

Petroleum Marketing Program Evaluation

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(Not received in time for the ASA Committee review prior to the 2005 spring meeting.)

Program Name:

The Petroleum Marketing Family of Surveys is conducted by the Petroleum Division of the Office of Oil and Gas within the Energy Information Administration (EIA). This evaluation was conducted using publicly available documentation for the program and its survey components, including the 2003 Paperwork Reduction Act Submission to the Office of Management and Budget (OMB), the Notes sections of published reports such as the *Petroleum Marketing Annual*, the survey data collection forms with associated definitions and instructions, and information posted on EIA's web site.

Brief Description of Program:

The Petroleum Marketing Program collects and publishes data on the nature, structure, and efficiency of petroleum markets at the national, regional, and State levels. The Petroleum Marketing Program compiles data via 11 survey forms, which are listed here in order of their place in the market chain:¹

- Domestic Crude Oil First Purchase Report (EIA-182)—a mandatory monthly census of firms that take or retain ownership of domestic crude oil leaving the lease on which it was produced within the United States including the Outer Continental Shelf. Firms report by stream on the volume in barrels and the weighted average cost per barrel for purchases they made in the target month.
- Monthly Foreign Crude Oil Acquisition Report (EIA-856)—a mandatory monthly census of two populations: (1) firms that reported data as of June 1982 on the Transfer Pricing Report (ERA-51) and (2) firms acquiring more than 500,000 barrels of foreign crude oil during the reporting month for importation to the United States and its territories/possessions. Firms report country of origin, volume acquired in barrels, and cost for each acquisition made in the target month.
- Refiners' Monthly Cost Report (EIA-14)—a mandatory monthly census of firms who own or control refining operations in the United States and its territories/possessions. Firms report for each Petroleum Administration Defense District (PADD) on the total volume (in thousands of barrels) of crude oil acquired and all costs (in thousands of dollars) associated with its

¹ PROGRAM MANAGER CLARIFICATION: Cost is used in the crude oil surveys to represent the cost of the crude as it comes to the company. Price is used in the petroleum product surveys to represent the price charged by the company as it goes out of the company.

acquisition and transport to the refinery for domestic and imported crude oil purchases.

- Refiners'/Gas Plant Operators' Monthly Petroleum Product Sales Report (EIA-782A)—a mandatory monthly census of firms who directly or indirectly control a refinery or a gas plant located in the United States. Firms report by state on their total sales volume (in thousands of gallons) and average price per gallon (excluding sales taxes) for each petroleum product by sales type by user category. The petroleum products are finished motor gasoline (by type/grade), No. 2 diesel oil (by sulfur content), No. 2 fuel oil, propane, No. 1 distillate, kerosene, aviation gasoline, kerosene-type jet fuel, No. 4 fuel oil, and residual fuel oil (by sulfur content).
 - Retail sales of gasoline are partitioned into sales through company-operated retail outlets versus sales to other end users, while wholesale sales are partitioned into DTW sales, rack sales, and bulk sales.
 - Retail sales of No.2 distillates and propane are partitioned into residential sales, commercial/institutional sales, industrial sales, sales through company-operated outlets, petrochemical sales, and sales to other end users.
 - Wholesale monthly state sales of No. 2 distillates and propane are reported as a group as are retail versus wholesale sales of other petroleum products.
- Monthly Report of Prime Supplier Sales of Petroleum Products Sold for Local Consumption (EIA-782C)—a mandatory monthly census of petroleum product suppliers who make the first sale of specified petroleum products and then deliver that product into a state for consumption in that state. Firms report by state on their monthly sales (in thousands of gallons) for finished motor gasoline (by type/grade), No. 2 diesel oil (by sulfur content), No. 2 fuel oil, propane, No. 1 distillate, kerosene, aviation gasoline, kerosene-type jet fuel, No. 4 fuel oil, and residual fuel oil (by sulfur content).
- Resellers'/Retailers' Monthly Petroleum Products Sales Report (EIA-782B)—a mandatory monthly sample survey of resellers and retailers of petroleum products within the United States that are selling to customers within the United States. Using essentially the same form as EIA-782A, firms report by state on their total sales volume (in thousands of gallons) and average price per gallon (excluding sales taxes) for each petroleum product by sales type by user category. However, the petroleum products for which reports are requested are restricted to finished motor gasoline (by type/grade), No. 2 diesel oil (by sulfur content), No. 2 fuel oil, propane, and residual fuel oil (by

sulfur content). The reporting categories for gasoline and No. 2 distillates and propane follow that of the EIA-782A survey. Residual fuel oil is reported by retail versus wholesale sales.

- Annual Fuel Oil and Kerosene Sales Report (EIA-821)—a mandatory annual sample survey of companies that deliver or sell to end users distillate and/or residual fuel oils or kerosene.² Firms report annual sales volume (in gallons) by state of destination by product type and by energy end use (residential, commercial, industrial, oil company, railroad, vessel bunkering, farm, military, on-highway, off-highway, electric power, and other uses). Annual sales are reported for kerosene, distillates by type of distillate (No. 1, No. 2 fuel oil, No. 2 low sulfur diesel, No. 2 high sulfur diesel, No. 4), and residual fuel oil. Every four years, companies are required to report their sales of motor gasoline.
- Winter Heating Fuels Telephone Survey (EIA-877)—a mandatory sample survey by telephone of No. 2 heating oil and propane dealers in 24 Eastern and Midwestern states. Twice monthly during the heating season from October 1 to March 31 (and weekly as needed for cold weather and emergency situations), sample dealers report their residential prices for No. 2 heating oil and propane as of the reference day for each of the states for which they were sampled. During the first telephone call at the beginning of the heating season, sampled dealers report their annual sales volume (in thousands of gallons) by sampled states for the 12-month period from September 1 to August 31.
- Motor Gasoline Price Survey (EIA-878)—a mandatory sample survey by telephone of company-operated retail gasoline outlets.³ Each week, sampled outlets report the retail pump price of each grade of self service unleaded gasoline (including taxes). Once a year, the outlet reports the state and local taxes included in the reported price.
- On-Highway Diesel Fuel Price Survey (EIA-888)—a mandatory sample survey by telephone of retail motor vehicle diesel fuel outlets. Each week, sampled outlets report the retail pump price of self service on-highway motor vehicle diesel fuel (including taxes). Once a year, the outlet reports the state and local taxes included in the reported price.
- Petroleum Product Sales Identification Survey (EIA-863)—a mandatory census of (1) resellers and retailers of No. 2 distillate, propane, and residual

² SURVEY MANAGER CLARIFICATION: Kerosene data are collected but not reported separately due to the sparseness of these data.

³ PROJECT MANAGER CLARIFICATION: Company-operated is not appropriate here. The outlets are selected regardless of custody or equity.

fuel oil; (2) resellers of motor gasoline; and (3) companies that sell kerosene, No. 1 distillate, crude oil, other LPG, No. 4 fuel oil, aviation gasoline, jet fuel, or other petroleum products.⁴ The census occurs every four years and is used to build the frame for the EIA-782B, EIA-821, the EIA-877, and other surveys.

Through this sequence of surveys, EIA monitors petroleum volumes and prices as the commodity moves through the various stages from production/importation (of the raw material) to refining (to create the finished products) to transfer/distribution (from the refiner to the retail outlets) to sales to ultimate consumers.

RECOMMENDATION: Presenting the surveys in this order makes it easier to understand how these surveys are related to one another and should be considered for overview presentations. Graphical presentations such as that given at http://eia.doe.gov/msg/asa_meeting_2004/fall/petroleummarket_files/slide0005.html would also be helpful if updated to include all surveys in the Petroleum Marketing Program.⁵

Program Objectives:

The petroleum marketing program through this family of surveys publishes high quality statistical data for public and governmental use on national and regional petroleum marketing activities with an emphasis on monitoring at national, regional and state levels the quantities of crude oil and its finished products present at various market stages and the associated acquisition costs or prices being charged. The Energy Information Administration is mandated to collect these data under the Federal Energy Administration Act of 1974 (P.L. 93-275) and the Department of Energy Organization Act (P.L. 95-91). The petroleum marketing data are used extensively by the Bureau of Economic Analysis in calculating various components of the U.S. Gross Domestic Product. Other Federal agencies use the data to investigate the impact of oil market events on national or regional economies and as a benchmark for making economic decisions. The National Highway Traffic Safety Administration uses petroleum marketing data to assess impacts of motor vehicle fuel economy standards, for instance. The Joint Committee on Taxation and the Internal Revenue Service use the data for analytic studies investigating the potential impact of disruptions in oil supply or major shifts in oil prices, as well as to validate tax receipts and make fiscal projections and economic forecasts. The Commodity Futures Trading Commission uses petroleum marketing data to assess futures trading and for market surveillance.⁶ The data are used for both analytic purposes as well as descriptive analyses. The data are also used as input for energy models developed and

⁴ PROJECT MANAGER CLARIFICATION: Firms that report on the EIA-821 in the year the EIA-863 is conducted are not required to report on the EIA-863.

⁵ PROGRAM MANAGER CLARIFICATION: An updated illustration and a preliminary program description entitled "Petroleum Marketing Program" are now available.

⁶ PROGRAM MANAGER CLARIFICATION: The U.S. Administration of Children and Families' Division of Energy Assistance also use the data to determine how to allocate funds during the winter for the Low Income Home Energy Assistance Program (LIHEAP).

maintained by EIA. The descriptive reports and analytic/modeling uses tend to combine data from multiple surveys.

RECOMMENDATION: The Petroleum Marketing Program supports a data system created through the integration of 11 component surveys. Documentation needs to be developed for the program as a whole, including a presentation of the overarching objectives underlying the design of the data system and how the individual survey components contribute to the overall design objectives. The present documentation focuses on each individual survey component as a separate entity without relating it to the overall system. The objectives for the overall data system should focus on what EIA wants to be able to accomplish using the data system. These objectives should clarify the geographic and temporal requirements for reporting, as well as the type of data that are needed. Geographic requirements include what constitutes the overall population and subunits like states or PADDs for which separate estimation is specified. Temporal requirements refer to the frequency of data collection, whether weekly, monthly, or annual. Objectives for each individual survey need to be developed that relate back to the objectives for the data system and that motivate why each survey is needed and cannot be replaced by another survey in the data system. These objectives will also motivate the frequency of data collection and the data items that are collected.

Target Populations:

The Petroleum Marketing Program collects data from two types of entities in general.⁷ In terms of the market chain, the data system begins by collecting data from firms that tend to be parent companies that have complex structures with multiple offices, locations, subsidiaries, and so forth. These surveys define the target population of firms in terms of their oil market activities, whether purchasing domestic or foreign crude oil (EIA-182, EIA-856); refining crude oil into finished petroleum products (EIA-14); or supplying, reselling, and retailing these finished products to customers (EIA-782A,B,C; EIA-821, EIA-877). The remaining surveys focus on individual outlets selling the products to consumers (EIA-878, EIA-888) and collect price data on a weekly basis. The Petroleum Product Sales Identification Survey (EIA-863) is used to build and maintain the frame for most of these surveys. The relationship between the entities across these survey components is unclear; population overlaps quite likely occur. The surveys vary in terms of what constitutes a “firm” for instance and are sometimes vague in defining the level of the business that should report and for which reports are needed. The geographic constraints on the target populations are not clearly specified for some surveys. Some surveys define the target population to include all of the United States and all its territories/possessions while other surveys appear to be restricted to the 50 states and DC

⁷ PROGRAM MANAGER CLARIFICATION: The reporting entity varies according to the data being requested. Monthly data that require the entity to report all transactions for the reporting period are most often available at the corporate level. Because of the way the individual corporations function, reporting by subsidiaries may be required in addition to, or instead of, the corporate level. Data reported on the weekly surveys represent prices as of that point in time. These data do not require that any transactions occur, but rather represent an offer price. Price data are most often available at the outlet level. However, some corporations request that the data be provided at the corporate level. If the corporation can provide that information within the submission time frame, that request is honored.

only.⁸ The reporting requirements for population members undergoing changes of ownership and control are not addressed for all surveys, but are addressed for the surveys that include smaller companies where such events can be expected to happen more frequently.

RECOMMENDATION: The target populations for the individual surveys need to be tightened up, particularly in terms of the level of the business comprising the target population and the geographic and temporal constraints on the target population. The individual definitions need to be sufficiently specific that inclusions and exclusions from the program's overall target population can be completely understood. Ideally, the target populations across surveys would use a common definition in terms of geography. Because of its use for economic reporting, it would be preferable if the target population were defined to include the U.S. territories and possessions whenever possible. In defining the target population geographically, distinctions need to be made between the location of the firm versus the location of its operations as they affect target population membership. Other terms like "firm" should also be defined comparably across surveys. For most of the surveys, the target population should be defined in terms of the entire business enterprise (the parent company including all locations and all consolidated and unconsolidated entities). For the petroleum price surveys, the target population should be defined in terms of establishments (the individual sales outlets). The definitions should specify the treatment of units experiencing changes during the survey reporting period in their ownership, control, operation, or in their market participation characteristics. Any size constraints (or lack thereof) on target population membership should be described for each individual survey.

Sampling Frames:

The 11 surveys comprising the Petroleum Marketing Program tend to develop and update their sampling frames independently. The available documentation for the surveys usually does not address the quality or coverage of the frames. The documentation needs to be expanded to provide further details and a professional assessment of the methods in use for frame building and maintenance and the extent to which they assure frame coverage.

The target population definitions are somewhat loose in terms of the level of the business that should respond and the frames may reflect this imprecision.⁹ The enterprise appears to be the most appropriate unit for most surveys, except for those that collect data from establishments. The enterprise is the parent company and the entities that the parent company owns or controls. An enterprise may have many establishments--locations or outlets where petroleum marketing occurs.

⁸ PROGRAM MANAGER CLARIFICATION: Geographic coverage varies according to survey. The crude oil surveys and the EIA-782C (deliveries) require data on U.S. territories and possessions, but the surveys of petroleum product sales do not. Information requirements determine the geographic coverage.

⁹ PROGRAM MANAGER CLARIFICATION: The reporting population, required to obtain the data according to how records are kept, are adjusted by survey and even according to individual record keeping practices. This reporting approach enables timely and accurate responses while minimizing the burden to respondents.

Ad hoc sources are used for those surveys such as EIA-14, EIA-182, EIA-782A, and EIA-856, which census small populations. The frame sizes for the censuses have been declining over time, and it is unclear to what extent (if any) the decline represents coverage losses for the frame. Data collection activities would capture deaths of companies on the frame as well as changes in ownership and control, but it is unclear the extent to which births are being captured.¹⁰ The source of the sampling frames for the censuses is diverse:

- The frame for the Refiners' Monthly Cost Report (EIA-14) was constructed from a list of 206 refiners obtained from the *Oil and Gas Journal* in 1983. In 2003, 67 of these 206 refiners were currently active and filing the EIA-14 form. The frame is updated periodically via information derived from the EIA-782A (Refiners'/Gas Plant Operators' Monthly Petroleum Product Sales Report) and the EIA-810 (Monthly Refinery Report).
- The frame for the Domestic Crude Oil First Purchase Report (EIA-182) was compiled from the 1974 Federal Energy Administration (FEA) Oil and Gas Survey of Producers and Operators. The size of the frame has declined from 340 firms in 1978 to 81 firms in 2005. The publicly available documentation does not cite how the frame is kept up to date.
- The frame for the Refiners'/Gas Plant Operators' Monthly Petroleum Product Sales Report (EIA-782A) was derived from a list of refiners that reported on past EIA surveys and a list of gas plant operators derived from the Natural Gas Liquids Operations Report. As of 2003, the EIA-782A frame contained 100 companies.
- The frame for the Monthly Report of Prime Supplier Sales of Petroleum Products Sold for Local Consumption (EIA-782C) was derived from the frame for its predecessor, the Prime Suppliers' Monthly Report (EIA-25), supplemented with firms identified from the Petroleum Products Sales Identification Survey (Form EIA-863) and other sources. As of 2003, the EIA-782C frame contained 170 companies.
- The frame for the Monthly Foreign Crude Oil Acquisition Report (EIA-856) is composed of all companies reporting data in June 1982 on the Transfer Pricing Report (ERA-51) and all companies acquiring more than 500,000 barrels of oil in the reference month for importation into the United States. The 2003 OMB package notes that, "Approximately 400 cargo shipments are reported each month by 37 companies."

¹⁰ PROGRAM MANAGER CLARIFICATION: Cross references between surveys are conducted on a regular basis using the Petroleum Master Frame File database and query system. Monthly reports of sales, mergers, acquisitions, and births provide information for identifying births and deaths.

The Petroleum Products Sales Identification Survey (EIA-863) is used for frame building for (1) resellers and retailers of No. 2 distillate fuel oil, No. 2 diesel, No. 5 and No. 6 residual fuel oil, propane, and motor gasoline and gasohol; and (2) companies that sell kerosene, No. 1 distillate, crude oil, other LPG, No. 4 fuel oil, aviation gasoline, jet fuel, and other petroleum products. EIA-863 is a census whose frame is constructed by merging the previous EIA-863 census master frame with state and commercial lists and then deduplicating the resultant database. The publicly available documentation does not discuss the survey's response rate.

The current EIA-863 survey results are then used to build the frame for the Resellers'/Retailers' Monthly Petroleum Sales Report (EIA-782B) after merging in data from the most recent Annual Fuel Oil and Kerosene Sales Report (EIA-821). Because the EIA-821 is a sample survey, use of these data in frame building has the potential for inducing bias in survey estimates. The OMB package also suggests that data from previous EIA-782B surveys were used to update to the frame. Again, use of sample-derived data—this time from previous EIA-782B surveys—has the potential for inducing bias in survey estimates.¹¹

The EIA 821 survey frame is itself derived from the most recent EIA-863 survey results, “supplemented by retailers/resellers and importers of residual fuel oil who were not identified by the EIA-863 survey.”¹² The source of this supplementation is unspecified or why these companies were not included in the EIA-863 survey.¹³

The Monthly Report of Prime Supplier Sales of Petroleum Products Sold for Local Consumption (EIA-782C) also derives its frame from the EIA-863 survey¹⁴ as does the Winter Heating Fuels Telephone Survey (EIA-877).¹⁵

The Monthly Gasoline Price Survey (EIA-878) creates a frame of company/state units based upon the EIA-782 surveys¹⁶ of refiners and resellers/retailers. The On-Highway Diesel Fuel Price Survey (EIA-888) also uses volume data from the EIA-782A and EIA-782B surveys to create a frame of company/state units for sampling purposes. The EIA-

¹¹ PROGRAM MANAGER CLARIFICATION: The use of EIA-821 data was a requirement dictated by OMB. Studies were conducted and no bias could be detected.

¹² The Petroleum Marketing 2003 OMB Report, No. 1905-0174, p. 53.

¹³ PROGRAM MANAGER CLARIFICATION: Residual fuel oil is imported directly by electric utility companies. Electric utility companies that directly import product are added to the sample to enable the EIA-821 to provide accurate estimates. These entities are researched each reporting year using information reported to the Federal Energy Regulatory Commission. However, electric utility companies are not in scope for the EIA-863 in that they do not sell the product.

¹⁴ PROGRAM MANAGER CLARIFICATION: The population of prime suppliers (EIA-782C) is very difficult to determine from the EIA-863. While large volume respondents on the EIA 863 would provide information for further research, much more rigorous studies are conducted to determine the population. There is an article in the *Petroleum Marketing Monthly* describing these studies.

¹⁵ PROGRAM MANAGER CLARIFICATION: The propane portion of the EIA-877 also uses a propane outlet frame list to identify specific outlets for sampling.

¹⁶ PROGRAM MANAGER CLARIFICATION: EIA-878 uses a specially created frame listing of gasoline outlets. This frame was created to provide the city detail required after the survey's geographic detail was expanded in 2003.

782B data are derived from a sample survey so the EIA-782B selection probabilities must be considered in sample selection.

RECOMMENDATION: The frame building and maintenance activities for each survey need to be documented in sufficient detail that the current procedures can be evaluated in terms of their ability to maintain frame quality and coverage. This documentation should describe the procedures in place to capture births to the target population as well as changes in ownership and control for frame members. The frame units need to be evaluated against a precise definition of the target population to determine whether deviations have occurred. An example might be multiple listings that are associated with the same parent company, which could be the source of duplicate reporting. Use of sample-derived data in frame building should be determined and procedures put in place to ensure bias is not being introduced in survey estimates.¹⁷ The coverage of each survey should be evaluated.

RECOMMENDATION: EIA might consider introducing more data sharing/coordination across petroleum marketing surveys. A register could be developed and maintained with entries for all enterprises engaged in petroleum marketing with their known petroleum activities recorded, surveys they are obligated to complete, ownership and control data, and so forth. EIA might also consider expanding the Petroleum Products Sales Identification Survey (EIA-863) so that it can serve as a vehicle for updating the frames for all the petroleum marketing surveys, particularly to investigate new entrants to their target populations.¹⁸

Program Design:

The Petroleum Marketing Program integrates data across 11 surveys to measure volume and prices across the various marketing activities. The available documentation does not present an overall design for the entire program so the design has to be pieced out of the design objectives of the individual surveys. The resultant design looks like it evolved over time rather than in response to a conceptual plan for the entire program. The overall result looks reasonable but a conceptual review of the entire system and its survey components is needed to determine if unnecessary burden is being placed on some businesses and whether some surveys could be collapsed or replaced with other surveys.

¹⁷ Updating the name and address information for firms should not introduce bias, for instance. Using sample-derived information to remove frame members from strata subject to sampling could introduce bias.

¹⁸ **PROGRAM MANAGER CLARIFICATION:** The Petroleum Division maintains a Master Frame File (MFF) that shows all petroleum companies, active and inactive, ownership linkages historically, and reporting status in petroleum surveys. The MFF includes marketing and supply companies and is used to coordinate frame and sample information across all surveys. This automated system is currently being revised to account for system changes in petroleum supply. Further plans include complete integration with petroleum supply at the site level for more comprehensive comparisons across surveys. Because of the dynamic nature of the industry, the EIA-863 being conducted every four years is insufficient to serve this purpose. The use of EIA-863 for refiners and so forth would not be an effective method for frames construction or maintenance.

RECOMMENDATION: A conceptual design needs to be developed for the overall Petroleum Marketing Program describing the program's objectives, the rationale for the survey components comprising the program, how the surveys fit within the program's data collection plan, and their adequacy for their intended role.¹⁹ The design should specify any changes needed to existing surveys to create a unified, cohesive program design.

The content and the reporting cycles for the 11 Petroleum Marketing Surveys have been appropriately chosen. Petroleum market conditions can change quite quickly and frequent monitoring of volumes and prices are needed to monitor their affect on the nation's economy. The Petroleum Marketing Program also collects necessary details on crude oil characteristics that affect demand and cost, about individual petroleum products and their availability and price changes, and about how these characteristics vary by region and by state. The bulk of the surveys require monthly reports, which is appropriate for petroleum market monitoring and also has the advantage of facilitating data integration across surveys. For the key products most closely monitored by the industry, policy makers, and the public, three surveys monitor prices on a biweekly or weekly basis, which is needed to capture more timely price swings for these products. There clearly are population overlaps across survey components and there may be some unnecessary/unusual burden placed on some population subgroups.

RECOMMENDATION: The overall design of the Petroleum Marketing Program results in the collection of vital economic data at appropriately frequent time intervals. Once EIA develops a conceptual design for the data system, it will be clearer whether some surveys might be redesigned and/or integrated to reduce reporting burden, particularly for large businesses. This conceptual design should not only define the roles of its individual survey components; it should also define the conceptual relationship between the Petroleum Marketing Program and the Petroleum Supply Program and the Reserve Survey Program and their associated survey components.

Five of the 11 surveys are sample surveys (EIA-782B, EIA-821, EIA-877, EIA-878, and EIA-888), and these surveys include small businesses as well as large businesses. The Resellers'/Retailers' Monthly Petroleum Products Sales Report (EIA-782B) has rotated smaller businesses in and out of the sample with a cycle of about 2 to 2.5 years but the 2003 OMB package suggests that substitution rather than randomization was used.²⁰

¹⁹ PROGRAM MANAGER CLARIFICATION: A conceptual design for program marketing was developed at the time the industry was deregulated and the regulatory functions previously included in the surveys eliminated. Since then, the EIA-877 was expanded to include propane in response to industry, Congressional, and public interest after regional shortages and high prices occurred one particularly cold winter. the program was further expanded to collect weekly diesel prices after concerns about the quality and stability of diesel prices produced by the Federal Trade Commission (FTC). Soon thereafter, the program was expanded further to include weekly gasoline prices as a result of the Desert Storm conflict and concerns for the effect on gasoline prices.

²⁰ PROGRAM MANAGER CLARIFICATION: The EIA-782B has always used a rotation procedure that included randomization. The rotation was required by an administrator to address industry concerns about burden on small companies. The EIA-821 selects a new, independent sample each frame year. Due to the

(The OMB package is in disagreement with other survey documents so the rotation approach may now involve randomization.) The sampling documentation for the remaining surveys does not mention the use of sample rotation.

RECOMMENDATION: All sample surveys should have procedures put in place that allow for sample rotation after about two years of reporting and these procedures should be random so that the probability of inclusion is known and quantifiable for all sampled cases.

The Resellers'/Retailers' Monthly Petroleum Products Sales Report (EIA-782B) has developed a creative and innovative solution to the extremely complex design problem posed by businesses which market varying petroleum products in varying states and regions. This same design problem is encountered by other sample surveys such as the Annual Fuel Oil and Kerosene Sales Report (EIA-821), but the 2003 OMB package suggests that the same design approach is not being used and it might improve statistical precision and possibly allow for sample size reduction.

RECOMMENDATION: The sample designs for the surveys other than EIA-782B should be reviewed to determine whether they would benefit from sample redesign using the 782B sampling strategy.²¹

Data Collection and Processing:

Section 13(b) of the Federal Energy Administration Act of 1974 (Public Law 93-275) specifies that survey participation is mandatory for the 11 surveys in the Program Marketing Program. The 11 surveys are not consistent in emphasizing the legal mandate to respond. The EIA-14, EIA-182, EIA-782A, EIA-782B, EIA-782C, and EIA-856 forms contain the warning that:

This report is mandatory under Public Law 93-275. Failure to comply may result in criminal fines, civil penalties and other sanctions as provided by law. For the sanctions and the provisions concerning the confidentiality of information submitted on this form, see sections 8 and 9 of the instructions. **Title 18 USC 1001 makes it a criminal offense for any person knowingly and willingly to make to any Agency or Department of the United States any false, fictitious, or fraudulent statements as to any matter within its jurisdiction.**

Form EIA-863 has a modified version of this warning:

detailed level of reporting required, sample rotation proved much more difficult to implement than for the EIA-782B.

²¹ PROGRAM MANAGER CLARIFICATION: Some aspects of the EIA-782B sample design were implemented for the EIA-821. Further redesign of the EIA-821 would have required major changes to the EIA-821 processing system and that was infeasible due to decreasing budgets. When the EIA-821 system is redesigned, the requirements for a new sample design should be implemented simultaneously.

This report is mandatory under the Federal Energy Administration Act of 1974 (Public Law 93-275). Failure to comply may result in criminal fines, civil penalties and other sanctions as provided by law. For the sanctions and the provisions concerning the confidentiality of information submitted on this form, see instructions. **Title 18 USC 1001 makes it a criminal offense for any person knowingly and willingly to make to any Agency or Department of the United States any false, fictitious, or fraudulent statements as to any matter within its jurisdiction.**

Form EIA-821 has a weakened warning:

This report is mandatory under Public Law 93-275. Title 18 USC 1001 makes it a criminal offense for any person knowingly and willingly to make to any Agency or Department of the United States any false, fictitious, or fraudulent statements as to any matter within its jurisdiction. For the provisions concerning the confidentiality of information submitted on this form and sanctions, see Sections 8 and 9 of the instructions.

The remaining forms—EIA-877, EIA-878, and EIA-888—contain an even weaker warning:

This report is mandatory under Public Law 93-275. For the sanctions and the provisions concerning the confidentiality of information submitted on this form, see Sections 8 and 9 of the instructions.

RECOMMENDATION: The mandatory nature of reporting is a “Big Stick” in encouraging response. All survey forms should contain the same warning and it should be similar to the more complete warning.

Most surveys in the Petroleum Marketing Program are conducted by mail, with the exception being the EIA-877, EIA-878, and EIA-888 surveys which are short telephone surveys designed for fast turnaround collection of price information for petroleum products. Typically, the mail survey forms are sent to refiners on an annual basis with business reply envelopes enclosed. (NOTE: this statement from the OMB package for some surveys is contradicted by the lead letter included in the OMB package saying that the firm must request that forms and mailing labels be sent to them.) Other response options EIA makes available to the respondent include using a PC Electronic Data Reporting Option (PEDRO) or a survey form in Microsoft Excel Spreadsheet format. The respondent can return their form by surface mail, by FAX, by e-mail, or through a secure HTTPS site. Typically, the companies are instructed to report no later than 30 days after the end of each month and to submit the survey form for months when no activity occurred. Five days after this deadline, a listing of nonrespondent firms is generated and the companies are telephoned and asked to submit the form. Noncompliance letters are

mailed to any companies not responding after the telephone prompt requesting submission by a specified date.

In general, the data collection strategy is quite effective in promoting response, particularly for the EIA-14, EIA-182, EIA-782A, and EIA-782C surveys which census small numbers of large businesses on an ongoing, monthly basis and achieve nearly if not exactly 100 percent response by the final close out of data collection. The 782B survey is a sample survey conducted monthly with a sample where smaller businesses rotate in and out of the sample each year.²² The 782B survey response rate is about 90 percent in spite of its mandatory requirement. Another annual sample survey, the EIA-821 survey of fuel oil and kerosene dealers had a 94 percent response rate in 2001 and an 88 percent response rate in 2003.²³ The OMB package does not provide response rates for EIA-856, EIA-863, or EIA-877 so these cannot be evaluated.²⁴ However, EIA-863 serves as a frame for many surveys so it is critical that it achieve as close to a 100 percent response rate as possible. The surveys where less than near perfect response is experienced tend to be sample surveys that include small businesses, which may go in and out of business. Although these surveys are mandatory, it is impractical to take action against these firms. However, allowing nonresponse may educate firms to the fact that in practice response is not required and lead to increasing nonresponse over time.

RECOMMENDATION: EIA should examine the procedures it is using for its mandated surveys experiencing nontrivial amounts of nonresponse to determine what steps might be taken to encourage response. For instance, EIA might consider revamping the mailout package for surveys experiencing problems with response. The mailout packages other agencies use for voluntary surveys might serve as examples to see how companies could be motivated to respond. The lead letter sent to respondents could be revamped to emphasize the importance of the survey and of their response. Including a brochure addressing “Questions and Answers About the EIA-xxx Survey” could encourage response as well as provide a vehicle to educate the respondent by including questions such as, “My company was sold last year. Do I need to return this form?” Studies have shown that even the design of the mailout envelop can affect response as well as details such as stamps versus machine stamping and express delivery versus regular delivery.

The Petroleum Marketing Survey includes three telephone surveys: the Winter Heating Fuels Telephone Survey (EIA-877), the Motor Gasoline Price Survey (EIA-878), and the On-Highway Diesel Fuel Price Survey (EIA-888). The response rate for EIA-877 is not provided in the 2003 OMB report but for the other two have response rates of 99.7 percent and 97 percent respectively, which is commendable for surveys such as these that

²² PROGRAM MANAGER CLARIFICATION: Sample rotations occurred every year originally. Budget cuts have resulted in rotations occurring closer to every two to three years.

²³ These response rates were derived from the 2003 OMB package and the *Petroleum Marketing Annual 2003*, respectively.

²⁴ PROGRAM MANAGER CLARIFICATION: The EIA-856 and EIA-877 have very high response rates, approximately 99 percent. The EIA-863 response rate is not a published survey, so there is no close-out time. However, by the time the survey is used as a frame for sampling, approximately 95 to 99 percent of the firms have been contacted to determine their operating status. These contacts do not always result in volume data, so response rates are lower if defined in terms of volumes reported.

need to collect price data expeditiously. The questionnaires are quite short and collect only a handful of items on current petroleum prices. These surveys collect data that should be readily known by the respondent and easy to report. The brevity of the survey might make it feasible for automated collection.

RECOMMENDATION: EIA should consider whether it would be cost effective to introduce an automated approach for reporting, supplemented with the current telephone interviews. When reporting is on a regular basis, say weekly, companies could be asked at close of business on the day before the reference day to call in to an automated line and enter the price data for the reference day. Then on the reference day, all nonresponding businesses could be called to complete the survey and to remind them to call in next time.²⁵

Large businesses quite likely have to complete multiple data collection forms because they can be expected to have company components that engage in multiple lines of business:

- The firm might take or retain ownership of domestic crude leaving the lease where it is produced (EIA-182).
- The firm might also acquire foreign oil for import into the United States (EIA-856).
- The firm might have acquired this domestic and foreign oil to support its refining operations so these acquisitions must be reported again (EIA-14).
- Refining operations also have to report their monthly petroleum product sales (EIA-782A).
- The firm may also have divisions that distribute petroleum as a prime supplier but they are exempted from EIA-782C if they complete EIA-782A.
- The firm may have retail operations where petroleum products are sold (EIA-782B).
- One or more company retail outlets may be sampled for the motor gasoline price survey (EIA-878).

²⁵ PROGRAM MANAGER CLARIFICATION: While the gasoline and diesel surveys are telephone surveys, a number of firms prefer to fax or e-mail their data. High response rates are obtained by prompting the companies with the weekly phone call. Touch tone data entry has been considered, but the costs involved, particularly because of the need to retain the phone option, make this option prohibitive in the current budget environment.

- These same retail outlets or other outlets may sell diesel fuel and be sampled again for reporting (EIA-888).
- The company may also be asked to complete the Petroleum Product Sales Identification Survey (EIA-863).

These same companies may also be completing forms for Petroleum Supply Surveys and/or the Reserves Surveys or even electric power surveys (refiners may generate electricity).

RECOMMENDATION: EIA should standardize procedures and methods as much as possible across surveys. For instance, defining the target population unit in terms of the same entity whenever possible and avoiding variations in geographic coverage. EIA should then examine its suite of petroleum surveys to determine which, if any, surveys could be integrated or combined. Such integration would reduce survey costs and improve data quality, while reducing overall burden for large businesses and even for moderate businesses. EIA should define its reporting entity to be the business enterprise or parent company and look for a designated contact person at each business to be responsible for all of the company's reports. Some government agencies also establish a "Go To" person within their agency so there is one person the large company can always approach to address problems or concerns.

The suite of surveys in the Petroleum Market Survey essentially collects the same data—volume and cost/price—at different stages in the market sequence from petroleum extraction through ultimate consumption. Except for the smallest companies, most companies will have to complete multiple forms. There is a great deal of variation in how volume and cost/price data are collected across forms:

- EIA-182 collects first purchase data as number of barrels (presumably rounded to nearest integer) and average cost per barrel (presumably rounded to the nearest dollar).
- EIA-856 collects foreign crude oil acquired as number of barrels rounded to the nearest integer and average price per barrel in dollars and cents.
- EIA-14 collects crude oil acquired as thousands of barrels and total cost in thousands of dollars.
- EIA-782A collects product sales as thousands of gallons and average price per gallon to the tenth of a cent.
- EIA-782C collects prime supplier sales in thousands of gallons and does not collect price data.

- EIA-821 collects fuel oil and kerosene sales in actual gallons and does not collect price data.
- EIA-877 collects winter heating fuels for a company/state combination with only price collected and an average price across outlets within the state expressed in dollars to the tenth of a cent.
- EIA-878 collects motor gasoline prices for individual stations with only price collected and expressed in dollars to the tenth of a cent.
- EIA-888 collects diesel fuel prices for individual stations with only price collected and expressed in dollars to the tenth of a cent.

Reporting of average cost per barrel or gallon may deviate from the way these events are recorded in the company's accounting system and hence require arithmetic to convert an easily assessable and precise total to an average. To determine the average price for a region or the nation, EIA often constructs a total sales amount by multiplying the firm's average price by total barrels or gallons (which may themselves have been rounded to thousands). Thus, collecting sales as an average per gallon/barrel introduces imprecision in survey estimates and may be more burdensome on the company responding.

RECOMMENDATION: EIA should examine the units used for collection of volume and price across surveys to make the units conform as closely as possible to companies' accounting records, to reduce the need for arithmetic by firms in responding, and to produce more precise statistics for EIA reports.

For the mail surveys and censuses, the firm is given well crafted instructions for returning the form by surface mail, by FAX, by e-mail, and by secure file transfer. The instructions advise that both e-mail and FAX returns are not secure and the company is urged to use secure file transfer approach instead. Companies are also instructed where to obtain a free copy of PEDRO software, which can be used for form completion. Because PEDRO has data edits built in, the firm is advised that use of PEDRO should result in the need for fewer resubmissions.²⁶ Procedures to ensure confidentiality of completed survey report forms are not described in the available documentation.

RECOMMENDATION: The Petroleum Marketing Program is to be commended for easing the burden of reporting by providing alternate vehicles, particularly for last-minute returns and for its cautions as to data security. Procedures should be put in place to ensure confidentiality of forms once they arrive in house or if already in place these procedures should be documented in the survey's methodology report and noted in the OMB package.

²⁶ PEDRO files no longer include company specific edits as a result of consolidating Petroleum Division's data in the door processes.

Forms Design:

The forms for the surveys in the Petroleum Marketing Program have a common format. The questionnaire is first and is short with tables for entry of petroleum marketing data. The second component of the package is composed of detailed instructions for completing the questionnaire. Finally, there is a list of definitions for key terms used in the questionnaire and in the instructions. The overall approach is commendable but there are minor modifications that would improve these documents. Changes that are specific to a particular questionnaire are presented in the individual survey evaluations. This section presents recommendations that are applicable across surveys.

The overall package—lead letter, form, instructions, and definitions—could benefit from review by a questionnaire specialist. The lead letters lack “punch.” The forms could make better use of space to improve readability and other professional touches. The forms, instructions, and definitions for some surveys had grammatical errors and complex sentences that need to be fixed. Certain survey conventions—like including the mail back address on the survey form—are not being followed. None of these problems are expected to create serious errors but they do not demonstrate the level of survey professionalism that EIA desires.

RECOMMENDATION: The entire package should be reviewed by a questionnaire specialist with an eye to ensuring that EIA is “putting its best foot forward” as well as to ensure readability, ease of use, and accuracy. Specific examples of problems are given in each survey’s evaluation.

The lead letters in the 2003 OMB package disagreed with the description in the methodology section so it was unclear if they were current or even whether lead letters are being mailed out. For the recurring monthly surveys, it would be appropriate to send a letter once a year. A decision could be made as to whether the package needs to include the survey form, instructions, and definitions, when these documents are unchanged. The lead letters included in the 2003 OMB package were adequate but need to be revamped to be more pertinent to the individual survey. Special attention should be given to the mailout packages for sample surveys to encourage response from smaller companies.

RECOMMENDATION: Except for EIA-863 survey which occurs every four years, EIA should mail lead letters to sampled/censused businesses at least once a year. These letters should be tailored to the specific populations replying to the individual surveys. The letters for the continuing censuses might be more like a “Thank You for Responding” letter with a “What’s New” discussion. The overall goal is to promote positive feelings about the survey and about the company’s participation in this survey. The letter for the sample surveys must welcome newcomers to the survey while convincing them to respond.

Some surveys require that the company submit separate forms for every state in which they sell petroleum products. Other than by comparisons to past reports, this approach

leaves no obvious way to determine if the firm failed to report for a particular state—say because accounting data were unavailable or unclear or the respondent forgot to complete the form. When large tables need to be completed, the respondent is instructed to leave blank any fields where the response is zero. Again, this approach makes it difficult to discern missing data from zero responses. Making the situation worse are the instructions to enter “0” for any value between 0 and 1.

RECOMMENDATION: EIA should consider revising forms so that respondents enter 0 for states or products where they have no activity so that missing can be distinguished from zero.²⁷ Conventional rounding should be used so that values less than 0.5 are rounded to zero.

The 11 surveys also provide detailed instructions for answering the questions for petroleum-related concepts. Again, though, the survey methodology constructs are not as detailed and well constructed. The instructions for several surveys allow the company to define what constitutes a “firm” and are not precise as to the activities that should be reported as it relates to the structure of the firm. For the sample surveys, the petroleum marketing activities that make a firm eligible for each survey are not explained in detail on the survey form in the “Who Must Submit” section nor why companies without these attributes need to respond.

RECOMMENDATION: The forms in use should be reviewed to determine ways to standardize data collection definitions and procedures across surveys. Once the definitions of the target populations are tightened up, the instructions and definitions should be revised to make the reporting unit precisely defined as well as the level of the company for which the unit should report. For each unit comprising the target population, the petroleum marketing activities that they should be reporting should also be clarified in survey forms.

Across the 11 surveys in the Petroleum Marketing Program, definitions are provided for petroleum-related concepts that are detailed, easy to understand, and common across surveys. Other concepts are allowed to vary across surveys, however, such as what constitutes a “firm” or the “United States.” The variation seems unnecessary, possibly confusing to the respondent, and perhaps detrimental to integration of data across surveys.

RECOMMENDATION: The Petroleum Marketing Program is to be commended for its concise, yet very precise, definitions for petroleum marketing activities. However, common definitions also need to be provided for concepts related to the survey design and these definitions need to be constant across surveys.

²⁷ PROGRAM MANAGER CLARIFICATION: The requirement for reporting zeros increases both respondent reporting time (because a significant number of cells are zero for most respondents), as well as EIA’s data entry and storage charges. The survey processing systems retain the previous report and check for missing data in the editing process. For these surveys, item nonresponse has not been a problem historically, so the potential for item nonresponse was best dealt with using editing.

Data Analysis, Products, and Documentation:

The data collected for the Petroleum Marketing Program are extensively used by EIA to produce descriptive reports, analytic reports, and model-based projections.²⁸ The descriptive data are available on a weekly, monthly or annual basis depending on the underlying data source within the Petroleum Marketing Program. Weekly data on prices are published in *Weekly On-Highway Diesel Prices* and *U.S. Retail Gasoline Prices*, and *This Week in Petroleum*. The latter report is both analytic and descriptive in nature and does not explicitly list sources of input data although some articles appear to draw on Petroleum Marketing Program data on prices for winter heating fuels (EIA-877), motor gasoline (EIA-878), and diesel fuel (EIA-888). Other descriptive reports include the *Fuel Oil and Kerosene Sales Report*, the *Petroleum Marketing Monthly*, and the *Petroleum Marketing Annual*. An examination of the tables in these reports show all data items collected in the surveys being used, indicating that the program is not collecting superfluous data. These reports are easily assessable from EIA's main website. The descriptive reports include a Notes section as an appendix with a description of methods used by some but not necessarily all surveys whose data appear in the report. The descriptions, though helpful, do not present a thumbnail sketch of all survey methods for the profiled surveys.

RECOMMENDATION: For each survey component, the Petroleum Marketing Program should develop a summary description of survey methodology including survey objectives, target population, sampling frame, sample design, data capture, editing and imputation, weighting, and time series changes and other analytic considerations. This description should be included in the Notes section of reports incorporating the data.

The Petroleum Marketing Program data are also used as input for EIA energy models. Descriptive and model derived data are used to produce analytic publications. The petroleum marketing papers are exceptionally well written, understandable by laymen as well as industry analysts, and are so interesting it is hard to stop reading them. The reports are not always specific about the sources of the data and how the estimates were derived, however. A notable example of how this information might be conveyed was in the Feb. 24, 2005 *This Week in Petroleum* article on "Thoughts of Summer in February," which included a link on Chart Methodology (but did not report data sources).

RECOMMENDATION: EIA is to be commended on its highly readable analytic reports. Analysts might want to include links that present the methods and the data sets that were used in the presentation.

With the exception of EIA-821, EIA only publishes data when the statistic is derived from at least three companies and when one or two companies do not dominate the statistic. The survey instructions in Section 8 for these surveys is somewhat strong, however, advising companies that, "...the risk of disclosure of identifiable information is

²⁸ These data are also used extensively by state governments and by industry analysts, but this report will center on EIA's own products.

very small.” The “very” should be struck. Statistics derived from the Annual Fuel Oil and Kerosene Sales Report (EIA-821) can be published when they are based upon one or two companies and when one or two companies dominate the statistic. The companies are advised that the survey is not subject to statistical disclosure guarantees and that individually identifiable data may be disclosed.

The documentation of each survey’s methodology is limited and incomplete, with no one document that can serve as the “go to” report to understand the survey methodology. Because methods are not being documented and reviewed, there is a potential for errors or substandard approaches to creep into the surveys, particularly when the survey contractor or the project officer changes. The Petroleum Marketing Surveys are used extensively for time series analyses so it is also important that changes in survey forms and procedures over time be summarized. Accurate documentation of existing procedures and changes over time would be valuable for producing survey methods summaries for use in the Notes sections of descriptive reports and in the OMB package submission.²⁹

RECOMMENDATION: A detailed Survey Methodology Report should be prepared for each survey in the Petroleum Marketing Program describing the survey objectives, target population, sampling frame and coverage, sample design and allocation procedures, data collection and mailout procedures and forms, weighting and nonresponse adjustment procedures, data capture, editing and imputation, and analysis and reporting procedures. An executive summary should be prepared that can be used to produce the methods description for the OMB package and the Notes appendix for descriptive reports.

The EIA web site is quite easy to navigate to find information about petroleum markets with general interest articles like “A Primer on Gasoline Prices,” analytic pieces like “An Oil Market Urban Legend”, and feature articles like “Gasoline Price Pass-through.” Survey methodology is difficult to find on EIA’s web site, however. It would be useful to have a site where the interested reader could go to find descriptions of each survey’s study protocol (like the executive summary referenced above) and articles and professional presentations that focus on the statistical design issues and survey methods.

RECOMMENDATION: EIA should set up a link for papers and presentations that staff members have prepared on statistical design and survey methodology issues.

Summary of Findings:

The Petroleum Marketing Program is an important and valuable source of petroleum marketing data. The program is, in general, configured well and the recommendations given above should make the program stronger, more effective, and better appreciated by survey respondents and data users.

²⁹ PROGRAM MANAGER CLARIFICATION: These methodologies are documented in a series of reports as well as for the EIA-782 until recently, in a Handbook of Methods. This handbook historically documents the evolution of the surveys, samples, and methodology. This level of detail is inappropriate in an OMB package or explanatory notes.