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[Federal Energy Administration's System for Monitoring Heating Oil Prices]. EMD-77-63(a); B-178205. August 25, 1977. 3 pp. + enclosure (14 pp.).

Report to Sen. Patrick J. Leahy; by Elmer B. Staats, Comptroller General.

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Congressional Relevance: Sen. Patrick J. Leahy.

Authority: Energy Policy and Conservation Act (89 Stat. 871).

Emergency Petroleum Allocation Act of 1973 (87 Stat. 627).

Under the monitoring system established by the Federal Energy Administration (FEA) to insure that heating oil price levels remain reasonable, FEA collects price information from a survey of about 600 firms and compares the average of these survey prices to an index price which is FEA's best estimate of what average heating oil prices would have been had they remained under price controls. Findings/Conclusions: Overall, the sampling plan is reasonable and fairly represents residential heating oil users. The design of the FEA regional and national monitoring systems is sufficiently sensitive to increases in residential prices so that a similar monitoring system designed specifically for residential heating oil prices is not necessary. Survey and sampling errors are reasonably small, and sampling errors have been insignificant for the past heating season. Recommendations: The Administrator of the Federal Energy Administration should: conduct periodic test surveys of heating oil firms which are outside the FEA's present sample but within its sampling frame to determine if these firms reflect higher prices because they are not constrained by the requirement of submitting monthly price reports to FEA; continue its weekly monitoring system and include nonresidential prices as well as residential prices; reevaluate the appropriateness of a full two-cent flexibility factor and provide an analytical justification for whatever flexibility factor value it determines appropriate; examine the feasibility of using FEA's yearly data instead of the adjusted 1975 Bureau of Mines data to calculate survey and index prices; and reevaluate its heating oil price monitoring system in terms of the blending of #1 and #2 fuel oil and, if necessary, make adjustments to the index formula to account for the impact of blending. (SC)

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COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

August 25, 1977

B-178205

The Honorable Patrick J. Leahy
United States Senate

Dear Senator Leahy:

On February 10, 1977, you, along with Senators Brooke, Durkin, Hathaway, Kennedy, McIntyre, Muskie, Pell, Ribicoff, and Stafford, requested that we examine the Federal Energy Administration's (FEA) system for monitoring heating oil prices. Heating oil was exempted from FEA's pricing and allocation regulations on July 1, 1976, and FEA established a monitoring system to insure that heating oil price levels remain reasonable.

Under this system FEA collects heating oil price information from a survey of approximately 600 firms and compares the average of these survey prices to an index price, which is FEA's best estimate of what average heating oil prices would have been had they remained under price controls. If the average survey price exceeds the index price, on a national or regional level, FEA holds public hearings within 10 days to decide what actions, if any, need to be taken to bring the survey price level down to or below the index level.

Specifically, you asked us to explore the following questions.

- Is FEA's sample valid?
- To what extent can the sample accurately reflect higher prices outside the sample and large increases in the residential sector?
- To what extent are the FEA index and survey prices pulled downward by lumping together commercial users who can obtain bulk discounts with residential users who cannot?

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- To what extent are the index and survey prices pulled downward in New England by using the Northeast as a category, rather than monitoring the New England and Middle Atlantic States separately?
- Is the four-week moving average the most accurate and current method of tracking price increases?
- What is the correct margin for statistical error in the monitoring system FEA is currently using, and are the factors included in FEA's two-cent "flexibility factor" quantifiable? If not, will a smaller "flexibility factor" reflect reality equally well?
- What thoughts can GAO provide on the way FEA calculates its index price?

Also, you requested us to alter the monitoring system in various ways to see if the alterations would have triggered the reimposition of price controls. You suggested that we alter the system by

- performing separate calculations for residential oil prices,
- calculating index and survey prices on a State-by-State basis,
- performing market area and subregional analyses,
- using a smaller "flexibility factor", and
- using a week-by-week or bi-weekly calculation instead of a four-week moving average.

Our analysis was limited to the national and Northeast Region monitoring systems for the months of June 1976 and January 1977. However, we studied other months and the monitoring systems for other regions in various contexts on a selected basis. We could not perform any market area or State-by-State analyses because heating oil firms do not maintain data at that level. We attended FEA public hearings, reviewed

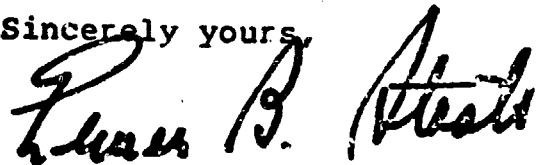
hearings minutes, and discussed the monitoring system with FEA representatives. We discussed the scope of our work with your and Senator Brooke's staff and briefed them on the results of our work.

Overall, we found that FEA's sampling plan was reasonable and fairly represented residential and New England heating oil users. We also found that the sampling errors for both the survey and index prices were small and relatively insignificant. However, we detected several deficiencies in the system and are making recommendations which we believe would correct these deficiencies and provide for a more accurate monitoring system. Our major area of concern was the two-cent flexibility factor which FEA adds to the base period price, along with other components, to obtain the index price. Since the factor was arbitrarily established, we recommend that FEA reevaluate its appropriateness and provide an analytical justification for the amount of the flexibility factor it determines appropriate.

Our detailed findings as they relate to the above questions and alterations to the system are presented in the enclosure of this letter. On August 9, 1977, we discussed the contents of the enclosure with FEA officials. They expressed general agreement with our findings.

We hope this information will be useful to you.

Sincerely yours,



Comptroller General
of the United States

Enclosure

ENCLOSURE

ENCLOSURE

GAO REVIEW OF FEA'S SYSTEM
FOR MONITORING HEATING OIL PRICES

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BACKGROUND

The Energy Policy and Conservation Act (89 Stat. 871) provides the President, subject to congressional disapproval, the authority to exempt crude oil, residual fuel oil, and refined petroleum products from the allocation and pricing regulations established under the Emergency Petroleum Allocation Act of 1973 (87 Stat. 627). The rationale in granting this authority was that there was no longer a general shortage of crude oil and most refined petroleum products and that a comprehensive regulatory structure may no longer be necessary.

Under this authority, the Federal Energy Administration (FEA) exempted the following products from allocation and price controls:

- residual fuel oil on June 1, 1976;
- middle distillates, which include heating oil, on July 1, 1976;
- naphthas, gas oils, greases, lubricants, certain petrochemical feedstocks, and other specialty products on September 1, 1976; and
- naphtha base jet fuel on October 1, 1976.

FEA plans to submit a motor gasoline decontrol proposal to the Congress in the fall of 1977.

After heating oil prices were decontrolled in July 1976, FEA established a system to monitor these prices on a weekly and monthly basis to assure that they remain reasonable under decontrol. In response to concerns expressed by members of the Congress, FEA committed itself to monitoring heating oil prices from September 1, 1976, until March 31, 1977. However, FEA voluntarily extended the weekly monitoring system through April 1977 and the monthly system indefinitely. The system measures actual average heating oil prices (survey prices) and compares them to FEA's best estimate of what the average price level of heating oil would have been had it remained under price controls (index price). Should the survey price exceed the index price, FEA holds public hearings to obtain information to assist it in determining what actions to take to return actual heating oil prices to levels at or below the index price. Such actions could include:

- reimposition of full price and allocation controls;

- imposition of partial price and allocation controls;
- imposition of full or partial controls over certain segments or distribution levels of the industry; and
- modification of FEA's entitlements program to reduce the cost of imported middle distillates.

Survey prices are obtained on a weekly and monthly basis from a sample of about 600 heating oil firms. Weekly telephone reports of residential heating oil prices are used to provide an early indication of excesses in heating oil prices. Monthly price information which is used in calculating the survey price includes both residential and non-residential consumer price data and is submitted in detailed reports by the firms.

The index price consists of a June 1976 base price to which certain monthly cost components and other factors are added. These are:

- Seasonal adjustment to account for changes in heating oil prices due to temperature variations in the weather;
- Price changes in imported and domestic crude oil to reflect increases or decreases in crude oil costs;
- Price changes in imported distillates to account for increases or decreases in the cost of importing middle distillates;
- Changes in refiners' non-product costs to reflect increases or decreases in refiners' non-product costs such as labor, overhead, and marketing;
- Changes in resellers' and retailers' non-product costs to allow for increases or decreases in resellers' and retailers' non-product costs; and
- A two-cent flexibility factor to allow for statistical error, inherent deficiencies of the index formula, and short-term market aberrations.

Table 1 shows the various components added to the June 1976 base price to arrive at the national index price for the 11 months ending April 1977.

Table 1
National Cost Components of Heating Oil Price Index
(Cents per gallon)

Month	Price	Changes in crude costs	Changes in refiners' nonproduct costs	Changes in nonrefiners' margin	Seasonal adjustment	Import adjustment	Flexibility factor	Index price
June 1976	36.6	0.000	0.000	0.000	0.000	0.000	2.0	38.6
July 1976	36.6	-0.183	-0.140	0.041	-0.145	-0.054	2.0	38.1
Aug 1976	36.6	0.232	0.219	0.079	-0.148	0.000	2.0	38.9
Sept 1976	36.6	0.426	0.278	-0.050	-0.037	0.003	2.0	39.3
Oct 1976	36.6	0.160	0.109	0.058	0.332	0.169	2.0	39.4
Nov 1976	36.6	0.787	0.193	0.095	0.565	0.003	2.0	40.2
Dec 1976	36.6	1.167	0.188	0.099	1.102	0.003	2.0	41.1
Jan 1977	36.6	1.457	0.311	0.099	1.111	0.049	2.0	41.7
Feb 1977	36.6	2.476	0.660	0.075	1.273	0.148	2.0	43.2
Mar 1977	36.6	2.815	0.629	0.091	1.044	0.171	2.0	43.4
Apr 1977	36.6	2.982	0.765	0.132	0.728	0.166	2.0	43.3

Source: FEA

FEA monitors survey and index prices on a national and regional basis. The regional indices--the Northeast, South, North Central, and West--were developed so that no region would be disadvantaged relative to the others. Table 2 illustrates the survey and index prices on a national and regional basis.

Table 2

Heating Oil Survey/Index Prices
(Cents per gallon)

	<u>Northeast</u>	<u>South</u>	<u>North Central</u>	<u>West</u>	<u>U.S.</u>
June 1976	38.2/40.2	34.3/36.3	35.0/37.0	38.2/40.2	36.6/38.6
July 1976	38.1/39.6	34.1/35.9	35.2/36.6	38.1/39.8	36.5/38.1
Aug. 1976	38.6/40.7	34.4/36.7	35.4/37.3	38.7/40.5	36.9/38.9
Sept. 1976	39.1/41.0	34.7/37.0	35.7/37.7	39.5/40.9	37.3/39.3
Oct. 1976	39.6/41.5	35.0/36.9	36.0/37.6	39.6/41.0	37.7/39.4
Nov. 1976	40.7/42.0	36.3/37.9	37.1/38.6	39.7/41.8	38.7/40.2
Dec. 1976	41.9/42.9	37.3/38.8	38.6/39.5	39.4/42.8	39.8/41.1
Jan. 1977	43.2/43.5	38.6/39.3	40.4/40.0	40.2/43.3	41.2/41.7
Feb. 1977	44.2/45.2	39.7/40.7	41.1/41.4	40.9/44.7	42.1/43.2
Mar. 1977	44.5/45.4	40.1/40.8	41.7/41.5	41.5/44.8	42.5/43.4
Apr. 1977	44.6/45.4	39.8/40.8	41.7/41.5	41.7/44.8	42.5/43.3

Source: FEA

In the North Central Region, monthly survey prices exceeded monthly index prices by four-tenths of a cent in January 1977 and two-tenths of a cent in March 1977. After FEA had discovered that the index was triggered in January, it held hearings in Chicago in April 1977 to determine what action was necessary to bring the survey price level down to or below index levels. Also, during April 1977, FEA discovered that weekly survey prices exceeded weekly index prices on a national basis and in the South and North Central Regions. However, when actual monthly data became available for April 1977, the survey price exceeded the index price only in the North Central Region by two-tenths of a cent. Because the index had been triggered on a weekly and monthly basis, FEA held regional hearings in July 1977 and

national hearings in August 1977 to determine what actions should be taken prior to the next heating season. Also, FEA conducted audits in June 1977 of selected firms within the sample to obtain information to ascertain whether heating oil prices were cost justified. FEA is currently evaluating the information collected from the hearings and audits to decide what actions must be taken, if any, to improve the monitoring system.

VALIDITY OF FEA'S
SAMPLING PLAN

FEA's sampling plan is appropriate and reasonable. The sample--which is stratified by size of heating oil firm sales--was chosen from a sampling frame representing 80 to 85 percent of all heating oil sales volume. The sampling frame is the number of firms (6,697) out of a universe of approximately 8,000 firms from which FEA selected its sample. Table 3 compares the number of firms in the sample with those in the sampling frame.

Table 3

FEA's Sampling Plan

	<u>Percent of end sales</u>	<u>Number of firms in the sample</u>	<u>Number of firms in the sam- pling frame</u>	<u>Sampling ratio</u>
Stratum I (Largest firms)	64	230	230	1:1
Stratum II (Moderate size firms)	20	194	1,165	1:6
Stratum III (Smallest firms)	16	177	5,302	1:30

FIRMS OUTSIDE THE SAMPLE

Since FEA selected a simple random sample of small and medium size firms and a 100 percent sample of large firms, we believe that the prices charged by firms outside the sample but within the sampling frame are at least theoretically represented by comparable firms in the sample. However, to the extent that

the sampling plan includes 1 in 30 or about 3% of the smallest firms (see Table 3), it is possible for a limited number of small firms charging extraordinarily high prices to remain undetected by the sample selection. We observed a wide spectrum of heating oil prices charged in January 1977 by firms in the sample ranging from 26 to 56 cents per gallon. Thus, it appears that all except the most extreme prices are represented by the FEA sample. However, a problem could arise due to FEA's repeated use of the same firms in the sample.

Since firms in the sample are aware that their heating oil prices are monitored, they would be more inclined to keep prices lower than those firms which are outside the sample. This could result in artificially low prices for those firms within the sample and higher prices for those outside the sample. To alleviate this potential problem, FEA could use a rotating sample whereby a different sample of firms in Strata II and III would be reporting each month. All firms in Stratum I would still be included in the sample.

INCREASES IN RESIDENTIAL PRICES

Under FEA's sampling plan, large increases in residential heating oil prices are proportionately and reasonably reflected in any increases in the average survey price which includes both residential and non-residential prices. We considered the feasibility of FEA constructing a similar monitoring system specifically for residential heating oil prices. Our analysis indicated that, on a national or regional basis, the probability of a residential survey price triggering a residential based index is about the same as that of the current overall survey price triggering its corresponding index. The difference between FEA's survey and index price appears to be proportional to the difference between the estimated residential average price and its hypothetical index. In our judgment, FEA's regional and national monitoring systems are sufficiently sensitive to excesses in residential heating oil prices, and we do not believe a separate residential monitoring system is needed.

IMPACT OF INCLUDING NON-RESIDENTIAL USERS WITH RESIDENTIAL USERS ON THE MONITORING SYSTEM

Heating oil prices paid by residential users have been historically higher than prices paid by non-residential users which obtain bulk discounts. Therefore, the average survey

price computed by FEA is lower than the average residential heating oil price. However, the FEA monitoring system directs itself to differences between survey and index prices rather than levels of these prices. Our analysis showed that these differences are proportional to differences between estimates of average residential survey prices and corresponding residential index prices. Consequently, we believe there is no need to have separate monitoring systems for non-residential and residential heating oil prices.

IMPACT ON INDEX AND SURVEY PRICES BY USING THE NORTHEAST AS A SINGLE CATEGORY

Average New England heating oil prices are higher than average heating oil prices of the remaining States included in the Northeast Region. (The Northeast Region includes the six New England States plus New York, New Jersey, and Pennsylvania.) In examining the question of the need to separately monitor New England and the Middle Atlantic States, the critical issue is how closely the relationship between the survey and index prices for the Northeast reflects the New England situation.

We considered the feasibility of FEA constructing a similar monitoring system specifically for New England. FEA advised us that it would be feasible to construct a New England monitoring system. This effort would require the selection of a new sample of heating oil firms who sell to New England States. FEA believes it could implement such a system within 3 to 4 months assuming that no data collection difficulties developed. However, there may be data collection difficulties since most firms do not maintain data on a State-by-State basis.

The probability of triggering a New England index is nearly equal to the probability of triggering the Northeast index. To arrive at this conclusion, we compared FEA data for New England to data for the Northeast. We estimated that the difference between the survey and index prices for the Northeast to be approximately proportional to the difference between the New England survey prices and hypothetical index prices. In our judgment, FEA's Northeast monitoring system is sufficiently sensitive to changes in New England heating oil prices. Based on our analysis, we believe that constructing a New England monitoring system is not necessary.

WEEKLY MONITORING SYSTEM

Weekly survey prices are based on the difference between the average of the residential prices reported by telephone to FEA for the most current four weeks and the average price established for the fourth week of the latest month for which

monthly survey and index values were computed. This difference is added to the latest monthly survey price to obtain the current week's estimated survey price. This weekly price is compared against an estimated weekly index value which is derived from the latest monthly index and its relative change over the previous month.

FEA's weekly monitoring system is intended to detect weekly excesses in heating oil prices. In our view, the system is not a reliable indicator of weekly prices because it is based on the assumptions that (1) a difference in a four-week average of residential prices adequately represents the incremental change in both residential and non-residential weekly prices, (2) week-to-week index price changes are equal, and (3) the change in the monthly index for successive months is approximately the same.

We also believe that the weekly system is not a good indicator of whether the monthly index will be triggered. For example, the weekly indices were exceeded in April 1977 on a national basis by one-tenth to two-tenths of a cent, in the South Region by five-tenths to six-tenths of a cent, and in the North Central Region by 1.1 to 1.2 cents. However, the subsequent monthly index was exceeded only in the North Central Region. Conversely, when the January 1977 monthly index was exceeded in the North Central Region, none of the earlier weekly indices were exceeded. Thus, the weekly monitoring system does not always indicate whether the more accurate monthly monitoring system will be triggered.

FEA attributed the failure of the North Central weekly monitoring system to trigger because non-residential prices increased faster than residential prices. We also found that, on a national basis, average non-residential prices increased faster than the average residential prices between June 1976 and January 1977.

Basing weekly survey price estimates on four-week averages rather than current week values could also underestimate the weekly survey price because the four-week average would smooth any sharp price increases. We substituted weekly prices for four-week average prices in FEA's weekly method and found that the weekly index was triggered 20 times whereas it was triggered 3 times using four-week averages through March 19, 1977. As previously stated, the weekly index is used to detect excesses in weekly heating oil prices. FEA relies on the more accurate monthly data in determining whether the index has been officially triggered.

In our view, a quick response capability provided by computing weekly estimates is appropriate. We believe that FEA should include non-residential heating oil prices as part of its weekly monitoring system to more accurately estimate weekly prices.

SAMPLING ERROR

For January 1977 we determined that the sampling error of FEA's monthly survey prices was .04 cents per gallon nationally and .05 cents per gallon for the Northeast Region. We determined that the sampling error for the index price for January 1977 both nationally and for the Northeast Region was about one-tenth of a cent. For January 1977 the national and Northeast Region survey prices were 41.2 and 43.2 cents per gallon, respectively, and the national and Northeast index prices were 41.7 and 43.5 cents per gallon, respectively. In our view, these sampling errors are reasonably small and unlikely to trigger the monthly index.

Since the differential between the survey and index prices is the determining factor in deciding whether there were excess price increases, we also studied the reliability of the monthly FEA monitoring system nationally and for the Northeast Region by jointly considering the impact of the sampling error on both survey and index prices. Combining the above sampling errors, we determined that FEA's monitoring system would fail to trigger the index about one-fourth of the time if the true survey price exceeds the true index price by one-tenth of a cent or less. (True survey and index prices are those which are calculated from a 100% sample.) Since the major factors used to compute the sampling errors do not vary among regions to any great degree, we believe our results can be extended to the heating oil monitoring systems for other regions. However, through April 1977 an untriggered monthly index price was never equal to the survey price nor greater than the survey price by one-tenth of a cent or less. Therefore, it is unlikely that the monitoring system had given any false readings due to the combined sampling errors of the survey and index prices.

FLEXIBILITY FACTOR

The two-cent flexibility factor is a major component of the index price and has a significant impact on whether the index is triggered. The amount of the factor was agreed upon by the former FEA Administrator and the Congress during the initial stages of setting up the system. At that time, there was no quantifiable justification for the amount

of the factor. When the monitoring system became effective, FEA justified the existence of the factor by stating that it is intended to compensate for statistical error, inherent deficiencies in the index, and short-term market aberrations. However, FEA has never attempted to quantify the flexibility factor.

We believe part of the two-cent flexibility factor may be a safety margin added to the index price. If the survey price exceeds the index price by more than the two-cent factor, FEA has no doubt that the controlled price would have been exceeded had controls still been in effect. The oil industry contended that the index was understated due to its inability to recognize additional costs incurred last winter. If the industry's contention is valid and if these costs were reflected in the survey price, it is logical to assume that the index price would have been exceeded on a monthly basis more than the three times it was from June 1976 to April 1977. The fact that the index price was not exceeded in more months suggests that the flexibility factor absorbed these increased costs.

We tested two alternative values for the flexibility factor. These values were not supported by any detailed analysis. They are:

--three and a half cents as suggested in public testimony by an oil company; and

--two percent of the sum of the other factors of the index as suggested in public testimony by the New York Emergency Energy Office.

While the two-cent flexibility factor shows the monthly index was triggered three times from June 1976 to April 1977, applying a two percent factor during this period would have triggered the monthly index 18 times. On the other hand, the index is never triggered using the three and a half cent factor. In fact, the reported survey price never comes within one cent of triggering the index under this alternative.

The two-cent flexibility factor is arbitrary with no factual basis. We believe that FEA should reevaluate the appropriateness of the factor and provide an analytical justification for whatever flexibility factor it determines appropriate. If the factor cannot be quantified, we suggest that FEA justify it by providing specific inherent deficiencies in the index for which the factor, in part, is supposed to compensate. Also, FEA should explain how short-term market aberrations affect the monitoring system.

OTHER CONSIDERATIONSWeighting scheme

To determine the base weighted average price for the index and the weighted average survey price for each month, FEA weighted 1975 Bureau of Mines annual aggregate data, the most recent heating oil sales data available, by using June 1976 relative sales volume as base period data along with data from FEA's 1974 market survey. A base period is desirable because it holds relative sales volume constant so that only price changes are measured by the monitoring system. June 1976 was used as the base period in the weighting scheme because it was the last month that heating oil was controlled. However, since June is a summer month, its relative sales volume is not typical of other months. FEA's 1974 market survey was used to weight the Bureau of Mines data by strata size.

To determine the sensitivity of using June 1976 as a base period with respect to sales volume, we used relative sales volumes from the full year of data that FEA collected in order to implement the monitoring system. Our calculations moved the index up to five-tenths of a cent closer to being triggered than FEA's calculations.

We recognize that FEA did not have yearly data available for its initial index and survey price calculations. Now that this data is available, we believe that FEA should consider using it instead of the modified 1975 Bureau of Mines data in determining future survey and index prices.

Seasonal considerations

We studied the impact of the seasonal adjustment incorporated by FEA in its heating oil monitoring system and have determined that current seasonal conditions are reasonably approximated through December 1976. Data was not available to assess the impact beyond December 1976.

We looked at the possibility that the index price may be understated in winter months because it does not provide for blending #2 heating oil with the more expensive #1 heating oil to improve viscosity in cold weather. Provided that reporting firms increase their heating oil prices to account for the increased costs of blending, the survey price would reflect the higher costs. We attempted to measure the amount by which the index price was understated due to its failure to recognize increased blending costs, but could not provide a reasonable

estimate because of limited data. Because of the possible impact on the index, we believe FEA should consider the feasibility of including increased blending costs in the index.

CONCLUSIONS

FEA's sampling plan is reasonable for determining monthly weighted average heating oil prices on a national or regional basis. The sampling frame from which FEA selects its sample represents 80 to 85 percent of all heating oil sales. We have some concern that heating oil firms not in the sample may feel less constrained to keep prices down than firms in the sample which report heating oil prices to FEA. We think FEA should conduct an appropriate test to see if such price differences exist. If such differences exist, FEA should establish a rotating sample to collect data from oil firms within its sampling frame.

Average residential heating oil prices are typically higher than average non-residential heating oil prices. Our analysis shows that residential heating oil users are proportionately and thus fairly represented in the computation of weighted average survey prices on a national and regional basis. Consequently, we determined that the design of the FEA national and regional monitoring systems is sufficiently sensitive to increases in residential prices so that a similar monitoring system designed specifically for residential heating oil prices is not necessary. For similar reasons we believe that a specific New England heating oil price monitoring system would not be necessary even though heating oil prices are typically higher in New England than in other States in the Northeast Region.

FEA's weekly price monitoring system is intended to provide a quick response to excessive heating oil prices. The weekly system is based on prior month results and changes in four-week averages. We believe that the weekly system can be improved if based on data collected by FEA for last year's heating season. It should be pointed out, however, that deficiencies in the weekly system do not impact on the monthly system.

Our analysis showed that FEA's survey and index sampling errors each are reasonably small. However, when these sampling errors are considered jointly, we estimate that one-fourth of the time FEA's monitoring system would fail to trigger if the true survey price exceeded the true index price by one-tenth of a cent or less. We feel the sampling errors have been insignificant for the past heating season.

The decision to include the two-cent flexibility factor in the index formula was arbitrary and without factual basis. The factor is a major component of the index and has a significant impact on whether the index is triggered. Accordingly, FEA should justify its size and existence.

Estimates of survey and index prices are sensitive to the base period sales volume used in determining the weighting scheme. Using FEA's yearly data instead of adjusted 1975 Bureau of Mines survey data, we found instances where the differences between the survey and index prices changed by up to five-tenths of a cent per gallon. We also tested in detail other assumptions FEA made in assigning relative weights to various regions, retail firms' sizes, and consuming sectors in determining weighted average survey prices. We determined that FEA's choice of assumptions over other plausible ones was not so sensitive or critical as to change any of the triggering or non-triggering events recorded by FEA thus far.

FEA's monitoring system does not directly account for blending of #2 heating oils for improved viscosity during extremely cold weather. Blending can have an appreciable impact on triggering the index because of cost differences of the fuels blended. Because of limited data, we could not provide a reasonable estimate of its impact.

RECOMMENDATIONS

We recommend that the Administrator, FEA:

- conduct periodic test surveys of heating oil firms which are outside FEA's present sample but within its sampling frame to determine if these firms reflect higher prices because they are not constrained by the requirement of submitting monthly price reports to FEA. If, at any time, these test results indicate a significant difference in prices, FEA should establish a rotating sample that would collect data from all heating oil firms in FEA's sampling frame.
- continue its weekly monitoring system and include non-residential prices as well as residential prices.
- reevaluate the appropriateness of a full two-cent flexibility factor and provide an analytical justification for whatever flexibility factor value it determines appropriate.

- examine the feasibility of using FEA's yearly data instead of the adjusted 1975 Bureau of Mines data to calculate survey and index prices.
- reevaluate its heating oil price monitoring system in terms of the blending of #1 and #2 fuel oil and, if necessary, make adjustments to the index formula to account for the impact of blending.