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Farm petroleum delivery

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SUMMARY

Nearly all Iowa farmers using petroleum depend upon tank truck delivery service. The 1940 census shows that 90 percent of Iowa farmers had automobiles, 54 percent had tractors and 11 percent had trucks. They purchased an estimated 235 million gallons of refined fuels in 1941.

Mechanized agriculture depends on an uninterrupted flow of fuel oil in order to attain its production goals. It is estimated that tank trucks serving Iowa farmers travel 24 million miles a year and that this mileage may be reduced 30 to 40 percent without depriving farmers of essential delivery service.

A survey of 64 school districts selected at random in 22 Iowa counties showed that 11.1 farmers in the average district purchased from 7.6 salesmen, or an average of one salesman for each 1 1/2 farmers. In the extreme case, 13 farmers in a district were served by 16 salesmen representing bulk plants located in six different towns 2.5 to 33 miles distant. On the other extreme were four districts, subsequently surveyed, in which 54 out of 57 farmers concentrated their patronage with one bulk plant. The gallonage delivered per mile of truck travel where the farmers concentrated their patronage is estimated at two to three times that in the former case.

The chief reasons why farmers in a given area tend to scatter their patronage among many salesmen are:

(1) Many salesmen solicit their business.
(2) Prices tend to be uniform.
(3) Farmers are unable to test claims made for different brands of fuel oils, although there is much rivalry among many brands.
(4) Salesmen vie with each other in rendering delivery and other services, thus striving to develop a customer preference for the salesman.
(5) Not only do prices tend to be uniform, but costs of services are included in the price.

Under the above conditions, any reasonably good salesman is likely to get "a share" of the business on the basis of one or another "sales point." And, since the more efficient firms usually do not give their customers the benefit of their higher efficiency (unless they are cooperative), customers have no
incentive to concentrate their patronage on a few, more efficient dealers.

Under the competitive conditions that prevail, many tank truck salesmen travel long distances to make fills. The longest distance from the farm to the bulk plant patronized that was reported was 66 miles. However, 75 percent of 708 random farmers purchased from dealers located eight miles or less from the farm. Also when many salesmen canvass the same area, each salesman’s customers will be widely scattered. The average distance between 323 stops made by 22 salesmen was 6.4 miles. Moreover, many of the fills are too small; one-fourth were less than 20 gallons. Knowing that many salesmen are at their service, most farmers do not order until fuel is needed. Over one-fourth of the orders were filled within three hours, and one-half within six hours. Truck operators usually are unable to plan economical trips when deliveries are made on short notice.

SUGGESTIONS FOR REDUCING EXCESSIVE TRUCK TRAVEL

Excessive truck travel may be reduced in the following ways:

(1) By placing competition more definitely on the basis of price, quality and relative efficiency by placing farm purchasing of petroleum products on the basis of quality standards instead of private brands, by separating delivery and other service charges from the price of the product and by cooperation among purchasers.

(2) Action by distributors and farmers to reduce long hauls, emergency fills, small fills and to eliminate non-essential competitive services and other practices that add to mileage.

(3) Action by neighborhood groups of farmers to make a group choice of source of supply as a substitute for present individual choices, which result in “scattering” of patronage.

(4) Administrative controls to conserve critical materials are being put into effect. Rationing of gasoline, tires, etc., is the means being adopted to achieve conservation. These measures will necessitate careful planning by distributors as well as farmers if the petroleum delivery services needed for essential food production are to be rendered during the emergency.
Farm Petroleum Delivery

BY W. T. MAAKESTAD AND FRANK ROBOTKA

The critical rubber situation resulting from the present war emergency, together with the pending acute shortage of trucks due to the shifting of a major portion of the automotive industry to defense contracts, has placed the spotlight on trucking and delivery systems throughout the nation. Agricultural production depends largely on power equipment and on a petroleum distribution system for fueling it. Under present conditions it is particularly vital that an adequate and efficient delivery system be maintained.

According to the 1940 U. S. census, 54 out of 100 Iowa farmers have tractors, 90 have automobiles and 11 have trucks. In addition, gas engines for power and many other types of petroleum-using equipment are found on Iowa farms. The value of petroleum products bought by Iowa farmers in 1941 is estimated at nearly 40 million dollars. The light material (gasoline, kerosene and tractor fuels) used is estimated at 235 million gallons.

The job of servicing the 236,601 automobiles, 137,952 tractors and 26,352 trucks now on Iowa farms represents a sizeable demand on the transportation facilities of the state.

Farmers have been asked to increase their production over previous years. They are responding nobly, but if they are to continue to meet production goals in the face of prospects for an intensified farm labor shortage, greater use must be

ACKNOWLEDGMENTS

The authors deeply appreciate the splendid cooperation received in connection with this study from numerous tank salesmen, petroleum purchasing organizations and the Extension Educational Cooperators who contacted 806 farmers in 64 school districts in Iowa. The authors are also grateful for the many helpful suggestions and criticisms received from their colleagues.

The Cooperative Service Company, Waterloo, Iowa, and the Consumers' Cooperative Association, North Kansas City, Mo., contributed toward some of the field work.

Assistance in tabulating survey data was furnished by the Federal Works Agency, Work Projects Administration, Unit 16, O. P. 365-1-72-3.

1 Project 726 of the Iowa Agricultural Experiment Station. This publication supersedes Transportation Memo. No. 7, Transportation Conservation in Iowa Farm Delivery of Petroleum Products.
2 U. S. Census, 1940.
3 Division of Agricultural Statistics, Iowa State Department of Agriculture, Des Moines, Iowa. Iowa Assessors Annual Farm Census, 1941, Bulletin No. 92-C.
made of tractor power and mechanized equipment, and, as a result, even more fuel will be consumed than in the past.

Gasoline rationing is here but there is every reason to believe that an adequate supply will be furnished to farmers for production. Granting that there will be a sufficient supply of fuel for essential purposes, how many tires and trucks will be available 6 to 12 months hence to replace those now in service delivering this fuel to farmers? Prospects for getting an adequate supply of tires are far from bright. Indications are that restrictions may become more stringent than they are at present. The truck supply situation may be even worse than the tire shortage.

All in all, farmers and suppliers of petroleum are soon likely to be faced with a serious problem concerning which very little has been done.

Farmers are concerned and confused about getting adequate supplies of motor fuels and adequate delivery service. They are also wondering whether or not they may have to change brands of products or the deliverymen with whom they have become accustomed to do business. (Some of the latter have, in fact, already left for military service or have gone into war or other industries.)

Suppliers are also raising questions: "What will we do for delivery equipment when our tires are worn out and there are not enough new ones or recaps to go around, even though we may get a priority rating? What will we do when our trucks, now in operation, break down beyond repair and we can't get replacement? If we must curtail service, can we hold our present customers? Can we afford to put miles on our trucks or cars to solicit business and make collections? Where will we get men to operate our trucks when so many of our personnel are being called into the service?"

Above the business and personal interests of farmers and petroleum distributors to be considered is the welfare of the nation, now engaged in an all-out war which demands that all resources be utilized with the greatest possible economy. The Office of Defense Transportation, on which rests the responsibility of adjusting and coordinating all transportation activities so that all essential war materials are transported with the greatest possible economy, is scrutinizing all delivery operations with the view to conserving existing transpor-
tation facilities and at the same time maintaining essential services. Will present methods of distributing petroleum products in Iowa bear such a scrutiny?

The Middle West has thus far had an adequate supply of petroleum. Although difficulties may arise in getting essential fuels to bulk storage points throughout the state, we are here concerned with the problem of getting this fuel from the bulk tanks to the farms of Iowa. That is where a transportation bottleneck is most likely to develop. Our investigations indicate that this danger may be reduced greatly, if not eliminated, without depriving farmers of urgently needed service. The key to this situation lies in the fact that much duplication in distributing facilities exists which results in excessive truck travel for the gallonage delivered. If the waste thus occasioned were eliminated, present delivery facilities might be made to serve twice as long, and at the same time result in a considerable saving of labor.

The data presented herewith are the result of a preliminary study of methods and costs of delivering petroleum products based on three types of surveys made in 1940, 1941 and 1942. It is believed that the data indicate what the general situation is and reveal some of the more important factors contributing to it.

PART I. THE SITUATION

SOME DELIVERY EXPERIENCE

The experience of 10 tank truck salesmen for a total of 14 separate months during the summer of 1940 gives us a glimpse of the problem.

They traveled from 507 to 1,748 miles per month or an average of 1,206 miles. They made from 81 to 310 fills and averaged 172 fills per month for the 14 months studied. They delivered from 3,790 to 25,985 gallons, or an average of 10,998 gallons per month. The gallons delivered per mile of travel ranged from 3.8 to 14.9 with an average of 8.8.

In the case of another group of 22 tank truck operators, who were accompanied by an investigator on one trip each in 1941, the gallons delivered per mile of truck travel per day per salesman ranged from 6.8 to 20.7 and averaged 10.8. Many reasons may be given for these wide variations, but
they all add up to the fact that many tank trucks travel too many miles for the gallonage delivered.

Three basic factors affect these results: (1) Distance between the farm and the bulk plant, (2) distance between farm stops or fills and (3) gallons unloaded at each stop.

(1) **Distance between farms and bulk plants.** Whereas the average distance between the 708 farms included in a random sample studied and their nearest bulk plant was 4.9 miles, the average distance to the bulk plants from which they bought was 7.4 miles. None of these farms was more than 10 miles from a bulk plant, yet 18 percent purchased from plants more than 10 miles distant and 10 percent from plants 15 or more miles distant. The five most distant plants from which purchases were reported were located 30, 32, 33, 52 and 66 miles from the farms reporting.

Most farmers, however, make their purchases from nearby bulk plants. Of the plants from which purchases were reported, 44 percent were 5 miles or less and 75 percent were 8 miles or less from the farms served (see table 1).

It is not to be expected that all farmers would normally purchase from their nearest bulk plant. But the farther a plant extends its territory the stronger the competition it is likely to encounter, hence the greater is the distance likely

---

**TABLE 1. DISTRIBUTION OF BULK PLANTS ACCORDING TO DISTANCE BETWEEN THEM AND 708 FARMS SURVEYED.**

<table>
<thead>
<tr>
<th>Distance from farm to bulk plant</th>
<th>Bulk plants nearest to farm</th>
<th>Bulk plants from which farmers bought</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Percentage of total</td>
</tr>
<tr>
<td>(Miles)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 3</td>
<td>63</td>
<td>9.0</td>
</tr>
<tr>
<td>3-5</td>
<td>355</td>
<td>55.1</td>
</tr>
<tr>
<td>6-8</td>
<td>225</td>
<td>32.2</td>
</tr>
<tr>
<td>9-11</td>
<td>26</td>
<td>3.7</td>
</tr>
<tr>
<td>12-14</td>
<td>64</td>
<td>6.6</td>
</tr>
<tr>
<td>15-17</td>
<td>52</td>
<td>5.4</td>
</tr>
<tr>
<td>18-20</td>
<td>22</td>
<td>2.3</td>
</tr>
<tr>
<td>21-66</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>699</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Average distance from farm to bulk plant 4.9 miles 7.4 miles
TABLE 2. DISTRIBUTION OF 323 STOPS MADE BY 22 SALESMEN DURING A SINGLE DAY'S DELIVERIES IN 1941, CLASSIFIED BY DISTANCE BETWEEN STOPS.

<table>
<thead>
<tr>
<th>Distance between stops (miles)</th>
<th>Number of stops</th>
<th>Percent of total</th>
<th>Cumulative percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 0.5</td>
<td>43</td>
<td>13.3</td>
<td>13.3</td>
</tr>
<tr>
<td>0.5-0.9</td>
<td>34</td>
<td>10.5</td>
<td>23.8</td>
</tr>
<tr>
<td>1.0-1.9</td>
<td>56</td>
<td>17.3</td>
<td>41.1</td>
</tr>
<tr>
<td>2.0-2.9</td>
<td>44</td>
<td>13.6</td>
<td>54.7</td>
</tr>
<tr>
<td>3.0-3.9</td>
<td>27</td>
<td>8.4</td>
<td>63.1</td>
</tr>
<tr>
<td>4.0-4.9</td>
<td>23</td>
<td>7.1</td>
<td>70.2</td>
</tr>
<tr>
<td>5.0-5.9</td>
<td>21</td>
<td>6.6</td>
<td>76.8</td>
</tr>
<tr>
<td>6.0-6.9</td>
<td>15</td>
<td>4.7</td>
<td>81.5</td>
</tr>
<tr>
<td>7.0-7.9</td>
<td>16</td>
<td>5.0</td>
<td>86.5</td>
</tr>
<tr>
<td>8.0-8.9</td>
<td>21</td>
<td>6.5</td>
<td>93.0</td>
</tr>
<tr>
<td>9.0-9.9</td>
<td>8</td>
<td>2.5</td>
<td>95.5</td>
</tr>
<tr>
<td>10.0-14.9</td>
<td>12</td>
<td>3.6</td>
<td>98.1</td>
</tr>
<tr>
<td>15.0 and over</td>
<td>3</td>
<td>0.9</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>323</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

to be between fills in the more distant parts of the trade area. Moreover, since frequent trips to the bulk plant to refill are necessary, the distance from the plant to the first farm stop and from the last stop to the plant is likely to be increased.

(2) **Distance between farm visits.** According to the daily records of a group of 22 salesmen, the daily averages of the distances between fills ranged from 2.9 to 13.5 miles. However, when the distances between individual stops were examined, the range was from 0.1 to 20.7 miles, or an average of 6.4 miles. Data based on 14 monthly reports of another group of 10 salesmen showed the same tendency for distances between fills to vary widely.

Although nearly one-fourth of the stops involved less than 1 mile travel and nearly two-thirds were under 4 miles, nearly 30 percent were 5 miles or over. (See table 2.)

But distance traveled alone does not indicate efficiency. The gallonage delivered must also be considered.

(3) **Gallons delivered per stop.** The 14 monthly salesmen's records showed a range from 34.8 to 89.3 in gallons of "light ends" per fill, or an average of 60 gallons. The 22 daily salesmen's records showed a range from 25.3 to 139 gallons in the average fills per individual salesman per day, or an average of 66.8 gallons. Individual fills ranged from 2.5 to 580 gallons.

---

4 Gasoline, kerosene and tractor fuel.
Fills of 50 and 100 gallons were the most common, but one-fourth of them were 20 gallons or less and 54 percent were 50 gallons or less. One out of seven fills was 10 gallons or less, the lowest being 2.5 gallons. The simple average was 71.6 gallons per fill.

Another factor to consider is that only 205 of the 323 stops in table 2 were to deliver petroleum products. The other 118 were for the following purposes:

- Trips back to bulk station, office or salesmen’s home: 58
- Checking patrons’ tanks — no fill resulting: 19
- Collections: 11
- Solicitations: 10
- Visiting: 8
- Servicing equipment: 4
- Miscellaneous: 8
- Total: 60

As for the trips back to the bulk plant or office, it is of course necessary to make them when the orders received have been filled, when the tank truck has been emptied, and at the end of the day. The larger the fills the more frequently will trips to reload have to be made unless the capacity of the tank truck is increased. Such trips, if frequent, will increase the average distance between fills. In a few cases, however, it appeared that returns to the plant were frequent because orders were not numerous and came from widely scattered parts of the trade area. In other cases the capacity of the tank truck apparently was too small.

The 60 farm stops for purposes other than delivery may have been made incidentally while enroute to make deliveries. When this is the case, no extra mileage is involved. This is not always the case, however, but no definite check regarding this point was made.

In any case, efficiency in the use of trucks requires high gallonage delivered per mile of travel, as well as a minimum of idle time for the truck. Obviously, a salesman who delivers only 3,790 gallons per month is not keeping the truck as busy as the salesman who delivers 26,000 gallons. Records were taken of one salesman who in May, 1941, delivered over 52,000 gallons of light materials and averaged 125 gallons per fill. No service station fills were included.
How, then, can the gallonage delivered per mile of truck travel be increased? The answer is suggested by a consideration of the factors that affect distance between fills and the size of fills.

If the gallons per fill are held constant, then gallons per mile of travel can be increased only by decreasing the distance between fills.

**REASONS FOR LONG DISTANCES BETWEEN FILLS**

Perhaps the more important factors affecting distance between farm stops are: (1) The number and size of petroleum-using farms; (2) multiplicity of salesmen serving a given area; (3) delivery arrangements.

**Distance between petroleum-using farms.** The distance between petroleum-using farms depends on the size of farms and the proportion of farmers who use petroleum products. Although no data were obtained regarding this point, it is generally known that the larger farms in the flat land areas use power implements more extensively than the smaller farms in the more hilly areas.

**Multiplicity of salesmen.** But regardless of the volume of business available in a given area, no one bulk plant operator gets all of it. A survey made in 1942 of 64 randomly selected school districts in 22 counties shows that at least three salesmen made sales to farmers in each of those districts (four square miles). Farmers bought from six or more salesmen in over three-fourths of the districts; they bought from 10 or more salesmen in over one-fourth of the districts, and from 14 or more salesmen in four districts. In one district they bought from 16 different salesmen. The average for the 64 districts was 7.6 salesmen. The distribution of the 64 districts according to the number of salesmen serving the district is given in table 3. The number of farmers averaged 12.6 per district, but only 11.1 of them received tank truck deliveries. Hence, there was one salesman for each 1.46 farmers! In two extreme districts in Montgomery County there were nearly twice as many salesmen as there
TABLE 3. DISTRIBUTION OF 64 SCHOOL DISTRICTS ACCORDING TO THE NUMBER OF SALESMEN PER DISTRICT.*

<table>
<thead>
<tr>
<th>Number of salesmen per 4-square-mile school district</th>
<th>Number of districts</th>
<th>Percent of total</th>
<th>Cumulative percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>3</td>
<td>4.7</td>
<td>4.7</td>
</tr>
<tr>
<td>4</td>
<td>8</td>
<td>12.5</td>
<td>17.2</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>7.8</td>
<td>25.0</td>
</tr>
<tr>
<td>6</td>
<td>9</td>
<td>14.0</td>
<td>32.0</td>
</tr>
<tr>
<td>7</td>
<td>9</td>
<td>14.0</td>
<td>52.0</td>
</tr>
<tr>
<td>8</td>
<td>8</td>
<td>12.5</td>
<td>65.5</td>
</tr>
<tr>
<td>9</td>
<td>5</td>
<td>7.8</td>
<td>73.3</td>
</tr>
<tr>
<td>10</td>
<td>7</td>
<td>10.9</td>
<td>84.2</td>
</tr>
<tr>
<td>11</td>
<td>4</td>
<td>6.3</td>
<td>90.5</td>
</tr>
<tr>
<td>12</td>
<td>1</td>
<td>1.6</td>
<td>92.1</td>
</tr>
<tr>
<td>13</td>
<td>1</td>
<td>1.6</td>
<td>93.7</td>
</tr>
<tr>
<td>14</td>
<td>2</td>
<td>3.1</td>
<td>96.8</td>
</tr>
<tr>
<td>15</td>
<td>1</td>
<td>1.6</td>
<td>98.4</td>
</tr>
<tr>
<td>16</td>
<td>1</td>
<td>1.6</td>
<td>100.0</td>
</tr>
<tr>
<td></td>
<td>64</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

TABLE 4. DISTRIBUTION OF 64 SCHOOL DISTRICTS ACCORDING TO THE NUMBER OF FARMERS PER SALESMAN.*

<table>
<thead>
<tr>
<th>Number of farmers per salesman</th>
<th>No. of 4-square mile school districts</th>
<th>Percent of total</th>
<th>Cumulative percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 1</td>
<td>8</td>
<td>12.5</td>
<td>12.5</td>
</tr>
<tr>
<td>1.0—1.4</td>
<td>24</td>
<td>37.5</td>
<td>50.0</td>
</tr>
<tr>
<td>1.5—1.9</td>
<td>12</td>
<td>18.7</td>
<td>68.7</td>
</tr>
<tr>
<td>2.0—2.4</td>
<td>12</td>
<td>18.7</td>
<td>87.4</td>
</tr>
<tr>
<td>2.5—2.9</td>
<td>3</td>
<td>4.7</td>
<td>92.1</td>
</tr>
<tr>
<td>3.0—3.4</td>
<td>4</td>
<td>6.3</td>
<td>98.4</td>
</tr>
<tr>
<td>3.5 and over</td>
<td>1</td>
<td>1.6</td>
<td>100.0</td>
</tr>
<tr>
<td></td>
<td>64</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

* These salesmen, of course, served other farmers in other districts. Data regarding the routes they traveled, the total number of patrons they served, or where the patrons were located were not obtained.

were farmers receiving tank truck service. The most farmers per salesman was 3.5 in a district in Fayette County.5

None of these 64 districts included towns of any size. The distribution of the 64 districts according to the ratio of farmers to tank truck salesmen is given in table 4.

The largest number of salesmen reported selling in a district was 16, and these operated from bulk plants located at six different surrounding points and involved hauling

5It should be clear that if the district were doubled in size, the increase in number of salesmen would not be proportional. In some cases, there would be no increase in the number of salesmen. The salesmen who served patrons in the districts surveyed also served patrons in other areas. The figures here given indicate the number of salesmen among whom farmers of the district were making their choices at the time of the survey.
distances ranging from 2.5 to 33 miles. In this district 13 farmers were served by the 16 salesmen. However, the district that had the most salesmen per farmer was a district in which only 8 farmers received tank truck deliveries, but they patronized 15 different tank truck salesmen.

Figures 1 and 2 illustrate contrasts between extreme situations. Districts A and B in fig. 1 illustrate selected districts showing extreme dispersion of patronage and fig. 2 extreme concentration of patronage.

The chief difference between Districts A and B in fig. 1 is that the farmers in District A not only dispersed their patronage among a large number of bulk plants but among a number of different trade centers. Although the farmers in District B traded at only one center, the dispersion of the patronage among bulk plants is as great as in District A. Moreover, the salesmen of five additional bulk plants canvassed but had no customers in the district at the time of the survey.

The four districts in fig. 2 were not included among the 64 districts included in the random sample previously referred to, but were surveyed later. They illustrate what may result through cooperative action among farmers. In this case all but three of the 57 farmers in these four districts patronized the same bulk plant. The almost complete elimination of duplication of truck travel and longer than necessary hauls is obvious in this case.

State gas tax reports show that over 900 sales agencies ship light materials into the state by tank car or transport. Not all of these serve rural areas, but, on the other hand, the list includes the “major” companies, some of which have one or more bulk storage plants in nearly every county in the state.

The scramble for business by bulk plant operators and their salesmen is facilitated by improved roads which enable them to extend their trade areas. But as all of them extend their trade areas, each on the average receives a smaller percentage of the business in the total area he serves. The result is that the mileage traveled for the gallonage delivered is increased.

Salesmen usually receive 1 cent per gallon commission on sales of fuel oils and 2 cents on sales of gasoline and kerosene.
Fig. 1. The scatter of farmer petroleum customers among bulk plants is illustrated by two selected school districts out of 64 surveyed by Iowa State College. When customers have little or no choice as to prices, are unable to judge quality of products, and all salesmen strive to render maximum service, customers will tend to scatter their patronage among as many bulk plants as may seek it.

DISTRIBUTION A. There were 13 farmers in district; all received tank truck delivery. They scattered their patronage among 16 bulk plants at six different towns.

DISTRIBUTION B. There were 12 farmers in district; eight of them received tank truck service from seven bulk plants all located in the same town. The salesmen of five other bulk plants in the same town also canvassed the district but had no customers there at the time of the survey.
Fig. 2. The concentration of farm petroleum patronage illustrated by four school districts selected at random within the trade area of a cooperative bulk plant in Sioux County, Iowa. Farmers in this case have an incentive to concentrate their patronage because they participate in resulting savings through patronage dividends.

Out of a total of 57 farmers in these four districts, 54 concentrated their patronage on the same bulk plant.
The higher these commissions are the farther out of his way can a salesman afford to travel to make a fill. But a salesman may make fills that add nothing to his wages (after deducting truck operating costs) rather than permit a competitor “to get a toe hold in the neighborhood.” Moreover, bulk plant operators who need additional volume over which to spread fixed bulk plant costs have no incentive to reduce commissions or to restrict the travel of commission salesmen. Such bulk plant operators may build volume at the expense of salesmen’s net income, since the latter must bear the costs of truck operation and few of them know what it costs to operate their trucks. A further point is that commissions, although they vary somewhat as among plants, tend to change little within a plant. Reductions in commissions are particularly infrequent. This fact suggests that costs of delivery per gallon should tend to be higher where salesmen are paid on a commission basis than where bulk plant operators own the trucks and hire the salesmen on a fixed wage basis. In a study of 72 companies that reported delivery expense, it was found that delivery expense averaged 5.9 percent of sales for 14 companies whose salesmen were employed on a fixed wage basis as compared with 9.5 percent for 58 companies whose salesmen were employed on a commission basis. Operators employing salesmen on a fixed wage basis can increase delivery costs only to the point where the increase in costs equals the savings in fixed plant costs resulting from the increased volume.

Delivery arrangements. The different arrangements under which farmers received deliveries and the number of times each was reported in the sample survey are as follows:

1. Order when fuel is needed .................. 548
2. Received delivery when salesmen traveling definite route visit farm ......................... 47
3. Agreement with salesman to “keep barrels full” .. 60
4. Buy from whoever comes along first when fuel is needed ........................................ 5
5. Others ............................................... 2

Total reports ..................................... 662

Some farmers used more than one method, and a considerable number failed to answer the question. Some of the
latter may have used methods other than those listed. Most farmers apparently order when fuel is needed. This, however, should not be interpreted to mean that farmers take all the initiative in seeking sources of supply and that salesmen merely wait for orders and make deliveries. The aggressiveness of salesmen is directed not only to getting potential customers to change the firm or salesmen from which they order, but to making sales without previous orders, in other words, peddling.

Rendering transportation service is usually associated with selling. Salesmen do most of their selling while on trips to fill orders or while traveling a definite route on which selling is combined with delivering. Where the route system is used, given routes are traveled on given days—one route on Monday, another on Tuesday and so on.

In the case of deliveries on order, orders may be filled largely as they are received from different parts of a salesman's trade area, or an itinerary may be planned before each trip on the basis of accumulated or advance orders. Salesmen, of course, prefer the latter method, but in most of the cases of delivery on order that were studied, patrons did not give sufficient notice to enable the salesmen to plan their routes most economically. Of 449 farmers who reported the time elapsing between the order and the delivery in the sample survey, 17.4 percent reported receiving delivery within an average of 2 hours or less of placing the order, 30.7 percent within 4 hours, or less, 50 percent within 6 hours, 58 percent within 8 hours, 60.6 percent within 10 hours, 87.7 percent within 24 hours, and 12.3 percent within periods that averaged more than 24 hours. The average of the average periods reported by 449 farmers was 12.5 hours. (See table 5.) Since orders placed any time before the day on which delivery is expected would represent at least 10 to 12 hours' notice, orders filled on shorter notice are likely to be orders placed during the same day that delivery was received. It follows, therefore, that nearly two-thirds of the orders are not received in time to permit much planning of routes. Even orders placed 10 to 12 hours in advance, if most of these are night hours, may not permit economical planning of routes. Twenty-four hours' notice would seem to be the minimum.
### TABLE 5. DISTRIBUTION OF 449 REPLIES ACCORDING TO THE AVERAGE NUMBER OF HOURS ELAPSING BETWEEN PLACING OF ORDER AND RECEIPT OF DELIVERY.

<table>
<thead>
<tr>
<th>Average no. of hrs. between order and delivery</th>
<th>Number of replies</th>
<th>Percentage of replies</th>
<th>Cumulative percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 1</td>
<td>31</td>
<td>6.9</td>
<td>6.9</td>
</tr>
<tr>
<td>2</td>
<td>47</td>
<td>10.5</td>
<td>17.4</td>
</tr>
<tr>
<td>3</td>
<td>40</td>
<td>8.9</td>
<td>26.3</td>
</tr>
<tr>
<td>4</td>
<td>20</td>
<td>4.4</td>
<td>30.7</td>
</tr>
<tr>
<td>5</td>
<td>61</td>
<td>13.6</td>
<td>44.3</td>
</tr>
<tr>
<td>6</td>
<td>25</td>
<td>5.6</td>
<td>49.9</td>
</tr>
<tr>
<td>7</td>
<td>5</td>
<td>1.1</td>
<td>51.0</td>
</tr>
<tr>
<td>8</td>
<td>31</td>
<td>6.9</td>
<td>57.9</td>
</tr>
<tr>
<td>9</td>
<td>12</td>
<td>2.7</td>
<td>60.6</td>
</tr>
<tr>
<td>10</td>
<td>19</td>
<td>4.2</td>
<td>64.8</td>
</tr>
<tr>
<td>12</td>
<td>103</td>
<td>22.9</td>
<td>87.7</td>
</tr>
<tr>
<td>24</td>
<td>16</td>
<td>3.6</td>
<td>91.3</td>
</tr>
<tr>
<td>36</td>
<td>48</td>
<td>4.0</td>
<td>95.3</td>
</tr>
<tr>
<td>over 48</td>
<td>21</td>
<td>4.7</td>
<td>100.0</td>
</tr>
</tbody>
</table>

In a few cases where at least 24 hours' notice was given, the salesman could not only plan each trip but could also load his truck in accordance with the kinds of products ordered. The latter is an important factor as it enables the salesman to empty his truck before returning to the bulk plant to reload.

If immediate delivery is demanded, however, or if orders are filled as received, the tank truck may shuttle constantly between the bulk plant and all parts of the trade area, frequently retracing most of a previous trip to serve another farmer in a neighborhood that had been visited earlier in the day.

In the case of definite routes, the distance between stops may be short, because most or all patrons on the route may be visited. The advantage gained in short distances between stops may, however, be off set because of time lost in checking patrons' barrels where no fill is needed or because of making small fills when barrels are only partially empty. Furthermore, it is a common experience for route men to run short of one kind of fuel before the other compartments are empty or before the route is completed. This necessitates making an extra trip back to the plant for a refill or making a special trip to complete delivery of the kind of fuel that ran short. Had the orders been placed in advance the truck compartments might have been loaded accordingly.
Although the following figures are by no means conclusive, it is believed they illustrate a general tendency. In this case 6 days’ results on as many routes were compared with 10 salesmen’s daily deliveries on order.

<table>
<thead>
<tr>
<th>Miles between fills (average per salesman)</th>
<th>Number of salesmen</th>
<th>Gallons per fill</th>
<th>Gallons delivered per mile of travel</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.0 to 4.0</td>
<td>4</td>
<td>34.4</td>
<td>10.68</td>
</tr>
<tr>
<td>4.0 to 6.9</td>
<td>10</td>
<td>75.9</td>
<td>12.68</td>
</tr>
<tr>
<td>7.0 to 13.3</td>
<td>8</td>
<td>87.8</td>
<td>9.80</td>
</tr>
</tbody>
</table>

Although wide differences occur in distances between fills and in gallons per fill, the difference in gallons delivered per mile traveled is not significant. However, this difference would be considerably greater if orders were placed in advance a sufficient time to permit economical planning of trips.

Another analysis based on 22 days’ experience of as many different salesmen, including both route deliveries and deliveries on order, shows the following results:

<table>
<thead>
<tr>
<th>Averages Per Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Miles between fills</td>
</tr>
<tr>
<td>6 days’ route deliveries</td>
</tr>
<tr>
<td>10 days’ deliveries on order</td>
</tr>
</tbody>
</table>

The above figures suggest that operators tend to avoid long trips for small orders but that some excessively long trips are made to fill large orders.

**Size of fills.** Another attack on the problem, however, is to increase the size of fill, holding the distance between fills constant. A general idea of the variations that occur in size of fills and some of the reasons for variations have already been presented. The storage capacity of the farmers’ tanks is probably the chief factor affecting the size of the fill, and this, in turn, is influenced by the amount of fuel a farmer uses. The number of different kinds of fuels used also is a factor. The gallonage unloaded per stop will be smaller where only one grade of gasoline or other fuel is used, and larger on the average where a farmer uses gasoline for the automobile, tractor fuel for the tractor, kerosene for the stove or heater, etc.
The farmer's buying methods and habits may result in large or small fills. If he is on a route, or asks that his barrels be kept full, his fills are likely to be frequent and small. If he waits until he is down to a 2 or 3 days' supply before ordering, his fills are likely to be less frequent and larger. And they will be the largest (considering his storage capacity) when he neglects or forgets to order until his barrels are nearly or entirely empty.

The credit policy may also be a factor. If a cash policy is followed and the farmer happens to be short of immediate cash, the size of his fill must be reduced to fit his pocketbook.

A quantity discount is sometimes granted to large users, but it is a question whether or not it is so used as to influence the size of fill.

Other factors of less relative importance also, no doubt, influence size of fills.

Although large fills are desirable, maximum size fills are desirable only if distance is held constant. The advantage of large size fills may be offset by large mileage. For this reason the objective must be large gallonage delivered per mile of truck travel. But the time of the salesman must also be considered. Maximizing the gallons delivered per mile of travel will, of course, save the most wear and tear on trucks and tires. But the war emergency demands that we also save manpower. Hence, the ideal to strive for is a minimum of the combined costs of truck operation and labor per gallon delivered.

HOW SALES MEN USE THEIR TIME

In connection with a survey made in 1941 of the operation of all the petroleum cooperatives functioning in the state, an investigator spent 22 days on the road riding with as many salesmen. Speedometer readings were recorded to determine distance between stops made, lane travel, and total mileage for the day. Time checks were also made to determine the length of time spent in travel and for each type of operation. A summary showing the division of time among the different activities recorded is shown in table 6.

Table 6 shows that these salesmen on these particular days, which may not be representative, spent about one-fifth of
their time on activities other than delivery. Most of these activities were no doubt incident and necessary to the operations of the business, and perhaps also much of the time reported as "miscellaneous" and "unproductive" could not have been avoided.

Of the time spent on activities incident to delivery, over half was spent in traveling and a little less than half on actually filling and completing the transactions.

It is also believed that a larger sample would show more time spent on other activities, such as soliciting and collecting and perhaps others, which tend to be stressed periodically or seasonally. No doubt also the presence of the investigator had some influence on salesmen's activities on these trips, even though the salesmen were urged to follow usual procedures.

As for the time spent traveling, this is influenced greatly by the distance between stops and size of fills and the amount of time spent on other activities. The percentage of the total time that was spent in road travel by the 22 salesmen ranged
from 17 to 52, it being from 30 percent to 40 percent for over half of them.

Since filling and preparations therefor occupied nearly one-fourth of the total salesmen's time, it is also important to note how efficiently this time was spent. The time spent on this activity ranged from 11 percent to 35 percent of the individual salesman's total time. Preparations for filling required from 2.2 to 36.2 minutes as averages per salesman per day, and the actual filling time ranged from 18.2 to 143.4 minutes per salesman per day.

The gallons unloaded per minute of filling time ranged from 4.9 to 23.4 and averaged 9.8 gallons.

The method of filling had an important influence on the gallons unloaded per minute as indicated by the following table.

<table>
<thead>
<tr>
<th>Method of unloading</th>
<th>No. of fills</th>
<th>Low</th>
<th>High</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>With buckets</td>
<td>139</td>
<td>2.6</td>
<td>13.0</td>
<td>6.5</td>
</tr>
<tr>
<td>With pump on truck</td>
<td>46</td>
<td>11.7</td>
<td>23.4</td>
<td>17.8</td>
</tr>
<tr>
<td>By gravity</td>
<td>16</td>
<td>13.7</td>
<td>27.7</td>
<td>20.9</td>
</tr>
</tbody>
</table>

To make the significance of these figures more concrete we might assume three salesmen using the three filling methods compared above for a good day's work of delivering 2,000 gallons. For filling time alone the man using buckets would spend 5 hours and 8 minutes, the man using a power pump would consume 1 hour and 52 minutes, and the man "hosing off" by gravity would consume only 1 hour and 36 minutes. The fatigue occasioned by filling and emptying a 5 gallon bucket 400 times should also not be overlooked. Yet nearly 70 percent of the fills were bucket fills! A few minutes' additional time can be saved by making out the ticket and the check while the pump or Mother Nature is making the fill.

The records of these 22 salesmen were taken during July, August, September and October, when the salesmen were not as busy as during the spring. Only 1 of the 22 worked a full day, 10 worked from 6 to less than 8 hours, seven from 4 to less than 7 hours, and four worked less than 4 hours. The range was from 3½ to 11½ hours. The average for the 22 men was 5¾ hours.

The foregoing data suggest that more trucks and salesmen are employed and that more mileage is traveled than seem
necessary to provide adequate delivery service. Immediate reasons for the above are: Too many small fills are made, distances between many fills are too long, and too much of the time of tank truck operators is used rendering services other than delivery.

In areas where farms are small because of hills or other reasons, delivery service is expected to be less efficient than in areas where there are many large users of petroleum products. But inefficiency in most areas results because there are too many bulk plants and salesmen scrambling for business and because the delivery methods used often do not permit economical routing of tank trucks.

But why are there too many salesmen and why are inefficient delivery methods used? The underlying reasons are to be found in the kind of competition that prevails in this industry.

COMPETITIVE METHODS CONTRIBUTE TO WASTE

A number of interrelated factors combine to give this industry a distinctive competitive character to which much of the waste that occurs may be attributed. Some of the more important of these competitive characteristics will be discussed to provide a basis for suggestions for improvements.

Ease of Entry. In the first place, it is relatively easy to enter into the business of farm distribution of petroleum products, which no doubt contributes greatly to the large number of bulk plants in operation. The total investment in storage tanks and delivery and other equipment for 67 Iowa plants studied in 1941 averaged $8,362 per plant.6 The average for 1,019 associations in the United States was $6,906.7 Moreover, successful operations may be carried on on a relatively small scale—from about $35,000 to $50,000 of sales annually. More significant still is the fact that lowest costs, under present methods of operation, are apparently attainable at the relatively low volume of about $70,000 of sales per year.7

6 The initial investments in fixed assets were no doubt less than these figures, as additions to facilities have in many cases been made subsequent to organization. Moreover, a considerable part of the initial capital is usually provided by credit agencies.

7 Knapp, Joseph C. and Hyre, French M., Farmers' retail petroleum associations. U. S. Farm Credit Administration, Cooperative Division, Circ. C-113. 1939.
The fact that operating a bulk plant is not a complicated or difficult process also contributes to the ease of entry. Moreover, alternative opportunities for employment have, until recently, been scarce.

**Price Competition.** Under these conditions, it would normally be expected that competition would be keen. In some respects it is but not normally on a price basis. In fact when price competition is active the situation is referred to in the trade as a "price war," or that some competitor is selling below "normal prices," that is, prices usually established by certain dominant firms regarded as leaders in the industry. Usually such price wars in Iowa are localized and of short duration. Their cessation is regarded as a return to "normal prices."

Price wars, however, occur with considerable frequency and no doubt represent resistance to the prices set by dominant firms. Moreover, subrosa concessions are sometimes made in special cases to favored customers or to classes of customers, such as large users, either by a salesman on his own responsibility or by the bulk plant operator. Such concessions, when they become sufficiently general or uncontrollable, may come to be recognized by the trade and adopted by the dominant firms as part of their price policy. The number and volume of business of "cut rate" distributors have also been increasing in recent years. If this trend continues it may have considerable significance for the future.

The presence of cooperatives has also, no doubt, had some influence on prices. Although most of them follow posted prices, some of them follow an independent price policy. Moreover, to the extent to which farmers are influenced by the prospect of a patronage dividend, the latter tends to inject a measure of price competition.

The extent to which the foregoing practices influence prices is not known, but it is believed they fall far short of bringing about aggressive price competition in retail markets. Only 3.2 percent of 723 randomly selected farmers reported that their choice of source of supply was influenced by prices.

**Integration.** Integration is usually resorted to for two primary reasons—control of the market and economy of
operation. The fact that several of the "integrated" companies control or operate a large number of bulk plants in Iowa suggests that such companies may exercise considerable control of the market. For example, during 1941, approximately 14 percent of the bulk plants in Iowa were operated by one dominant firm. Firms who operate or control large numbers of bulk plants are in a position to recoup losses due to a price war in one locality out of earnings in other localities. What is more significant, however, is the fact that the firms who control the largest numbers of bulk plants often also operate refineries, pipe lines, tank cars, water transport, and crude oil fields. By means of this form of "vertical" integration a firm may recoup losses that may be incurred in one operation out of profits earned in other operations. In other words, firms engaged solely in distribution of finished products may be "squeezed" by "integrated" firms by the simple device of raising the wholesale or jobbing price, thus reducing the margins in distribution.

Incidentally, dealers' margins in Iowa have declined from 6 cents to about 3.5 cents per gallon since the cooperatives have entered this field in significant numbers.

"Differentiated" Products. Another important consideration is the fact that each important producer of petroleum products has gone to great lengths to impress on the minds of consumers the idea that his product is better, or at least sufficiently different, to warrant his switching to this or that brand. Not only is considerable expense incurred by each such company in advertising and other sales efforts in order to attract his competitor's customers, but each of the 13 prospective farm customers in District A, fig. 1, previously cited, may be prevailed upon by the "selling points" of a different company. In the absence of (1) true facts concerning quality, and (2) knowledge as to how to interpret these facts, they would likely divide their patronage among all of the different brands. Farm consumers of petroleum products have no means of verifying high sounding claims that may be made for a particular brand, except by "trials," which they are not equipped to conduct with any degree of precision. And the sort of information given farmers is not the sort that helps them function intelligently as buyers.
In spite of the fact that advertisements and salesmen would have consumers believe that a particular brand of gasoline has some mysterious and superior quality, laboratory tests which have been observed indicate about as much variation among samples of the same brand as among different brands. Also, due to scarcity of tetraethyl lead because of the present emergency, all refiners of gasoline are now restricted as to the amount they may use in order to step up octane rating.

Furthermore, it is an established practice among refiners to trade gasoline with each other in order to save transportation costs. Then too, with many different brands of gasoline coming through the same pipe line, it is alleged that an interchange of gasoline may occur.

The situation regarding tractor fuels and motor oils, however, is somewhat different in this respect. Differences in quality among different brands of these products are apparently such that the user is in a somewhat better position to make rational choices than he is in the case of gasoline. But even in the case of these products, the farmer is in no position to verify many of the extravagant and exaggerated claims that are made.

A sample census recently conducted by the Iowa Agricultural Experiment Station revealed that out of 723 random replies received from farmers, 24.9 percent indicated that choice of source of supply was based on preference for a particular brand of product. This suggests that product differentiation is a significant factor in the competitive process in the petroleum industry.

Firm or Salesman Preference. The extent to which efforts are made in the petroleum industry to develop a preference among customers for the firm, as a supplement to offering other real or imaginary inducements, has not been investigated beyond a question as to reasons for patronizing the preferred salesman. No doubt in many cases the preference for a particular salesman in reality reflects a preference for a particular brand of product, the quality of services rendered, or other preferences.

Of the 723 who reported reasons for preferences, however,
14.7 percent cited membership in a cooperative association as the reason for patronizing a particular salesman. The preference was “personal” in 111 out of 723, or 15.4 percent of the reports. In 7 out of these 111 reports the salesman was a relative of the patron. Honesty and dependability were mentioned 33 times, and other unspecified personal reasons 71 times. It was not clear, however, whether the “honesty and dependability” referred specifically to the salesman, the service, the firm, or the product.

An additional 4.4 percent of the replies merely indicated “satisfaction,” and another 4.6 percent reported “habit” and “convenience.”

In view of the fact that the salesman is usually the only representative of the firm who makes frequent personal contacts with purchasers, his personality and traits of character no doubt are important factors influencing customer preferences. They may frequently be the deciding factors when there is no definite consumer prejudice against the product, the price, or the service.

Preference for Service. Satisfactory service was mentioned more frequently than any other reason for patronizing the preferred salesman. It was reported by 30.2 percent of the farmers surveyed. Reasons why farmers base their choices more frequently on service than on prices or quality are: (1) Usually they have little choice as to prices; and (2) they are much more readily able to sense and judge differences in service than differences in quality of products.

Although extending retail credit has been one of the services with reference to which competition has been aggressive, it is now a less important competitive factor because of restrictions imposed by recent war emergency measures. Only 2.6 percent of the farmers surveyed reported credit as a reason for their choice.

Competition on other services, however, is aggressive. The sky is the limit on services that some salesmen render in order to get and hold business. Many salesmen spend a considerable portion of their time doing things which, though they are acceptable to customers, result in additional costs which, in the long run, are borne by the customer. Making small
fills and emergency fills, filling cars and tractors, servicing equipment, airing tractor tires, breaking a lane following a snow storm, and running store errands in town are some of the things customers ask their salesmen to do. Among the above, the privilege of getting small fills and emergency fills are the ones most often abused and which add most to truck mileage and costs of delivery.

No doubt other factors also enter into the competitive process, but it is believed that the more important ones have been considered. Of the factors discussed, competition appears to be least aggressive in relation to price and most aggressive in relation to service and quality.

Competition on the above basis does not enable the farm purchaser to make his choice rationally from the point of view of his best interest. Even though competition were more aggressive as to prices, the farmer would still be unable to judge the price in the light of the quality. Moreover, with reference to service, the cost of this is a part of the price, hence he has no opportunity to choose only the particular services he is willing to pay for. His normal reaction, therefore, would be to take all the service he can get and demand even more since he believes the price will be the same whether he does or not.

The effect of many firms operating under the conditions outlined is to reduce the volumes of business of most of them below the point of minimum costs, to pyramid service costs and to scatter the patronage geographically, the effect of which is to increase truck mileage and delivery costs. The latter is of particular significance in view of the present need for saving critical materials and labor.

PART II. SUGGESTIONS FOR IMPROVEMENT

IMPROVING THE COMPETITIVE PROCESS

The above analysis suggests several directions in which approaches might be made in an effort to improve the situation.

(1) Establish definite and uniform quality standards and grades. Consumers can make rational choices only when they are familiar with specific quality characteristics and with
the degree to which each quality characteristic that is essential for specific needs must be present. For example, what qualities are essential for a satisfactory tractor, automobile, or truck fuel, and to what degree must they be present? In the second place, how much more are farmers justified in paying for an extra degree of superiority of one product over another? This is a job for a technical laboratory.

Farmers may make such technical laboratory service available to themselves through their cooperatives, or they may request that a fuel and lubricating oil testing service be made available to them on the same basis as seed and soil testing now is. Many farmers now have feeds mixed for them according to their own specifications based on Experiment Station formulas. Specifications for petroleum products may similarly be established on the basis of which standards might be prescribed by law. Whether prescribed by law or not, specifications may be made the basis on which petroleum cooperatives might make their purchases for their members. Some of them are already doing so. As an emergency measure, the government may be warranted in establishing a series of “victory” brands, each meeting a specific need as determined by technicians.

Any action taken which would reduce or eliminate confusion and guess work regarding quality would cause farmers to become more insistent on “being shown” just why one brand was better than another or why it was better adapted to their particular needs. They would become less responsive to advertising, personal persuasion, psychological tricks of salesmen, and to appeals based on church or lodge affiliation, nationality, prejudice, and other non-economic considerations.

(2) Differentiate costs of service from price. As long as costs of services are submerged in the price of the product, consumers neither know the costs, nor are they able to choose the kinds and amounts of service that it may be in their interest to “buy.” For example, if a purchaser wants 60 days’ rather than 30 days’ credit, he should have to reckon with the added cost. Likewise, a purchaser may “choose” to give 24 hours’ notice rather than pay the extra cost of a special
delivery. A knowledge of costs and factors affecting them is essential for rational action, particularly among patrons who are members of cooperative associations.

(3) Increase price competition. Important as it is for farmers to know quality in order to be able to make intelligent choices of products to meet specific needs, such a knowledge would also contribute much to making price competition more effective. Purchasers would refuse to pay a fancy price for a highly advertised brand unless its quality in their judgment justified it, and then only if equal quality was not available at a lower price. Purchasers would be less likely to pay premiums for given products merely because they were skeptical about the quality of a lower priced product.

But knowledge of quality and uniform quality standards alone are not enough to make prices fully competitive. The whole question of the extent of price control and rigidities in the petroleum industry should be thoroughly investigated and appropriate action taken based on the findings. In connection with the enforcement of anti-trust laws, more recognition needs to be given to those broad areas in some industries in which prices, though they may not be monopolistic as defined by the law, are still so imperfectly competitive that they fall far short of functioning in the public interest. Perhaps the anti-trust laws may need some revision, and perhaps existing laws could be enforced more vigorously. But even the best of enforcement of adequate laws would not relieve purchasers of assuming considerable responsibility themselves for promoting and safeguarding their interests through group action.

(4) Cooperative purchasing. Whereas laws prohibit only certain undesirable practices, cooperating groups of patrons may take positive action in their interest with respect to many things which in practice the laws may deal with only partly or not touch at all. It would, however, require a considerable extension of present cooperative efforts among farm petroleum users and a definite focusing of their objectives on price competition to influence it significantly beyond the local retail market. However, with reference to
the waste that arises from duplication in local retail distribution, another form of cooperative action is suggested.

(5) Substitute group decisions for individual decisions. A consumer who has a decided preference for a particular brand of gasoline or oil based on well-grounded reasons will not readily change his decision, nor should he be required to do so. But it is inconceivable that each of the 13 farmers in the district served by 16 salesmen (see page 694) had equally decided preferences or equally well-grounded reasons for them. In fact, of the 708 farmers surveyed, 16.2 percent of the replies received indicated no reason for their preference, and no doubt in the case of many of the others it may have been a matter of indifference to them which of three or four products or salesmen they chose. In any case, if these 13 farmers had held a conference, they may have readily decided on two or three sources, if not one source, of product instead of the 16 actually used, especially if they were informed as to the savings possible and if they were to receive the benefits of such savings. Likely as not, many of the choices may have been based on limited experience, propaganda, "hunches," or any number of other considerations of relatively little real significance.

EDUCATION

The normal procedure in seeking to bring about improvements in the functioning of any part of the economy is to rely on the general dissemination of information regarding the situation that it is sought to improve. Whereas in peace times it is desirable that the economy function smoothly and efficiently, during a war emergency it is necessary that it do so. Normal responses may be speeded up under war emergency conditions by intensifying educational efforts, by appeals to patriotism, and by administrative action.

Any course of action taken should result quickly in a decrease in the motor facilities used in farm delivery of petroleum products and in conserving those remaining in use. It is also essential to the war effort that the above objective be attained with the minimum curtailment of essential services by first eliminating waste. Then as much protection
as exigencies permit should be assured to purchasers against undesirable competitive methods and practices. Impetus would thus be given to continued improvement in the future.

Even though administrative agencies have been set up to conserve motor equipment, they will attain their major objective only as they contribute to the maintenance of essential and efficient transportation service at least for the duration of the emergency. They will have to deal with transportation as they find it enmeshed in its economic setting, and any policy adopted will affect that setting for better or worse. It may be found most feasible to bring about many desirable changes in transportation by modifying the competitive processes.

Obviously, the difficulties confronting these agencies are many and complicated, but the need is so urgent that all citizens must contribute their utmost cooperative effort.

Moreover, even though specific "orders" have been issued by administrative agencies for conserving motor equipment, effective application of those orders will require that both truck operators and the farmers served by them clearly understand the situation and that they exercise considerable initiative in evolving plans and methods for making the adjustments that will have to be made. The process of making adjustments will no doubt extend over a considerable period of time, especially as probable further changes in the regulations will necessitate further adjustments. The more thought and study given to the foregoing considerations and to all the other factors involved in the problem, the more effectively and speedily are the necessary adjustments likely to be made.

An understanding of the foregoing considerations can be gained only if and as data regarding them are made available and their significance is brought out by free and open discussion. A basis for planning and carrying out courses of action is thus established. War emergency and other governmental agencies and educational agencies and facilities on national, state and county levels are available for carrying out the educational and local planning work involved in accomplishing the foregoing purposes.
ACTION BY DISTRIBUTORS AND FARMERS

Action may be taken voluntarily by distributors and farmers. They can do many things without extended deliberation to reduce the mileage involved in delivery. Some suggestions follow:

A. What individual bulk plant operators and salesmen may do:

1. Insist that service men drive and care for trucks and tires in a manner approved by authorities on the subject.
2. Require at least 24 hours’ notice on delivery of orders and then plan delivery trips carefully to minimize travel in filling orders.
3. Restrict use of tank trucks only to rendering delivery service. (Use other means for soliciting business and for collections, except where collection is made at time of fill.)
4. Discourage emergency fills by making an extra service charge.
5. Discourage small fills by making a flat charge for making the stop at the farm yard.
6. Make no fills where the number of gallons delivered per mile of travel involved is less than 5, and in any case make no fills of less than 25 gallons, or that individually increase the total mileage of the trip by more than 25 miles.
7. Operate routes only where it can be demonstrated that gallonage delivered per mile of travel is larger than it would be if delivery were on order, as under 2 above.

Much of what is suggested under A is likely to prove feasible only to the extent that it meets with acceptance by farmers. Such acceptance is not likely to be extensive or enthusiastic if farmers feel that dealers are the chief beneficiaries of any savings that may result, or if the changes should result in significant curtailment of services. Much as farmers may respond to appeals to patriotism, they also respond to cost and price appeals, hence any changes made should make provision for equitable participation by farmers in any savings that may result. However, farmers must also
weigh probable future needs and conveniences against those of the present. For instance, any immediate reduction in costs or prices to them would be insignificant in comparison with the military needs for critical materials or with a subsequent failure of essential transportation service.

The least farmers may do now to contribute individually to the conservation of tires and trucks in petroleum delivery is to cooperate on any plan that gives promise of conserving them.

B. What farmers may do:

1. Place orders at least 2 days before it is anticipated tanks or barrels will be empty.
2. Enlarge storage capacity wherever possible but without increasing fire hazards.
3. Arrange for making payment at time of delivery to avoid special personal calls by salesmen to make collections.
4. If the occasion for making emergency fills arises, be willing to pay the extra cost. Better still, avoid such emergencies by watching the barrels more closely.
5. Be willing to take fills when the tank truck is in the neighborhood.
6. Do not ask salesmen for special services or to run errands when meeting the request would result in extra mileage for the gasoline truck.
7. Cooperate with neighbors to reduce the number of salesmen serving a neighborhood.

If a conscientious effort was made by dealers and farmers as suggested under A and B above, the effect would be to increase the gallonage delivered per mile of truck travel. This increase would be brought about by increasing the size of fills, decreasing the distance traveled between fills, and by decreasing the amount of travel occasioned by soliciting, collecting and rendering other miscellaneous services. Even then, the total saving in mileage traveled would probably not equal half the possible saving. It should be possible to reduce present mileage by 30 to 50 percent. Most of this extra mileage is traveled because patrons scatter their patronage promiscuously among a large number of bulk plants and salesmen. This scattering of patrons, in turn, is mostly
a result of the manner in which farmers choose their salesmen and brands of products and the manner in which bulk plant operators and salesmen procure their patronage.

Hence, it seems that anything approaching maximum reductions in mileage cannot be brought about without also affecting the competitive process. Improvements in competitive practices might be brought about in time by educational means. In view of the emergency, however, administrative and technical assistance, and guidance are necessary.

PART III. PROPOSALS FOR EMERGENCY ACTION

ADMINISTRATIVE ACTION

War emergency agencies have been established, charged with the responsibility of conserving transportation equipment, rubber and other critical materials. These agencies no doubt are in a position to exercise considerable discretion as to the means adopted to accomplish their objectives. General Order ODT 21, and previous orders which, among other things it seeks to make effective, are of particular interest in the conservation of motor vehicles involved in the distribution of petroleum products. Under this order, no truck may operate after Nov. 15, 1942, without a “Certificate of War Necessity.”

Among the proposals included in an earlier draft of this manuscript was one providing for the licensing of tank truck operators. General Order ODT 21 provides for what in effect amounts to the same thing. The licensing feature included in this order, plus the rationing program of the Office of Price Administration, provides the means by which transportation conservation efforts may be given full force and effect.

Any course of action taken to conserve transportation equipment, if it is to bring significant results, will affect present business and competitive practices, trade area relationships, the scale of operations and bulk plant operating costs; the methods and costs of operating tank trucks; the manner in which farmers choose salesmen, brands of products and bulk plants; the manner in which any resulting economies in transportation may be shared by bulk plant operators, truck operators and farmers; the quality of services
and products; and the extent to which private initiative and enterprise participate in the formulation and execution of plans and policies and the manner of such participation.

The statement of the situation in Part I indicates many opportunities for improvement. It is desirable that, in so far as possible, the objectives of transportation conservation be achieved by policies and methods that will also promote and facilitate basic improvements in the situation. The following considerations are suggested as a basis for the formulation of transportation conservation policies.

**BASIC CONSIDERATIONS FOR TRANSPORTATION CONSERVATION POLICIES IN FARM PETROLEUM DISTRIBUTION**

(1) Aside from conservation attainable through the proper use and care of tires and trucks, the possibilities should be exhausted of conserving motor equipment through the reduction of waste resulting from duplication of delivery services, small fills and uneconomical planning of delivery trips before attempting reductions in essential delivery services.

(2) A desirable policy should not only preserve at least such safeguards as present competition affords farmers, but it should seek to improve these safeguards. Should the policy have the effect of weakening them, some positive provision should be made to remedy the deficiency.

(3) A desirable policy should consider the economic effects of transportation conservation on the operations of existing bulk plants, the concentration of volume to the point of maximum efficiency, the strategic location of bulk plants in relation to trade areas served and in relation to conservation of transportation facilities between refineries and bulk plants.

(4) Consideration should also be given to the manner in which such economics in distribution as may result from transportation conservation may be shared equitably by farmers, who in the long run must bear the costs.

(5) It is recognized that the emergency will necessitate many denials of peace-time privileges and practices. A desirable policy should, however, take as much advantage
as possible of desirable normal incentives and should stimulate private initiative and individual enterprise to make their maximum contribution.

**ADMINISTRATIVE APPROACHES TO TRANSPORTATION CONSERVATION**

A number of possible approaches that administrative agencies may make are briefly outlined and discussed. Although detailed procedures are not outlined, it will probably be found feasible, if not necessary, for the administrative agency to function in local areas through or with the aid of appropriate committees or offices in charge of a disinterested official representing the public. Such a representative could aid the committee in making plans or in passing on plans which the committee has helped subcommittees or local groups develop. It would also be the function of the chairman to see that recognition is given to such basic considerations as may be prescribed by the administrative agency. Such a committee, or different committees functioning in different areas, would undoubtedly evolve or approve plans that differed widely as to objectives and effects unless all were guided by the same general basic considerations. Whether the administrative agency functions through committees or not, it will have to decide or pass on the method or methods to be used to reduce the amount of truck travel.

A choice may be made from among a considerable number of methods, and a wide variety of plans will no doubt be proposed, many of which will differ from others only in details. All such methods or plans, however, would no doubt fall into a small number of categories if classified according to the basic considerations outlined on page 716. Five plans are outlined on the following pages, each differing from the others with respect to one or more basic features. It is hoped these proposals may serve as helpful suggestions. The general idea on which each is based would, of course, need to be developed as to details, which might differ considerably from one situation to another.

The several plans are outlined in the order in which, in the judgment of the authors, they satisfy the basic considerations already referred to.
PLAN I. SET UP DELIVERY DISTRICTS

Methods:

A. Administrative agency would:
   1. Designate each rural township as a “delivery district” permitting as many as may desire to do so to merge or combine wherever larger districts may be more economical.
   2. Prescribe “victory” brands or minimum quality standards for products.
   3. Require farm users of petroleum products in district to submit a plan for approval, and when a proposed plan is approved, serve notice on the district to that effect, and to the effect that it will be put into operation by a given date unless adequately supported and valid objections received prior to that date warrant reconsideration, modification or rejection of the proposed plan.
   4. Require all farm users of petroleum products in district to comply with provision of plan when approved and put into operation.
   5. Provide for receiving, hearing and adjusting complaints by a local or county administrative office or committee, and provide for appeals from their decisions to a state office or committee.
   6. Arrange for technical and advisory assistance through the research and extension facilities of the land-grant institutions to delivery districts or to such county or state committees as may be set up to assist with or administer the work of surveying the areas, developing plans, and with other related matters.

B. Farmers in a given area (not less than a township) would:
   1. Outline a procedure for providing themselves with petroleum products and delivery services.
   2. Designate an individual or a committee to negotiate for them with tank truck and/or bulk plant operators and to represent them in their contacts with administrative agencies and their committees.
3. Prepare and present a plan to the administrative agency or committee outlining how they propose to function, such plan to be supported by data showing present methods of procurement and delivery, and, in comparison with proposed plan, extent to which truck travel, labor and other critical materials will be conserved.

C. Delivery districts may be set up on different bases:
1. To negotiate collectively with tank truck operators for delivery service and with bulk plant operators for products. In this case, the delivery district may comprise an area as small as one township (or an average of about 100 petroleum-using farmers) or two or more townships may form a delivery district.
2. To own and operate delivery equipment and to negotiate with bulk plant operators for products. In this case the district would consist of as many townships as would be necessary to keep at least one tank truck operator fully employed, but the district may be expanded to keep several truck operators employed.
3. To operate a bulk plant (owned or leased) as well as to negotiate for or to provide their own delivery service. In this case the district should comprise as many advantageously located townships as would provide the volume of business necessary for the economical operation of at least one bulk plant and an office to receive orders and plan delivery trips for tank truck operators, etc.

Advantages:
1. A maximum of unnecessary truck travel that is now occasioned by duplications of delivery services and solicitation by tank truck salesmen would be eliminated within the delivery district.
2. The plan calls for the exercise of initiative and enterprise by democratic processes by those who receive and bear the cost of the service. The group choice would likely be more rational than present individual choices.
3. Tank truck operators would compete more directly on the basis of efficiency, and bulk plant operators would compete more aggressively on the basis of prices and quality of products.

4. Farmers who now bear the costs of service would benefit directly from such economies in distribution as would result from the elimination of duplication and other unnecessary travel.

Disadvantages:

The plan has no disadvantages from the point of view of the four basic considerations. Possible disadvantages from points of view other than these considerations may be:

1. Difficulties in getting the boundaries of delivery districts established so as to avoid gaps or pockets. Licensing agency or appropriate committees, however, may assist in setting such boundaries, or each township may be designated as a delivery district with the privilege of combining or merging into economically advantageous districts.

2. Another disadvantage is that varying proportions of farmers in each district will feel aggrieved if denied the right to deviate from the choice of the majority. This difficulty may be met at least partly if adequate provision is made to receive and hear complaints in order that consideration may be given meritorious cases.

PLAN II. SET UP TANK TRUCK “DISPATCHING” OFFICE IN AREA

Method:

Pool all petroleum delivery equipment operating out of each trade center and place it in charge of disinterested “dispatcher” under suitable arrangements.

Lay out area to be served out of trade center.

Prescribe minimum quality standards to be met by all brands of fuel oils or establish “victory” brands.

Customers in designated area will place orders at least 24 hours in advance with dispatching office and each will desig-
nate firm he desires to be "credited" with the order at the time it is placed.

As sufficient orders are received from a given area to permit the planning of an economical trip, dispatcher will dispatch a truck for the trip to the bulk plant showing the largest gallonage "credited" to it by the orders to be filled on the trip, if there is such a bulk plant; in any case, dispatcher shall strive to so dispatch trucks among the several bulk plants that the volume handled by each shall, on a weekly basis, correspond as closely as possible to the volume "credited" to it by customers.

Only as many trucks would be available to a dispatching office as may be necessary to render essential services.

Prices quoted would be prices at the bulk plant, and the charge for delivery service would be a separate charge added when the farmer is billed for the merchandise.

The dispatching office shall be operated as nearly as practicable on a cost basis.

**Advantages:**

1. Saving in truck travel would be considerable and may approximate the maximum saving possible, because of better planning of delivery trips and the elimination of duplications of mileage by trucks. Many trucks would thus be released for other purposes or reserved for future use. Greater flexibility and fuller employment would be possible if trucks were not identified with particular bulk plants.

2. Bulk plants would compete more definitely on a price basis, as quality and delivery service would be standardized, and patrons would be free to choose their favored firm.

3. The plan would provide free play for the exercise of enterprise and initiative. Either bulk plant operators, tank truck operators, or users of petroleum products could take the initiative in organizing a tank truck dispatching office.

4. Users of petroleum products would receive delivery service at cost, hence would participate fully in any savings.
Disadvantages:
1. Not all farmers would always be able to choose the brand of product desired. This would be a real disadvantage only to the extent that there were real differences in quality, and the farmers’ needs were such as to require a particular brand of product.
2. Some difficulty may be experienced in establishing the area to be served from a given dispatching office and in getting all farms included in some dispatching office area.
3. The establishment of dispatching offices represents a considerable departure from present methods. Some confusion would be occasioned until the people become accustomed to the new procedure.

PLAN III. PRESCRIBE MINIMUM STANDARDS OF EFFICIENCY FOR TANK TRUCK DELIVERY OPERATIONS

Method:
Require truck operators to meet prescribed minimum operating requirements. For example, operators may be required to show:
1. That at least a given minimum percentage of the business of a given area is obtained by the operator.
2. That not less than a given minimum average number of gallons of “light ends” (10 or 15) are delivered per mile of truck travel per month. (This minimum gallonage may be higher in areas of high consumption than in areas of low consumption, and it may also be different for different seasons of the year, or the annual average may be used as a criterion.)
3. That no fill of less than 25 gallons (light materials) was made.
4. That no individual fill was made that resulted in the addition of 25 miles or more to the mileage of the trip, and then only if the fill equalled the capacity of the tank truck.

Advantages:
1. If requirements similar to the above were enforced, the average gallonage delivered per mile of truck travel would be increased considerably.
2. Competition among truck operators would be placed more definitely on the basis of operating efficiency measured in terms of gallonage delivered per mile. Bulk plant operators in their competitive efforts would place less emphasis on unnecessary services and more on prices and quality.

3. The initiative and enterprise of both tank truck and bulk plant operators would be stimulated in a desirable direction.

4. The more aggressive competition among tank truck operators on an efficiency basis would force them to share at least part of the resulting savings with farmers.

Disadvantages:
1. Nothing approximating maximum elimination of duplication of truck travel would be achieved, because minimum requirements would eliminate only the least efficient operators. Duplication of travel by the others would still continue.

2. Considerable administrative difficulty and work would be involved in checking and auditing truck operators' reports.

3. In their effort to meet the requirements, truck operators might resort to unethical competitive practices.

4. Unless the minimum requirements were adjusted to local situations, they may cause hardship.

PLAN IV. DEALER COLLABORATION

Methods:
1. Dealers exchange with each other their most widely scattered customers or parts of trade areas most costly to service. (Involves denying a minority of customers freedom to choose dealers or products.)

2. Dealers arrange to service each other's customers wherever more economical delivery would result. (Involves denying a minority of customers freedom to choose brand of product but not the dealer.)

Advantages:
1. The plan would be relatively simple to carry out and would disturb present dealer-customer relationships to a minimum degree.
2. Dealers would be free to exercise initiative and enterprise in working out arrangements.

Disadvantages:
1. Only a minimum amount of elimination of duplication of truck travel would result, unless dealers on their own initiative rigorously restricted and controlled the travel of the trucks and salesmen under their control.
2. In most areas the patronage is so scattered among so many dealers that significant reductions in duplication could be accomplished only by division of territory among dealers or the voluntary withdrawal of a major part of the dealers from each area, with the result that competition would be decreased if not eliminated.
3. Farmers would be denied a voice in working out the arrangements and their choice of firms would be restricted.
4. The plan provides no assurance that farmers would benefit from any savings in delivery costs that might result.

PLAN V. ALLOCATE TRADE AREA TO SINGLE BULK PLANT

Method:
Lay out the territory that may be served by a given bulk plant so as to eliminate duplication of truck travel that results when several firms canvass the same area.

Trade area may be laid out on a number of bases:
1. Density of present patronage; that is, allocate each township to the firm that now serves the highest percentage of patrons in it, but require that trade area be built up of contiguous townships.
2. Allocate to each firm an area nearest to it large enough to yield a volume of business equal to its present volume or the average of a few recent years.
3. Allocate a trade area that will yield a volume that will result in a minimum total of combined plant and delivery costs per unit of product handled.

Advantages:
1. All duplication of truck travel due to scattering of patronage would be eliminated, on the assumption that patrons would not be permitted to choose haulers.
Disadvantages:
1. Competition would be eliminated—farmers would be denied the right to choose either bulk plant or salesman and they, in turn, their customers. As a result, inefficient bulk plants would be perpetuated and the way would be open to exploitation of farmers. The efficient plants would either increase their profits or become less efficient. The alternatives would be some form of state control of prices, standards of quality and services, socialization of the industry, or its organization on a cooperative basis with compulsory membership of all patrons.
2. Allocations of trade areas would be difficult under each of the bases outlined even though the task was undertaken by a disinterested and competent agency.
3. Private enterprise and initiative would play no part in the development of the plan, and it would contribute nothing of value to continued improvement in the post-war period.
4. The plan precludes participation of farmers in any resulting economies.

EVALUATION OF PROPOSALS
The enumeration of advantages and disadvantages accompanying each proposal should provide a basis for the independent evaluation of the different proposals by readers. The accompanying tabulation will further assist in making such an evaluation. In this tabulation the several plans are appraised on the basis of the following six considerations:
A. Their effect on reduction of duplication in truck travel;
B. Their effect on competition—salesmen’s choices of patrons and patrons’ choices of firms or salesmen;
C. Extent to which private initiative and enterprise are relied upon to bring about reductions in duplication of truck travel;
D. Extent to which farmers would benefit from savings;
E. Carry-over value to continued postwar improvement;
F. Administrative difficulties involved.
Plans I and II rank highest among the five considered when appraised objectively on the basis of the six considerations specified. The authors’ first choice is plan I, mainly because of the greater scope it affords farmers for the exercise
<table>
<thead>
<tr>
<th>Basis of evaluation</th>
<th>Plan I—Farmers organize delivery districts</th>
<th>Plan II—Set up local truck dispatching office</th>
<th>Plan III—Prescribe minimum standards of efficiency in delivering</th>
<th>Plan IV—Dealer collaboration</th>
<th>Plan V—Allocate area to single bulk plant</th>
</tr>
</thead>
<tbody>
<tr>
<td>A—Effect on duplication and waste in tank truck travel</td>
<td>Maximum possible eliminated</td>
<td>Maximum possible eliminated</td>
<td>Partly eliminated</td>
<td>Moderate</td>
<td>Maximum possible eliminated</td>
</tr>
<tr>
<td>B—Effect on competition: 1. Right to trade freely Farmers' choice of: Truck operator</td>
<td>Collective choice granted</td>
<td>Denied</td>
<td>Granted, but range of choice restricted</td>
<td>Restricted</td>
<td>Denied</td>
</tr>
<tr>
<td></td>
<td>Bulk plant</td>
<td>Collective choice granted</td>
<td>Granted</td>
<td>Restricted</td>
<td>Denied</td>
</tr>
<tr>
<td></td>
<td>Brand of product</td>
<td>Collective choice granted</td>
<td>Partly restricted</td>
<td>Restricted</td>
<td>Denied</td>
</tr>
<tr>
<td></td>
<td>Bulk plants' choice of: Truck operator Patrons</td>
<td>Denied</td>
<td>Denied</td>
<td>Granted</td>
<td>Granted</td>
</tr>
<tr>
<td></td>
<td>Patrons</td>
<td>Free to bid for collective patronage of area</td>
<td>To dispatching office for delivery in area</td>
<td>Granted within self-imposed limits</td>
<td>Granted</td>
</tr>
<tr>
<td></td>
<td>2. Special franchise granted</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>To bulk plant to serve area</td>
</tr>
<tr>
<td>C—Extent private initiative and enterprise are stimulated or relied on: Farmers Dealers</td>
<td>Much</td>
<td>Free to set up dispatching office</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Would be more aggressive</td>
<td>Free to set up dispatching office</td>
<td>Much—to increase delivery efficiency</td>
<td>None</td>
</tr>
<tr>
<td>D—Extent farmers would participate in savings</td>
<td>Fully</td>
<td>Fully only if office is operated at cost</td>
<td>Probably some extent</td>
<td>Doubtful</td>
<td>Doubtful</td>
</tr>
<tr>
<td>E—Post-war carryover value</td>
<td>Great</td>
<td>Great</td>
<td>Moderately high</td>
<td>Doubtful</td>
<td>None</td>
</tr>
<tr>
<td>F—Administrative difficulties</td>
<td>Minimum</td>
<td>Minimum</td>
<td>Considerable—checking truck operators’ reports</td>
<td>Minimum</td>
<td>Considerable in allocating areas</td>
</tr>
</tbody>
</table>
of initiative and enterprise, and because it would probably be less difficult to put into effect than plan II.

Plan V is not favored by the authors even as last choice because of its obvious disadvantages and obnoxious features. It is included only because it has received some serious consideration.

Plans III and IV each have some merit, but rank far below plans I and II in the authors' estimation.

**CONCLUSIONS**

It is evident that a great deal of inefficiency exists in farm delivery of petroleum products. Some of this inefficiency is the result of laxness on the part of tank truck and bulk plant operators, and some of it results from farmers' thoughtlessly taking advantage of and responding to appeals made by competing salesmen and distributors.

Most of the inefficiency results, however, from the kind of competition that prevails when a large number of salesmen scramble for the available business in a given community and when they compete largely on the basis of service rather than price and relative efficiency. The effect of such competition results in farmers in a given area scattering their patronage among a large number of salesmen. The "density of patronage" is thus greatly reduced, with the result that excessive mileage is traveled in delivering a given volume of petroleum products.

This situation is not likely to improve merely as a result of the operation of present competitive forces, except perhaps over an inordinately long period of time. Farmers' co-operative purchasing associations, however, have in many cases achieved a higher than average concentration of patronage and in some cases have approached maximum concentration. A more general awareness among farmers of the savings that might accrue to them through greater voluntary concentration of patronage should result in more rapid improvement.

More aggressive competition on the basis of price and relative efficiency, however, is needed, but competition on such basis is not likely to be achieved as long as the present practice of "product differentiation" through brands continues. Hence, the purchase by farmers of refined fuels on the basis of specifications or scientific tests of quality would be a long step toward more rational competition. Farmers
cannot avail themselves of purchases on this basis, however, except through cooperatives or the establishment of standard brands as a war emergency measure.

WAR EMERGENCY CONTROLS

The present emergency, however, demands that drastic conservation of critical materials and manpower be achieved promptly. Hence, either normal processes for achieving efficiency must be speeded up or emergency controls adopted.

Any increase in the efficiency of distribution of petroleum products will result directly in conservation of scarce materials essential to the war effort. Not all methods of conserving trucks and tires, however, will result in increased efficiency or maintenance of service on a level essential for maximum food production. Hence, it is highly desirable that in the selection of methods of conservation, consideration be given to their effects on agricultural production and on efficiency of petroleum distribution. Moreover, any method put into effect will involve more or less modification of present practices and methods of delivery and competition.

Another consideration is the desirability of getting maximum conservation of transportation facilities with a minimum of administrative and regulatory effort. In order that there may be a maximum of enlightened, voluntary action, there must be considerable assumption of responsibility and exercise of initiative by farmers, dealers and truck operators, and a large measure of cooperation between them and the administrative agencies.

Such action may be facilitated and promoted by a thorough understanding of:

1. The urgency of the needs; 2. factors in the situation that make possible conservation without restricting essential services; and 3. the relative merits of alternative conservation methods in terms of: (a) The amount of conservation that is likely to result; (b) their immediate and long run effects on freedom of choice; and (c) their effects on costs and quality of essential services.

Thus the formulation of sound programs and policies and enlisting the enlightened participation of the people in helping to carry them out, throw a heavy burden of responsibility on fact finding, analysis and evaluation, dissemination of information, and finally, on planning appropriate courses of action and appraisals of results.