

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 2006 by crude oil or natural gas well operators who were active as of December 31, 2006. 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 1999 and 2006, and depicts the number of active operators, with 2002 showing the largest in the series. The 2006 sampling frame consisted of 173 Category I, 467 Category II, 232 Category III Certainty, and 12,948 Category III Noncertainty operators, for a total of 13,820 active operators. The survey sample consisted of 872 operators selected with certainty that included all of the Category I and II Certainty operators, the 232 smaller operators that were selected with certainty because of their size in relation to the area or areas in which they operated, and 483 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 2006 survey is summarized in **Table E2**. EIA makes a considerable effort to gain responses from all operators. About 5.3 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 58 nonoperators, 11 had successor operators that had taken over the production of the nonoperator. These successor operators were subsequently sampled. The overall response rate for the 2006 survey was 95 percent. For the 69 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, 1999-2006

Operator Category	Number of Operators							
	1999	2000	2001	2002	2003	2004	2005	2006
Certainty								
Category I	177	175	179	176	164	164	172	173
Category II	399	436	485	480	512	532	522	467
Category III	648	854	559	388	399	275	195	232
Sampled	1,224	1,465	1,223	1,044	1,075	971	889	872
Percent Sampled	100	100	100	100	100	100	100	100
Noncertainty								
Sampled	1,305	1,311	644	533	479	370	505	483
Percent Sampled	7	7	3	3	3	2	4	4
Total								
Active Operators	22,089	22,102	22,519	22,823	20,923	20,670	15,158	13,820
Not Sampled	19,560	19,326	20,652	21,246	19,369	19,329	13,764	12,465
Sampled	R2,529	2,776	1,867	1,577	1,554	1,341	1,394	1,355
Percent Sampled	R11	13	8	7	7	7	9	10

R=Revised data.

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

Table E2. Form EIA-23 Survey Response Statistics, 2006

Operator Category	Original Sample Selected	Successor ^a Operators	Net ^b Category Changes	Non- ^c operators	Adjusted ^d Sample	Responding Operators		Nonresponding ^e Operators	
						Number	Percent	Number	Percent
Certainty									
Category I	173	0	1	-6	168	168	100.0	0	0.0
Category II	467	3	-19	-11	440	427	97.0	13	3.0
Category III	232	8	24	-17	247	224	90.7	23	9.3
Subtotal	872	11	6	-34	855	819	95.8	36	4.2
Noncertainty									
Noncertainty	483	0	-6	-24	453	420	92.7	33	7.3
Total	1,355	11	0	-58	1,308	1,239	94.7	69	5.3

^aSuccessor operators are those, not initially sampled, that have taken over the production of a sampled operator.

^bNet of recategorized operators in the sample (excluding nonoperators).

^cIncludes former operators reporting that they were not operators during the report year and operators that could not be located who are treated as nonoperators.

^dAdjusted sample equals original sample plus successor operators plus net category changes minus nonoperators.

^eFor the 69 operators (13 Category II operators, 23 Category III operators, and 33 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" 2006.

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 2006*, in January 2007, was the 25th annual report and reflected data collected through December 2006. 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 2006, Form EIA-23 National estimates of production were 1,834 million barrels for crude oil and lease condensate or 28 million barrels (1.5 percent) lower than that reported in the *Petroleum Supply Annual 2006* for crude oil and lease condensate (1,862 million barrels). Form EIA-23 National estimates of production for dry natural gas were 18,545 billion cubic feet, 14 billion cubic feet (less than 1 percent) higher than the *Natural Gas Monthly, October 2007* for 2006 dry natural gas production (18,531 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 HPDI, LLC., 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 2006 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 31, 2006. Of these, 15,158 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

Table E3. Summary of the 2006 Operator Frame Activity, Form EIA-23

Total 2005 Operator Frame	68,616
Operators	15,158
Nonoperators	53,458
Changes to 2005 Operator Status	2,574
From Nonoperator to Operator ^a	1,761
From Operator to Nonoperator	813
New Operators	811
No Changes to 2005 Operator Status	66,042
Operators	13,007
Nonoperators	53,035
Additions to 2005 Operator Frame	0
Operator	0
Nonoperator	0
Total 2006 Operator Frame	68,616
Operators	16,106
Nonoperators	52,510

^aIncludes operator frame activity through December 31, 2006.

^bNo 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.

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.

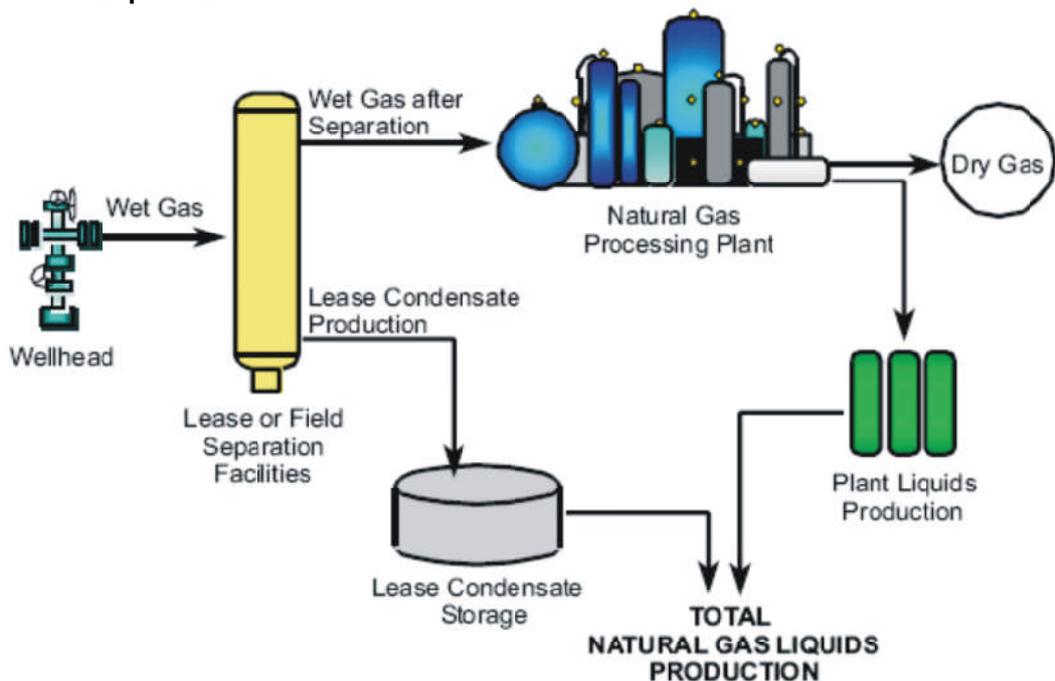
The EIA recognized that its estimates of proved reserves of natural gas liquids (NGL) had to reflect not only those volumes extractable in the future under current economic and operating conditions at the lease or field (lease condensate), but also volumes (plant liquids) extractable downstream at existing 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, 2006. In addition, plant operators whose plants were shut down or dismantled during 2006 were required to complete forms for the portion of 2006 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 221 operators of 491 plants were sent forms. This number included 6 new plants, 2 reactivated plants, and 1 successor plants, all identified after the initial 2006 survey mailing. A total of 5 plants were reported as nonoperating according to the Form EIA-64A

Figure E1. Natural Gas Liquids Extraction Flows



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

definition. For the 19th 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, 2006

Plant Location	Volume of Natural Gas Delivered to Processing Plants				Total Liquids Extracted (thousand barrels)
	State Production	Federal Production	Out of State Production	Natural Gas Processed	
	(million cubic feet)				
Alaska	2,665,742	0	0	2,665,742	20,993
Alabama	33,239	252,889	1,150	287,278	14,736
Arkansas	13,702	0	0	13,702	166
California	223,029	551	0	223,580	11,267
Colorado	750,835	0	201	751,036	26,111
Florida	1,973	0	1,999	3,972	357
Kansas	323,765	0	129,346	453,111	21,509
Kentucky	39,559	0	0	39,559	1,666
Louisiana	904,476	1,607,326	0	2,511,802	73,551
Michigan	33,213	0	0	33,213	2,335
Mississippi	6,019	272,417	0	278,436	9,666
Montana	12,685	0	0	12,685	1,043
North Dakota	65,575	0	0	65,575	5,560
New Mexico	817,261	0	0	817,261	68,755
Oklahoma	899,826	0	8,229	908,055	62,992
Texas	3,953,075	0	37,787	3,990,862	261,087
Utah	190,119	0	3,717	193,836	2,418
West Virginia	98,521	0	30,813	129,334	5,939
Wyoming	1,272,661	0	15,463	1,288,124	46,847
Miscellaneous ^a	15,025	0	0	15,025	637
Total	12,320,300	2,133,183	228,705	14,682,188	637,635

^aIncludes Illinois, Ohio, and Pennsylvania.

Source: Form EIA-64A, "Annual Report of the Origin of Natural Gas Liquids Production," 2006

revisions to EIA's monthly estimates. Differences, when found, were reconciled in both sources. For 2006, the Form EIA-64A National estimates (Table E4) were 1 percent (6,819 thousand barrels) lower than the *Petroleum Supply Annual 2006* volume of 626,703 thousand barrels for natural gas plant liquids production.

Table E5. Form EIA-64A 2006 Plant Frame Activity

Frame as of 2005 survey mailing	489
Additions	58
Deletions	-56
Frame as of 2006 survey mailing	491

Note: Includes operator frame activity through March 1, 2007.

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 2006 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 March 1, 2007.