4	39	153
State Offshore	46	-4	12	12	7	6	3	0	2	10	36
Michigan	48	4	6	7	0	0	1	0	0	4	48
Mississippi	7	0	1	1	0	0	0	0	0	1	6
Montana	8	-1	0	1	0	0	1	0	0	1	6
New Mexico	875	-72	131	90	37	72	63	1	0	79	864
East	272	-20	48	36	21	39	30	1	0	39	274
West	603	-52	83	54	16	33	33	0	0	40	590
North Dakota	45	-1	8	6	1	2	1	0	0	5	43
Oklahoma	686	40	122	93	25	37	98	0	0	75	790
Texas	2,517	115	445	398	147	218	318	14	15	296	2,801
RRC District 1	29	6	4	4	3	2	2	4	0	4	36
RRC District 2 Onshore	69	7	12	15	6	12	11	0	2	13	79
RRC District 3 Onshore	207	32	50	63	14	13	28	4	5	41	221
RRC District 4 Onshore	287	57	51	69	19	26	41	0	3	51	326
RRC District 5	51	-2	9	6	2	4	3	0	0	4	53
RRC District 6	248	10	50	29	8	19	36	1	3	26	304
RRC District 7B	32	24	3	10	3	3	1	0	0	7	43
RRC District 7C	345	18	69	49	27	29	28	0	0	30	383
RRC District 8	498	-10	66	73	26	36	50	4	0	46	499
RRC District 8A	163	11	39	6	3	8	2	1	0	18	197
RRC District 9	236	-48	25	15	28	30	59	0	0	24	235
RRC District 10	347	10	67	58	6	34	57	0	0	31	420
State Offshore	5	0	0	1	2	2	0	0	2	1	5
Utah and Wyoming	898	-20	150	158	50	46	122	0	1	62	927
West Virginia	68	7	16	6	2	1	5	0	0	4	85
Federal Offshore[a]	725	119	148	208	59	68	44	7	32	155	721
Pacific (California)	8	0	0	0	0	0	0	0	0	0	8
Gulf of Mexico (Louisiana)[a]	598	118	104	168	57	66	43	7	31	127	615
Gulf of Mexico (Texas)	119	1	44	40	2	2	1	0	1	28	98
Miscellaneous[b]	10	0	2	2	0	0	0	0	0	0	10
U.S. Total	**7,459**	**273**	**1,232**	**1,135**	**442**	**554**	**734**	**26**	**54**	**827**	**7,928**

[a]Includes Federal offshore Alabama.

[b]Includes Arizona, Illinois, Indiana, Maryland, Missouri, Nebraska, Nevada, New York, Ohio, Oregon, Pennsylvania, South Dakota, Tennessee, and Virginia.

Note: The production estimates in this table are based on data reported on Form EIA-23, “Annual Survey of Domestic Oil and Gas Reserves,” and Form EIA-64A, “Annual Report of the Origin of Natural Gas Liquids Production.” They may differ from the official Energy Information Administration production data for natural gas and natural gas liquids for 2004 contained in the publications *Petroleum Supply Annual 2004*, DOE/EIA-0340(04) and *Natural Gas Annual 2004* DOE/EIA-0131(04).

Source: Energy Information Administration, Office of Oil and Gas.

Table 14. Natural Gas Plant Liquids Proved Reserves and Production, 2004
(Million Barrels of 42 U.S. Gallons)

State and Subdivision	2004 Reserves	2004 Production
Alaska	369	18
Lower 48 States	**6,338**	**627**
Alabama	29	2
Arkansas	2	0
California	121	10
Coastal Region Onshore	19	1
Los Angeles Basin Onshore	8	0
San Joaquin Basin Onshore	94	9
State Offshore	0	0
Colorado	362	26
Florida	12	0
Kansas	267	22
Kentucky	71	3
Louisiana	167	31
North	53	4
South Onshore	87	20
State Offshore	27	7
Michigan	44	3
Mississippi	1	0
Montana	6	1
New Mexico	805	73
East	245	35
West	560	38
North Dakota	39	5
Oklahoma	666	64
Texas	2,466	250
RRC District 1	31	3
RRC District 2 Onshore	64	10
RRC District 3 Onshore	149	27
RRC District 4 Onshore	253	38
RRC District 5	44	3
RRC District 6	233	21
RRC District 7B	42	7
RRC District 7C	365	27
RRC District 8	487	45
RRC District 8A	197	18
RRC District 9	228	22
RRC District 10	373	29
State Offshore	0	0
Utah and Wyoming	765	52
West Virginia	84	4
Federal Offshore[a]	423	81
Pacific (California)	0	0
Gulf of Mexico (Louisiana)[a]	410	78
Gulf of Mexico (Texas)	13	3
Miscellaneous[b]	8	0
U.S. Total	**6,707**	**645**

[a]Includes Federal Offshore Alabama.

[b]Includes Arizona, Illinois, Indiana, Maryland, Missouri, Nebraska, Nevada, New York, Ohio, Oregon, Pennsylvania, South Dakota, Tennessee, and Virginia.

Note: The production estimates in this table are based on data reported on Form EIA-23, “Annual Survey of Domestic Oil and Gas Reserves,” and Form EIA-64A, “Annual Report of the Origin of Natural Gas Liquids Production.” They may differ from the official Energy Information Administration production data for natural gas plant liquids for 2004 contained in the publications *Petroleum Supply Annual 2004, DOE/EIA-0340(2004) and Natural Gas Annual 2004*, DOE/EIA-0131(2004).

Source: Energy Information Administration, Office of Oil and Gas.

Table 15. Lease Condensate Proved Reserves and Production, 2004
(Million Barrels of 42 U.S. Gallons)

State and Subdivision	2004 Reserves	2004 Production
Alaska	0	0
Lower 48 States	**1,221**	**182**
Alabama	21	2
Arkansas	1	0
California	1	0
Coastal Region Onshore	0	0
Los Angeles Basin Onshore	0	0
San Joaquin Basin Onshore	1	0
State Offshore	0	0
Colorado	103	6
Florida	0	0
Kansas	4	0
Kentucky	1	0
Louisiana	96	25
North	21	3
South Onshore	66	19
State Offshore	9	3
Michigan	4	1
Mississippi	5	1
Montana	0	0
New Mexico	59	6
East	29	4
West	30	2
North Dakota	4	0
Oklahoma	124	11
Texas	335	46
RRC District 1	5	1
RRC District 2 Onshore	15	3
RRC District 3 Onshore	72	14
RRC District 4 Onshore	73	13
RRC District 5	9	1
RRC District 6	71	5
RRC District 7B	1	0
RRC District 7C	18	3
RRC District 8	12	1
RRC District 8A	0	0
RRC District 9	7	2
RRC District 10	47	2
State Offshore	5	1
Utah and Wyoming	162	10
West Virginia	1	0
Federal Offshore[a]	298	74
Pacific (California)	8	0
Gulf of Mexico (Louisiana)[a]	205	49
Gulf of Mexico (Texas)	85	25
Miscellaneous[b]	2	0
U.S. Total	**1,221**	**182**

[a]Includes Federal Offshore Alabama.
[b]Includes Arizona, Illinois, Indiana, Maryland, Missouri, Nebraska, Nevada, New York, Ohio, Oregon, Pennsylvania, South Dakota, Tennessee, and Virginia.
Note: The estimates in this table are based on data reported on Form EIA-23, “Annual Survey of Domestic Oil and Gas Reserves” 2004.
Source: Energy Information Administration, Office of Oil and Gas.

Sales and Acquisitions

There were 554 million barrels of acquisitions and 442 million barrels of sales in 2004. The net of these transactions added 112 million barrels of natural gas liquids proved reserves.

Production

Natural gas liquids production was an estimated 827 million barrels in 2004, an increase of 3 percent from 2003. Alaskan production remained level and production in the lower 48 States increased.

Six areas accounted for about 87 percent of the Nation's natural gas liquids production.

- Texas (36 percent of the National total)
- Gulf of Mexico Federal Offshore (19 percent)
- New Mexico (10 percent)
- Oklahoma (9 percent)
- Utah-Wyoming (7 percent)
- Louisiana (7 percent).

Natural Gas Plant Liquids

Proved Reserves

Natural gas plant liquids proved reserves increased in 2004 to 6,707 million barrels, a 7 percent increase from the 2003 level (6,244 million barrels) (**Table 14**). Six areas accounted for about 82 percent of the Nation's natural gas plant liquids proved reserves:

Area	Percent of U.S. Gas Plant Liquids
Texas	37
New Mexico	12
Utah-Wyoming	11
Oklahoma	10
Gulf of Mexico Federal Offshore	6
Alaska	6
Area Total	**82**

Production

Natural gas plant liquids production increased 6 percent in 2004—from 611 million barrels in 2003 to 645 million barrels of production (**Table 14**) even though gas production decreased in 2004. The reasons for this are primarily economic.

In 2003, given certain gas market conditions, it was more economic to offer higher BTU gas directly to the market than to strip the liquids from the produced gas stream. With higher average crude oil prices in 2004, liquids regained an advantage and more liquids were produced at gas plants.

The number of active gas plants dropped in 2004. According to survey results from Form EIA-64A, the number of unique active U.S. natural gas proccessing plants dropped from 497 in 2003 to 491 in 2004.

The top six areas for proved reserves of natural gas plant liquids accounted for about 82 percent of the Nation's natural gas plant liquids production:

- Texas (39 percent)
- Gulf of Mexico Federal Offshore (13 percent)
- New Mexico (11 percent)
- Oklahoma (10 percent)
- Utah and Wyoming (8 percent)
- Alaska (3 percent).

Natural gas processing plants are usually located in the same general area where the natural gas is produced. Table E4 in Appendix E lists the volumes of natural gas produced and processed in the same State, and the volumes of liquids extracted.

Lease Condensate

Proved Reserves

Proved reserves of lease condensate in the United States were 1,221 million barrels in 2004 (**Table 15**). This was less than 1 percent higher than the volume reported in 2003 (1,215 million barrels). The reserves of five areas accounts for about 82 percent of the Nation's lease condensate proved reserves.

Area	Percent of U.S. Condensate Reserves
Texas	27
Gulf of Mexico Federal Offshore	24
Utah-Wyoming	13
Oklahoma	10
Colorado	8
Area Total	**82**

Production

Production of lease condensate was 182 million barrels in 2004, a decrease of 5 percent from 2003's production (191 million barrels). The production of five areas account for about 91 percent of the Nation's lease condensate production.

- Gulf of Mexico Federal Offshore (41 percent)
- Texas (25 percent)
- Louisiana (14 percent)
- Oklahoma (6 percent)
- Utah and Wyoming (5 percent).

Reserves in Nonproducing Status

Like crude oil and natural gas, not all lease condensate proved reserves were producing during 2004. Proved reserves of 409 million barrels of lease condensate, an increase of 3 percent from 2003's level (399 million barrels), were reported in nonproducing status in 2004 (**Appendix D, Table D10**). About 37 percent of the nonproducing lease condensate reserves were located in the Gulf of Mexico Federal Offshore.

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Appendix A

Operator Level Data

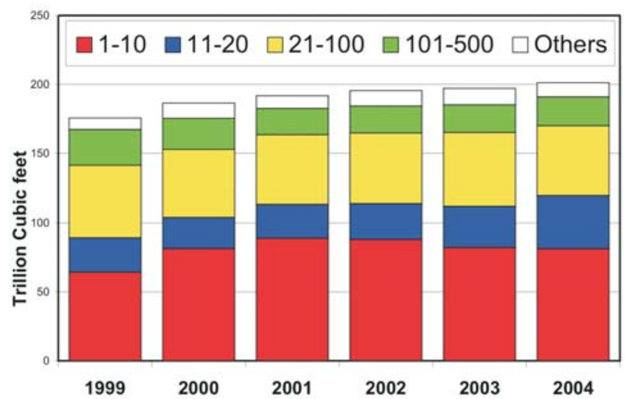
Operator Level Data

Appendix A provides a series of tables of the proved reserves and production by production size class for the years 1999 through 2004 for oil and gas well operators. The tables show the volumetric change and percent change from the previous year and from 1999. In addition they show the 2004 average per operator in each class. All companies that reported to EIA were ranked by production size for each of the 6 years. We computed company production size classes as the sum of the barrel oil equivalent of the crude oil production, lease condensate production, and wet gas production for each operator. The companies were then placed in the following production size classes: 1-10, 11-20, 21-100, 101-500, and all "other" oil and gas operators. The "other" category contains 20,170 small operators. We estimated production and reserves for small operators for 2004 from a sample of approximately 3 percent.

Class 1-10 contains the 10 highest producing companies each year on a barrel oil equivalent basis. These companies are not necessarily the same 10 companies each year.

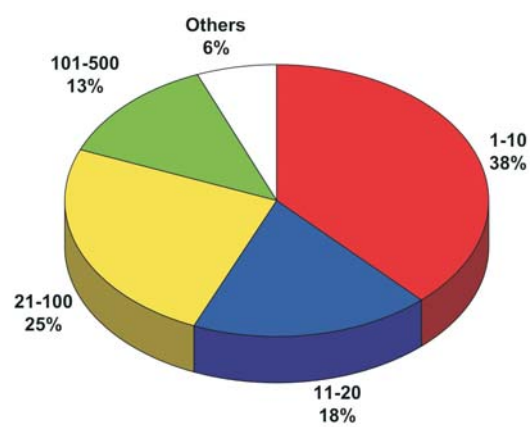
Natural Gas Proved Reserves

The wet natural gas proved reserves reported for 1999 through 2004 have changed from 176,159 billion cubic feet to 201,200 billion cubic feet (Table A1). These proved reserves are highly concentrated in the larger companies. In 2004, the top 20 operators (Class 1-10 and Class 11-20) producing companies had 60 percent of the proved reserves of natural gas. The next two size classes contain 80 and 400 companies and account for 25 and 10 percent of the U.S. natural gas proved reserves, respectively. The top 20 operators had an increase of 34 percent in their natural gas proved reserves from 1999 to 2004. The rest of the operators in (Class 21-100, Class 101-500, and Class Other) had a decrease of 6 percent in their reserves in the same period. In 2004, the top 20 operators' natural gas reserves had a increase of 7 percent from 2003.



Natural Gas Production

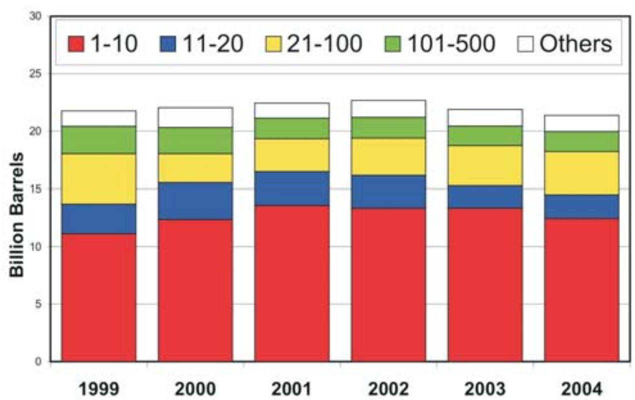
Wet natural gas production has decreased from 20,231 billion cubic feet in 2003 to 20,017 billion cubic feet in 2004 (Table A2). In 2004, the top 20 producing companies had 56 percent of the production of wet natural gas. The next two size classes have 25 and 13 percent of the wet natural gas production, respectively. The top 20 operators had an increase of 8 percent in wet natural gas production from 1999 to 2004. The rest of the operators had a decrease of 7 percent from 1999 to 2004. The top 20 operators' wet natural gas production had a decrease of less than 1 percent in 2004 from 2003.



Crude Oil Proved Reserves

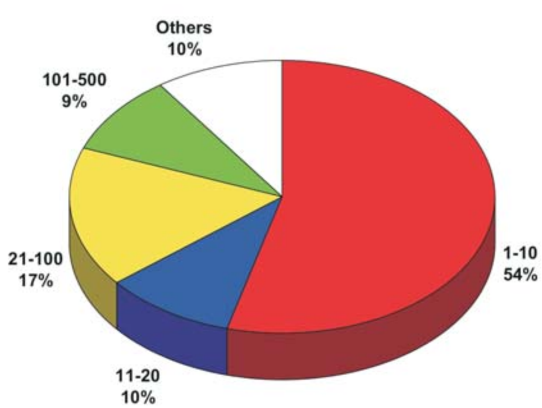
Proved reserves of crude oil are more highly concentrated in a few companies than those of natural gas. The 20 largest oil and gas producing companies in 2004 had 68 percent of U.S. proved reserves of crude oil (Table A3), in contrast to wet natural gas where these same companies operated 60 percent of the total proved reserves.

U.S. proved reserves of crude oil decreased 2 percent in 2004 from 2003. The top 20 producing companies proved reserves of crude oil during 2004 decreased 5 percent from 2003. The top 20 class had an increase of 6 percent in their crude oil proved reserves from 1999 to 2004.



Crude Oil Production

Crude oil production reported for 1999 to 2004 has decreased from 1,877 million barrels to 1,819 million barrels (Table A4). The 20 largest oil and gas producing companies had 64 percent of U.S. production of crude oil in 2004. In 1999 they accounted for 62 percent of production.



This is in contrast to wet natural gas where these same companies produced 56 percent of the total. U.S. production of crude oil declined by 7 percent from 1999 to 2004. The top 20 operators had a decline of 4 percent in their oil production during the same period. U.S. production of crude oil declined 3 percent from 2003 to 2004. In the same period the top 20 operators production decreased by 7 percent.

Crude Oil and Natural Gas Fields

The number of fields in which Category I and Category II operators were active increased during the 1999-2004 period (Table A5). From 1999-2004, the number of fields in which the top 20 operators were active increased by 2,688 fields (66 percent) while in 2004 the number increased by 580 fields from 2003.

We also include statistics for operator Category sizes at the bottom portion of tables in this appendix. These are the categories used by EIA in processing and assessing reserves surveys and are presented here as additional perspective. For further explanation of categories sizes see definitions and descriptions in Appendix E.

Ranked Crude Oil and Natural Gas Production

Table A6 lists the top U.S. Oil and gas operators ranked by reported 2004 operated production data. Table A6 has been moved from Appendix B to Appendix A to reflect the operator nature of the table. The following list of companies taken from previous reports is representative of the tremendous change that has taken place in the US oil and gas industry since 1999. In this list are companies, formerly in the top 50 producing operators in the United States, which are longer reporting to the Energy Information Administration on the form EIA-23. Former operators in this list were either merged or acquired by other operators. On the other hand, this does not mean that all the reserves which they operated have disappeared as most reserves remained with the acquiring company. Some reserves were sold by the acquiring or merging company as the consolidation occurred.

Operators Formerly in the Ranks of the Top 50 Reported for the U.S. 1999-2003

Num	Formerly Operated As	Currently Operated By
1	AEC Oil & Gas (USA) Inc	Encana Oil & Gas Inc
2	Agip Petroleum Co Inc	Eni SpA
3	Altura Energy Ltd	Occidental Petroleum Corp
4	Arco Exploration & Production	BP Plc
5	Arguello Inc	Plains Explor & Prod Co
6	Barrett Resources Corp	Williams Energy Inc
7	BP Amoco	BP Plc
8	British Borneo USA Inc	Eni SpA
9	C N G Producing Co	Dominion Resources Inc
10	Chevron USA Production Co	ChevronTexaco Inc
11	Coastal Oil & Gas Corp	El Paso Energy
12	Coho Resources Inc	Denbury Resources Inc
13	Conoco Inc	ConocoPhillips Co
14	Evergreen Operating Corp	Pioneer Natural Resources USA
15	Fina Oil & Chemical Co	Total SA
16	Helmerich & Payne Inc	Cimarex Energy Co
17	Howell Petroleum Corp	Anadarko Petroleum Corp
18	HS Resources Inc	Kerr-McGee Corp
19	Louis Dreyfus Natural Gas Corp	Dominion Resources Inc
20	Mitchell Energy & Development Corp	Devon Energy Corp
21	Nuevo Energy Co	Plains Explor & Prod Co
22	Ocean Energy Inc	Devon Energy Corp
23	Patina Oil & Gas Corp	Noble Energy Inc
24	Phillips Petroleum Co	ConocoPhillips Co
25	Prize Operating Co	Gruy Petroleum Management Co
26	River Gas Corp	ConocoPhillips Co
27	Santa Fe Snyder Corp	Devon Energy Corp
28	Stocker Resources Inc	Plains Explor & Prod Co
29	Texaco Inc	ChevronTexaco Inc
30	Tom Brown Inc	Encana Oil & Gas Inc
31	Union Pacific Resources	Anadarko Petroleum Corp
32	Vastar Resources Inc	BP Plc
33	Westport Resources Corp	Kerr-McGee Corp

Table A1. Natural Gas Proved Reserves, Wet After Lease Separation, by Operator Production Size Class, 1999–2004
(Billion Cubic Feet at 14.73 psia and 60° Fahrenheit)

Size Class	1999	2000	2001	2002	2003	2004	2003–2004 Volume and Percent Change	1999–2004 Volume and Percent Change	2004 Average Reserves per Operator
Class 1-10	64,320	81,437	88,936	88,100	82,222	81,325	-896	17,005	8,132.536
Percent of Total	36.5%	43.7%	46.4%	45.0%	41.7%	40.4%	-1.1%	26.4%	
Class 11-20	24,925	22,590	24,588	25,938	29,890	38,643	8,753	13,718	3,864.340
Percent of Total	14.1%	12.1%	12.8%	13.3%	15.2%	19.2%	29.3%	55.0%	
Class 21-100	52,160	48,832	50,055	50,633	53,098	50,149	-2,949	-2,011	626.867
Percent of Total	29.6%	26.2%	26.1%	25.9%	26.9%	24.9%	-5.6%	-3.9%	
Class 101-500	25,967	22,620	19,046	19,723	20,030	20,912	882	-5,055	52.280
Percent of Total	14.7%	12.1%	9.9%	10.1%	10.2%	10.4%	4.4%	-19.5%	
Class Other (20,170)	8,289	11,030	9,118	11,167	11,905	10,170	-1,735	1,881	0.504
Percent of Total	5.0%	5.9%	4.8%	5.7%	6.0%	5.1%	-14.6%	22.7%	
Category I (164)	146,458	162,144	169,056	173,325	173,225	178,269	5,044	31,811	1,087.006
Percent of Total	82.8%	86.9%	88.2%	88.6%	87.9%	88.6%	2.9%	21.7%	
Category II (532)	18,033	13,123	13,346	11,051	11,983	12,494	511	-5,539	23.485
Percent of Total	12.5%	7.0%	7.0%	5.7%	6.1%	6.2%	4.3%	-30.7%	
Category III (19,974)	7,952	R11,243	9,342	11,184	11,937	10,437	-1,500	2,485	0.523
Percent of Total	4.7%	6.0%	4.9%	5.7%	6.1%	5.2%	-12.6%	31.2%	
Total Published	**176,159**	**186,510**	**191,743**	**195,561**	**197,145**	**201,200**	**4,055**	**25,041**	**9.734**
Percent of Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**2.1%**	**14.2%**	

R = Revised

Note: There were 19,974 active Category III operators in the 2004 sample frame.The reserves and production of Category III operators were estimated from an adjusted sample of 606 Category III operators (Table E2). The "other" size class represents 20,170 operators in the 2004 frame (20,670 active operators minus the 500 largest operators).

Source: Energy Information Administration, Office of Oil and Gas.

Table A2. Natural Gas Production, Wet After Lease Separation, by Operator Production Size Class, 1999–2004
(Billion Cubic Feet at 14.73 psia and 60° Fahrenheit)

Size Class	1999	2000	2001	2002	2003	2004	2003–2004 Volume and Percent Change	1999–2004 Volume and Percent Change	2004 Average Production per Operator
Class 1-10	6,881	8,495	9,019	8,996	8,220	7,617	-603	736	761.662
Percent of Total	34.7%	42.1%	43.7%	44.4%	40.6%	38.1%	-7.3%	10.7%	
Class 11-20	3,560	2,886	3,064	2,854	3,136	3,647	511	87	364.658
Percent of Total	14.1%	14.3%	14.8%	14.1%	15.5%	18.2%	16.3%	2.4%	
Class 21-100	5,523	4,965	4,949	4,763	5,275	4,982	-293	-541	62.275
Percent of Total	29.6%	24.6%	24.0%	23.5%	26.1%	24.9%	-5.6%	-9.8%	
Class 101-500	2,793	2,780	2,609	2,475	2,386	2,559	173	-234	6.396
Percent of Total	14.7%	13.8%	12.6%	12.2%	11.8%	12.8%	7.2%	-8.4%	
Class Other (20,170)	1,099	1,038	1,000	1,161	1,215	1,213	-1	114	0.060
Percent of Total	5.0%	5.1%	4.8%	5.7%	6.0%	6.1%	-0.1%	10.4%	
Category I (164)	16,248	17,096	17,672	17,335	17,347	17,036	-311	788	103.876
Percent of Total	82.8%	84.8%	85.6%	85.6%	85.7%	85.1%	-1.8%	4.8%	
Category II (532)	2,556	1,921	1,932	1,738	1,648	1,718	70	-838	3.230
Percent of Total	12.5%	9.5%	9.4%	8.6%	8.1%	8.6%	4.3%	-32.8%	
Category III (19,974)	1,052	1,147	1,038	1,176	1,236	1,263	27	211	0.063
Percent of Total	4.7%	5.7%	5.0%	5.8%	6.1%	6.3%	2.1%	20.0%	
Total Published	**19,856**	**20,164**	**20,642**	**20,248**	**20,231**	**20,017**	**-214**	**161**	**0.968**
Percent of Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**-1.1%**	**0.8%**	

R = Revised
Note: There were 19,974 active Category III operators in the 2004 sample frame. The reserves and production of Category III operators were estimated from an adjusted sample of 606 Category III operators (Table E2). The "other" size class represents 20,170 operators in the 2004 frame (20,670 active operators minus the 500 largest operators).
Source: Energy Information Administration, Office of Oil and Gas.

Table A3. Crude Oil Proved Reserves by Operator Production Size Class, 1999–2004
(Million Barrels of 42 U.S. Gallons)

Size Class	1999	2000	2001	2002	2003	2004	2003–2004 Volume and Percent Change	1999–2004 Volume and Percent Change	2004 Average Reserves per Operator
Class 1-10	11,121	12,367	13,590	13,346	13,355	12,454	-901	1,333	1,245.392
Percent of Total	51.1%	56.1%	60.5%	58.9%	61.0%	58.3%	-6.7%	12.0%	
Class 11-20	2,585	3,172	2,901	2,817	1,907	2,053	145	-532	205.270
Percent of Total	11.9%	14.4%	12.9%	12.4%	8.7%	9.6%	7.6%	-20.6%	
Class 21-100	4,338	2,505	2,856	3,230	3,483	3,711	228	-627	46.386
Percent of Total	19.9%	11.4%	12.7%	14.2%	15.9%	17.4%	6.5%	-14.5%	
Class 101-500	2,379	2,286	1,794	1,817	1,705	1,761	55	-618	4.402
Percent of Total	10.9%	10.4%	8.0%	8.0%	7.8%	8.2%	3.2%	-26.0%	
Class Other (20,170)	1,342	1,716	1,305	1,468	1,440	1,393	-47	51	0.069
Percent of Total	6.2%	7.8%	5.8%	6.5%	6.6%	6.5%	-3.3%	3.8%	
Category I (164)	18,952	19,421	20,325	20,213	19,499	19,055	-443	103	116.192
Percent of Total	87.1%	88.1%	90.6%	89.1%	89.1%	89.2%	-2.3%	0.5%	
Category II (532)	1,521	873	794	992	937	906	-31	-615	1.703
Percent of Total	7.0%	4.0%	3.5%	4.4%	4.3%	4.2%	-3.3%	-40.4%	
Category III (19,974)	1,293	1,751	1,326	1,472	1,456	1,410	-46	117	0.071
Percent of Total	5.9%	7.9%	5.9%	6.5%	6.6%	6.6%	-3.1%	9.0%	
Total Published	**21,765**	**22,045**	**22,446**	**22,677**	**21,891**	**21,371**	**-520**	**-394**	**1.034**
Percent of Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**-2.4%**	**-1.8%**	

R = Revised

Note: There were 19,974 active Category III operators in the 2004 sample frame. The reserves and production of Category III operators were estimated from an adjusted sample of 606 Category III operators (Table E2). The "other" size class represents 20,170 operators in the 2004 frame (20,670 active operators minus the 500 largest operators).

Source: Energy Information Administration, Office of Oil and Gas.

Table A4. Crude Oil Production by Operator Production Size Class, 1999–2004
(Million Barrels of 42 U.S. Gallons)

Size Class	1999	2000	2001	2002	2003	2004	2003–2004 Volume and Percent Change	1999–2004 Volume and Percent Change	2004 Average Production per Operator
Class 1-10	974	961	1,061	1,037	1,047	986	-61	12	98.641
Percent of Total	49.9%	51.1%	55.4%	55.3%	55.8%	54.2%	-5.8%	1.3%	
Class 11-20	241	304	240	233	205	180	-25	-61	18.025
Percent of Total	12.3%	16.2%	12.5%	12.4%	10.9%	9.9%	-12.0%	-25.2%	
Class 21-100	350	214	233	240	272	303	31	-47	3.783
Percent of Total	17.9%	11.4%	12.2%	12.8%	14.5%	16.6%	11.3%	-13.5%	
Class 101-500	208	211	195	181	178	172	-6	-36	0.430
Percent of Total	10.7%	11.2%	10.2%	9.7%	9.5%	9.5%	-3.5%	-17.3%	
Class Other (20,170)	179	190	186	184	175	178	3	-1	0.009
Percent of Total	9.2%	10.1%	9.7%	9.8%	9.3%	9.8%	1.7%	-0.8%	
Category I (164)	1,617	1,572	1,612	1,573	1,574	1,534	-40	-83	9.353
Percent of Total	82.8%	83.6%	84.2%	83.9%	83.9%	84.3%	-2.6%	-5.1%	
Category II (532)	160	111	112	115	124	105	-19	-55	0.198
Percent of Total	8.2%	5.9%	5.8%	6.1%	6.6%	5.8%	-15.1%	-34.1%	
Category III (19,974)	175	197	191	187	179	180	1	5	0.009
Percent of Total	9.0%	10.5%	10.0%	10.0%	9.5%	9.9%	0.6%	2.6%	
Total Published	**1,952**	**1,880**	**1,915**	**1,875**	**1,877**	**1,819**	**-58**	**-133**	**0.088**
Percent of Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**-3.1%**	**-6.8%**	

R = Revised

Note: There were 19,974 active Category III operators in the 2004 sample frame. The reserves and production of Category III operators were estimated from an adjusted sample of 606 Category III operators (Table E2). The "other" size class represents 20,170 operators in the 2004 frame (20,670 active operators minus the 500 largest operators).

Source: Energy Information Administration, Office of Oil and Gas.

Table A5. Operator Field Count by Operator Production Size Class, 1999–2004

Size Class	1999	2000	2001	2002	2003	2004	2003–2004 Number and Percent Change	1999–2004 Number and Percent Change	2004 Average Number of Fields per Operator
Class 1-10	2,559	3,444	3,794	3,596	3,689	3,409	-280	850	340.900
Percent of Total	10.0%	13.0%	14.0%	12.9%	13.2%	12.4%	-7.6%	33.2%	
Class 11-20	1,514	1,923	2,212	2,392	2,492	3,352	860	1,838	335.200
Percent of Total	5.9%	7.2%	8.2%	8.6%	8.9%	12.2%	34.5%	121.4%	
Class 21-100	8,180	7,084	7,195	7,947	8,168	8,071	-97	-109	100.888
Percent of Total	32.0%	26.7%	26.5%	28.4%	29.3%	29.4%	-1.2%	-1.3%	
Class 101-500	12,344	12,580	12,435	12,661	11,859	10,698	-1,161	-1,646	26.745
Percent of Total	48.2%	47.4%	45.9%	45.3%	42.5%	39.0%	-9.8%	-13.3%	
Rest	1,287	1,529	1,480	1,349	1,709	1,929	220	642	9.842
Percent of Total	5.0%	5.8%	5.5%	4.8%	6.1%	7.0%	12.9%	49.9%	
Category I	15,120	16,174	16,196	17,049	16,760	17,368	608	2,248	105.902
Percent of Total	59.1%	60.9%	59.7%	61.0%	60.0%	63.3%	3.6%	14.9%	
Category II	10,467	10,146	10,764	10,473	10,688	9,486	-1,202	-981	17.831
Percent of Total	40.9%	38.2%	39.7%	37.5%	38.3%	34.5%	-11.2%	-9.4%	
Total	**25,587**	**26,560**	**27,116**	**27,945**	**27,917**	**27,459**	**-458**	**1,872**	**39.453**
Percent of Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**-1.6%**	**7.3%**	

Note: Includes only data from Category I and Category II operators. In 2004 there were 164 Category I operators and 532 Category II operators. The “rest” size class had 196 operators in 2004.
Source: Energy Information Administration, Office of Oil and Gas.

Table A6. Top 50 U.S. Operators Ranked by Reported 2004 Operated Production Data

Rank	Company Name	Crude Oil Production (thousand barrels/day)	Rank	Company Name	Total Natural Gas Production (milion cubic feet/day)
1	BP PLC	827	1	BP PLC	4,252
2	CHEVRONTEXACO INC	493	2	EXXONMOBIL CORP	2,513
3	SHELL EXPLORATION & PRODUCTION CO	413	3	DEVON ENERGY CORPORATION	2,244
4	CONOCOPHILLIPS CO	322	4	CHEVRONTEXACO INC	2,128
5	OCCIDENTAL PETROLEUM CORP	261	5	CONOCOPHILLIPS CO.	2,110
6	AERA ENERGY LLC	216	6	BURLINGTON RESOURCES OIL & GAS CO	1,928
7	EXXONMOBIL CORP	213	7	SHELL EXPLORATION & PRODUCTION CO	1,894
8	KERR-MCGEE CORP	152	8	ANADARKO PETROLEUM CORP	1,628
9	APACHE CORP	95	9	KERR-MCGEE CORP	1,459
10	ANADARKO PETROLEUM CORP	88	10	CHESAPEAKE OPERATING INC.	1,368
Top 10 Volume Subtotal		***3,080***	***Top 10 Volume Subtotal***		***21,524***
Top 10 Percentage of U.S. Total		***56%***	***Top 10 Percentage of U.S. Total***		***39%***
11	AMERADA HESS CORP	83	11	ENCANA OIL & GAS INC	1,328
12	DEVON ENERGY CORPORATION	74	12	APACHE CORP	1,276
13	PLAINS EXPLOR & PROD CO	66	13	XTO ENERGY INC	1,219
14	MARATHON OIL CO	59	14	DOMINION RESOURCES INC	1,099
15	UNOCAL CORP	54	15	EL PASO ENERGY	1,010
16	KINDER MORGAN PROD CO INC	48	16	E O G RESOURCES INC	936
17	BURLINGTON RESOURCES OIL & GAS CO	37	17	UNOCAL CORP	843
18	MERIT ENERGY CO	36	18	MARATHON OIL CO	808
19	POGO PRODUCING CO	33	19	NEWFIELD EXPLORATION CO	745
20	CITY OF LONG BEACH	32	20	PIONEER NATURAL RESOURCES USA INC.	698
Top 20 Volume Subtotal		***3,602***	***Top 20 Volume Subtotal***		***31,486***
Top 20 Percentage of U.S. Total		***66%***	***Top 20 Percentage of U.S. Total***		***58%***
21	XTO ENERGY INC	31	21	OCCIDENTAL PETROLEUM CORP	656
22	E O G RESOURCES INC	30	22	WILLIAMS ENERGY INC	577
23	CITATION OIL & GAS CORP	28	23	SAMSON RESOURCES CO	504
24	PIONEER NATURAL RESOURCES USA INC.	28	24	QUESTAR CORP	471
25	DENBURY RESOURCES INC.	27	25	AMERADA HESS CORP	346
26	NEXEN PETROLEUM USA INC.	26	26	TOTALFINAELF SA	330
27	CHESAPEAKE OPERATING INC.	26	27	HOUSTON EXPLORATION	324
28	MURPHY OIL CORP	26	28	MERIT ENERGY CO	290
29	DOMINION RESOURCES INC.	23	29	NOBLE ENERGY INC	288
30	HILCORP ENERGY CO	22	30	YATES PETROLEUM CORP	280
31	NEWFIELD EXPLORATION CO	22	31	POGO PRODUCING CO	275
32	ENCORE OPERATING LP	22	32	ENERGEN RESOURCES CORP	273
33	BERRY PETROLEUM CO	21	33	PATINA OIL & GAS CORP.	270
34	PATINA OIL & GAS CORP.	21	34	CIMAREX ENERGY CO	257
35	FOREST OIL CORP	20	35	FOREST OIL CORP	253
36	ENI PETROLEUM CO INC	20	36	WALTER OIL & GAS CORP	248
37	NOBLE ENERGY INC	19	37	HUNT OIL CO.	246
38	VINTAGE PETROLEUM INC	18	38	EQUITABLE RESOURCES INC.	246
39	ST MARY LAND & EXPLOR CO	17	39	CABOT OIL & GAS CORP	236
40	STONE ENERGY CORP	16	40	HILCORP ENERGY CO	211
41	EL PASO ENERGY	16	41	HUNT PETROLEUM CORPORATION	199
42	SWIFT ENERGY CO	15	42	KAISER FRANCIS OIL CO.	188
43	BHP BILLITON	15	43	W & T OFFSHORE INC	172
44	TOTALFINAELF SA	14	44	RED WILLOW PRODUCTION CO	162
45	CONTINENTAL RESOURCES INC	14	45	STONE ENERGY CORP	160
46	NATIONAL FUEL GAS	13	46	ENERGY PARTNERS LTD	158
47	GRUY PETROLEUM MANAGEMENT CO.	13	47	WESTERN GAS RESOURCES INC.	156
48	ENERGEN RESOURCES CORP	13	48	C N X GAS CO LLC	156
49	ENDEAVOR ENERGY RESOURCES LP	12	49	FIDELITY EXPLORATION & PROD CO	151
50	WALTER OIL & GAS CORP	12	50	PEOPLES ENERGY CORP	150
Top 50 Volume Subtotal		***4,202***	***Top 50 Volume Subtotal***		***39,719***
Top 50 Percentage of U.S. Total		***77%***	***Top 50 Percentage of U.S. Total***		***73%***

Note: Crude oil production includes production of lease condensate. Total natural gas production is wet after lease separation.

Appendix B

Top 100 Oil and Gas Fields

Top 100 Oil and Gas Fields

This appendix presents estimates of the proved reserves and production of the top 100 liquids or gas fields by reserves or by production. The liquids production and reserve data include both crude oil and lease condensate, and are labeled as liquids. The total gas production and reserve data is wet after lease separation. Although there is considerable grouping of field-level statistics within the tables, rough orders of magnitude may be estimated for the proved reserves and production of most fields. They rank the top 100 fields by production (B3 and B4) rather than by reserves (B1 and B2).

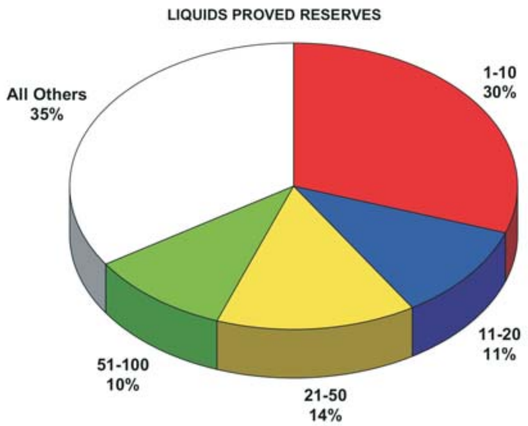
Many of the fields in the top 100 group are operated by only one or two operators, therefore, the totals for proved reserves are grouped as top 10, top 20, top 50, and top 100 to avoid revealing company proprietary data. Many of the same fields are in each of the tables B1, B2, B3, and B4. The liquids fields with the more recent Discovery dates are typically located in the Gulf of Mexico Offshore and Alaska. The gas fields with the more recent Discovery dates are located in the Gulf of Mexico Offshore, New Mexico, Colorado, and Wyoming. Blanco/Ignacio-Blanco and Basin have been combined into San Juan Basin Gas Area for the 2004 tables.

Summary for the Top 100 Fields for 2004 Liquids and Gas

Rank Group	12/31/2004 Proved Reserves	Percent	12/31/2004 Nonproducing Reserves	Percent	Est. 2004 Production	Percent
Table B1. Top 100 U.S. Fields as Ranked by Liquids Proved Reserves (Million Barrels)						
Top 10	6,813.1	30.2%	1,591.6	28.7%	432.9	21.6%
Top 20	9,289.7	41.1%	2,252.1	40.6%	584.9	29.2%
Top 50	12,564.7	55.6%	3,148.2	56.7%	823.5	41.2%
Top 100	14,893.3	65.9%	3,782.2	68.1%	1,016.0	50.8%
Others	7,698.7	34.1%	1,769.8	31.9%	985.0	49.2%
Total	22,592.0	100.0%	5,552.0	100.0%	2,001.0	100.0%
Table B2. Top 100 U.S. Fields as Ranked by Gas Proved Reserves (Billion Cubic Feet)						
Top 10	51,973.3	25.8%	10,221.2	19.9%	3,584.3	17.9%
Top 20	69,821.9	34.7%	14,362.2	27.9%	4,781.2	23.9%
Top 50	92,477.1	46.0%	20,800.8	40.5%	6,574.9	32.8%
Top 100	110,298.0	54.8%	25,915.7	50.4%	8,012.5	40.0%
Others	90,902.0	45.2%	25,496.3	49.6%	12,004.5	60.0%
Total	201,200.0	100.0%	51,412.0	100.0%	20,017.0	100.0%
Table B3. Top 100 U.S. Fields as Ranked by Liquids Production (Million Barrels)						
Top 10	n/a	n/a	n/a	n/a	516.4	25.8%
Top 20	n/a	n/a	n/a	n/a	684.5	34.2%
Top 50	n/a	n/a	n/a	n/a	934.3	46.7%
Top 100	n/a	n/a	n/a	n/a	1,139.8	57.0%
Others	n/a	n/a	n/a	n/a	861.2	43.0%
Total	n/a	n/a	n/a	n/a	2,001.0	100.0%
Table B4. Top 100 U.S. Fields as Ranked by Gas Production (Billion Cubic Feet)						
Top 10	n/a	n/a	n/a	n/a	3,797.6	19.0%
Top 20	n/a	n/a	n/a	n/a	5,006.1	25.0%
Top 50	n/a	n/a	n/a	n/a	6,974.6	34.8%
Top 100	n/a	n/a	n/a	n/a	8,746.1	43.7%
Others	n/a	n/a	n/a	n/a	11,270.9	56.3%
Total	n/a	n/a	n/a	n/a	20,017.0	100.0%

Table B1. Top 100 Liquids Fields Ranked by Reserves

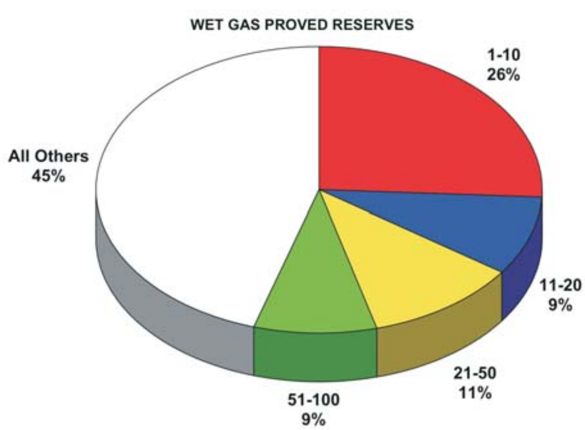
The top 100 liquids fields by reserves had 14,893 million barrels of **proved reserves** accounting for 66 percent of the total United States as of December 31, 2004, (**Table 6 and Table 14**) and 68 percent of the reported nonproducing reserves. In the top 20 liquids fields for 2004 there are five fields, which are in the deep water of the Gulf of Mexico Federal Offshore and four are currently nonproducing.



The top 100 liquids fields by reserves had 1,016 million barrels of **production**, or 51 percent of the 2004 U.S. total (**Table 6 and Table 14**). From year to year these top 100 fields change rank. The most notable change from last year is the Salt Creek field in Wyoming, moving to 29rd in 2004, as the operator increased enhanced oil recovery by CO_2 injection.

Table B2. Top 100 Gas Fields Ranked by Reserves

The top 100 gas fields by reserves had 110,298 billion cubic feet of wet natural gas **proved reserves** or 55 percent of the total, as of December 31, 2004 (**Table 9**) and 50 percent of the reported nonproducing reserves.



The top 100 gas fields by reserves had 8,012 billion cubic feet of **production**, or 40percent of the 2004 U.S. total (**Table 9**).

Table B3. Top 100 Liquids Fields Ranked by Production

The top 100 liquids fields by production had 1,139 million barrels of **production**, or 57 percent of the 2004 U.S. total (**Table 6 and Table 14**).

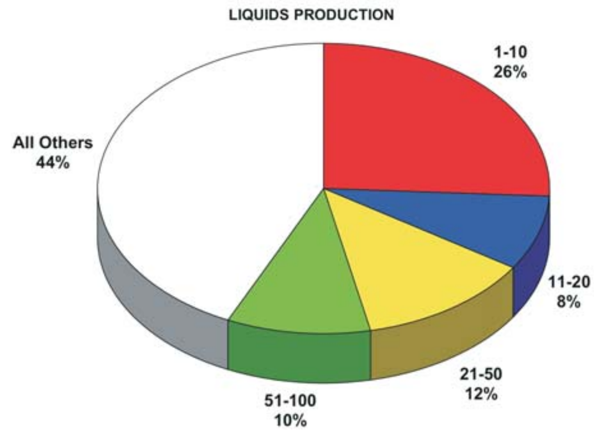


Table B4. Top 100 Gas Fields Ranked by Production

The top 100 gas fields had 8,746 billion cubic feet of **production**, or 44 percent of the 2004 U.S. total (**Table 9**).

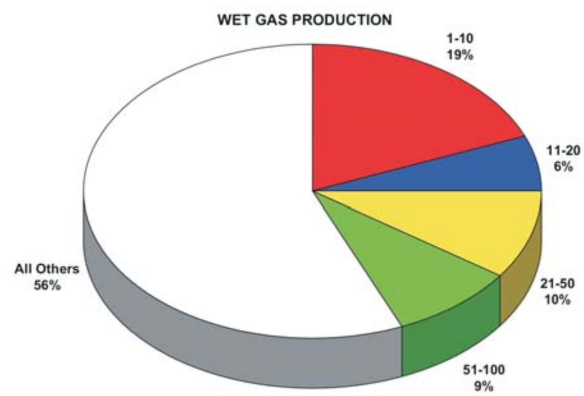


Table B1. Top 100 U.S. Fields Ranked by Liquids Proved Reserves from Estimated 2004 Field Level Data[a]
(Million Barrels of 42 U.S. Gallons)

Num	Field Name	Location	Discovery Year	Rank Group: Proved Reserves	Rank Group: Nonproducing Reserves	2004 Estimated Production Volume
1	PRUDHOE BAY	AK	1967	(1-10)		129.0
2	WASSON	TX	1937	(1-10)		24.8
3	KUPARUK RIVER	AK	1969	(1-10)		51.1
4	BELRIDGE SOUTH	CA	1911	(1-10)		39.8
5	MISSISSIPPI CANYON BLK 807 (MARS-URSA)	FG	1989	(1-10)		98.4
6	MISSISSIPPI CANYON BLK 778 (THUNDER HORSE)	FG	1999	(1-10)		0.0
7	MIDWAY-SUNSET	CA	1901	(1-10)		45.0
8	SPRABERRY TREND AREA	TX	1950	(1-10)		26.2
9	GREEN CANYON BLK 699 (ATLANTIS)	FG	1998	(1-10)		0.0
10	ELK HILLS	CA	1920	(1-10)		18.7
Top 10 Volume Subtotal				**6,813.1**	**1,591.6**	**432.9**
Top 10 Percentage of U.S. Total				**30.2%**	**28.7%**	**21.6%**
11	KERN RIVER	CA	1899	(11-20)		35.1
12	ALPINE	AK	1994	(11-20)		36.1
13	SLAUGHTER	TX	1937	(11-20)		14.8
14	MILNE POINT	AK	1982	(11-20)		18.8
15	GREEN CANYON BLK 644 (HOLSTEIN)	FG	1999	(11-20)		0.0
16	HONDO	FP	1969	(11-20)		8.0
17	GREEN CANYON BLK 826 (MAD DOG)	FG	1999	(11-20)		0.0
18	CYMRIC	CA	1916	(11-20)		18.8
19	LEVELLAND	TX	1945	(11-20)		9.5
20	LOST HILLS	CA	1910	(11-20)		11.1
Top 20 Volume Subtotal				**9,289.7**	**2,252.1**	**584.9**
Top 20 Percentage of U.S. Total				**41.1%**	**40.6%**	**29.2%**
21	WILMINGTON	CA	1932	(21-50)		14.8
22	WATTENBERG	CO	1970	(21-50)		10.8
23	CEDAR HILLS	ND & MT & SD	1951	(21-50)		7.9
24	GREEN CANYON BLK 640 (TAHITI)	FG	2002	(21-50)		0.0
25	WEST SAK	AK	1969	(21-50)		4.5
26	PESCADO	FP	1970	(21-50)		5.3
27	MISSISSIPPI CANYON BLK 84 (KING/HORN MT.)	FG	1993	(21-50)		31.0
28	SHO-VEL-TUM	OK	1905	(21-50)		9.1
29	SALT CREEK	WY	1889	(21-50)		1.6
30	ENDICOTT	AK	1978	(21-50)		7.7
31	INGLEWOOD	CA	1924	(21-50)		2.5
32	POINT MCINTYRE	AK	1988	(21-50)		13.9
33	COWDEN NORTH	TX	1930	(21-50)		7.2
34	HOBBS	NM	1928	(21-50)		4.0
35	SAN ARDO	CA	1947	(21-50)		4.0
36	SACATE	FP	1970	(21-50)		3.0
37	GREEN CANYON BLK 339 (FRONT RUNNER)	FG	2001	(21-50)		0.3
38	KELLY-SNYDER	TX	1948	(21-50)		10.4
39	NORTHSTAR	AK	1984	(21-50)		24.7
40	ORION	AK	2002	(21-50)		2.1
41	YATES	TX	1926	(21-50)		7.2
42	MISSISSIPPI CANYON BLK 383 (KEPLER)	FG	1987	(21-50)		21.0
43	VENTURA	CA	1916	(21-50)		4.4
44	BOREALIS	AK	2001	(21-50)		9.9
45	ROBERTSON NORTH	TX	1956	(21-50)		4.6
46	MCELROY	TX	1926	(21-50)		5.3
47	VACUUM	NM	1929	(21-50)		6.4
48	ELM COULEE	MT	2000	(21-50)		5.7
49	GOLDSMITH NORTH	TX	1946	(21-50)		5.1
50	FULLERTON	TX	1942	(21-50)		4.3
Top 50 Volume Subtotal				**12,564.7**	**3,148.2**	**823.5**
Top 50 Percentage of U.S. Total				**55.6%**	**56.7%**	**41.2%**

Table B1. Top 100 U.S. Fields Ranked by Liquids Proved Reserves from Estimated 2004 Field Level Data[a] (Continued)
(Million Barrels of 42 U.S. Gallons)

Num	Field Name	Location	Discovery Year	Rank Group Proved Reserves	Rank Group Nonproducing Reserves	2004 Estimated Production Volume
51	MISSISSIPPI CANYON BLK 773 (DEVILS TOWER)	FG	2000	(51-100)		3.0
52	LOOKOUT BUTTE EAST	MT	1986	(51-100)		4.6
53	GREATER ANETH	UT	1956	(51-100)		3.6
54	HAWKINS	TX	1940	51-100)		2.8
55	SEMINOLE	TX	1936	(51-100)		8.5
56	VIOSCA KNOLL BLK 786 (PETRONIUS)	FG	1996	(51-100)		11.5
57	RANGELY	CO	1902	(51-100)		5.0
58	MONUMENT BUTTE	UT	1964	(51-100)		2.8
59	PENNEL	MT	1955	(51-100)		2.1
60	GREEN CANYON BLK 680	FG	2003	(51-100)		0.0
61	POLARIS	AK	2000	(51-100)		1.0
62	LAKE WASHINGTON	LA	1931	(51-100)		5.3
63	ARROYO GRANDE	CA	1906	(51-100)		0.6
64	MISSISSIPPI CANYON BLK 20	FG	1995	(51-100)		0.3
65	JAY	AL & FL	1951	(51-100)		2.4
66	GIDDINGS	TX	1960	(51-100)		9.1
67	COALINGA	CA	1887	(51-100)		6.0
68	LISBURNE	AK	1967	(51-100)		3.4
69	GREEN CANYON BLK 518 (K2 NORTH)	FG	2003	(51-100)		0.0
70	SALT CREEK	TX	1942	(51-100)		4.2
71	BELRIDGE NORTH	CA	1912	(51-100)		3.2
72	MEANS	TX	1934	(51-100)		3.4
73	MISSISSIPPI CANYON BLK 582 (MEDUSA)	FG	2000	(51-100)		10.2
74	TARN	AK	1991	(51-100)		10.6
75	CEDAR LAKE	TX	1939	(51-100)		2.4
76	AURORA	AK	1969	(51-100)		3.3
77	KERN FRONT	CA	1925	(51-100)		1.6
78	HOWARD-GLASSCOCK	TX	1925	(51-100)		2.8
79	WESTBROOK	TX	1920	(51-100)		1.5
80	EWING BANK BLK 873 (LOBSTER)	FG	1991	(51-100)		6.6
81	MELTWATER	AK	2001	(51-100)		2.5
82	GREEN CANYON BLK 562 (K2)	FG	1999	(51-100)		0.0
83	ANTON-IRISH	TX	1944	(51-100)		4.2
84	PINEDALE	WY	1955	(51-100)		1.1
85	DOLLARHIDE	NM & TX	1945	(51-100)		2.9
86	EAST BREAKS BLK 602 (NANSEN)	FG	1999	(51-100)		11.3
87	EAST TEXAS	TX	1930	(51-100)		4.7
88	BLUEBELL	UT	1949	(51-100)		2.5
89	GARDEN BANKS BLK 215 (BALDPATE)	FG	1995	(51-100)		9.0
90	JO-MILL	TX	1953	(51-100)		2.5
91	PATRICK DRAW	WY	1959	(51-100)		0.3
92	VIOSCA KNOLL BLK 990 (POMPANO)	FG	1981	(51-100)		4.9
93	GREEN CANYON BLK 243 (ASPEN)	FG	2001	(51-100)		7.1
94	IATAN EAST HOWARD	TX	1926	(51-100)		1.5
95	NIAKUK	AK	1984	(51-100)		4.0
96	FOSTER	TX	1932	(51-100)		2.6
97	WELCH	TX	1942	(51-100)		2.0
98	ELK BASIN	MT & WY	1915	(51-100)		2.0
99	GARDEN BANKS BLK 668 (GUNNISON)	FG	2000	(51-100)		4.1
100	SOUTH PASS EA BLK 62	FG	1967	(51-100)		1.0
Top 100 Volume Subtotal				**14,893.3**	**3,782.2**	**1,016.0**
Top 100 Percentage of U.S. Total				**65.9%**	**68.1%**	**50.8%**

[a]Includes lease condensate.

Notes: The U.S. total production estimate of 2,001 million barrels and the U.S. total reserves estimate of 22,592 million barrels, used to calculate the percentages in this table, are from the combined totals of Table 6 and Table 15 in this publication. Column totals may not add due to independent rounding.

FP = Federal Offshore Pacific.

FG = Federal Offshore Gulf of Mexico.

Source: Energy Information Administration, Office of Oil and Gas.

Table B2. Top 100 U.S. Fields Ranked by Gas Proved Reserves from Estimated 2004 Field Level Data[a]
(Billion Cubic Feet)

Num	Field Name	Location	Discovery Year	Rank Group Proved Reserves	Rank Group Nonproducing Reserves	2004 Estimated Production Volume
1	SAN JUAN BASIN GAS AREA	CO & NM	1927	(1-10)		1450.8
2	PRUDHOE BAY	AK	1967	(1-10)		209.3
3	PINEDALE	WY	1955	(1-10)		150.4
4	NEWARK EAST	TX	1981	(1-10)		412.6
5	HUGOTON GAS AREA	KS & OK & TX	1922	(1-10)		307.9
6	JONAH	WY	1977	(1-10)		250.9
7	LOWER MOBILE BAY AREA	AL & FG	1979	(1-10)		290.1
8	WATTENBERG	CO	1970	(1-10)		192.0
9	MADDEN	WY	1968	(1-10)		153.5
10	ANTRIM	MI	1965	(1-10)		166.7
Top 10 Volume Subtotal				**51,973.3**	**10,221.2**	**3,584.3**
Top 10 Percentage of U.S. Total				**25.8%**	**19.9%**	**17.9%**
11	RATON BASIN GAS AREA	CO & NM	1998	(11-20)		101.8
12	CARTHAGE	TX	1923	(11-20)		191.4
13	PRB COAL BED	WY	1992	(11-20)		325.7
14	NATURAL BUTTES	UT	1952	(11-20)		103.9
15	SPRABERRY TREND AREA	TX	1950	(11-20)		128.7
16	SAWYER	TX	1975	(11-20)		76.5
17	VERNON	LA	1967	(11-20)		90.7
18	FOGARTY CREEK	WY	1975	(11-20)		36.6
19	MAMM CREEK	CO	1959	(11-20)		95.7
20	BIG SANDY	KY & WV	1926	(11-20)		45.8
Top 20 Volume Subtotal				**69,821.9**	**14,362.2**	**4,781.2**
Top 20 Percentage of U.S. Total				**34.7%**	**27.9%**	**23.9%**
21	OAKWOOD	VA	1990	(21-50)		56.9
22	MISSISSIPPI CANYON BLK 807 (MARS-URSA)	FG	1989	(21-50)		149.3
23	GRAND VALLEY	CO	1985	(21-50)		42.3
24	ELK HILLS	CA	1920	(21-50)		105.7
25	ELM GROVE	LA	1958	(21-50)		73.2
26	PANHANDLE WEST	TX	1918	(21-50)		97.4
27	RED OAK-NORRIS	OK	1910	(21-50)		64.7
28	OAK HILL	TX	1958	(21-50)		66.2
29	STRONG CITY DISTRICT	OK	1966	(21-50)		71.9
30	RULISON	CO	1958	(21-50)		37.9
31	DRUNKARDS WASH	UT	1989	(21-50)		68.4
32	LAKE RIDGE	WY	1981	(21-50)		16.9
33	BALD PRAIRIE	TX	1976	(21-50)		51.9
34	PANOMA GAS AREA	KS	1956	(21-50)		57.4
35	PARACHUTE	CO	1985	(21-50)		32.5
36	MAYFIELD NE	OK	1951	(21-50)		108.1
37	BELUGA RIVER	AK	1962	(21-50)		56.7
38	GIDDINGS	TX	1960	(21-50)		106.8
39	GOLDEN TREND	OK	1945	(21-50)		42.6
40	MOCANE-LAVERNE GAS AREA	KS & OK & TX	1946	(21-50)		79.8
41	FARRAR	TX	1963	(21-50)		40.2
42	GOMEZ	TX	1977	(21-50)		48.0
43	OAKS	TX	1975	(21-50)		29.4
44	KINTA	OK	1914	(21-50)		51.1
45	BUFFALO WALLOW	TX	1978	(21-50)		39.4
46	WILD ROSE	WY	1975	(21-50)		22.0
47	WATONGA-CHICKASHA TREND	OK	1962	(21-50)		56.0
48	WAMSUTTER	WY	1958	(21-50)		31.5
49	DEW	TX	1982	(21-50)		42.5
50	FREESTONE	TX	1949	(21-50)		46.9
Top 50 Volume Subtotal				**92,477.1**	**20,800.8**	**6,574.9**
Top 50 Percentage of U.S. Total				**46.0%**	**40.5%**	**32.8%**

Table B2. Top 100 U.S. Fields Ranked by Gas Proved Reserves from Estimated 2004 Field Level Data[a] (Continued)
(Billion Cubic Feet)

Num	Field Name	Location	Discovery Year	Rank Group: Proved Reserves	Rank Group: Nonproducing Reserves	2004 Estimated Production Volume
51	DOWDY RANCH	TX	1999	(51-100)		42.9
52	SLIGO	LA	1922	(51-100)		30.9
53	STANDARD DRAW	WY	1979	(51-100)		21.6
54	COOK INLET NORTH	AK	1962	(51-100)		42.8
55	MISSISSIPPI CANYON BLK 383 (KEPLER)	FG	1987	(51-100)		100.4
56	WASSON	TX	1937	(51-100)		24.0
57	EAST BREAKS BLK 602 (NANSEN)	FG	1999	(51-100)		57.6
58	OVERTON	TX	1973	(51-100)		34.3
59	HALEY	TX	1985	(51-100)		15.9
60	GREEN RIVER BEND	WY	1958	(51-100)		34.7
61	MISSISSIPPI CANYON BLK 778 (THUNDER HORSE)	FG	1999	(51-100)		0.0
62	SHO-VEL-TUM	OK	1905	(51-100)		39.0
63	ECHO SPRINGS	WY	1977	(51-100)		25.8
64	EAST BREAKS BLK 945 (DIANA)	FG	1994	(51-100)		57.7
65	WILBURTON	OK	1941	(51-100)		37.7
66	SIBERIA RIDGE	WY	1976	(51-100)		8.3
67	MIMMS CREEK	TX	1978	(51-100)		42.7
68	ELK CITY	OK	1947	(51-100)		49.4
69	VIOSCA KNOLL BLK 956 (RAM-POWELL)	FG	1985	(51-100)		64.0
70	BRUFF	WY	1969	(51-100)		31.1
71	VERDEN	OK	1948	(51-100)		28.4
72	BEAR GRASS	TX	1977	(51-100)		17.4
73	CEDARDALE NE	OK	1958	(51-100)		24.5
74	MISSISSIPPI CANYON BLK 731 (MENSA)	FG	1987	(51-100)		84.6
75	KUPARUK RIVER	AK	1969	(51-100)		18.1
76	HOLLY	LA	1928	(51-100)		22.1
77	NORA	VA	1949	(51-100)		2.4
78	MOBILE BLK 823	FG	1983	(51-100)		30.8
79	CEMENT	OK	1917	(51-100)		38.7
80	BROWN-BASSETT	TX	1953	(51-100)		32.1
81	EXSUN	TX	1974	(51-100)		34.6
82	OZONA	TX	1962	(51-100)		25.0
83	STILES RANCH	TX	1984	(51-100)		9.9
84	DAVIDSON RANCH	TX	1980	(51-100)		16.8
85	STRATTON	TX	1937	(51-100)		15.5
86	GREEN CANYON BLK 699 (ATLANTIS)	FG	1998	(51-100)		0.0
87	TEAGUE	TX	1945	(51-100)		8.3
88	BOONSVILLE	TX	1950	(51-100)		27.0
89	BETHANY	TX	1936	(51-100)		28.6
90	BLANCO SOUTH	NM	1951	(51-100)		20.7
91	WHISKEY BUTTE	WY	1975	(51-100)		18.7
92	MISSISSIPPI CANYON BLK 657 (COULOMB)	FG	1988	(51-100)		9.0
93	OAK GROVE COAL DEGASIFICATION	AL	1980	(51-100)		15.8
94	WILLOW SPRINGS	TX	1954	(51-100)		26.4
95	KENAI	AK	1959	(51-100)		24.3
96	BLOCKER	TX	1954	(51-100)		9.8
97	BROOKWOOD COAL DEGASIFICATION	AL	1981	(51-100)		18.7
98	OKEENE NW	OK	1980	(51-100)		18.9
99	CARPENTER	OK	1980	(51-100)		19.4
100	SOONER TREND	OK	1938	(51-100)		30.6
Top 100 Volume Subtotal				**110,298.0**	**25,915.7**	**8,012.5**
Top 100 Percentage of U.S. Total				**54.8%**	**50.4%**	**40.0%**

[a]Total wet gas after lease separation.

Note: The U.S. total production estimate of 20,017 billion cubic feet and the U.S. total reserves estimate of201,200 billion cubic feet, used to calculate the percentages in this table, are from Table 9 in this publication. Column totals may not add due to independent rounding.

FP = Federal Offshore Pacific.

FG = Federal Offshore Gulf of Mexico.

Source: Energy Information Administration, Office of Oil and Gas.

Table B3. Top 100 U.S. Fields Ranked by Liquids Production from Estimated 2004 Field Level Data[a]
(Million Barrels of 42 U.S. Gallons)

Num	Field Name	Location	Discovery Year	2004 Estimated Production Volume
1	PRUDHOE BAY	AK	1967	129.0
2	MISSISSIPPI CANYON BLK 807 (MARS-URSA)	FG	1989	98.4
3	KUPARUK RIVER	AK	1969	51.1
4	MIDWAY-SUNSET	CA	1901	45.0
5	BELRIDGE SOUTH	CA	1911	39.8
6	ALPINE	AK	1994	36.1
7	KERN RIVER	CA	1899	35.1
8	MISSISSIPPI CANYON BLK 84 (KING/HORN MT.)	FG	1993	31.0
9	SPRABERRY TREND AREA	TX	1950	26.2
10	WASSON	TX	1937	24.8
Top 10 Volume Subtotal				**516.4**
Top 10 Percentage of U.S. Total				**25.8%**
11	NORTHSTAR	AK	1984	24.7
12	MISSISSIPPI CANYON BLK 383 (KEPLER)	FG	1987	21.0
13	MILNE POINT	AK	1982	18.8
14	CYMRIC	CA	1916	18.8
15	ELK HILLS	CA	1920	18.7
16	WILMINGTON	CA	1932	14.8
17	SLAUGHTER	TX	1937	14.8
18	POINT MCINTYRE	AK	1988	13.9
19	VIOSCA KNOLL BLK 786 (PETRONIUS)	FG	1996	11.5
20	EAST BREAKS BLK 602 (NANSEN)	FG	1999	11.3
Top 20 Volume Subtotal				**684.5**
Top 20 Percentage of U.S. Total				**34.2%**
21	LOST HILLS	CA	1910	11.1
22	WATTENBERG	CO	1970	10.8
23	TARN	AK	1991	10.6
24	GREEN CANYON BLK 205 (GENESIS)	FG	1988	10.5
25	EAST BREAKS BLK 643 (BOOMVANG)	FG	1999	10.4
26	KELLY-SNYDER	TX	1948	10.4
27	MISSISSIPPI CANYON BLK 582 (MEDUSA)	FG	2000	10.2
28	BOREALIS	AK	2001	9.9
29	GARDEN BANKS BLK 387 (LLANO)	FG	1990	9.8
30	LEVELLAND	TX	1945	9.5
31	GIDDINGS	TX	1960	9.1
32	GREEN CANYON BLK 158 (BRUTUS)	FG	1992	9.1
33	SHO-VEL-TUM	OK	1905	9.1
34	GARDEN BANKS BLK 215 (BALDPATE)	FG	1995	9.0
35	SEMINOLE	TX	1936	8.5
36	HONDO	FP	1969	8.0
37	CEDAR HILLS	ND & MT & SD	1951	7.9
38	ENDICOTT	AK	1978	7.7
39	COWDEN NORTH	TX	1930	7.2
40	YATES	TX	1926	7.2
41	GREEN CANYON BLK 243 (ASPEN)	FG	2001	7.1
42	SOUTH TIMBALIER SA BLK 314	FG	2001	6.7
43	EWING BANK BLK 873 (LOBSTER)	FG	1991	6.6
44	MAIN PASS BLK 61	FG	2001	6.5
45	ALAMINOS CANYON BLK 25 (HOOVER)	FG	1997	6.5
46	VACUUM	NM	1929	6.4
47	SOUTH TIMBALIER BLK 37	FG	1974	6.2
48	COALINGA	CA	1887	6.0
49	EUGENE ISLAND SA BLK 352	FG	1983	5.9
50	GREEN CANYON BLK 236 (TYPHOON)	FG	1999	5.9
Top 50 Volume Subtotal				**934.3**
Top 50 Percentage of U.S. Total				**46.7%**

Table B3. Top 100 U.S. Fields Ranked by Liquids Production from Estimated 2004 Field Level Data[a] (Continued)

(Million Barrels of 42 U.S. Gallons)

Num	Field Name	Location	Discovery Year	2004 Estimated Production Volume
51	ELM COULEE	MT	2000	5.7
52	VIOSCA KNOLL BLK 956 (RAM-POWELL)	FG	1985	5.6
53	GREEN CANYON BLK 282 (BORIS)	FG	2002	5.5
54	LAKE WASHINGTON	LA	1931	5.3
55	PESCADO	FP	1970	5.3
56	MISSISSIPPI CANYON BLK 899 (CROSBY)	FG	1998	5.3
57	MCELROY	TX	1926	5.3
58	GREEN CANYON BLK 254 (ALLEGHENY)	FG	1994	5.2
59	GOLDSMITH NORTH	TX	1946	5.1
60	RANGELY	CO	1902	5.0
61	GREEN CANYON BLK 244 (TROIKA)	FG	1994	4.9
62	VIOSCA KNOLL BLK 990 (POMPANO)	FG	1981	4.9
63	GARDEN BANKS BLK 426 (AUGER)	FG	1992	4.8
64	INDIAN BASIN	NM	1971	4.7
65	EAST TEXAS	TX	1930	4.7
66	ROBERTSON NORTH	TX	1956	4.6
67	LOOKOUT BUTTE EAST	MT	1986	4.6
68	GARDEN BANKS BLK 260	FG	1995	4.6
69	WEST SAK	AK	1969	4.5
70	MISSISSIPPI CANYON BLK 243 (MATTERHORN)	FG	1993	4.5
71	VENTURA	CA	1916	4.4
72	FULLERTON	TX	1942	4.3
73	ANTON-IRISH	TX	1944	4.2
74	SALT CREEK	TX	1942	4.2
75	GARDEN BANKS BLK 668 (GUNNISON)	FG	2000	4.1
76	NIAKUK	AK	1984	4.0
77	SAN ARDO	CA	1947	4.0
78	HOBBS	NM	1928	4.0
79	WEST DELTA BLK 30	FG	1949	4.0
80	GRAYBURG JACKSON	NM	1929	3.8
81	GREEN CANYON BLK 608 (MARCO POLO)	FG	2002	3.7
82	POINT ARGUELLO	FP	1981	3.6
83	GREATER ANETH	UT	1956	3.6
84	BAY MARCHAND BLK 2	LA	1949	3.5
85	MEANS	TX	1934	3.4
86	VIOSCA KNOLL BLK 825 (NEPTUNE)	FG	1988	3.4
87	LISBURNE	AK	1967	3.4
88	AURORA	AK	1969	3.3
89	MONUMENT	NM	1935	3.3
90	MCARTHUR RIVER	AK	1965	3.3
91	BELRIDGE NORTH	CA	1912	3.2
92	SHIP SHOAL BLK 169	FG	1961	3.1
93	COGDELL	TX	1949	3.1
94	MISSISSIPPI CANYON BLK 773 (DEVILS TOWER)	FG	2000	3.0
95	KENT BAYOU	LA	1950	3.0
96	SACATE	FP	1970	3.0
97	EWING BANK BLK 921 (MORPETH)	FG	1993	2.9
98	DOLLARHIDE	NM & TX	1945	2.9
99	HOWARD-GLASSCOCK	TX	1925	2.8
100	MONUMENT BUTTE	UT	1964	2.8
Top 100 Volume Subtotal				**1,139.8**
Top 100 Percentage of U.S. Total				**57.0%**

[a]Includes lease condensate.

Notes: The U.S. total production estimate of 2,068 million barrels and the U.S. total reserves estimate of 23,106 million barrels, used to calculate the percentages in this table, are from the combined totals of Table 6 and Table 15 in this publication. Column totals may not add due to independent rounding.

FP = Federal Offshore Pacific.

FG = Federal Offshore Gulf of Mexico.

Source: Energy Information Administration, Office of Oil and Gas.

Table B4. Top 100 U.S. Fields Ranked by Gas Production from Estimated 2004 Field Level Data[a]
(Billion Cubic Feet)

Num	Field Name	Location	Discovery Year	2004 Estimated Production Volume
1	SAN JUAN BASIN GAS AREA	CO & NM	1927	1450.8
2	NEWARK EAST	TX	1981	412.6
3	PRB COAL BED	WY	1992	325.7
4	GUYMON-HUGOTON GAS AREA	KS & OK & TX	1922	307.9
5	LOWER MOBILE BAY AREA	AL & FG	1979	290.1
6	JONAH	WY	1977	250.9
7	PRUDHOE BAY	AK	1967	209.3
8	WATTENBERG	CO	1970	192.0
9	CARTHAGE	TX	1923	191.4
10	ANTRIM	MI	1965	166.7
Top 10 Volume Subtotal				**3,797.6**
Top 10 Percentage of U.S. Total				**19.0%**
11	MADDEN	WY	1968	153.5
12	PINEDALE	WY	1955	150.4
13	MISSISSIPPI CANYON BLK 807 (MARS-URSA)	FG	1989	149.3
14	SPRABERRY TREND AREA	TX	1950	128.7
15	MAYFIELD NE	OK	1951	108.1
16	GIDDINGS	TX	1960	106.8
17	ELK HILLS	CA	1920	105.7
18	NATURAL BUTTES	UT	1952	103.9
19	RATON BASIN GAS AREA	CO & NM	1998	101.8
20	MISSISSIPPI CANYON BLK 383 (KEPLER)	FG	1987	100.4
Top 20 Volume Subtotal				**5,006.1**
Top 20 Percentage of U.S. Total				**25.0%**
21	PANHANDLE WEST	TX	1918	97.4
22	INDIAN BASIN	NM	1971	96.7
23	MAMM CREEK	CO	1959	95.7
24	VERNON	LA	1967	90.7
25	MISSISSIPPI CANYON BLK 731 (MENSA)	FG	1987	84.6
26	MOCANE-LAVERNE GAS AREA	KS & OK & TX	1946	79.8
27	JUDGE DIGBY	LA	1977	78.3
28	SAWYER	TX	1975	76.5
29	WHITNEY CANYON-CARTER CRK	WY	1978	73.4
30	ELM GROVE	LA	1958	73.2
31	STRONG CITY DISTRICT	OK	1966	71.9
32	DRUNKARDS WASH	UT	1989	68.4
33	OAK HILL	TX	1958	66.2
34	RED OAK-NORRIS	OK	1910	64.7
35	VIOSCA KNOLL BLK 956 (RAM-POWELL)	FG	1985	64.0
36	EAST BREAKS BLK 945 (DIANA)	FG	1994	57.7
37	EAST BREAKS BLK 602 (NANSEN)	FG	1999	57.6
38	PANOMA GAS AREA	KS	1956	57.4
39	OAKWOOD	VA	1990	56.9
40	BELUGA RIVER	AK	1962	56.7
41	WATONGA-CHICKASHA TREND	OK	1962	56.0
42	BALD PRAIRIE	TX	1976	51.9
43	MISSISSIPPI CANYON BLK 305 (ACONCAGUA)	FG	2002	51.6
44	KINTA	OK	1914	51.1
45	MCALLEN RANCH	TX	1986	49.5
46	ELK CITY	OK	1947	49.4
47	EAST BREAKS BLK 579 (FALCON)	FG	2003	48.6
48	GOMEZ	TX	1977	48.0
49	VAQUILLAS RANCH	TX	1978	47.3
50	SOUTH TIMBALIER BLK 176	FG	1963	47.1
Top 50 Volume Subtotal				**6,974.6**
Top 50 Percentage of U.S. Total				**34.8%**

Table B4. Top 100 U.S. Fields Ranked by Gas Production from Estimated 2004 Field Level Data[a] (Continued)
(Billion Cubic Feet)

Num	Field Name	Location	Discovery Year	2004 Estimated Production Volume
51	FREESTONE	TX	1949	46.9
52	BIG SANDY	KY & WV	1926	45.8
53	GARDEN BANKS BLK 668 (GUNNISON)	FG	2000	44.9
54	LA PERLA	TX	1958	43.0
55	DOWDY RANCH	TX	1999	42.9
56	COOK INLET NORTH	AK	1962	42.8
57	MIMMS CREEK	TX	1978	42.7
58	GOLDEN TREND	OK	1945	42.6
59	DEW	TX	1982	42.5
60	GRAND VALLEY	CO	1985	42.3
61	FARRAR	TX	1963	40.2
62	BUFFALO WALLOW	TX	1978	39.4
63	DESOTO CANYON BLK 133 (KING'S PEAK)	FG	1993	39.2
64	SHO-VEL-TUM	OK	1905	39.0
65	CEMENT	OK	1917	38.7
66	WEST CAMERON BLK 19	FG	2000	38.6
67	B M T	TX	1994	38.6
68	RULISON	CO	1958	37.9
69	WILBURTON	OK	1941	37.7
70	FOGARTY CREEK	WY	1975	36.6
71	JAVELINA	TX	1947	36.2
72	MISSISSIPPI CANYON BLK 348 (CAMDEN HILLS)	FG	2000	35.8
73	GARDEN BANKS BLK 215 (BALDPATE)	FG	1995	35.6
74	HAYNES	TX	1954	34.8
75	GREEN RIVER BEND	WY	1958	34.7
76	EXSUN	TX	1974	34.6
77	OVERTON	TX	1973	34.3
78	MCARTHUR RIVER	AK	1965	34.2
79	GREEN CANYON BLK 472 (KING KONG)	FG	1989	33.6
80	BRAZOS SA BLK A133	FG	1975	32.8
81	PARACHUTE	CO	1985	32.5
82	SOUTH TIMBALIER BLK 172	FG	1965	32.2
83	BROWN-BASSETT	TX	1953	32.1
84	WAMSUTTER	WY	1958	31.5
85	BRUFF	WY	1969	31.1
86	SLIGO	LA	1922	30.9
87	MOBILE BLK 823	FG	1983	30.8
88	SOONER TREND	OK	1938	30.6
89	CHARCO	TX	1948	30.2
90	MATAGORDA ISLAND BLK 623	FG	1980	29.9
91	GREEN CANYON BLK 116 (POPEYE)	FG	1985	29.9
92	WEST CAMERON BLK 100	FG	1989	29.7
93	TOM EAST	TX	2001	29.5
94	SAMANO	TX	1985	29.5
95	BAYOU BILOXI	LA	1963	29.5
96	OAKS	TX	1975	29.4
97	BETHANY	TX	1936	28.6
98	KNOX	OK	1916	28.5
99	VERDEN	OK	1948	28.4
100	LOS MOGOTES	TX	1960	27.9
Top 100 Volume Subtotal				**8,746.1**
Top 100 Percentage of U.S. Total				**43.7%**

[a]Total wet gas after lease separation.

Note: The U.S. total production estimate of 20,231 billion cubic feet and the U.S. total reserves estimate of 197,145 billion cubic feet, used to calculate the percentages in this table, are from Table 9 in this publication. Column totals may not add due to independent rounding.

FP = Federal Offshore Pacific.

FG = Federal Offshore Gulf of Mexico.

Source: Energy Information Administration, Office of Oil and Gas.

Appendix C

Conversion to the Metric System

Appendix C

Conversion to the Metric System

Public Law 100–418, the Omnibus Trade and Competitiveness Act of 1988, states: "It is the declared policy of the United States—

(1) to designate the metric system of measurement as the preferred system of weights and measures for United States trade and commerce. . . .

(2) to require that each Federal agency, by the end of Fiscal Year 1992, use the metric system of measurement in its procurements, grants, and other business–related activities."{43}

Table C1 is in keeping with the spirit of this law. The petroleum industry in the United States is slowly moving in the direction prescribed by this law and the data collected by EIA are collected in the units that are still common to the U.S. petroleum industry, namely barrels and cubic feet. Standard metric conversion factors were used to convert the National level volumes in **Table 1** to the metric equivalents in **Table C1**. Barrels were multiplied by 0.1589873 to convert to cubic meters and cubic feet were multiplied by 0.02831685 to convert to cubic meters.

Table C1. U.S. Proved Reserves of Crude Oil, Dry Natural Gas, and Natural Gas Liquids, in Metric Units, 1994 – 2004

Year	Adjustments (1)	Net Revisions (2)	Revisions[a] and Adjustments (3)	Net of Sales and Acquisitions (4)	Extensions (5)	New Field Discoveries (6)	New Reservoir Discoveries in Old Fields (7)	Total[b] Discoveries (8)	Estimated Production (9)	Proved[c] Reserves 12/31 (10)	Change from Prior Year (11)
	Crude Oil (million cubic meters)										
1994	30.1	160.1	190.2	NA	63.1	10.2	17.6	90.9	360.6	3,570.4	-79.5
1995	19.4	163.4	182.8	NA	79.5	18.1	54.5	152.1	351.8	3,553.5	-16.9
1996	28.0	117.1	145.1	NA	86.3	38.6	22.4	147.3	345.5	3,500.4	-53.1
1997	82.6	145.4	228.0	NA	75.8	101.3	18.9	196.0	339.9	3,584.5	84.1
1998	-101.5	82.3	-19.2	NA	52.0	24.2	19.1	95.3	316.5	3,344.1	-240.4
1999	22.1	289.2	311.3	NA	41.2	51.0	23.1	115.3	310.3	3,460.4	116.3
2000	22.7	118.6	141.3	-3.2	121.8	43.9	39.6	205.3	298.9	3,504.9	44.5
2001	-0.6	-25.1	-25.8	-13.8	137.7	223.7	46.4	407.8	304.5	3,568.6	63.7
2002	66.1	114.5	180.6	3.8	78.2	47.7	24.5	150.4	298.1	3,605.4	36.8
2003	25.9	14.9	40.9	-63.3	67.7	112.1	16.1	195.9	298.4	3,480.4	-125.0
2004	11.8	66.8	78.5	3.7	98.1	5.2	21.0	124.3	289.2	3,397.7	-82.7
	Dry Natural Gas (billion cubic meters)										
1994	55.08	155.29	210.37	NA	196.55	53.63	98.54	348.72	518.82	4,639.35	40.27
1995	16.42	219.00	235.42	NA	193.77	47.18	69.43	310.38	508.74	4,676.41	37.06
1996	107.18	115.70	222.88	NA	219.65	41.09	88.07	348.81	534.08	4,714.02	37.61
1997	-16.70	138.81	122.11	NA	299.73	75.92	67.45	443.10	544.00	4,735.23	21.21
1998	-46.30	162.54	116.24	NA	232.11	30.41	61.22	323.74	530.09	4,645.12	-90.11
1999	27.81	297.44	325.25	NA	199.44	44.40	62.18	306.02	535.98	4,740.41	95.29
2000	-25.23	197.14	171.91	114.15	418.72	56.15	67.05	541.93	544.22	5,024.17	283.76
2001	77.64	-65.64	12.01	74.47	463.83	101.32	79.29	644.44	560.08	5,195.01	170.84
2002	105.54	26.53	132.07	10.76	418.21	37.72	47.97	503.90	548.02	5,293.72	98.71
2003	80.45	-46.38	34.07	29.28	465.93	34.60	45.59	546.12	550.05	5,353.10	59.38
2004	-3.2	21.1	17.8	52.2	515.3	21.5	34.2	571.0	542.8	5,451.4	98.2
	Natural Gas Liquids (million cubic meters)										
1994	6.9	31.3	38.2	NA	49.9	8.6	20.8	79.3	125.8	1,139.9	-8.3
1995	30.6	44.0	74.6	NA	68.7	8.1	10.7	87.6	125.8	1,176.3	36.4
1996	75.4	27.8	103.2	NA	71.7	10.3	17.3	99.4	135.1	1,243.8	67.4
1997	-2.2	45.9	43.7	NA	85.1	18.1	14.3	117.5	137.4	1,267.6	23.8
1998	-57.4	33.1	-24.3	NA	60.9	10.5	14.0	85.4	132.4	1,196.2	-71.4
1999	15.8	115.6	131.4	NA	49.8	8.1	14.0	71.9	142.5	1,257.0	60.8
2000	-13.2	73.0	59.8	23.1	102.5	14.6	16.2	133.4	146.4	1,326.7	69.7
2001	-68.2	-21.0	-89.2	16.2	114.0	21.9	22.6	158.5	141.5	1,270.8	-55.9
2002	9.9	4.9	14.8	8.6	97.3	7.6	12.4	117.3	140.5	1,270.9	0.1
2003	-53.7	-25.6	-79.3	4.8	100.0	5.6	11.4	117.0	127.5	1,185.9	-85.0
2004	43.4	15.4	58.8	17.8	116.7	4.1	8.6	129.4	131.5	1,260.5	74.6

[a]Revisions and adjustments = Col. 1 + Col. 2.
[b]Total discoveries = Col. 5 + Col. 6 + Col. 7.
[c]Proved reserves = Col. 10 from prior year + Col. 3 + Col. 4 + Col. 8 - Col. 9.

Notes: Old means discovered in a prior year. New means discovered during the report year. The production estimates in this table are based on data reported on Form EIA–23, "Annual Survey of Domestic Oil and Gas Reserves" and Form EIA–64A, "Annual Report of the Origin of Natural Gas Liquids Production." The following conversion factors were used to convert data: barrels = 0.1589873 per cubic meter and cubic feet = 0.02831685 per cubic meter. Number of decimal digits varies in order to accurately reproduce corresponding equivalents shown on Table 1 in Chapter 2.

Source: *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves*, 1994–2003 annual reports, DOE/EIA–0216.{18–27}

Appendix D

Historical Reserves Statistics

Appendix D

Historical Reserves Statistics

EIA maintains a data archive of all published proved reserves volumes at the State and National level. Appendix D provides a series of tables of the proved reserves and production of crude oil, natural gas, and natural gas liquids for the U.S. and the lower 48 States for the years 1977 through 2004.

All historical statistics included have previously been published in the annual reports of 1977 through 2003 of the EIA publication *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves Annual Report*, DOE EIA-0216.{1-27}

Liquid volumes are in million barrels of 42 U.S. gallons. Gas volumes are in billion cubic feet (Bcf), at 14.73 psia and 60° Fahrenheit. NA appears in this appendix wherever data are not available or are withheld to avoid disclosure of data which may be proprietary. An asterisk (*) marks those estimates associated with sampling errors (95 percent confidence interval) greater than 20 percent of the value estimated.

An electronic version of the Data Archive (in Microsoft Excel™) format is available for downloading at the following link:
http://www.eia.doe.gov/oil_gas/natural_gas/data_publications/crude_oil_natural_gas_reserves/cr.html

The Data Archive is listed in the "Special Files" section of the destination site.

Table D1. U.S. Proved Reserves of Crude Oil, 1976–2004
(Million Barrels of 42 U.S. Gallons)

Year	Adjustments[a] (1)	Net Revisions (2)	Revisions[b] and Adjustments (3)	Net of Sales and Acquisitions (4)	Extensions (5)	New Field Discoveries (6)	New Reservoir Discoveries in Old Fields (7)	Total[c] Discoveries (8)	Estimated Production (9)	Proved[d] Reserves 12/31 (10)	Change from Prior Year (11)
1976	–	–	–	–	–	–	–	–	–	[e]33,502	–
1977	[f]-40	386	346	NA	496	168	130	794	2,862	31,780	-1,722
1978	366	1,390	1,756	NA	444	267	116	827	3,008	31,355	-425
1979	337	437	774	NA	424	108	104	636	2,955	29,810	-1,545
1980	219	1,889	2,108	NA	572	143	147	862	2,975	29,805	-5
1981	138	1,271	1,409	NA	750	254	157	1,161	2,949	29,426	-379
1982	-83	434	351	NA	634	204	193	1,031	2,950	27,858	-1,568
1983	462	1,511	1,973	NA	629	105	190	924	3,020	27,735	-123
1984	159	2,445	2,604	NA	744	242	158	1,144	3,037	28,446	711
1985	429	1,598	2,027	NA	742	84	169	995	3,052	28,416	-30
1986	57	855	912	NA	405	48	81	534	2,973	26,889	-1,527
1987	233	2,316	2,549	NA	484	96	111	691	2,873	27,256	367
1988	364	1,463	1,827	NA	355	71	127	553	2,811	26,825	-431
1989	213	1,333	1,546	NA	514	112	90	716	2,586	26,501	-324
1990	86	1,483	1,569	NA	456	98	135	689	2,505	26,254	-247
1991	163	223	386	NA	365	97	92	554	2,512	24,682	-1,572
1992	290	735	1,025	NA	391	8	85	484	2,446	23,745	-937
1993	271	495	766	NA	356	319	110	785	2,339	22,957	-788
1994	189	1,007	1,196	NA	397	64	111	572	2,268	22,457	-500
1995	122	1,028	1,150	NA	500	114	343	957	2,213	22,351	-106
1996	175	737	912	NA	543	243	141	927	2,173	22,017	-334
1997	520	914	1,434	NA	477	637	119	1,233	2,138	22,546	529
1998	-638	518	-120	NA	327	152	120	599	1,991	21,034	-1,512
1999	139	1,819	1,958	NA	259	321	145	725	1,952	21,765	731
2000	143	746	889	-20	766	276	249	1,291	1,880	22,045	280
2001	-4	-158	-162	-87	866	1,407	292	2,565	1,915	22,446	401
2002	416	720	1,136	24	492	300	154	946	1,875	22,677	231
2003	163	94	257	-398	426	705	101	1,232	1,877	21,891	-786
2004	74	420	494	23	617	33	132	782	1,819	21,371	-520

[a]Includes operator reported corrections for the years 1978 through 1981. After 1981 operators included corrections with revisions.
[b]Revisions and adjustments = Col. 1 + Col. 2.
[c]Total discoveries = Col. 5 + Col. 6 + Col. 7.
[d]Proved reserves = Col. 10 from prior year + Col. 3 + Col. 4 + Col. 8 - Col. 9.
[e]Based on following year data only.
[f]Consists only of operator reported corrections and no other adjustments.
– = Not applicable.

Notes: Old means discovered in a prior year. New means discovered during the report year. The production estimates in this table are based on data reported on Form EIA-23, “Annual Survey of Domestic Oil and Gas Reserves”. They may differ from the official Energy Information Administration production data for crude oil contained in the *Petroleum Supply Annual*, DOE/EIA-0340.

Source: *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves*, 1977 through 2004 annual reports, DOE/EIA-0216.{1-27}

Table D2. U.S. Lower 48 Proved Reserves of Crude Oil, 1976–2004
(Million Barrels of 42 U.S. Gallons)

Year	Adjustments[a] (1)	Net Revisions (2)	Revisions[b] and Adjustments (3)	Net of Sales and Acquisitions (4)	Extensions (5)	New Field Discoveries (6)	New Reservoir Discoveries in Old Fields (7)	Total[c] Discoveries (8)	Estimated Production (9)	Proved[d] Reserves 12/31 (10)	Change from Prior Year (11)
1976	–	–	–	–	–	–	–	–	–	[e]24,928	–
1977	[f]–40	383	343	NA	496	168	130	794	2,698	23,367	-1,561
1978	-48	509	461	NA	444	142	116	702	2,559	21,971	-1,396
1979	342	429	771	NA	424	108	104	636	2,443	20,935	-1,036
1980	210	1,524	1,734	NA	479	143	147	769	2,384	21,054	119
1981	276	1,009	1,285	NA	750	254	157	1,161	2,357	21,143	89
1982	-82	684	602	NA	633	204	193	1,030	2,323	20,452	-691
1983	462	949	1,411	NA	625	105	190	920	2,355	20,428	-24
1984	160	1,587	1,747	NA	742	207	158	1,107	2,399	20,883	455
1985	361	1,667	2,028	NA	581	84	169	834	2,385	21,360	477
1986	70	359	429	NA	399	48	81	528	2,303	20,014	-1,346
1987	233	1,353	1,586	NA	294	38	101	433	2,155	19,878	-136
1988	359	1,181	1,540	NA	340	43	127	510	2,062	19,866	-12
1989	214	1,113	1,327	NA	342	108	87	537	1,903	19,827	-39
1990	151	1,001	1,152	NA	371	98	135	604	1,853	19,730	-97
1991	164	50	214	NA	327	97	87	511	1,856	18,599	-1,131
1992	297	277	574	NA	279	8	84	371	1,821	17,723	-876
1993	250	198	448	NA	343	319	109	771	1,760	17,182	-541
1994	187	527	714	NA	316	64	111	491	1,697	16,690	-492
1995	117	756	873	NA	434	114	333	881	1,673	16,771	81
1996	172	728	900	NA	479	115	141	735	1,663	16,743	-28
1997	514	695	1,209	NA	459	520	119	1,098	1,665	17,385	642
1998	-639	315	-324	NA	299	56	120	475	1,554	15,982	-1,403
1999	138	1,669	1,807	NA	253	242	145	640	1,564	16,865	883
2000	144	622	766	132	540	276	157	973	1,552	17,184	319
2001	-5	-71	-76	-87	716	1,126	292	2,134	1,560	17,595	411
2002	414	567	981	24	467	300	146	913	1,514	17,999	404
2003	162	5	167	-398	391	705	101	1,197	1,520	17,445	-554
2004	75	373	448	23	506	33	74	613	1,485	17,044	-401

[a]Includes operator reported corrections for the years 1978 through 1981. After 1981 operators included corrections with revisions.
[b]Revisions and adjustments = Col. 1 + Col. 2.
[c]Total discoveries = Col. 5 + Col. 6 + Col. 7.
[d]Proved reserves = Col. 10 from prior year + Col. 3 + Col. 4 + Col. 8 - Col. 9.
[e]Based on following year data only.
[f]Consists only of operator reported corrections and no other adjustments.
– = Not applicable.

Notes: Old means discovered in a prior year. New means discovered during the report year. The production estimates in this table are based on data reported on Form EIA-23, “Annual Survey of Domestic Oil and Gas Reserves”. They may differ from the official Energy Information Administration production data for crude oil contained in the *Petroleum Supply Annual*, DOE/EIA-0340.

Source: *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves,* 1977 through 2004 annual reports, DOE/EIA-0216.{1-27}

Table D3. U.S. Proved Reserves of Dry Natural Gas, 1976–2004
(Billion Cubic Feet at 14.73 psia and 60° Fahrenheit)

Year	Adjustments[a] (1)	Net Revisions (2)	Revisions[b] and Adjustments (3)	Net of Sales and Acquisitions (4)	Extensions (5)	New Field Discoveries (6)	New Reservoir Discoveries in Old Fields (7)	Total[c] Discoveries (8)	Estimated Production (9)	Proved[d] Reserves 12/31 (10)	Change from Prior Year (11)
1976	–	–	–	–	–	–	–	–	–	[e]213,278	–
1977	[f]–20	-1,605	-1,625	NA	8,129	3,173	3,301	14,603	18,843	207,413	-5,865
1978	2,429	-1,025	1,404	NA	9,582	3,860	4,579	18,021	18,805	208,033	620
1979	-2,264	-219	-2,483	NA	8,950	3,188	2,566	14,704	19,257	200,997	-7,036
1980	1,201	1,049	2,250	NA	9,357	2,539	2,577	14,473	18,699	199,021	-1,976
1981	1,627	2,599	4,226	NA	10,491	3,731	2,998	17,220	18,737	201,730	2,709
1982	2,378	455	2,833	NA	8,349	2,687	3,419	14,455	17,506	201,512	-218
1983	3,090	-15	3,075	NA	6,909	1,574	2,965	11,448	15,788	200,247	-1,265
1984	-2,241	3,129	888	NA	8,299	2,536	2,686	13,521	17,193	197,463	-2,784
1985	-1,708	2,471	763	NA	7,169	999	2,960	11,128	15,985	193,369	-4,094
1986	1,320	3,572	4,892	NA	6,065	1,099	1,771	8,935	15,610	191,586	-1,783
1987	1,268	3,296	4,564	NA	4,587	1,089	1,499	7,175	16,114	187,211	-4,375
1988	2,193	-15,060	-12,867	NA	6,803	1,638	1,909	10,350	16,670	168,024	-19,187
1989	3,013	3,030	6,043	NA	6,339	1,450	2,243	10,032	16,983	167,116	-908
1990	1,557	5,538	7,095	NA	7,952	2,004	2,412	12,368	17,233	169,346	2,230
1991	2,960	4,416	7,376	NA	5,090	848	1,604	7,542	17,202	167,062	-2,284
1992	2,235	6,093	8,328	NA	4,675	649	1,724	7,048	17,423	165,015	-2,047
1993	972	5,349	6,321	NA	6,103	899	1,866	8,868	17,789	162,415	-2,600
1994	1,945	5,484	7,429	NA	6,941	1,894	3,480	12,315	18,322	163,837	1,422
1995	580	7,734	8,314	NA	6,843	1,666	2,452	10,961	17,966	165,146	1,309
1996	3,785	4,086	7,871	NA	7,757	1,451	3,110	12,318	18,861	166,474	1,328
1997	-590	4,902	4,312	NA	10,585	2,681	2,382	15,648	19,211	167,223	749
1998	-1,635	5,740	4,105	NA	8,197	1,074	2,162	11,433	18,720	164,041	-3,182
1999	982	10,504	11,486	NA	7,043	1,568	2,196	10,807	18,928	167,406	3,365
2000	-891	6,962	6,071	4,031	14,787	1,983	2,368	19,138	19,219	177,427	10,021
2001	2,742	-2,318	424	2,630	16,380	3,578	2,800	22,758	19,779	183,460	6,033
2002	3,727	937	4,664	380	14,769	1,332	1,694	17,795	19,353	186,946	3,486
2003	2,841	-1,638	1,203	-10,092	16,454	1,222	1,610	19,286	19,425	189,044	2,098
2004	-114	744	630	1,844	18,198	759	1,206	20,163	19,168	192,513	3,469

[a]Includes operator reported corrections for the years 1978 through 1981. After 1981 operators included corrections with revisions.
[b]Revisions and adjustments = Col. 1 + Col. 2.
[c]Total discoveries = Col. 5 + Col. 6 + Col. 7.
[d]Proved reserves = Col. 10 from prior year + Col. 3 + Col. 4 + Col. 8 - Col. 9.
[e]Based on following year data only.
[f]Consists only of operator reported corrections and no other adjustments.
[g]An unusually large revision decrease to North Slope dry natural gas reserves was made in 1988. It recognizes some 24.6 trillion cubic feet of downward revisions reported during the last few years by operators because of economic and market conditions. EIA in previous years carried these reserves in the proved category.
– = Not applicable.

Notes: Old means discovered in a prior year. New means discovered during the report year. The production estimates in this table are based on data reported on Form EIA-23, “Annual Survey of Domestic Oil and Gas Reserves,” and Form EIA-64A, “Annual Report of the Origin of Natural Gas Liquids Production”. They may differ from the official Energy Information Administration production data for natural gas contained in the *Natural Gas Annual,* DOE/EIA-0131.

Source: *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves,* 1977 through 2004 annual reports, DOE/EIA-0216.{1-27}

Table D4. U.S. Lower 48 Proved Reserves of Dry Natural Gas, 1976–2004
(Billion Cubic Feet at 14.73 psia and 60° Fahrenheit)

Year	Adjustments[a] (1)	Net Revisions (2)	Revisions[b] and Adjustments (3)	Net of Sales and Acquisitions (4)	Extensions (5)	New Field Discoveries (6)	New Reservoir Discoveries in Old Fields (7)	Total[c] Discoveries (8)	Estimated Production (9)	Proved[d] Reserves 12/31 (10)	Change from Prior Year (11)
1976	–	–	–	–	–	–	–	–	–	[e]180,838	–
1977	[f]–21	-1,540	-1,561	NA	8,056	3,173	3,301	14,530	18,637	175,170	-5,668
1978	2,446	-758	1,688	NA	9,582	3,860	4,277	17,719	18,589	175,988	818
1979	-2,202	-707	-2,909	NA	8,949	3,173	2,566	14,688	19,029	168,738	-7,250
1980	1,163	62	1,225	NA	9,046	2,539	2,577	14,162	18,486	165,639	-3,099
1981	1,840	2,506	4,346	NA	10,485	3,731	2,994	17,210	18,502	168,693	3,054
1982	2,367	-1,748	619	NA	8,349	2,687	3,419	14,455	17,245	166,522	-2,171
1983	3,089	421	3,510	NA	6,908	1,574	2,965	11,447	15,515	165,964	-558
1984	-2,245	2,617	372	NA	8,298	2,536	2,686	13,520	16,869	162,987	-2,977
1985	-1,349	2,500	1,151	NA	7,098	999	2,960	11,057	15,673	159,522	-3,465
1986	1,618	4,144	5,762	NA	6,064	1,099	1,761	8,924	15,286	158,922	-600
1987	1,066	2,645	3,711	NA	4,542	1,077	1,499	7,118	15,765	153,986	-4,936
1988	2,017	8,895	10,912	NA	6,771	1,638	1,909	10,318	16,270	158,946	4,960
1989	2,997	2,939	5,936	NA	6,184	1,450	2,243	9,877	16,582	158,177	-769
1990	1,877	4,572	6,449	NA	7,898	2,004	2,412	12,314	16,894	160,046	1,869
1991	2,967	3,860	6,827	NA	5,074	848	1,563	7,485	16,849	157,509	-2,537
1992	1,946	5,937	7,883	NA	4,621	649	1,724	6,994	17,009	155,377	-2,132
1993	915	4,779	5,694	NA	6,076	899	1,858	8,833	17,396	152,508	-2,869
1994	1,896	5,289	7,185	NA	6,936	1,894	3,480	12,310	17,899	154,104	1,596
1995	973	7,223	8,196	NA	6,801	1,666	2,452	10,919	17,570	155,649	1,545
1996	3,640	4,055	7,695	NA	7,751	1,390	3,110	12,251	18,415	157,180	1,531
1997	-609	3,192	2,583	NA	10,571	2,681	2,382	15,634	18,736	156,661	-519
1998	-1,463	5,696	4,233	NA	8,195	1,070	2,162	11,427	18,207	154,114	-2,547
1999	849	10,452	11,301	NA	7,041	1,512	2,173	10,726	18,469	157,672	3,558
2000	-914	8,755	7,841	4,214	12,838	1,983	2,355	17,176	18,713	168,190	10,518
2001	2,753	-2,216	537	2,630	16,321	3,504	2,796	21,621	19,318	174,660	6,470
2002	3,692	914	4,606	380	14,707	1,332	1,686	17,725	18,893	178,478	3,818
2003	2,840	-1,830	1,010	1,034	16,373	1,202	1,609	19,184	18,947	180,759	2,281
2004	-113	319	206	1,844	18,057	759	1,171	19,987	18,690	184,106	3,347

[a]Includes operator reported corrections for the years 1978 through 1981. After 1981 operators included corrections with revisions.
[b]Revisions and adjustments = Col. 1 + Col. 2.
[c]Total discoveries = Col. 5 + Col. 6 + Col. 7.
[d]Proved reserves = Col. 10 from prior year + Col. 3 + Col. 4 + Col. 8 - Col. 9.
[e]Based on following year data only.
[f]Consists only of operator reported corrections and no other adjustments.
– = Not applicable.

Notes: Old means discovered in a prior year. New means discovered during the report year. The production estimates in this table are based on data reported on Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves," and Form EIA-64A, "Annual Report of the Origin of Natural Gas Liquids Production". They may differ from the official Energy Information Administration production data for natural gas contained in the *Natural Gas Annual,* DOE/EIA-0131.

Source: *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves,* 1977 through 2004 annual reports, DOE/EIA-0216.{1-27}

Table D5. U.S. Proved Reserves of Wet Natural Gas, After Lease Separation, 1978–2004
(Billion Cubic Feet at 14.73 psia and 60° Fahrenheit)

Year	Adjustments[a] (1)	Net Revisions (2)	Revisions[b] and Adjustments (3)	Net of Sales and Acquisitions (4)	Extensions (5)	New Field Discoveries (6)	New Reservoir Discoveries in Old Fields (7)	Total[c] Discoveries (8)	Estimated Production (9)	Proved[d] Reserves 12/31 (10)	Change from Prior Year (11)
1978	–	–	–	–	–	–	–	–	–	[e]208,033	–
1979	5,356	-223	5,133	NA	9,332	3,279	2,637	15,248	20,079	208,335	302
1980	1,253	1,137	2,390	NA	9,757	2,629	2,648	15,034	19,500	206,259	-2,076
1981	2,057	2,743	4,800	NA	10,979	3,870	3,080	17,929	19,554	209,434	3,175
1982	2,598	455	3,053	NA	8,754	2,785	3,520	15,059	18,292	209,254	-180
1983	4,363	57	4,420	NA	7,263	1,628	3,071	11,962	16,590	209,046	-208
1984	-2,413	3,333	920	NA	8,688	2,584	2,778	14,050	18,032	205,984	-3,062
1985	-1,299	2,687	1,388	NA	7,535	1,040	3,053	11,628	16,798	202,202	-3,782
1986	2,137	3,835	5,972	NA	6,359	1,122	1,855	9,336	16,401	201,109	-1,093
1987	1,199	3,522	4,721	NA	4,818	1,128	1,556	7,502	16,904	196,428	-4,681
1988	2,180	-14,931	[f]-12,751	NA	7,132	1,677	1,979	10,788	17,466	[f]176,999	–19,429
1989	2,537	3,220	5,757	NA	6,623	1,488	2,313	10,424	17,752	175,428	-1,571
1990	1,494	5,837	7,331	NA	8,287	2,041	2,492	12,820	18,003	177,576	2,148
1991	3,368	4,569	7,937	NA	5,298	871	1,655	7,824	18,012	175,325	-2,251
1992	2,543	6,374	8,917	NA	4,895	668	1,773	7,336	18,269	173,309	-2,016
1993	1,048	5,541	6,589	NA	6,376	927	1,930	9,233	18,641	170,490	-2,819
1994	1,977	5,836	7,813	NA	7,299	1,941	3,606	12,846	19,210	171,939	1,449
1995	889	8,091	8,980	NA	7,204	1,709	2,518	11,431	18,874	173,476	1,537
1996	4,288	4,277	8,565	NA	8,189	1,491	3,209	12,889	19,783	175,147	1,671
1997	-730	5,057	4,327	NA	11,179	2,747	2,455	16,381	20,134	175,721	574
1998	-1,624	5,982	4,358	NA	8,630	1,116	2,240	11,986	19,622	172,433	-3,288
1999	1,102	11,182	12,284	NA	7,401	1,622	2,265	11,288	19,856	176,159	3,726
2000	-1,295	7,456	6,161	4,286	15,550	2,055	2,463	20,068	20,164	186,510	10,351
2001	1,849	-2,438	-589	2,715	17,183	3,668	2,898	23,749	20,642	191,743	5,233
2002	4,004	1,038	5,042	428	15,468	1,374	1,752	18,594	20,248	195,561	3,816
2003	2,323	-1,715	608	1,107	17,195	1,252	1,653	20,100	20,231	197,145	1,584
2004	170	825	995	1,975	19,068	790	1,244	21,102	20,017	201,200	4,055

[a]Includes operator reported corrections for the years 1978 through 1981. After 1981 operators included corrections with revisions.
[b]Revisions and adjustments = Col. 1 + Col. 2.
[c]Total discoveries = Col. 5 + Col. 6 + Col. 7.
[d]Proved reserves = Col. 10 from prior year + Col. 3 + Col. 4 + Col. 8 - Col. 9.
[e]Based on following year data only.
[f]An unusually large revision decrease to North Slope wet natural gas reserves was made in 1988. It recognizes some 25 trillion cubic feet of downward revisions reported during the last few years by operators because of economic and market conditions. EIA in previous years carried these reserves in the proved category.

– = Not applicable.

Notes: Old means discovered in a prior year. New means discovered during the report year. The production estimates in this table are based on data reported on Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves". They may differ from the official Energy Information Administration production data for natural gas contained in the *Natural Gas Annual,* DOE/EIA-013.

Source: *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves,* 1979 through 2004 annual reports, DOE/EIA-0216.{3-27}

Table D6. U.S. Lower 48 Proved Reserves of Wet Natural Gas, After Lease Separation, 1978–2004
(Billion Cubic Feet at 14.73 psia and 60° Fahrenheit)

Year	Adjustments[a] (1)	Net Revisions (2)	Revisions[b] and Adjustments (3)	Net of Sales and Acquisitions (4)	Extensions (5)	New Field Discoveries (6)	New Reservoir Discoveries in Old Fields (7)	Total[c] Discoveries (8)	Estimated Production (9)	Proved[d] Reserves 12/31 (10)	Change from Prior Year (11)
1978	–	–	–	–	–	–	–	–	–	[e]175,988	–
1979	5,402	-711	4,691	NA	9,331	3,264	2,637	15,232	19,851	176,060	72
1980	1,218	150	1,368	NA	9,446	2,629	2,648	14,723	19,287	172,864	-3,196
1981	2,270	2,650	4,920	NA	10,973	3,870	3,076	17,919	19,318	176,385	3,521
1982	2,586	-1,748	838	NA	8,754	2,785	3,520	15,059	18,030	174,252	-2,133
1983	4,366	493	4,859	NA	7,262	1,628	3,071	11,961	16,317	174,755	503
1984	-2,409	2,821	412	NA	8,687	2,584	2,778	14,049	17,708	171,508	-3,247
1985	-1,313	2,713	1,400	NA	7,463	1,040	3,053	11,556	16,485	167,979	-3,529
1986	2,114	4,410	6,524	NA	6,357	1,122	1,845	9,324	16,073	167,754	-225
1987	1,200	2,868	4,068	NA	4,772	1,116	1,556	7,444	16,553	162,713	-5,041
1988	2,025	9,390	11,415	NA	7,099	1,677	1,979	10,755	17,063	167,820	5,107
1989	2,545	3,128	5,673	NA	6,467	1,485	2,313	10,265	17,349	166,409	-1,411
1990	1,811	4,859	6,670	NA	8,232	2,041	2,492	12,765	17,661	168,183	1,774
1991	3,367	4,013	7,380	NA	5,281	871	1,614	7,766	17,657	165,672	-2,511
1992	2,265	6,217	8,482	NA	4,840	668	1,773	7,281	17,851	163,584	-2,088
1993	996	4,971	5,967	NA	6,349	927	1,922	9,198	18,245	160,504	-3,080
1994	1,924	5,613	7,537	NA	7,294	1,941	3,606	12,841	18,756	162,126	1,622
1995	1,304	7,525	8,829	NA	7,162	1,709	2,518	11,389	18,443	163,901	1,775
1996	4,219	4,246	8,465	NA	8,183	1,430	3,209	12,822	19,337	165,851	1,950
1997	-835	3,322	2,487	NA	11,165	2,747	2,455	16,367	19,657	165,048	-803
1998	-1,461	5,937	4,476	NA	8,628	1,112	2,240	11,980	19,104	162,400	-2,648
1999	958	11,130	12,088	NA	7,399	1,566	2,242	11,207	19,391	166,304	3,904
2000	-1,294	9,273	7,979	4,471	13,574	2,055	2,450	18,079	19,654	177,179	10,875
2001	1,849	-2,336	-487	2,715	17,123	3,593	2,894	23,610	20,175	182,842	5,663
2002	4,004	1,038	5,042	428	15,468	1,374	1,752	18,594	20,248	19,5561	3,816
2003	2,324	-1,909	415	1,107	17,114	1,232	1,652	19,998	19,751	188,797	1,769
2004	170	395	565	1,975	18,927	790	1,209	20,926	19,536	192,727	3,930

[a]Includes operator reported corrections for the years 1978 through 1981. After 1981 operators included corrections with revisions.
[b]Revisions and adjustments = Col. 1 + Col. 2.
[c]Total discoveries = Col. 5 + Col. 6 + Col. 7.
[d]Proved reserves = Col. 10 from prior year + Col. 3 + Col. 4 + Col. 8 - Col. 9.
[e]Based on following year data only.
– = Not applicable.

Notes: Old means discovered in a prior year. New means discovered during the report year. The production estimates in this table are based on data reported on Form EIA-23, “Annual Survey of Domestic Oil and Gas Reserves”. They may differ from the official Energy Information Administration production data for natural gas contained in the *Natural Gas Annual,* DOE/EIA-0131.

Source: *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves,* 1979 through 2004 annual reports, DOE/EIA-0216.{3-27}

Table D7. U.S. Proved Reserves of Natural Gas Liquids, 1978–2004
(Million Barrels of 42 U.S. Gallons)

Year	Adjustments[a] (1)	Net Revisions (2)	Revisions[b] and Adjustments (3)	Net of Sales and Acquisitions (4)	Extensions (5)	New Field Discoveries (6)	New Reservoir Discoveries in Old Fields (7)	Total[c] Discoveries (8)	Estimated Production (9)	Proved[d] Reserves 12/31 (10)	Change from Prior Year (11)
1978	–	–	–	–	–	–	–	–	–	[e]6,772	–
1979	[f]64	-49	15	NA	364	94	97	555	727	6,615	-157
1980	153	104	257	NA	418	90	79	587	731	6,728	113
1981	231	86	317	NA	542	131	91	764	741	7,068	340
1982	299	-21	278	NA	375	112	109	596	721	7,221	153
1983	849	66	915	NA	321	70	99	490	725	7,901	680
1984	-123	142	19	NA	348	55	96	499	776	7,643	-258
1985	426	162	588	NA	337	44	85	466	753	7,944	301
1986	367	223	590	NA	263	34	72	369	738	8,165	221
1987	231	191	422	NA	213	39	55	307	747	8,147	-18
1988	11	453	464	NA	268	41	72	381	754	8,238	91
1989	-277	123	-154	NA	259	83	74	416	731	7,769	-469
1990	-83	221	138	NA	299	39	73	411	732	7,586	-183
1991	233	130	363	NA	189	25	55	269	754	7,464	-122
1992	225	261	486	NA	190	20	64	274	773	7,451	-13
1993	102	124	226	NA	245	24	64	333	788	7,222	-229
1994	43	197	240	NA	314	54	131	499	791	7,170	-52
1995	192	277	469	NA	432	52	67	551	791	7,399	229
1996	474	175	649	NA	451	65	109	625	850	7,823	424
1997	-14	289	275	NA	535	114	90	739	864	7,973	150
1998	-361	208	-153	NA	383	66	88	537	833	7,524	-449
1999	99	727	826	NA	313	51	88	452	896	7,906	382
2000	-83	459	376	145	645	92	102	839	921	8,345	439
2001	-429	-132	-561	102	717	138	142	997	890	7,993	-352
2002	62	31	93	54	612	48	78	738	884	7,994	1
2003	-338	-161	-499	30	629	35	72	736	802	7,459	-535
2004	273	97	370	112	734	26	54	814	827	7,928	469

[a]Includes operator reported corrections for the years 1978 through 1981. After 1981 operators included corrections with revisions.
[b]Revisions and adjustments = Col. 1 + Col. 2.
[c]Total discoveries = Col. 5 + Col. 6 + Col. 7.
[d]Proved reserves = Col. 10 from prior year + Col. 3 + Col. 4 + Col. 8 - Col. 9.
[e]Based on following year data only.
[f]Consists only of operator reported corrections and no other adjustments.
– = Not applicable.

Notes: Old means discovered in a prior year. New means discovered during the report year. The production estimates in this table are based on data reported on Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves," and Form EIA-64A, "Annual Report of the Origin of Natural Gas Liquids Production". They may differ from the official Energy Information Administration production data for natural gas liquids contained in the *Natural Gas Annual,* DOE/EIA-0131.

Source: *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves,* 1979 through 2004 annual reports, DOE/EIA-0216.{3-27}

Table D8. U.S. Lower 48 Proved Reserves of Natural Gas Liquids, 1978–2004
(Million Barrels of 42 U.S. Gallons)

Year	Adjustments[a] (1)	Net Revisions (2)	Revisions[b] and Adjustments (3)	Net of Sales and Acquisitions (4)	Extensions (5)	New Field Discoveries (6)	New Reservoir Discoveries in Old Fields (7)	Total[c] Discoveries (8)	Estimated Production (9)	Proved[d] Reserves 12/31 (10)	Change from Prior Year (11)
1978	–	–	–	–	–	–	–	–	–	[e]6,749	–
1979	[f]63	-49	14	NA	364	94	97	555	726	6,592	-157
1980	165	104	269	NA	418	90	79	587	731	6,717	125
1981	233	85	318	NA	542	131	91	764	741	7,058	341
1982	300	-21	279	NA	375	112	109	596	721	7,212	154
1983	850	66	916	NA	321	70	99	490	725	7,893	681
1984	-115	123	8	NA	348	55	96	499	776	7,624	-269
1985	70	152	222	NA	334	44	85	463	748	7,561	-63
1986	363	226	589	NA	263	34	72	369	735	7,784	223
1987	179	191	370	NA	212	39	55	306	731	7,729	-55
1988	10	452	462	NA	267	41	72	380	734	7,837	108
1989	-273	123	-150	NA	259	83	74	416	714	7,389	-448
1990	-60	221	161	NA	298	39	73	410	714	7,246	-143
1991	183	138	321	NA	187	25	55	267	730	7,104	-142
1992	225	254	479	NA	183	20	64	267	746	7,104	0
1993	101	124	225	NA	245	24	64	333	761	6,901	-203
1994	38	196	234	NA	314	54	131	499	765	6,869	-32
1995	204	230	434	NA	432	52	67	551	761	7,093	224
1996	417	178	595	NA	450	56	109	615	817	7,486	393
1997	-107	55	-52	NA	533	114	90	737	829	7,342	-144
1998	-74	208	134	NA	383	66	88	537	809	7,204	-138
1999	102	617	719	NA	304	50	86	440	848	7,515	311
2000	9	459	468	145	645	92	102	839	899	8,068	553
2001	-429	-280	-709	-102	717	138	142	997	870	7,588	-480
2002	42	31	73	54	612	48	78	738	864	7,589	1
2003	-338	-161	-499	30	629	35	72	736	784	7,072	-517
2004	273	97	370	112	734	26	54	814	809	7,559	487

[a]Includes operator reported corrections for the years 1978 through 1981. After 1981 operators included corrections with revisions.
[b]Revisions and adjustments = Col. 1 + Col. 2.
[c]Total discoveries = Col. 5 + Col. 6 + Col. 7.
[d]Proved reserves = Col. 10 from prior year + Col. 3 + Col. 4 + Col. 8 - Col. 9.
[e]Based on following year data only.
[f]Consists only of operator reported corrections and no other adjustments.
– = Not applicable.

Notes: Old means discovered in a prior year. New means discovered during the report year. The production estimates in this table are based on data reported on Form EIA-23, “Annual Survey of Domestic Oil and Gas Reserves,” and Form EIA-64A, “Annual Report of the Origin of Natural Gas Liquids Production”. They may differ from the official Energy Information Administration production data for natural gas liquids contained in the *Natural Gas Annual,* DOE/EIA-0131.

Source: *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves*, 1979 through 2004 annual reports, DOE/EIA-0216.{3-27}

Table D9. Deepwater Production and Proved Reserves of the Gulf of Mexico Federal Offshore, 1992-2004

Year	Gulf of Mexico Total	Gulf of Mexico Louisiana[a]	Gulf of Mexico Texas	Depth Greater than 200 meters	Depth Less than 200 meters	Deepwater Percentage
	Crude Oil (million barrels of 42 U.S. gallons)					
Production						
1992	267	253	14	46	221	17.2
1993	266	252	14	46	220	17.3
1994	265	245	20	53	212	20.1
1995	292	262	30	77	215	26.4
1996	303	265	38	90	213	29.7
1997	342	298	44	123	219	36.0
1998	372	336	36	171	201	46.0
1999	421	376	45	228	193	54.2
2000	419	381	38	234	185	55.8
2001	459	417	42	286	173	62.2
2002	451	395	57	288	163	63.9
2003	485	426	59	336	149	69.3
2004	467	404	63	310	157	66.4
Reserves						
1992	1,835	1,643	192	557	1,278	30.4
1993	2,072	1,880	192	824	1,248	39.8
1994	2,127	1,922	205	877	1,250	41.2
1995	2,518	2,269	249	1,241	1,277	49.3
1996	2,567	2,357	210	1,311	1,256	51.1
1997	2,949	2,587	362	1,682	1,267	57.0
1998	2,793	2,483	310	1,611	1,182	57.8
1999	2,744	2,442	302	1,626	1,118	59.3
2000	3,174	2,751	423	2,021	1,153	63.7
2001	4,288	3,877	411	3,208	1,080	74.8
2002	4,444	4,088	356	3,372	1,072	75.9
2003	4,554	4,251	303	3,627	927	79.6
2004	4,144	3,919	225	3,280	864	79.2

Table D9. Deepwater Production and Proved Reserves of the Gulf of Mexico Federal Offshore, 1992-2004 (continued)

Year	Gulf of Mexico Total	Gulf of Mexico Louisiana[a]	Gulf of Mexico Texas	Depth Greater than 200 meters	Depth Less than 200 meters	Deepwater Percentage
	Natural Gas, Wet After Lease Separation (billion cubic feet at 14.73 psia and 60° Fahrenheit)					
Production						
1992	4,576	3,292	1,284	166	4,410	3.6
1993	4,651	3,383	1,268	229	4,422	4.9
1994	4,797	3,505	1,292	294	4,503	6.1
1995	4,679	3,421	1,258	354	4,315	7.8
1996	5,045	3,752	1,293	549	4,496	10.9
1997	5,230	3,984	1,246	577	4,653	11.0
1998	4,967	3,817	1,150	724	4,243	14.6
1999	5,000	3,829	1,171	1,124	3,876	22.5
2000	4,901	3,747	1,154	1,196	3,705	24.4
2001	5,027	3,843	1,184	1,367	3,660	27.2
2002	4,544	3,541	1,003	1,365	3,180	30.0
2003	4,397	3,330	1,067	1,545	2,852	35.1
2004	3,967	2,890	1,077	1,251	2,716	31.5
Reserves						
1992	27,050	20,006	7,044	3,273	23,777	12.1
1993	26,463	19,751	6,712	3,495	22,968	13.2
1994	27,626	21,208	6,418	4,772	22,854	17.3
1995	28,229	21,664	6,565	5,811	22,418	20.6
1996	28,153	22,119	6,034	6,389	21,764	22.7
1997	28,455	22,428	6,027	7,491	20,964	26.3
1998	26,937	21,261	5,676	7,575	19,362	28.1
1999	26,062	20,172	5,890	7,726	18,336	29.6
2000	26,891	20,466	6,425	8,731	18,160	32.5
2001	27,100	20,290	6,810	11,229	15,871	41.4
2002	25,347	19,113	6,234	10,540	14,807	41.6
2003	22,522	17,168	5,354	10,041	12,481	44.6
2004	19,288	15,144	4,144	8,591	10,698	44.5

Table D9. Deepwater Production and Proved Reserves of the Gulf of Mexico Federal Offshore, 1992-2004 (continued)

Year	Gulf of Mexico Total	Gulf of Mexico Louisiana[a]	Gulf of Mexico Texas	Depth Greater than 200 meters	Depth Less than 200 meters	Deepwater Percentage
Natural Gas Liquids (million barrels of 42 U.S. gallons)						
Production						
1992	91	76	15	4	87	4.4
1993	97	80	17	6	91	6.2
1994	98	83	15	6	92	6.1
1995	85	71	14	12	73	14.1
1996	101	84	17	13	88	12.9
1997	140	123	17	17	123	12.1
1998	139	120	19	26	113	18.7
1999	167	136	31	51	116	30.5
2000	199	164	35	84	115	42.2
2001	192	147	45	96	96	50.0
2002	184	149	35	66	118	36.0
2003	148	120	28	55	93	37.2
2004	155	127	28	51	104	40.9
Reserves						
1992	590	472	118	91	499	15.4
1993	605	490	115	97	508	16.0
1994	603	500	103	110	493	18.2
1995	630	496	134	294	336	46.7
1996	753	621	132	300	456	39.8
1997	906	785	121	349	557	38.5
1998	919	776	143	387	532	42.1
1999	994	833	161	411	583	41.3
2000	1,074	921	153	468	606	43.6
2001	967	785	182	443	524	45.8
2002	965	783	182	407	558	42.2
2003	717	598	119	262	455	36.5
2004	713	615	98	292	421	40.9

Table D9. Deepwater Production and Proved Reserves of the Gulf of Mexico Federal Offshore, 1992-2004 (continued)

Year	Gulf of Mexico			Depth		
	Total	Louisiana[a]	Texas	Greater than 200 meters	Less than 200 meters	Deepwater Percentage
	Dry Natural Gas (billion cubic feet at 14.73 psia and 60° Fahrenheit)					
Production						
1992	4,508	3,233	1,275	162	4,346	3.6
1993	4,577	3,319	1,258	224	4,353	4.9
1994	4,725	3,440	1,285	288	4,437	6.1
1995	4,627	3,376	1,251	361	4,266	7.8
1996	4,991	3,706	1,285	544	4,447	10.9
1997	5,133	3,895	1,238	565	4,568	11.0
1998	4,872	3,728	1,144	711	4,161	14.6
1999	4,885	3,721	1,164	1,099	3,786	22.5
2000	4,773	3,626	1,147	1,165	3,608	24.4
2001	4,913	3,735	1,178	1,334	3,578	27.4
2002	4,423	3,427	996	1,328	3,095	30.0
2003	4,306	3,244	1,062	1,513	2,793	35.1
2004	3,874	2,802	1,072	1,222	2,652	31.5
Reserves						
1992	26,649	19,653	6,996	3,225	23,424	12.1
1993	26,044	19,383	6,661	3,438	22,606	13.2
1994	27,218	20,835	6,383	4,709	22,509	17.3
1995	27,917	21,392	6,525	5,751	22,166	20.6
1996	27,852	21,856	5,996	6,322	21,530	22.7
1997	27,922	21,934	5,988	7,343	20,579	26.3
1998	26,422	20,774	5,648	7,425	18,997	28.1
1999	25,451	19,598	5,853	7,533	17,918	29.6
2000	26,172	19,788	6,384	8,506	17,666	32.5
2001	26,456	19,721	6,735	10,943	15,513	41.4
2002	24,689	18,500	6,189	10,266	14,423	41.6
2003	22,059	16,728	5,331	9,835	12,224	44.6
2004	18,812	14,685	4,127	8,379	10,433	44.5

Table D9. Deepwater Production and Proved Reserves of the Gulf of Mexico Federal Offshore, 1992-2004 (continued)

	Gulf of Mexico			Depth		
Year	Total	Louisiana[a]	Texas	Greater than 200 meters	Less than 200 meters	Deepwater Percentage
	Lease Condensate (million barrels of 42 U.S. gallons)					
Production						
1992	44	35	9	2	42	4.4
1993	46	35	11	3	43	6.2
1994	47	37	10	3	44	6.1
1995	49	40	9	7	42	14.1
1996	60	49	11	8	52	12.9
1997	70	59	11	8	62	12.1
1998	72	57	15	13	59	18.7
1999	87	61	26	27	60	30.5
2000	106	76	30	45	61	42.2
2001	101	60	41	51	50	50.2
2002	90	60	30	38	52	42.2
2003	78	53	25	30	48	38.5
2004	74	49	25	27	47	36.2
Reserves						
1992	310	226	84	48	262	15.4
1993	316	235	81	51	265	16.0
1994	311	233	78	57	254	18.2
1995	412	305	107	192	220	46.7
1996	527	422	105	210	317	39.8
1997	527	433	94	203	324	38.5
1998	557	435	122	234	323	42.1
1999	567	430	137	234	333	41.3
2000	560	433	127	244	316	43.6
2001	482	325	157	221	261	45.8
2002	454	300	154	195	259	43.0
2003	353	251	102	135	218	38.2
2004	290	205	85	103	187	35.6

[a]Includes Federal Offshore Alabama.
Source: Based on data reported on Form EIA-23, “Annual Survey of Domestic Oil and Gas Reserves.”

Table D10. 2004 Reported Proved Nonproducing Reserves of Crude Oil, Lease Condensate, and Wet Natural Gas, After Lease Separation[a]

State and Subdivision	Crude Oil (mbbls)	Lease Condensate (mbbls)	Nonassociated Gas (bcf)	Associated Dissolved Gas (bcf)	Total Gas (bcf)
Alaska	707	0	664	17	681
Lower 48 States	**4,436**	**409**	**45,332**	**5,399**	**50,731**
Alabama	2	3	369	2	371
Arkansas	3	0	315	10	325
California	267	0	221	403	624
Coastal Region Onshore	16	0	6	12	18
Los Angeles Basin Onshore	63	0	0	30	30
San Joaquin Basin Onshore	158	0	215	342	557
State Offshore	30	0	0	19	19
Colorado	62	39	3,788	621	4,409
Florida	6	0	0	0	0
Kansas	11	0	54	5	59
Kentucky	5	0	107	0	107
Louisiana	150	30	3,524	282	3,806
North	11	6	1,982	46	2,028
South Onshore	115	23	1,376	215	1,591
State Offshore	24	1	166	21	187
Michigan	10	1	468	29	497
Mississippi	79	0	76	7	83
Montana	104	0	158	41	199
New Mexico	142	15	4,169	160	4,329
East	142	10	613	159	772
West	0	5	3,556	1	3,557
New York	0	0	26	0	26
North Dakota	52	1	14	22	36
Ohio	7	0	92	11	103
Oklahoma	92	38	3,800	80	3,880
Pennsylvania	1	0	410	38	448
Texas	625	76	13,084	831	13,915
RRC District 1	9	2	395	6	401
RRC District 2 Onshore	13	2	545	15	560
RRC District 3 Onshore	21	20	760	51	811
RRC District 4 Onshore	4	22	3,067	42	3,109
RRC District 5	1	1	2,461	23	2,484
RRC District 6	15	12	1,729	30	1,759
RRC District 7B	5	0	21	4	25
RRC District 7C	14	1	842	98	940
RRC District 8	218	0	737	186	923
RRC District 8A	311	0	10	327	337
RRC District 9	9	1	1,417	4	1,421
RRC District 10	5	14	1,041	41	1,082
State Offshore	0	1	59	4	63
Utah	61	5	1,136	127	1,263
Virginia	0	0	742	0	742
West Virginia	0	0	510	0	510
Wyoming	45	41	5,524	23	5,547
Federal Offshore[b]	2,708	160	6,718	2,707	9,425
Pacific (California)	55	8	47	60	107
Gulf of Mexico (Louisiana)[b]	2,581	112	5,114	2,488	7,602
Gulf of Mexico (Texas)	72	40	1,557	159	1,716
Miscellaneous[c]	4	0	27	0	27
U.S. Total	**5,143**	**409**	**45,996**	**5,416**	**51,412**

[a]Includes only those operators who produced during the report year 400,000 barrels of crude oil or 2 billion cubic feet of wet natural gas, or more (Category I and Category II operators).

[b]Includes Federal offshore Alabama.

[c]Includes Arizona, Maryland, Missouri, Nevada, Oregon, South Dakota and Tennessee.

Source: Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves," 2004.

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Appendix E

Summary of Data Collection Operations

Appendix E

Summary of Data Collection Operations

Form EIA-23 Survey Design

The data collected on Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves," were used to produce this report. This section provides information concerning the survey design, response statistics, reporting requirements, and frame maintenance.

Form EIA-23 is mailed annually to all known large and intermediate size operators, and a scientifically selected sample of small operators. Operator size categories were based upon their annual production as indicated in various Federal, State, and commercial records. The term **State/subdivision** refers to an individual subdivision within a State or an individual State that is not subdivided. Operators were divided into the three size categories shown below.

- **Category I** - *Large Operators:* Operators who produced 1.5 million barrels or more of crude oil, or 15 billion cubic feet or more of natural gas, or both.
- **Category II** - *Intermediate Operators:* Operators who produced at least 400,000 barrels of crude oil or 2 billion cubic feet of natural gas, or both, but less than Category I operators.
- **Category III** - *Small Operators:* Operators who produced less than the Category II operators.

Category III operators were further subdivided into operators sampled with Certainty (**Certainty**) and operators that were randomly sampled (**Noncertainty**).

Data were filed for calendar year 2004 by crude oil or natural gas well operators who were active as of December 31, 2004. EIA defines an operator as an organization or person responsible for the management and day-to-day operation of crude oil or natural gas wells. The purpose of this definition is to eliminate responses from royalty owners, working interest owners (unless they are also operators), and others not directly responsible for operations. An operator need not be a separately incorporated entity. To minimize reporting burden, corporations are permitted to report on the basis of operating units of the company convenient for them. A large corporation may be represented by a single form or by several forms.

Table E1 shows a comparison of the EIA-23 sample and sampling frame between 1997 and 2004, and depicts the number of active operators, with 2002 showing the largest in the series. The 2004 sampling frame consisted of 164 Category I, 532 Category II, 275 Category III Certainty, and 19,699 Category III Noncertainty operators, for a total of 20,670 active operators. The survey sample consisted of 971 operators selected with certainty that included all of the Category I and II Certainty operators, the 275 smaller operators that were selected with certainty because of their size in relation to the area or areas in which they operated, and 370 Noncertainty operators selected as a systematic random sample of the remaining operators.

Form EIA-23 Response Statistics

Each company and its parent company or subsidiaries were required to file Form EIA-23 if they met the survey specifications. Response to the 2004 survey is summarized in **Table E2**. EIA makes a considerable effort to gain responses from all operators. About 3.8 percent of those selected turned out to be nonoperators (those that reported being nonoperators during the report year and operators that could not be located). Of the 51 nonoperators, 12 had successor operators that had taken over the production of the nonoperator. These successor operators were subsequently sampled. The overall response rate for the 2004 survey was 96 percent. For the 47 operators that did not respond, production data was obtained from State or other sources.

Form EIA-23 Reporting Requirements

The collection format for Form EIA-23 actually consists of two forms. The form the respondent is required to file is dependent upon the annual production levels of crude oil, natural gas, and lease condensate. Category I and Category II operators file a more detailed field

Table E1. Comparison of the EIA-23 Sample and Sampling Frame, 1997-2004

Operator Category	Number of Operators							
	1997	1998	1999	2000	2001	2002	2003	2004
Certainty								
Category I	180	178	177	175	179	176	164	164
Category II	461	420	399	436	485	480	512	532
Category III	1,194	862	648	854	559	388	399	275
Sampled	1,835	1,460	1,224	1,465	1,223	1,044	1,075	971
Percent Sampled	100	100	100	100	100	100	100	100
Noncertainty								
Sampled	1,645	1,459	1,305	1,311	644	533	479	370
Percent Sampled	8	7	6	6	3	3	2	2
Total								
Active Operators	22,678	23,620	22,089	22,102	22,519	22,823	20,923	20,670
Not Sampled	19,198	20,701	19,560	19,326	20,652	21,246	19,369	19,329
Sampled	3,480	2,919	R2,529	2,776	1,867	1,577	1,554	1,341
Percent Sampled	15	12	R11	13	8	7	7	7

R=Revised data.
Source: Energy Information Administration, Office of Oil and Gas.

Table E2. Form EIA-23 Survey Response Statistics, 2004

Operator Category	Original Sample Selected	Successor[a] Operators	Net[b] Category Changes	Non-[c] operators	Adjusted[d] Sample	Responding Operators		Nonresponding Operators	
						Number	Percent	Number	Percent
Certainty									
Category I	164	0	14	-7	171	171	100.0	0	0.0
Category II	532	12	-49	-27	468	459	98.1	9	1.9
Category III	275	0	39	-6	308	289	93.8	[e]19	6.2
Subtotal	971	12	4	-40	947	919	97.0	[e]28	3.0
Noncertainty	370	0	-4	-11	355	336	94.6	[e]19	5.4
Total	1,341	12	0	-51	1,302	1,255	96.4	[e]47	3.6

[a]Successor operators are those, not initially sampled, that have taken over the production of a sampled operator.
[b]Net of recategorized operators in the sample (excluding nonoperators).
[c]Includes former operators reporting that they were not operators during the report year and operators that could not be located who are treated as nonoperators.
[d]Adjusted sample equals original sample plus successor operators plus net category changes minus nonoperators.
[e]For the 47 operators (9 Category II operators, 19 Category III operators, and 19 Noncertainty operators) that did not respond, production data was obtained from State or other sources.
Source: Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves" 2004.

level data form. Category III operators file a summary report which is aggregated at a State/subdivision level.

The cover page required of all respondents identifies each operator by name and address (**Figure I1**, Appendix I). The oil and gas producing industry includes a large number of small enterprises. To minimize reporting burden, only a sample of small operators were required to file a summary report of Form EIA-23 (**Figures I2 and I3**, Appendix I). Report year production data were required by State/subdivision areas for crude oil, natural gas, and lease condensate. Proved reserves data for operators were required only for those properties where estimates existed in the respondent's records.

All Category I and Category II operators were required to file field level data on Schedule A, "Operated Proved Reserves, Production, and Related Data by Field," for each oil and/or gas field in which the respondent operated properties (**Figure I4**, Appendix I). All Category I and those Category II operators who had reserve estimates were required to file on a total operated basis for crude oil, nonassociated natural gas, associated-dissolved natural gas, and lease condensate. The following data items were required to be filed: proved reserves at the beginning and the end of the report year, revision increases and revision decreases, sales and acquisitions, extensions, new field discoveries, new reservoirs in old fields, production, indicated additional reserves of crude oil, nonproducing reserves, field discovery year, water depth, and field location information.

Category II operators who did not have reserves estimates were required to file the field location information and report year production for the four hydrocarbon types from properties where reserves were not estimated. These respondents used Schedule B, "Footnotes," to provide clarification of reported data items when required in the instructions, or electively to provide narrative or detail to explain any data item filed (**Figure I5**, Appendix I).

Crude oil and lease condensate volumes were reported rounded to thousands of barrels of 42 U.S. gallons at 60° Fahrenheit, and natural gas volumes were reported rounded to millions of cubic feet. All natural gas volumes were requested to be reported at 60° Fahrenheit and a pressure base of 14.73 pounds per square inch absolute. Other minor report preparation standards were specified to assure that the filed data could be readily processed.

Oil and Gas Field Coding

A major effort to create standardized codes for all identified oil or gas fields throughout the United States was implemented during the 1982 survey year. Information from previous lists was reviewed and reconciled with State lists and a consolidated list was created. The publication of the *Oil and Gas Field Code Master List 2004*, in December 2004, was the 23nd annual report and reflected data collected through November 2004. This list was made available to operators to assist in identifying the field code data necessary for the preparation of Form EIA-23.

Form EIA-23 Comparison with Other Data Series

Estimated crude oil, lease condensate, and natural gas production volumes from Form EIA-23 were compared with official EIA production data supplied by Federal and State oil and natural gas regulatory agencies and published in EIA's monthly and annual reports. Reports published by the Federal and State oil and natural gas regulatory agencies were used to compare specific operator production responses to these agencies with Form EIA-23 responses. When significant differences were found, responses were researched to detect and reconcile possible reporting errors.

For 2004, Form EIA-23 National estimates of production were 2,001 million barrels for crude oil and lease condensate or 18 million barrels (less than 1 percent) lower than that reported in the *Petroleum Supply Annual 2004* for crude oil and lease condensate (1,983 million barrels). Form EIA-23 National estimates of production for dry natural gas were 19,168 billion cubic feet, 244 billion cubic feet (less than 2 percent) higher than the *Natural Gas Monthly, September 2005* for 2004 dry natural gas production (18,924 billion cubic feet).

Form EIA-23 Frame Maintenance

Operator frame maintenance is a major data quality control effort. Extensive effort is expended to keep the frame as current as possible. The Form EIA-23 frame contains a listing of all crude oil and natural gas well operators in the United States and must be maintained and updated regularly in order to ensure an accurate frame from which to draw the sample for the annual crude oil and natural gas reserves survey. The original frame, created in 1977, is revised annually. In addition, outside sources, such as State publications and electronic data, and commercial information data bases such as IHS Energy Group, are used to obtain information on operator status and to update addresses for the frame each year.

A maintenance procedure is utilized in conjunction with State production records and commercial information data bases to update possible crude oil and natural gas well operators presently listed on EIA's master frame and add new operators to the master frame. This procedure identifies active operators and nonoperators which improves the frame for future sample selections for the annual survey. **Table E3** provides a summary of changes made to the Form EIA-23 frame of crude oil and natural gas well operators for the 2004 survey mailing. These changes resulted from all frame maintenance activities.

The Form EIA-23 operator frame contained a total of 68,616 entries as of December 14, 2004. Of these, 20,670 were confirmed operators. These are operators who have filed in the past or for whom the EIA has recent production data from an outside source. The remaining

Table E3. Summary of the 2004 Operator Frame Activity, Form EIA-23

Total 2003 Operator Frame	68,616
Operators	20,923
Nonoperators	47,693
Changes to 2003 Operator Status	1,264
From Nonoperator to Operator[a]	122
From Operator to Nonoperator	619
New Operators	523
No Changes to 2003 Operator Status	67,352
Operators	20,386
Nonoperators	46,966
Additions to 2003 Operator Frame	0
Operator	0
Nonoperator	0
Total 2004 Operator Frame	68,616
Operators	20,670
Nonoperators	47,946

[a]Includes operator frame activity through December 14, 2004.
[b]Relatively few additions were made since EIA ID numbers are now being recycled when no useable data is available with a specific EIA ID number. This procedure will increase the number of Nonoperator to Operator changes more than usual.

operators (including both definite and probable nonoperators) exist as a pool of names and addresses that may be added to the active list if review indicates activity.

Form EIA-64A Survey Design

The data for this report are also collected on Form EIA-64A, "Annual Report of the Origin of Natural Gas Liquids Production." This section provides information concerning the survey design, response statistics, reporting requirements, and frame maintenance for Form EIA-64A.

Form EIA-23 for report years 1977 and 1978 required natural gas well operators to report their natural gas data on a fully dry basis. It was discovered in the course of those surveys that many operators had little or no knowledge of the extraction of liquids from their produced natural gas streams once custody transfer had taken place. Therefore, these operators reverted to reporting the only natural gas volume data they had in their possession. These volume data were for dryer natural gas than that which had passed through the wellhead, but wetter than fully dry natural gas. With reference to **Figure E1**, they reported their volumes either at the wellhead or after removal of lease condensate in their lease or field separation facilities.

Some of the larger operators, however, also owned or operated natural gas processing plants. They reported their volumes after removal of both lease condensate and plant liquids, as required by Form EIA-23. The aggregate volumes resulting from the 1977 and 1978 surveys, therefore, were neither fully dry (as was intended) nor fully wet. They do appear to have been more dry than wet simply because the operators who reported fully dry volumes also operated properties that contained the bulk of proved natural gas reserves.

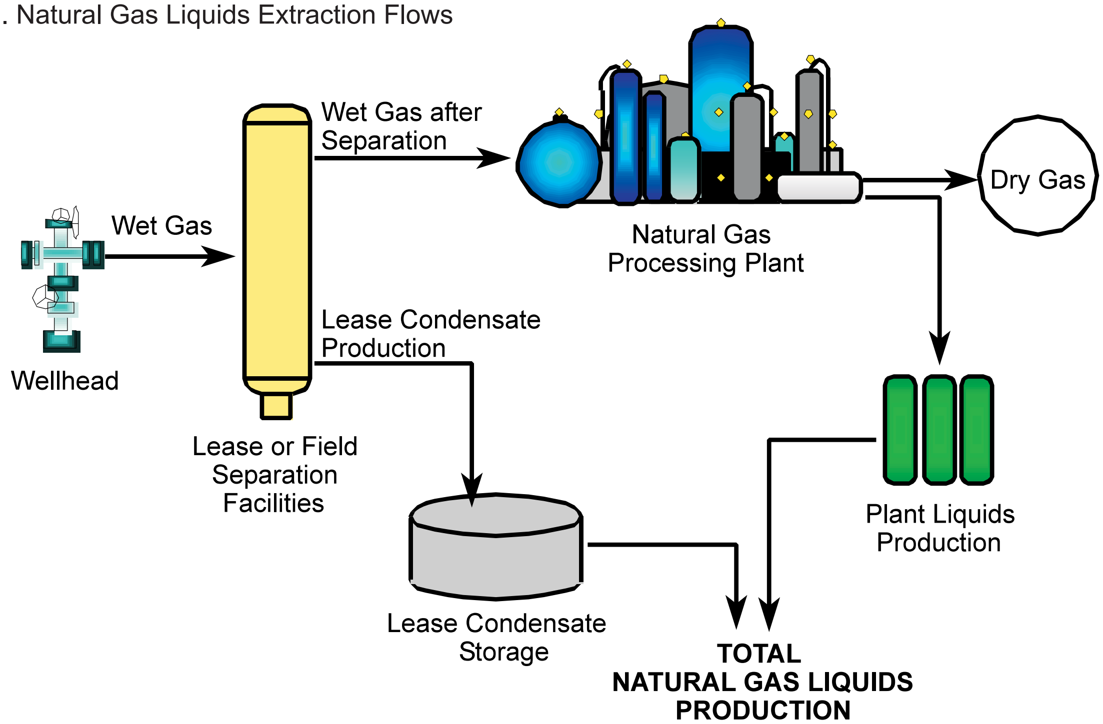
The EIA recognized that its estimates of proved reserves of natural gas liquids (NGL) had to reflect not only those volumes extractable in the future under current economic and operating conditions at the lease or field (lease condensate), but also volumes (plant liquids) extractable downstream at existing natural gas processing plants. Form EIA-64, which already canvassed these processing plants, did not request that the plants' production volumes be attributed to source areas. Beginning with the 1979 survey, a new form to collect plant liquids production according to the area or areas where their input natural gas stream had been produced was mailed to all of the operating plants. The instructions for filing the Form EIA-23 were altered to collect data from natural gas well operators that reflected those volumes of natural gas dried only through the lease or field separation facilities. The reporting basis of these volumes are referred to as "wet after lease separation." The methodology used to estimate NGL reserves by State and State subdivision is provided in Appendix F.

Form EIA-64A Response Statistics

EIA mailed EIA-64A forms to all known natural gas processing plant operators as of February 1, 2005. In addition, plant operators whose plants were shut down or dismantled during 2004 were required to complete forms for the portion of 2004 when the plants were in operation.

Natural gas processing plant operators were requested to file a Form EIA-64A for each of their plants. A total of 211 operators of 488 plants were sent forms. This number included 3 new plants and 2 successor plants identified after the initial 2004 survey mailing. A total of 14 plants were reported as nonoperating according

Figure E1. Natural Gas Liquids Extraction Flows



Source: Energy Information Administration, Office of Oil and Gas.

to the Form EIA-64A definition. For the 17th consecutive year the response rate was 100 percent.

Form EIA-64A respondents were requested to report natural gas liquids production data by area of origin. **Table E4** summarizes the responses by plant operators of the volume and origin of natural gas delivered to the processing plants and the volume of the natural gas liquids extracted by the plants by State. The majority of the plant operators reported only one area of origin for the natural gas that was processed by a plant. The State or area of origin reported is generally also the plant's location.

Form EIA-64A Reporting Requirements

Form EIA-64A consisted of the reporting schedule shown in **Figure I6**, Appendix I. The form identifies the plant, its geographic location, the plant operator's name and address, and the parent company name. The certification was signed by a responsible official of the operating entity. The form pertains to the volume of natural gas received and of natural gas liquids produced at the plant, allocated to each area of origin. Operators also filed the data pertaining to the amount of natural gas shrinkage that resulted from extraction of natural gas liquids at the plant, and the amount of fuel used in processing.

Natural gas liquids volumes were reported rounded to thousands of barrels of 42 U.S. gallons at 60° Fahrenheit, and natural gas volumes were reported rounded to millions of cubic feet. All natural gas volumes were requested to be reported at 60° Fahrenheit and a pressure base of 14.73 pounds per square inch absolute. Other minor report preparation standards were specified to assure that the filed data could be readily processed.

Form EIA-64A Comparison with Other Data Series

Form EIA-64A plant liquids production data were compared with data collected on Form EIA-816, "Monthly Natural Gas Liquids Report." Aggregated production from Form EIA-816 represents the net volume of natural gas processing plant liquid output less input for the report year. These data are published in EIA's *Petroleum Supply Annual* reports. The Form EIA-64A annual responses reflect all corrections and

Table E4. Natural Gas Processed and Liquids Extracted at Natural Gas Processing Plants, 2004

Plant Location	Volume of Natural Gas Delivered to Processing Plants				
	State Production	Federal Production	Out of State Production	Natural Gas Processed	Total Liquids Extracted
	(million cubic feet)				(thousand barrels)
Alaska	2,680,859	0	0	2,680,859	27,866
Alabama	32,825	229,319	1,282	263,426	10,534
Arkansas	10,139	0	0	10,139	190
California	235,655	810	0	236,465	10,898
Colorado	703,804	0	0	703,804	25,706
Florida	3,088	0	1,717	4,805	587
Kansas	391,395	0	115,777	507,172	24,278
Kentucky	38,208	0	0	38,208	1,662
Louisiana	1,025,344	2,219,506	0	3,244,850	93,995
Michigan	37,977	0	0	37,977	2,933
Mississippi	2,471	281,292	0	283,763	9,333
Montana	6,720	0	0	6,720	496
North Dakota	60,261	0	0	60,261	4,754
New Mexico	940,295	0	0	940,295	72,918
Oklahoma	836,636	0	2,730	839,366	58,437
Texas	3,702,000	0	46,670	3,748,670	254,266
Utah	188,524	0	4,569	193,093	2,556
West Virginia	95,589	0	31,795	127,384	5,671
Wyoming	1,227,994	0	21,315	1,249,309	49,380
Miscellanous[a]	13,634	0	0	13,634	572
Total	12,233,418	2,730,927	225,855	15,190,200	657,032

[a]Includes Illinois, Ohio, and Pennsylvania.
Source: Form EIA-64A, “Annual Report of the Origin of Natural Gas Liquids Production,” 2004

revisions to EIA’s monthly estimates. Differences, when found, were reconciled in both sources. For 2004, the Form EIA-64A National estimates were less than 3 percent (17 million barrels) lower than the *Petroleum Supply Annual 2004* volume for natural gas plant liquids production.

Table E5. Form EIA-64A 2004 Plant Frame Activity

Frame as of 2003 survey mailing	504
Additions	74
Deletions	–90
Frame as of 2004 survey mailing	488

Note: Includes operator frame activity through February 15, 2005.
Source: Energy Information Administration, Office of Oil and Gas.

Form EIA-64A Frame Maintenance

The Form EIA-64A plant frame contains data on all known active and inactive natural gas processing plants in the United States. The 2004 plant frame was compared to listings of natural gas processing plants from Form EIA-816, “Monthly Natural Gas Liquids Report”; the *LPG Almanac*; and the *Oil and Gas Journal*. A list of possible additions to the plant frame was compiled. **Table E5** summarizes the Form EIA-64A plant frame changes made as a result of the comparisons as of February 15, 2005.

Appendix F

Statistical Considerations

Appendix F

Statistical Considerations

Sampling Plan

The goal was a sample that would provide estimates of reserves and production of crude oil, natural gas, and lease condensate for the United States. A stratified sample using a single stage and systematic selection with probability proportional to size was designed. The measure of size was the volume of production for crude oil, natural gas, and lease condensate by State by company in 2003. There were two strata: companies selected with certainty and companies selected under the systematic probability proportional to size design.

Operators of crude oil and natural gas wells were selected as the appropriate respondent population because they have access to the most current and detailed information, and therefore, presumably have better reserve estimates than do other possible classes of respondents, such as working interest or royalty owners. EIA conducts extensive frame maintenance activities each year to identify all current operators of crude oil and natural gas wells in the country. While large operators are quite well known, they comprise only a small portion of all operators. The small operators are not well known and are difficult to identify because they go into and out of business, alter their corporate identities, and change addresses frequently.

Sample Design

To meet survey objectives, while minimizing respondent burden, a sampling strategy has been used since 1977. EIA publishes data on reserves and production for crude oil, natural gas, and lease condensate by State for most States, and by subdivision for the States of California, Louisiana, New Mexico, and Texas.The total volume of production varies among the State/subdivisions. To meet the survey objectives while controlling total respondent burden, EIA selected the following target sampling error for the 2003 survey for each product class.

Each operator is asked to report production and reserves for crude oil, natural gas, and lease condensate for each State/subdivision in which he operates. The term State/subdivision refers to an individual subdivision within a State or an individual State that is not subdivided.

EIA selected the following target sampling error for the 2004 survey for each product class.

- 1.0 percent for National estimates and for each of the States having subdivisions: Alaska, California, Louisiana, New Mexico, and Texas.
- 2.5 percent for each State having 1 percent or more of estimated lower 48 States reserves or production in 2003 for any product class.
- 4 percent for each State/subdivision having less than 1 percent of estimated U.S. reserves or production in 2003 (lower 48 States) for all 3 product class.
- 8 percent for States not published separately.

Certainty Stratum

There are three components to the certainty stratum Category I, Category II, and certain Category III Small Operators.

- **Category I** - *Large Operators:* Operators who produced a total of 1.5 million barrels or more of crude, or 15 billion cubic feet or more of natural gas, or both in 2003.
- **Category II** - *Intermediate Operators:* Operators who produced a total of at least 400,000 barrels of crude oil or 2 billion cubic feet of natural gas, or both, but less than Category I operators in 2003, and additionally, all coalbed methane and Federal Offshore operators.
- **Category III** - *Small Operators:* Operators who produced less than the Category II operators in 2003.

Small operators were further subdivided into certainty and noncertainty strata. Small operators who satisfied any of the following criteria based upon their production shown in the operator frame are certainty operators:

- All other operators with production or reserves in a State/subdivision that exceed selected cutoff levels.

Table F1. 2004 EIA–23 Initial Number of Operators in Survey Sample

State and Subdivision	Number of Certainty Operators	Number of Multi–State Operators	Number of Noncertainty Operators	Target Error Oil	Target Error Gas
Alabama Onshore	42	1	4	0.040	0.025
Alaska	20	0	0		
Arkansas	67	5	11	0.040	0.025
California - Coastal Region Onshore	18	0	4	0.080	0.080
California - Los Angeles Basin Onshore	13	3	2	0.010	0.010
California - San Joaquin Basin Onshore	41	2	7	0.025	0.040
Colorado	118	3	21	0.025	0.010
Florida - Onshore	5	0	0	0.025	0.025
Illinois	30	6	25	0.040	0.040
Indiana	18	4	19	0.040	0.080
Kansas	184	81	70	0.040	0.080
Kentucky	28	12	14	0.025	0.010
Louisiana-North	115	22	25	0.040	0.040
Louisiana-South Onshore	183	8	21	0.010	0.010
Michigan	36	5	4	0.010	0.010
Mississippi - Onshore	81	4	16	0.040	0.040
Montana	69	1	5	0.040	0.040
Nebraska	25	2	19	0.040	0.040
New Mexico - East	160	1	34	0.040	0.080
New Mexico - West	55	1	3	0.025	0.025
New York	18	9	5	0.025	0.010
North Dakota	65	0	5	0.080	0.040
Ohio	22	23	16	0.040	0.040
Oklahoma	265	26	77	0.040	0.040
Pennsylvania	46	11	11	0.025	0.025
Texas - RRC District 1	137	12	49	0.040	0.040
Texas - RRC District 2 Onshore	186	2	43	0.025	0.025
Texas - RRC District 3 Onshore	269	16	64	0.040	0.025
Texas - RRC District 4 Onshore	198	3	37	0.025	0.025
Texas - RRC District 5	111	2	18	0.040	0.010
Texas - RRC District 6	181	20	47	0.040	0.010
Texas - RRC District 7B	163	35	96	0.025	0.010
Texas - RRC District 7C	167	3	53	0.025	0.025
Texas - RRC District 8	211	7	69	0.040	0.025
Texas - RRC District 8A	191	0	53	0.010	0.010
Texas - RRC District 9	158	23	67	0.010	0.040
Texas - RRC District 10	154	12	30	0.025	0.025
Utah	57	2	3	0.040	0.010
Virginia	17	0	1	0.040	0.025
West Virginia	38	18	14	0.080	0.040
Wyoming	164	2	16	0.040	0.025
Offshore Areas	320	0	0	0.025	0.025
Other States (a)	56	12	0	0.080	0.080
Total	**[b]987**	**399**	**[b]398**	**0.010**	**0.010**

[a]Includes Arizona, Idaho, Iowa, Maryland, Missouri, Nevada, Oregon, South Dakota, Tennessee, and Washington.
[b]Nonduplicative count of operators by States.
Note: Sampling rate was 7 percent except in Alaska, Florida Onshore, Virginia, and Offshore areas where sampling rate was 100 percent.
Source: Energy Information Administration, Office of Oil and Gas.

- The largest operator in each State/subdivision regardless of level of production or reserves.
- Operators with production or reserves of oil or gas for six or more State/subdivisions.

Noncertainty Stratum

Small operators not in the certainty stratum were classified in the noncertainty stratum. They were systematically sampled with probability proportional to size. Only the operators in the following 10 states were included in the noncertainty sample: Illinois, Indiana, Kentucky, Maryland, New York, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia. All other States were treated as certainty stratum.

In each State/subdivision the balance between the number of operators and the sample size was determined in an iterative procedure designed to minimize the number of total respondents. The iteration for each State/subdivision began with only the Category I and Category II operators in the certainty stratum. The size of the sample of small operators required to meet the target variance was calculated based on the variance of the volumes of those operators. For a number of State/subdivisions with high correlations between frame values across pairs of consecutive years, an adjusted target variance was calculated, that utilized the information about the correlations. This allowed the selection of a smaller sample that still met the target sampling error criteria. Independent samples of single location operators (operators who, according to the sampling frame, operate in only one State/subdivision) were selected from each State/subdivision using systematic random sampling.

State/subdivision volume estimates are calculated as the sum of the certainty strata and all of the estimates for the sampling strata in that region. The sampling variance of the estimated total is the sum of the sampling variances for the sampling strata. There is no sampling error associated with the certainty stratum. The square root of the sampling variance is the standard error. It can be used to provide confidence intervals for the State/subdivision totals.

For the States in which subdivision volume estimates are published, the State total is the sum of the individual volume estimates for the subdivisions. The U.S. total is the sum of the State estimates. A sampling variance is calculated for each State/subdivision and for the U.S. Total. **Table F1** shows sampling rates.

Total U.S. Reserve Estimates

Conceptually, the estimates of U.S. reserves and production can be thought of as the sum of the estimates for the individual States. Correspondingly, the estimates for the four States for which estimates are published separately by subdivision (California, Louisiana, New Mexico, and Texas) can be thought of as the sum of the estimates by subdivision. The remaining States are not subdivided and may be considered as a single subdivision.

The estimates of year-end proved reserves and annual production for any State/subdivision is the sum of the volumes in the State/subdivision reported by the certainty stratum operators and an estimate of the total volume in the State/subdivision by the noncertainty stratum operators. The total volume of certainty operators in the State/subdivision is simply the sum of individual operator's volumes. The estimated total volume of noncertainty operators in the State/subdivision is the weighted sum of the reports of the noncertainty sample operators.

In many State/subdivisions, the accuracy of the oil and gas estimates was improved by using the probability proportional to size procedure. This procedure took advantage of the correlation between year-to-year production reports. The weights used for estimating the oil production were different from the weights used for estimating the gas production.

The weight used for the estimation is the reciprocal of the probability of selection for the stratum from which the sample operator was selected. In making estimates for a State/ subdivision, separate weights are applied as appropriate for noncertainty operators shown in the frame as having had production in only the State/subdivision, for those shown as having had production in that State/subdivision and up to four other State/ subdivisions, and for operators with no previous record of production in the State/subdivision. National totals were then obtained by summation of the component totals.

Imputation and Estimation for Reserves Data

There were 355 operators sampled proportional to size (Table E1) that responded as Category III noncertainty operators. Only 137 of these, located in 10 states, had their data weighted and used to estimate the production and reserves of the operators that were not sampled in those states. The remaining 218 noncertainty sampled operators were treated as certainty sampled operators with a weight of 1 and were used in states where the bulk of the operator production data was obtained from auxiliary State data.

The data reported by operator category on Form EIA-23 and data imputed and estimated for report year 2004 are summarized in **Tables F2, F3, F4, and F5**. The reported data in **Table F2** shows that those responding operators accounted for 97.0 percent of the published production for wet natural gas and 95.4 percent of the reserves shown in **Table 9**. Data shown in **Table F3** indicate that those responding operators accounted for 96.9 percent of the nonassociated natural gas production and 95.5 percent of the reserves published in **Table 10**. The reported data shown in **Table F4** indicate that those responding operators accounted for 95.9 percent of published crude oil production and 93.9 percent of the reserves shown in **Table 6**. Additionally, **Table F5** indicates that those responding operators accounted for 97.8 percent of the published production and 96.0 percent of the published proved reserves for lease condensate shown in **Table 15**.

In order to estimate reserve balances for National and State/subdivision levels, a series of imputation and estimation steps at the operator level must be carried out.

- Year-end reserves for operators who provided production data only were imputed on the basis of their production volumes.
- Imputation was also applied to the small and intermediate operators as necessary to provide data on each of the reserve balance categories (i.e., revisions, extensions, or new discoveries).
- Imputation was required for the natural gas data of the small operators to estimate their volumes of associated-dissolved and nonassociated natural gas.
- Adjustments to maintain reserves balance.

Methods used are discussed in the following sections.

Imputation of Year-End Proved Reserves

Category I operators were required to submit year-end estimates of proved reserves. Category II and Category III operators were required to provide year-end estimates of proved reserves only if such estimates existed in their records. Some of these respondents provided estimates for all of their operated properties, others provided estimates for only a portion of their properties, and still others provided no estimates for any of their properties. All respondents did, however, provide annual production data.

A year-end proved reserves estimate was imputed from reported production data in each case where an estimate was not provided by the respondent. A R/P function was derived and used to calculate a reserves-to-production (R/P) ratio, based on operator size and the geographic region where the operator's properties were located. The R/P function has the following functional form for each geographic region:

*Calculated P/[P+R] = Beta * EXP(Alpha * ln (1 + MOS))*

- *Alpha, Beta* = Regional Coefficients (calculated)
- *MOS = Measure of size* for a respondent, which is equal to the barrel oil equivalent volume of a respondent's 2004 production.

Table F6 lists the coefficients used for each region and the number of observations on which it was based. The regional areas used are similar to the National Petroleum Council Regions (**Figure F1**). These regions generally follow the boundaries of geologic provinces wherein the stage of resource development tends to be somewhat similar.

Once the R/P ratio was obtained for an operator, it could be multiplied by the reported or estimated production to give a proved reserves estimate. Operators that had production plus end of year reserves equal to zero were excluded from the respondents selected to calculate the R/P coefficients.

In 2004, rather than rely on a weighted sample, the R/P function was used to estimate the proved reserves of all noncertainty operators in these States: Texas, California, Colorado, Louisiana, Montana, New Mexico, South Dakota, Utah, and Wyoming. These States were chosen for this new procedure because of the many years of historical production and reserves data within EIA and availability of reliable State government and commercial production data for these States. This technique improved the correlation of EIA data with State and commercial production data, and reduced the burden of reporting and analysis on both EIA and the noncertainty operators in these States.

Imputation of Changes to Proved Reserves by Component of Change

Category II and Category III operators that do not keep reserves data were not asked to provide estimates of beginning-of-year reserves or annual changes to

Table F2. Summary of Form EIA-23 Reported, Imputed, and Estimated Natural Gas Data for 2004, Wet after Lease Separation (Million Cubic Feet at 14.73 psia and 60 Degrees Fahrenheit)

Level of Reporting	Operator Category I	II	Certainty III	Noncertainty III	Auxillary State Data	Total
Reported						
Number of Operators	171	459	289	336	13,664	14,919
Proved Reserves as of 12/31/03	173,021,831	13,832,380	904,544	1,606	0	187,760,361
(+) Revision Increases	25,344,424	1,379,662	46,603	0	0	26,770,689
(–) Revision Decreases	24,254,297	1,668,617	70,416	0	0	25,993,330
(–) Sales	8,582,347	2,259,065	662,280	0	0	11,503,692
(+) Acquisitions	11,930,606	1,238,458	27,874	13,290	0	13,210,228
(+) Extensions	15,359,064	2,861,495	28,667	0	0	18,249,226
(+) New Field Discoveries	554,690	198,921	388	0	0	753,999
(+) New Reservoirs in Old Fields	818,884	349,950	1,217	0	0	1,170,051
(–) Production With Proved Reserves Reported	16,896,526	1,463,271	45,169	343	0	18,405,309
(–) Production Without Proved Reserves Reported	17,397	456,894	11,680	0	0	485,971
Proved Reserves as of 12/31/04	177,293,000	14,485,809	231,544	14,553	0	192,024,906
Imputed and Estimated						
Number of Operators	-	-	-	5,751	-	5,751
Proved Reserves as of 12/31/03	-	-	-	-	-	-
(+) Revision Increases	0	0	0	0	1,346,399	1,346,399
(–) Revision Decreases	0	0	0	0	1,297,072	1,297,072
(–) Sales	0	0	0	0	78,056	78,056
(+) Acquisitions	0	0	0	0	350,242	350,242
(+) Extensions	0	0	0	0	819,835	819,835
(+) New Field Discoveries	0	0	0	0	37,444	37,444
(+) New Reservoirs in Old Fields	0	0	0	0	74,259	74,259
(–) Production With Proved Reserves Reported	0	0	0	0	63,314	63,314
(–) Production Without Proved Reserves Reported	3,820	153,710	109,288	266,818	527,016	1,060,652
Proved Reserves as of 12/31/04	22,758	1,296,243	731,272	2,050,273	5,069,781	9,170,327
Total						
Number of Operators	171	459	289	6,087	13,664	20,670
Proved Reserves as of 12/31/03	173,021,831	13,832,380	904,544	1,606	0	187,760,361
(+) Revision Increases	25,344,424	1,379,662	46,603	0	1,346,399	28,117,088
(–) Revision Decreases	24,254,297	1,668,617	70,416	0	1,297,072	27,290,402
(–) Sales	8,582,347	2,259,065	662,280	0	78,056	11,581,748
(+) Acquisitions	11,930,606	1,238,458	27,874	13,290	350,242	13,560,470
(+) Extensions	15,359,064	2,861,495	28,667	0	819,835	19,069,061
(+) New Field Discoveries	554,690	198,921	388	0	37,444	791,443
(+) New Reservoirs in Old Fields	818,884	349,950	1,217	0	74,259	1,244,310
(–) Production With Proved Reserves Reported	16,896,526	1,463,271	45,169	343	63,314	18,468,623
(–) Production Without Proved Reserves Reported	21,217	610,604	120,968	266,818	527,016	1,546,623
Proved Reserves as of 12/31/04	177,315,758	15,782,052	962,816	2,064,826	5,069,781	201,195,233
Summary						
Total Number of Operators	**171**	**459**	**289**	**6,087**	**13,664**	**20,670**
Percent of Total	**0.8%**	**2.2%**	**1.4%**	**29.4%**	**66.1%**	**100.0%**
Total Production in 2004	**16,917,743**	**2,073,875**	**166,137**	**267,161**	**590,330**	**20,015,246**
Percent of Total	**84.5%**	**10.4%**	**0.8%**	**1.3%**	**2.9%**	**100.0%**
Total Proved Reserves 12/31/04	**177,315,758**	**15,782,052**	**962,816**	**2,064,826**	**5,069,781**	**201,195,233**
Percent of Total	**88.1%**	**7.8%**	**0.5%**	**1.0%**	**2.5%**	**100.0%**

[a]There were 355 noncertainty responses, 137 were used with their sample weights and 218 were treated as Certainty III operators.
– = Not applicable.
Notes: Table 9 totals include imputed and estimated wet natural gas proved reserves rounded at the State/subdivision level. Field level data are reported volumes and may not balance due to submission of incomplete reserve component records.
Source: Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves," 2004.

Table F3. Summary of Form EIA-23 Reported, Imputed, and Estimated Nonassociated Natural Gas Data for 2004, Wet after Lease Separation (Million Cubic Feet at 14.73 psia and 60 Degrees Fahrenheit)

Level of Reporting	Operator Category I	II	Certainty III	Noncertainty III	Auxillary State Data	Total
Reported						
Number of Operators	171	459	289	336	13,664	14,919
Proved Reserves as of 12/31/03	147,537,859	12,388,805	821,519	636	0	160,748,819
(+) Revision Increases	21,771,601	1,187,590	45,071	0	0	23,004,262
(–) Revision Decreases	21,559,084	1,480,544	51,726	0	0	23,091,354
(–) Sales	7,756,635	2,116,675	626,074	0	0	10,499,384
(+) Acquisitions	11,147,233	1,064,400	26,671	433	0	12,238,737
(+) Extensions	14,613,036	2,766,447	26,099	0	0	17,405,582
(+) New Field Discoveries	528,835	191,991	388	0	0	721,214
(+) New Reservoirs in Old Fields	729,776	343,373	1,217	0	0	1,074,366
(–) Production With Proved Reserves Reported	14,577,571	1,297,837	41,935	194	0	15,917,537
(–) Production Without Proved Reserves Reported	14,364	410,336	9,243	0	0	433,943
Proved Reserves as of 12/31/04	152,435,411	13,062,395	201,345	875	0	165,700,026
Imputed and Estimated						
Number of Operators	-	-	-	5,751	-	5,751
Proved Reserves as of 12/31/03	-	-	-	-	-	-
(+) Revision Increases	0	0	0	0	1,104,909	1,104,909
(–) Revision Decreases	0	0	0	0	1,029,717	1,029,717
(–) Sales	0	0	0	0	78,004	78,004
(+) Acquisitions	0	0	0	0	332,755	332,755
(+) Extensions	0	0	0	0	759,114	759,114
(+) New Field Discoveries	0	0	0	0	36,069	36,069
(+) New Reservoirs in Old Fields	0	0	0	0	72,857	72,857
(–) Production With Proved Reserves Reported	0	0	0	0	56,034	56,034
(–) Production Without Proved Reserves Reported	3,521	139,524	96,008	239,053	389,251	867,357
Proved Reserves as of 12/31/04	21,034	1,169,058	652,333	1,842,425	4,165,195	7,850,045
Total						
Number of Operators	171	459	289	6,087	13,664	20,670
Proved Reserves as of 12/31/03	147,537,859	12,388,805	821,519	636	0	160,748,819
(+) Revision Increases	21,771,601	1,187,590	45,071	0	1,104,909	24,109,171
(–) Revision Decreases	21,559,084	1,480,544	51,726	0	1,029,717	24,121,071
(–) Sales	7,756,635	2,116,675	626,074	0	78,004	10,577,388
(+) Acquisitions	11,147,233	1,064,400	26,671	433	332,755	12,571,492
(+) Extensions	14,613,036	2,766,447	26,099	0	759,114	18,164,696
(+) New Field Discoveries	528,835	191,991	388	0	36,069	757,283
(+) New Reservoirs in Old Fields	729,776	343,373	1,217	0	72,857	1,147,223
(–) Production With Proved Reserves Reported	14,577,571	1,297,837	41,935	194	56,034	15,973,571
(–) Production Without Proved Reserves Reported	17,885	549,860	105,251	239,053	389,251	1,301,300
Proved Reserves as of 12/31/04	152,456,445	14,231,453	853,678	1,843,300	4,165,195	173,550,071
Summary						
Total Number of Operators	**171**	**459**	**289**	**6,087**	**13,664**	**20,670**
Percent of Total	**0.8%**	**2.2%**	**1.4%**	**29.4%**	**66.1%**	**100.0%**
Total Production in 2004	**14,595,456**	**1,847,697**	**147,186**	**239,247**	**445,285**	**17,274,871**
Percent of Total	**84.5%**	**10.7%**	**0.9%**	**1.4%**	**2.6%**	**100.0%**
Total Proved Reserves 12/31/04	**152,456,445**	**14,231,453**	**853,678**	**1,843,300**	**4,165,195**	**173,550,071**
Percent of Total	**87.8%**	**8.2%**	**0.5%**	**1.1%**	**2.4%**	**100.0%**

[a]There were 355 noncertainty responses, 137 were used with their sample weights and 218 were treated as Certainty III operators.
– = Not applicable.
Notes: Table 10 totals include imputed and estimated nonassociated wet natural gas proved reserves rounded at the State/subdivision level. Field level data are reported volumes and may not balance due to submission of incomplete reserve component records.
Source: Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves," 2004.

Table F4. Summary of Form EIA-23 Reported, Imputed, and Estimated Crude Oil Data for 2004,
(Thousand Barrels of 42 U.S. Gallons)

Level of Reporting	Operator Category I	II	Certainty III	Noncertainty III	Auxillary State Data	Total
Reported						
Number of Operators	171	459	289	336	13,664	14,919
Proved Reserves as of 12/31/03	19,530,949	1,005,518	35,508	1,581	0	20,573,556
(+) Revision Increases	1,668,535	116,677	2,060	0	0	1,787,272
(–) Revision Decreases	1,304,833	100,662	3,861	0	0	1,409,356
(–) Sales	804,315	110,375	20,564	0	0	935,254
(+) Acquisitions	790,706	129,255	378	13,384	0	933,723
(+) Extensions	519,783	58,072	1,131	0	0	578,986
(+) New Field Discoveries	28,926	4,398	26	0	0	33,350
(+) New Reservoirs in Old Fields	125,721	6,051	0	0	0	131,772
(–) Production With Proved Reserves Reported	1,527,996	88,359	2,110	310	0	1,618,775
(–) Production Without Proved Reserves Reported	29	15,179	777	0	0	15,985
Proved Reserves as of 12/31/04	19,026,541	1,021,392	12,569	14,655	0	20,075,157
Imputed and Estimated						
Number of Operators	-	-	-	5,751	-	5,751
Proved Reserves as of 12/31/03	-	-	-	-	-	-
(+) Revision Increases	0	0	0	0	152,390	152,390
(–) Revision Decreases	0	0	0	0	112,689	112,689
(–) Sales	0	0	0	0	637	637
(+) Acquisitions	0	0	0	0	25,314	25,314
(+) Extensions	0	0	0	0	40,793	40,793
(+) New Field Discoveries	0	0	0	0	1,759	1,759
(+) New Reservoirs in Old Fields	0	0	0	0	1,278	1,278
(–) Production With Proved Reserves Reported	0	0	0	0	13,575	13,575
(–) Production Without Proved Reserves Reported	42	17,329	12,877	30,248	110,460	170,956
Proved Reserves as of 12/31/04	270	143,700	109,695	253,665	786,111	1,293,441
Total						
Number of Operators	171	459	289	6,087	13,664	20,670
Proved Reserves as of 12/31/03	19,530,949	1,005,518	35,508	1,581	0	20,573,556
(+) Revision Increases	1,668,535	116,677	2,060	0	152,390	1,939,662
(–) Revision Decreases	1,304,833	100,662	3,861	0	112,689	1,522,045
(–) Sales	804,315	110,375	20,564	0	637	935,891
(+) Acquisitions	790,706	129,255	378	13,384	25,314	959,037
(+) Extensions	519,783	58,072	1,131	0	40,793	619,779
(+) New Field Discoveries	28,926	4,398	26	0	1,759	35,109
(+) New Reservoirs in Old Fields	125,721	6,051	0	0	1,278	133,050
(–) Production With Proved Reserves Reported	1,527,996	88,359	2,110	310	13,575	1,632,350
(–) Production Without Proved Reserves Reported	71	32,508	13,654	30,248	110,460	186,941
Proved Reserves as of 12/31/04	19,026,811	1,165,092	122,264	268,320	786,111	21,368,598
Summary						
Total Number of Operators	**171**	**459**	**289**	**6,087**	**13,664**	**20,670**
Percent of Total	**0.8%**	**2.2%**	**1.4%**	**29.4%**	**66.1%**	**100.0%**
Total Production in 2004	**1,528,067**	**120,867**	**15,764**	**30,558**	**124,035**	**1,819,291**
Percent of Total	**84.0%**	**6.6%**	**0.9%**	**1.7%**	**6.8%**	**100.0%**
Total Proved Reserves 12/31/04	**19,026,811**	**1,165,092**	**122,264**	**268,320**	**786,111**	**21,368,598**
Percent of Total	**89.0%**	**5.5%**	**0.6%**	**1.3%**	**3.7%**	**100.0%**

[a]There were 355 noncertainty responses, 137 were used with their sample weights and 218 were treated as Certainty III operators.
– = Not applicable.
Notes: Table 6 totals include imputed and estimated crude oil proved reserves rounded at the State/subdivision level. Field level data are reported volumes and may not balance due to submission of incomplete reserve component records.
Source: Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves," 2004.

Table F5. Summary of Form EIA-23 Reported, Imputed, and Estimated Lease Condensate Data for 2004,
(Thousand Barrels of 42 U.S. Gallons)

Level of Reporting	I	II	Certainty III	Noncertainty III	Auxillary State Data	Total
Reported						
Number of Operators	171	459	289	336	13,664	14,919
Proved Reserves as of 12/31/03	1,055,487	103,119	8,882	0	0	1,167,488
(+) Revision Increases	284,962	26,153	1,482	0	0	312,597
(–) Revision Decreases	263,941	21,945	369	0	0	286,255
(–) Sales	80,417	11,048	4,457	0	0	95,922
(+) Acquisitions	79,008	23,877	1,096	0	0	103,981
(+) Extensions	90,912	18,984	147	0	0	110,043
(+) New Field Discoveries	3,072	905	0	0	0	3,977
(+) New Reservoirs in Old Fields	15,530	9,363	7	0	0	24,900
(–) Production With Proved Reserves Reported	152,210	16,106	668	0	0	168,984
(–) Production Without Proved Reserves Reported	158	3,918	75	0	0	4,151
Proved Reserves as of 12/31/04	1,032,347	133,347	6,120	0	0	1,171,814
Imputed and Estimated						
Number of Operators	-	-	-	5,751	-	5,751
Proved Reserves as of 12/31/03	-	-	-	-	-	-
(+) Revision Increases	0	0	0	0	12,355	12,355
(–) Revision Decreases	0	0	0	0	16,147	16,147
(–) Sales	0	0	0	0	435	435
(+) Acquisitions	0	0	0	0	7,435	7,435
(+) Extensions	0	0	0	0	5,479	5,479
(+) New Field Discoveries	0	0	0	0	354	354
(+) New Reservoirs in Old Fields	0	0	0	0	1,521	1,521
(–) Production With Proved Reserves Reported	0	0	0	0	257	257
(–) Production Without Proved Reserves Reported	108	566	861	1,535	4,426	7,496
Proved Reserves as of 12/31/04	711	2,179	3,392	6,282	35,185	47,749
Total						
Number of Operators	171	459	289	6,087	13,664	20,670
Proved Reserves as of 12/31/03	1,055,487	103,119	8,882	0	0	1,167,488
(+) Revision Increases	284,962	26,153	1,482	0	12,355	324,952
(–) Revision Decreases	263,941	21,945	369	0	16,147	302,402
(–) Sales	80,417	11,048	4,457	0	435	96,357
(+) Acquisitions	79,008	23,877	1,096	0	7,435	111,416
(+) Extensions	90,912	18,984	147	0	5,479	115,522
(+) New Field Discoveries	3,072	905	0	0	354	4,331
(+) New Reservoirs in Old Fields	15,530	9,363	7	0	1,521	26,421
(–) Production With Proved Reserves Reported	152,210	16,106	668	0	257	169,241
(–) Production Without Proved Reserves Reported	266	4,484	936	1,535	4,426	11,647
Proved Reserves as of 12/31/04	1,033,058	135,526	9,512	6,282	35,185	1,219,563
Summary						
Total Number of Operators	**171**	**459**	**289**	**6,087**	**13,664**	**20,670**
Percent of Total	**0.8%**	**2.2%**	**1.4%**	**29.4%**	**66.1%**	**100.0%**
Total Production in 2004	**152,476**	**20,590**	**1,604**	**1,535**	**4,683**	**180,888**
Percent of Total	**84.3%**	**11.4%**	**0.9%**	**0.8%**	**2.6%**	**100.0%**
Total Proved Reserves 12/31/04	**1,033,058**	**135,526**	**9,512**	**6,282**	**35,185**	**1,219,563**
Percent of Total	**84.7%**	**11.1%**	**0.8%**	**0.5%**	**2.9%**	**100.0%**

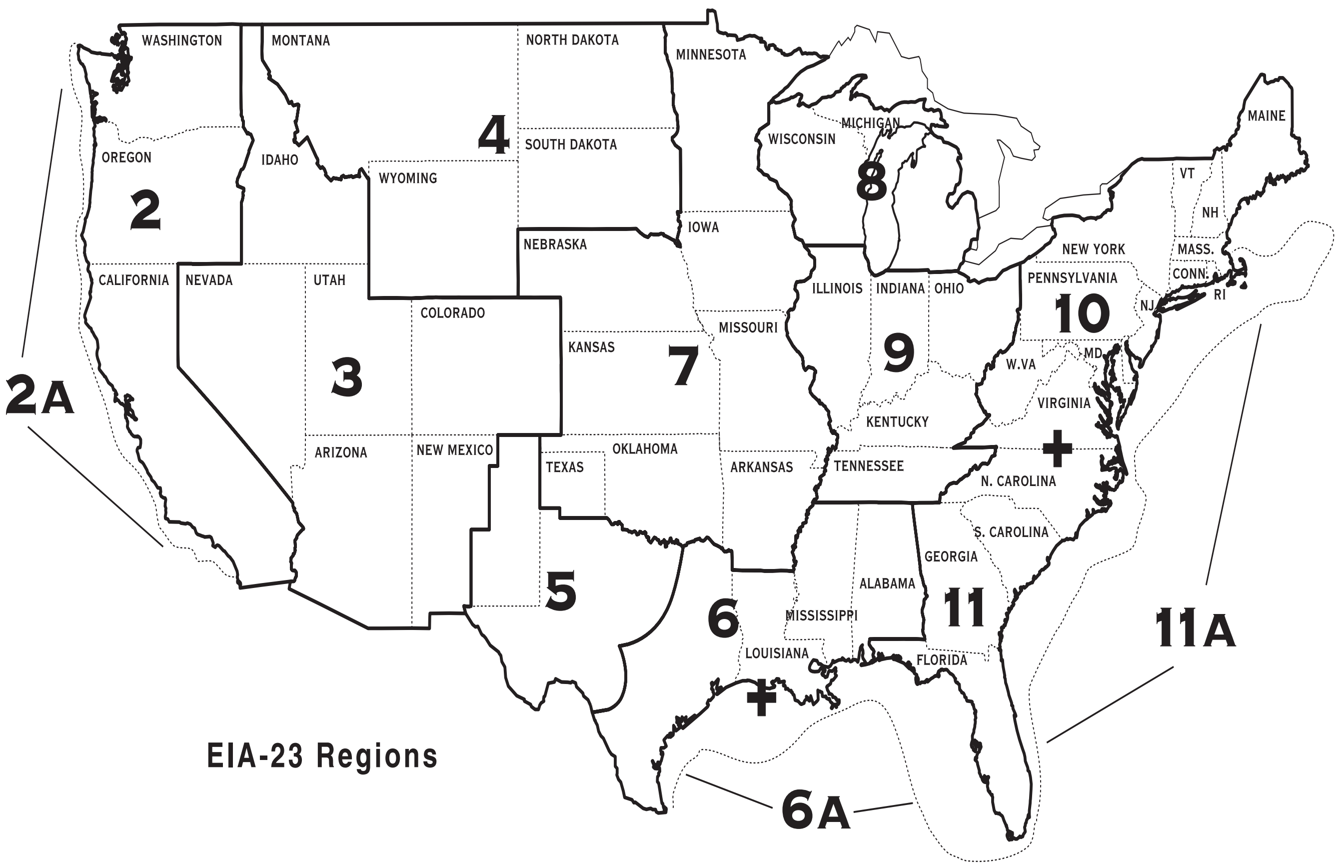
[a]There were 355 noncertainty responses, 137 were used with their sample weights and 218 were treated as Certainty III operators.
– = Not applicable.
Notes: Table 15 totals include imputed and estimated lease condensate proved reserves rounded at the State/subdivision level. Field level data are reported volumes and may not balance due to submission of incomplete reserve component records.
Source: Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves," 2004.

Table F6. Statistical Parameters of Reserves Estimation Equation by Region for 2004

Region Number	Region	Number of Nonzero R/P Pairs Oil	Gas	LC	Equation Coefficients Oil Alpha	Oil Beta	Gas Alpha	Gas Beta	LC Alpha	LC Beta
1	Alaska	8	8	0	-0.1320	0.3987	-0.1295	0.4172	0.0000	0.0000
2	Pacific Coast States	42	56	5	-0.1320	0.3027	-0.1295	0.3526	-0.1166	0.7765
2A	Federal Offshore Pacific	4	6	0	-0.1320	0.5436	-0.1295	0.4245	0.0000	0.0000
3	Western Rocky Mountains	74	130	52	-0.1320	0.2551	-0.1295	0.2928	-0.1166	0.1836
4	Northern Rocky Mountains	163	169	49	-0.1320	0.2583	-0.1295	0.2827	-0.1166	0.2280
5	West Texas and East New Mexico	491	498	167	-0.1320	0.2764	-0.1295	0.3614	-0.1166	0.5075
6	Western Gulf Basin	511	849	577	-0.1320	0.3503	-0.1295	0.4163	-0.1166	0.4956
6A	Gulf of Mexico	75	140	115	-0.1320	0.4990	-0.1295	0.7261	-0.1166	0.7270
7	Mid-Continent	274	367	147	-0.1320	0.2639	-0.1295	0.3172	-0.1166	0.2826
8 + 9	Michigan Basin and Eastern Interior	68	59	16	-0.1320	0.2239	-0.1295	0.1888	-0.1166	0.2684
10 + 11	Appalachians	24	66	9	-0.1320	0.2519	-0.1295	0.1673	-0.1166	0.2526
	United States	1,734	2,348	1,137	-0.1320	0.3627	-0.1295	0.3818	-0.1166	0.4676

Source: Based on data filed on Form EIA-23,"Annual Survey of Domestic Oil and Gas Reserves, 2004".

Figure F1. Form EIA-23 Regional Boundaries



Source: Energy Information Administration, Office of Oil and Gas.

proved reserves by component of change, i.e., revisions, extensions, and discoveries. When they did not provide estimates, these volumes were estimated by either:

- applying an algebraic allocation scheme which preserved the relative relationships between these items within each State/subdivision, as reported by Category I and Category II operators, or
- applying a modified version of the R/P function to each separate component of change, calculated with its own set of geographically dependent coefficients. This method was used in all four states where the R/P Function was applied to calculate end of year reserves.

Both methods preserved an exact annual reserves balance of the following form:

Published Proved Reserves at End of Previous Report Year
+ Adjustments
+ Revision Increases
– Revision Decreases
– Sales
+ Acquisitions
+ Extensions
+ New Field Discoveries
+ New Reservoir Discoveries in Old Fields
– Report Year Production
= Published Proved Reserves at End of Report Year

The algebraic allocation method used for all but nine states in the 2004 survey worked as follows: A ratio was calculated as the sum of the annual production and year-end proved reserves of those respondents who did not provide the reserves balance components, divided by the sum of year-end proved reserves and annual production of those respondents of similar size who did provide these quantities. This ratio was then multiplied by each of the reserves balance components reported by Category I and some Category II operators, to obtain imputed volumes for the reserves balances of the other Category II operators and certainty and noncertainty operators. These were then added to the State/subdivision totals.

Imputation of Natural Gas Volumes

Small operators in the certainty and noncertainty strata were not asked to segregate their natural gas volumes by type of natural gas, i.e., nonassociated natural gas (NA) and associated-dissolved natural gas (AD). The total estimated year-end proved reserves of natural gas and the total annual production of natural gas reported by, or imputed to, operators in the State/subdivision certainty and noncertainty strata were, therefore, subdivided into the NA and AD categories, by State/subdivision, in the same proportion as was reported by large and intermediate operators in the same area.

Adjustments

The instructions for Schedule A of Form EIA-23 specify that, when reporting reserves balance data, the following arithmetic equation must hold:

Proved Reserves at End of Previous Year
+ Revision Increases
– Revision Decreases
– Sales
+ Acquisitions
+ Extensions
+ New Field Discoveries
+ New Reservoir Discoveries in Old Fields
– Report Year Production
= Proved Reserves at End of Report Year

Any remaining difference in the State/subdivision annual reserves balance between the published previous year-end proved reserves and current year-end proved reserves not accounted for by the imputed reserves changes was included in the adjustments for the area. One of the primary reasons that adjustments are necessary is the instability of the noncertainty operators sampled each year. There is no guarantee that in the smaller producing States/subdivision the same number of small operators will be selected each year, or that the operators selected will be of comparable sizes when paired with operators selected in a prior year. Thus, some instability of this stratum from year to year is unavoidable, resulting in minor adjustments.

Some of the adjustments are, however, more substantial, and could be required for any one or more of the following reasons:

- The frame coverage may or may not have improved between survey years, such that more or fewer certainty operators were included in 2004 than in 2003.
- One or more operators may have reported data incorrectly on Schedule A in 2004 or 2003, but not both, and the error was not detected by edit processing.

- Operation of properties was transferred during 2004 from operators not in the frame or noncertainty operators not selected for the sample to certainty operators or noncertainty operators selected for the sample.
- Respondent changed classification of natural gas from NA to AD or vice versa.
- The trend in reserve changes imputed for the small operators, which was based on the trend reported by the large operators, did not reflect the actual trend for the small operators.
- noncertainty operators, who have grown substantially in size since they were added to the frame, occasionally cause a larger standard error than expected.
- The noncertainty sample for either year in a state may have been an unusual one.

The causes of adjustments are known for some but not all areas. The only problems whose effects cannot be expected to balance over a period of several years are those associated with an inadequate frame or those associated with any actual trend in reserves changes for small operators not being the same as those for large operators. EIA continues to attempt to improve sources of operator data to resolve problems in frame completeness.

Sampling Reliability of the Estimates

The sample of noncertainty operators selected is only one of the large number of possible samples that could have been selected and each would have resulted in different estimates. The standard error or sampling error of the estimates provides a measure of this variability. When probability sampling methods are used, as in the EIA-23 survey, the sampling error of estimates can also be estimated from the survey data.

The estimated sampling error can be used to compute a confidence interval around the survey estimate, with a prescribed degree of confidence that the interval covers the value that would have been obtained if all operators in the frame had been surveyed. If the estimated volume is denoted by $\hat{V}_s$ and its sampling error by S.E. (- $\hat{V}_s$), the confidence interval can be expressed as:

$$\hat{V}_s \pm k\,S.E.(\hat{V}_s)$$

where k is a multiple selected to provide the desired level of confidence. For this survey, k was taken equal to 2. Then there is approximately 95 percent confidence that the interval:

$$\hat{V}_s \pm 2S.E.(\hat{V}_s)$$

includes the universe value, for both the estimates of reserves and production volumes. Correspondingly, for approximately 95 percent of the estimates in this report, the difference between the published estimate and the value that would be found from a complete survey of all operators is expected to be less than twice the sampling error of the estimate. **Tables F7 and F8** provide estimates for 2S.E. ($\hat{V}_s$) by product. These estimates are directly applicable for constructing approximate 95 percent confidence intervals. For example, the 95 percent confidence interval for dry natural gas proved reserves is 192,513 ±392 billion cubic feet. The sampling error of $\hat{V}_s$ is equal to the sampling error of the noncertainty estimate $\hat{V}_{sr}$, because the certainty total is not subject to sampling error. The estimated sampling error of a noncertainty estimate is the square root of its estimated sampling variance.

Sources of Errors

The EIA maintains an evaluation program to assess the accuracy and quality of proved reserve estimates gathered on Form EIA-23. Field teams consisting of petroleum engineers from EIA's Reserves and Production Division conduct technical reviews of reserve estimates and independently estimate the proved reserves of a selected sample of operator properties. The results of these reviews are used to evaluate the accuracy of reported reserve estimates. Operators are apprized of the team's findings to assist them in completing future filings. The magnitude of errors due to differences between reserve volumes submitted by operators on the Form EIA-23 and those estimated by EIA petroleum engineers on their field trips were generally within accepted professional engineering standards. Several sources of possible error, apart from sampling error, are associated with the Form EIA-23 survey:

- Operator nonresponse
- Respondent estimation errors
- Reporting errors and data processing errors
- Inadequate frame coverage
- Errors associated with statistical estimates.

Imputation for Operator Nonresponse

The nonresponse rate for certainty operators for the 2004 survey was 3.0 percent and for the noncertainty operators 5.4 percent. An imputation was made for the production and reserves for the 47 nonresponding operators.

Respondent Estimation Errors

The principal data elements of the Form EIA-23 survey consist of respondent estimates of proved reserves of crude oil, natural gas, and lease condensate. Unavoidably, the respondents are bound to make some estimation errors, i.e., until a particular reservoir has been fully produced to its economic limit and abandoned, its reserves are not subject to direct measurement but must be inferred from limited, imperfect, or indirect evidence. A more complete discussion of the several techniques of estimating proved reserves, and the many problems inherent in the task, appears in Appendix G.

Reporting and Data Processing Errors

Reporting errors on the part of respondents are of definite concern in a survey of the magnitude and complexity of the Form EIA-23 program. Several steps were taken by EIA to minimize and detect such problems. The survey instrument itself was carefully developed, and included a detailed set of instructions for filing data, subject to a common set of definitions similar to those already used by the industry. Editing software is continually developed to detect different kinds of probable reporting errors and flag them for resolution by analysts, either through confirmation of the data by the respondent or through submission of amendments to the filed data. Data processing errors, consisting primarily of random keypunch errors, are detected by the same software.

Frame Coverage Errors

Of all the sources of controllable error connected with the Form EIA-23 survey, errors in the operator frame were expected to be the most important. If the frame does not list all operators in a given State, the sample selected from the frame for the State will not represent the entire operator population, a condition called under coverage. Under coverage is a problem with certain States, but it does not appear to be a problem with respect to the National proved reserve estimates for either crude oil or natural gas. While it is relatively straightforward to use existing sources to identify large operators and find addresses for them, such is not the case for small operators. A frame such as that used in the 2004 survey is particularly likely to be deficient in States where a large portion of total reserves and production is accounted for by small operators. EIA is continuing to work to remedy the under coverage problem in those States where it occurred.

Imputation Errors

Some error, generally expected to be small, is an inevitable result of the various estimations outlined. These imputation errors have not yet been completely addressed by EIA and it is possible that estimation methods may be altered in future surveys. Nationally, 6.0 percent of the crude oil proved reserve estimates, 3.9 percent of the wet natural gas proved reserve estimates, and 3.9 percent of the lease condensate proved reserve estimates resulted from the imputation and estimation of reserves for those certainty and noncertainty operators who did not provide estimates for all of their properties, in combination with the expansion of the sample of noncertainty operators to the full population. Errors for the latter were quantitatively calculated, as discussed in the previous section. Standard errors, for the former, would tend to cancel each other from operator to operator, and are, therefore, expected to be negligible, especially at the National level of aggregation. In States where a large share of total reserves is accounted for by Category III and smaller Category II operators, the errors are expected to be somewhat larger than in States where a large share of total reserves is accounted for by Category I and larger Category II operators.

Calculation of Reserves of Natural Gas Liquids and Dry Natural Gas

Natural Gas Liquids Reserve Balance

The published reserves, production, and reserves change statistics for crude oil, lease condensate, and natural gas, wet after lease separation, were derived from the data reported on Form EIA-23 and the application of the imputation methods discussed previously. The information collected on Form EIA-64A was then utilized in converting the estimates of the wet natural gas reserves into two components: plant liquids reserve data and dry natural gas reserve data. The total natural gas liquids reserve estimates presented in **Table 14** were computed as the sum of plant liquids estimates (**Table 15**) and lease condensate (**Table 16**) estimates.

Table F7. Factors for Confidence Intervals (2S.E.) for Crude Oil Proved Reserves and Production, 2004
(Million Barrels of 42 U.S. Gallons)

State and Subdivision	2004 Reserves	2004 Production	State and Subdivision	2004 Reserves	2004 Production
United States	26	3	Montana[b]	0	0
Alabama[b]	0	0	Nebraska	0	0
Alaska[a]	0	0	New Mexico[b]	0	0
Arkansas[b]	0	0	North Dakota[b]	0	0
California[b]	0	0	Ohio	8	1
Colorado[b]	0	0	Oklahoma[b]	0	0
Florida[a]	0	0	Pennsylvania	0	1
Illinois	9	1	Texas[b]	0	0
Indiana	2	0	Utah[b]	0	0
Kansas[b]	0	0	Virginia[a]	0	0
Kentucky	11	0	West Virginia	1	0
Louisiana[b]	0	0	Wyoming[b]	0	0
Michigan[b]	0	0	Federal Offshore[a]	0	0
Mississippi[b]	0	0	Miscellaneous[c]	0	0

[a]Sampling rate was 100 percent in Alaska, Florida Onshore, Virginia, and Offshore areas.
[b]Sampling was not used. Estimates for each operator were made using an imputation function.
[c]Includes Arizona, Missouri, Nevada, New York, South Dakota, Tennessee, and Virginia.
Notes: Confidence intervals are associated with Table 6 reserves and production data.
Factors for confidence intervals for each State and the United States are independently estimated and do not add.
Source: Factor estimates based on data filed on Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves," 2004.

Table F8. Factors for Confidence Intervals (2S.E.) for Natural Gas Proved Reserves and Production, Wet After Lease Separation, 2004
(Billion Cubic Feet at 14.73 psia and 60 Degrees Fahrenheit)

State and Subdivision	2004 Reserves	2004 Production	State and Subdivision	2004 Reserves	2004 Production
United States	392	36	New Mexico[b]	0	0
Alabama[b]	0	0	New York	82	7
Alaska[a]	0	0	North Dakota[b]	0	0
Arkansas[b]	0	0	Ohio	136	14
California[b]	0	0	Oklahoma[b]	0	0
Colorado[b]	0	0	Pennsylvania	309	27
Florida[a]	0	0	Texas[b]	0	0
Kansas[b]	0	0	Utah[b]	0	0
Kentucky	30	3	Virginia[a]	0	0
Louisiana[b]	0	0	West Virginia	37	3
Michigan[b]	0	0	Wyoming[b]	0	0
Mississippi[b]	0	0	Federal Offshore[a c]	0	0
Montana[b]	0	0	Miscellaneous[d]	7	1

[a]Sampling rate was 100 percent in Alaska, Florida Onshore, Virginia, and Offshore areas.
[b]Sampling was not used. Estimates for each operator were made using an imputation function.
[c]Includes Federal offshore Alabama.
[d]Includes Arizona, Illinois, Indiana, Maryland, Missouri, Nebraska, Nevada, Oregon, South Dakota, and Tennessee.
Notes: Confidence intervals are associated with Table 8 reserves and production data.
Factors for confidence intervals for each State and the United States are independently estimated and do not add.
Source: Factor estimates based on data filed on Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves," 2004

To generate estimates for each element in the reserves balance for plant liquids in a given producing area, the first step was to group all natural gas processing plants that reported this area as an area-of-origin on their Form EIA-64A, and then sum the liquids production attributed to this area over all respondents. Next, the ratio of the liquids production to the total wet natural gas production for the area was determined. This ratio represented the percentage of the wet natural gas that was recovered as natural gas liquids. Finally, it was assumed that this ratio was applicable to the reserves and each component of reserve changes (except adjustments), as well as production. Therefore, each element in the wet natural gas reserves balance was multiplied by this recovery factor to yield the corresponding estimate for plant liquids. Adjustments of natural gas liquids were set equal to the difference between the end of previous year reserve estimates, based upon the current report year Form EIA-23 and Form EIA-64A surveys, and the end of current year reserve estimates published in the preceding year's annual reserves report.

Natural Gas Reserve Balance

This procedure involved downward adjustments of the natural gas data, wet after lease separation, in estimating the volumes of natural gas on a fully dry basis. These reductions were based on estimates of the gaseous equivalents of the liquids removed (in the case of production), or expected to be removed (in the case of reserves), from the natural gas stream at natural gas processing plants. Form EIA-64A collected the volumetric reduction, or shrinkage, of the input natural gas stream that resulted from the removal of the NGL at each natural gas processing plant.

The shrinkage volume was then allocated to the plant's reported area or areas of origin. Because shrinkage is, by definition, roughly in proportion to the NGL recovered, i.e. the NGL produced, the allocation was in proportion to the reported NGL volumes for each area of origin. However, these derived shrinkage volumes were rejected if the ratio between the shrinkage and the NGL production (gas equivalents ratio) fell outside certain limits of physical accuracy. The ratio was expected to range between 1.558 MMCF per thousand barrels (where NGL consists primarily of ethane) and 0.940 MMCF per thousand barrels (where NGL consists primarily of natural gasolines). When the computed gas equivalents ratio fell outside these limits, an imputed ratio was utilized to estimate the plant's natural gas shrinkage allocation to each reported area of origin.

This imputed ratio was that calculated for the aggregate of all other plants reporting production and shrinkage, and having a gas equivalent ratio within the aforesaid limits, from the area in question. The imputed area ratio was applied only if there were at least five plants to base its computation on. If there were less than five plants, the imputed ratio was calculated based on all plants in the survey whose individual gas equivalents ratio was within the acceptable limits. Less than one percent of the liquids production was associated with shrinkage volumes imputed in this manner. Based on the 2004 Form EIA-64A survey, the national weighted average gas equivalents ratio was computed to be 1,401 cubic feet of natural gas shrinkage per barrel of NGL recovered. The total shrinkage volume (reported plus imputed) for all plants reporting a given area of origin was then subtracted from the estimated value of natural gas production, wet after lease separation, yielding dry natural gas production for the area. The amount of the reduction in the wet natural gas production was then expressed as a percentage of the wet natural gas production. Dry natural gas reserves and reserve changes were determined by reducing the wet natural gas reserves and reserve changes by the same percentage reduction factor.

A further refinement of the estimation process was used to generate an estimate of the natural gas liquids reserves in those States with coalbed methane fields. The States where this procedure was applied were Alabama, Colorado, Kansas, New Mexico, Oklahoma, Pennsylvania, Utah, Virginia, West Virginia, and Wyoming. The first step in the process was to identify all Form EIA-23 reported coalbed methane fields. Coalbed methane fields contain no extractable natural gas liquids. Therefore, when the normal shrinkage procedure was applied to the wet gas volume reserve components, the estimate of State coalbed methane volumes were excluded and were not reduced for liquid extraction. Following the computation for shrinkage, each coalbed field gas volume reserve components was added back to each of the dry gas volume reserve components in a State. The effect of this is that the large increases in reserves in some States from coalbed methane fields did not cause corresponding increases in the State natural gas liquids proved reserves.

Appendix G

Estimation of Reserves and Resources

Appendix G

Estimation of Reserves and Resources

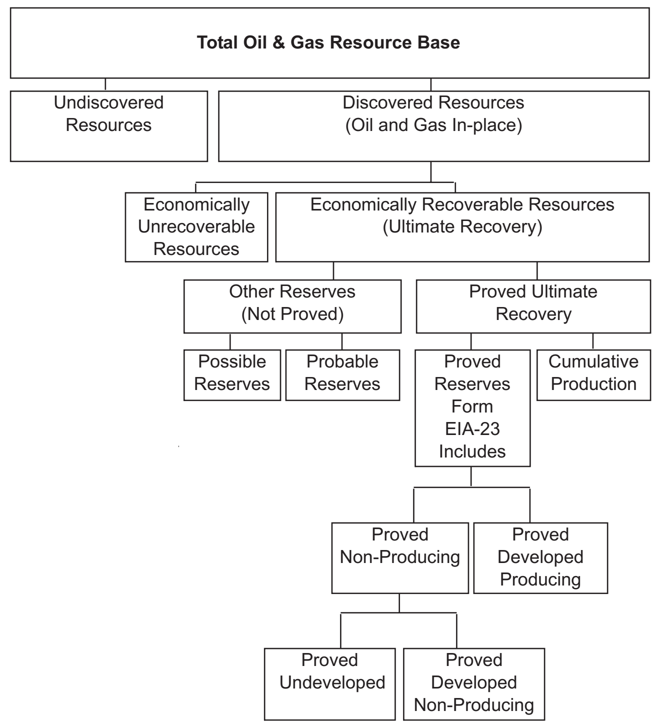
Oil and Gas Resource Base

Universally accepted definitions have not been developed for the many terms used by geologists, engineers, accountants and others to denote various components of overall oil and gas resources. In part, this is because most of these terms describe estimated and therefore uncertain, rather than measured, quantities. The lack of standardized terminology sometimes leads to inaccurate understanding of the meaning and/or import of estimates. Particularly common is an apparently widespread lack of understanding of the substantial difference between the terms "reserves" and "resources", as indicated by the frequent misuse of either term in place of the other.

The total resource base of oil and gas is the entire volume formed and trapped in–place within the Earth before any production. The largest portion of this total resource base is nonrecoverable by current or foreseeable technology. Most of the nonrecoverable volume occurs at very low concentrations throughout the earth's crust and cannot be extracted short of mining the rock or the application of some other approach that would consume more energy than it produced. An additional portion of the total resource base cannot be recovered because currently available production techniques cannot extract all of the in–place oil and gas even when present in commercially viable concentrations. The inability to recover all of the in–place oil and gas from a producible deposit occurs because of unfavorable economics, intractable physical forces, or a combination of both. Recoverable resources, the subset of the total resource base that is of societal and economic interest, are defined so as to exclude these nonrecoverable portions of the total resource base.

The structure presented in **Figure G1** outlines the total resource base and its components. The total resource base first consists of the recoverable and nonrecoverable portions discussed above. The next level down divides recoverable resources into discovered and undiscovered segments. Discovered resources are further separated into cumulative (i.e., all past) production, and reserves. Reserves are additionally subdivided into proved reserves and "other reserves".

Figure G1. Components of the Oil and Gas Resource Base



Source: Energy Information Administration, Office of Oil and Gas.

Recoverable Resources

Discovered recoverable resources are those economically recoverable quantities of oil and gas for which specific locations are known. While the specific locations of estimated undiscovered recoverable resources are not yet known, they are believed to exist in geologically favorable settings.

Current estimates of undiscovered recoverable resources merit discussion in order to provide a useful sense of scale relative to proved reserves. The sources of official estimates of domestic undiscovered recoverable resources are two agencies of the Department of the Interior (DOI), the United States Geological Survey (USGS) for onshore areas and those offshore waters subject to State jurisdiction, and the Minerals Management Service (MMS) for those offshore waters under Federal jurisdiction.

The USGS defines undiscovered recoverable conventional resources as those expected to be resident in accumulations of sufficient size and quality that they could be produced using conventional recovery technologies, without regard to present economic viability. Therefore, only part of the USGS undiscovered recoverable conventional resource is economically recoverable now. The USGS also defines a class of resources that occur in "continuous–type" accumulations. Unlike conventional oil and gas accumulations, continuous–type accumulations do not occur in discrete reservoirs of limited areal extent. They include accumulations in low–permeability (tight) sandstones, shales, and chalks, and those in coal beds. Again, only part of the continuous–type technically recoverable resource is economically recoverable now. In fact, only a small portion of the in–place continuous–type resource accumulations are estimated to be technically recoverable now. **Table G1** presents a compilation of USGS and MMS estimates.

Technically recoverable resources of dry natural gas (discovered, unproved, and undiscovered) are estimated at 1,431 trillion cubic feet (**Table G1**). Adding the 2004 U.S. proved reserves of 193 trillion cubic feet yields a technically recoverable resource target of 1,624 trillion cubic feet. This is about 85 times the 2004 dry gas production level.

Other organizations have also estimated unproven technically recoverable gas resources. For example, the Potential Gas Committee (PGC), an industry sponsored group, provides detailed geology–based gas resource estimates every 2 years. In 2000 the PGC mean estimate of potential gas resources was 1,091 trillion cubic feet, about 340 trillion cubic feet less than the estimates in **Table G1**. Another recent estimate was made by the National Petroleum Council (NPC), an industry–based group that serves in an advisory capacity to the U.S. Secretary of Energy. The NPC's estimate, based on data available at year–end 1999, was 1,555 trillion cubic feet, 124 trillion cubic feet more than the estimates summarized in **Table G1**. The differences among these estimates are usually due to the availability of newer data, differences in coverage or resource category definitions, and legitimate but differing data interpretations.

While the estimation of undiscovered resources is certainly a more imprecise endeavor than is the estimation of proved reserves, it is clear that substantial volumes of technically recoverable oil and gas resources remain to be found and produced domestically. Current estimates indicate that as much domestic gas remains to be found and then produced as has been to date. Of course, much effort, investment and time will be required to bring this gas to market.

There is a perception that the oil resource base has been more intensively developed than the gas resource base. And in fact, more oil has been produced in the United States than is estimated as remaining recoverable. Nevertheless, the ratio of unproven technically recoverable oil resources to 2004 oil production (**Table G1**) was about 88 to 1, higher than the comparable gas ratio.

Federal Land Resources

Estimates of technically recoverable resources that underlie Federal jurisdiction lands are listed in **Table G1**. These estimates are based on National assessments performed by the USGS and the MMS. It is estimated that 60 percent of the technically recoverable resources of crude oil, 52.4 percent of the dry gas resources, and 34.7 percent of the natural gas liquids resources underlie Federal lands.

Discovered Resources

In addition to cumulative production, which is the sum of current year production and the production in all prior years, estimates of discovered recoverable resources include estimates of reserves. Broadly, reserves are those volumes that are believed to be recoverable in the future from known deposits through the eventual application of present or anticipated technology.

Reserves

Reserves include both **proved reserves** and **other reserves**. Several different reserve classification systems are in use by different organizations, as preferred for operational reasons. These systems utilize and incorporate various definitions of terms such as *measured reserves*, *indicated reserves*, *inferred reserves*,

Table G1. Mean Estimates of Technically Recoverable Oil and Gas Resources by Deposit Type and Location

Area	Jurisdiction	Crude Oil[a] (billion barrels)	Natural Gas (Dry) (trillion cubic feet)	Natural Gas Liquids (billion barrels)
Undiscovered Conventionally Reservoired Fields				
Alaska Onshore + State Offshore	Federal	3.75	33.97	0.54
Alaska Onshore + State Offshore	Other	4.68	95.37	0.61
Alaska Federal Offshore	Federal	24.90	122.60	0.00
Lower 48 States Onshore + State Offshore	Federal	3.79	23.97	1.26
Lower 48 States Onshore + State Offshore	Other	17.83	166.41	5.64
Lower 48 States Federal Offshore	Federal	50.10	239.60	0.00
Alaska Subtotal		33.33	251.94	1.15
Alaska Percentage Federal		86.0%	62.1%	47.0%
Lower 48 States Subtotal		71.72	429.98	6.90
Lower 48 States Percentage Federal		75.1%	61.3%	18.3%
Technically Recoverable Resources in U.S. Undiscovered Conventionally Reservoired Fields		**105.05**	**681.92**	**8.05**
Percentage Federal		**78.6%**	**61.6%**	**22.4%**
Ultimate Recovery Appreciation				
U.S. Onshore + State Offshore	Federal	14.33	118.70	4.94
U.S. Onshore + State Offshore	Other	45.67	203.30	8.46
U.S. Federal Offshore	Federal	7.70	68.00	0.00
Technically Recoverable Resources in U.S. from Ultimate Recovery Appreciation in Discovered Conventionally Reservoired Fields		**67.70**	**390.00**	**13.40**
U.S. Percentage Federal		**32.5%**	**47.9%**	**36.9%**
Continuous Type Deposits				
Non-coal bed	Federal	0.32	127.08	1.45
Non-coal bed	Other	1.75	181.72	0.67
Coal bed	Federal	0.00	16.08	0.00
Coal bed	Other	0.00	33.83	0.00
Non-coal bed Subtotal		2.07	308.80	2.12
Non-coal bed Percentage Federal		15.5%	41.2%	68.4%
Coal bed Subtotal		0.00	49.91	0.00
Coal bed Percentage Federal		0.0%	32.2%	0.0%
Technically Recoverable Resources in U.S. from Continuous Type Deposits		**2.07**	**358.71**	**2.12**
Continuous Type Percentage Federal		**15.5%**	**39.9%**	**68.4%**
U.S. Totals All Sources				
U.S. Onshore + State Offshore	Federal	22.19	319.80	8.19
U.S. Onshore + State Offshore	Other	69.93	680.63	15.38
Federal Offshore	Federal	82.70	430.20	0.00
Federal Subtotal		104.89	750.00	8.19
U.S. Technically Recoverable Resources		**174.82**	**1,430.63**	**23.57**
Percentage Federal		**60.0%**	**52.4%**	**34.7%**

Notes:
Proved Reserves are not included in these estimates.
Federal Onshore excludes Indian and Native lands even when Federally managed in trust.
Zero (0) indicates either that none exists in this area or that no estimate of this resource has been made for this area.

Table G1. Mean Estimates of Technically Recoverable Oil and Gas Resources by Deposit Type and Location (continued)

Notes (continued): Federal Offshore indicates MMS estimates for Federal Offshore jurisdictions (Outer Continental Shelf and deeper water areas seaward of State Offshore).

Probable and Possible reserves are considered by USGS definition to be part of USGS Reserve Growth, but are separately considered by the MMS as its Unproved Reserves term. The USGS did not set a time limit for the duration of Reserve Growth; the MMS set the year 2020 as the time limit in its estimates of Reserve Growth in existing fields of the Gulf of Mexico.

Excluded from the estimates are undiscovered oil resources in tar deposits and oil shales, and undiscovered gas resources in geopressured brines and gas hydrates.

Data Sources: National Oil and Gas Resource Assessment Team, *1996 National Assessment of United States Oil and Gas Resources,* Circular 1118, United States Geological Survey, Washington DC, 1995.

D.L Gautier, G.L. Dolton, and E.D. Atanasi, *1995 National Oil and Gas Assessment and Onshore Federal Lands,* Open File Report 95-75-N, United States Geological Survey, Washington DC, January 1998.

Resource Evaluation Program, *Outer Continental Shelf Petroleum Assessment 2000,* Brochure 7, Minerals Management Service, Washington, DC, January 2001 at <http://www.mms.gov/revaldiv/RedNatAssessment.htm>.

Resource Evaluation Program, *An Assessment of the Undiscovered Hydrocarbon Potential of the Nation's Outer Continental Shelf,* OCS Report MMS 96-0034, Minerals Management Service, Washington, DC, 1996.

Minerals Management Service, *Mineral Revenues 1996,* U.S. Department of the Interior, Washington, DC, 1997, Table 12 on p. 33 and Table 23 on p. 70.

Energy Information Administration, *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves 1996 Annual Report,* Washington, DC, December 1997, Table 15 on p. 39.

Energy Information Administration, *Petroleum Supply Annual 1996,* Washington, DC, June 1997, Volume 1, Table 14 on p. 96.

Energy Information Administration, *Natural Gas Annual 1996,* Washington, DC, September 1997, Table 3 on p. 12.

probable reserves, and *possible reserves*. As used by the different organizations, the definitions that attach to these terms sometimes overlap, or the terms may require a slightly different interpretation from one organization to the next. Nevertheless, all kinds of "other reserves" are generally less well known and therefore less precisely quantifiable than proved reserves, and their eventual recovery is less assured.

Measured reserves are defined by the USGS as that part of the identified (i.e., discovered) economically recoverable resource that is estimated from geologic evidence and supported directly by engineering data.{44} They are similarly defined by the MMS, although its system also subdivides them by degree of development and producing status.{45} Measured reserves are demonstrated with reasonable certainty to be recoverable in future years from known reservoirs under existing economic and operating conditions, and are essentially equivalent to proved reserves as defined by the EIA. Effectively, estimates of proved reserves may be thought of as reasonable estimates (as opposed to exact measures) of "on–the–shelf inventory".

Inferred reserves and indicated reserves, due to their more uncertain economic or technical recoverability, are included in the "other reserves" category. The USGS defines inferred reserves as that part of the identified economically recoverable resource, over and above both measured and indicated (see below) reserves, that will be added to proved reserves in the future through extensions, revisions, and the discovery of new pay zones in already discovered fields.{43} Inferred reserves are considered equivalent to "probable reserves" by many analysts, for example, those of the PGC.

Proved Reserves

The EIA defines proved reserves as those volumes of oil and gas that geological and engineering data demonstrate with reasonable certainty to be recoverable in future years from known reservoirs under existing economic and operating conditions.

When deterministic proved reserves estimation methods are used, the term reasonable certainty is intended to express a high degree of confidence that the estimated quantities will be recovered. When probabilistic methods are used there should be at least a 90 percent probability that the actual quantities recovered will exceed the estimate.

Proved reserves are either proved producing or proved nonproducing (i.e., resident in reservoirs that did not produce during the report year). The latter may represent a substantial fraction of total proved reserves.

Reserve Estimation Methodologies

The adoption of a standard definition of proved reserves for each type of hydrocarbon surveyed by the Form EIA–23 program provided a far more consistent response from operators than if each operator had used their own definition. Such standards, however, do not guarantee that the resulting estimates themselves are determinate. Regardless of the definition selected, proved reserves cannot be measured directly. They are estimated quantities that are inferred on the basis of the best geological, engineering, and economic data available to the estimator, who generally uses considerable judgment in the analysis and interpretation of the data. Consequently, the accuracy of a given estimate varies with and depends on the quality and quantity of raw data available, the estimation method used, and the training and experience of the estimator. The element of judgment commonly accounts for the differences among independent estimates for the same reservoir or field.

Data Used in Making Reserve Estimates

The raw data used in estimating proved reserves include the engineering and geological data for reservoir rock and its fluid content. These data are obtained from direct and indirect measurements. The data available for a given reservoir vary in kind, quality, and quantity. When a reservoir is first discovered only data from a single well are available, and prior to flow testing or actual production, proved reserves can only be inferred. As development of the reservoir proceeds, and flow tests are made or actual production commences, more and more data become available, enabling proved reserves estimates to become more accurate.

Many different kinds of data are useful in making reserves estimates. They may include: data on porosity, permeability, and fluid saturations of the reservoir rocks (obtained directly from core analysis or from various types of electrical measurements taken in a well or several wells); data on the production of fluids from a well or several wells; geologic maps of the areal extent, thickness, and continuity of the reservoir rocks (inferred from well logs, geophysical, and geological data); and reservoir pressure and temperature data. Also involved are economic data including the current price of crude oil and natural gas, and various developmental and operating costs.

Reserve Estimation Techniques

Depending on the kinds and amounts of data available, and a judgment on the reliability of those data, the estimator will select one of several methods of making a proved reserves estimate. Methods based on production performance data are generally more accurate than those based strictly on inference from geological and engineering data. Such methods include the *Production Decline* method (for crude oil or natural gas reservoirs), the *Material Balance* method (for crude oil reservoirs), the *Pressure Decline* method (which is actually a material balance, for natural gas reservoirs), and the *Reservoir Simulation* method (for crude oil or natural gas reservoirs). The reservoir type and production mechanisms and the types and amounts of reliable data available determine which of these methods is more appropriate for a given reservoir. These methods are of comparable accuracy.

Methods not based upon production data include the *Volumetric* method (for crude oil or natural gas reservoirs) and the *Nominal* method. Of these, the *Volumetric* method is the more accurate. Both methods, however, are less accurate than those based on production data. **Table G2** summarizes the various methods.

Table G2. Reserve Estimation Techniques

Method	Comments
Volumetric	Applies to crude oil and natural gas reservoirs. Based on raw engineering and geologic data.
Material Balance	Applies to crude oil and natural gas reservoirs. Is used in estimating reserves. Usually of more value in predicting reserves, and reservoir performance.
Pressure Decline	Applies to nonassociated and associated gas reservoirs. The method is a special case of material balance equation in the absence of water influx.
Production Decline	Applies to crude oil and natural gas reservoirs during production decline (usually in the later stages of reservoir life).
Reservoir Simulation	Applies to crude oil and natural gas reservoirs. Is used in estimating reserves. Usually of more value in predicting reservoir performance. Accuracy increases when matched with past pressure and production data.
Nominal	Applied to crude oil and natural gas reservoirs. Based on rule of thumb or analogy with another reservoir or reservoirs believed to be similar; least accurate of methods used.

Judgmental Factors in Reserve Estimation

The determination of rock and hydrocarbon fluid properties involves judgment and is subject to some uncertainty; however, the construction of the geologic maps and cross sections and the determination of the size of the reservoir are the major judgmental steps in the *Volumetric* method, and are subject to the greatest uncertainty. Estimates made using the *Material Balance* method, the *Reservoir Simulation* method, or the *Pressure Decline* method are based on the estimator's judgment that the type of reservoir drive mechanism has been identified and on the specification of abandonment conditions. Estimates based on the *Production Decline* method are subject to judgment in constructing the trend line, and are based on the estimator's assumption of reservoir performance through abandonment.

Contributing to the degree of uncertainty inherent in the above methods for estimating reserves are other factors associated with economic considerations and the perceived reservoir limits, which together influence the final reserves estimate. A brief discussion of these other factors follows.

Economic considerations: There has been continuing debate about the effects of prices on proved reserves. Although no all–inclusive statement can be made on the impact of price, the points at issue can be discussed and some general remarks can be made about some circumstances where price may be a factor.

- *Developed gas fields* – In a gas reservoir, price affects the economic limit (i.e., the production rate required to meet operating costs) and, therefore, the abandonment pressure. Thus, price change has some effect on the conversion of noneconomic hydrocarbon resources to the category of proved reserves. In both nearly depleted reservoirs and newly developed reservoirs, the actual increase in the quantity of proved reserves resulting from price rises is generally limited in terms of national volumes (even though the percentage increase for a given reservoir may be great).

- *Developed oil fields* – In developed crude oil reservoirs many of the same comments apply; however, there is an additional consideration. If the price is raised to a level sufficient to justify initiation of an improved recovery project, and if the improved recovery technique is effective, then the addition to ultimate recovery from the reservoir can be significant. Because of the speculative nature of predicting prices and costs many years into the future, proved reserves are estimated on the basis of current prices, costs, and operating practices in effect as of the date the estimation was made.

- *Successful exploration efforts* – Price can have a major impact on whether a new discovery is produced or abandoned. For example, the decision to set casing in a new onshore discovery, or to install a platform as the result of an offshore discovery, are both price–sensitive. If the decision is made to set pipe or to install a platform, the discoveries in both cases will add to the proved reserves total. If such projects are abandoned, they will make no contribution to the proved reserves total.

Effect of operating conditions: Operating conditions are subject to change caused by changes in economic conditions, unforeseen production problems, new production practices or methods, and the operator's financial position. As with economic conditions, operating conditions to be expected at the time of abandonment are speculative. Thus, current operating conditions are used in estimating proved reserves. In considering the effect of operating conditions, a distinction must be made between processes and techniques that would normally be applied by a prudent operator in producing his oil and gas, and initiation of changes in operating conditions that would require substantial new investment.

- *Compression* – Compression facilities are normally installed when the productive capacity or deliverability of a natural gas reservoir or its individual wells declines. In other cases compression is used in producing shallow, low–pressure reservoirs or reservoirs in which the pressure has declined to a level too low for the gas to flow into a higher pressure pipeline. The application of compression increases the pressure and, when economical, is used to make production into the higher pressure pipeline possible. Compression facilities normally require a significant investment and result in a change in operating conditions. It increases the proved reserves of a reservoir, and reasonably accurate estimates of the increase can be made.

- *Well stimulation* – Procedures that increase productive capacity (workovers, such as acidizing or fracturing, and other types of production practices) are routine field operations. The procedures accelerate the rate of production from the reservoir, or extend its life, and they have only small effect on proved reserves. Reasonable estimates of their effectiveness can be made.

- *Improved recovery techniques* – These techniques involve the injection of a fluid or fluids into a reservoir to augment natural reservoir energy. Because the response of a given reservoir to the application of an improved recovery technique cannot be accurately predicted, crude oil production that may ultimately result from the application of these techniques is classified as "indicated additional reserves of crude oil" rather than as proved reserves until response of the reservoir to the technique has been demonstrated. In addition, improved recovery methods are not applicable to all crude oil reservoirs. Initiation of improved recovery techniques may require significant investment.

- *Infill drilling* – Infill drilling (drilling of additional wells within a field/reservoir) may result in a higher recovery factor, and, therefore, be economically justified. Predictions of whether infill drilling will be justified under current economic conditions are generally based on the expected production behavior of the infill wells.

Reservoir limits: The initial proved reserves estimate made from the discovery well is subject to significant uncertainty because one well provides little information on the size of the reservoir. The area proved by a discovery well is frequently estimated on the basis of experience in a given producing region. Where there is continuity of the producing formation over wide geographic areas, a relatively large proved area may be assigned. In some cases where reliable geophysical and geological data are available, a reasonable estimate of the extent of the reservoir can be made by drilling a relatively small number of delineation wells. Conversely, a relatively small proved area may be assigned when the producing formation is of limited continuity, owing to either structural or lithological factors.

Additional wells provide more information and reduce the uncertainty of the reserves estimate. As additional wells are drilled, the geometry of the reservoir and, consequently, its bulk volume, become more clearly defined. This process accounts for the large extensions to proved reserves typical of the early stages of most reservoir development.

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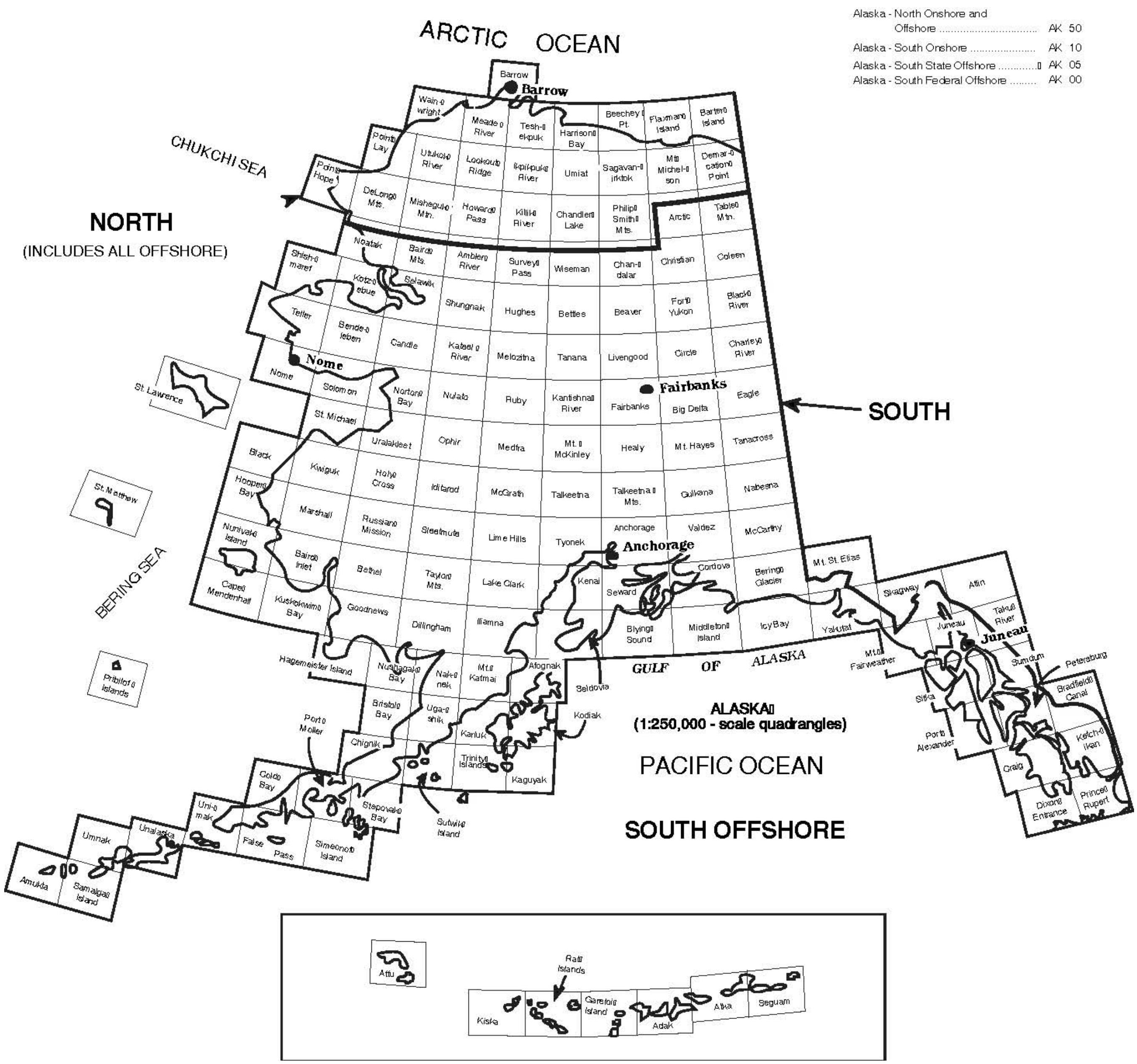
Appendix H

Maps of Selected State Subdivisions

Appendix H

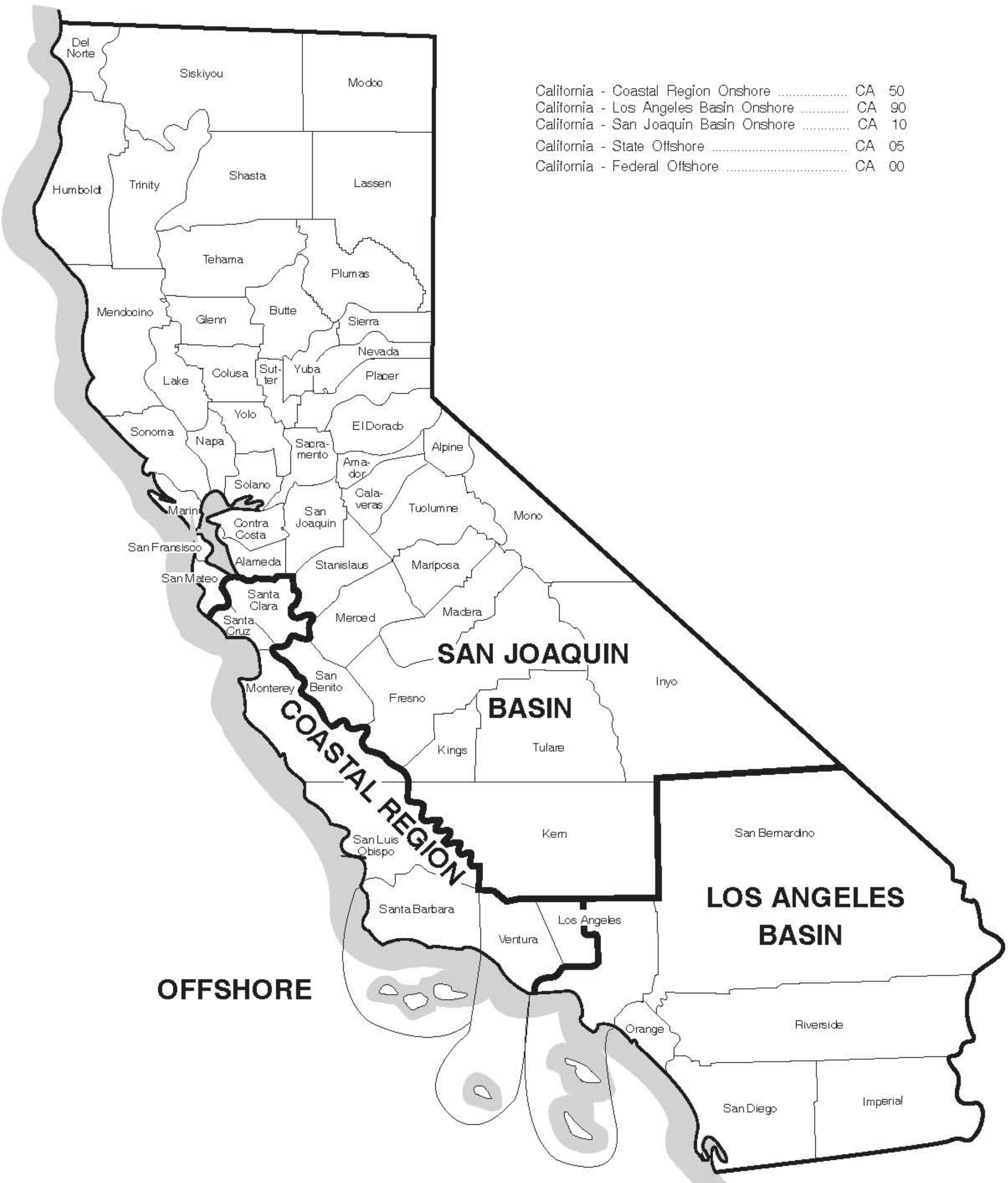
Maps of Selected State Subdivisions

Figure H1. Subdivisions of Alaska



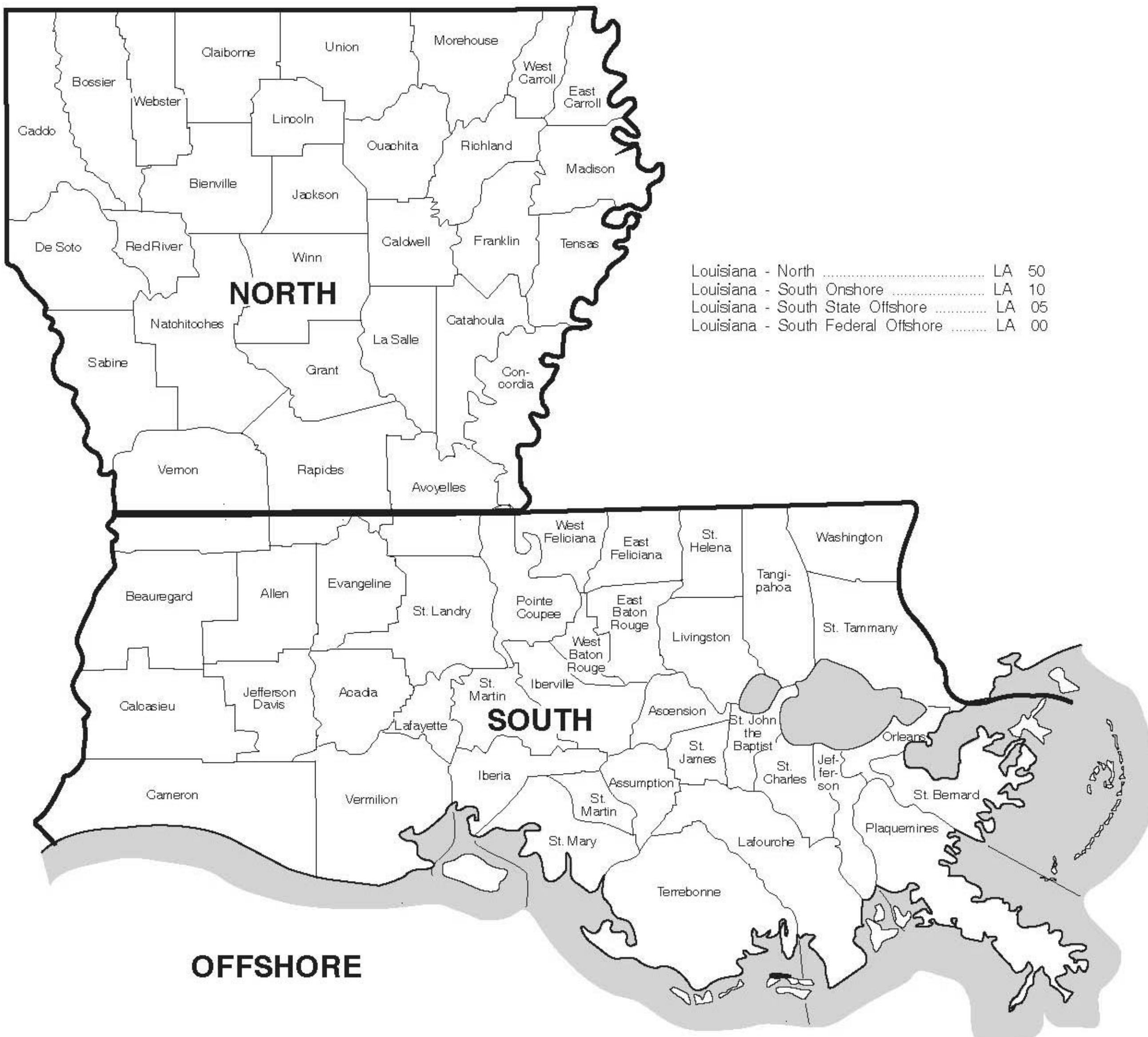
Source: After U.S. Geological Survey.

Figure H2. Subdivisions of California



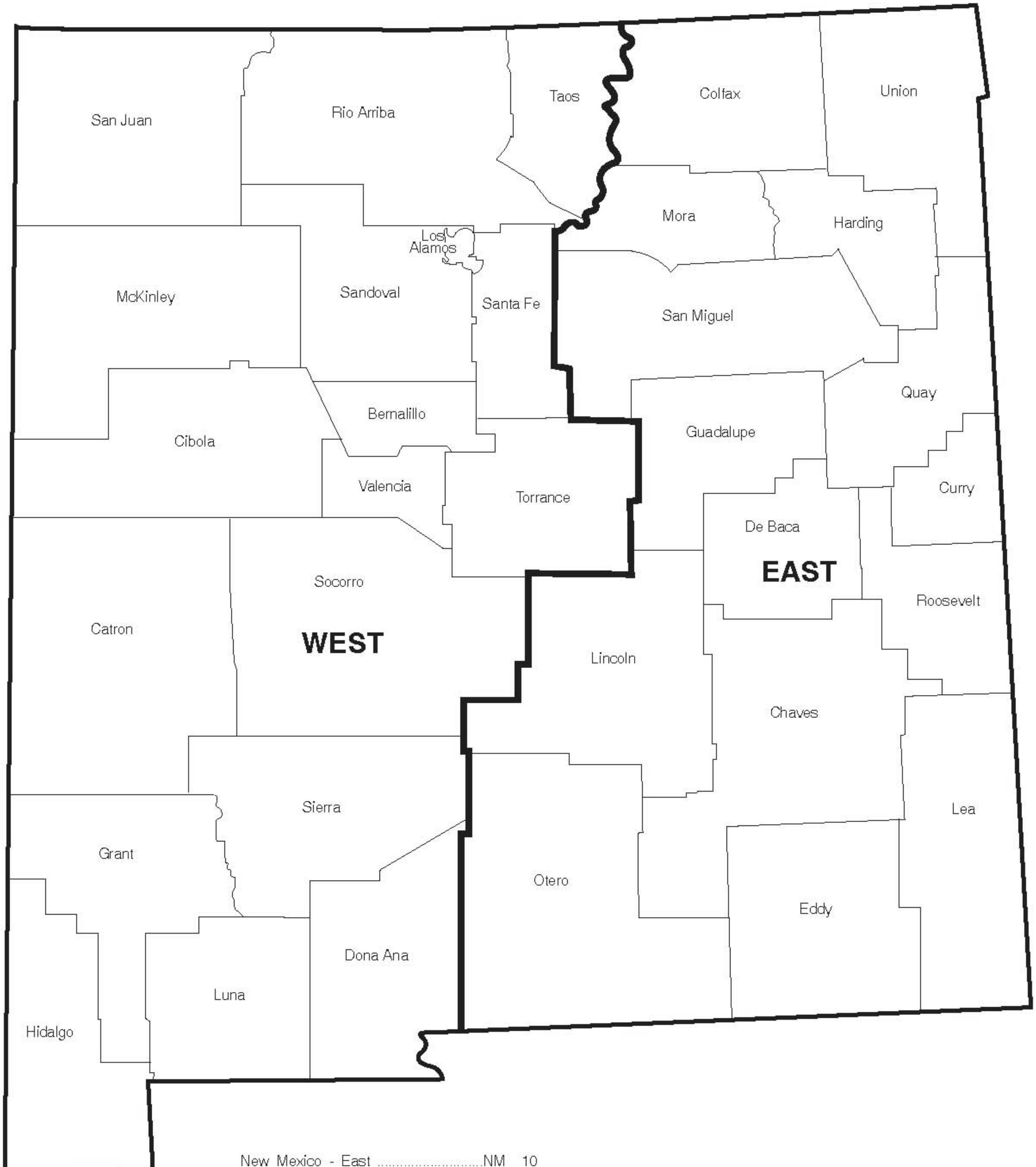
Source: Energy Information Administration, Office of Oil and Gas.

Figure H3. Subdivisions of Louisiana



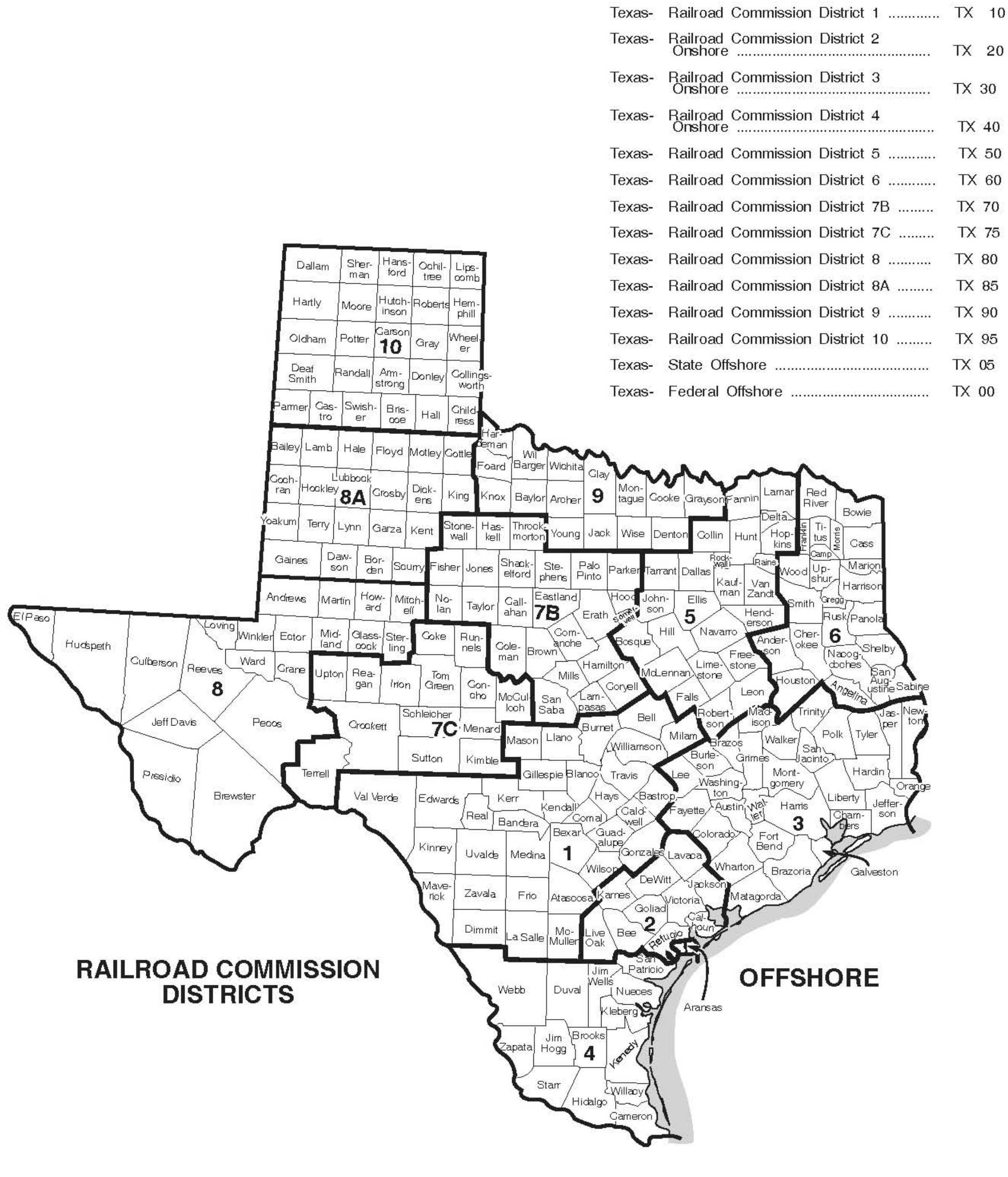
Source: Energy Information Administration, Office of Oil and Gas.

Figure H4. Subdivisions of New Mexico



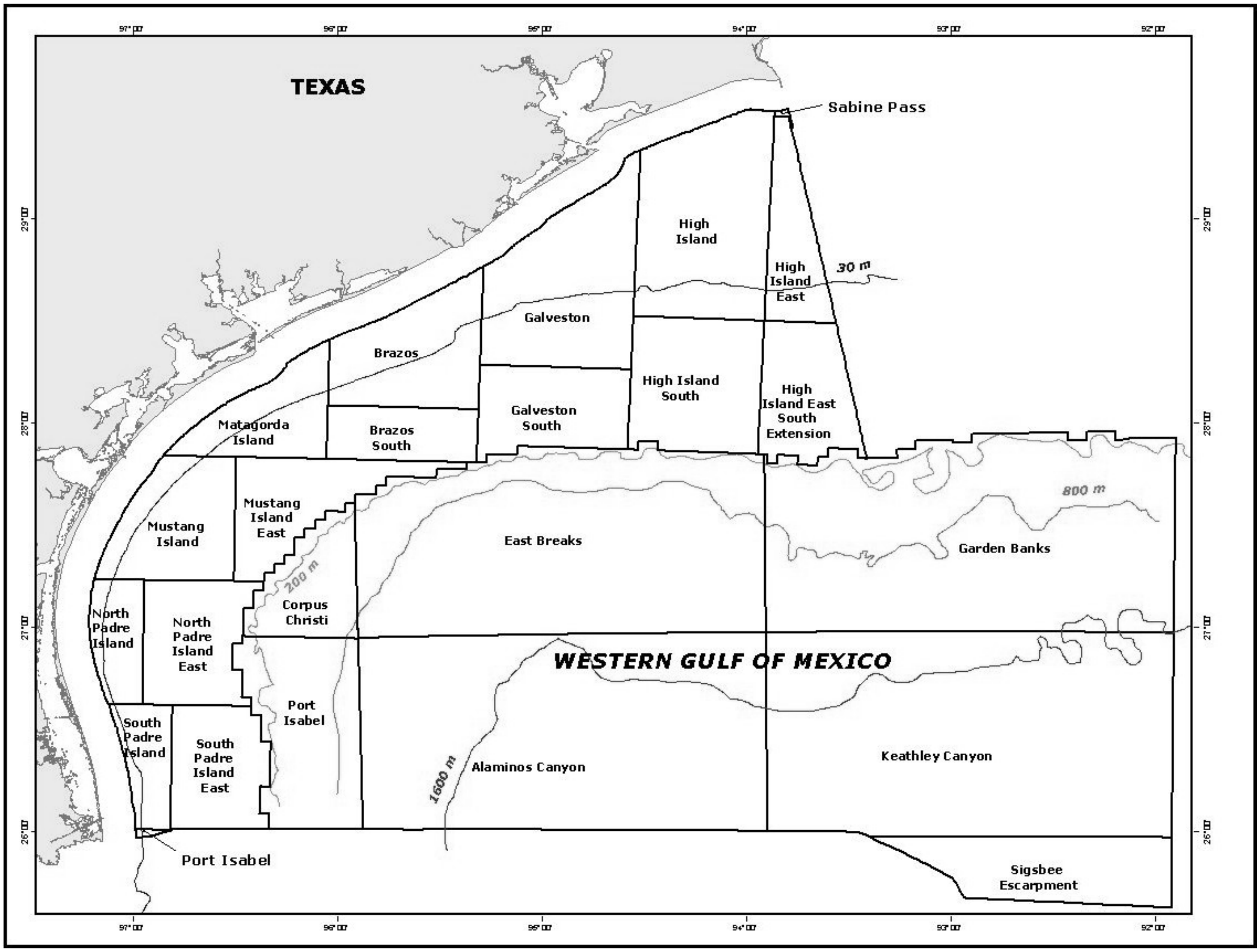
Source: Energy Information Administration, Office of Oil and Gas.

Figure H5. Subdivisions of Texas



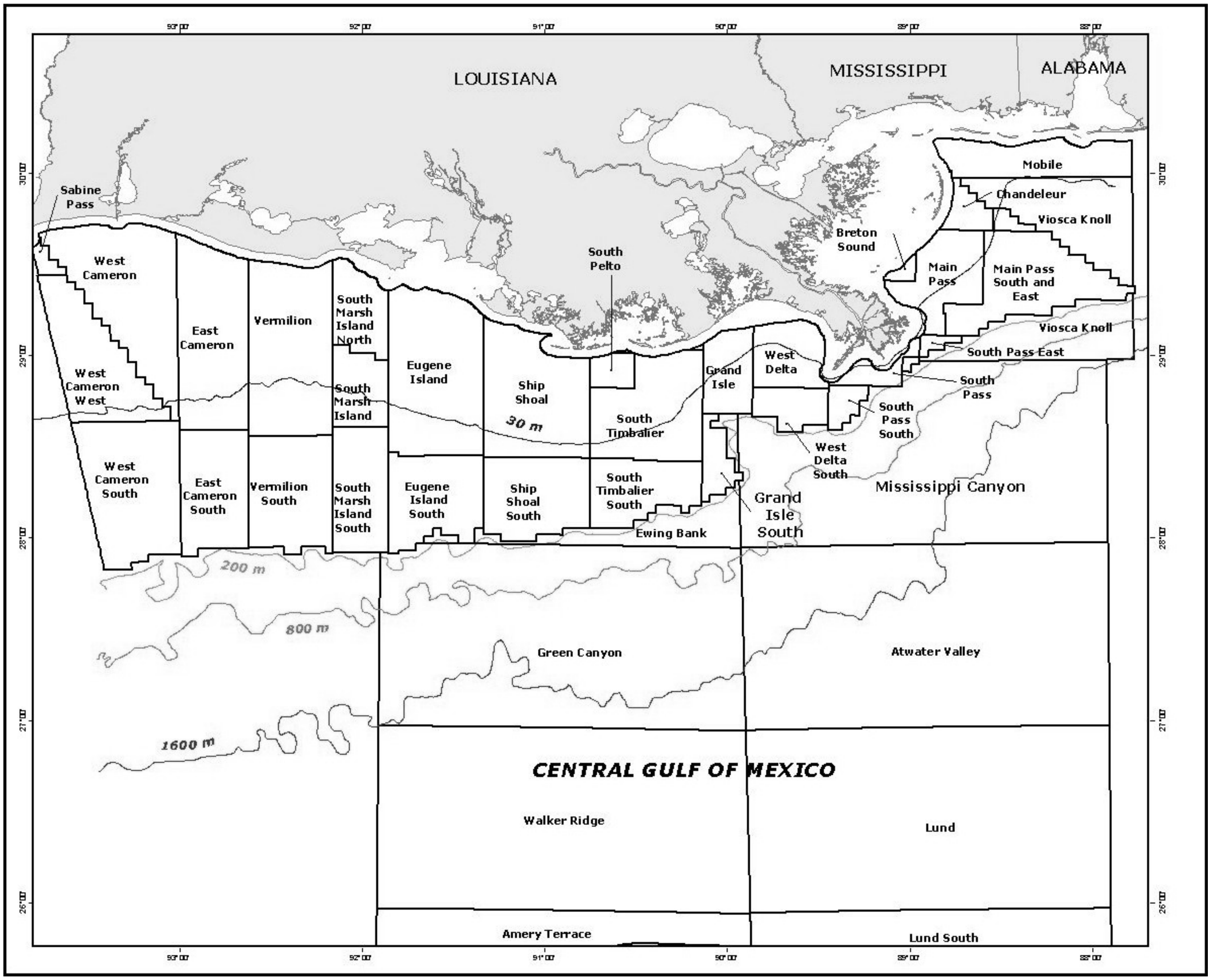
Source: Energy Information Administration, Office of Oil and Gas.

Figure H6. Western Planning Area, Gulf of Mexico Outer Continental Shelf Region



Source: Energy Information Administration, Office of Oil and Gas.

Figure H7. Central Planning Area, Gulf of Mexico Outer Continental Shelf Region



Source: Energy Information Administration, Office of Oil and Gas.

Figure H8. Eastern Planning Area, Gulf of Mexico Outer Continental Shelf Region

Source: Energy Information Administration, Office of Oil and Gas.

Appendix I

Annual Survey Forms for Domestic Oil and Gas Reserves

Figure I1. Form EIA-23, Cover Page

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Energy Information Administration

U.S. DEPARTMENT OF ENERGY
ENERGY INFORMATION ADMINISTRATION
Washington, DC 20585

Form Approved
OMB No. 1905-0057
Expiration Date: 12/31/06
(Revised 2003)

FORM EIA-23L
ANNUAL SURVEY OF DOMESTIC OIL AND GAS RESERVES
REPORT YEAR 2 0 0 4

This report is mandatory under the Federal Energy Administration Act of 1974 (Public Law 93-275). For the provisions concerning the confidentiality of information and sanction statements, see Section VII and VIII of the instructions.

Resubmission?

PART I. IDENTIFICATION

Complete and return by April 1, 2005 to:

Energy Information Administration
U.S. Department of Energy
P O Box 8279
Silver Spring, MD 20907-8279
Attn: Form EIA-23
OR
Fax to: (202) 586-1076/ATTN: FORM EIA-23

Questions? Call 1-800-879-1470

Enter mailing address and EIA ID number, if not shown

EIA Identification Number: _ _ _ _ _ _ 0 0 0 0

Company Name:

Street or P.O Box:

City, State, Zip Code:

1. Contact Information ***(person most knowledgeable about the reported data)***

Contact Person: ____________________

Phone Number: ( ) - Ext.______

Fax Number: ( ) -__________

E-mail Address: ____________________

2. Was your company an oil and gas field operator at any time during calendar year 2004? ***(See definition of an operator, page 1)***

(1) ☐ No... *Complete only items 3 through 14 below and return this page.*

(2) ☐ Yes... *Complete rest of form.*

3. Company Status, Name, and/or Address Change or Correction. (Check appropriate box.)

☐ Name and address on mailing label are correct.

☐ Change company name, contact person, and/or mailing address as indicated below.

☐ Company was sold to or merged with company entered below.

☐ Company went out of business. Operations transferred to company entered below..

4. Change Company Name, Address, and/or Contact Information to:

Company Name:

Street or P. O. Box:

City, State, Zip Code:

Contact Person (*Please Print*):

Phone Number: ( ) - Ext. | Fax Number: ( ) - | E-Mail Address:

Comments:

SAMPLE

PART II. PARENT COMPANY IDENTIFICATION

5. Is there a parent company that exercises ultimate control over your company?

(1) ☐ No... Answer 11 through 14.

(2) ☐ Yes... Answer 6 through 14.

6. Parent Company Name

7. Street or P.O. Box

8. City | **9.** State | **10.** Zip Code

PART III. APPROVAL

11. Reviewed and approved by: (*Please Print*) | **12.** Title

13. Signature | **14.** Date

Title 18 USC 1001 makes it a criminal offense for any person knowingly and willingly to make to any Agency or Department of the United States any false, fictitious, or fraudulent statements as to any matter within its jurisdiction.

Source: Energy Information Administration, Offfice of Oil and Gas.

Figure I2. Form EIA-23, Summary Report – Page 1

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2004

FORM EIA-23S

ANNUAL SURVEY OF DOMESTIC OIL AND GAS RESERVES

SUMMARY REPORT

PAGE 1 OF 2

Form Approved
OMB No. 1905-0057
Expiration Date: 12/31/06
(Revised 2003)

Report All Volumes of Crude Oil and Lease Condensate in Thousands of Barrels [MBbls] at 60°F
Report All Volumes of Natural Gas in Millions of Cubic Feet [MMCF] at 14.73 psia and 60°F

1.0 OPERATOR AND REPORT IDENTIFICATION DATA

1.1 OPERATOR EIA ID CODE	1.2 OPERATOR NAME	REPORT DATE	1.3 ORIGINAL	1.4 RESUBMISSION
		12 31 04		

2.0 PRODUCTION AND RESERVES DATA

STATE OR GEOGRAPHIC SUBDIVISION		CRUDE OIL RESERVES	CRUDE OIL 2004 PRODUCTION		NATURAL GAS RESERVES	NATURAL GAS 2004 PRODUCTION		LEASE CONDENSATE RESERVES	LEASE CONDENSATE 2004 PRODUCTION	
		Proved Reserves Dec. 31, 2004 (MBbls) (A)	(From properties for which reserves were Estimated) (MBbls) (B)	(From properties for which reserves were Not Estimated) (MBbls) (C)	Proved Reserves Dec. 31, 2004 (MMCF) (D)	(From properties for which reserves were Estimated) (MMCF) (E)	(From properties for which reserves were Not Estimated (MMCF) (F)	Proved Reserves Dec. 31, 2004 (MBbls) (G)	(From properties for which reserves were Estimated) (MBbls) (H)	(From properties for which reserves were Not Estimated) (MBbls) (I)
ALABAMA-ONSHORE	AL									
ALABAMA-STATE OFFSHORE	AL05									
ALASKA-NORTH ONSHORE AND OFFSHORE	AK50									
ALASKA-SOUTH ONSHORE	AK10									
ALASKA-SOUTH STATE OFFSHORE	AK05									
ARIZONA	AZ									
ARKANSAS	AR									
CALIFORNIA-COASTAL REGION ONSHORE	CA50									
CALIFORNIA-LOS ANGELES BASIN ONSHORE	CA90									
CALIFORNIA-SAN JOAQUIN BASIN ONSHORE	CA10									
CALIFORNIA-STATE OFFSHORE	CA05									
COLORADO	CO									
FLORIDA-ONSHORE	FL									
FLORIDA-STATE OFFSHORE	FL05									
ILLINOIS	IL									
INDIANA	IN									
KANSAS	KS									
KENTUCKY	KY									
LOUISIANA-NORTH	LA50									
LOUISIANA-SOUTH ONSHORE	LA10									
LOUISIANA-STATE OFFSHORE	LA05									
MARYLAND	MD									
MICHIGAN	MI									
MISSISSIPPI-ONSHORE	MS									
MISSISSIPPI-STATE OFFSHORE	MS05									
MISSOURI	MO									
MONTANA	MT									
NEBRASKA	NE									
NEVADA	NV									
NEW MEXICO-EAST	NM10									
NEW MEXICO-WEST	NM50									
NEW YORK	NY									
NORTH DAKOTA	ND									
OHIO	OH									

SAMPLE

Source: Energy Information Administration, Offfice of Oil and Gas.

Figure I3. Form EIA-23, Summary Report – Page 2

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2004

FORM EIA-23S
ANNUAL SURVEY OF DOMESTIC OIL AND GAS RESERVES
SUMMARY REPORT
PAGE 2 OF 2

Form Approved
OMB No. 1905-0057
Expiration Date: 12/31/06
(Revised 2003)

Report All Volumes of Crude Oil and Lease Condensate in Thousands of Barrels [MBbls] at 60°F
Report All Volumes of Natural Gas in Millions of Cubic Feet [MMCF] at 14.73 psia and 60°F

1.0 OPERATOR AND REPORT IDENTIFICATION DATA

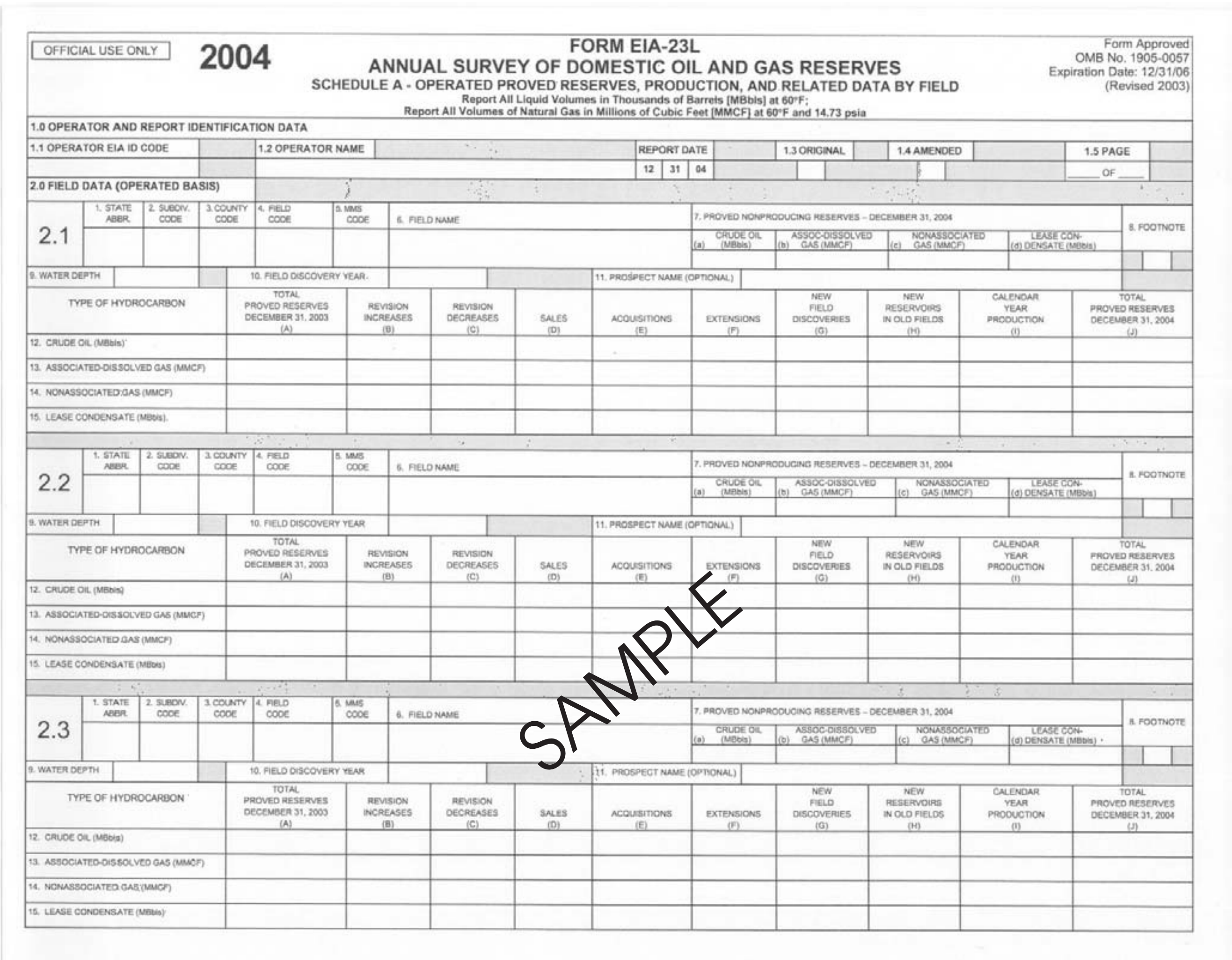
1.1 OPERATOR I.D. CODE	1.2 OPERATOR NAME	REPORT DATE			1.3 ORIGINAL	1.4 AMENDED
		12	31	04		

2.0 PRODUCTION AND RESERVES DATA

STATE OR GEOGRAPHIC SUBDIVISION		CRUDE OIL			NATURAL GAS			LEASE CONDENSATE		
		RESERVES	2004 PRODUCTION		RESERVES	2004 PRODUCTION		RESERVES	2004 PRODUCTION	
		Proved Reserves Dec. 31, 2004 (MBbls) (A)	(From properties for which reserves were Estimated) (MBbls) (B)	(From properties for which reserves were Not Estimated) (MBbls) (C)	Proved Reserves Dec. 31, 2004 (MMCF) (D)	(From properties for which reserves were Estimated) (MMCF) (E)	(From properties for which reserves were Not Estimated (MMCF) (F)	Proved Reserves Dec. 31, 2004 (MBbls) (G)	(From properties for which reserves were Estimated) (MBbls) (H)	(From properties for which reserves were Not Estimated) (MBbls) (I)
OKLAHOMA	OK									
PENNSYLVANIA	PA.									
SOUTH DAKOTA	SD									
TENNESSEE	TN									
TEXAS-RRC DISTRICT 1	TX10									
TEXAS-RRC DISTRICT 2 ONSHORE	TX20									
TEXAS-RRC DISTRICT 3 ONSHORE	TX30									
TEXAS-RRC DISTRICT 4-ONSHORE	TX40									
TEXAS-RRC DISTRICT 5	TX50									
TEXAS-RRC DISTRICT 6	TX60									
TEXAS-RRC DISTRICT 7B	TX70									
TEXAS-RRC DISTRICT 7C	TX75									
TEXAS-RRC DISTRICT 8	TX80									
TEXAS-RRC DISTRICT 8A	TX85									
TEXAS-RRC DISTRICT 9	TX90									
TEXAS-RRC DISTRICT 10	TX95									
TEXAS-STATE OFFSHORE	TX05									
UTAH	UT									
VIRGINIA	VA									
WEST VIRGINIA	WV									
WYOMING	WY									
FEDERAL OFFSHORE-GULF OF MEXICO (ALABAMA)	AL00									
FEDERAL OFFSHORE-GULF OF MEXICO (FLORIDA)	FL00									
FEDERAL OFFSHORE-GULF OF MEXICO (LOUISIANA)	LA00									
FEDERAL OFFSHORE-GULF OF MEXICO (MISSISSIPPI)	MS00									
FEDERAL OFFSHORE-GULF OF MEXICO (TEXAS)	TX00									
FEDERAL OFFSHORE-PACIFIC (ALASKA)	AK00									
FEDERAL OFFSHORE-PACIFIC (CALIFORNIA)	CA00									
FEDERAL OFFSHORE-PACIFIC (OREGON)	OR00									
OTHER STATE (SPECIFY)										
TOTAL (SUM EACH COLUMN)	US									

Source: Energy Information Administration, Offfice of Oil and Gas.

Figure I4. Form EIA-23, Detail Report – Schedule A



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FORM EIA-23L
ANNUAL SURVEY OF DOMESTIC OIL AND GAS RESERVES
SCHEDULE A - OPERATED PROVED RESERVES, PRODUCTION, AND RELATED DATA BY FIELD
Report All Liquid Volumes in Thousands of Barrels [MBbls] at 60°F;
Report All Volumes of Natural Gas in Millions of Cubic Feet [MMCF] at 60°F and 14.73 psia

Form Approved
OMB No. 1905-0057
Expiration Date: 12/31/06
(Revised 2003)

1.0 OPERATOR AND REPORT IDENTIFICATION DATA

1.1 OPERATOR EIA ID CODE	1.2 OPERATOR NAME	REPORT DATE	1.3 ORIGINAL	1.4 AMENDED	1.5 PAGE
		12 31 04			___ OF ___

2.0 FIELD DATA (OPERATED BASIS)

2.1

1. STATE ABBR.	2. SUBDIV. CODE	3. COUNTY CODE	4. FIELD CODE	5. MMS CODE	6. FIELD NAME	7. PROVED NONPRODUCING RESERVES – DECEMBER 31, 2004: (a) CRUDE OIL (MBbls)	(b) ASSOC-DISSOLVED GAS (MMCF)	(c) NONASSOCIATED GAS (MMCF)	(d) LEASE CONDENSATE (MBbls)	8. FOOTNOTE

9. WATER DEPTH | 10. FIELD DISCOVERY YEAR | 11. PROSPECT NAME (OPTIONAL)

TYPE OF HYDROCARBON	TOTAL PROVED RESERVES DECEMBER 31, 2003 (A)	REVISION INCREASES (B)	REVISION DECREASES (C)	SALES (D)	ACQUISITIONS (E)	EXTENSIONS (F)	NEW FIELD DISCOVERIES (G)	NEW RESERVOIRS IN OLD FIELDS (H)	CALENDAR YEAR PRODUCTION (I)	TOTAL PROVED RESERVES DECEMBER 31, 2004 (J)
12. CRUDE OIL (MBbls)										
13. ASSOCIATED-DISSOLVED GAS (MMCF)										
14. NONASSOCIATED GAS (MMCF)										
15. LEASE CONDENSATE (MBbls)										

2.2

1. STATE ABBR.	2. SUBDIV. CODE	3. COUNTY CODE	4. FIELD CODE	5. MMS CODE	6. FIELD NAME	7. PROVED NONPRODUCING RESERVES – DECEMBER 31, 2004: (a) CRUDE OIL (MBbls)	(b) ASSOC-DISSOLVED GAS (MMCF)	(c) NONASSOCIATED GAS (MMCF)	(d) LEASE CONDENSATE (MBbls)	8. FOOTNOTE

9. WATER DEPTH | 10. FIELD DISCOVERY YEAR | 11. PROSPECT NAME (OPTIONAL)

TYPE OF HYDROCARBON	TOTAL PROVED RESERVES DECEMBER 31, 2003 (A)	REVISION INCREASES (B)	REVISION DECREASES (C)	SALES (D)	ACQUISITIONS (E)	EXTENSIONS (F)	NEW FIELD DISCOVERIES (G)	NEW RESERVOIRS IN OLD FIELDS (H)	CALENDAR YEAR PRODUCTION (I)	TOTAL PROVED RESERVES DECEMBER 31, 2004 (J)
12. CRUDE OIL (MBbls)										
13. ASSOCIATED-DISSOLVED GAS (MMCF)										
14. NONASSOCIATED GAS (MMCF)										
15. LEASE CONDENSATE (MBbls)										

2.3

1. STATE ABBR.	2. SUBDIV. CODE	3. COUNTY CODE	4. FIELD CODE	5. MMS CODE	6. FIELD NAME	7. PROVED NONPRODUCING RESERVES – DECEMBER 31, 2004: (a) CRUDE OIL (MBbls)	(b) ASSOC-DISSOLVED GAS (MMCF)	(c) NONASSOCIATED GAS (MMCF)	(d) LEASE CONDENSATE (MBbls)	8. FOOTNOTE

9. WATER DEPTH | 10. FIELD DISCOVERY YEAR | 11. PROSPECT NAME (OPTIONAL)

TYPE OF HYDROCARBON	TOTAL PROVED RESERVES DECEMBER 31, 2003 (A)	REVISION INCREASES (B)	REVISION DECREASES (C)	SALES (D)	ACQUISITIONS (E)	EXTENSIONS (F)	NEW FIELD DISCOVERIES (G)	NEW RESERVOIRS IN OLD FIELDS (H)	CALENDAR YEAR PRODUCTION (I)	TOTAL PROVED RESERVES DECEMBER 31, 2004 (J)
12. CRUDE OIL (MBbls)										
13. ASSOCIATED-DISSOLVED GAS (MMCF)										
14. NONASSOCIATED GAS (MMCF)										
15. LEASE CONDENSATE (MBbls)										

SAMPLE

Source: Energy Information Administration, Offfice of Oil and Gas.

Figure I5. Form EIA-23, Detail Report – Schedule B

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FORM EIA-23L
ANNUAL SURVEY OF DOMESTIC OIL AND GAS RESERVES
SCHEDULE B – FOOTNOTES

Form Approved
OMB No. 1905-0057
Expiration Date:12/31/06
(Revised 2003)

1.1 OPERATOR EIA ID CODE	1.2 OPERATOR NAME	REPORT DATE	1.3 ORIGINAL	1.4 AMENDED	1.5 PAGE
		12 / 31 / 04			

STATE ABBR. (a)	SUBDIV. CODE (b)	COUNTY CODE (c)	FIELD CODE (d)	MMS CODE (e)	HYDRO-CARBON TYPE (f)	COLUMN (g)	FOOTNOTES (h)

SAMPLE

Source: Energy Information Administration, Offfice of Oil and Gas.

Figure I6. Form EIA-64A

www.eia.doe.gov
eia Energy Information Administration

U.S. DEPARTMENT OF ENERGY
ENERGY INFORMATION ADMINISTRATION
Washington, DC 20585

Form Approved
OMB No. 1905-0057
Expiration Date: 12/31/06

ANNUAL REPORT OF THE ORIGIN OF NATURAL GAS LIQUIDS PRODUCTION
FORM EIA-64A
CALENDAR YEAR 2004

This report is mandatory under Public Law 93-275. Failure to comply may result in criminal fines, civil penalties and other sanctions as provided by law. For the sanctions and the provisions concerning the confidentiality of information submitted on this form, see Page 2 of the Instructions.

Complete and return by April 1, 2005 to:

Energy Information Administration
P O Box 8279
Silver Spring, MD 20907-8279
Attn: EIA-64A
OR
Fax to (202) 586-1076 (Attn: EIA-64A)

Questions ?: Call 1-800-879-1470

Affix Mailing Label

PART I. PLANT AND PRODUCTION REPORT IDENTIFICATION

1.0 Does this report reflect active natural gas processing at the facility for the entire year? ☐ Yes ☐ No (indicate number of months below)

Months covered by this report ____________ through ____________, 2004 (Include Explanatory Notes in Section 7.0)

2.0 Submission Status ☐ Original ☐ Amended

3.0 Label Information **(If label is incorrect or information is missing or no label is given, enter correct information below).**

3.1 Parent Company's Name

3.2 Operator's Name

3.3 Plant Name

3.4 Geographic Location (Use Area of Origin Codes, Page 6) ☐☐☐☐

3.5 Operator's Street Address/PO Box

3.6 City | 3.7 State | 3.8 Zip Code

3.9 Contact Name | 3.10 Title | 3.11 Date

3.12 Telephone Number ( ) Ext | 3.13 Fax Number | 3.14 E-mail Address:

PART II. ORIGIN OF NATURAL GAS RECEIVED AND NATURAL GAS LIQUIDS PRODUCED

Line	Area of Origin Code (A)	Natural Gas Received Report in millions of cubic feet (MMCF) (B)	Natural Gas Liquids Production Report in thousands of barrels (MBbl) (C)
4.1			
4.2			
4.3			
4.4			
4.5			
4.6			
4.7			
4.8	**TOTAL**		

5.0 Gas Shrinkage Resulting from Natural Gas Liquids Extracted (MMCF):

6.0 Natural Gas Used as Fuel in Processing (MMCF):

7.0 Explanatory Notes:

Title 18 USC 1001 makes it a criminal offense for any person knowingly and willingly to make to any Agency or Department of the United States any false, fictitious, or fraudulent statements as to any matter within its jurisdiction.

SAMPLE

Source: Energy Information Administration, Offfice of Oil and Gas.

Glossary

Glossary

This glossary contains definitions of the technical terms used in this report and employed by respondents in completing Form EIA--23, “Annual Survey of Domestic Oil and Gas Reserves,” or Form EIA--64A, “Annual Report of the Origin of Natural Gas Liquids Production,” for the report year 2001.

Acquisitions: The volume of proved reserves gained by the purchase of an existing fields or properties, from the date of purchase or transfer.

Adjustments: The quantity which preserves an exact annual reserves balance within each State or State subdivision of the following form:

Published Proved Reserves at End of Previous Report Year
+ Adjustments
+ Revision Increases
− Revision Decreases
− Sales
+ Acquisitions
+ Extensions
+ New Field Discoveries
+ New Reservoir Discoveries in Old Fields
− Report Year Production
= Published Proved Reserves at End of Report Year

These adjustments are the yearly changes in the published reserve estimates that cannot be attributed to the estimates for other reserve change categories because of the survey and statistical estimation methods employed. For example, variations as a result of changes in the operator frame, different random samples or imputations for missing or unreported reserve changes, could contribute to adjustments.

Affiliated (**Associated**) **Company:** An “affiliate” of, or a person “affiliated” with, a specific person is a person that directly, or indirectly through one or more intermediaries: controls; or is controlled by; or is under common control with, the person specified. (See **Person and Control**)

Control: The term “control” (including the terms “controlling,” “controlled by,” and “under common control with”) means the possession, direct or indirect, of the power to direct or cause the direction of the management and policies of a person, whether through the ownership of voting shares, by contract, or otherwise. (See **Person**)

Corrections: (See **Revisions**)

Crude Oil: A mixture of hydrocarbons that exists in the liquid phase in natural underground reservoirs and remains liquid at atmospheric pressure after passing through surface separating facilities. Crude oil may also include:

1. Small amounts of hydrocarbons that exist in the gaseous phase in natural underground reservoirs but are liquid at atmospheric pressure after being recovered from oil well (casinghead) gas in lease separators, and that subsequently are comingled with the crude stream without being separately measured
2. Small amounts of nonhydrocarbons produced with the oil.

When a State regulatory agency specifies a definition of crude oil which differs from that set forth above, the State definition is to be followed and its use footnoted on Schedule B of Form EIA--23.

Extensions: The reserves credited to a reservoir because of enlargement of its proved area. Normally the ultimate size of newly discovered fields, or newly discovered reservoirs in old fields, is determined by wells drilled in years subsequent to discovery. When such wells add to the proved area of a previously discovered reservoir, the increase in proved reserves is classified as an extension.

Field: An area consisting of a single reservoir or multiple reservoirs all grouped on, or related to, the same individual geological structural feature and/or stratigraphic condition. There may be two or more reservoirs in a field that are separated vertically by intervening impervious strata, or laterally by local geologic barriers, or by both.

Field Area: A geographic area encompassing two or more pools that have a common gathering and metering system, the reserves of which are reported as a single unit. This concept applies primarily to the Appalachian region. (See **Pool**)

Field Discovery Year: The calendar year in which a field was first recognized as containing economically recoverable accumulations of oil and/or gas.

Field Separation Facility: A surface installation designed to recover lease condensate from a produced natural gas stream frequently originating from more than one lease, and managed by the operator of one or more of these leases. (See **Lease Condensate**)

Gross Working Interest Ownership Basis: Gross working interest ownership is the respondent's working interest in a given property plus the proportionate share of any royalty interest, including overriding royalty interest, associated with the working interest. (See **Working Interest** and **Royalty** (including **Overriding Royalty**) **Interest**)

Indicated Additional Reserves of Crude Oil: Quantities of crude oil (other than proved reserves) which may become economically recoverable from existing productive reservoirs through the application of improved recovery techniques using current technology. These recovery techniques may:

1. Already be installed in the reservoir, but their effects are not yet known to the degree necessary to classify the additional reserves as proved
2. Be installed in another similar reservoir, where the results of that installation can be used to estimate the indicated additional reserves.

Indicated additional reserves are not included in proved reserves due to their uncertain economic recoverability. When economic recoverability is demonstrated, the indicated additional reserves must be transferred to proved reserves as positive revisions.

Lease Condensate: A mixture consisting primarily of pentanes and heavier hydrocarbons which is recovered as a liquid from natural gas in lease or field separation facilities, exclusive of products recovered at natural gas processing plants or facilities.

Lease Separator: A lease separator is a facility installed at the surface for the purpose of (a) separating gases from produced crude oil and water at the temperature and pressure conditions of the separator, and/or (b) separating gases from that portion of the produced natural gas stream which liquefies at the temperature and pressure conditions of the separator.

Natural Gas: A mixture of hydrocarbon compounds and small quantities of various nonhydrocarbons existing in the gaseous phase or in solution with crude oil in natural underground reservoirs at reservoir conditions. The principal hydrocarbons normally contained in the mixture are methane, ethane, propane, butane, and pentanes. Typical nonhydrocarbon gases which may be present in reservoir natural gas are water vapor, carbon dioxide, helium, hydrogen sulfide, and nitrogen. Under reservoir conditions, natural gas and the liquefiable portions occur either in a single gaseous phase in the reservoir or in solution with crude oil, and are not distinguishable at the time as separate substances. (See **Natural Gas, Associated--Dissolved** and **Natural Gas, Nonassociated**)

Natural Gas, Associated--Dissolved: The combined volume of natural gas which occurs in crude oil reservoirs either as free gas (associated) or as gas in solution with crude oil (dissolved).

Natural Gas, "Dry": The actual or calculated volumes of natural gas which remain after:

1. The liquefiable hydrocarbon portion has been removed from the gas stream (i.e., gas after lease, field, and/or plant separation)
2. Any volumes of nonhydrocarbon gases have been removed where they occur in sufficient quantity to render the gas unmarketable.

Natural Gas, Nonassociated: Natural gas not in contact with significant quantities of crude oil in a reservoir.

Natural Gas Liquids: Those hydrocarbons in natural gas which are separated from the gas through the processes of absorption, condensation, adsorption, or other methods in gas processing or cycling plants. Generally such liquids consist of propane and heavier hydrocarbons and are commonly referred to as condensate, natural gasoline, or liquefied petroleum gases. Where hydrocarbon components lighter than propane are recovered as liquids, these components are included with natural gas liquids.

Natural Gas Processing Plant: A facility designed to recover natural gas liquids from a stream of natural gas which may or may not have passed through lease separators and/or field separation facilities. Another function of the facility is to control the quality of the processed natural gas stream. Cycling plants are considered natural gas processing plants.

Natural Gas, Wet After Lease Separation: The volume of natural gas remaining after removal of lease condensate in lease and/or field separation facilities, if any, and after exclusion of nonhydrocarbon gases where they occur in sufficient quantity to render the gas unmarketable. Natural gas liquids may be recovered from volumes of natural gas, wet after lease separation, at natural gas processing plants. (See **Lease Condensate, Lease Separator,** and **Field Separation Facility**)

Net Revisions: (See **Revisions**)

New Field: A field discovered during the report year.

New Field Discoveries: The volumes of proved reserves of crude oil, natural gas and/or natural gas liquids discovered in new fields during the report year.

New Reservoir: A reservoir discovered during the report year.

New Reservoir Discoveries in Old Fields: The volumes of proved reserves of crude oil, natural gas, and/or natural gas liquids discovered during the report year in new reservoir(s) located in old fields.

Nonproducing Reserves: Quantities of proved liquid or gaseous hydrocarbon reserves that have been identified, but which did not produce during the last calendar year regardless of the availability and/or operation of production, gathering or transportation facilities. This includes both proved undeveloped and proved developed non-producing reserves.

Old Field: A field discovered prior to the report year.

Old Reservoir: A reservoir discovered prior to the report year.

Operator, Gas Plant: The person responsible for the management and day--to--day operation of one or more natural gas processing plants as of December 31 of the report year. The operator is generally a working interest owner or a company under contract to the working interest owner(s). Plants shut down during the report year are also to be considered "operated" as of December 31. (See **Person**)

Operator, Oil and/or Gas Well: The person responsible for the management and day--to--day operation of one or more crude oil and/or natural gas wells as of December 31 of the report year. The operator is generally a working interest owner or a company under contract to the working interest owner(s). Wells included are those which have proved reserves of crude oil, natural gas, and/or lease condensate in the reservoirs associated with them, whether or not they are producing. Wells abandoned during the report year are also to be considered "operated" as of December 31. (See **Person**, **Proved Reserves of Crude Oil**, **Proved Reserves of Natural Gas**, **Proved Reserves of Lease Condensate**, **Report Year**, and **Reservoir**)

Ownership: (See **Gross Working Interest Ownershi p Basis**)

Parent Company: The parent company of a business entity is an affiliated company which exercises ultimate control over that entity, either directly or indirectly through one or more intermediaries. (See **Affiliated** (**Associated**) **Company and Control**)

Person: An individual, a corporation, a partnership, an association, a joint--stock company, a business trust, or an unincorporated organization.

Pool: In general, a reservoir. In certain situations a pool may consist of more than one reservoir. (See **Field Area**)

Plant Liquids: Those volumes of natural gas liquids recovered in natural gas processing plants.

Production, Crude Oil: The volumes of crude oil which are extracted from oil reservoirs during the report year. These volumes are determined through measurement of the volumes delivered from lease storage tanks, (i.e., at the point of custody transfer) with adjustment for (1) net differences between opening and closing lease inventories, and for (2) basic sediment and water. Oil used on the lease is considered production.

Production, Lease Condensate: The volume of lease condensate produced during the report year. Lease condensate volumes include only those volumes recovered from lease or field separation facilities. (See **Lease Condensate**)

Production, Natural Gas, Dry: The volume of natural gas withdrawn from reservoirs during the report year less (1) the volume returned to such reservoirs in cycling, repressuring of oil reservoirs and conservation operations; less (2) shrinkage resulting from the removal of lease condensate and plant liquids; and less (3) nonhydrocarbon gases where they occur in sufficient quantity to render the gas unmarketable. Volumes of gas withdrawn from gas storage reservoirs and native gas, which has been transferred to the storage category, are not considered production. This is not the same as marketed production, since the latter also excludes vented and flared gas, but contains plant liquids.

Production, Natural Gas, Wet after Lease Separation: The volume of natural gas withdrawn from reservoirs during the report year less (1) the volume returned to such reservoirs in cycling, repressuring of oil reservoirs and conservation operations; less (2) shrinkage resulting from the removal of lease condensate; and less (3) nonhydrocarbon gases where they occur in sufficient quantity to render the gas unmarketable. Volumes of gas withdrawn from gas storage reservoirs and native gas, which has been transferred to the storage category, are not considered production. This is not the same as marketed production, since the latter excludes vented and flared gas.

Production, Natural Gas Liquids: The volume of natural gas liquids removed from natural gas in lease separators, field facilities, gas processing plants or cycling plants during the report year.

Production, Plant Liquids: The volume of liquids removed from natural gas in natural gas processing plants or cycling plants during the report year.

Proved Reserves of Crude Oil: Proved reserves of crude oil as of December 31 of the report year are the estimated quantities of all liquids defined as crude oil, which geological and engineering data demonstrate with reasonable certainty to be recoverable in future years from known reservoirs under existing economic and operating conditions.

Reservoirs are considered proved if economic producibility is supported by actual production or conclusive formation test (drill stem or wire line), or if economic producibility is supported by core analyses and/or electric or other log interpretations. The area of an oil reservoir considered proved includes (1) that portion delineated by drilling and defined by gas--oil and/or oil--water contacts, if any; and (2) the immediately adjoining portions not yet drilled, but which can be reasonably judged as economically productive on the basis of available geological and engineering data. In the absence of information on fluid contacts, the lowest known structural occurrence of hydrocarbons is considered to be the lower proved limit of the reservoir.

Volumes of crude oil placed in underground storage are not to be considered proved reserves.

Reserves of crude oil which can be produced economically through application of improved recovery techniques (such as fluid injection) are included in the "proved" classification when successful testing by a pilot project, or the operation of an installed program in the reservoir, provides support for the engineering analysis on which the project or program was based.

Estimates of proved crude oil reserves do not include the following: (1) oil that may become available from known reservoirs but is reported separately as "indicated additional reserves"; (2) natural gas liquids (including lease condensate); (3) oil, the recovery of which is subject to reasonable doubt because of uncertainty as to geology, reservoir characteristics, or economic factors; (4) oil that may occur in undrilled prospects; and (5) oil that may be recovered from oil shales, coal, gilsonite, and other such sources. It is not necessary that production, gathering or transportation facilities be installed or operative for a reservoir to be considered proved.

Proved Reserves of Lease Condensate: Proved reserves of lease condensate as of December 31 of the report year are the volumes of lease condensate expected to be recovered in future years in conjunction with the production of proved reserves of natural gas as of December 31 of the report year, based on the recovery efficiency of lease and/or field separation facilities installed as of December 31 of the report year. (See **Lease Condensate** and **Proved Reserves of Natural Gas**)

Proved Reserves of Natural Gas: Proved reserves of natural gas as of December 31 of the report year are the estimated quantities which analysis of geological and engineering data demonstrate with reasonable certainty to be recoverable in future years from known reservoirs under existing economic and operating conditions.

Reservoirs are considered proved if economic producibility is supported by actual production or conclusive formation test (drill stem or wire line), or if economic producibility is supported by core analyses and/or electric or other log interpretations.

The area of a gas reservoir considered proved includes: (1) that portion delineated by drilling and defined by gas--oil and/or gas--water contacts, if any; and (2) the immediately adjoining portions not yet drilled, but which can be reasonably judged as economically productive on the basis of available geological and engineering data. In the absence of information on fluid contacts, the lowest known structural occurrence of hydrocarbons is considered to be the lower proved limit of the reservoir.

Volumes of natural gas placed in underground storage are not to be considered proved reserves.

For natural gas, wet after lease separation, an appropriate reduction in the reservoir gas volume has been made to cover the removal of the liquefiable portions of the gas in lease and/or field separation facilities and the exclusion of nonhydrocarbon gases where they occur in sufficient quantity to render the gas unmarketable.

For dry natural gas, an appropriate reduction in the gas volume has been made to cover the removal of the liquefiable portions of the gas in lease and/or field separation facilities, and in natural gas processing plants, and the exclusion of nonhydrocarbon gases where they occur in sufficient quantity to render the gas unmarketable.

It is not necessary that production, gathering, or transportation facilities be installed or operative for a reservoir to be considered proved. It is to be assumed that compression will be initiated if and when economically justified.

Proved Reserves of Natural Gas Liquids: Proved reserves of natural gas liquids as of December 31 of the report year are those volumes of natural gas liquids (including lease condensate) demonstrated with reasonable certainty to be separable in the future from proved natural gas reserves, under existing economic and operating conditions.

Proved Ultimate Recovery: The sum of proved reserves and cumulative production. It is expected to change over time for any field, group of fields, State, or Country. Proved Ultimate Recovery does not represent the maximum recoverable volume of resources for an area. It is instead a gauge of how much has already been produced plus proved reserves. Proved reserves of crude oil or natural gas are the estimated quantities of petroleum which geological and engineering data demonstrate with reasonable certainty to be recoverable in future years from known reservoirs under existing economic and operating conditions. When deterministic proved reserves estimation methods are used, the term reasonable certainty is intended to express a high degree of confidence that the estimated quantities will be recovered. When probabilistic methods are used there should be at least a 90 percent probability that the actual quantities recovered will exceed the estimate.

Report Year: The calendar year to which data reported in this publication pertain.

Reserves: (See **Proved Reserves**)

Reserve Additions: Consist of adjustments, net revisions, extensions to old reservoirs, new reservoir discoveries in old fields, and new field discoveries.

Reserves Changes: Positive and negative revisions, extensions, new reservoir discoveries in old fields, and new field discoveries, which occurred during the report year.

Reservoir: A porous and permeable underground formation containing an individual and separate natural accumulation of producible hydrocarbons (oil and/or gas) which is confined by impermeable rock or water barriers and is characterized by a single natural pressure system.

Revisions: Changes to prior year--end proved reserves estimates, either positive or negative, resulting from new information other than an increase in proved acreage (extension). Revisions include increases of proved reserves associated with the installation of improved recovery techniques or equipment. They also include correction of prior report year arithmetical or clerical errors and adjustments to prior year--end production volumes to the extent that these alter reported prior year reserves estimates.

Royalty (Including Overriding Royalty) Interests: These interests entitle their owner(s) to a share of the mineral production from a property or to a share of the proceeds therefrom. They do not contain the rights and obligations of operating the property, and normally do not bear any of the costs of exploration, development, and operation of the property.

Sales: The volume of proved reserves deducted from an operator’s total reserves when selling an existing field or property, during the calendar year.

Subdivision: A prescribed portion of a given State or other geographical region defined in this publication for statistical reporting purposes.

Subsidiary Company: A company which is controlled through the ownership of voting stock, or a corporate joint venture in which a corporation is owned by a small group of businesses as a separate and specific business or project for the mutual benefit of the members of the group. (See **Control**)

Total Discoveries: The sum of extensions, new reservoir discoveries in old fields, and new field discoveries, which occurred during the report year.

Total Liquid Hydrocarbon Reserves: The sum of crude oil and natural gas liquids reserves volumes.

Total Operated Basis: The total reserves or production associated with the wells operated by an individual operator. This is also commonly known as the "gross operated" or "8/8ths" basis.

Working Interest: A working interest permits the owner(s) to explore, develop and operate a property. The working interest owner(s) bear(s) the costs of exploration, development and operation of the property, and in return is (are) entitled to a share of the mineral production from the property or to a share of the proceeds therefrom.