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Supporting Statement for Survey Clearance

# Part B: Collections of Information Employing Statistical Methods

**OMB No. 1905-0057**

*Form EIA-23L, Annual Report of Domestic Oil and Gas Reserves*

*Form EIA-23S, Annual Report of Domestic Oil and Gas Reserves*

*Form EIA-64A, Annual Report of the Origin of Natural Gas Liquids Production*

 

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## B.1. Respondent Universe

Form EIA-23L

The Form EIA-23L, Annual Survey of Domestic Oil and Gas Reserves, collects data on domestic production and reserves of crude oil, condensate, and natural gas. Form EIA-64A, complimentary to the EIA-23L, collects data on production of natural gas liquids. Each respondent reports proved reserves and production for crude oil, natural gas, and lease condensate by county for each county in which it operates, as well as the reservoir type associated with the reserves. Shale, conventional, and low permeability are the reservoir types reported by operators in section 2 of Form EIA-23L under the data element *Type Code*.

Operators of crude oil and natural gas wells were selected as the appropriate respondent population for Form EIA-23L because the well operators have access to the most current and detailed reserves information. Therefore, they presumably have better proved reserves estimates than other possible classes of respondents, such as working interest or royalty owners.

The universe of currently active oil and natural gas well operators in the United States contains roughly 15,000 operators. Though the large production volume well operators are well-known to EIA, they comprise only a small portion of all operators. The 200 largest operators produce more than 85% of the nation’s oil and natural gas. The small volume well operators are difficult to identify because they go into and out of business more easily, frequently alter their corporate identities, make relatively large property sales and acquisitions that significantly change their size, and often change addresses. EIA uses production data purchased from Drillinginfo, Inc., and operator data from state regulatory agencies, to build and maintain its survey frames.

Form EIA-64A

The EIA-64A frame is a census survey of natural gas processing plants. All natural gas processing plant operators need to file Form EIA-64A for each process plants that they own. Natural gas processing plants report natural gas liquids production by the area of origin of the natural gas processed. The majority of the plant operators are determined by weighted least squares fit.

The survey frame contains contact information and production data on all known 600 active gas plants and inactive natural gas processing plants in the United States. Operators of plants that closed or ceased operations during the reporting year are required to complete forms for that portion of the reporting year the plants were operated.

Operators of natural gas plants were selected because they have access to the most current and detailed information on natural gas plant liquids. These operators have more complete information on gas plant liquids production, gas inlet, and dry gas outlet data than gas producers or pipeline companies.

## B.2. Statistical Methods

EIA publishes crude oil and natural gas data from shale reservoirs by state/subdivision units. (Hereafter, the term “state/subdivision” refers to an individual subdivision within a state or an individual state that is not subdivided.)

**Sampling**

Current Form EIA-23L

EIA uses a nonprobabilistic cutoff sample design that consists of the well operators in the population with the largest values for crude oil or natural gas production. Cutoff sampling approach selects operators by product (gas and oil), then by geography, and then by reservoir type (conventional and shale). The sample design focuses on the largest operators in the nation, in a geologic province and in a state/subdivision to generate summary-level data. Sample selection is performed using nationwide, geologic province and state/subdivision operator production, and operators are added to the sample until a production coverage percentage (national level 85%, geologic province and state/subdivision levels 42%) is reached for the nation, geologic province or state/subdivision. Operators with more than 10% gas or oil production in a geologic province or state/subdivision are included in the sample. On the other hand, operators with less than 600,000 MCF of nationwide natural gas production annually (1.64 MMCF per day) or less than 500 barrels of oil per day nationally will not be selected.

Estimates are required for multiple attributes (natural gas and liquids by state/subdivision and by reservoir type). Thus, a variant of cutoff sampling, quasi-cutoff sampling, allows a sample design that yields reliable estimates for the various attributes (sometimes called “target variables,” or “variables of interest”). Because many operators selected for their production in one attribute (e.g., liquids) will also have production in other attributes (e.g., gas), a few more respondents may be added to the sample than the minimum number required to meet the coverage threshold for a particular attribute in a particular state/subdivision. This may cause some state/subdivisions to appear to have a few “extra” respondents scattered throughout the population, but the total number of respondents does not increase.

The cutoff sample for the Form EIA-23L consists of approximately 500 respondents. Sampling is based on annual production volumes of the well operators, at the state/subdivision and geological province level (geological provinces define the estimation groups, See section B.2.2). Using this sample design, EIA expects approximately 90% of U.S. oil and natural gas reserves volumes will be reported on the Form EIA-23L, leaving the remaining 10% to be estimated.

The cutoff sample for the Form EIA-23L is selected based on coverage thresholds set at national, state/subdivision and geological province levels for each product (oil and gas) and reservoir type. The sample design provides high coverage for each publication group (state/subdivision by reservoir type) and estimation group (geological province by reservoir type) except for groups that lack eligible operators whose production is higher than the minimum requirements mentioned above. Groups without enough eligible operators may not achieve the coverage targets without sampling a large number of extremely small operators. In these cases a lower cutoff threshold is used to avoid over sampling these small operators, to reduce respondent burden, and to stay within EIA’s resource constraints. In some situations, data for some areas will be combined or withheld to prevent disclosure issues.

See [Efforts to Reduce Total Survey Error](#_Efforts_to_Reduce) section for estimates of anticipated RSEs.­­­­

**Estimating Proved Reserves**

The published estimates of U.S. proved reserves and production are the sum of the estimates for the individual states covered by the sample. Correspondingly, estimates for the states with subdivisions (estimates are published separately by subdivision for California, Federal Offshore, Louisiana, New Mexico, and Texas) are the sum of the subdivision estimates. The remaining states are not subdivided and may be considered as a single subdivision. This cutoff sample will result in collecting approximately 90% of the U.S. proved reserves for both oil and gas being reported directly on Form EIA-23L, and leaves the remaining 10% to be estimated.

Production data from other sources (Drillinginfo, Inc., or the state regulatory agencies) are used to estimate proved reserves for the non-surveyed operators. The estimates, performed at the geologic province level, are based on reported reserves and production at the operator/county level within that geological province.

The published estimates are created using a weighted least squares fit of an equation relating production to proved reserves. County level data from operators who report on Form EIA-23L are grouped into geologic provinces, i.e., areas that have similar geologic characteristics and therefore have similar stages of oil and gas development, often within the same reservoirs. The equation is fit separately for each province and each fuel type (crude oil and natural gas). Additional estimates would be created for shale natural gas and oil from tight formations, using appropriate subtotals of county level data.

The boundaries of the geologic provinces used for this purpose are similar to the province and basin boundaries developed by the United States Geological Survey (viewable at <https://ngmdb.usgs.gov/Geolex/stratres/provinces>). Sixty-four geologic provinces are identified, though only about 40 provinces are used in practice. Some provinces are combined because they have too few operators for sufficient statistical rigor when analyzed individually.

Use of this estimation procedure reduces reporting and analysis burden by minimizing the number of operators that have to be surveyed. Since the statistical distributions of production and proved reserves are to a significant degree positively skewed, weighted linear regression estimation is used to reduce a propensity for dominance of the provincial fit by the largest operators and largest fields. The weight is defined as inverse of the operator’s size or annual production.

The following ratio estimation function is used in the provincial estimation models:

$$EQUATION \left(1\right) RCP =x\*PCP$$

Where:

 $RCP$ = Operator’s Year End Reserves in County (C) in Province (P),

 $PCP$ = Operator’s Annual Production in County (C) in Province (P), and

 $x$ = average reserves-to-production ratio, defined by (estimation group sample total reserve) / estimation group sample total production), as determined by weighted least squares fit.

For each geologic province, ratio estimation functions were derived for conventional liquids production and conventional gas production, using Equation (1). Two more functions are derived for shale natural gas, and oil from tight formations. Operators that report a reserves-to-production ratio greater than 25 are excluded from the calculation of the province coefficients. (Note that the aforementioned situation is rare—the reported values of this type are typically erroneous or based on less than a full year’s production.)

The classical ratio estimator (CRE) function is applied to data for non-sampled operators that are listed in the Drillinginfo, Inc., frame file with positive production values in order to estimate the proved reserves of non-surveyed operators in all states, except Illinois, Indiana, Kentucky, and Tennessee. Current production information is not available in these four states, so the same estimation procedure described above is not applicable.

Obtaining operator production data for the smaller oil and gas producing states of Illinois, Indiana, Kentucky, and Tennessee requires an alternative approach from using Drillinginfo, Inc., data, because Drillinginfo, Inc., excludes these states or the data is not current. Samples of operators in these states are compiled from lists of oil and gas companies licensed to do business in the state, internet searches, and past reports on Forms EIA-23L and EIA-23S. Because production data is not current or not available, the sampling process described in the previous section cannot be used. The summary-level data (U.S. level and “Miscellaneous States” level) may be published including these states ‘as reported’ (i.e., no estimates for the total state population will be generated for these states).

The largest operators in the states of Illinois, Indiana, Kentucky, and Tennessee are identifiable using prior years’ data from Drillinginfo, Inc., and from state regulatory agencies where current data are available. However, the frame will be incomplete and may be insufficient to reliably estimate reserves for non-sampled operators in these states. These four states, when combined, are estimated to hold less than 0.2% of U.S. total oil and condensate reserves and less than 0.4% of U.S. total natural gas reserves.

EIA will continue to study the available frame information for Illinois, Indiana, Kentucky, and Tennessee to determine if reliable proved reserve estimates can be generated using the same methods as in the other states. In particular, EIA will coordinate with state agencies, including agencies other than oil and gas regulatory agencies, and industry trade journals, newsletters, etc., to build a sample frame that includes these states.

Figure 1 shows the map of geologic provinces used to group the reported data and estimate proved reserves for the non-sampled operators. The reported reserves and the estimated reserves are summed to the county level. The county level reserves are then summed to the state/subdivision level which is then summed to the U.S. level.

**Figure 1: U.S. Oil and Gas Bearing Geologic Provinces**

**Estimating Reserves Balancing Categories**

Estimated proved reserves balancing categories (i.e., revisions, extensions and discoveries, etc.) are assumed to have the same relationship to estimated year-end reserves as the reported proved reserves balancing categories have to the reported year-end reserves. Ratios for the total reported categories in a province are applied to the estimated reserves volumes to calculate the estimated balancing categories. Estimated balance items will have the same proportion to year-end reserves as do the reported volumes.

The Instructions for Form EIA-23L on page 8 under Column (H) state that when reporting proved reserves data, after entering the volumes of total proved reserves as of December 31, the following adjustments are applied:

Proved Reserves at End of Previous Report Year

+ Revision Increases (the total of upward revisions made in the county during the survey year)

− Revision Decreases (the total of downward revisions made in the county during the survey year)

− Sales (amount of reserves transferred if operations were sold to another company)

+ Acquisitions (amount of reserves acquired if operators were purchased or transferred)

+ Extensions and Discoveries (Extensions are reserves additions that result from expanding the proved acreage of previously discovered reserves through additional drilling. Discoveries are the sum of new field discoveries, and new reservoir discoveries found in a county (or county-equivalent area) during a survey year)

− Report Year Production (the volumes produced from wells in the county)

= Proved Reserves at End of Report Year

Any remaining difference in the annual proved reserves balance between the published previous reporting year-end proved reserves and current reporting year-end proved reserves, not accounted for by the estimated proved reserves changes, is included in the adjustments for the area. One of the reasons that adjustments are necessary is that the inclusion of operators with the same operating characteristics in each year’s sample is uncertain. There is no guarantee in the smaller producing states/subdivisions that the same small operators will be selected each reporting year, or that the operators selected will have similar production volumes when compared with operators selected in a prior reporting year.

Other reasons for more substantial adjustments to the annual proved reserves balance may include any combination of the following:

* The frame sample coverage may or may not have improved between survey years, such that more or fewer operators were included in the reporting year than the previous year.
* One or more operators may have reported data incorrectly in one reporting year or the next, but not both, and the error was not detected during data validation.
* Operation of properties was transferred during the reporting year from operators not in the sample to surveyed operators.
* Operation of properties was transferred during the reporting year to an operator with a different evaluation of the proved reserves associated with the properties than that of the previous year's operator.
* The respondent changed the classification of their natural gas from non-associated gas to associated-dissolved gas, or vice versa.
* The trend in reserves changes imputed for the non-sampled operators, which was based on the trend reported by the sampled operators, did not reflect the actual trend for the non-sampled operators.

The causes for adjustments are known for some, but not all instances of imbalance. The only problems for which the effects cannot be expected to balance over a period of several years are problems associated with an inadequate survey frame or with any actual trend in reserves changes for non-sampled operators not being the same as the reserves changes for sampled operators. EIA continues to attempt to improve sources of operator data to create as comprehensive a frame as possible.

**Yield of Natural Gas Plant Liquids and Dry Natural Gas from Total Natural Gas**

The published reserves, production, and reserves change statistics for crude oil, lease condensate, and natural gas (wet after lease separation) are derived from data reported on Form EIA-23L and the application of the estimation methods discussed previously. The information collected on Form EIA-64A is then utilized to calculate, on a regional basis, the estimated yield of natural gas plant liquids and dry natural gas from total natural gas.

In estimating the volumes of natural gas on a dry basis, downward adjustments of the natural gas data, wet after lease separation, are made. These reductions are 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 collects the volumetric reduction, or shrinkage, of the input natural gas stream that results from the removal of the natural gas plant liquids (NGPL) at each natural gas processing plant.

The shrinkage volume is then allocated to the plant's reported area or areas of origin. Because shrinkage volume is, by definition, proportionate to the NGPL recovered (i.e., the volume of NGPL produced), this allocation is in proportion to the reported production of NGPL volumes for each area of origin. However, these derived shrinkage volumes are rejected if the ratio between the shrinkage and the NGPL production (gas equivalents ratio) fall outside certain limits of physical accuracy. The ratio is expected to range between 1,558 cubic feet per barrel (for ethane) and 885 cubic feet per barrel (for condensate). If the computed gas equivalents ratio falls outside these limits, the plant operator is contacted to gather additional data to explain this discrepancy.

This imputed ratio is calculated for the aggregate of all plants from the area that report production and shrinkage and also have a gas equivalent ratio within the aforesaid limits. The imputed ratio is applied only if there are at least five plants reporting NGPL production in a producing area that are within these range limits. If there are less than five plants, the imputed ratio is calculated based on all plants in the survey for which the individual gas equivalents ratio is within the acceptable limits. Less than 1% of gas liquids production is associated with shrinkage volumes imputed in this manner. Based on the Form EIA-64A survey of 2017, the national weighted average gas equivalents ratio was computed to be 1,422 cubic feet of natural gas shrinkage per barrel of NGPL recovered.

The total shrinkage volume (reported plus imputed) for all plants reporting a given area of origin is 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 is then expressed as a percentage of the wet natural gas production. The expected yield of dry natural gas can then be calculated from wet natural gas proved reserves and proved reserves changes by using the same percentage reduction factor.

A further refinement of the estimation process is used to generate an estimate of the yield of NGPL in those states with coalbed methane fields. The states where this procedure is applied are Alabama, Arkansas, Colorado, Illinois, Indiana, Kansas, Louisiana, Maryland, Montana, New Mexico, Ohio, Oklahoma, Pennsylvania, Tennessee, Utah, Virginia, West Virginia, and Wyoming. Estimates for Illinois, Indiana, and Tennessee are not published individually, but are included in national aggregates. The first step in the process is to identify all Form EIA-23L reported coalbed methane production. The assumption is that coalbed methane fields contain little or no extractable natural gas liquids. Therefore, when the normal shrinkage procedure is applied to the natural gas proved reserves volumes, the estimate of state coalbed methane volumes are excluded and are not reduced for liquid extraction. Following the computation for shrinkage, coalbed methane reserves are added back to each of the dry gas reserves in a state. The effect of this calculation is that the large increases in natural gas proved reserves in some states from coalbed methane fields do not cause errors in the EIA-64A derived estimates of NGPL yields.

**Imputation for Item Non-Response**

Form EIA-23L

Survey questionnaire items for which a response is not received are anticipated to be rare for the sampling method for Form EIA-23L. Non-response items will be imputed, using Equation (1) in the same manner as for the non-sampled cases. In 2017, Form EIA-23L survey response rate was 98% (412 of 418).

Form EIA-64A

Form EIA-64A uses a census frame file to collect data from all active natural gas processing plants. This survey has a 100% response rate. In 2017, Form EIA-64A survey response rate was 100% (535 of 535). NGPL recovery rates are calculated from data supplied on Form EIA-64A. If a plant fails to report data, EIA will follow up with the plant operator to acquire the missing data. In the very rare event the data is lost or unattainable, production data from the Form EIA-816, Monthly Natural Gas Plant Liquids Report, is used to calculate an estimated shrinkage factor for that plant, but this would not provide the area of origin data needed for the natural gas liquids production.

**Frame Maintenance**

Form EIA-23L

Since its inception in 1977, EIA has maintained an oil and natural gas operator sampling frame of the nation’s producers. EIA uses various sources of information to maintain the completeness of the frame, including trade press, other data providers, and state regulatory agencies. EIA plans to maintain the natural gas, crude oil, and lease condensate frame by continuing similar practices.

EIA continuously reviews all available information to adjust the survey frame for the Form EIA-23L data collection for births, deaths, mergers, and company information changes.

Form EIA-64A

Each year, the Form EIA-64A plant frame is compared to listings of natural gas processing plants from the Form EIA-816, Monthly Natural Gas Plant Liquids Report, Form EIA-757, Natural Gas Processing Plant Survey, the LPG Almanac, and the Oil and Gas Journal. A list of possible changes to the plant frame is compiled each year. Telephone calls to the newly-identified plants are conducted to verify their operating status. Changes identified during frame maintenance are coordinated with the Form EIA-816 and EIA-757 program offices at EIA.

**Efforts to Reduce Total Survey Error**

Frame Coverage Errors

In states where a large portion of total proved reserves and production is accounted for by a small number of operators, the EIA-23L frame may have undercoverage because not all operators are included in the sample. These states are not likely to allocate sufficient resources to keep track of all operators on a current basis. Some undercoverage of this type may exist, particularly with respect to crude oil operators. EIA is continuing to work to remedy the undercoverage problem in those states where it has occurred.

Reporting Errors and Data Processing Errors

Reporting errors on the part of respondents are of concern in a survey of the magnitude and complexity of the Form EIA-23L. Several steps have been taken by EIA to minimize and detect such problems. The survey instrument includes a detailed set of instructions for filing data, subject to a common set of definitions similar to those already used by the industry. EIA uses software encoded with a set of edits to validate the data and 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.

Estimation Errors by Respondents

The principal data elements of the Form EIA-23L survey consist of respondent estimates of proved reserves of crude oil, natural gas, and lease condensate. However, until a particular reservoir has been fully produced to its economic limit and abandoned, the proved reserves of the reservoir are not subject to direct measurement, but instead must be inferred from limited, imperfect, or indirect evidence. As a result, respondents cannot perfectly estimate their proved reserves, and such estimates change over time.

Reserves estimates change from year to year as new discoveries are made, as existing fields are more thoroughly appraised, as existing reserves are produced, and as prices and technologies change. Higher fuel prices typically increase proved reserves estimates (positive revisions) as operators consider a broader portion of the resource base economically producible, or proved. Lower prices, on the other hand, generally reduce estimates (negative revisions) as the economically producible base diminishes.

Sampling Errors

As in most establishment surveys, Form EIA-23L reserves and production data are highly skewed. In most states, reserves data for natural gas, oil, and lease condensate are provided by relatively few well operators, and there are many small operators.

The classical ratio estimator (CRE) is model-based and is well-suited for the cutoff sampling design used for the Form EIA-23L. CRE is based on well-established theory with readily available standard error estimators[[1]](#footnote-2). The model-based CRE[[2]](#footnote-3) is quite robust for estimation of both out-of-sample cases and for non-response. Based on the 2017 data, Tables 1 and 2 show EIA estimates of RSEs by state and subdivision

**Table 1: Estimated Natural Gas Reserves RSEs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **State/Subdivision** | **Estimated RSE** |  | **State/Subdivision** | **Estimated RSE** |
| AK Alaska | 2% |  | OH Ohio | 2% |
| AL Alabama | 5% |  | OK Oklahoma | 2% |
| AR Arkansas | 3% |  | PA Pennsylvania | 2% |
| CA 1 Los Angeles Basin Onshore | 5% |  | TX 1 Texas Railroad Commission District 1 | 3% |
| CA 2 California Coastal Region Onshore  | 5% |  | TX 2 Texas Railroad Commission District 2 | 2% |
| CA 3 California San Joaquin Basin Onshore | 5% |  | TX 3 Texas Railroad Commission District 3 | 4% |
| CA 99 California State Offshore  | 5% |  | TX 4 Texas Railroad Commission District 4 | 2% |
| CO Colorado | 2% |  | TX 5 Texas Railroad Commission District 5 | 2% |
| FG Federal Gulf of Mexico Offshore | 3% |  | TX 6 Texas Railroad Commission District 6 | 3% |
| FL Florida | 5% |  | TX 7B Texas Railroad Commission District 7B | 5% |
| FP Federal Pacific Offshore | 2% |  | TX 7C Texas Railroad Commission District 7C | 4% |
| KS Kansas | 7% |  | TX 8 Texas Railroad Commission District 8 | 2% |
| LA N Louisiana North | 2% |  | TX 8A Texas Railroad Commission District 8A | 5% |
| LA S Louisiana South Onshore | 4% |  | TX 9 Texas Railroad Commission District 9 | 3% |
| LA 99 Louisiana State Offshore | 5% |  | TX 10 Texas Railroad Commission District 10 | 3% |
| MI Michigan | 5% |  | TX 99 Texas State Offshore | 5% |
| MS Mississippi | 5% |  | UT Utah | 4% |
| MT Montana | 5% |  | VA Virginia | 5% |
| ND North Dakota | 3% |  | WV West Virginia | 2% |
| NM E New Mexico East | 3% |  | WY Wyoming | 2% |
| NM W New Mexico West | 3% |  |  |  |
| NY New York | 5% |  |  |  |

**Table 2: Estimated Crude Oil Plus Lease Condensate Reserves RSEs**

|  |  |  |  |
| --- | --- | --- | --- |
| **State/Subdivision** | **Estimated RSE** | **State/Subdivision** | **Estimated RSE** |
| AK Alaska | 2% | NM W New Mexico West | 5% |
| AL Alabama | 5% | OH Ohio | 5% |
| AR Arkansas | 5% | OK Oklahoma | 2% |
| CA 1 Los Angeles Basin Onshore | 5% | PA Pennsylvania | 5% |
| CA 2 California Coastal Region Onshore  | 5% | TX 1 Texas Railroad Commission District 1 | 2% |
| CA 3 California San Joaquin Basin Onshore | 2% | TX 2 Texas Railroad Commission District 2 | 2% |
| CA 99 California State Offshore  | 5% | TX 3 Texas Railroad Commission District 3 | 3% |
| CO Colorado | 2% | TX 4 Texas Railroad Commission District 4 | 5% |
| FG Federal Gulf of Mexico Offshore | 3% | TX 5 Texas Railroad Commission District 5 | 5% |
| FL Florida | 5% | TX 6 Texas Railroad Commission District 6 | 5% |
| FP Federal Pacific Offshore | 2% | TX 7B Texas Railroad Commission District 7B | 5% |
| KS Kansas | 5% | TX 7C Texas Railroad Commission District 7C | 2% |
| LA N Louisiana North | 5% | TX 8 Texas Railroad Commission District 8 | 2% |
| LA S Louisiana South Onshore | 5% | TX 8A Texas Railroad Commission District 8A | 2% |
| LA 99 Louisiana State Offshore | 5% | TX 9 Texas Railroad Commission District 9 | 5% |
| MI Michigan | 5% | TX 10 Texas Railroad Commission District 10 | 5% |
| MS Mississippi | 5% | TX 99 Texas State Offshore | 5% |
| MT Montana | 5% | UT Utah | 5% |
| ND North Dakota | 2% | WV West Virginia | 5% |
| NE Nebraska | 5% | WY Wyoming | 2% |
| NM E New Mexico East | 2% |  |  |

Unit Non-response

Non-response is minimal for the Form EIA-23L sampling method and are not anticipated to have a significant impact on published totals. Estimated reserves are published at aggregated levels by geographic region. For states where a large share of total proved reserves is accounted for by a large number of small size operators, errors in estimating aggregated data may be larger than in states where a large share of total proved reserves is accounted for by a small number of large size operators.

## B.3. Maximizing Response Rates

EIA uses standard procedures to conduct the data collections for the Form EIA-23L and Form EIA-64A. An introductory letter signed by a relevant EIA official is sent to each company that is selected for the sample. Follow-up procedures for non-response consist of an email message or a reminder letter (for those not using email) to all companies that do not return a completed survey form by the due date. This reminder communication is followed by repeated email messages, letters, and phone calls until a response is received or other agreeable solution is found.

## B.4. Test Procedures and Form Consultations

The changes to Form EIA-64A were tested through cognitive interview. The results of the study showed that the information being collected on the form is information that respondents maintain in their records as part of their ordinary course of business.

## B.5. Statistical Consultations

For additional information concerning this data collection, please contact Steven Grape at (202) 586-1868, or steven.grape@eia.gov.

1. Royall, R.M.(1970), “On Finite Population Sampling Theory Under Certain Linear Regression Models,” Biometrika, Vol 57, pp. 377-387. [↑](#footnote-ref-2)
2. Knaub, J.R., Jr. (2005), “Classical Ratio Estimator,” InterStat, <http://interstat.statjournals.net/YEAR/2005/abstracts/0510004.php?Name=510004>. [↑](#footnote-ref-3)