DOE/BC/10053-21

ANALYSIS OF POTENTIAL USED-OIL RECOVERY FROM INDIVIDUALS

Final Report

Work Performed for the Department of Energy
Under Contract No. DE-AC19-79BC10053

Date Published—July 1981

Market Facts, Inc.
Chicago, Illinois

U. S. DEPARTMENT OF ENERGY

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Available from the National Technical Information Service, U.S. Department of Commerce, Springfield, Virginia 22161.

NTIS price codes

Paper copy:	$12.50
Microfiche copy:	$3.50

DOE/BC/10053-21
Distribution Category UC-92b

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Final Report

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UNITED STATES DEPARTMENT OF ENERGY

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I. EXECUTIVE SUMMARY

A. Introduction

To assist the Department of Energy in its investigation of methods for recycling used motor oil, Market Facts conducted a telephone survey of individuals who change their own motor oil. The study examined the amount of oil used, oil change practices, oil disposal methods, and perceptions and attitudes toward used motor oil disposal and oil recycling.

A national probability sample of 4,805 telephone households in the contiguous continental United States was used for this study. The survey identified vehicle households as well as households where at least one member changed the oil in a motor vehicle within the last 12 months.

B. The National Motor Oil Market

Of the 79.6 million households in the contiguous continental United States, 85 percent own, lease, or operate a motor vehicle that is available to a licensed driver on a regular basis. Of al vehicle households, 55 percent are do-it-yourself (DIY) oil change households where, during the past 12 months, one or more household members personally changed the motor oil of a household vehicle. (These DIY households represent 47 percent of all U.S. households.)

1. National Vehicle Use

The average number of vehicles in DIY households is 2.3, as contrasted with 1.6 vehicles in non-DIY households. The average number of miles driven annually is 26,000 in DIY households, with an average of 11,000 miles driven per vehicle for both DIY and non-DIY households.

2. Motor Oil Consumption

Almost three quarters of one billion (745 million) gallons of motor oil are consumed in American vehicle households annually: almost 80 percent in oil changes and the remainder in oil added between changes. After use, 73 percent is drained from crankcases during oil changes; the remainder is burned or leaked. DIY households account for two-thirds of oil consumed and two-thirds of oil drained from crankcases.

Note: As will be discussed in Section III.A.2., the amount of oil drained per oil change is derived from responses to questions 3d, 3e, and 17a.

3. Geographic Variation

Vehicle households as a percentage of all households range from 80 percent in the Northeast to 89 percent in the North Central and West census regions. (A census map is provided in Appendix C.) The number of vehicles per vehicle household ranges from 1.8 in the Northeast to 2.1 in the West. For vehicle households with DIY oil changers, the range is 2.1 vehicles per household in the Northeast to 2.4 in the West region. The annual miles per vehicle and the annual miles per household show relatively little or no regional variation. Nevertheless, the South census region accounts for almost one-third of all DIY oil drained for oil changes.

Each census region contains two or three census divisions. Geographic variation is even more pronounced at the division level. Vehicle households as a percentage of all households range from 95 percent in the Mountain census division to 76 percent in the Middle Atlantic division. The two census divisions which account for the greatest share of used DIY oil are the East North Central and Pacific divisions. Together theses divisions account for 37 percent of all DIY oil drained for changes.

C. DIY Oil Change Practices

The following findings are based on the responses of the household member who is actually involved in changing the motor oil.

1. Frequency of Oil Changes

The average time elapsed between oil changes is 4.2 months, and the average number of miles driven is about 3,860. The number of oil changes per year for the vehicle changed most recently in DIY households is 3.8 (only slightly higher than the estimate obtained from the screening interview.)

2. Oil Change Behavior

Most respondents record the mileage and/or the date when they change their oil. The most common location for an oil change was the driveway. An open container is usually used for draining oil, but for disposal, about a quarter of the DIYs transfer the oil to another container.

3. Methods by Which DIYs Dispose of Used Motor Oil

Respondents identified numerous and varied ways for disposing of used motor oil. Forty percent used methods that result in the oil eventually being poured on the ground. If oil collected with the trash is taken to a landfill or dump, this percentage (oil poured on the

ground) is actually greater than 40 percent. (Twenty-one percent put oil in with the trash to be collected.) About 14 percent of the respondents recycle oil or take it to a gas station to be added to the used oil drum. Eight percent use oil on machinery, and the remainder include a variety of uses for the oil.

There appear to be some regional variations in disposal method. In rural areas pouring oil on a road is the most common disposal method. In non-rural areas the most common method of disposal is to put oil in with the trash to be collected.

4. Motor Oil Purchase Patterns of Do-It-Yourselfers (DIYs)

a. National Purchase Patterns

Department or discount stores are the primary outlets for DIY motor oil purchases (about one-half of the respondents usually buy oil at these outlets). Another 26 percent usually purchase oil from automotive parts or supply stores.

About one-third of the DIYs purchase 24 quarts of oil at one time. Twenty-three percent buy five quarts at a time. Almost all DIYs buy oil in one-quart containers.

b. Geographic Purchase Variations

Department and discount stores appear to be less important in the West, particularly in the Mountain region, than they are elsewhere. Automotive parts and supply stores are substantially more important in the Pacific division.

D. Attitudes toward Oil Disposal and Recycling Used Motor Oil

Most respondents feel that pouring oil down a storm sewer is very harmful. Only one-third think that burying used oil in the ground is very harmful to the environment.

More than two-thirds of all respondents reported that they have seen or heard something about recycling used motor oil. These respondents were about three times more likely to dispose of used oil by taking it to a gas station or by giving the oil away for recycling. They were also more likely to view certain methods of oil disposal as "very harmful" to the environment. Nevertheless, past exposure to information about recycling used motor oil does not appear to have influenced:

- perceptions of how good recycled oil would be for use in respondents' cars,
- perceptions of how much energy would be saved by recycling oil,
- intentions to recycle oil under various circumstances.

The overall perception of recycled motor oil is that it would not be as good as new motor oil for use in DIYs' cars. DIY willingness to bring used oil in for recycling appears to be related to perceptions of how good recycled oil would be for their own use. Respondents who feel that recycled motor oil is just as good or better

than new oil appear to be consistently more willing to bring used oil in for recycling. Respondents who feel that recycled oil is "not at all as good" as new oil are more than twice as likely never to bring in used oil for recycling.

Almost all respondents said they think that energy can be saved by recycling used motor oil. More than two fifths think "a great deal" of energy can be saved in this manner. Respondents' perceptions of the amount of energy saved are somewhat related to their impressions of the quality of recycled motor oil.

DIYs, for the most part, report a willingness to save used oil for recycling. About 70 percent said they would always save oil for recycling if the oil were picked up at their house. More than half said they would always save used oil if they could take the oil to a convenient place. Non-rural DIYs are more likely than are rural DIYs to bring in used oil for recycling. This may be due to the fact that about 50 percent of DIYs in rural areas use their used motor oil for roads, machinery, insects, weeds, and so forth.

Motivators and Incentives to Recycling Motor Oil

An objective of the survey was to determine whether statements regarding the ability of oil recycling to reduce environmental pollution and/or imports of foreign oil would have any effect on DIY responses. In addition, two incentive payment amounts, 5 cents and 15 cents per quart, were tested. The survey responses indicate that neither the statements nor the level of payment tested appeared to affect a respondent's expression of willingness to return used motor oil for recycling.

II. INTRODUCTION

A. Background and Introduction

1. Purpose of the Study

Each year hundreds of millions of gallons of lubricating oil are drained from the vehicles of Americans who change their own motor oil. Much of this oil is disposed of in ways that can harm the environment. In addition to environmental damage, any potential for oil recovery is lost.

The Department of Energy has been investigating methods for recycling used oil. The technical aspects of the problem have been studied, and the next step is to attract do-it-yourselfers to recycling programs. To do this, a survey of individuals who change their own motor oil was conducted to assess the behaviors, awareness, and attitudes of the do-it-yourself (DIY) motor oil market.

The purpose of this study is to determine the amount of oil used, oil change practices, disposal methods involved, perceived harmfulness of various disposal methods, and attitudes toward recycling used motor oil. This information will be used to encourage the DIY to dispose of oil in order that the motor oil can be recycled.

2. How the Study Was Conducted

a. Description of the Sample

This survey is based on a national probability sample of telephone households in the contiguous continental United States, based on random digit dialing to insure the inclusion of households with unlisted telephone numbers. The sampling frame was provided by Survey Sampling, Inc., whose description of the statistical characteristics of the sample is included in Appendix B. The key characteristics are: (1)

the sample is constituted so that every telephone household has an equal probability of being selected; this permits direct projection to United States households; (2) the sample is stratified to all counties such that the number of telephone households drawn from a county or from a group of counties is proportional to its (their) share of U.S. telephone households. This permits direct projection to U.S. Census regions and divisions; (3) the sample is an element (household) rather than a clustered sample; this permits direct calculation of sampling errors.

See Appendix A for a description of the composition of the survey sample.

b. Description of the Survey Questionnaire. The survey was conducted in two stages. During the first stage a screener questionnaire was administered to a probability sample of 4,805 U.S. telephone households. (For additional information on the sample composition, see Appendix A.) The screener questionnaire elicited the following information:

- Household vehicles owned, leased, and operated (number, make, model year, vehicle type, number of cylinders, mileage). Information regarding vehicle make was used for editing purposes only. Vehicle make information was not coded or tabulated.
- Miles driven per year
- Number of complete oil changes per year
- Population density (city, suburb, rural)
- Zip code
- Presence of do-it-yourselfer in household.

Vehicle households (4,084) were identified. These households comprise 85 percent of all telephone households screened. (U.S. Census Bureau statistics indicate that in 1978 84 percent of all U.S. households owned one or more motor vehicles.) The respondent for the screener stage of the study was asked if he or she personally changed the motor oil in a household vehicle. If the reply was negative, the respondent was asked if another person in the household did so. The person who actually performed the oil change provided information for the second stage of the study.

The survey identified do-it-yourselfers (DIYs) who were individuals who performed a complete oil change on a household vehicle within the past year. Fifty-five percent or 2,251 of the 4,084 vehicle households identified were households where at least one member changed the oil in a household motor vehicle within the last 12 months. Those DIYs who agreed to participate (80% of all DIYs screened -- a good response) answered a second set of questions. The second stage of the survey was designed to obtain the following:

Information regarding the last oil change:

- Make and model year of vehicle for which change was made
- Whether a record of the change was made, kind of record (date, mileage)
- Whether the oil filter was replaced
- Number of quarts of oil drained
- Container used for draining oil
- Container used for disposal of oil
- Method of oil disposal
- Number of quarts of new oil used
- Type of oil, size of container purchased
- Whether this was the first time the oil in the vehicle was changed.

Information regarding the frequency of oil changes:

- Number of months between most recent change and previous change
- Miles between the most recent oil change and previous change
- Individual who performed the oil change
- Number of quarts added between changes
- Individual who added oil
- Number of miles between oil changes
- Whether anyone else changes oil in vehicle.

Information regarding the respondent's oil change experience:

- Number of years that respondent has been changing own oil
- Reasons for changing own oil
- Whether respondent has been driving more or fewer miles between changes
- Reason for driving more or fewer miles.

Information regarding oil purchase practices:

- Number of quarts bought in a year
- When oil is purchased
- Number of quarts bought at one time
- Container size purchased
- Type of retail outlet where oil purchased.

DIY attitudes and awareness:

- Perceived harmfulness of disposal methods
- Familiarity with recycled motor oil
- Perception of quality of recycled motor oil
- Perception of amount of energy saved
- Frequency with which respondent would bring in recycled oil, six scenarios for oil collection.

Respondent demographics:

- Type of dwelling unit
- Education, employment status
- Age, household income, sex.

c. Pre-testing. Forty pre-test interviews were conducted in order to test for the following:

- Evidence of respondent inability to understand the questions
- Discrimination among pre-structured questions
- Interviewer difficulty in following "skip" patterns.

The entire set of study procedures was tested and approved for data collection.

d. Interviewer control. Experienced interviewers were recruited and briefed. Practice sessions were conducted and after a final briefing, the first actual interview was monitored. If necessary, the interviewer was re-trained.

Each shift of interviewers was supervised by an experienced field supervisor. In addition, written instructions for interviewers and supervisors were provided, and a member of the professional staff was present throughout the training and for the first two or three days of work. A professional staff member acted as the project field supervisor.

Work was monitored and reviewed for accuracy and completeness. Daily activity reports permitted assessment of interviewer and shift performance. Finally, interviews were quality-checked during the coding process.

B. Organization of the Report

The remainder of the report is organized into three sections: Findings, Discussion of Findings, and Appendix. The appendix contains a description of the sample and sample composition, a census division map, copies of all questionnaires used in the study, supplemental tabulations, and the findings and analysis of the farm sample.

The supplemental tabulations are detailed tables of study findings that are not directly referenced in the Findings section of the report. All tables that are referenced in the Findings section are included as "Exhibits." The Exhibits are located in the Findings section, directly behind the narrative portion of the findings.

The final appendix, Appendix G, contains a table of sampling error. This table can be used to estimate the range within which survey results will lie 95 times out of 100 (at the 95% level of confidence).

III. FINDINGS

A. The National Motor Oil Market

Of the 79.6 million households in the contiguous continental United States, 67.9 million (85%) own, lease, or operate a motor vehicle available to a licensed driver on a regular basis. Of all vehicle households, 37.4 million are do-it-yourself (DIY) households where, during the past 12 months, one or more household members personally changed the motor oil of a household vehicle. The DIY households represent 47 percent of all households and 55 percent of all vehicle households.

1. National Vehicle Use

A total of 134 million vehicles are available for use in 79.6 million American households: an average of 1.7 vehicles per household and two vehicles per vehicle household. The average number of vehicles in DIY households is 2.3, as contrasted with 1.6 vehicles in non-DIY households. The average number of miles driven annually in vehicle households is 22,000; 26,000 in DIY households, and 16,000 in non-DIY households. The average number of miles driven per vehicle is 11,000 for both DIY and non-DIY households. These comparisons are shown on the following page.

	Households:			
	All U.S.[1]	Vehicle[2]	DIY	non-DIY
Number of households (in millions)	79.6	67.9	37.4	30.5
Percent of all households	100	85	47	38
Average number of vehicles per household	1.7	2.0	2.3	1.6
Average number of miles driven annually per household (in thousands)	19	22	26	17
Average number of miles per vehicle (in thousands)	11	11	11	11

[1]The 48 contiguous continental states and the District of Columbia. U.S. Statistical Abstract, 1979, p.784. Figures projected (from 1977) to 1980.

[2]Market Facts survey, screening questionnaire. Projection from U.S. Census 1977 estimate (U.S. Statistical Abstract, 1979, p. 650) yields 67.5 million vehicle households.

2. Motor Oil Consumption

Almost three-quarters of one billion (745 million) gallons of motor oil are consumed in American vehicle households annually: 593 million in oil changes and 152 million in oil added between changes. Of these, more than one-half billion (542 million) gallons are drained from crankcases during oil changes; the remainder (203 million gallons) are burned or leaked.[3] DIY households account for almost one-half billion (478 million) gallons of oil consumed and over one-third of a billion (342 million) gallons of oil drained from crankcases.

	Total	DIY	non-DIY
Oil added (millions of gallons)	745	478	267
during changes	593	375	218
between changes	152	103	49
Oil consumed	745	478	267
drained[4]	542	342	200
burned or leaked	203	136	67

[3] Estimates of the amount of oil burned or leaked are based on the total amount of oil added less oil drained for changes.

[4] The amount of oil drained per oil change for DIY and non-DIY households is estimated from oil change data derived from responses (by the person making the oil change) to the DIY or second stage of the questionnaire. The estimated number of oil changes and quarts of oil added between changes was derived from responses to the screener or first stage of the questionnaire.

3. Geographic Variation

This section examines differences in survey findings which relate to census region or division and population density of the areas in which respondents live. Census regions and divisions are shown in Appendix C. These geographic boundaries are used to isolate variations in survey responses.

a. Population Density

An objective of the study is to determine whether and how the number of DIYs and non-DIYs' oil change behavior may be related to the location in which they live. All individuals screened were asked which of the following categories best describes the place where they live:

- inside the limits of a major city,
- in the suburban area of a major city,
- in a small city or town that is not near a major city,
- in a rural area.

The classification of responses by population density is based solely on individuals' own definitions of where they live. The results are shown in Exhibit 1. It is evident that rural areas have the highest percentage of DIY households (48 percent).

b. Regional Variations

As shown in Exhibit 2, vehicle households as a percentage of all households range from 80 percent in the Northeast to 89 percent in the North Central and West census regions. By census division, this variation is greater: 76 percent in the Middle Atlantic division to 95 percent in the Mountain division. Appendix C shows regions and divisions.

The incidence of DIY households ranges from 49 percent of vehicle households in the Northeast to 58 percent in the West (and 57 percent in the North Central) region. At the census division level, the incidence of DIY households is over 60 percent in the Mountain and West South Central divisions (64%), and in the East North Central division (61%), as shown in the same Exhibit.

The number of vehicles per household ranges from 1.5 in the Northeast region to 1.9 in the West for all households. The number of vehicles per vehicle household ranges from 1.8 in the Northeast to 2.1 in the West. For DIY households the range is from 2.1 vehicles per household in the Northeast to 2.4 in the West region. (See Exhibit 3.)

The annual miles per household show relatively little regional variation and annual miles per vehicle show virtually no regional variation, as shown in Exhibit 4. Exhibit 5 shows how all households, vehicle households, and DIY households are distributed across census regions and divisions. The data reveal that a larger than proportionate share of DIY households is located in the North Central census region while the opposite is true of the Northeast census region.

Exhibit 6 shows, on a per vehicle basis, the number of oil changes and amounts of oil used annually. These figures are the basis for Exhibits 7 and 8 which show the national motor oil consumption for all vehicle households and DIY households by census region and division.

As shown in Exhibit 8, the South census region accounts for almost one-third of all DIY oil drained for changes (441 out of 1369 million quarts). However, examination of the individual census divisions reveals that two divisions -- the East North Central and Pacific divisions -- together account for an even larger share: 37 percent of all DIY oil drained for changes. Due to volume, these two divisions may have particularly good potential for oil recycle efforts.

B. DIY Oil Change Practices

The discussion of findings has thus far been based on responses from the screener or first stage of the questionnaire. The following sections contain findings which are based on the responses of the household member who is actually involved in changing the motor oil.

1. Frequency of Oil Changes

During the second stage of the interview DIYs were asked for information regarding the frequency of oil changes. The average time elapsed between oil changes is 4.2 months, and the average number of miles driven is about 3,860.

The data on time and mileage between oil changes were elicited in two ways: by asking earlier in the interview the average number of miles and months between the last two changes and by asking later in the interview the average number of miles usually driven and the average number of months that usually elapse between changes. For both sets of questions the responses were similar:

	Means
Miles driven between the last two oil changes (in thousands)	3.91
Miles usually driven between oil changes (in thousands)	3.82
Months elapsed between the last two oil changes	4.10
Months usually elapsed between oil changes	4.30

If the oil change interval is converted into number of oil changes for year and averaged, the resulting estimate for the number of oil changes per year for the vehicle changed most recently in DIY households is 3.80 (only slightly higher than the estimate obtained from the screening interview).

2. Oil Change Behavior

The information about the nature of records made, location of the oil change, type of container used, amount of oil drained and whether the oil filter was replaced for the most recent oil change are shown in the supplemental tabulations (Appendix E).

Most respondents (58%) make a record of their oil changes, usually in a notebook or on a door sticker. Virtually all of those who make a record, record the mileage when the oil is changed. Almost as many record the date of the oil change. Survey data also show that the tendency to record oil changes appears to be positively correlated with the age of the DIY.

The most common location for an oil change was the driveway (used by 43 percent). One-fourth changed their oil in a garage, and 16 percent used a lawn or yard for their last oil change. These data are presented in detail in the supplementary tabulations, as mentioned earlier.

For their last oil change, almost three-quarters of the respondents drained the used oil into a pan, pot, or other open container. The remaining respondents used closed containers such as bottles, jars, cans, plastic bags, and milk jugs. For disposal of used oil, one-half of the respondents used a pan, pot or open container. (It is apparent that about one-fourth of the respondents transferred the oil from an open container to another, possibly closed, container.)

3. Methods by Which DIYs Dispose of Used Motor Oil

When asked how they disposed of the oil from their last oil change, respondents identified numerous and varied methods for disposing of used motor oil. As Exhibit 9 shows, no single method was cited by more than 21 percent of the respondents.

When grouped into categories, 40 percent of all respondents used methods that result in the oil eventually being poured on the ground, as also illustrated in Exhibit 9. If oil collected with the trash is taken to a landfill or dump, this percentage (oil poured on the ground) is actually greater than 40 percent.

Exhibit 9 also shows that about 14 percent of the respondents recycle oil or take it to a gas station to be added to the used oil drum. Other survey results reveal that the percentage of those who recycle oil increases with income. Nevertheless, the percentage of respondents who put oil in the trash is also higher for those earning $25,000 per year or more.

There appear to be some regional variations in oil disposal methods. The most common disposal method, particularly among those living in non-rural areas, is to put the oil in with the trash to be collected. In rural areas, pouring oil on a gravel driveway or road is the most common disposal method, as shown in Exhibit 10.

As mentioned earlier, on page III-6, the Pacific and East North Central divisions together account for 37 percent of all DIY oil drained during oil changes. A closer look at these two divisions, as shown in Exhibit 11, reveals that almost one quarter of the Pacific census division respondents dispose of motor oil in an acceptable manner requiring

some effort -- by either taking the oil to a gas station for deposit in the used oil drum, or by giving the oil away for recycling. Nevertheless, about 37 percent of the oil for these two highest oil-consuming census divisions is dumped on or in the ground.

4. Motor Oil Purchase Patterns of Do-It-Yourselfers (DIYs)

a. National Purchase Patterns

Purchase location. Department or discount stores are the primary outlets for DIY motor oil purchases. As Exhibit 12 indicates, about one-half of the respondents reported that they usually purchase motor oil at these locations. Another 26 percent indicated that automotive parts or supply stores are their usual source of motor oil. The remaining respondents purchase oil from a variety of other outlets. Most respondents (51%) buy oil when it is time to change it; almost as many (45%) buy oil when it is on sale.

Quantity. Almost one-third (31%) of the DIYs surveyed purchase 24 quarts of oil at one time. Twenty-three percent buy five quarts at a time, and 25 percent buy from 6 to 23 quarts (usually 12 or fewer) at one time, as shown in Exhibit 13.

Container size. One-quart containers are favored by DIYs. Almost all (94%) of the respondents purchase motor oil in one-quart containers. Drums, two-, four-, and five-quart containers are purchased by very few people. (See Exhibit 13.)

b. Geographic Purchase Variations

Exhibit 14 shows the relative importance of the four major types of retail outlets for DIY motor oil purchases in total and by census region and division. Department and discount stores appear to be less important in the West particularly in the Mountain region than they are elsewhere, automotive parts and supply stores are substantially more important in the Pacific division.

C. Attitudes Toward Oil Disposal and Recycling Used Motor Oil

1. Perceived Harmfulness of Methods of Oil Disposal

Respondents were asked how harmful to the environment they consider various methods of oil disposal. As Exhibit 15 shows, most respondents feel that pouring oil down a storm sewer is very harmful, whereas only one-third think that burying used oil in the ground is very harmful.

2. Attitudes Toward Recycling Used Motor Oil

Unless otherwise referenced, the data supporting the following discussion are presented in detail in the supplementary tables. More than two-thirds of all respondents reported that they have seen or heard something about recycling used motor oil. Not surprisingly, respondents who claim to have been exposed to the concept of recycling motor oil were about three times as likely to dispose of used oil by taking it to a gas station to be put in the used oil drum or by giving oil away for recycling. These respondents were also more likely to view certain methods of oil disposal as "very harmful" to the environment.

Nevertheless, past exposure to information about recycling used motor oil does not appear to have influenced:

- perceptions of how good recycled oil would be for use in respondents' cars,
- perceptions of how much energy would be saved by recycling oil,
- intentions to recycle oil under various circumstances.

Respondents were asked the following question: "compared to new motor oil, how good do you think that recycled motor oil would be for use in your car -- better than new oil, just as good...nearly as good...or not at all as good as new oil?"

The overall perception of recycled motor oil is that it would not be as good as new motor oil for use in their car. About 28%, however, as shown in Exhibit 16, think that used motor oil is "nearly as good," and an equal number think recycled oil would be "just as good" as new oil for use in their car.

Willingness to recycle used motor oil appears to be related to perceptions of how good recycled oil would be for use in respondents' cars. On the average, almost three-quarters of respondents who feel recycled oil is better or just as good as used oil said they would always bring the oil in for recycling; only slightly more than one-half for the respondents who feel that recycled oil is "not at all as good" as new oil said they would always bring in used oil for recycling (Exhibit 17).

Exhibit 17 shows that for each of the recycling circumstances described, respondents who feel that recycled oil is just as good or better than new oil appear to be consistently more willing to bring used oil in for recycling. Respondents who feel that recycled oil is "not at all as good" as new oil are more than twice as likely to never bring in used oil for recycling.

Almost all respondents said they think that energy can be saved by recycling used motor oil -- more than two-fifths think "a great deal" of energy can be saved in this manner. See Exhibit 18.

Exhibit 19 shows that respondents' perceptions of the amount of energy saved are somewhat related to their impressions of recycled motor oil. More than one-half of the respondents who feel that recycled motor oil is just as good or better than new oil also think that recycling will save "a great deal" of energy. On the other hand, DIYs who feel that recycled motor oil is "not at all as good as new oil" are more likely than other respondents to think that recycling will save "not very much" or "an insignificant amount" of energy.

Respondents, for the most part, report a willingness to bring in used oil for recycling if they could take the oil to a convenient place. As shown in Exhibit 20, the most attractive option is that which requires the least effort -- having a group pick up the used oil at their house. Regional differences, as shown in Exhibit 21, do not appear to be significant. Population density, however, does appear to affect the likelihood of recycling oil.

Exhibits 22 and 23 show that, for each recycling alternative presented, there is a significant difference between the percentages of rural and major city respondents who said they would <u>always</u> bring in used oil for recycling. The rural respondent group consistently shows a smaller percentage of those who say they would always bring used oil in for recycling under each of the various alternatives. This may be due to their uses for oil, such as for oiling down gravel roads or for use in machinery.

3. Motivators and Incentives to Recycling Motor Oil

One objective of the survey was to determine whether statements regarding the ability of oil recycling to reduce environmental pollutions and/or imports of foreign oil would have any effect on DIY responses. In addition, two incentive payment amounts, 5 cents and 15 cents per quart, were also tested.

To do this, eight versions of the questionnaire were administered. All versions asked respondents how often they would bring in used motor oil for recycling if they were paid for each quart of oil brought in. Four versions of the questionnaire used 5 cents per quart as a hypothetical payment, and the other four versions used 15 cents per quart as a payment. In addition to the payment, six versions of the questionnaire contained statement B, C, or D as follows:

Statement B: It is felt that if used motor oil is collected and recycled, environmental pollution would be substantially reduced.

Statement C: It is felt that if used motor oil is collected and recycled imports of foreign oil could be significantly reduced.

Statement D: It is felt that if used motor oil is collected and recycled, environmental pollution would be substantially reduced and imports of foreign oil could be significantly reduced.

In summary, the versions were as follows:

Version 1: Contained statement B and payment of 5 cents.

Version 2: Statement B and payment of 15 cents.

Version 3: Statement C; payment of 5 cents.

Version 4: Statement C; payment of 15 cents.

Version 5: Statement D; payment of 5 cents

Version 6: Statement D; payment of 15 cents.

Version 7: No statement; payment of 5 cents.

Version 8: No statement; payment of 15 cents.

The survey responses indicate that neither these statements nor the level of payments tested appear to affect a respondent's expression of willingness to return used motor oil for recycling.

D. Demographic Profile of DIY Respondents

As Exhibit 24 shows, two-fifths of the DIYs interviewed are high school graduates. Another two-fifths also attended college. All age and income groups are represented, but almost all (92%) of the respondents are male. Three-quarters are employed on a full-time basis, and 78 percent live in single-family houses.

Survey data revealed few significant differences among DIYs that could be attributed to demographic characteristics, although some distinctions can be made. Not surprisingly, DIYs who live in apartments are more likely to dispose of used oil in the trash or garbage than are DIYs who live in single-family houses. Familiarity with recycled motor oil appears to increase with income and with age. Willingness to bring in oil for recycling appears to increase slightly with income.

Males are twice as likely as females to be familiar with the concept of recycled motor oil. Nevertheless, females appear to be somewhat more favorably disposed toward the use of recycled motor oil in their car.

DIYs as a group tend to be slightly more likely than non-DIYs to be driving a vehicle other than a passenger car -- such as a truck, van, or other vehicle. However, the number of cylinders and age of vehicle tend to be similar for both groups of respondents.

Exhibits

Exhibits (continued)

Exhibit 1

Population Density

	ALL	DIY	DIYs as a % of all households*	
	(%)	(%)	(%)	Base
Inside limits of a major city*	23	18	29	(1108)
Suburbs of a major city*	26	27	38	(1244)
Small town or town not near a major city	29	28	36	(1379)
Rural Area	22	27	48	(1023)
Base	(4754)	(1792)		

*Size of Major City

	ALL (%)	DIY (%)
More than a million people	29	24
Between half a million and one million people	27	31
Less than a half a million people	44	44
Base	(2147)	(750)

Source: Questions 4a, 4b

*Based on all DIYs screened

Exhibit 2

Household Vehicle Availability and DIY Status
by Census Region and Division*

	Vehicle Households as a percent of All Households		DIY Households as a percent of of All Households
	With Vehicle	DIY	DIY
Total	85	47	55
Northeast	80	39	49
New England	86	43	50
Middle Atlantic	76	37	49
North Central	89	52	58
East No. Central	90	55	61
West No. Central	86	44	51
South	84	46	55
So. Atlantic	84	41	49
East So. Central	84	47	56
West So. Central	86	55	64
West	89	51	57
Mountain	95	61	64
Pacific	88	48	55

*Please see map on page

Exhibit 3

Number of Vehicles per Household
by DIY Status within Census Region and Division

Number of Vehicles Per Household*

	Total	Vehicle Household	DIY Household	Non-DIY Household
Total	1.67	1.97	2.27	1.60
Northeast	1.46	1.82	2.14	1.52
New England	1.65	1.92	2.28	1.56
Middle Atlantic	1.36	1.79	2.09	1.51
North Central	1.77	1.95	2.17	1.64
East No. Central	1.75	1.94	2.17	1.58
West No. Central	1.69	1.96	2.22	1.69
South	1.66	1.98	2.34	1.54
So. Atlantic	1.61	1.92	2.32	1.54
East So. Central	1.74	2.07	2.38	1.68
West So. Central	1.75	2.03	2.34	1.48
West	1.89	2.12	2.39	1.76
Mountain	1.93	2.03	2.24	1.65
Pacific	1.89	2.15	2.45	1.79

* Vehicle information was obtained from the screening interviews.

Exhibit 4

Annual Vehicle Use (in thousands of miles)
by DIY Status within Census Region and Division

	Per Vehicle Household			Per Vehicle[1]		
	Vehicle Household	DIY Household	Non-DIY Household	Vehicle Household	DIY Household	Non-DIY Household
Total	22	26	17	11	11	11
Northeast	21	25	16	11	12	11
New England	23	28	19	12	12	12
Middle Atlantic	20	24	16	11	12	11
North Central	21	24	16	11	11	11
East No. Central	22	25	16	11	12	11
West No. Central	19	22	16	10	10	9
South	23	27	17	11	12	11
So. Atlantic	21	26	16	11	11	11
East So. Central	22	29	19	12	12	11
West So. Central	19	28	18	12	12	12
West	22	25	18	10	11	10
Mountain	20	22	14	10	10	9
Pacific	23	27	19	11	11	10

[1] U.S. Statistical Abstract, 1979, p.643 shows 9.6 thousand miles per passenger vehicle.

Exhibit 5

U.S. Households by Census Division,
Availability of Vehicle, and DIY Status
(U.S. Total Distributed by Percent
Across Census Regions and Divisions)

	Households[2]	Vehicle Households[3]	DIY Households[3]
U.S. Total[1]	79.6	67.9	37.4
	(%)	(%)	(%)
Northeast	22	21	18
New England	5	6	5
Middle Atlantic	17	15	13
North Central	26	27	29
East North Central	18	19	21
West South Central	8	8	8
South	33	32	32
South Atlantic	16	16	14
East South Central	7	6	6
West South Central	10	10	12
West	19	20	21
Mountain	5	5	6
Pacific	14	15	15
	100%	100%	100%

[1]The 48 contiguous continental states and the District of Columbia.

[2]U.S. Statistical Abstract, 1979, p.784. Figures projected (from 1977) to 1980.

[3]Market Facts survey, screening questionnaire. Projection from U.S. Census 1977 estimate (U.S. Statistical Abstract, 1979, p.650) yields 67.5 million vehicle households.

Exhibit 6

Profile of Motor Oil Usage
Average
(Per Vehicle)

		ALL	DIY
A.	Number of Oil Changes/Year	3.658	3.640
B.	Quarts of Oil Added During Each Change	4.853*	4.853
C.	Quarts of Oil Drained During Each Change	4.430*	4.430
D.	Total Annual Quarts of Oil Added Between Changes	4.550	4.860
E.	Total Annual Quarts of Oil Added for Changes (AxB)	17.752	17.665
F.	Total Annual Quarts of Oil Added to Vehicle (D+E)	22.302	22.525
G.	Total Annual Quarts of Oil Drained for Changes (AxC)	16.205	16.125
H.	Total Annual Quarts of Oil Burned or Leaked (F-G)	6.097	6.400

* DIY amounts assumed for all individuals. These amounts are based on the Market Facts survey.

Exhibit 7

Annual Addition and Disposition
of Motor Oil by Census Region and Division
(in millions of quarts)
for All Vehicle Households

	Oil Added			Oil Used		
	During Change	Between Changes	Total	Drained for Change*	Burned or Leaked*	Total
Total	2374	608	2979	2167	812	2979
Northeast	445	124	569	407	162	569
New England	142	36	178	129	49	178
Middle Atlantic	304	87	391	277	114	391
North Central	627	151	778	572	206	778
East No. Central	427	111	538	390	148	538
West No. Central	200	40	240	182	58	240
South	766	202	968	699	269	968
So. Atlantic	321	97	418	293	126	418
East So. Central	160	33	193	146	47	193
West So. Central	285	72	357	260	97	357
West	535	128	664	489	175	664
Mountain	123	35	158	112	45	158
Pacific	412	94	506	376	130	506
Total (converted to gallons)	593	152	745	542	203	745

* Oil Burned or Leaked = Total Oil Added Less Oil Drained for Changes

Exhibit 8

Annual Addition and Disposition
of Motor Oil by Census Region and Division
(in millions of quarts)
for Do-It-Yourself Households**

	Oil Added			Oil Used		
	During Change	Between Changes	Total	Drained for Change	Burned or Leaked*	Total
Total	1500	412	1913	1369	543	1913*
Northeast	254	74	328	232	96	328
New England	78	21	99	72	28	99
Middle Atlantic	176	53	229	160	69	229
North Central	414	110	524	378	146	524
East No. Central	291	83	375	266	109	375
West No. Central	122	27	150	112	38	150
South	483	140	623	441	182	623
So. Atlantic	194	63	257	177	80	257
East So. Central	92	18	111	84	26	111
West So. Central	198	58	255	180	75	255
West	349	88	437	318	118	437
Mountain	85	25	110	78	33	110
Pacific	264	63	326	241	86	326
Total (converted to gallons)	375	103	478	342	136	478

* Oil Burned or Leaked = Total Oil Added Less Oil Drained for Changes

**Figures obtained from all DIYs screened.

Exhibit 9

Oil Disposal Methods

	(%)	(%)
Oil was poured on the ground:	40	
Poured on gravel driveway/road		11
Dumped in backyard		9
Used as a weed killer		6
Took to public dump/landfill		4
Dumped in woods/vacant lot		4
Buried it		3
Poured into storm sewer		2
Let it drain where the car was		1
Oil was put in the trash or garbage to be collected*:	21	
Oil was taken to a gas station or recycled:	14	
Took to gas station to put in used oil drum		9
Gave away for recycling		5
Oil was burned:	4	
Used to start fire/burned it		3
Added to home heating oil		1
Miscellaneous uses:	25	
Used on machinery		8
Kept it		7
Gave away for an unknown purpose		3
Used on animals to keep lice away		1
Used as an insecticide		1
Used as wood treatment		1
Other		4
Base	(1776)	(1776)

Source: Question 18

*If trash is taken to a landfill, disposal of oil through garbage collection falls into the first category -- oil disposed of on the ground.

Exhibit 10

Most Common Methods of Disposing of Used Motor Oil

Rank	Major City	Suburb of a Major City	Small City or Town	Rural
1	Trash 25%	Trash 32%	Trash 20%	Road 18%
2	Gas Station 12%	Gas Station 10%	Road 10%	Machinery 16%
3	Road 10%	Backyard 9%	Gas Station 9%	Trash 9%
4	Backyard 10%	Road 7%	Backyard 8%	Keep it 9%
Base:	(319)	(471)	(496)	(489)

Source: Question 18

Exhibit 11

Methods for Disposal of Used Oil

Pacific Census Division

Method	(%)
Put in trash to be collected	20
Gave away for recycling	12
Dumped in backyard	11
Took to gas station to put in used oil drum	10
Poured on gravel driveway/road	10

East North Central Division

Method	(%)
Put in trash to be collected	23
Poured on gravel driveway/road	16
Used on machinery	11
Kept it	8

Exhibit 12

Type of Outlet Where
Motor Oil is Most Often Purchased

Outlet	(%)
Department or Discount Store	49
Automotive Parts or Supply Store	26
Gasoline Station	8
Supermarket	6
Oil Company Distributor	4
Drug Store	2
Other	5
Base	(1786)

Source: Question 42

Exhibit 13

Number of Quarts Generally Purchased at One Time

	(%)
Less than 5 quarts	12
5 quarts	23
6 to 23 quarts	25
24 quarts	31
More than 24 quarts	6
Base	(1793)

Container Size Usually Purchased

	(%)
Quart	94
Two- or Four-Quart	2
Five Quarts	1
Drum	2
Other	1
Base	(1783)

Source: Question 41

Exhibit 14

Type of Outlet Where Motor Oil is
Most Often Purchased by Census Region and Division

	Department or Discount Store	Automotive Parts or Supply Store	Gasoline Station	Supermarket	Base
	(%)	(%)	(%)	(%)	
Total	49	26	8	6	(1775)
Northeast	54	30	5	4	(338)
New England	59	28	6	4	(95)
Middle Atlantic	52	30	5	4	(243)
North Central	53	19	10	4	(566)
East No. Central	55	22	7	3	(410)
West No. Central	51	14	17	5	(156)
South	48	27	8	6	(575)
So. Atlantic	46	28	5	6	(254)
East So. Central	54	24	7	5	(121)
West So. Central	46	28	11	8	(200)
West	35	32	8	9	(296)
Mountain	32	21	16	17	(107)
Pacific	38	38	4	5	(189)

Exhibit 15

Perceived Harmfulness of Method of Disposal

Method	Very Harmful (%)	Somewhat Harmful (%)	Not at All Harmful (%)	Rank*
Pouring used oil on the ground	51	37	12	2
Pouring down a storm sewer	75	19	5	1
Putting in closed container in the trash	40	36	24	3
Burying used oil in the ground	35	40	24	4
Used to oil down a dirt or asphalt road or driveway	17	35	48	5
Used as a weed killer	35	39	26	4
Used as fuel for oil furnace	38	31	31	4
Used as lubricator or coating for tools	4	10	86	6

Source: Question 43

* Ranked in order of perceived harmfulness.

Exhibit 16

Question 44b: Compared to new motor oil, how good do you think that recycled motor oil would be for use in your car?

	(%)
Better than new oil	2
Just as good as new oil	28
Nearly as good as new oil	28
Not at all as good as new oil	33
Can't say/don't know	10
Base	(1792)

Exhibit 17

Willingness to Bring in Used Oil
Based on Perceptions of Recycled Oil*

Circumstance and Frequency	Perception of Recycled Oil: Better/Just as good (%)	Not at all as good (%)
If could bring to a convenient place:		
Always	66	42
Never	7	20
If were paid 5 or 15 cents for each quart:		
Always	73	50
Never	6	19
If could take the oil to where they shop:		
Always	68	45
Never	6	20
If service station nearby would take oil:		
Always	71	49
Never	7	15
If oil was picked up at home by a group:		
Always	78	60
Never	6	11
If there were a collection center where oil is purchased:		
Always	67	46
Never	7	19
If they had a special container to hold oil:		
Always	77	53
Never	5	15
Base	(525)	(584)

Source: Questions 44b and 47a

*Frequency with which respondents said they would bring in used oil for recycling under various circumstances, by perception of recycled oil as compared to new oil for use in their car.

Exhibit 18

Question 45: How much energy do you think can be saved by recycling used motor oil? Would you say...

	(%)
A Great Deal	43
A Moderate Amount	38
Not Very Much	13
An Insignificant Amount	6
Base	(1723)

Source: Question 45

Exhibit 19

Perception of Recycled Oil
by Perception of Energy Saved

	Perceptions of recycled motor oil as compared to new motor oil:		
Amount of energy saved:	Better/ Just as good	Nearly as good	Not at all as good
	(%)	(%)	(%)
A great deal	54	45	31
A moderate amount	36	42	37
Not very much	7	10	22
An insignificant amount	3	3	10
Base	(510)	(482)	(565)

Source: Questions 44b and 45

Exhibit 20

Question 47: Would you always, usually, sometimes or never save the used oil for recycling if...

	Always (%)	Usually (%)	Sometimes (%)	Never (%)
You could take the used oil to the place where you shop	57	15	16	12
A service station near you would take the used oil	60	15	15	10
The used oil could be picked up at your house by the town or city or civic group	71	12	10	8
The place where you buy the motor oil had a recycling collection center	57	15	17	12
You had a special container so that the oil wouldn't spill when you took it to the recycling center	65	14	2	8

Source: Question 47

Exhibit 21

Question 46: Suppose you could take your used motor oil to some convenient place such as a nearby service station, shopping center, (etc.) ... How often would you bring in your used oil for recycling instead of disposing of it yourself?

	Total	Major City	Suburb of a Major City	Small City/ Town	Rural Areas
	(%)	(%)	(%)	(%)	(%)
Always	53	62	61	51	43
Usually	17	12	18	17	20
Sometimes	17	16	11	20	19
Never	13	9	10	12	18
Base:	(1785)	(321)	(474)	(500)	(489)

Source: Question 46

Exhibit 22

Question 46: Suppose you could take your used motor oil to some convenient place such as a nearby service station, shopping center, (etc.)... How often would you bring in your used oil for recycling instead of disposing of it yourself?

		Census Regions:			
	Total (%)	NE (%)	NC (%)	South (%)	West (%)
Always	53	58	53	50	57
Usually	17	17	18	16	17
Sometimes	17	13	17	20	13
Never	13	11	9	14	12
Base:	(1785)	(339)	(562)	(576)	(297)

Source: Question 46

Exhibit 23

Question 47: Would you always, usually, sometimes or never save the used oil for recycling if...

	% Responding "Always"			
	Major City (%)	Suburb of a Major City (%)	Small City/ Town (%)	Rural Area (%)
You could take the used oil to the place where you shop	64	61	57	47
A service station near you would take the used oil	68	66	60	49
The used oil could be picked up at your house by the town or city or a civic group	78	74	71	63
The place where you buy the motor oil had a recycling collection center	65	59	57	49
You had a special container so that the oil wouldn't spill when you took it to the recycling center	73	70	65	56
Base:*	(321)	(474)	(500)	(489)

Source: Question 47

*The base represents the total number of DIYs living in each of the four areas.

Exhibit 24

DIY Respondent Demographic Profile

Education	(%)
Some High School, not completed or less	19
Completed High School	40
Some College, not completed	21
Completed College or more	21
Base	(1785)

Age	(%)
Under 25	21
25-34	32
35-54	30
55 or over	17
Base	(1784)

Household Income	
Under $15,000	32
$15,000 to 24,999	35
$25,000 and over	33
Base	(1688)

Sex	
Male	92
Female	8
Base	(1784)

Employment Status	(%)
Full time	75
Part time	5
Retired	9
Student	5
Unemployed	4
Homemaker	2
Base	(1785)

Dwelling Unit	(%)
Single Family House	78
Apartment	11
Mobile Home	6
Duplex or Townhouse	5
Base	(1787)

IV. DISCUSSION OF FINDINGS

The findings of this study confirm the generally held view that about half the vehicle households in the United States now do their own oil changes and additions. These DIY households account for almost two-thirds of the motor oil consumed by all U.S. households and produce about one-third of one billion gallons of used motor oil annually.

At least half of this used motor oil, more than 170 million gallons, is returned to the environment in a form that pollutes the ground and endangers the water supply. Most of this oil is simply poured on or buried in the ground. Only 14 percent is disposed of in a manner that might make the oil available for recycling; that is, returned to a gas station or given away for recycling.

Some of this oil waste is attributable to ignorance or a mistaken view of the harmful environmental effects of various disposal methods. For example, 24 percent of the DIY oil changers consider burying used oil in the ground to be not at all harmful to the environment; 12 percent consider pouring oil on the ground to be not at all harmful.

Some waste may result from lack of knowledge about the possibilities for recycling used oil. About one-third of the DIY oil changers have never seen or heard anything about recycling used motor oil. About one out of five DIYs thinks that relatively little energy can be saved by recycling used motor oil.

Measures such as requiring information about proper disposal and the need for recycling used oil to be printed on motor oil containers have been taken in many states. Many state oil recovery organizations are conducting educational campaigns using posters, displays, and news releases. It seems reasonable to expect that such measures will reduce the waste resulting from ignorance.

However, it seems clear that education about the harmful environmental effects of improper used oil disposal and/or the potential for recycling will not be sufficient to eliminate all used oil waste. For example, one half or more of the DIY oil changers perceive various improper oil disposal practices to be very harmful to the environment. Two out of three have heard about recycling; almost one out of three DIY oil changers considers recycled oil to be better than or just as good as new oil. Almost one-half of the DIY oil changers feel that a "great deal" of energy can be saved by recycling used motor oil. Yet many of these people report disposing of their used oil improperly.

This discrepant behavior may occur because:

(a) DIYs' level of concern about the environment and energy conservation may not be sufficient to motivate their behavior. For example, while their answers to the survey questions indicate an awareness of the consequences of improper disposal, they may not have been thinking about those consequences at the time they changed their oil.

(b) DIYs regard the cost in time and effort of employing proper disposal practices as being too high.

The first of these causes suggests the need for reminder advertising and reinforcement education and information. The second cause requires practical measures to ease the burden of compliance. The results of this survey indicate that such practical measures might indeed be helpful in encouraging proper disposal practices. Thus, more than two-thirds of the DIY oil changers reported that they would "always" save their oil for recycling if it were picked up at their house. Almost as many reported they would "always" save oil for recycling if they had a suitable container for bringing their oil to a recycling center. More than half indicated that the availability of a suitable collection facility at a shopping center or a nearby service station would be sufficient to motivate them.

These results suggest that careful consideration be given to the logistics of these measures. The most appealing of the measures would appear to be making a special container available to DIY oil changers. Employing civic groups as collection agents would also seem to be attractive. However, the incentive costs required to motivate such groups might not be economically possible at current cost levels. A rough calculation of the return from a community of 2,500 households (shown in Exhibit 25) indicates that a civic group would gross only about $268 per month from such an effort even with an incentive as high as 15 cents per quart.

The current activities of state recovery organizations appear to be centered on establishing collection points. These points are located at shopping centers and service stations.

Another approach to easing the pain of saving oil for recycling is to offer individual incentives. However, the results of this survey indicate that incentives would probably have to be greater than 15 cents per quart to have any appreciable effect, and this is not feasible in today's market.

Many of the respondents to this survey had not been exposed to the concept of recycling motor oil. To supplement the information obtained from the DIYs surveyed, an assessment of any past or current (operational) recycle programs should be made. Such an assessment will permit identification of any differences between intentions as they are expressed to an interviewer and actual behavior in response to the opportunity to bring oil in for recycling.

To test the effectiveness of different types of program operation configurations and incentives, prototype recycle programs should be set up on a location-by-location basis. All operational and response data should be documented. Local

response rates should be examined, and DIY interviews should permit an examination and comparison of DIY characteristics and attitudes as they relate to response rates and program operational factors.

A representative series of recycle test programs would provide detailed information regarding behaviors of DIYs when they are actually presented with the opportunity to recycle used motor oil. This information, when coupled with the results of the national DIY survey, would permit a realistic assessment of the costs and benefits of recycle operation alternatives.

Exhibit 25

Community Oil Collection Incentives
(Example)

National Estimates Used as Basis for Community Estimate

DIY total annual quarts of oil drained	1,369 million
Total DIY households	37.4 million
DIY households as a percentage of all households	47%
DIY vehicles per household	2.3
DIY oil changes per year per vehicle	3.6
Quarts of oil drained per oil change	4.4
DIY annual quarts of oil drained per household	36.6

Hypothetical Community Estimate

Total households in community	2,500
Total DIY households (47%)	1,175
Total DIY vehicles	2,703
Total DIY oil changes per year	9,729
DIY oil changes per month	811
DIY quarts of oil drained per year	42,808
DIY oil drained per month	3,567

Value of recycled oil for one month, based on 50% participation (1,784 quarts per month):

Incentive	Total
$.05/quart	$ 89
$.10/quart	$178
$.15/quart	$268

Appendix A

The Survey Sample Composition

Telephone interviews were conducted in November, 1980. Screening interviews were conducted with 4,805 households in the 48 contiguous continental states and the District of Columbia. These households represent a probability sample of U.S. telephone households. Of the households screened, 4,084 households owned, leased, or operated a motor vehicle that was available to any of the licensed drivers in the household on a regular basis. These households are referred to as "vehicle households."

Of the 4,084 vehicle households, 2,251 were households where, during the past 12 months, one or more household members personally changed the motor oil in a motor vehicle owned, operated, or leased by that household. These households are referred to as "do-it-yourself" (DIY) households. There were 1,793 DIY households which completed the DIY questionnaire, as shown on the following page.

Sample Composition

	Households[1]	Vehicle Households[2]	DIY Households[3]	Questionnaires Completed[4]
U.S. Total	4805	4084	2251	1793
Northeast	1135	896	441	339
New England	308	264	129	95
Middle Atlantic	827	632	312	244
North Central	1323	1173	680	561
East North Central	892	797	485	408
West North Central	431	376	195	153
South	1576	1331	724	576
South Atlantic	778	647	314	253
East South Central	344	290	158	122
West South Central	454	394	252	201
West	708	637	371	298
Mountain	217	202	132	107
Pacific	491	435	239	191
Not Classified	63	47	35	19

[1] Probability sample of continental U.S. telephone households.

[2] Households which own, lease, or operate a motor vehicle that is available to any of the licensed drivers in the household on a regular basis.

[3] Households where, during the past 12 months, one or more household members personally changed the motor oil in a motor vehicle owned, operated, or leased by that household. All of these households completed the screener questionnaire.

[4] DIY household members who completed the DIY questionnaire as well as the screener questionnaire.

Appendix B

Statistical Characteristics of Random Digit Telephone Samples Produced by Survey Sampling, Inc.

I. SUMMARY

By utilizing a massive data base, specialized computer programs and classical statistical techniques, Survey Sampling has developed a method by which highly efficient and unbiased samples of telephone numbers can be drawn along recognized geographic boundaries. Well-conducted telephone surveys using these samples can be reliably projected, on a national basis, to some 70 million American households.

The statistical characteristics of these samples can be described by five criteria proposed by Prof. Leslie Kish, a well-known Sampling statistician:

1. The method produces samples in which all telephone households in the geographic sampling frame are given, within the limits of available data, equal probability of selection.

2. The method produces element samples rather than clustered samples.

3. The samples are stratified to all counties in the geographic frame such that the number of telephone households drawn from a county for the sample is proportional to that county's share of telephone households.

4. Samples are drawn systematically from an array of counties and an array of working telephone blocks within each county.

5. The method employs double sampling with the final sample drawn from the county-stratified first phase sample.

A detailed description of the selection process and related data bases are given below.

II. The Universe: 70 Million American Households with Telephones

According to a series of excellent national health surveys conducted by the federal government, by 1976 some 91.6 percent of American households contained telephones. According to the most recent estimates published by SALES & MARKETING MANAGEMENT, there are about 76.9 million households in the nation, so that perhaps 70.4 million homes can be accessed by a telephone survey employing random digit techniques.

If the sampling frame was restricted to households listed in published telephone directories, perhaps 30 percent or more of the telephone households would be excluded from a survey. At present, about 57 million households are listed in directories. However, each year about 18 percent of American households move and when one considers that it may take two or three months to publish and distribute a new directory, it is not surprising that from 12 to 15 percent of the residential numbers in a typical directory are disconnected when called. Thus, directory-based surveys only include some 48 million of the 70 million telephone homes.

If the remaining 22 million telephone households were a random subset of the sampling frame, there would be little need to employ random digit techniques. However, numerous studies have shown that unlisted homes are different: They are younger, more urban, etc. Thus, because of known differences, no serious telephone survey of the population can be based on directory numbers alone.

III. Creation of the Sampling Frame

Before any random sample can be drawn, it is necessary to construct a "frame" -- a set of operations which permits selection of specific elements of the population with known probability. In this case, frame construction consisted of a series of steps to narrow the search for 70 million operating residential phone numbers from a pool of 330 million possibilities to a pool of approximately 125 million. Care was taken to minimize the elimination of actual residential listings while at the same time increasing their probability of selection from .21 to .56 or higher.

A list of about 33,000 area code-exchange combinations currently operative in the United States is maintained by the Long Lines division of AT&T and is updated monthly. However, not all these exchanges are used for residential purposes. Some are devoted to internal telephone company use; others are assigned exclusively to large companies or government agencies.

To eliminate non-residential exchanges from the frame, a special, proprietary data file was developed based on information obtained from Donnelley Marketing, a subsidiary of Dun & Bradstreet. Donnelley regularly acquires all known telephone directories in the United States and enters all listings which appear to be residential. After the names, street addresses and telephone numbers are transferred to computer tapes, they are geographically coded so that the correct mailing post office and zip code are added to each record. In urbanized areas, the address is also related to Census tracts, block groups or enumeration districts. About 35 percent of the addresses located in more rural areas are identified only by town and county. At present, the Donnelley file contains more than 57 million households.

Survey Sampling developed specialized computer programs which performed the following operations on the Donnelley file:

---Added the appropriate area code and time zone to each telephone number.

---Sorted all numbers to area code, exchange, and phone number sequence.

---Tabulated the county(ies) of residence for all the listed residential numbers of each exchange.

---Tabulated which ZIP codes were associated with each exchange and the number of listings in each ZIP.

---Counted the number of listings in each exchange.

---Identified the "working blocks" of each exchange, where a block is a group of 100 contiguous numbers (e.g., 1700-1799) and a working block is one which contains one or more listed residential numbers.

This analysis permitted elimination of 12 percent/4,000 of the AT&T exchanges from the sampling frame. An exchange was eliminated if fewer than ten residential listings were found. This number was chosen to screen out erroneous phone numbers due to key-entry errors. Most eliminated exchanges had no residential listings. In a few instances, Survey Sampling has checked the status of eliminated exchanges with local telephone companies and in each case the exchange was described as "an internal telephone company exchange."

Thus, this step reduced the pool of possible numbers from 330 million to about 293 million and increased the probability of encountering a working residential number from .21 to .24.

Next, non-working "blocks" of numbers were eliminated from working exchanges. Again, a block is considered to be 100 contiguous numbers with each exchange having 100 blocks (e.g., the telephone number 226-7558 is found in the 75th block of exchange 226). Examination of patterns of listed numbers supports the widely-held belief that most telephone companies systematically assign groups of numbers for use rather than randomly select them. This practice has to do with the characteristics of switching equipment in rotary exchanges (and a majority of telephones still rely on rotary rather than electronic switching). A component of this practice involved the reassignment of disconnected numbers to new subscribers so that active numbers are densely compressed in a relatively small number of blocks.

Frequency distributions of block density were tabulated by state. Patterns do vary by state particularly between urban and rural states. The density distribution curves were approximately normal in shape, though skewed to the right towards high density. State modes varied between 55 and 65 percent. That is, the typical listed residential number occurred in blocks in which about 60 of the 100 possible numbers were listed telephone residences. Thus, the chance of encountering a listed household is around 60 percent.

The general pattern of these curves closely resembles one derived from a national random digit telephone survey conducted at the Survey Research Center of the University of Michigan

(Robert M. Groves, "An Empirical Comparison of Two Telephone Sample Designs," Journal of Marketing Research, November, 1978, pp. 622-31). This study estimated national block density of both listed and unlisted residential phones and showed a mode of about .75. The ratio of all telephones to listed phone households is 1.23. Applying this adjustment to .6 (the approximate mode of listed residential density) produces an estimated chance of hitting a phone household of .74.

The close correspondence between the Survey Sampling curves, based on listed residences, and the Groves curve, based on all telephone households, lends empirical support to an important assumption required by the new sampling model:

> The assignment of numbers to households is made independently of their publication status in the directory.

If this is true, then unlisted numbers will tend to be found in the same blocks as listed numbers. Further, blocks heavily used for listed households will also tend to have a higher incidence of unlisted numbers, except for those blocks totally filled with listed numbers.

This assumption squares with common sense. If, for example, telephone companies intentionally segregated unlisted residential numbers in certain blocks, the risk of inadvertent disclosure would be heightened. Also, it would be more complicated and expensive for telephone service personnel to process number assignments in two different ways.

The effect of eliminating non-working blocks is quite important. About 60 percent of the possible blocks have not a single listed residential number. This reduces the pool of possible numbers in working blocks to about 117 million and increases the probability of encountering a telephone household to an estimated .6.

At this point, a cautious statistician might well inquire as to the probability of encountering working residential numbers in the "non-working" blocks. Due to the constant assignment of new numbers and growing populations, it is quite likely that a small number of telephone residences are contained in the non-working blocks. However, it seems reasonable to believe that their number would be relatively small and that their inclusion in a survey would have little chance of altering its results. It would be expensive to include such households, and money spent for that purpose would generally be better spent on other aspects of the survey project.

IV. Method of Stratification

In this model, the sampling frame is accessed in such a way as to produce proportionate stratified systematic random samples from working blocks of exchanges located within specified geographic boundaries. The method of stratification is highly important to the control of bias that might be introduced through improper use of the sampling frame.

The problem is that the incidence of unlisted numbers is quite variable from one area of the country to another. Generally, the use of unlisted numbers is much more an urban phenomenon than a rural one, but great variation is found even among large cities and in certain rural areas. For example, in Minneapolis and St. Paul, 90 percent of residents list their number in the directory, but in nearby Chicago, perhaps 35 percent of the numbers are unpublished. Thus, without adjustment, the sampling frame would tend to under-represent Chicago and over-represent Minneapolis.

To equalize the probability of telephone households being selected anywhere in the country, samples are first systematically stratified to all counties in proportion to each county's share of telephone households in the survey area. To obtain reasonable estimates of telephone households by county, a special data base was developed, beginning with county estimates of telephone incidence measured in the 1970 Census of Population and Housing. Yearly estimates of statewide installation of residential telephones was obtained from the Federal Communication Commission for all states from 1970 through 1977 (the most recent available data). The growth (or, in one or two states, the loss) of installations was calculated as the ratio of 1977 to 1970 installations. These updated estimates were then applied to the current projections of households by county published annually by Sales Management magazine to produce estimates of total telephone households by county.

After a geographic area has been defined as a combination of counties, the total of telephone households is calculated and divided by the desired sample size to produce a sampling interval. The counties are then ordered (normally by alphabetic state and county within state). A random number between one and the sampling interval is generated and a cumulative count of telephone households is calculated. At the point at which the accumulation reaches the random starting point, a specific county is selected. The second point is one interval away from the first point. Counties whose population is greater than the sampling interval of telephone households will be selected repeatedly and counties whose population is less than the sampling interval have some chance of being skipped. In this way, the sample is distributed across all counties in proportion to their share of the total population of telephone homes.

A second level of stratification occurs when a specific working block(s) within a selected county is selected. Two methods of systematic selection are available. In Method A, the total number of working blocks is calculated and that sum is divided by the number of sampling points assigned to the county. This produces a sampling interval in which all blocks have equal chance of being selected. Blocks within a county are ordered in ascending order by exchange and block number within exchange.

From a random start within the first interval, one or more blocks are selected in a systematic fashion. Once a specific block has been selected, two random digits in range 00-99 are generated and added to the block and its exchange to form a complete telephone number. Thus, in Method A, all working blocks are given equal probability of selection regardless of their utilization for listed residential numbers.

Method B offers an optional variation and generally produces noticeably more efficient samples than Method A. In this approach, the sampling interval is calculated by summing the number of listed residential numbers in each working block and dividing that sum by the desired quantity of numbers. Thus, each block's chance of being selected is proportional to its share of listed homes so that more active blocks have a greater probability of selection. Method B has proven markedly more efficient than Method A, adding typically ten points to the chance of encountering a working residential number. Although exhaustive tests of possible bias that might be introduced by Method B have not been completed, tentative evidence does not suggest that bias is present.

The methods of stratification described in this section have been developed primarily to equalize the probability of selection for all telephone homes in the United States. To the extent that this has been successful, the resulting samples resemble samples in which all population elements have equal probability of selection. Such samples have the advantage of being self-weighting (assuming the sample is expertly executed as the survey proceeds).

These samples are also element samples in the extreme, since careful steps are followed to avoid clustering of sampling points in any fashion. The use of clustering, though usually necessary when personal interviewing is required in the field, almost always has adverse effects on the statistical efficiency of a survey. For example, Groves reports that the use of 9-element

clusters in a national telephone survey increased error estimates from 17 to 40 percent. Stated another way, this modest use of clustering (employing the well-known Waksberg method) would require a sample 37 to 69 percent larger than a simple element sample.

Finally, upon selection, samples are ordinarily ordered by time zone, area code and exchange and then systematically divided into a number of subsamples or replicates. When administered in replicate order, it is a simple matter to control the geographic distribution of a telephone survey as interviewing proceeds.

write on top of each questionnaire

REP.: 1
PAGE: 17

RESEARCH FIRM: Market Facts Inc.

STUDY NAME: Name Association (A115)

JOB: 00340.00

DATE: 04-MAR-90

AREA: Continental U.S.

Survey Sampling, Inc.
155 E. POST ROAD
WESTPORT, CONNECTICUT 06880
(203) 226-7558

TYPE: RANDOM B

time zone →

	1ST ATTEMPT DATE	1ST ATTEMPT TIME	RESULTS	2ND ATTEMPT DATE	2ND ATTEMPT TIME	RESULTS	3RD ATTEMPT DATE	3RD ATTEMPT TIME	RESULTS	4TH ATTEMPT DATE	4TH ATTEMPT TIME	RESULTS	DONE
P(209)673-1801	3/7 Ex	11:05 A P	CB	/	: A P		/	: A P		/	: A P		( )
P(209)722-3017	3/7 Ex	11:07 A P	NA	3/7	11:31 A P	BZ	3/7	11:45 A P	C	/	: A P		(X)
P(209)951-5434	3/7 Ex	12:01 A P	C	/	: A P		/	: A P		/	: A P		(X)
P(213)380-2480	/	: A P		/	: A P		/	: A P		/	: A P		( )
P(213)633-2043	/	: A P		/	: A P		/	: A P		/	: A P		( )
P(408)225-3040	/	: A P		/	: A P		/	: A P		/	: A P		( )
P(408)266-1705	/	: A P		/	: A P		/	: A P		/	: A P		( )
P(408)394-6135	/	: A P		/	: A P		/	: A P		/	: A P		( )
P(408)629-6209	/	: A P		/	: A P		/	: A P		/	: A P		( )
P(415)254-0719	/	: A P		/	: A P		/	: A P		/	: A P		( )
P(415)355-2358	/	: A P		/	: A P		/	: A P		/	: A P		( )
P(415)447-7032	/	: A P		/	: A P		/	: A P		/	: A P		( )
P(415)524-4412	/	: A P		/	: A P		/	: A P		/	: A P		( )
P(415)584-1403	/	: A P		/	: A P		/	: A P		/	: A P		( )
P(415)652-9123	/	: A P		/	: A P		/	: A P		/	: A P		( )
P(415)687-5930	/	: A P		/	: A P		/	: A P		/	: A P		( )
P(415)826-4314	/	: A P		/	: A P		/	: A P		/	: A P		( )
P(415)873-0755	/	: A P		/	: A P		/	: A P		/	: A P		( )
P(415)948-6562	/	: A P		/	: A P		/	: A P		/	: A P		( )
P(503)256-4526	/	: A P		/	:		/	: A P		/	: A P		( )
P(503)367-4984	/	: A P		/	:		/	: A P		/	: A P		( )
P(503)535-6800	/	: A P		/	:		/	: A P		/	: A P		( )
P(503)640-4255	/	: A P		/	:		/	: A P		/	: A P		( )
P(503)666-2115	/	: A P		/	: A P		/	: A P		/	: A P		( )
P(503)753-5279	/	: A P		/	: A P		/	: A P		/	: A P		( )

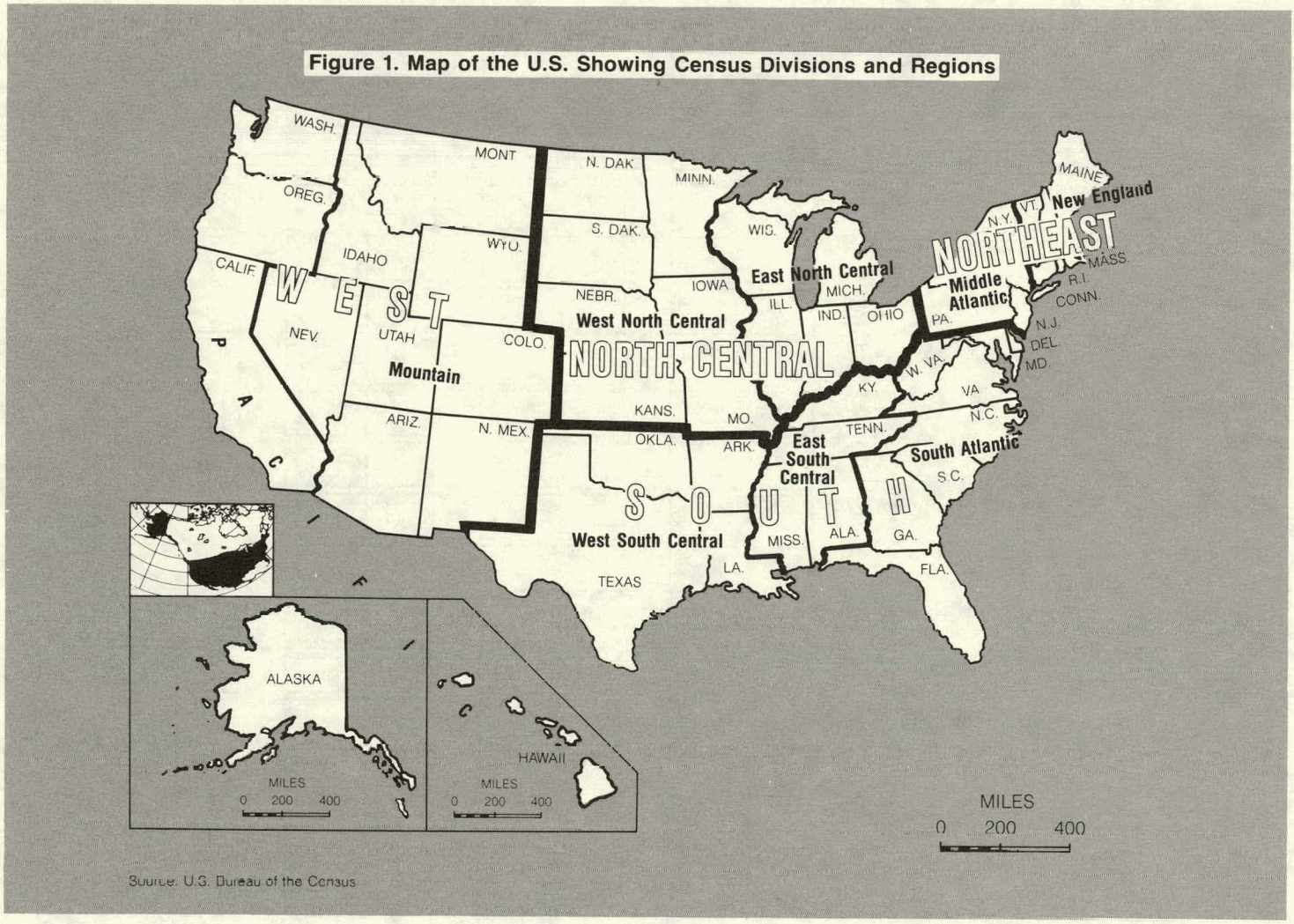
RESULT CODES:

CM -COMPLETED	DS -DISCONNECTED	CB -CALLBACK
NA -NO ANSWER	BG -BUSINESS/GVT.	TM -TERMINATED
BZ -BUSY SGN.	DL -DEAF/LANGUAGE	R -REFUSAL

INTERVIEWER:

Appendix C

Census Divisions and Regions



Note: Alaska and Hawaii are not covered in the study.

Appendix D

Questionnaires

MARKET FACTS, INC. 100 SOUTH WACKER DRIVE CHICAGO, ILLINOIS 60606

JOB NO. 6316
OMB# 038-F80-005
EXPIRES 12/31/80
Card 1
ID# _____ (1-4)

OIL CHANGE STUDY (5 open)

- Screener -

Market Facts' Repr.: _____

Field Service Organization: NTC

Date: _____ Time Interview Began: _____ AM/PM

Telephone Number: _____ (16-18)

6 8
3 1 0 0 0 (9-14 open)
1 (15)

(ASK TO SPEAK TO SOMEONE IN THE HOUSEHOLD 16 YEARS OF AGE OR OLDER)

Hello, I'm _____ of Market Facts Incorporated, an independent research firm. We're conducting a survey for the United States Department of Energy. It's about motor oil changing and I would like to ask you a few questions. This study is being conducted under Public Laws 94-163 and 95-91. Your participation in the study is entirely voluntary, and your responses will remain anonymous.

(19 open)

1. Does this household own, lease, or operate any motor vehicle that is available to any of the licensed drivers in the household on a regular basis? By motor vehicle, I mean any passenger automobile, van or recreational vechicle, a pickup or other truck, or a motorcycle. (DO NOT READ)

   Yes ..... 1 No ..... 2 → (SKIP TO QU. 4a) (20)

2. How many motor vehicles are owned, leased or operated by the members of this household?

   No. of vehicles _____ (WRITE IN EXACT NUMBER) (21-22)

3. What is the make and year model of (this/your most recent year model) vehicle?

RECORD BELOW. IF MORE THAN ONE MOTOR VEHICLE IN HOUSEHOLD, ASK MAKE AND YEAR OF EACH VEHICLE UNTIL YOU HAVE ACCOUNTED FOR THE NUMBER OF VEHICLES REPORTED IN QU. 2. RECORD IN FIRST COLUMN BELOW. THEN ASK QU. 3a-f FOR EACH LISTED VEHICLE AND RECORD ANSWERS BELOW.

a. Is this (make/year) a passenger car, a pickup truck, a van or some other type of vehicle?

b. How many cylinders does it have?

IN QU. 3c-f, USE PARENTHESES IF VEHICLE IN HOUSEHOLD LESS THAN ONE YEAR.

c. About how many thousands of miles per year is (do you expect) this vehicle (to be) driven?

d. About how many times per year do you (expect to) have a complete oil change in this vehicle?

e. In addition to any complete oil changes, about how many quarts of motor oil are (do you expect to be) added to this vehicle per year?

f. What is the approximate mileage in thousands of miles, on this vehicle? (The odometer reading).

Veh. (23)	Make/Year	Pass Car	Trk/ Van	Oth	# Cyl.	# Miles Per Year	Changes Per Year	# QT. Oil Added	Mileage	
1.	_____ 19 (24-25)	1	2	3 (26)	(37-38)					(27-36)
2.	_____ 19 (37-38)	1	2	3 (39)	(50-51)					(40-49)
3.	_____ 19 (50-51)	1	2	3 (52)	(63-64)					(53-62)
4.	_____ 19 (63-64)	1	2	3 (65)						(66-75)

79 0 1 80
Card 2
Dup 1-4

5.	_____ 19 (5-6)	1	2	3 (7)						(8-17)
6.	_____ 19 (18-19)	1	2	3 (20)						(21-30)

(31-36 open)

4a. Which of the following best describes the place in which you live?

Inside the limits of a major city. 1
In the suburban area of a major city 2 (37)
In a small city or town that is not near a major city . . . . . 3 → (SKIP TO QU. 4c)
In a rural area. . . . . 4 → (SKIP TO QU. 4c)

4b. Is the size of this major city

More than a million people 1
Between half a million and one million people. . . 2 (38)
Or less than half a million people 3

4c. May I have your Zip Code ☐☐☐☐☐ (39-43)

IF NO TO QU. 1 SKIP TO QUESTION 8

5. During the past 12 months, have you, or has any member of your household, personally changed the motor oil in the motor vehicle (any of the motor vehicles) owned, operated or leased by your household? By changing the motor oil, I mean completely draining the oil from the engine and putting in new oil, not just adding oil. (DO NOT READ)

Yes . . . . . 1 → (SKIP TO QU. 7a)
No. . . . . 2 → (SKIP TO QU. 8) (44)
Don't know. . . . . 3 →

ASK TO SPEAK TO THE PERSON IN THE HOUSEHOLD WHO MIGHT KNOW WHETHER ANYONE IN THE HOUSEHOLD PERSONALLY CHANGED MOTOR OIL IN A HOUSEHOLD VEHICLE. WHEN YOU REACH THAT PERSON, GO TO QU. 6. IF SUCH A PERSON IS NOT HOME, ASK HIS/HER NAME (OR RELATION TO RESPONDENT) AND WHEN YOU MIGHT FIND HIM/HER AT HOME. WHEN YOU REACH HIM/HER, ASK QU. 6.

Knowledgeable Person's Name:_____

	Date/Time Called Back	Result of Call
1	_____	_____
2	_____	_____
3	_____	_____

5. (RE-INTRODUCE YOURSELF AND ASK:) During the past 12 months have you, or has any member of your household, personally changed the motor oil in the motor vehicle (any of the motor vehicles) owned, operated or leased by your household? By changing the motor oil, I mean completely draining the oil from the engine and putting in new oil, not just adding oil. (DO NOT READ)

Yes 1
No. . . . . 2 → (SKIP TO QU. 8) (45)

ASK TO SPEAK TO A PERSON IN THE HOUSEHOLD WHO MIGHT KNOW WHETHER ANYONE IN THE HOUSEHOLD PERSONALLY CHANGED MOTOR OIL IN A HOUSEHOLD VEHICLE. WHEN YOU REACH THAT PERSON, ASK QU. 7. IF SUCH A PERSON IS NOT HOME, ASK HIS/HER NAME OR RELATION TO RESPONDENT. AND WHEN YOU MIGHT FIND HIM/HER AT HOME. WHEN YOU REACH HIM/HER, ASK QU. 7.

Knowledgeable Person's Name:_____

Date/Time Called Back	Result of Call	(49-50 open)
_____	_____	
_____	_____	
_____	_____	

7. (RE-INTRODUCE YOURSELF AND ASK:) During the past 12 months have you or any member of your household, personally changed the motor oil in the motor vehicle (any of the motor vehicles) owned, operated or leased by the household? By changing the motor oil, I mean completely draining the oil from the engine and putting in new oil, not just adding oil.

Yes 1
No . . . . . 2 ⟶ (SKIP TO QU. 8c) (51)

8a. Did you personally change the motor oil in (the motor vehicle/any of the motor vehicles) owned, operated or leased by your household?

Yes . . . . 1 ⟶ (GO TO QU. 12 OIL CHANGE QUESTIONNAIRE. DO NOT READ INTRODUCTION.) (52)
No 2

8b. What is the name of the person who actually changed the motor oil in this vehicle? (One of these vehicles).

(WRITE-IN)_____ (53-59 open)
_____
_____

ASK TO SPEAK TO THAT PERSON. IF MORE THAN ONE QUALIFIED HOUSEHOLD MEMBER IS AT HOME, ASK TO SPEAK WITH THE FIRST PERSON ON THE LIST IN QU. 8b. IF NOT AT HOME, ASK TO SPEAK WITH SECOND PERSON ON LIST, ETC. GO TO INTRODUCTION TO QU. 9 OF OIL CHANGE SCREENER. IF NO QUALIFIED PERSONS ARE AT HOME, ASK:

When is a good time to call to speak with (PERSON FROM QU. 8b WHO BEST QUALIFIES)?

CALLBACK (RECORD:) Person's Name:_____

Time:_____AM/PM Date:_____

8c. VERIFY: Telephone Number ( ) _____

THANK RESPONDENT AND TERMINATE

(IF TALKING WITH NEW RESPONDENT READ INTRODUCTION)

Hello, I'm_____of Market Facts, Incorporated, an independent research firm. We're conducting a survey for the United States Department of Emergy. It's about motor oil changing and I would like to ask you a few questions. This study is being conducted under Public Laws 94-163 and 95-91. Your participation in the study is entirely voluntary, and your responses will remain anonymous.

9. I understand that you have personally changed the motor oil in one of your household's vehicles (your household's vehicle). By changing the oil, I mean a complete motor oil change - not just adding oil. Have you personally changed the oil?

Yes. . . . . 1 ⟶ (SKIP TO QU. 12)
No 2 (60)

10. Is there anyone else at home that has personally changed the motor oil in (one of your household's vehicles/your household' vehicle)?

Yes. . . . . 1 ⟶ (ASK TO SPEAK TO THAT PERSON. IF THAT PERSON IS HOME, RE-INTRODUCE YOURSELF AND TO QU. 12 IF PERSON IS NOT HOME, GO TO QU. 11)
No . . . . . 2 ⟶ (SKIP TO QU. 11b) (61)

11. When is a good time for me to call back to speak with another household memember who has personally changed the motor oil in your household's vehicle (any of your household's vehicles)?

CALLBACK (RECORD:) Person's Name:_____

Time:_____AM/PM DATE:_____

11b. VERIFY: Telephone Number ( ) _____

THANK RESPONDENT AND TERMINATE

(62-78 open)

79 [0][3] 80

MARKET FACTS, INC., 100 SOUTH WACKER DRIVE, CHICAGO, ILLINOIS 60606 OMB#038-F80-005
Job No. 6316 Expires 12/31/80

OIL CHANGE STUDY Card 4
Dup 1-4

- Questionnaire -

(INTERVIEWER RECORD TIME:_____)

(IF TALKING WITH NEW RESPONDENT READ INTRODUCTION)

Hello, I'm _____ of Market Facts, Incorporated, an independent research firm. We're conducting a survey for the United States Department of Energy. It's about motor oil changing and I would like to ask you a few questions. This study is being conducted under Public Laws 94-163 and 95-91. Your participation in the study is entirely voluntary, and your responses will remain anonymous.

(5-8 open)

12a. Please think about the last time you changed the motor oil in any of the motor vehicles in your household. How long ago was that?

(WRITE IN:) _____ Months
_____ Weeks 9 [ ][ ][ ] 11

IF 12 MONTHS (52 WEEKS) OR LESS, SKIP TO QU. 13.

IF MORE THAN 12 MONTHS OR 52 WEEKS, ASK TO SPEAK TO ANOTHER PERSON IN THE HOUSEHOLD, IF ANY, WHO MIGHT HAVE CHANGED THE OIL MORE RECENTLY. IF PERSON IS AVAILABLE, RE-INTRODUCE YOURSELF AND ASK QU. 12b. IF NO SUCH PERSON IS AVAILABLE, NOW OR LATER, THANK RESPONDENT AND TERMINATE.

12b. Please think about the last time you changed the motor oil in any of the motor vehicles in your household. How long ago was that?

(WRITE IN:) _____ Months
_____ Weeks 12 [ ][ ][ ] 14

(IF MORE THAN 12 MONTHS OR 52 WEEKS, THANK RESPONDENT AND TERMINATE.)

13. What is the make and model year of the vehicle(s) for which you made this recent oil change?

Make (Ford, Chevy, etc.)	Model Year	
_____	19[ ][ ]	(15-16)
_____	19[ ][ ]	(17-18)

CHECK VEHICLE(S) AGAINST SCREENER LIST QUESTION 3. IF THE VEHICLE(S) ABOVE ARE NOT LISTED, ASK SCREENER QUESTION 3 AND ADD VEHICLE(S) TO LIST. IF MORE THAN ONE VEHICLE HAD OIL CHANGE AT THE SAME TIME, PROBE: WHICH VEHICLE DID YOU FINISH LAST? THIS VEHICLE IS CONSIDERED THE MOST RECENT ONE. CIRCLE THAT VEHICLE'S NUMBER IN SCREENER QUESTION 3, THEN CONTINUE.

(19-20 open)

14a. Did you make a record of the oil change? (DO NOT READ)

Yes.....1
No.....2 ⟶ (SKIP TO QU. 15) (21)

14b. What kind of record did you make of the oil change? (DO NOT READ)

Recorded in notebook..... 1
Recorded on a vehicle door sticker..... 2 (22)
Other (DESCRIBE:) _____

_____

14c. Did you record the date of the oil change? (DO NOT READ)

Yes..... 1
No..... 2 (23)

14d. Did you record the mileage of the motor vehicle when you changed the oil? (DO NOT READ)

Yes..... 1
No..... 2 (24)

15. Did you change the oil filter when you made the most recent oil change? (DO NOT READ)

Yes..... 1
No..... 2 (25)

16. Still thinking about the most recent oil change, where was the car parked when you made this oil change? (DO NOT READ LIST)

In a garage..... 1
In a driveway..... 2
On the street..... 3
In a carport..... 4 (26
On a lawn/yard..... 5
At a service or gas station, a commercial garage, a do-it-yourself center..... 6
At a friend's neighbor's ..... (Probe: Where was the car parked at your friend's? RECORD ABOVE)
Other (DESCRIBE:)_____

17a. Approximately how many quarts of used oil would you say you drained from this vehicle? (RECORD TO NEAREST 1/2 QUART)

(WRITE IN:) _____ quarts 27 [ ][ ] 28

17b. When you drained the oil from this vehicle, what kind of container did you drain the oil into? (RECORD UNDER QU. 17b BELOW)

17c. After the motor oil was drained from this vehicle, what kind of container did you use to dispose of the used oil? (RECORD UNDER QU. 17c BELOW) (DO NOT READ)

	Qu. 17b (29)		Qu. 17c (30)	
None.....	1	→ (SKIP TO QU. 18)		
Empty milk jug.....	2		2	
Empty oil can.....	3		3	
Empty bottle/jar/can	4		4	(31-32 open)
Plastic bag.....	5		5	
Pan, pot, open container	6		6	
Other (DESCRIBE:).....	_____		_____	

18. What did you do with the used motor oil that you drained from the vehicle? (DO NOT READ)

Put in trash/garbage to be collected.....1-

Poured on gravel driveway/road.....2-

Poured down sink.....3-

Poured down toilet.....4-

Poured into storm sewer.....5-

Dumped in backyard.....6-

Dumped in woods/vacant lot.....7-

Took to public dump/landfill.....8-

Took to service station and put in used oil drum.....9-

Used on machinery (as lubricant/protective measure for machinery).....-1

Added to home heating oil.....-2

Used as undercoating on motor vehicle.....-3

Used as weed killer.....-4

Other (DESCRIVE:)_____

_____

(33-34)

19. About how many quarts of new motor oil did you put into the vehicle? (RECORD TO NEAREST 1/2 QUART)

(WRITE IN:) _____ quarts (35)

(36 open)

20. What kind of oil did you use in this last change? Was it

A multigrade oil such as low-40, 10-20-30, or 10-30 1

A synthetic oil such as Mobil One, Uniflow, or Arco Graphite. . 2 (37)

Or a single grade oil like 20 or 30 weight. 3

21. In what size of container did you buy the motor oil?
(DO NOT READ)

Quart..... 1
Two-quart..... 2
Four-quart..... 3 (38)
Five-quart..... 4
Drum..... 5
Case of quarts..... 6
Other (SPECIFY:)_____

22. Was this most recent change the first oil change made on this particular vehicle or had the oil in this vehicle been changed before? (DO NOT READ)

First time.....1 ⟶ (SKIP TO QU. 30) (39)

Changed before.....2

23. Still thinking about this motor vehicle, about how many months elapsed between the last oil change and the oil change before that one?

(WRITE IN:) _____ months (40-41)

(IF MORE THAN 12 MONTHS, SKIP TO QU. 31)

24. About how many miles was the vehicle driven between the most recent oil change and the oil change before that?

(WRITE IN): _____ miles (42-46)

25. Thinking about the second most recent oil change on this vehicle, who was the individual who changed the oil? (DO NOT READ)

Yourself..... 1
Another household member..... 2
A friend/neighbor..... 3
A service station attendant..... 4 (47)
A garage attendant or mechanic..... 5
A car dealer..... 6
Other (SPECIFY:)

_____

26. Thinking back to that second most recent motor oil change, about how much, if any, motor oil was added between that change and the previous complete oil change?

(WRITE IN:) _____ quarts (48)

(IF NO OIL ADDED, SKIP TO QU. 28)

(49 open)

27. Who added the oil between the complete oil changes? (PROBE: Anyone else? RECORD ALL REPLIES)

Yourself..... 1
Another household member..... 2
A friend/neighbor..... 3
A service station attendant..... 4 (50)
A garage attendant or mechanic..... 5
A car dealer..... 6
Other (SPECIFY:)

_____

28. Can you tell me approximately how many miles this motor vehicle is usually driven between oil changes?

(WRITE IN:) _____ miles (51-55)

29. I'd also like to know how often the motor oil is changed in this vehicle. That is, on the average, about how many months does this vehicle go between oil changes?

(WRITE IN:) _____ months (56-57)

30. As far as you know, do you, or does anyone else in this household, personally change the motor oil in any other motor vehicle owned, operated or leased by your household?

Yes..... 1
(58)
No..... 2 → (SKIP TO QU. 32)

31. For which of the other vehicles in the household does anyone personally change the oil? Did they change the oil for the _____? (READ YEAR/MAKE FROM SCREENER QU. 3. REPEAT FOR EACH VEHICLE LISTED IN SCREENER QU. 3 EXCEPT THE VEHICLE NUMBER THAT IS CIRCLED)

Vehicle #	Personal Change Yes	No	
1	1	2	(59)
2	1	2	(60)
3	1	2	(61)
4	1	2	(62)
5	1	2	(63)
6	1	2	(64)

32. About how long have you been doing your own oil changes? (DO NOT READ)

Less than one year . . . 1
1 - 3 years 2
4 - 5 years 3
6 - 8 years 4 (65)
9 or more years 5

(IF NUMBER OF YEARS CANNOT BE DETERMINED BY THEIR RESPONSE, PROBE: How many years would you say that is?)

33. Why would you say you started doing your own oil changes? (DO NOT READ. PROBE: Any other reason?)

Difficulty in finding a service station..... 1
It costs less to change my own oil..... 2
Service stations cannot be trusted to actually change the oil... 3 (66)
It saves time..... 4
It's more convenient..... 5
I've always done my own oil changes..... 6
Other (SPECIFY) _____

34. Was there anytime in the past where you drove more miles or fewer miles between oil changes than you do now? (67 open)

Yes..... 1
No..... 2 → (SKIP TO QU. 38) (68)

35. Compared to that time, are you now driving more miles between oil changes or are you now driving fewer miles between oil changes? (DO NOT READ)

More miles now..... 1
Fewer miles now..... 2 → (SKIP TO QU. 37) (69)
Both more and fewer miles..... 3

36. Why are you now driving more miles between oil changes? (DO NOT READ)

Now driving a newer car (fewer miles on it)..... 1
Now driving an older car (more miles on it)..... 2
Present car requires less oil changing according to manufacturer's recommendation..... 3 → (SKIP TO QU. 38) (70)
Now using a different grade or brand of oil..... 4
Oil is more expensive..... 5
Other (DESCRIBE)..... .....

37. Why are you now driving fewer miles between oil changes? (DO NOT READ)

Now driving a newer car (fewer miles on it)..... 1
Now driving an older car (more miles on it) 2
Present car requires more oil changing according to manufacturer's recommendation..... 3 (71)
Now using a different grade or brand of oil..... 4
Other (DESCRIBE)_____

38. Now I'd like to ask you some general questions about how you buy motor oil. Generally speaking, how much motor oil would you say you buy in a year to personally add to or completely change the motor oil in your household's vehicles? (WRITE IN TO THE NEAREST QUART) (72 open)

(WRITE IN:) _____ quarts (73-74)

39. When do you usually buy motor oil? (DO NOT READ. PROBE: Any other time?)

When motor oil is on sale 1
When it's time to change the oil 2 (75)
When I happen to see it in the store ..... 3 (76-78 open)
Other (SPECIFY): _____ 79 | 0 | 4 | 80
_____ Card 5
Dup 1-4
(5 open)

40. About how many quarts of motor oil do you generally buy at one time?

(WRITE IN:) _____ quarts (6-7)

41. What container size do you usually buy?

Quart 1
Two-quart 2
Four-quart/gallon 3
Five-quart 4 (8)
Drum 5
Other (SPECIFY:)

_____

42. In which one of the following places do you most often buy motor oil? (READ LIST. RECORD ONLY ONE ANSWER.)

Drug store 1
Supermarket 2
Department or discount store 3
Automotive parts or supply store 4 (9)
Tire store 5
or a gasoline station 6
Other _____ (WRITE IN)

(10 open)

43. Some ways of disposing of used motor oil may harm the environment less than others. I'm going to describe several disposal methods and I would like you to tell me whether you think each method is very harmful, somewhat harmful, or at all harmful.

START AT "X" AND READ ALL ITEMS GOING DOWN THE LIST AND THEN CONTINUE WITH THOSE AT THE TOP OF THE LIST UNTILL YOU REACH THE STARTING POINT. READ CATEGORIES (VERY HARMFUL, SOMEWHAT HARMFUL, OR NOT AT ALL HARMFUL FOR EACH ITEM UNTIL THE RESPONDENT IS FAMILIAR WITH THEM.

	Way of Disposal	Very Harmful	Somewhat Harmful	Not at all Harmful	
☐	Pouring used motor oil on the ground in the back yard, a vacant lot or in the woods	1	2	3	(11)
☐	Pouring used motor oil down a storm sewer	1	2	3	(12)
☐	Putting used motor oil in a closed container in the household trash	1	2	3	(13)
☐	Burying the used motor oil in the ground	1	2	3	(14)
☐	Using it to oil down a dirt or asphalt road or driveway	1	2	3	(15)
☐	Using it as fuel for an oil furnace	1	2	3	(16)
☐	Using it as a weed killer	1	2	3	(17)
☐	Using it as a protective coating or lubricant for tools or machinery	1	2	3	(18)

44a. It is possible to recycle used motor oil by cleaning it through a chemical refining process. Have you seen or heard anything about recycled motor oil? (DO NOT READ)

Yes 1

No 2 (19)

44b. Compared to new motor oil, how good do you think that recycled motor oil would be for use in your car.

Better than new oil..... 1

Just as good as new oil 2

Nearly as good as new oil 3 (20)

or Not at all as good as new oil 4

(DO NOT READ) Can't say/Don't know 5

45. How much energy do you think can be saved by recycling used motor oil? Would you say...

A great deal 1

A moderate amount 2

Not very much 3 (21)

or, An insignificant amount 4

(22 open)

[4] (23)

46. (READ STATEMENT B)

Statement B: It is felt that if used motor oil is collected and recycled, environmental pollution would be substantially reduced.

Suppose you could take your used motor oil to some convenient place such as a nearby service station, shopping center, school or church for recycling or other proper disposal. How often would you bring in your used oil for recycling instead of disposing of it yourself. Would you (READ RESPONSES)

Always bring it in 1
Usually bring it in 2
Sometimes bring it in 3
or Never bring it in? 4 (24)

47. Now I'd like to ask you a few questions about saving or collecting used motor oil for recycling. _____ (READ ITEM) would you always, usually, sometimes or never save the used oil for recycling? (ASK FOR ALL ITEMS)

(25-26 open)

	Always	Usually	Sometimes	Never	
If you were paid 15 cents for every quart of used oil you recycled	1	2	3	4	(27)
If you could take the used oil to the place where you shop	1	2	3	4	(28)
If a service station near you would take the used oil	1	2	3	4	(29)
If the used oil could be picked up at your house by the town or city or a civic group like the Scouts	1	2	3	4	(30)
If the place where you buy the motor oil had a recycling collection center	1	2	3	4	(31)
If you had a special container so that the oil wouldn't spill when you took it to the recycling center	1	2	3	4	(32)

(33 open)

Finally, I would like to ask a few questions so that we can group your answers with those of others. Remember that the information you give us will not be connected with your name.

48. What type of dwelling unit do you live in? (DO NOT READ)

Apartment	1	
Single family house	2	
Duplex	3	(34)
Townhouse	4	
Mobile home	5	
Other (SPECIFY): _____		

49. What was the last grade of school you completed? (DO NOT READ)

Completed grade school or less (8 years or less)	1	
Some high school, not completed (9-11 years)	2	
Completed high school (12 years)	3	(35)
Some college, not completed (13-15 years)	4	
Completed college (16 years)	5	
Post graduate work started or completed (17 or more years)	6	
Other response _____		

50. Which of these describes your employment status?

Full time	1	
Part time	2	
Retired	3	(36)
Student	4	
Full-time homemaker	5	
Unemployed	6	

51. May I please have your age as of your last birthday? (DO NOT READ)

Under 25	1	
25 - 34	2	
35 - 44	3	(37)
45 - 54	4	
55 - 64	5	
65 or older	6	

52. Was your total household income in 1979, from all sources, under or over $15,000?

Exactly $15,000 . . . . . 1 → (SKIP TO QU. 53)

Under $15,000 ☐ Was it under or over $10,000?

Under $10,000 . . . 2

Over $10,000 . . . 3 → (SKIP TO QU. 53)

Exactly $10,000 . . 4 (38)

Over $15,000 ☐ Was it under or over $25,000?

Under $25,000 . . . 5

Over $25,000 . . . 6

Exactly $25,000 . . 7

53. (INTERVIEWER RECORD SEX:)

Male 1 (39)

Female 2

Finally, may I please have your name, zip code and telephone number? My supervisor may wish to verify that I conducted this interview.

54. Name _____ Zip Code _____
(Do not ask address)

Telephone Number: ( ) _____
AREA CODE NUMBER

Time Interview Ended: _____ AM/PM

(40-78 open)

79 [0][5] 80

Appendix E

Supplementary Tabulations

Supplementary Tabulations (continued)

U.S. Households by Census Division,
Availability of Vehicle, and DIY Status
(in millions)

	Households[2]	Vehicle Households[3]	DIY Households[3]
U.S. Total[1]	79.6	67.9	37.4
Northeast	17.6	14.0	6.9
New England	4.4	3.8	1.9
Middle Atlantic	13.4	10.2	5.0
North Central	20.9	18.5	10.9
East North Central	14.6	13.1	8.0
West South Central	6.3	5.4	2.8
South	25.7	21.7	11.9
South Atlantic	12.8	10.7	5.2
East South Central	4.9	4.1	2.3
West South Central	8.0	6.9	4.4
West	15.2	13.6	7.8
Mountain	3.8	3.6	2.3
Pacific	11.4	10.0	5.5

[1] The 48 contiguous continental states and the District of Columbia.

[2] U.S. Statistical Abstract, 1979, p.784. Figures projected (from 1977) to 1980.

[3] Market Facts survey, screening questionnaire. Projection from U.S. Census 1977 estimate (U.S. Statistical Abstract, 1979, p.650) yields 67.5 million vehicle households.

Total Annual Quarts of
Motor Oil Drained, per Vehicle,
for Do-It-Yourselfers

Northeast	15.7
New England	17.1
Middle Atlantic	15.2
North Central	16.1
East North Central	15.4
West North Central	17.8
South	15.9
South Atlantic	14.7
East South Central	15.7
West South Central	17.4
West	16.9
Mountain	14.9
Pacific	17.8

Source: 17a

Type of Container Used
for Draining Oil
from Vehicle

	(%)
Pan, pot, open container	72
Empty bottle/jar/can	6
Empty oil can	5
Plastic bag	5
Empty milk jug	4
Barrel/large can/tank	4
None	3
Other	1
Base	(1790)

Source: Question 17D

Type of Container Used
for Disposal of Used Oil

	(%)
Pan, pot, open container	50
Empty milk jug	13
Empty bottle/jar/can	12
Barrel/large can/tank	11
Plastic bag	6
Empty oil can	6
Base	(1728)

Source: Question 17C

Kind of Oil Used for Last Change

	(%)
Multigrade	80
Single grade	14
Synthetic	6
Base	(1787)

Source: Question 20

Question 22: Was this most recent change the first oil change made on this particular vehicle or had the oil in this vehicle been changed before?

	(%)
First time	9
Changed before	91
Base	(1788)

Question 25: Thinking about the second most recent oil change on this vehicle, who was the individual who changed the oil?

	(%)
Yourself	86
Another household member	6
Service station attendant	4
A garage attendant or mechanic	2
Car dealer	1
Friend or neighbor	1
Base	(1534)

Question 27: Who added the oil between the complete oil changes?

	(%)
Yourself	91
Another household member	6
A service station attendant	4
Garage attendant or mechanic	1
Base	(883)

Question 30: As for as you know, do you, or does anyone else in this household personally change the motor oil in any other motor vehicle owned, operated or leased by your household?

	(%)
Yes	34
No	66
Base	(1791)

Question 32: About how long have you been doing your own oil changes?

	(%)
Less than one year	3
1 to 3 years	11
4 to 5 years	10
6 to 8 years	9
9 or more years	67
Base	(1792)

Question 33: Why would you say you started doing your own oil changes?

	(%)
It costs less to change my own oil	73
I've always done my own oil changes	12
It's more convenient	12
To be sure it is done right/better	8
Service stations cannot be trusted to actually change the oil	8
I enjoy/get satisfaction out of it	5
It saves time	5
I know how to do it/it is easy	5
Used to be or is now a mechanic	4
To know quality oil and/or filter is used	2
Something to do/have time for it	1
Other	4
Base	(1786)

Question 39: When do you usually buy motor oil?

	(%)
When it's time to change the oil	51
When motor oil is on sale	45
When I run out/run low	5
When I happen to see it in the store	3
When personal stock runs low	2
In spring	2
In fall	2
In summer	1
In winter	1
Base	(1776)

Oil Change Practices
(for most recent oil change)

Question 14A: Did you make a record of the oil change?

Yes	58%
No	42%
Base	(1791)

Question 14B: What kind of record did you make of the oil change?

	(%)
Recorded in notebook	45
Recorded on vehicle door sticker	38
Recorded on vehicle other than door sticker	7
Maintenance record/owner or driver's manual	4
Loose paper record	6
Other	3
Base	(1006)

Question 14C: Did you record the date of the oil change?

Yes	84%
No	16%
Base	(1015)

Question 14D: Did you record the mileage of the motor vehicle when you changed the oil?

Yes	94%
No	6%
Base	(1026)

Question 15: Did you change the oil filter when you made the most recent oil change?

Yes	92%
No	8%
Base	(1790)

Location of Car for Last Oil Change

Driveway	43
Garage	25
Lawn/yard	16
Service or gas station, a commercial garage, a do-it-yourself center	6
Street	6
Carport	2
Parking lot	1
Other	2
Base	(1791)

Source: Question 16

Changes in Miles Driven between Oil Changes

Question 34: Was there anytime in the past where you drove more miles or fewer miles between oil changes than you do now?

Yes	44%
No	56%
Base	(1767)

Question 35: Compared to that time, are you now driving more miles between oil changes or are you now driving fewer miles between oil changes?

	(%)
More miles now	36
Fewer miles now	55
Both more and fewer miles now	9
Base	(774)

Reasons for Driving More Miles
between Oil Changes

	(%)
Present car requires less oil changing according to manufacturer's recommendation	19
Oil is more expensive	18
Now using a different grade or brand of oil	17
No time to do it/forgot to/too lazy	15
Driving more miles	10
Now driving a newer car, fewer miles on it	6
Now driving an older car, more miles on it	6
Other	16
Base	(272)

Source: Question 36

Reasons for Driving Fewer Miles
between Oil Changes

	(%)
Better for car	25
Drive less	25
Cost of gas/save gas	12
Now driving an older car (more miles on it)	8
Now driving a newer car (fewer miles on it)	6
Present car requires more oil changing according to manufacturer's recommendation	6
Now using a different grade or brand of oil	2
Other	21
Base	(476)

Source: Question 37

Respondents Who Felt that
Method of Disposal was "Not at All Harmful"
(by Census Region)

Method of Disposal	Northeast (%)	North Central (%)	South (%)	West (%)
Pouring used oil on the ground	8	9	17	9
Pouring used oil down on a storm sewer	5	3	7	6
Putting in closed container in the trash	23	27	22	22
Burying used oil in the ground	19	20	30	28
Used to oil down dirt or asphalt road*	39	50	50	49
Used oil as fuel for oil furnace	30	31	32	35
As weed killer**	17	38	18	25

* About 60% of those in the West South Central and Mountain divisions felt this practice is not at all harmful.

** 41 and 47 percent of the East South Central and West South Central divisions, respectively, felt that use of oil as a weed killer was "not at all harmful."

Source: Question 43

Perception of Energy Saved by Familiarity with Recycled Oil

Perception of amount of energy saved:	Have you seen or heard anything about recycled motor oil? Yes (%)	No (%)
A great deal	43	43
A moderate amount	39	36
Not very much	13	13
An insignificant amount	5	7
Base	(1184)	(539)

Source: Questions 44a and 45

Perception of Quality of Recycled Oil by Familiarity with Recycled Oil

Perception of quality of recycled oil: *	Have you seen or heard anything about recycled motor oil? Yes (%)	No (%)
Better than new oil	?	1
Just as good as new oil	28	27
Nearly as good as new oil	28	27
Not at all as good as new oil	33	33
Can't say/don't know	10	12
Base	(1226)	(566)

Source: Question 44a, 44b

*Question 44b: Compared to new motor oil, how good do you think that recycled motor oil would be for use in your car?

Oil Disposal Methods by
Whether DIY Had Seen or Heard
Anything about Recycled Oil

Response:**	(Yes) (%)	(No) (%)
Oil was poured on the ground:	36	46
Oil was put in the trash or garbage to be collected*:	20	24
Oil was taken to a gas station or recycled:	18	6
Oil was burned:	4	3
Miscellaneous uses:	22	21
Base	(1216)	(560)

Source: Questions 18 and 44a

*If trash is taken to a landfill, disposal of oil through garbage collection falls into the first category -- oil disposed of on the ground.

** Question 44a: Have you seen or heard anything about recycled motor oil?

Perceived Harmfulness of Method of Disposal
by Familiarity with Recycled Oil

Method / Response:*	Very Harmful		Somewhat Harmful		Not at All Harmful	
	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)
Pouring used oil on the ground	53	46	36	40	11	13
Pouring down a storm sewer	77	71	18	22	5	7
Putting in closed container in the trash	42	38	36	35	22	27
Burying used oil in the ground	38	28	39	43	22	28
Used to oil down a dirt or asphalt road or driveway	18	17	35	34	47	49
Used as a weed killer	36	34	39	39	25	28
Used as fuel for oil furnance	35	44	31	30	34	26
Used as lubricator or coating for tools	4	5	10	10	86	85

Source: Questions 43,44a

*Response to question 44a: Have you seen or heard anything about recycled oil?

Willingness to Bring in Used Oil Based on Perceptions of Recycled Oil*

Circumstance and Frequency	Seen or Heard Anything About Recycled Oil: Yes (%)	No (%)
If could bring to a convenient place:		
Always	54	53
Never	12	13
If were paid 5 or 15 cents for each quart:		
Always	62	61
Never	11	11
If could take the oil to where they shop:		
Always	56	58
Never	13	11
If service station nearby would take oil:		
Always	60	60
Never	10	9
If oil was picked up at home by a group:		
Always	70	72
Never	9	5
If there were a collection center where oil is purchased:		
Always	57	56
Never	12	11
If they had a special container to hold oil:		
Always	66	63
Never	9	7
Base	(1219)	(566)

Source: Questions 44a and 47a

*Frequency with which respondents said they would bring in used oil for recycling under various circumstances, by whether respondent had seen or heard anything about recycled motor oil.

Appendix F

The Farm Survey

A. Introduction

In connection with the Household Motor Oil Study, Market Facts conducted a telephone survey of farm households. The universe represented in this survey consists of individual owner-operated (non-corporate) farms having a telephone and 50 or more planted acres. The sample frame for this universe was a listing compiled from U.S. Department of Agriculture sources by Market Identificaiton, Inc. This listing contains over one million farms, about half of which have telephone listings. After excluding corporate and non-telephone listings as well as those with fewer than 50 planted acres, a systematic random sample was drawn, using a random start and a skip interval.

Screening interviews were conducted by telephone with 434 households. Of these 434 households, 21 reported no vehicle available for household use; 384 vehicle households completed the screener interview. Of those who completed the screener, 355 reported that a household member had changed the oil in a household vehicle during the past 12 months, and 290 of these agreed to the DIY household interview; that is the same DIY questionnaire used in the national household survey. The farm screener questionnaire was similar to the household screener with the addition of some questions on off the road and other gasoline or diesel fueled power equipment and on the type of farming and acreage. (See end of Appendix F.)

The following section presents the sample composition and the key findings from the screener interviews.

B. Summary of Screener Findings

1. Sample Composition

The bulk of the farm sample is concentrated in the North Central region. The principal type of farming represented is crops, particularly food crops and feeds. Two-thirds of the farms are under 500 acres. The mean number of acres is 624. (Exhibit F-1)

2. Farm Oil Use

The average number of vehicles available to farm households is 2.97. The average amount of motor oil used in oil changes for household vehicles annually is estimated at 52.5 quarts. Another 12.2 quarts per farm household are added annually between oil changes. Of these 64.7 quarts, 47.9 quarts are drained annually and 16.8 are burned or leaked.

Of the 384 farm households completing the farm screener, 362 reported having items of gasoline or diesel powered equipment in addition to the household vehicles, mostly tractors. The average number of such items in these 362 households was 3.0 The estimated amount of oil used annually by this equipment is 41.1 quarts per farm in oil changes, and 20.9 quarts in oil added between changes. The estimated volume of oil drained is 37.4 quarts per farm.

The total amount of oil drained from household vehicles and other gasoline and diesel powered equipment is 85.3 quarts annually per farm. This is the equivalent of .14 quarts per acre (based on an average farm size of 624 acres).

C. Summary of Farm DIY Questionnaire Findings

The following sections deal with oil changing practices for farm household vehicles.

1. Oil Changing and Buying Practices

The mean oil change interval for household vehicles in farm DIY households is 4.4 months. This interval is slightly longer than that for non-farm DIY households.

The two most commonly used methods of used oil disposal are oiling roads (18%) and oiling machinery (39%). As might be expected, very few farms have waste oil picked up with the trash (1%) or take it to a landfill. (See Exhibit F-2.)

About one-half of the DIY farm households buy motor oil from a service station or oil company distributor; about one third from a farm store or cooperative or from a farm machinery dealership (Exhibit F-3). More than 80 percent of the DIY farmers buy oil in quantities of 24 quarts or more; about one half of the DIY farmers buy oil by the drum. (See Exhibit F-4.)

2. Oil Disposal Beliefs and Attitudes

As seen earlier, the most common methods of used oil disposal by farmers are to protect machinery and to oil down roads. It is not surprising therefore to find that farmers are more likely than the general DIY population to consider these methods as "not at all harmful" to the environment.

Method:	Percent Who Consider Method "Not at all Harmful"	
	Non-Farm (%)	Farm (%)
Oil down road	48	70
Coat machinery/tools	86	94
Heating fuel	31	50
Bury	24	32
Pour on ground	12	20
Put in trash	24	11
Pour down storm sewer	5	5

Farmers appear to have a somewhat lower estimate than the general DIY population of the amount of energy savings available from recycling used oil. (Exhibit F-5.)

In view of the alternative uses of used motor oil available to the farmer, one would expect the farmer to be less responsive than the general DIY population to any efforts to facilitate the saving of oil for recycling. This expectation is born out by the responses (shown on the following page) to a question as to how often (always, usually, sometimes, or never) the respondent would save oil for recycling under various conditions.

	Percent Who Would Always Save Oil For Recycling If ...	
	Non-Farm (%)	Farm (%)
You could take the used oil to the place where you shop	57	37
A service station near you would take the used oil	60	38
The used oil could be picked up at your house by the town or city or civic group	71	47
The place where you buy the motor oil had a recycling collection center	57	22
You had a special container so that the oil wouldn't spill when you took it to the recycling center	65	41
You were paid 5/15 cents for every quart of oil	62	39

Exhibit F-1

Composition of the Farm Sample

Region	(%) *	Type of Crop	(%)
North East	1	Cattle	12
North Central	73	Dairy	11
South	19	Crops	75
West	5		
		Foodgrains	48
Base	(413)	Feed	8
		Other crops	19
		Other	2
		Base	(384)

Number of Acres Farmed	(%)
Under 100	9
100-299	33
300-499	25
500-999	16
1000-2999	14
3000 or more	3
Base	(384)
Mean	624.2 acres

*Most farms in the South have fewer than 50 planted acres, and the West region has a large number of corporate and/or cattle farms. Hence, many farms in these regions did not qualify for the sample.

Exhibit F-2

Oil Disposal Methods

	National Sample		Farm Sample
	(%)	(%)	(%)
Oil was poured on the ground:	40		37
Poured on gravel driveway/road		11	18
Dumped in backyard		9	6
Used as a weed killer		6	7
Took to public dump/landfill		4	2
Dumped in woods/vacant lot		4	2
Buried it		3	1
Poured into storm sewer		2	-
Let it drain where the car was		1	1
Oil was put in the trash or garbage to be collected*:	21		1
Oil was taken to a gas station or recycled:	14		5
Took to gas station to put in used oil drum		9	4
Gave away for recycling		5	1
Oil was burned:	4		8
Used to start fire/burned it		3	6
Added to home heating oil		1	2
Miscellaneous uses:	25		61
Used on machinery		8	39
Kept it		7	8
Gave away for an unknown purpose		3	-
Used on animals to keep lice away		1	5
Used as an insecticide		1	1
Used as wood treatment		1	4
Other		4	4
Base	(1776)	(1776)	290)

Source: Question 18

*If trash is taken to a landfill, disposal of oil through garbage collection falls into the first category -- oil disposed of on the ground.

Exhibit F-3

Type of Outlet Where
Motor Oil is Most Often Purchased

Outlet	Non-Farm (%)	Farm (%)
Department or Discount Store	49	8
Automotive Parts or Supply Store	26	11
Gasoline Station	8	27
Supermarket	6	1
Oil Company Distributor	4	24
Drug Store	2	-
Other/Farm Cooperative	5	30*
Base	(1786)	(290)

Source Question: 42

*Farm store/coop	17%
Farm machinery Dealership	4
Other	9

Exhibit F-4

Number of Quarts Generally Purchased at One Time

	Non-Farm (%)	Farm (%)
Less than 5 quarts	12	1
5 quarts	23	6
6 to 23 quarts	25	10
24 quarts	31	28
More than 24 quarts	6	55
Base	(1793)	

Container Size Usually Purchased

	(%)	(%)
Quart	94	44
Two- or Four-Quart	2	4
Five Quarts	1	1
Drum	2	47
Other	1	4
Base	(1783)	(290)

Source: Question 41

Exhibit F-5

Question 45: How much energy do you think can be saved by recycling used motor oil? Would you say...

	Non-Farm (%)	Farm (%)
A great Deal	43	29
A Moderate Amount	38	42
Not Very Much	13	20
An Insignificant Amount	6	9
Base	(1723)	(290)

Source: Question 45

MARKET FACTS, INC. 100 SOUTH WACKER DRIVE CHICAGO, ILLINOIS 60606

JOB NO. 6316
OMB# 038-F80-005
EXPIRES 12/31/80
Card 1
ID# _____ (1-4)

(5 open)

OIL CHANGE STUDY
FARM
- Screener -

6 | | | | 8
3 | 1 | 0 | 0 | 0
(9-14 open)
2 (15)

Market Facts' Repr.: _____

Field Service Organization: NTC

Date: _____ Time Interview Began: _____ AM/PM

Telephone Number: _____ (16-18)

(ASK TO SPEAK TO SOMEONE IN THE HOUSEHOLD 16 YEARS OF AGE OR OLDER)

Hello, I'm _____ of Market Facts Incorporated, an independent research firm. We're conducting a survey for the United States Department of Energy. It's about motor oil changing and I would like to ask you a few questions. This study is being conducted under Public Laws 94-163 and 95-91. Your participation in the study is entirely voluntary, and your responses will remain anonymous.

(19 open)

1. Does this household own, lease, or operate any motor vehicle that is available to any of the licensed drivers in the household on a regular basis? By motor vehicle, I mean any passenger automobile, van or recreational vechicle, a pickup or other truck, or a motorcycle. (DO NOT READ)

   Yes ..... 1 No ..... 2 → (SKIP TO QU. 8c) (20)

2. How many motor vehicles are owned, leased or operated by the members of this household?

   No. of vehicles _____ (WRITE IN EXACT NUMBER) (21-22)

3. What is the make and year model of (this/your most recent year model) vehicle?

RECORD BELOW. IF MORE THAN ONE MOTOR VEHICLE IN HOUSEHOLD, ASK MAKE AND YEAR OF EACH VEHICLE UNTIL YOU HAVE ACCOUNTED FOR THE NUMBER OF VEHICLES REPORTED IN QU. 2. RECORD IN FIRST COLUMN BELOW. THEN ASK QU. 3a-f FOR EACH LISTED VEHICLE AND RECORD ANSWERS BELOW.

a. Is this (make/year) a passenger car, a pickup truck, a van or some other type of vehicle?

b. How many cylinders does it have?

IN QU. 3c-f, USE PARENTHESES IF VEHICLE IN HOUSEHOLD LESS THAN ONE YEAR.

c. About how many thousands of miles per year is (do you expect) this vehicle (to be) driven?

d. About how many times per year do you (expect to) have a complete oil change in this vehicle?

e. In addition to any complete oil changes, about how many quarts of motor oil are (do you expect to be) added to this vehicle per year?

f. What is the approximate mileage in thousands of miles, on this vehicle? (The odometer reading)

Veh. (23)	Make/Year	3a Pass Car	3a Trk/ Van	3a Oth	3b # Cyl.	3c # Miles Per Year	3d Changes Per Year	3e # Qt. Oil Added	3f Mileage	
1.	_____ 19 (24-25)	1	2	3 (26)						(27-36)
2.	_____ 19 (37-38)	1	2	3 (39)						(40-49)
3.	_____ 19 (50-51)	1	2	3 (52)						(53-62)
4.	_____ 19 (63-64)	1	2	3 (65)						(66-75)
										79 [ ] 80 Card 2 Dup 1-4
5.	_____ 19 (5-6)	1	2	3 (7)						(8-17)
6.	_____ 19 (18-19)	1	2	3 (20)						(21-30)

(31-36 open)

4. Besides the vehicle(s) you've just described, what other gasoline or diesel powered equipment, if any, is owned, leased or operated by this household? This includes any farming equipment, power boats, or riding mowers. LIST BELOW. ASK QU. 4a-d FOR EACH ITEM. IF NONE, CHECK THIS BOX ☐ AND SKIP TO QU. 5a.

a. How many cylinders does the gasoline or diesel engine have? (37-46 open)

b. About how many hours per year is this (NAME ITEM) operated?

c. About how many complete oil changes does this (NAME ITEM) have each year?

d. In addition to the complete oil changes, if any, about how many quarts of oil are added to the (NAME ITEM) each year? ☐ 47

(48 open)

Power Equipment Items	4a No. Of Cylinders	4b Hours Per Year	4c No. Of Complete Oil Changes	4d Added	
_____ ☐	☐	☐☐☐☐	☐☐	☐☐	(49-58)
_____ ☐	☐	☐☐☐☐	☐☐	☐☐	(59-68)
_____ ☐	☐	☐☐☐☐	☐☐	☐☐	(69-78)

79 [0][2] 80
Card 3
Dup 1-4

_____ ☐	☐	☐☐☐☐	☐☐	☐☐	(5-14)
_____ ☐	☐	☐☐☐☐	☐☐	☐☐	(15-24)

(25-35 open)

5a. Which one of the following best describes the type of farming that you do?

Cattle. . . 1
Dairy . . . 2 → (SKIP TO QU. 5c)
Poultry . . 3

Crops. 4 (36)
Other (DESCRIBE)
_____ (37 open)

(IF OTHER IS NON CROP RELATED SKIP TO QU. 5c.)

5b. What is your principal crop?

Cotton. 1
Tobacco 2
Food grains . . . 3
Feed crops. . . . 4
Oil bearing crops. . . . 5
Vegetables 6
Fruits and nuts. 7 (38-39)
Other (DESCRIBE) . . . .
_____

5c. How many acres do you farm? (WRITE-IN) _____ (40-43)

5d. About how many acres are dedicated to your principal crops or products?

(WRITE-IN) _____ (44-47)

6. During the past 12 months, have you, or has any member of your household, personally changed the motor oil in the motor vehicle (any of the motor vehicles) or farm equipment owned, operated or leased by your household? By changing the motor oil, I mean completely draining the oil from the engine and putting in new oil, not just adding oil. (DO NOT READ)

Yes. . . . 1 → (SKIP TO QU. 8a)
No . . . . 2 → (SKIP TO QU. 8c) (48)
Don't know 3

7a. Did you personally change the motor oil in the motor vehicle (any of the motor vehicles) owned, operated or leased by your household? (DO NOT READ)

Yes . . . . . 1 → (GO TO QU. 12 OF OIL CHANGE QUESTIONNAIRE DO NOT READ INTRODUCTION.)
No. 2 (46)

7b. What is the name of the person(s) who actually changed the motor oil in one of these vehicles?

_____(WRITE-IN)
_____
_____

ASK TO SPEAK TO THAT PERSON. IF MORE THAN ONE QUALIFIED HOUSEHOLD MEMBER IS AT HOME, ASK TO SPEAK WITH THE FIRST PERSON ON THE LIST IN QU. 7b. IF NOT AT HOME, ASK TO SPEAK WITH SECOND PERSON ON THE LIST, ETC. GO TO INTRODUCTION TO QU. 9 OF OIL CHANGE SCREENER. IF NO QUALIFIED PERSONS ARE AT HOME, ASK:

When is a good time to call to speak with (PERSON FROM QU. 7b WHO BEST QUALIFIES)?

CALLBACK (RECORD:) Person's Name:_____

Time:_____AM/PM Date:_____

8. VERIFY: Telephone Number ( ) _____

THANK RESPONDENT AND TERMINATE.

(47-78 open)

79 [0][2] 80

(IF TALKING WITH NEW RESPONDENT READ INTRODUCTION)

Hello, I'm_____of Market Facts, Incorporated, an independent research firm. We're conducting a survey for the United States Department of Energy. It's about motor oil changing and I would like to ask you a few questions. This study is being conducted under Public Laws 94-163 and 95-91. Your participation in the study is entirely voluntary, and your responses will remain anonymous.

9. I understand that you have personally changed the motor oil in one of your household's vehicles (your household's vehicle). By changing the oil, I mean a complete motor oil change - not just adding oil. Have you personally changed the oil?

Yes. . . . . 1 ⟶ (SKIP TO QU. 12)
No 2 (60)

10. Is there anyone else at home that has personally changed the motor oil in (one of your household's vehicles/your household' vehicle)?

Yes. . . . . 1 ⟶ (ASK TO SPEAK TO THAT PERSON. IF THAT PERSON IS HOME, RE-INTRODUCE YOURSELF AND TO QU. 12 IF PERSON IS NOT HOME, GO TO QU. 11)
No . . . . . 2 ⟶ (SKIP TO QU. 11b) (61)

11. When is a good time for me to call back to speak with another household memember who has personally changed the motor oil in your household's vehicle (any of your household's vehicles)?

CALLBACK (RECORD:) Person's Name:_____

Time:_____AM/PM DATE:_____

11b. VERIFY: Telephone Number ( ) _____

THANK RESPONDENT AND TERMINATE

(62 78 open)

79 [0|3] 80

STATISTICAL RELIABILITY FOR DETERMINING ACCURACY OF PERCENTS WITHIN A SINGLE SAMPLE*

At the 95% level of confidence

Sample Size	Magnitude of Expected or Observed Percent					
	10% 90%	20% 80%	30% 70%	40% 60%	50% 50%	
100	5.9	7.9	9.0	9.6	9.8	
200	4.2	5.6	6.3	6.8	6.9	
400	3.0	3.9	4.5	4.8	4.9	
600	2.4	3.2	3.7	3.9	4.0	**
1000	1.9	2.5	2.9	3.0	3.1	
2000	1.3	1.8	2.0	2.2	2.2	
2600	1.2	1.5	1.8	1.9	1.9	
3000	1.1	1.4	1.7	1.8	1.8	

* Not to be used for comparing observations from different groups of respondents

** Observed percent ± the appropriate number shows by how much the observation could vary due to sampling error

STATISTICAL RELIABILITY FOR COMPARING PERCENTS BETWEEN TWO INDEPENDENT SAMPLES*

At the 95% level of confidence

Size of Each Sample	Average of the Two Observed Percents					
	10% 90%	20% 80%	30% 70%	40% 60%	50% 50%	
100	8.3	11.1	12.7	13.6	13.9	
200	5.9	7.8	9.0	9.6	9.8	
400	4.2	5.6	6.3	6.8	6.9	
600	3.3	4.5	5.3	5.6	5.7	**
1000	2.6	3.5	4.0	4.3	4.1	
2000	1.9	2.5	2.8	3.0	3.1	
2600	1.6	2.2	2.5	2.6	2.7	
3000	1.5	2.0	2.3	2.5	2.5	

* Not to be used for measuring accuracy of percents within a single sample

** Minimum difference required between the observed percents in the two sampled populations to be statistically different

☆ U.S. GOVERNMENT PRINTING OFFICE: 1981—771-031/72

UNITED STATES DEPARTMENT OF ENERGY
BARTLESVILLE ENERGY TECHNOLOGY CENTER
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