

## **Summary of Data Collection Operations**

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### 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 1999 by crude oil or natural gas well operators who were active as of December 31, 1999. 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 1992 and 1999, and depicts the number of active operators, 1994 showing the largest in the series. The 1999 sampling frame consisted of 177 Category I, 399 Category II, 648 Category III Certainty, and 20,865 Category III Noncertainty operators, for a total of 22,089 active operators. The survey sample consisted of 1,224 operators selected with certainty that included all of the Category I and II Certainty operators, the 648 smaller operators that were selected with certainty because of their size in relation to the area or areas in which they operated, and 1,305 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 1999 survey is summarized in **Table E2**. EIA makes a considerable effort to gain responses from all operators. About 3 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 88 nonoperators, 20 had successor operators that had taken over the production of the nonoperator. These successor operators were subsequently sampled. The overall response rate for the 1999 survey was 94.1 percent. For the 146 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, 1992-1999**

Operator Category	Number of Operators							
	1992	1993	1994	1995	1996	1997	1998	1999
<b>Certainty</b>								
Category I . . . . .	157	160	161	161	176	180	178	177
Category II . . . . .	480	500	482	476	486	461	420	399
Category III . . . . .	1,896	1,723	1,694	1,596	3	1,194	862	648
Sampled . . . . .	2,533	2,383	2,337	2,233	665	1,835	1,460	1,224
Percent Sampled . . . . .	100	100	100	100	100	100	100	100
<b>Noncertainty</b>								
Sampled . . . . .	1,724	1,691	1,737	1,632	0	1,645	1,459	1,305
Percent Sampled . . . . .	8	8	8	8	0	8	7	6
<b>Total</b>								
Active Operators . . . . .	R24,173	R23,656	R24,222	22,766	23,410	22,678	23,620	22,089
Not Sampled . . . . .	19,916	19,791	20,148	18,901	22,745	19,198	20,701	19,560
Sampled . . . . .	4,257	4,074	4,074	3,865	665	3,480	2,919	1,868
Percent Sampled . . . . .	18	17	17	17	3	15	12	8

R=Revised data.

Note: Active operators in 1998 include 10 operators added after December 29, 1998 and not included in Table E3.

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

**Table E2. Form EIA-23 Survey Response Statistics, 1999**

Operator Category	Original Sample Selected	Successor <sup>a</sup> Operators	Net <sup>b</sup> Category Changes	Non- <sup>c</sup> operators	Adjusted <sup>d</sup> Sample	Responding Operators		Nonresponding Operators	
						Number	Percent	Number	Percent
<b>Certainty</b>									
Category I . . . . .	177	3	10	-16	174	174	100.0	0	0.0
Category II . . . . .	399	17	-33	-17	366	366	100.0	0	0.0
Category III . . . . .	648	0	23	-21	650	591	90.9	59 <sup>e</sup>	9.1
Subtotal . . . . .	1,224	20	0	-54	1,190	1,131	95.0	59 <sup>e</sup>	5.0
<b>Noncertainty</b>									
Subtotal . . . . .	1,305	1	0	-34	1,272	1,185	93.2	87 <sup>e</sup>	6.8
<b>Total</b> . . . . .	<b>2,529</b>	<b>1</b>	<b>0</b>	<b>-88</b>	<b>2,462</b>	<b>2,316</b>	<b>94.1</b>	<b>146<sup>e</sup></b>	<b>5.9</b>

<sup>a</sup>Successor operators are those, not initially sampled, that have taken over the production of a sampled operator.

<sup>b</sup>Net of recategorized operators in the sample (excluding nonoperators).

<sup>c</sup>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.

<sup>d</sup>Adjusted sample equals original sample plus successor operators plus net category changes minus nonoperators.

<sup>e</sup>For the 146 operators (59 Category III operators and 87 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" 1999.

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 11, 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 12 and 13, 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 14, 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, 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 1998*, in January of 1999, was the 17th annual report and reflected data collected through October 1998. This publication was mailed to operators to assist in identifying the field code data necessary for the preparation of Form EIA-23. A copy of this publication may be purchased from the National Energy Information Center (see inside cover page).

## 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 1999, Form EIA-23 National estimates of production were 2,151 million barrels for crude oil and lease condensate or 4 million barrels (0.1 percent) higher than that reported in the *Petroleum Supply Annual 1999* for crude oil and lease condensate. Form EIA-23 National estimates of production for dry natural gas were 18,928 billion cubic feet – 231 billion cubic feet (1 percent) higher than the *Natural Gas Annual 1999* for 1999 dry natural gas production.

## 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, using a postcard form with prepaid return postage, to contact possible active crude oil and natural gas well operators presently listed on EIA's master frame, but for whom the listing had not been updated for 2 years. This procedure identifies active operators and nonoperators which improves the frame for future sample selections for the 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 1999 survey mailing. These changes resulted from all frame maintenance activities.

The Form EIA-23 operator frame contained a total of 68,501 entries as of December 29, 1999. Of these, 22,127 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 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.

**Table E3. Summary of the 1999 Operator Frame Activity, Form EIA-23**

Total 1998 Operator Frame . . . . .	68,468
Operators . . . . .	23,392
Nonoperators . . . . .	45,076
Changes to 1998 Operator Status . . . . .	1,642
From Nonoperator to Operator . . . . .	54
From Operator to Nonoperator . . . . .	1,588
No Changes to 1998 Operator Status . . . . .	66,826
Operators . . . . .	22,040
Nonoperators . . . . .	44,786
Additions to 1998 Operator Frame . . . . .	33
Operator . . . . .	33
Nonoperator . . . . .	0
<b>Total 1999 Operator Frame . . . . .</b>	<b>68,501</b>
Operators . . . . .	22,127
Nonoperators . . . . .	46,374

Note: Includes operator frame activity through December 29, 1999.  
Source: Energy Information Administration, Office of Oil and Gas.

## 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.

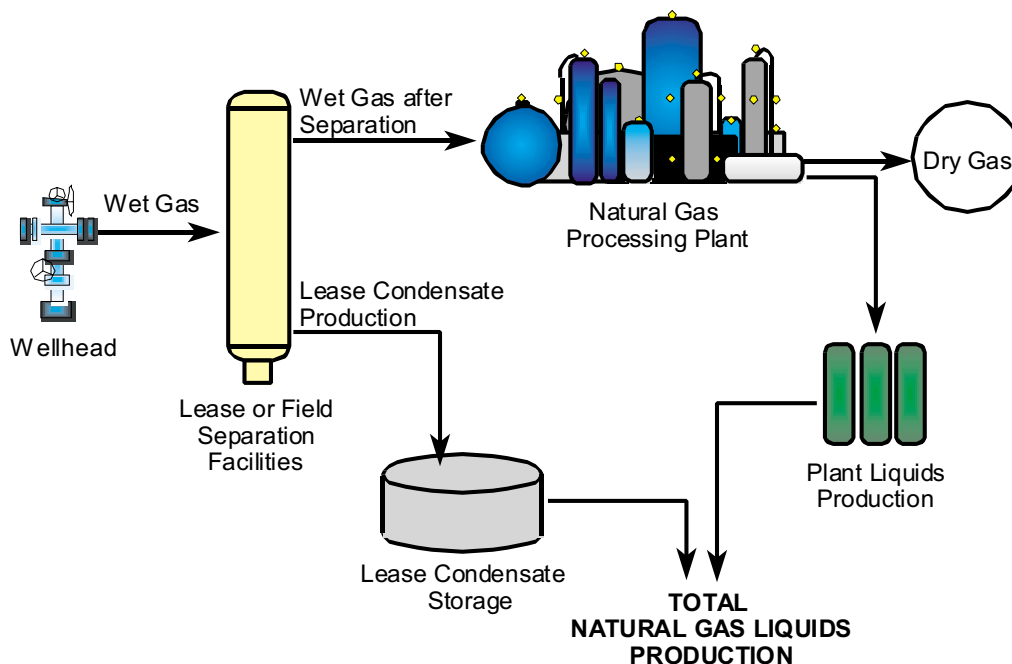
## Form EIA-64A Response Statistics

EIA mailed EIA-64A forms to all known natural gas processing plant operators as of February 1, 2000. In addition, plant operators whose plants were shut down or dismantled during 1999 were required to complete forms for the portion of 1999 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 254 operators of 589 plants were sent forms. This number included 3 new plants, 2 reactivated plants, and 14 successor plants identified after the initial 1999 survey mailing. A total of 35 plants were reported as nonoperating according to the Form EIA-64A definition. For the twelfth 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

**Figure E1. Natural Gas Liquids Extraction Flows**



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

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.

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 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

## 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 revisions to EIA's monthly estimates. Differences, when found, were reconciled in both sources. For 1999, the Form EIA-64A National estimates were 21 percent (157 million barrels) higher than the *Petroleum Supply Annual 1999* volume for natural gas plant liquids production.

**Table E4. Natural Gas Processed and Liquids Extracted at Natural Gas Processing Plants, 1999**

Plant Location	Volume of Natural Gas Delivered to Processing Plants			Total Liquids Extracted (thousand barrels)
	State Production (million cubic feet)	Out of State Production (million cubic feet)	Natural Gas Processed (million cubic feet)	
Alaska . . . . .	2,950,502	0	2,950,502	32,297
Alabama . . . . .	308,008	1,484	309,492	12,586
Arkansas . . . . .	179,524	0	179,524	355
California . . . . .	259,518	0	259,518	8,848
Colorado . . . . .	444,894	84	444,978	19,047
Florida . . . . .	4,937	3,502	8,439	1,594
Illinois . . . . .	358	0	358	43
Kansas . . . . .	532,139	121,376	653,515	34,455
Kentucky . . . . .	44,064	0	44,064	1,691
Louisiana . . . . .	4,526,840	160,421	4,687,261	114,826
Michigan . . . . .	67,514	0	67,514	4,315
Mississippi . . . . .	3,661	132,112	135,773	4,149
Montana . . . . .	5,211	0	5,211	337
North Dakota . . . . .	52,191	0	52,191	4,462
New Mexico . . . . .	872,842	959	873,801	74,570
Ohio . . . . .	2,933	0	2,933	61
Oklahoma . . . . .	883,517	8,879	892,396	65,212
Pennsylvania . . . . .	6,773	4,488	11,261	674
Texas . . . . .	3,875,214	28,137	3,903,351	257,661
Utah . . . . .	205,709	5,805	211,514	7,974
West Virginia . . . . .	66,249	139	66,388	5,112
Wyoming . . . . .	902,365	524	902,889	36,593
<b>Total . . . . .</b>	<b>16,194,963</b>	<b>467,910</b>	<b>16,662,873</b>	<b>686,862</b>

<sup>a</sup>Includes Illinois, Nebraska, Ohio, Pennsylvania, and Tennessee.  
Source: Form EIA-64A, "Annual Report of the Origin of Natural Gas Liquids Production," 1999.

## 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 1999 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 December 28, 1999.

**Table E5. Form EIA-64A 1999 Plant Frame Activity**

Frame as of 1998 survey mailing . . . . .	621
Additions . . . . .	159
Deletions . . . . .	-191
Frame as of 1999 survey mailing . . . . .	589

Note: Includes operator frame activity through December 28, 1999.  
Source: Energy Information Administration, Office of Oil and Gas.