**Supporting Statement B**
**for the**
**Natural Gas Data Collection Program Package**
**Office of Management and Budget (OMB) # 1905-0175**

**B.  Collections of Information Employing Statistical Methods**

**B1.  Description of Respondent Universe and Sampling Procedures**

Form EIA-176 is a census survey collecting data from all known interstate and intrastate natural gas pipeline companies, natural gas distributors, underground natural gas storage operators, synthetic natural gas plant operators, and field, well, and processing plant operators that transport gas across State borders and/or deliver gas directly to consumers.  Respondents are required to complete all relevant data items on the form.

EIA has an established procedure for both follow-up of nonrespondents and for verification of data filed.

Data filed on the EIA-176 are aggregated by computer and undergo a series of mathematical checks for reasonableness and accuracy.  Because the EIA-176 is a universe survey, the data are not subjected to any statistical procedures.

Form EIA-191 collects data from all underground natural gas storage operators. Nonrespondents or late filers are contacted by telephone to assure timeliness of this monthly survey.  Previous months' data are used for imputing for nonresponders.  No other statistical procedures are employed.

Form EIA-910 surveys all active natural gas marketers selling to residential and/or commercial consumers in Georgia, New York, and Ohio.  Collection is currently authorized for the States of Florida, Illinois, Maryland, Michigan, New Jersey, Pennsylvania, West Virginia, and Virginia as well as the District of Columbia though collection in the aforementioned States was suspended in May 2011 due to budget constraints.  Nonresponders, late filers, or companies filing questionable data are contacted and required to file or resubmit questionable filings.

Form EIA-757, Schedule A is a census of approximately 500 active natural gas processing plant operators in the United States. Schedule B collects data only if there is a disruption of natural gas supplies. Respondents to Schedule B would be selected from those companies in the frame that are affected by the supply disruption. The selection of respondents to Schedule B, the frequency of the survey submissions, and the corresponding reporting due-date, will be determined at the time Schedule B is activated in response to the supply emergency. Factors that will be considered in identifying the respondents include: the geographic location of the supply emergency, the size and number of processing plants in the supply disruption area, the utility of the information vis-à-vis the U.S. natural gas delivery system, and the burden to respondents. The list of needed respondents to Schedule B would be determined at the time the Schedule is activated in response to a natural gas supply disruption.

Form EIA-857 is a sample of 401 from a universe of approximately 1,300 companies delivering natural gas to consumers including local distribution companies, interstate pipelines, and intrastate pipelines that report on the survey for 2011.  The sample was selected independently for each of the 50 States and the District of Columbia.  Each selected company is required to complete and file the Form EIA-857 on a monthly basis.  Initial response statistics on a monthly basis for recent months show that approximately 98 percent of responses are received and processed by the date the aggregate data tables for the *Natural Gas Monthly* are first released for publication.  Data for non-respondents are estimated.  A new sampling scheme for EIA-857 that will result in 310 respondents being surveyed will be used for 2012 as described in B2.

Form EIA-912 is a sample drawn from the list of the approximately 131 respondents to Form EIA-191, "Monthly Underground Natural Gas Storage Report" for the purpose of preparing estimates of natural gas working volumes in underground storage facilities in each of three regions. The Form EIA-191 is completed by all operators of underground natural gas storage fields in the United States.  Up to 85 of the 131 underground natural gas storage operators are in the EIA-912 sample.  Weekly response to the EIA-912 is generally 97 to 100 percent.

**B2.  Description of Procedures for Collecting Information and Statistical Methodology**

**B2.1.  Methodology for Form EIA-857, "Monthly Report of Natural Gas Purchases and Deliveries to Consumers."**

Sample Design

The Form EIA-857 implements a monthly sample survey of companies delivering natural gas to consumers.  It includes interstate and intrastate pipeline companies and local distribution companies.

The survey provides data that are used each month to estimate the volume of natural gas delivered and the price for direct sales by utilities of natural gas by State to three consumer sectors: residential, commercial, and industrial.

The sample for the EIA-857 survey of "Monthly Report of Natural Gas Purchases and Deliveries to Consumers" is drawn from the frame for the EIA-176 "Annual Report of Natural and Supplemental Gas Supply and Disposition."  If prior historical patterns continue through the renewal period 2012-2014, the EIA projects the EIA-176 frame will consist of approximately 1,500 suppliers in scope of the EIA-857 and hence eligible for sampling.

Beginning in 2012, the EIA proposes to change its sample design from single stage probability-proportional-to-size ("PPS") to a cut off sample In order to reduce respondent burden and decrease processing costs.  Upon careful examination, EIA has determined that the skewness of the volume of reported natural gas within the primary traditional sectors of interest for the EIA-857, residential, commercial, and industrial, are sufficiently large to enable a cut-off design that will maintain estimates of similar quality as under the previous PPS sample design.

One of the purposes of the sample is to provide a ratio useful for scaling the monthly state sector volumes in the sample up to precise estimates of the actual state sector monthly volumes.  In cases where at most two suppliers in a State service a particular sector, all suppliers are included in the cut off sample.  In States with more than two suppliers in a sector, the cut off sample is constructed by adding suppliers in descending order of volume until the change in the ratio of interest is considered statistically insignificant.

The EIA projects a cut off sample constructed as described above should provide estimates of actual State sector monthly volume with a relative standard error not to exceed 5 percent.   The cut off sample will be constructed via computer algorithm to achieve the desired precision for a State sector volume estimate.

The single stage PPS sample design typically yielded approximately 390 respondents for the EIA-857 during 2009-2011.  The cutoff sample approach as described above is expected to reduce this figure to approximately 310 respondents.

Estimation Procedures

***Estimates of Volumes***.  To estimate the total gas sales and deliveries for the State, a ratio estimator is applied to the reported volumes in each State for the sampled companies.

Ratio estimators are calculated for each consumer sector — residential, commercial, and industrial — in each State where companies are sampled using annual data from the most recent submission of Form EIA-176.

The formula for calculating the ratio estimator (T.j) for the volume of gas in a State for consumer sector j is:

$$T_{.j} = \frac{\sum_{i \varepsilon S} y_{ij}}{\sum_{i \varepsilon S} x_{ij}} \quad (1)$$

where:

$y_{ij}$ = the monthly volume within a State for sector j and company i that is an element of the EIA-857 sample, s,

$x_{ij}$ = the annual volume within a State for sector j and company i that is an element of the EIA-857 sample, s.

The ratio estimator is applied as follows:

$$V_{.j} = T_{.j} * X_{.j} \qquad (2)$$

.

where:

$V_{.j}$ = the estimate of monthly gas volumes in a State for consumer sector *j*,

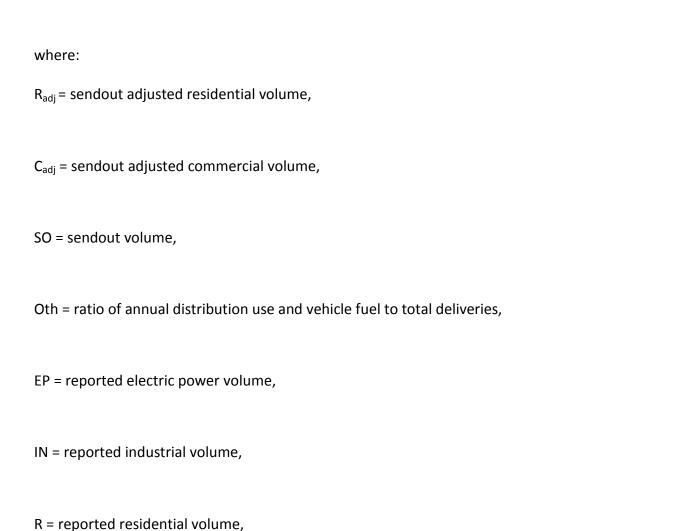$X_{.j}$ = the annual volume within a State for sector j for all companies.

The estimation of residential and commercial consumption requires one additional step than the industrial sector. In this extra step the company level reported volumes are adjusted using sendout. Sendout, which was added to Form EIA-857 for the August 2010 report month, is the total volume of gas dispatched for delivery during a calendar month. It should be noted that the adjusted volumes for the residential and commercial sector are used in equation 2.

The adjustment is implemented by taking reported sendout and removing gas that is consumed in company operations and distribution use as well as gas delivered to electric power, industrial, and vehicle use sectors. The remaining gas is allocated to the residential and commercial sectors proportionally based on reported totals for the report month.

The formulas for adjusting the reported residential and commercial volumes at the company level are:

$$Radj = (SO * (1 - Oth) - EP - IN) * \frac{R}{R+C} \qquad (3)$$

$$Cadj = (SO * (1 - Oth) - EP - IN) * \frac{C}{R+C} \qquad (4)$$

where:

R$_{adj}$ = sendout adjusted residential volume,

C$_{adj}$ = sendout adjusted commercial volume,

SO = sendout volume,

Oth = ratio of annual distribution use and vehicle fuel to total deliveries,

EP = reported electric power volume,

IN = reported industrial volume,

R = reported residential volume,

C = reported commercial volume.

***Computation of Natural Gas Prices***.  While EIA is currently reviewing the calculations of natural gas prices collected from EIA-857 data, the following describes the current monthly price calculation EIA employs using data from Form EIA-857.

The natural gas volumes that are included in the computation of prices represent only those volumes associated with natural gas sales by natural gas companies except as explained below.

The price of natural gas within a State for sector j is calculated as follows:

$$P_j = \frac{R_j}{V_j} \qquad (5)$$

where:

$P_j$ = the average price for gas sales within a State for consumer sector *j*,

$R_j$ = the reported revenue from natural gas sales within a State for consumer sector *j*,

$V_j$ = the reported volume of natural gas sales within a State for consumer sector *j*.

All average prices are weighted by their corresponding sales volume estimates when national average prices are computed.

The monthly average prices of natural gas to residential and commercial consumers in Georgia, New York, and Ohio are monthly average prices of natural gas, based on total sales (sales by local distribution companies and natural gas marketers). For 2005 to 2010, monthly average prices to commercial consumers in DC, FL, MI, PA, and VA were based on total sales. For the same period, monthly average prices to residential customers in FL, NJ, PA, and VA were also based on total sales.

Volumes of gas delivered for the account of others to these consumer sectors are not included in the State or national average prices except in these States.

The price of natural gas in the residential and commercial sectors where EIA-910 data are used is calculated as follows:

$$P_c = \left[ \left( \frac{R_s}{V_s} \right) * \left( \frac{V_s}{V_s + V_t} \right) \right] + \left[ \left( \frac{Rm_s}{Vm_s} \right) * \left( \frac{V_t}{V_s + V_t} \right) \right] \quad (6)$$

where:

$P_c$ = the combined average price for gas sales by local distribution companies and marketers within the State in sector s (residential or commercial),

$R_s$ = the reported revenue from natural gas sales by local distribution companies within the State in sector *s* (residential or commercial),

$V_s$ = the reported volume of natural gas sales by local distribution companies within the State in sector *s* (residential or commercial),

$V_t$ = the reported volume of natural gas transported by local distribution companies for marketers within the State in sector *s* (residential or commercial),

Rm$_s$ = the reported revenue from natural gas sales by marketers within the State in sector *s* (residential or commercial),

Vm$_s$ = the reported volume of natural gas sales by a marketer within the State in sector *s* (residential or commercial).

All natural gas prices to the residential sector represent onsystem sales volumes only except in States where EIA-910 data are used.

***Imputation for Nonrespondents and Edit Failures***.  A volume for each delivered and transported consumer category is imputed for companies that fail to respond in time for inclusion in the published estimates (unit nonresponse) or for which reported volumes have failed the edit and not been confirmed or corrected (item nonresponse).

In the case of unit nonresponse, the imputed volumes for the residential, commercial, and industrial sectors are derived through a multi-stage procedure:

(1) Prediction of monthly volumes for the commercial, industrial, and residential sectors within Census Division.  Census Division refers to the nine divisions into which the U.S. Bureau of the Census groups the 50 States and the District of Columbia for reporting and analysis purposes.

For the commercial and residential sectors, the predicted division volume for a month depends on the heating degree days reported by the National Oceanic and Atmospheric Administration (NOAA) for that month within the Census Division as well as a monthly variable that captures historical trends particular to that month.

For the industrial sector, the predicted division volume for a month depends on the corresponding volume for the previous month, weighted with the intent to capture the effect of gradual changes in the pattern of consumption over the preceding year.

The coefficients are estimated via ordinary least squares multiple linear regression.  The source is a database of monthly sector volumes for the 5 years ending December 31 of the immediately prior calendar year.  Coefficient estimation is restricted to companies reporting continuously during the 5 years.

(2) Allocating the monthly sector volume for a particular respondent based on the respondent's share of that sector volume in the latest Form EIA-176 survey.

Once the predicted division volume for a sector is obtained, it is multiplied by an allocation factor to obtain the imputed sector volume for a respondent.

The allocation factor is the ratio of that respondent's sector volume to the total of all such sector volumes as reported in the latest Form EIA-176 survey.

(3) The final piece of data to be imputed is sendout.  As reported sendout includes volumes consumed distributing natural gas as well as deliveries to vehicle fuel, residential, commercial, industrial, and electric power sectors, the imputation method aggregates estimates for each of these components.  Distribution use and vehicle fuel are currently only collected annually, thus monthly totals are estimated based on annual ratios against total deliveries.  However, once the data are reported consistently for one or more years on the monthly EIA-857, the monthly values for distribution use and vehicle fuel may be deducted instead of the estimated monthly values from annual data.  Industrial and electric power sectors are both calculated using the industrial method that was previously described.  The estimation of the residential and commercial components uses a company specific regression model with localized heating degree data.

In the case of item nonresponse for sendout, the residential and commercial sectors default to the reported values.  Item nonresponse for all other items is handled in the same manner as unit nonresponse.

***Estimation of Revenue***.  The company's previous month's sector-specific price is multiplied by the corresponding sales volume to impute revenue for that sector.

***Adjusting Monthly Data to Annual Data***.  After the annual data reported on the Form EIA-176 have been submitted, edited, and prepared for publication in the Natural Gas Annual, revisions are made to monthly data.

The revisions are made to the volumes and prices of natural gas delivered to consumers that have appeared in the *Natural Gas Monthly (NGM)* to match them to the annual values appearing in the Natural Gas Annual.

The revised monthly estimates allocate the difference between the sum of monthly estimates and the annual reports, according to the distribution of the estimated values across the months.

Before the final revisions are made, changes or additions to submitted data received after publication of the monthly estimate and not sufficiently large to require a revision to be published in the NGM, are used to derive an updated estimate of monthly consumption and revenues for each State's residential, commercial, or industrial natural gas consumption.

For each State, two numbers are revised, the estimated consumption and the estimated price per thousand cubic feet.

The formula for revising the estimated consumption is:

$$V_{jm}^* = V_{jm}\left(\frac{V_{ja}}{V_{jm}'}\right) \qquad (7)$$

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where:

$V^*_{jm}$ = the final volume estimate for month m in consumer sector j,

$V_{jm}$ = the estimated volume for month m in consumer sector j,

$V_{ja}$ = the volume for the year reported on Form EIA-176,

$V'_{jm}$ = the annual sum of estimated monthly volumes.

The price is calculated as described above in the Estimation Procedures section, using the final revised consumption estimate and a revised revenue estimate.

The formula for revising the estimated revenue is:

$$R^*_{jm} = R_{jm}\left(\frac{R_{ja}}{R'_{jm}}\right) \qquad (8)$$

where:

$R^*_{jm}$ = the final revenue estimate for month m in consumer sector j,

$R_{jm}$ = the estimated revenue for month m in consumer sector j,

$R_{ja}$ = the revenue for the year reported on Form EIA-176,

$R'_{jm}$ = the annual sum of estimated monthly revenues.

***Revision of Volumes and Prices for Deliveries to Electric Power Sector***.  Revisions to monthly deliveries to the electric power sector are published throughout the year as they become available.

***Reliability of Monthly Data.***  The monthly data published in this report are subject to two sources of error:  nonsampling error and sampling error.  Nonsampling errors occur in the collection and processing of the data.

Sampling error may be defined as the difference between the results obtained from a sample and the results that a complete enumeration would provide. The standard error statistic is a measurement of sampling error.

***Standard Errors***. A standard error of an estimate is a statistical measure that indicates how the estimate from the sample compares to the result from a complete enumeration.

The standard errors for monthly natural gas volume and price estimates by State are published monthly in the *Natural Gas Monthly*. They are constructed so that over the long run the true value is within two standard errors of its estimate 95% of the time. For volume estimates, the relative standard error (RSE) is published as a percent. Standard errors of prices are expressed in dollars.

The relative standard error of a natural gas volume estimate is the square root of the variance of the estimate divided by the published volume. The formula for calculating the variance of the volume estimate is:

$$Var(V_{\cdot j}) = \sigma_\epsilon^2 \sum_{i=n+1}^{N} x_{ij} + \left( \sigma_\epsilon^2 \Big/ \sum_{i=1}^{n} x_{ij} \right) \left( \sum_{i=n+1}^{N} x_{ij} \right)^2 \qquad (9)$$

where:

$V_{\cdot j}$ = the estimate of monthly gas volumes in a State for sector j,

$\sigma_\epsilon^2 = \sum_{i=1}^{n} \sigma_{oi}^2 \Big/ (n-1)$, the sum of squared residuals,

$\sigma_{oi} = \dfrac{(y_{ij} - T_{\cdot j} x_{ij})}{\sqrt{x_{ij}}}$, the weighted residual for company i,

$T_{\cdot j}$ = the ratio estimator defined in equation 1,

$x_{ij}$ = the reported annual volume for company i in sector j,

$y_{ij}$ = the reported monthly volume for company i in sector j,

$n$ = sample size ( i > n implies company i not in sample),

N = frame size.

As the price of natural gas is calculated as a quotient of revenue to volume, the approximate standard error of natural gas prices is derived using the variance properties of a quotient. The variance of revenue is calculated in the same manner as the volumes described in equation 9, with revenue substituted for volume. The formula is for calculating the approximate standard error of prices is below:

$$SE(P_j) = \sqrt{Var(P_j)} = \sqrt{Var\left(\frac{R_j}{V_j}\right)}$$

$$\approx \sqrt{\left(\frac{E(R_j)}{E(V_j)}\right)^2 * \left(\frac{Var(R_j)}{E(R_j)^2} + \frac{Var(V_j)}{E(V_j)^2} - 2\left(\frac{Cov(R_j, V_j)}{E(R_j) * E(V_j)}\right)\right)} \qquad (10)$$

where:

$P_j$ = natural gas price in sector j,

$R_j$ = natural gas revenue in sector j,

$V_j$ = natural gas volume in sector j,

$E(V_j)$ = expected value of volume in sector i, which is the $T_{.j} * X_{ij}$ product in equation 2,

$E(R_j)$ = expected value of revenue in sector j calculated in the same manner as the $T_{.j} * X_{ij}$ product in equation 2,

$Var(V_j)$ = the variance of volume in sector j calculated using equation 9,

$Var(R_j)$ = the variance of revenue in sector j calculated in the same manner as equation 9,

Cov($V_{ij}$,$R_j$) = the covariance between revenue and volume in sector.


## B2.2. <u>Methodology for EIA-912, Weekly Natural Gas Storage Report</u>.

The EIA prepares weekly estimates of working gas in storage using the methodology described below. The overall approach is to collect weekly survey data from a sample of operators of underground storage facilities and to prepare regional and national estimates based on the relationship between the weekly sample and the larger universe of storage operators reporting to EIA on the Form EIA-191, an existing monthly survey of the same population. The following describes the weekly survey form and survey processing procedures, the methodology for sample selection and estimation, and procedures relating to revisions and data security.

<u>Survey Processing</u>

The goal of the program is to provide weekly estimates of the level of working gas in underground storage for the Lower 48 States and three regions. The total volume of natural gas in underground storage reservoirs is classified as either base gas or working gas. Underground storage facilities may be reservoirs in depleted oil and gas fields, aquifers, or salt caverns. The Form EIA-912 requests reports of the volumes of working gas in storage as of 9 a.m. Friday of the previous week from a sample of underground natural gas storage operators. Respondents are asked to provide data representing working gas in storage fields their company operates in each of three regions of the United States. The three EIA storage regions are composed of the states below:

- *Producing Region*:  Texas, Louisiana, Kansas, Oklahoma, New Mexico, Arkansas, Mississippi, and Alabama;
- *East Region*:  Connecticut, Delaware, District of Columbia, Florida, Georgia, Iowa, Illinois, Indiana, Kentucky, Massachusetts, Maryland, Maine, Michigan, Missouri, North Carolina, Nebraska, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, South Carolina, Tennessee, Vermont, Virginia, Wisconsin, and West Virginia; and
- *West Region*:  Arizona, California, Colorado, Idaho, Minnesota, Montana, Nevada, North Dakota, Oregon, South Dakota, Washington, Wyoming, and Utah.

Respondents are also instructed to submit revisions to data for previous weeks if those revisions were greater than 500 million cubic feet and to include notes explaining any unusual activity. Examples of unusual activity might include reclassification of working and base gas or changes in ownership or operation of storage fields.

The EIA employs a number of editing processes to ensure that the data collected each week are accurate. For example, current week's data are compared with data reports for the previous week, to data reports from companies with facilities that are similar in size and type, and to compilations of the monthly data reports for the company's fields on the EIA monthly storage form, EIA-191. The EIA also employs secondary source information such as weather data and

stock or net change predictions in evaluating the validity of reported data.   Companies with responses outside the edit bounds or with notes about special issues are contacted by survey personnel for confirmation or correction. An explanation will be obtained and accommodated in the estimation process, if necessary.

<u>Sampling and Estimation</u>

The sample for the EIA-912 is drawn from the list of respondents to Form EIA-191, "Monthly Underground Natural Gas Storage Report," for the purpose of preparing estimates of natural gas in underground storage facilities in each of three regions. The Form EIA-191 is completed by all operators of underground natural gas storage fields in the United States.  Approximately 135 underground natural gas storage operators report on Form EIA-191 for their operations at approximately 411 storage fields.  To prepare the sampling frame for the EIA-912 for each region, reported volumes of working gas in storage as reported on the Form EIA-191 are aggregated by storage operator and region.

For each region, two strata are formed: a certainty stratum from which all operators are selected and a noncertainty stratum from which other operators are selected with probability proportional to size. A special stratification is performed to distinguish salt and non-salt fields for the Producing Region. Companies that operate at least one salt cavern field are designated salt companies if salt cavern operations constitute the majority of working gas storage volumes. A rigorous statistical analysis of monthly storage data from the EIA-191 examined the hypothesis that working gas stock patterns differ for salt and non-salt companies.  The results verified that the salt companies have different patterns of working gas in storage than the non-salt companies. Given the relatively small number of salt fields in the East and West Regions and that salt cavern operators constitute a significant proportion of working gas volumes in the Producing Region, the stratification is limited to the Producing Region.  The certainty stratum consists of the larger operators in the region as well as all operators with storage fields in more than one region. The probability of selection for members of the noncertainty stratum is proportional to their working gas volume based on the EIA-191 data.  A stratified sample of companies is selected from the list of operators to achieve a target standard error of the estimate of working gas in storage that is no greater than 5 percent of the estimate for each region.  The current sample of 77 respondents accounts for more than 90 percent of the average reported working gas in storage in each region.

The sample is planned to be reselected regularly with the new sample selected based on the working gas volumes submitted on Form EIA-191. Companies in the certainty stratum, because of their large size, may be expected to continue to qualify as certainty companies, but will be re-examined to determine if they still qualify for inclusion in the certainty stratum. Companies not qualifying for inclusion in the certainty stratum will be considered for sampling in the noncertainty stratum. Those selected from the noncertainty groups are subject to change during sample reselection.

The method of estimation uses both a 12-month moving average of working gas volumes (based on the latest published EIA-191 monthly data), and the latest EIA-912 weekly data. The trends exhibited by the data from the weekly sample group are used to estimate the latest weekly values for the storage operators not reporting on the EIA-912. Each individual company outside the weekly sample is considered based on its own past history in the monthly data from the EIA-191 survey and the weekly behavior of sampled companies within the same stratum. These company-level weekly estimates of working gas stocks for the reporting and non-reporting operators are summed to form the weekly estimated total for each of the four noncertainty strata.

More specifically, for each company in the EIA-191 frame, 12-month equal-weighted moving averages and corresponding standard deviations and coefficients of seasonal variation are computed as described below. For each weekly reporting company $i$, we calculate a company-level ratio, $r_{i,t}$, of the weekly stock volume reported in the EIA-912 for week $t$ ( $w_{i,t}$ ) to the most recent available 12-month moving average of reported monthly stock volumes.

$$r_{i,t} = \frac{w_{i,t}}{\overline{m}_{i,T}},$$

where $\overline{m}_{i,T} = \frac{1}{12} \sum_{k=T-11}^{T} m_{i,k}$ , and $T$ represents the reference month for the most recent available monthly stock volume $m_{i,T}$ reported by company $i$. (Usually month $T$ is 2 or 3 months prior to the month that includes week $t$.) For each sampling stratum $k$, let $R_{k,t}$ represent the median value of $r_{i,t}$ for all weekly-reporting companies $i$ in the stratum. In addition to the mean ( $\overline{m}_{i,T}$ ), the standard deviation across months ( $\hat{\sigma}_{i,T}$ ) and a coefficient of seasonal variation ( $c_{i,T}$ ) are calculated for $\overline{m}_{i,T}$ :

$$\hat{\sigma}_{i,T} = \sqrt{\frac{1}{12} \left( \sum_{k=T-11}^{T} \left[ m_{i,k} - \overline{m}_{i,T} \right]^2 \right)} , \text{ and } c_{i,T} = \frac{\hat{\sigma}_{i,T}}{\overline{m}_{i,T}} .$$

Let $j$ denote a company in stratum $k$ that is not in the weekly-reporting sample, and let

$$\overline{m}_{j,T} = \frac{1}{12} \sum_{k=T-11}^{T} m_{j,k} . \text{ We compute } \hat{\sigma}_{j,T} \text{ and } c_{j,T} \text{ as described above for the weekly-reporting}$$

units. Let $C_{k,T}$ denote the median of the $c_{i,T}$ for weekly-reporting companies in stratum $k$. The volume of natural gas stored by company $j$ in week $t$ is estimated as

$$\hat{w}_{j,t} = \overline{m}_{j,T} R_{k,t}^{p(j)},$$

where $p(j) = \dfrac{c_{j,T}}{C_{k,T}}$, a factor representing the seasonal pattern of company $j$ relative to that of

weekly-reporting companies in stratum $k$.

The company-level estimation equation captures the seasonal variation of a specific company relative to that of weekly-reporting companies in its stratum. The generality of the estimation equation makes it quite flexible and capable of representing a wide variety of possibilities. For example, if a given company has no variation over the previous 12 months for which data are available, so that $c_{j,T} = 0$, the estimation equation implies that the latest weekly volume is equal to the 12-month moving average ($\hat{w}_{j,t} = \overline{m}_{j,T}$). If the company's variation matches the median pattern of its stratum, then $c_{j,T} = C_{k,T}$, and the estimation equation implies that the latest weekly volume is equal to the strict moving average estimator ($\hat{w}_{j,t} = \overline{m}_{j,T} R_{k,t}$).

EIA estimates current working gas inventory for a region as the sum of two total components: the total volume of the reporting companies and the total of the estimated volumes for companies not reporting on the weekly (the Producing-Salt and Producing-Nonsalt strata are combined to obtain the Producing region total). For each stratum $k$, the estimated volume of working gas stored in week $t$ is computed as:

$$\hat{Y}_{k,t} = \sum_{i=1}^{n_k} w_{i,t} + \sum_{j=1}^{N_k - n_k} \hat{w}_{j,t},$$ where $N_k$ is the number of companies in stratum $k$, and $n_k$ is the

number of weekly-reporting companies. Estimates for the Producing region are computed by adding the estimates from the Producing-Salt and Producing-Nonsalt strata.

The estimate for the Lower 48 States is the sum of the estimates for the three regions.

The estimation technique is not model-based. However, specific 12-month moving averages and their associated coefficients of seasonal variation are updated with the most recent month's data as the data become available. Additional adjustments to the working gas data will be incorporated on an ongoing basis as necessary. Some examples are discussed below.

***Reclassification of base and working gas by a sample company***. Occasionally, operators of storage fields decide to change the classification of some of the gas in the storage field from base gas to working gas or from working gas to base gas. Because the EIA-912 is a survey of working gas, this reclassification leads to an apparent change in the volume of available gas. A reclassification of significant size is handled by including the reclassified working gas volume in the data used for the calculations of the 12-month moving average and the coefficient of variation. When EIA observes such a change in classification, EIA notifies report users of this

change in inventory levels with a note about the reclassification if the effect of the reclassification and other changes are 7 billion cubic feet or more.

***Purchase or sale of storage field***.  The adjustments to the estimation system will vary depending on whether the company is in the sample company or non-sample company groups.

***Startup or shutdown of a field***.  Field shutdowns are handled by simply eliminating the company's record, in the case of a single-field company, or by removing the associated volume from the 12-month moving average for the appropriate company.   In the case of a field startup, the moving average is based on the available information from the EIA-191 survey, so a complete 12-month average is not formed until a year's worth of data is reported on the EIA-191.  Field startups with working gas volumes exceeding a certain threshold level will become part of the EIA-912 sample.

***Negative values***.  Although not a common occurrence, from time to time a company may report a negative working gas value, which may be caused by removal of base gas from storage in anticipation of sale or abandonment of a storage field or withdrawal from base gas at the end of the withdrawal season. When confirmed negative values are received for a field expected to be shut down, a value of zero is entered into the database. If the report is caused by temporary withdrawals from base gas, such as occurred toward the end of winter 2002-2003, EIA announces the occurrence and describes the adopted changes in estimation procedures at that time.

Imputation

Occurrences of non-response or data quality issues of individual companies are addressed through implicit or explicit imputation. Imputation of company data values for any stratum occurs either by treating the nonrespondent as a company not reporting on the weekly or by using company-specific linear extrapolation methods based on the most recent data in which relative changes for the stratum as a whole are applied to the nonresponding company's previous week's reported inventory level.

Weekly Report

The result of estimation for the most recent and current weeks, any revision to the estimates for the prior week, and historical data to use for comparisons are presented in the *Weekly Natural Gas Storage Report,* which will be posted at 10:30 a.m. on Thursday on the EIA web site at http://tonto.eia.doe.gov/oog/info/ngs/ngs.html except for certain weeks in which Federal Holidays occur.

Revisions

Revisions may be presented for the most recent estimates of working gas in storage under a number of circumstances that occur after release of the estimates. These include:

(1) A respondent revises previously submitted data (respondents are requested to submit revisions if the change is greater than 500 million cubic feet);
(2) A respondent submits late data for the week;
(3) A respondent reports a change in field operating status.

***General EIA "Weekly Natural Gas Storage Report" (WNGSR) Revisions Policy***. Revisions generally are disseminated in the *WNGSR* according to the established schedule and shall occur when the effect of reported changes is at least 7 billion cubic feet (Bcf) at either a regional or national level. If a revision is made, changes to all regions shall be recorded. Consequently, although all respondents' changes shall be entered into EIA's database for editing, imputation, and other analytic purposes, the changes shall only lead to a published revision when it is at least 7 Bcf. In the event of a cumulative revision of 10 Bcf or more at either a regional or national level, a special release of the *WNGSR* may occur as described below. The general policy was announced in a November 2002 *Federal Register* notice, a copy of which is available at http://www.eia.doe.gov/oss/WNGSR-Revision-Policy-Nov12-2002.pdf.  Subsequently, EIA in early 2005 solicited via *a Federal Register* notice (70 FR 1426-28) public comment on possible modifications to the existing revision policy to allow certain releases on an unscheduled basis. The response to that solicitation resulted in the following policy that was announced in a *Federal Register* notice published on April 26, 2005.

***EIA WNGSR Policy to Allow Unscheduled Release of Revisions***. The unscheduled release of revisions to weekly estimates of working gas held in underground storage shall occur when the cumulative effect of data changes or corrections is at least 10 Bcf for the current or prior week. Revisions shall be disseminated on a Federal workday between 2:00 p.m. and 2:10 p.m. (Eastern Time) following notice of the pending release to the public between 1:00 p.m. and 1:10 p.m. (Eastern Time). If a revision is made, changes to all affected regions shall be recorded in the 2:00-2:10 p.m. release. Public notification will occur in a number of ways including a Web site notice of the impending release of revised data that will replace the current *WNGSR*, e-mail notification to selected media, and an e-mail notice that will be sent to all users of *WNGSR* data who have signed onto a free distribution service. There are two special circumstances related to handling certain data changes in the *WNGSR*. First, this unscheduled release policy will not apply to data changes resulting from changes in the estimation methodology or parameters because those changes will be announced in advance. Second, reclassification of gas (between working gas and base gas inventories) will be reported only in regularly-scheduled releases of the *WNGSR*. The policy for unscheduled releases of revisions was announced in April 2005 as a *Federal Register* notice (70 FR 21406-08), a copy of which is available at http://www.eia.doe.gov/oss/WNGSR-Unscheduled-Release-Policy-Final-April2005.pdf.

Security

Several steps have been taken to assure protection and security of respondent data and estimates during data processing and report preparation. One example is that respondent data can be submitted using the secure file transfer (SFT) e-mail system to EIA. SFT is based on the secure hypertext transfer protocol (HTTPS), an industry standard method to send information over the web using a secure, encrypted process. All information is protected by 128-bit encryption to maintain the privacy and protection of transmitted data. See Section A10 for a discussion on protection of the data.

For the EIA-912, a number of additional actions regarding data security also have been taken. One example is the decision to operate the data processing and estimation system on computers that are not connected to the EIA network. When estimates are ready to be released on the EIA website, they are transferred to the EIA network on disks. This prevents unauthorized access of the estimates by hacking into the EIA system and it also prevents accidental early release of data.

## B3.  Methods to Maximize Response Rates

To maximize response rates, forms are designed to be easily completed, and instructions are written to be clear, concise, and easily understood.  Forms are mailed as early as possible to maximize the time that respondents have to complete the surveys.  Also, the forms and instructions are available from EIA's internet site.

Survey nonrespondents are contacted by telephone to discuss the requirement to file and any problems or questions that are delaying filing.  Follow-up letters regarding the failure to file may also be mailed to nonresponders.

Specific schedules are followed for telephone calls and letters to nonrespondents for the various surveys.  Every effort is made to assist respondents in completing the survey and submitting them in a timely manner.

Response to the EIA's surveys is typically very high. Every effort is made to assist respondents in completing the surveys and submitting them in a timely manner.

## B4.  Tests of Procedures

The natural gas surveys are established continuing surveys.  Modifications to all of the existing forms were made by the EIA staff in conjunction with discussions with industry representatives and consultations through the Federal Register notice discussed earlier. These actions served as a test of the availability of data and the clarity of instructions of the survey forms, as well as the proposed modifications.

**B5.  <u>Forms Consultation</u>**

For additional information concerning the survey designs, please contact Amy Sweeney at (202) 586-2627.  For more information regarding the approval request, please contact Alethea Jennings at (202) 586-5879.