Explanatory Notes

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The EIA-782 Survey

Background

The EIA-782 surveys were implemented in 1983 to fulfill the data requirements necessary to meet Energy Information Administration (EIA) legislative mandates and user community data needs. The requirements include petroleum product price, market distribution, demand (or sales), and product supply data, which are needed for a complete evaluation of petroleum market performance. The EIA-782 series includes the Form EIA-782A, "Refiners'/Gas Plant Operators' Monthly Petroleum Product Sales Report"; Form EIA-782B, "Resellers'/Retailers' Monthly Petroleum Product Sales Report"; and Form EIA-782C, "Monthly Report of Prime Supplier Sales of Petroleum Products Sold for Local Consumption."

The Form EIA-782A collects refiner and gas plant operator monthly price and volume data at a State level on 14 petroleum products for various retail and wholesale marketing categories. The Form EIA-782B collects reseller/retailer monthly price and volume data at a State level for gasoline, No. 2 distillate, propane, and residual fuel. The Form EIA-782C collects prime supplier monthly volume data on 15 petroleum products. The EIA-782 forms were modified in October 1993 to reflect the changes in refined petroleum products arising out of the requirements of the Clean Air Act Amendments of 1990 (CAAA). The CAAA require that oxygenated gasoline be sold during the winter months in carbon monoxide nonattainment areas beginning October 1, 1992. They require that reformulated gasoline be sold in ozone nonattainment areas beginning January 1, 1995. Beginning October 1, 1993, diesel fuel sold for on-highway use must be low-sulfur diesel fuel (i.e., diesel fuel containing less than or equal to 0.05 percent sulfur). As a result of these environmental regulations, gasoline data collected on the EIA-782 forms were divided into *conventional*, *oxygenated*, and *reformulate*d categories. Diesel fuel sales were separated into low- and high-sulfur categories. The wholesale gasoline categories on the EIA-782A and EIA-782B forms were also modified to include *dealer tank wagon*, *rack*, and *bulk* sales. The retail categories for propane on the EIA-782A and EIA-782B were expanded to include *residential*, *commercial/institutional*, *industrial*, *sales through company-operated retail outlets*, *petrochemical*, and *other end user* sales.

Discussion of Sample Design

The Form EIA-782A is sent to a census of refiners and gas plant operators. Respondents are selected with certainty due to their small number and because of the relative size of their sales volume.

The Form EIA-782B is sent to a scientifically selected sample of motor gasoline resellers, and distillate, propane, and residual fuel oil resellers and retailers. The Form EIA-863, "Petroleum Product Sales Identification Survey," served as the basis of the sampling frame of dealers. Information obtained from the Form EIA-863 is supplemented with information from the Form EIA-821, "Annual Fuel Oil and Kerosene Sales Report." The sales volumes obtained from these surveys are used to assign measures of size for sampleing. Dealers comprising 5 percent or more of sales in a State were selected with certainty. The remaining units on the frame were each assigned a probability of selection. In this design, the probability was based on the size of the company, as determined by their sales volume, relative to the total for all companies for each geographic area and type-of-sale classification relevant for that company. In addition, a random number between 0 and 1 was assigned to each company. The companies were then ordered by the ratio of the random number minus the random number times the probability to the probability minus the random number times the probability (r-rp)/(p-rp). The first 2,200 companies in this ordering were then selected for the sample. The noncertainty companies were then post-stratified within each geographic/type-of-sale category by their volume. The sample weights, the inverse of the probabilities, were

multiplied by the sample expectation adjustment which was the ratio of the sum of the probabilities of selection for all frame units in the stratum to the actual sample size of the stratum.

The geographic areas were defined as (a) the 24 States in which No. 2 distillate was a significant heating source and 50 States and the District of Columbia for residual and motor gasoline, (b) the 25 States in which propane was a significant energy source, or as (c) the PAD Districts for districts where not all State estimates are provided. The type-of-sale classifications were retail and resale for motor gasoline and residual fuel oil, and residential and nonresidential retail and wholesale for distillate and propane. Four volume-of-sales strata (certainty, zero, low, and high) were defined with volume boundaries differing by State, sales type, and product.

The design of the EIA-782B sample was based on ten target variables: total retail motor gasoline, total wholesale motor gasoline, residential No. 2 fuel oil, other retail No. 2 fuel oil, total wholesale No. 2 fuel oil, residential propane, total other retail propane, wholesale propane, total retail residual fuel oil, and total wholesale residual fuel oil. A sample size of 2,200 was expected to yield a median level of accuracy for each target variable of volume coefficients of variation (CV) of 15 percent for No. 2 distillate and 10 percent for the other products, determined at the publishable State level (24 States for distillate, 25 for propane, 50 States and the District of Columbia for motor gasoline and residual). Studies on the relationship of volume CV to price CV have shown that this will produce price CVs of less than 1 percent. The reliability of current month estimates will vary from these goals due to the deterioration of the frame over time and the changing distributions of price and volume.

Prior to March 1997, the sample design was a linked stratified sample. Within each product, sales type, and geographic area, companies were stratified by the size of the company as determined by their sales volumes. The samples resulting from the separate stratification schemes were combined by means of joint linked selection to yield a sample size of approximately 3,500 companies. Prior to October of 1993, the sample design, the survey sample, and the survey form did not include propane.

The Form EIA-782C was sent to all prime suppliers of any of the selected products on the EIA-782C. A prime supplier is a firm that produces, imports, or transports any of the selected petroleum products across State boundaries and local marketing areas and sells the product to local distributors, local retailers, or end users. They were selected with certainty due to their small number and the relative size of their sales volumes.

Discussion of the Sampling Frame

The EIA-782A survey consists of a census of respondents who either directly or indirectly control a refinery or gas plant facility. The EIA-782A form collects sales data on 14 refined petroleum products. Currently, 134 companies respond to the EIA-782A survey.

The EIA-863 data base provided the sampling frame for the EIA-782B survey. The Form EIA-863, "Petroleum Product Sales Identification Survey," was mailed to approximately 22,000 companies in January 1995, in order to collect 1994 State-level sales volume data for No. 2 distillate, residual, and motor gasoline. The No. 2 distillate data were further identified by residential/nonresidential end-use and non-end-use sales, while the residual and motor gasoline data were identified by end-use and non-end-use sales. The mailing list for the EIA-863 survey was constructed by merging and unduplicating the previous master frame file and approximately 71 State and commercial lists.

Data from the 1994 EIA-821, "Annual Fuel Oil and Kerosene Sales Report" survey were merged with data from the EIA-863 survey to yield a combined file. A transformed and edited version of this file was created to form the sample file used to design and select the EIA-782B sample.

NOTE: Service stations and smaller truck stops selling No. 2 diesel fuel were not specifically included in the frame. Therefore, the EIA-782B end-use category, "sales through company outlets," does not incorporate all sales of No. 2 distillate.

The EIA-782C survey consists of a census of suppliers who produce, import, or transport any of the 15 refined petroleum products listed on the form across State boundaries and local marketing areas, and who sell the product to local distributors, local retailers, or end users. Currently, 214 firms respond to the EIA-782C survey.

Reliability of Data

There are two types of errors possible in an estimate based on a sample survey: sampling and nonsampling. Sampling errors occur because observations are made only on a sample, not on the entire population. Non-sampling errors can be attributed to many sources in the collection and processing of data. The accuracy of survey results is determined by the joint effects of sampling and nonsampling errors.

Measures of Sampling Variability

Tables 14 through 18, 31 through 34, and 38 through 41 utilize a sample of nonrefiners and, therefore, have sampling error. The remainder of the tables published are based on census data; therefore, there is no error due to sampling. The particular sample used for the EIA-782B is one of a large number of all possible samples that could have been selected using the same design. Estimates derived from the different samples would differ from each other. The average of these estimates would be close to the estimate derived from a complete enumeration of the population (a census), assuming that a complete enumeration has the same nonsampling errors as the sample survey.

The sampling error, or standard error of the estimate, is a measure of the variability among the estimates from all possible samples of the same size and design and, thus, is a measure of the precision with which an estimate from a particular sample approximates the results of a complete enumeration.

Nonsampling Errors

Nonsampling errors can be attributed to many sources: (1) inability to obtain complete information about all cases in the sample (i.e., nonresponse), (2) response errors, (3) definitional difficulties, (4) differences in the interpretation of questions, (5) mistakes in recording or coding the data obtained, and (6) other errors of collection, response, coverage, and estimation for missing data. These nonsampling errors also occur in complete censuses.

Although no direct measurement of the biases due to nonsampling errors can be obtained, precautionary steps were taken in all phases of the frame development and data collection, processing, and tabulation processes, in an effort to minimize their influence. In addition, the close cooperative consultation between EIA and the EIA-782 survey respondents and data users results in a more accurate information gathering and reporting process.

Imputation and Estimation

Survey data gathered from the respondents invariably contain incomplete reporting, nonresponse, and values that fail editing. These missing data are estimated, or imputed for, as follows. First, for all survey units, the previous month's reported value and the previous month's predicted value are weighted together to yield a predicted value for the current month. The sum of the weighted, predicted values for nonrespondents in the current month is then multiplied by a chain link multiplier (the ratio of the sum of the weighted, reported values for respondents in the current month to the sum of the weighted, predicted values for respondents in the current month). The resulting estimate for nonreported values is then added to the reported values. That is,

$$\hat{V}_{t.} = \sum_{R,h} W^*_{i,h}\, V_{i,h,t} + \sum_{NR,h} W^*_{j,h}\, V'_{j,h,t}$$

and similarly

$$\hat{Q}_{t.} = \sum_{R,h} W^*_{i,h}\, V_{i,h,t}\, P_{i,h,t} + \sum_{NR,h} W^*_{j,h}\, V'_{j,h,t}\, P'_{j,h,t}$$

where

$$V'_{j,h,t} = \frac{\sum_{R,h,PADD} W^*_{i,h}\, V_{i,h,t}}{\sum_{R,h,PADD} W^*_{i,h}\, \tilde{V}_{i,h,t}}\, \tilde{V}_{j,h,t}$$

$$P'_{j,h,t} = \frac{\sum_{R,h,PADD} P_{i,h,t}}{\sum_{R,h,PADD} \tilde{P}_{i,h,t}}\, \tilde{P}_{j,h,t}$$

and,

$$W^*_{i,h} = \frac{\sum^{N_h} \frac{i}{W_{i,h}}}{n_h} \quad (W_{i,h})$$

$W_{i,h}$ = the weight for company i in stratum h. For resellers/retailers responding to

EIA-782B, $W_{i,h}$ is inversely proportional to the probability of inclusion. For all certainty units $W_{i,h}$ = 1. The certainty units are all respondents to the EIA-782A, the EIA-782C, and the units selected with certainty for the EIA-782B.

N_h = total number of population units in stratum h,

n_h = number of sampled units in stratum h,

$\sum_{R,h}$ = summation across current month respondents i, all strata

$\sum_{NR,h}$ = summation across current month nonrespondents j, all strata

$V_{i,h,t}$ = current month (t) reported volume for company i, in stratum h

$P_{i,h,t}$ = current month (t) reported price for company i, in stratum h

$\hat{V}_t$ = current month (t) estimated total volume,

$\hat{Q}_t$ = current month (t) estimated total revenue,

$\tilde{V}_{i,t}$ = current month (t) predicted volume for company i, respondent,

$\tilde{P}_{i,t}$ = current month (t) predicted price for company i, respondent,

$$\tilde{V}_{i,t} = \alpha V'_{i,t-1} + (1-\alpha)V_{i,t-1}$$

$$\tilde{P}_{i,t} = \alpha P'_{i,t-1} + (1-\alpha)P_{i,t-1}$$

where

$V_{i,t-1}$ = previous month (t-1) reported volume for company i,

$P_{i,t-1}$ = previous month (t-1) reported price for company i,

α = constant between 0 and 1, set by form, product, type of sale and price or volume,

and

$$\hat{P}_{t.} = \frac{\hat{Q}_{t.}}{\hat{V}_{t.}},$$

the resulting estimate of price at the published level for month t.

Multiple product data collection and linked sample selection yield two types of respondents: basic and supplemental. Both types are used for imputation, estimation, and standard errors.

The variance estimate is :

$$VAR(\hat{P}_{t.}) = \frac{1}{\hat{V}_{t.}^2} \sum_k N_k^2 n_k (1-f_k) \frac{M_k}{(\sum_i W_{ik})^2}$$

where

N_k = the number of population units in group k,

n_k = the number of basic and volunteer respondents in group k,

W_{ik} = the sampling weight for respondent i in group k,

$$f_k = \frac{n_k}{N_k}$$

and $\hat{P}_{t.}$ and $\hat{V}_{t.}$ are previously defined.

The term M_k is computed as follows:

$$M_k = \frac{\sum_i (M_{ik})^2}{n_k - 1}$$

where

$$M_{ik} = W_{ik}V_{ik}D_{ik} - \frac{W_{ik}}{(\sum_i W_{ik})} \times (\sum_i W_{ik}V_{ik}D_{ik})$$

and

$D_{ik} = P_{ik} - \hat{P}_{t.}$

V_{ik} = reported volume for respondent i in group k

P_{ik} = reported price for respondent i in group k.

Data Continuity

When the EIA-782 series was implemented in 1983, it replaced prior surveys that had been used to meet the Energy Information Administration's data requirements. The Form EIA-782A replaced the refiner and gas plant operator portions of the Form EIA-460, "Petroleum Industry Monthly Report for Product Prices"; and Form EIA-9A, "No. 2 Distillate Price Monitoring Report"; the Form EIA-782B replaced the nonrefiner portions of the Form EIA-460 and Form EIA-9A; and the Form EIA-782C replaced Form EIA-25, "Prime Supplier's Monthly Report."

Since the transition from the EIA-460, the EIA-9A, and the EIA-25 to the EIA-782 took place over a period of 4 months, rather than occurring at one time, it was possible to compare data from the predecessor surveys with data from the new survey during the transition period for some data elements. This comparative analysis yielded adjustment factors which reflected the estimated overall effect of the changes.

These adjustment factors were applied to the appropriate predecessor survey prices to yield a backcast estimate. A complete description of the estimation of historical data prior to January 1983 is contained in the feature article of the December 1983(3) issue of the PMM.

The backcast price estimation employed the predecessor survey published price as the initial approximation. The initial approximation, however, frequently represented less aggregated product categories and more aggregated seller / sales categories. Therefore, more comparable product categories were formed by volume weighting the disaggregated predecessor survey product prices. For the EIA-9A, comparable categories were formed by subtracting from the price the average taxes reported. Comparable seller / sales categories were formed by multiplying the predecessor price by the ratio of the EIA-782 price for the category to be estimated divided by the volume weighted prices for the aggregate of the EIA-782 categories most comparable to the predecessor category. That is,

$$\hat{\hat{P}}_{460,i} = \hat{P}_{460,j} \frac{\hat{\hat{P}}_{782,i}}{\hat{\hat{P}}_{782,j}}$$

where i represents the EIA-782 category to be backcast and j represents the most similar category on the predecessor survey.

The backcast price series were estimated by multiplying the estimate for the previous time period from the predecessor survey by an adjustment factor:

$$\hat{\hat{P}}_{782,i,t} = \hat{P}_{Predecessor,i,t} \times (Adjustment\ \ Factor)$$

where t = reference month.

Adjustment factors were computed by dividing the EIA-782 December price by the derived December predecessor price for comparable categories:

$$Adjustment\ Factor = \frac{\hat{P}_{782,i,December}}{\hat{\hat{P}}_{Predecessor,i,December}}$$

The EIA-782 December 1982 price for all respondents had to be estimated since not all of the EIA-782 respondents were reporting in December. This estimate was based on the average of the ratios of the prices for the December respondents to the prices for all respondents in January, February, and March of 1982. That is,

$$\hat{\hat{P}}_{782,i,December} = \hat{P}_{782,i,r,December} \div \frac{\sum_{m} \frac{\hat{P}_{782,i,r,m}}{\hat{P}_{782,i,m}}}{3}$$

where r = respondents who reported in the December reference month and m = the months of January, February, and March.

Starting with the September 1990 final estimates, prices published are derived using the sample described under "Discussion of Sample Design." Prices published for January 1984 through August 1990 were derived using different samples and slightly different designs (refer to the 1987 PMA for a further description). Also, the monthly price estimates from January through December 1983 were derived using another sample design (see the December 1983(3) issue of the PMM). Therefore, there may be some minor discontinuity in price estimates between August 1988 and September 1988 and between December 1983 and January 1984.

Table EN1. Federal and State Motor Fuel Taxes[1]
(Cents per Gallon)

	Motor Gasoline	Diesel Fuel	Gasohol		Motor Gasoline	Diesel Fuel	Gasohol
Federal[2]	18.40	24.40	13.00	Mississippi[4]	18.40	18.40	18.40
Average State Tax	19.85	19.65	19.74	Missouri[4]	17.00	17.00	17.00
				Montana[4]	27.75	28.50	27.75
Alabama[4]	18.00	19.00	18.00	Nebraska	24.60	24.60	24.60
Alaska	8.00	8.00	8.00	Nevada[4]	23.75	27.75	23.75
Arizona	18.00	18.00	18.00	New Hampshire	18.16	18.16	18.16
Arkansas	18.60	18.60	18.60	New Jersey[3]	10.50	13.50	10.50
California[3 4]	18.00	18.00	18.00	New Mexico	18.88	19.88	18.88
Colorado	22.00	20.50	22.00	New York[3 4]	22.65	21.85	22.65
Connecticut[3]	32.00	18.00	31.00	North Carolina	21.60	21.60	21.60
Delaware	23.00	22.00	23.00	North Dakota	20.00	20.00	20.00
District of Columbia	20.00	20.00	20.00	Ohio	22.00	22.00	22.00
Florida[4]	13.00	13.00	13.00	Oklahoma	17.00	14.00	17.00
Georgia[3 4]	7.50	7.50	7.50	Oregon[4]	24.00	24.00	24.00
Hawaii[3 4]	16.00	16.00	16.00	Pennsylvania	25.90	30.80	25.90
Idaho	25.00	25.00	22.50	Rhode Island	29.00	29.00	29.00
Illinois[3 4]	19.00	21.50	19.00	South Carolina[4]	16.00	16.00	16.00
Indiana[3]	15.00	16.00	15.00	South Dakota	21.00	21.00	19.00
Iowa[3]	20.00	22.50	19.00	Tennessee	20.00	17.00	20.00
Kansas	18.00	20.00	18.00	Texas	20.00	20.00	20.00
Kentucky	16.40	13.40	16.40	Utah	24.50	24.50	24.50
Louisiana	20.00	20.00	20.00	Vermont	20.00	17.00	20.00
Maine	19.00	20.00	19.00	Virginia[3]	17.50	16.00	17.50
Maryland	23.50	24.25	23.50	Washington[4]	23.00	23.00	23.00
Massachusetts	21.00	21.00	21.00	West Virginia[3]	20.50	20.50	20.50
Michigan[3]	19.00	15.00	19.00	Wisconsin	24.80	24.80	24.80
Minnesota[3]	20.00	20.00	20.00	Wyoming	14.00	14.00	14.00

[1] This figure lists rates of general application (including, but not limited to, excise taxes, environmental taxes, special taxes, and inspection fees), exclusive of county and local taxes. Rates are also exclusive of any State taxes based on gross or net receipts. The State rates are effective July 1, 1998.

[2] The Federal tax on motor gasoline and diesel fuel increased to 18.4 and 24.4 cents, respectively, on October 1, 1997.

[3] Additional State taxes are levied as follows: California: 7.25 percent sales tax; Connecticut: 5 percent gross earnings tax; Georgia: 4 percent sales tax; Hawaii: 4 percent gross income tax; Illinois: 6.25 percent sales tax; Indiana: 5 percent sales tax; Iowa: 1 percent environmental protection tax; Michigan: 6 percent sales tax; New Jersey: gross receipts tax of 4 cents per gallon for on-highway use fuels; New York: 4 percent sales tax; Virginia: 2 percent sales tax in areas where mass transit systems exist; West Virginia: Consumer and sales tax of 4.85 cents per gallon.

[4] Local option taxes (LOTS) are allowed. In Florida, the State assesses a State Comprehensive Enhanced Transportation System (SCETS) tax which is two-thirds of each county's rate. In addition, the State collects a "ninth cent tax" and a second local tax. These taxes add an average of 11.8 cents to the motor fuel State tax. In Hawaii, LOTS are as follows: Honolulu: 16.5 cents per gallon; Maui: 13.0 cents per gallon; Hawaii: 8.8 cents per gallon; Kauai: 10.0 cents per gallon.

Table EN 2. U.S. Postal Two-Letter State Abbreviations

State Code	State	State Code	State	State Code	State
AL	Alabama	KY	Kentucky	ND	North Dakota
AK	Alaska	LA	Louisiana	OH	Ohio
AZ	Arizona	ME	Maine	OK	Oklahoma
AR	Arkansas	MD	Maryland	OR	Oregon
CA	California	MA	Massachusetts	PA	Pennsylvania
CO	Colorado	MI	Michigan	RI	Rhode Island
CT	Connecticut	MN	Minnesota	SC	South Carolina
DE	Delaware	MS	Mississippi	SD	South Dakota
DC	District of Columbia	MO	Missouri	TN	Tennessee
FL	Florida	MT	Montana	TX	Texas
GA	Georgia	NE	Nebraska	UT	Utah
HI	Hawaii	NV	Nevada	VT	Vermont
ID	Idaho	NH	New Hampshire	VA	Virginia
IL	Illinois	NJ	New Jersey	WA	Washington
IN	Indiana	NM	New Mexico	WI	Wisconsin
IA	Iowa	NY	New York	WV	West Virginia
KS	Kansas	NC	North Carolina	WY	Wyoming

Collection Methods

Survey data are collected by mail every month. It is mandatory for each respondent to submit completed forms to EIA within the specified time allotted. For the EIA-782A and B, completed forms must be submitted no later than 30 calendar days after the close of each reference month. For the EIA-782C, completed forms must be submitted no later than 20 calendar days after the close of the reference month. Telephone follow-up calls to nonrespondents begin the day after the established due date in order to collect all outstanding data. Late submissions and resubmissions are processed when received.

Data Processing

As EIA-782 forms are received, they are logged into an automated Survey Control File which maintains monthly status codes for each company. The data are reviewed manually and then entered onto the computer files. They are then processed through an automated edit program which detects missing data, inconsistent prices, volumes and prices that significantly differ from those previously reported by the company, and outlying values that will affect published estimates. Data that fail the edits are resolved through telephone calls to the data reporters, and corrections and verification codes are entered onto the computer files. Statistical reports, including publication tables, are then generated using only acceptable and verified data.

Nondisclosure

The data contained in this publication are subject to statistical nondisclosure procedures. The objective of the disclosure-avoidance procedures, as stated in the Energy Information Administration Standard 88-05-06, Subject: "Nondisclosure of Company Identifiable

Data in Aggregate Cells," is to ensure that confidential, company-identifiable data are not disclosed in tables where "company specific responses may be proprietary and prohibited from public disclosure by 18 U.S.C. 1905." Statistics representing data aggregated from fewer than three companies or that are dominated by input from one or two companies are withheld. EIA identifies cells that are sensitive according to these criteria by applying a statistical formula to the data contained in each cell to determine if a few companies "dominate" the cell.

If a cell is sensitive, the data in that cell are suppressed and a "W" is placed in the publication cell. Also, since many tables include row or column totals, some non-sensitive data cells have been suppressed to prevent the reader from calculating the suppressed numbers by simply subtracting the published numbers from the total.

Relationship of Refiner and Prime Supplier Sales Volumes

The refiner sales volumes collected on the EIA-782A are related to the prime supplier sales volumes collected on the EIA-782C, but conceptual differences exist that cause variations between these data. In general, EIA-782A volumes are intended to reflect *refiner sales* of petroleum products into *all secondary and tertiary markets*, while EIA-782C volumes are designed to measure *prime supplier sales* into only the *local markets of final consumption*. Specifically:

The reporting universe for the EIA-782C survey is significantly larger than that of the EIA-782A. While nearly all refiners and gas plant operators report on both surveys (a small number do not qualify as prime suppliers), some large, inter-State distributors and retailers, as well as some importers, report only on the EIA-782C.

EIA-782A respondents are asked only to exclude sales to other refiners (that is, other respondents that comprise the primary market), while EIA-782C respondents are asked to exclude sales to any company that is not a local distributor, local retailer, or end user (DRE). Therefore, EIA-782C respondents are asked not only to exclude sales to refiners, but also to most large inter-State resellers, importers, traders, and retailers who transport products across State boundaries.

The EIA-782A is designed to gather data on the sales of selected petroleum products made in each State, regardless of where the products are physically located or will be consumed. In contrast, the EIA-782C is designed to collect data reflecting only delivered sales of selected petroleum products into those States where the products are expected to be locally consumed.

Consequently, EIA-782A and EIA-782C volumetric data generally vary at national, regional, and State levels. In particular, differences are expected in States and regions in which major supply origination, pipeline distribution, or transfer points are located. In these States, large volumes of products may change hands many times, often for eventual shipment outside the State. Since the EIA-782C is intended to measure only those sales into the final local markets of consumption (sales to DREs), all preceding sales are excluded. Furthermore, sales by EIA-782C respondents are reported wherever the product was delivered, which may differ from the State where title transferred. In contrast, the EIA-782A reflects all sales made to secondary resellers, wherever title transfers.

Additionally, the EIA-782C reflects imports by firms that are neither refiners nor gas plant operators, that would not be measured on the EIA-782A unless they were transferred to a distribution chain. This mostly affects regions with a high level of product imports, such as the New England or Mid-Atlantic States.

Therefore, States with major refining areas, such as Texas or California, generally show higher volumes on the EIA-782A survey than the EIA-782C survey, since some of the volumes reported on the EIA-782A are excluded on the EIA-782C or are reported in different States. Conversely, net consuming States (e.g., most PAD District I and PAD District II States) may show larger prime supplier sales on the EIA-782C due to inter-State movements or imports by resellers and/or differences in State of delivery versus title transfer. However, this may be partially or entirely offset by some refiners reporting larger sales volumes on the EIA-782A than on the EIA-782C (due to fewer exclusions taken on the EIA-782A).

In summary, caution should be exercised when comparing sales volumes between refiners and prime suppliers. Whereas EIA-782A data reflect the marketing of products by refiners to non-refiners where the sale occurs, EIA-782C data reflect prime supplier sales to local distributors, local retailers, and end users where the product is delivered. Therefore, the EIA-782A and EIA-782C surveys differ by the respondents reporting (refiners versus prime suppli-

Table EN3. Revision Error in Selected 1996 U.S. Average Price Data
(Cents per Gallon Excluding Taxes)

Date	Refiner/Reseller Unleaded Regular Sales to End Users			No. 2 Distillate Sales to Residential Customers			Residual Fuel Oil Sales to End Users		
	PMM	Final	Difference	PMM	Final	Difference	PMM	Final	Difference
January	69.9	70.1	-0.2	94.7	94.6	0.1	49.1	49.7	-0.6
February	70.5	70.5	0.0	95.9	95.9	0.0	46.7	46.2	0.5
March	75.6	75.6	0.0	99.1	99.1	0.0	46.1	46.4	-0.3
April	84.1	84.0	0.1	101.5	101.5	0.0	46.3	46.4	-0.1
May	87.6	87.6	0.0	97.8	97.8	0.0	44.1	44.4	-0.3
June	85.1	85.1	0.0	90.8	91.0	-0.2	41.0	41.0	0.0
July	82.9	82.9	0.0	88.6	87.9	0.7	40.8	40.8	0.0
August	81.1	81.1	0.0	88.0	88.1	-0.1	41.7	42.1	-0.4
September	81.0	81.0	0.0	94.5	94.5	0.0	44.4	44.5	-0.1
October	81.5	81.5	0.0	102.6	102.6	0.0	48.6	48.8	-0.2
November	84.0	84.0	0.0	105.4	105.4	0.0	50.6	50.7	-0.1
December	83.7	83.7	0.0	107.3	107.5	-0.2	51.3	51.6	-0.3

Sources: PMM data are from Tables 15, 31, and 42 of the *Petroleum Marketing Monthly*. Final data are from Tables 15, 31, and 42 of the *Petroleum Marketing Annual,* 1996.

Table EN4. Revision Error in Selected 1996 Refiner Sales Volume Data
(Million Gallons)

Date	Motor Gasoline Sales for Resale			No. 2 Distillate Sales for Resale			Residual Fuel Oil Sales to End Users		
	PMM	Final	Percent Change	PMM	Final	Percent Change	PMM	Final	Percent Change
January	264.5	264.5	0.0	118.4	119.1	-0.6	13.4	14.4	-7.5
February	284.2	283.4	0.3	123.3	123.7	-0.3	15.0	15.0	0.0
March	281.5	280.3	0.4	118.8	119.4	-0.5	12.8	12.7	0.8
April	300.5	299.7	0.3	120.2	120.3	-0.1	11.9	11.8	0.8
May	301.8	301.4	0.1	111.4	110.5	0.8	11.0	10.7	2.7
June	307.0	306.8	0.1	109.7	109.6	0.1	11.3	11.3	0.0
July	310.6	310.4	0.1	109.7	109.4	0.3	11.7	11.8	-0.6
August	306.7	306.9	-0.1	111.2	111.3	-0.1	11.7	12.3	-5.1
September	286.3	286.4	0.0	112.1	112.0	0.1	9.5	10.9	-14.7
October	293.8	293.7	0.0	125.5	125.2	0.2	12.4	13.5	-8.9
November	292.6	292.6	0.0	118.9	119.1	-0.2	13.9	14.3	-2.9
December	296.5	297.0	-0.2	121.3	122.1	-0.7	15.4	15.7	-1.9

Sources: PMM data are from Tables 7, 46, and 47 of the *Petroleum Marketing Monthly*. Final data are from Tables 7, 46, and 47 of the *Petroleum Marketing Annual,* 1996.

Table EN5. Revision Error in Selected Volumes of 1996 Prime Supplier Sales Data
(Million Gallons)

Date	Total Motor Gasoline			Total No. 2 Distillate			Total Residual Fuel Oil		
	PMM	Final	Percent Change	PMM	Final	Percent Change	PMM	Final	Percent Change
January	311.6	311.4	0.1	150.0	150.9	-0.6	37.2	37.3	-0.3
February	327.5	326.9	0.2	154.0	154.0	0.0	34.3	34.2	0.3
March	331.6	331.2	0.1	141.6	142.0	-0.3	32.2	32.1	0.3
April	342.6	342.3	0.1	140.1	140.8	-0.5	27.5	27.4	0.4
May	346.3	345.8	0.1	130.4	130.6	-0.2	23.6	23.1	2.1
June	348.3	348.3	0.0	127.7	128.1	-0.3	26.4	26.2	0.8
July	353.7	353.6	0.0	125.8	126.6	-0.6	27.2	27.0	0.7
August	356.0	355.3	0.2	131.1	131.4	-0.2	28.1	27.6	1.8
September	335.3	334.8	0.1	130.3	130.7	-0.3	24.2	23.8	1.7
October	345.7	344.5	0.3	144.2	144.9	-0.5	25.9	25.9	0.0
November	340.9	339.9	0.3	140.6	141.0	-0.3	29.5	29.5	0.0
December	337.1	336.4	0.2	139.0	139.5	-0.4	33.2	33.4	-0.6

Sources: PMM data are from Tables 48, 49, and 50 of the *Petroleum Marketing Monthly*. Final data are from Tables 48, 49, and 50 of the *Petroleum Marketing Annual*, 1996.

ers), the types of sales reported (sales to non-refiners versus sales to DREs), and the location of the reported sales (point of title transfer versus destination of the sale).

Revision Error

The petroleum product price and volume data shown for the current month are preliminary. These numbers may be revised in the next month's publication based on data received late or revisions received. For example, if the latest data shown are for the month of February, the February data are preliminary and the January data may have been revised due to the receipt of late or revised data. The data are final upon publication in the *Petroleum Marketing Annual* (PMA). The difference between the data when they appear in the *Petroleum Marketing Monthly* (PMM) and when they appear in the PMA is called the revision error. The amount of revision error for some selected EIA-782 data series is shown in Tables EN3 - EN5.

The Crude Oil Price Surveys

Background

Form EIA-182: "Domestic Crude Oil First Purchase Report"

Each month, the Form EIA-182 collects data from the buyers on first purchases of domestic crude oil. A "first purchase" constitutes a transfer of ownership of crude oil during or immediately after the physical removal of the crude oil from a production property for the first time. Transactions between affiliated companies are reported as if they were "arms-length" transactions. (This definition is consistent with the Windfall Profits Tax (WPT) concepts of "first sale" and "removal price.") The primary objective is to calculate an average first purchase price at various levels of aggregation. A company's monthly average first purchase prices are volume weighted across given geographical areas for selected crude streams and gravity bands. Prices are computed from the following reported data elements:

Area of production. The producing State or non-State production "area" (i.e., Alaska North Slope, Alaska Other Mainland, Federal Offshore California and Federal Offshore Gulf--about one-fifth off Texas and the remainder off Louisiana).

Average cost. Reported f.o.b. the lease boundary and based on the actual purchase expenditures, including discounts or premiums paid.

Total volume purchased. The amount of crude bought and paid for as it is measured at the lease boundary (usually at a lease automatic custody transfer unit--a LACT unit), adjusted for basic sediment and water (BS&W) and temperature.

Prices published from data collected on Form EIA-182 are calculated by dividing the sum of the total average costs paid by the sum of the total volumes purchased.

Form EIA-856: "Monthly Foreign Crude Oil Acquisition Report"

The Form EIA-856 collects monthly price and volume data for about 90 percent of all crude oil imported into the United States. It also collects classification data that enable EIA to determine the terms of an acquisition. The data are reported for the parent company and all the affiliates controlled by the parent. Under this definition, the acquisition price reported for each cargo is the one paid to an unaffiliated seller, in principle an "arms-length" price, which is consistent with use of the data to represent market trends, rather than monitoring internal company transfer pricing policies.

Each month, respondents report the following for cargos acquired for U.S. importation:

Offshore inventories. Crude oil owned by the respondent that is intended for importation into the United States. These inventories include oil in tankers enroute to the United States and floating or on-land storage outside the United States.

Crude type. Includes the country of origin of the cargo of crude, the stream or type of crude oil (e.g., Saudi Light), and the API gravity.

Volume acquired. The number of 42 U.S. gallon barrels in the cargo.

Dates. The date of loading/acquisition and the expected date of landing.

Transportation. Ports of loading and landing and the name of the vessel.

Prices. Acquisition cost, landed cost, and other costs such as demurrage, agent's fees, import tariffs and fees, etc. (all costs are reported in dollars per barrel).

Days credit. The number of days credit is extended to the purchaser by the seller.

Purchase classifying information. Type of transaction (e.g., purchase from host government), terms of transaction (spot or contract), and point of transaction (f.o.b. (free on board), country of origin or CIF (cost, insurance, and freight), U.S. port of entry).

Published prices are calculated by first multiplying the purchase volume by a price to obtain a total cost, then the sums of the total costs are divided by the sums of the purchase volumes.

The prices associated with data collected on Form EIA-856 are aggregated within the month of acquisition, which can be the month of loading, the month of landing, or sometime between those events. By design, the prices are not aggregated for the month in which they are determined, unless the acquisition and price determination month are the same. EIA-856 data reflect types of trades occurring over the entire spectrum of international crude oil markets, ranging from continuing supply agreements to spot market purchases. Prices can be determined at time of loading or at time of landing. Prices can be negotiated between the parties involved or tied to spot or futures market price levels. The methodology chosen for the EIA-856 provides a consistent historical series even though its prices may not always agree with measures of prices from other sources.

International crude oil markets are complex and dynamic. For example, a cargo of Saudi Arabian crude oil could be acquired in June at a loading port in Saudi Arabia. The cargo may land in the United States in August. The price for the crude oil could be determined by spot crude oil prices in effect during the 5 days before and after landing. For the PMM, the price for this cargo will be aggregated in the month of June, when it was acquired. Conversely, a cargo of Brent crude may be acquired in June, but its price may have been determined in the forward Brent market in April. This cargo's price will also be aggregated in June, when the purchaser took title to the crude.

In the early 1980's, most crude oil prices were set by the country selling the crude. Gradually, as the supply of crude oil became more abundant, markets became more competitive. A robust spot market for

crude evolved, in which prices for crude oil were determined by demand and supply. Frequently, the official sales price set by the selling government was considerably different than spot market assessments. As buyers began to purchase more crude oil on the spot market, the control that sellers had theretofore exercised eroded.

In order to protect their market share, crude oil producing governments began to tie prices for their crude to market-related prices. When these market-related pricing formulas came into prominence in late 1985, many crude oil prices were tied to a "netback realization," wherein a crude oil's value was determined by volume weighted spot market prices of products derivable from that crude. The weights essentially reflected the relative yield of selected products from a given crude stream. These netback-based formulas gradually gave way to formulas based on spot crude oil assessments.

The formulas and terms used by sellers of crude oil continue to change. Since the EIA-856 prices are aggregated by month of acquisition--not necessarily the same as month of price determination--they may not always show the same pattern as a series from another source (e.g., trade-press publications). During periods of dramatic change in crude oil prices, aggregate prices derived from EIA-856 data will tend to "lead" the market. That is, these prices will show the emerging trend earlier, reach the inflection point sooner, and then return to the underlying trend. When averaged over longer periods of time, however, EIA-856 prices show the same relative price movements as exogenous sources.

Form EIA-14: "Refiners' Monthly Cost Report"

The EIA-14 is a monthly census of all U.S. refiners. It collects the net acquisition costs and volumes of crude oil, both domestic and imported, on a corporate national basis (i.e., not for individual refineries). Included in the costs are all charges associated with the acquisition, transportation, and storage of crude incurred by respondents up to the time the oil is booked into their refineries.

Each month, refiners report the volume (in thousands of barrels) and costs (in thousands of dollars) for:

Domestic crude oil. Oil produced in the United States or from its outer continental shelf.

Imported crude oil. Oil produced outside the United States and brought into the United States for domestic processing.

Unfinished oil. All other oils, both domestic and imported, requiring further refining, except those requiring only mechanical blending.

Average prices are calculated by dividing the sum of the costs by the sum of the volumes.

Respondent Frame

Form EIA-182:

All firms that buy domestic crude oil at the lease boundary, acquiring ownership of the crude in a first purchase transaction. The list initially was compiled from the 1974 Federal Energy Administration (FEA) Oil and Gas Survey of Producers and Operators. Collection of data from first purchasers began in February 1976. By 1978, the frame consisted of 340 respondents. Of these, 198 purchased more than 150,000 barrels per year and together represented 99.9 percent of the total reported volume.

Adjustments to the frame have mostly been "deaths," with relatively few "births." Following decontrol in January 1981, there was a major contraction of the list of active first purchasers. Many small firms went out of business or were absorbed by larger companies. More recent changes include several mergers among majors and one breakup of a major company. Currently, the EIA-182 survey collects data from 102 active respondents.

Form EIA-856:

All companies that were reporting data on the ERA-51, "Transfer Pricing Report," as of June 1982, regardless of the total volumes of crude oil that are imported. In addition, all other companies that acquire more than 500,000 barrels of foreign crude oil in the report month for importation into the United States are required to prepare and submit an EIA-856 for that month.

Form EIA-14:

All refiners of crude oil in the United States, including its territories and possessions. There are currently 107 active respondents to the EIA-14.

The list of respondents to the EIA-14 is updated annually by supplementation from the EIA-782A, "Refiners' / Gas Plant Operators' Monthly Petroleum Product Sales Report," and the EIA-810, "Monthly Refinery Report."

Data Collection Processing

All three crude oil data collection systems are operated independently. Each performs similar data collection and processing functions that are outlined below.

Survey data are collected by mail every month. It is mandatory for each respondent to submit completed forms to EIA no later than 30 calendar days after the close of each reference month. Telephone follow-up calls to nonrespondents begin 2 days after the established due date in order to collect all outstanding data. Late submissions and resubmissions are processed when received.

The forms are logged and reviewed manually. The data are then entered onto computer files. The files are then processed through an automated edit program which detects missing data, inconsistent prices, and outlying values that affect published estimates. Data that fail the edits are resolved through telephone calls to data reporters, and corrections and verification codes are entered onto computer files. Statistical reports, including publication tables, are then generated using only acceptable and verified data. Response rates are normally 100 percent by the time final statistics are calculated.

Nondisclosure

The data contained in this publication are subject to statistical nondisclosure procedures. The objective of the disclosure-avoidance procedures, as stated in the Energy Information Administration Standard 88-05-06, Subject: "Nondisclosure of Company Identifiable Data in Aggregate Cells," is to ensure that confidential, company-identifiable data are not disclosed in tables where "company specific responses may be proprietary and prohibited from public disclosure by 18 U.S.C. 1905." Statistics representing data aggregated from fewer than three companies or that are dominated by input from one or two companies are withheld. EIA identifies cells that are sensitive according to these criteria by applying a statistical formula to the data contained in each cell to determine if a few companies "dominate" the cell.

If a cell is sensitive, the data in that cell are suppressed and a "W" is placed in the publication cell. Also, since many tables include row or column totals, some nonsensitive data cells have been suppressed to prevent the reader from calculating the suppressed numbers by simply subtracting the published numbers from the total.

Data Continuity

The crude oil statistics published in the *Petroleum Marketing Monthly* constitute both a republishing of numbers that already appear in the *Monthly Energy Review* (MER) and the *Annual Energy Review* (AER), and a simple extension of the detail of such statistics. These statistics have been published for a number of years in the MER and AER. The data currently collected through the crude oil surveys are compatible with data used to derive statistics for the historical series. The definitions, respondents, and processing have not changed substantially over the years the data have been collected. The target populations and the computational algorithms have remained virtually unchanged.

Reliability of Data

There are two types of errors possible in an estimate based on a sample survey: sampling and nonsampling. Sampling errors occur because observations are made only on a sample, not on the entire population. Since the crude oil surveys are based on a census of the population, these surveys contain no sampling error.

Nonsampling errors can be attributed to many sources: (1) inability to obtain complete information from all respondents in the survey (i.e., nonresponse), (2) response errors, (3) definitional difficulties, (4) differences in the interpretation of questions, (5) mistakes in recording or coding the data obtained, and (6) other errors of collection, response, coverage, and estimation for missing data.

Although no direct measurement of the biases due to nonsampling errors can be obtained, precautionary steps were taken in all phases of the frame development and data collection, processing, and tabulation processes, in an effort to minimize their influence. In addition, the close cooperative consultation between EIA and the survey respondents and data users results in a more accurate information gathering and reporting process.

Table EN6. Revision Error in 1996 Refiner Acquisition Cost Data
(Dollars per Barrel)

Date	Refiner Acquisition Costs								
	Domestic			Imported			Composite		
	PMM	Final	Difference	PMM	Final	Difference	PMM	Final	Difference
January	17.96	17.98	-0.02	17.40	17.48	-0.08	17.68	17.74	-0.06
February	18.10	18.10	0.00	17.73	17.77	-0.04	17.93	17.95	-0.02
March	19.63	19.63	0.00	19.85	19.90	-0.05	19.73	19.76	-0.03
April	21.88	21.88	0.00	21.29	21.33	-0.04	21.61	21.63	-0.02
May	21.15	21.15	0.00	20.08	20.12	-0.04	20.59	20.61	-0.02
June	19.30	19.30	0.00	19.00	19.32	-0.32	19.14	19.31	-0.17
July	19.89	19.91	-0.02	19.58	19.60	-0.02	19.74	19.76	-0.02
August	20.54	20.55	-0.01	20.25	20.53	-0.28	20.39	20.54	-0.15
September	21.88	21.87	0.01	22.35	22.04	0.31	22.11	21.96	0.15
October	22.94	22.93	0.01	23.23	23.22	0.01	23.09	23.08	0.01
November	23.04	23.08	-0.04	22.65	22.66	-0.01	22.84	22.87	-0.03
December	23.39	23.38	0.01	23.15	23.22	-0.07	23.27	23.30	-0.03

Sources: PMM data are from Table 1 of the *Petroleum Marketing Monthly.* Final data are from Table 1 of the *Petroleum Marketing Annual,* 1996.

Table EN7. Revision Error in 1996 Domestic First Purchase Price Data
(Dollars per Barrel)

Month	PMM	Final	Difference
January	15.43	15.43	0.00
February	15.57	15.54	0.03
March	17.63	17.63	0.00
April	19.61	19.58	0.03
May	17.96	17.94	0.02
June	16.94	16.94	0.00
July	17.64	17.63	0.01
August	18.29	18.29	0.00
September	19.98	19.93	0.05
October	21.09	21.09	0.00
November	20.21	20.20	0.01
December	21.35	21.34	0.01

Sources: Preliminary data are from Table 1 of the *Petroleum Marketing Monthly* for each respective month. Final data are from Table 1 of the *Petroleum Marketing Annual*, 1996.

Table EN8. Revision Error in 1996 Foreign Crude Oil Acquisition Cost Data
(Dollars per Barrel)

Month	FOB Cost of Imports			Landed Cost of Imports		
	PMM	Final	Difference	PMM	Final	Difference
January	15.91	16.15	-0.24	17.10	17.27	- 0.17
February	16.49	16.75	-0.26	17.44	17.69	-0.25
March	18.58	18.30	0.28	19.41	19.26	0.15
April	19.82	19.66	0.16	20.92	20.83	0.09
May	18.41	18.45	- 0.04	19.67	19.71	-0.04
June	17.53	17.55	-0.02	18.76	18.79	-0.03
July	18.13	18.13	0.00	19.31	19.33	-0.02
August	19.11	19.18	-0.07	20.07	20.19	-0.12
September	21.02	20.77	0.25	21.91	21.77	0.14
October	21.97	22.02	-0.05	22.90	22.97	-0.07
November	21.18	21.18	0.00	22.03	22.11	-0.08
December	21.78	21.48	0.30	22.61	22.47	0.14

Sources: PMM data are from Table 1 of the *Petroleum Marketing Monthly* for each respective month. Final data are from Table 1 of the *Petroleum Marketing Annual,* 1996.

Imputation

Since the response rates for the crude oil survey are virtually 100 percent, there are no imputation procedures in the PMM data for nonresponse to these surveys. Imputation is performed, however, on EIA-182 volume data used in estimating crude oil production published in the *Petroleum Supply Monthly* (PSM). Since production estimates for the PSM are required on an expedited schedule, some responses are imputed for the PSM. However, all responses are received prior to the publication of the PMM, thus no imputation is required for the price data published in the PMM. See Note 4 in the Explanatory Notes in the PSM for additional information on the use of EIA-182 data in estimating domestic crude oil production.

Revision Error

The crude oil values shown for Domestic First Purchase Prices and Refiner Acquisition Cost (RAC) for the current month and for Average Landed Costs for the current 2 months are preliminary. These numbers are revised in the month after the preliminary month(s) based on data received late or revisions received. For example, in the February publication, the February RAC data are preliminary and the January RAC data may have been revised due to receipt of late or revised data. The data are final upon publication in the *Petroleum Marketing Annual* (PMA). In the above example, the difference between the January RAC data in the *Petroleum Marketing Monthly* (PMM) and when they appear in the PMA is called the revision error. The amount of revision error for some selected crude oil data series is shown in Tables EN6 through EN8.