IMPACT EVALUATION OF THE SPARE REFRIGERATOR RECYCLING PROGRAM CEC STUDY #537 FINAL REPORT

Prepared for

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1 INTRODUCTION

1.1 OVERVIEW

Southern California Edison (SCE) has been implementing its Spare Refrigerator Recycling Program (Program) for several years. Through the Program, customers can schedule an appointment to have their working and operating spare refrigerator or freezer picked up and hauled away. The appliance is then taken to a recycling center where the metals, components, and refrigerant are recycled using environmentally sound procedures. Over 25,000 refrigerators and freezers were recycled through the Program during 1996. For participating in the Program during 1996 customers received a $50 U. S. Savings Bond or $25 cash.

This report presents the results of the impact evaluation of the 1996 Program.

1.2 KEY FINDINGS

1.2.1 Net Impacts

The key impact findings are summarized in Table 1-1. Total net savings for the Program were 29.1 GWh per year. The net savings per unit was 1,141 kWh per year for refrigerators and 1,182 kWh per year for freezers.

Table 1-1
Summary of Impact Findings

Unit Type	Number Collected	Program Planning Estimate (kWh/year)	Full-Year UEC (kWh/year)	Net-to-Gross	Net Savings Per Unit (kWh/year)	Net Savings Program Total (GWh/year)	Realiz. Rate Relative to Planning	Precision at 90% Confidence Relative (%)
Refrigerator	20,330	1,569	2,148	0.53	1,141	23.2	0.73	10.3%
Freezer	5,001	1,569	2,058	0.57	1,182	5.9	0.75	33.2%
All Units	25,331	1,569	2,130	0.54	1,149	29.1	0.73	17.5%

Savings for freezers were higher than for refrigerators. One reason for this was that, although the full-year UEC was lower for freezers, the part-use and net-to-gross ratios were higher for freezers.

For refrigerators, the unit net savings was 53 percent of the full-year UEC estimated by this evaluation. For freezers, the net savings was 57 percent of the full-year UEC.

In addition to part-use, the other factor affecting the net-to-gross ratio was the way the unit would otherwise have been disposed of, if at all, without the Program. This is the factor that determines the credit assigned to the Program for the removal. For refrigerators, it is estimated that about 38 percent of the collected refrigerators would have been taken out of use without the Program. For freezers this number is closer to 45 percent.

The Program planning estimate of savings was the same for both refrigerators and freezers. The full-year UEC estimated in this evaluation was 37 percent higher than the Program planning estimate for refrigerators and 31 percent higher for freezers. Relative to the planning figures, the net savings represent a realization rate of 73 percent for the Program as a whole, 73 percent for refrigerators, and 75 percent for freezers.

1.2.2 Program Targeting

Refrigerator recycling programs are generally targeted to removal of existing spare refrigerators that will not be replaced. However, based on the participant survey results, spare refrigerator removals (without replacement) accounted for only 59 percent of the refrigerators collected through the Program. About 24 percent of the collected refrigerators were main refrigerators, and 33 percent of the refrigerators were replaced. Overall, freezers accounted for 15 percent of collected units.

1.3 METHODOLOGY

The analysis identifies the average gross savings per unit and develops a net-to-gross ratio. The gross savings is the average unit energy consumption (UEC) for a refrigerator or freezer operating for a full year. The net-to-gross ratio is the average savings that can be credited to the Program for removal of a unit as a fraction of the full-year UEC.

The UEC for refrigerators and freezers were determined by Edison based on a metering study of a sample of units picked up by the Program. This study is described in *Refrigerator/Freezer UEC Estimation, 1996 ARCA/SCE Turn-In Program*: *(In Support of XENERGY Inc.'s Evaluation of the 1996 Appliance Recycling Program)* by John Peterson of Athens Research.

The primary basis for the estimation of the net-to-gross ratio was a telephone survey conducted for this purpose. The survey was developed by XENERGY, and implemented by Luth Research Inc. under subcontract to XENERGY.

Developing the net-to-gross ratio from this survey information alone would have required certain assumptions that were plausible, but not verifiable. To strengthen the analysis with empirical estimates of otherwise subjective factors, supplemental data were collected. The supplemental data collection included:

- telephone surveys with customers who disposed of a refrigerator or freezer outside the Program.
- telephone surveys with customers who acquired a used refrigerator or freezer.

In addition, qualitative information developed during the evaluation of the 1994 Program were also used. This information was based on telephone interviews with junk and scrap dealers and used refrigerator dealers, as well as on compilation of used refrigerator prices from area newspapers.

A key component in assessing the effect of removing refrigerators through the Recycling Program is estimation of whether the customers who disposed of the unit would have discarded it anyway. However, the direct effect of recycling the unit is not the only energy benefit of the Program. The effect of removing the unit from possible re-use through the used refrigerator market must also be taken into account. The supplemental data collection was designed to help address these secondary market effects.

Even with the supplemental data collection, there are still a range of plausible assumptions and interpretations of the data. To address these uncertainties, net-to-gross ratios were estimated using more than one approach and more than one set of assumptions.

The method of developing net-to-gross ratios used the participant survey data and the supplemental data.

1.4 REPORT ORGANIZATION

Section 2 presents findings from the participant survey. The net-to-gross analysis incorporating these findings is described in Section 3. The final savings estimates are presented in Section 4.

More detailed documentation is provided in the appendices:

- Appendix A Survey Methodology;
- Appendix B Details of Net-to-Gross Analysis;
- Appendix C Survey Instruments;
- Appendix D Detailed Net-to-Gross Scenario Tables;
- Appendix E Participant and Nonparticipant Survey Database Record Layouts and Analysis Documentation;
- Appendix F M&E Protocol Summary Tables; and
- Appendix G SCE Waiver Request.

2 PARTICIPANT SURVEY ANALYSIS

2.1 OVERVIEW

The participant survey is used to estimate two primary quantities:

1. The fraction of units picked up by the Program that would otherwise have been discarded by the participants even without the Program.
2. The fraction of the year units that would have been kept if not picked up would have been used.

The first quantity, the fraction of units that would have been discarded in the absence of the Program, is similar to a simple free rider estimate. However, as described further in Section 3, this fraction by itself is not the net-to-gross estimate for the Program. One reason is that the units that would have been discarded would not necessarily have been taken out of use. The net-to-gross analysis described in Section 3 utilizes survey data from nonparticipant acquirers and disposers of used units to estimate the credit attributable to the Program for picked-up units that would otherwise have been discarded.

A second component required for the net-to-gross analysis is the part-use factor. This factor is the second quantity determined from the participant survey. Because units that would otherwise have been kept in use would not necessarily have been in use for a full year, the credit to the Program for collecting these units is less than the full-year UEC.

Below, we describe how the participant survey data are used to calculate part-use factors and to assign units to primary disposition categories. These categories indicate what the participant would have done with the unit if it had not been picked up. We then summarize the participant survey results.

As a matter of interest to the Program operations, dispositions and part-use factors are computed separately for different categories of disposals. Refrigerators that were previously used as spares are reported separately from main refrigerators. Also, units that were turned in because they were replaced with a new one are reported separately from outright removals. However, these classifications are available for the surveyed customers only, not for all participants. To calculate Program impacts, the average net-to-gross across all units is applied to the average UEC across all units picked up by the Program. This Program-level impact calculation is done separately for refrigerators and freezers.

The conceptual framework for assigning disposition and part-use factors is described below, followed by the details of the assignments based on the participant survey responses. The results of the disposition and part-use analysis are then presented.

2.2 PART-USE FACTOR

The part-use factor is the fraction of the year the recycled unit would have been operated if it had not been picked up. The participant survey collected data on how many months the collected unit had been used in the past twelve months. However, the usage that would have occurred in the following year if the unit had not been picked up is not necessarily the same as the prior year's usage. Units that had been used as the main unit but were disposed of would presumably have been converted to spares if they had stayed in use in the home. Likewise, units that were replaced by another, even if they were already spares, would not necessarily have been used the same way if they had remained in the home. Therefore, the previous year's usage was not used to estimate the part-use factor.

Participants who reported that they were not planning on disposing of the unit prior to hearing of the Program were asked how the unit may have been used if it were not picked up by the Program. These results were used to estimate the part-use factor by type of appliance and main/spare designation. As it turned out, the same average part-use (for future use if kept) was obtained for main as for spare units turned in.

Some participants reported that their refrigerators would have been kept, but would have been stored unused. In these cases, the disposition was assigned as "kept," but the part-use factor U was set to zero. The computations are summarized in Table 2-1.

Table 2-1
Part-Use Computations

Disposition	Unit Type	Main/ Spare	Average Part Use U
Kept but stored unused	Any	Any	0.00
All others	Refrigerator Refrigerator Freezer	Main Spare	0.86 0.86 0.91

The average part-use factor was 0.86 for refrigerators and 0.91 for freezers. These results reflect the fact that the great majority of refrigerators collected by the Program would have been used ten to eleven months each year if kept and used. The average usage for freezers was almost eleven months.

2.2.1 Treatment of Nonworking Units

The program is designed to remove working spare units. As part of the program screening procedures, units reported not to be working at the time the customer calls to participate, or found to be nonworking at pickup, are not accepted for the program. It is to be expected, however, that some nonworking units do get through the screening procedures. For a small fraction (less than four percent) of units picked up, the phone survey respondent reported (Q. 11) that the unit was not working at the time it was picked up.

The information from SCE's metering study shows a similar fraction. Of the units taken to the metering laboratory for SCE's UEC study, eight out of approximately 150, or five percent, were found not to run.

Additional units were reported by participants to be working but in need of repairs or found in the laboratory to run but not cool or not cool adequately. However, there is no reason to presume that such poorly operating units were not plugged in. Indeed, they may have been running substantially more than other units.

A difficulty with drawing firm conclusions from nonworking units arriving at the laboratory is that being transported may have damaged units that were in fact working when collected. The standard program collection procedures involve making the unit inoperable immediately on pick-up. No extraordinary measures were taken to maintain the tested units in their original operating condition. Thus, the rate of nonperforming units found at the laboratory may overstate the fraction of such units collected by the program.

Moreover, even those units not working at all might have been recharged with refrigerant and re-sold if discarded by the customer. Nonworking units that would have been kept but stored unused are explicitly accounted for in the part-use factor computations.

For these reasons, no additional adjustment for nonworking units is made in this analysis. That is, we assume that:

- the proportion of nonworking units collected by the program was small, under 5 percent;
- those unit that were not working when collected might still have been plugged in or might have been repaired and re-used if discarded; and
- nonworking units that would have been kept but stored unused are explicitly accounted for in the part-use computation.

2.3 CLASSIFICATION BASED ON PARTICIPANT SURVEY RESPONSES

The analysis described above requires the following variables:

- Primary disposition category: kept or discarded
- Usage category: kept and used, or kept and stored
- Replacement/removal category
- Main or spare category
- Number of months unit would have been used in following twelve months.

This section describes how these variables are assigned from the participant survey responses. The assignments were made separately for each unit picked up by the 1996 Program from the surveyed households. The survey instrument is shown in Appendix C.

2.3.1 Primary Disposition Category

The primary disposition category is based on responses to Questions 6 through 17a. Figure 2-1 diagrams the classification procedure and provides the overall unit counts for each step of the procedure. Figure B-1 and Figure B-2 in Appendix B show the same procedure and counts for refrigerators only and freezers only, respectively. The procedure steps are as follows.

1. If the customer *was* planning to discard the unit prior to hearing about the Program (Q.6)
    a. if the customer was planning to leave the unit behind when moving (Q.16)

        Primary disposition = Discard

    b. if the customer was planning to sell the unit or give it away (Q.16)
        i. *and* was planning to do so within one year (Q.21, 26)

            Primary disposition = Discard

        ii. *and* was *not* planning to do so within one year (Q.21, 26)

            Primary disposition = Kept

    c. if the customer was planning to throw away the unit, hire someone to remove it, recycle it, or have an appliance dealer pick it up (Q.16)
        i. *and* was planning to do so within one year (Q.27, 23, 28, 25)

            Primary disposition = Discard

        ii. *and* was *not* planning to do so within one year (Q.27, 23, 28, 25)

            Primary disposition = Kept

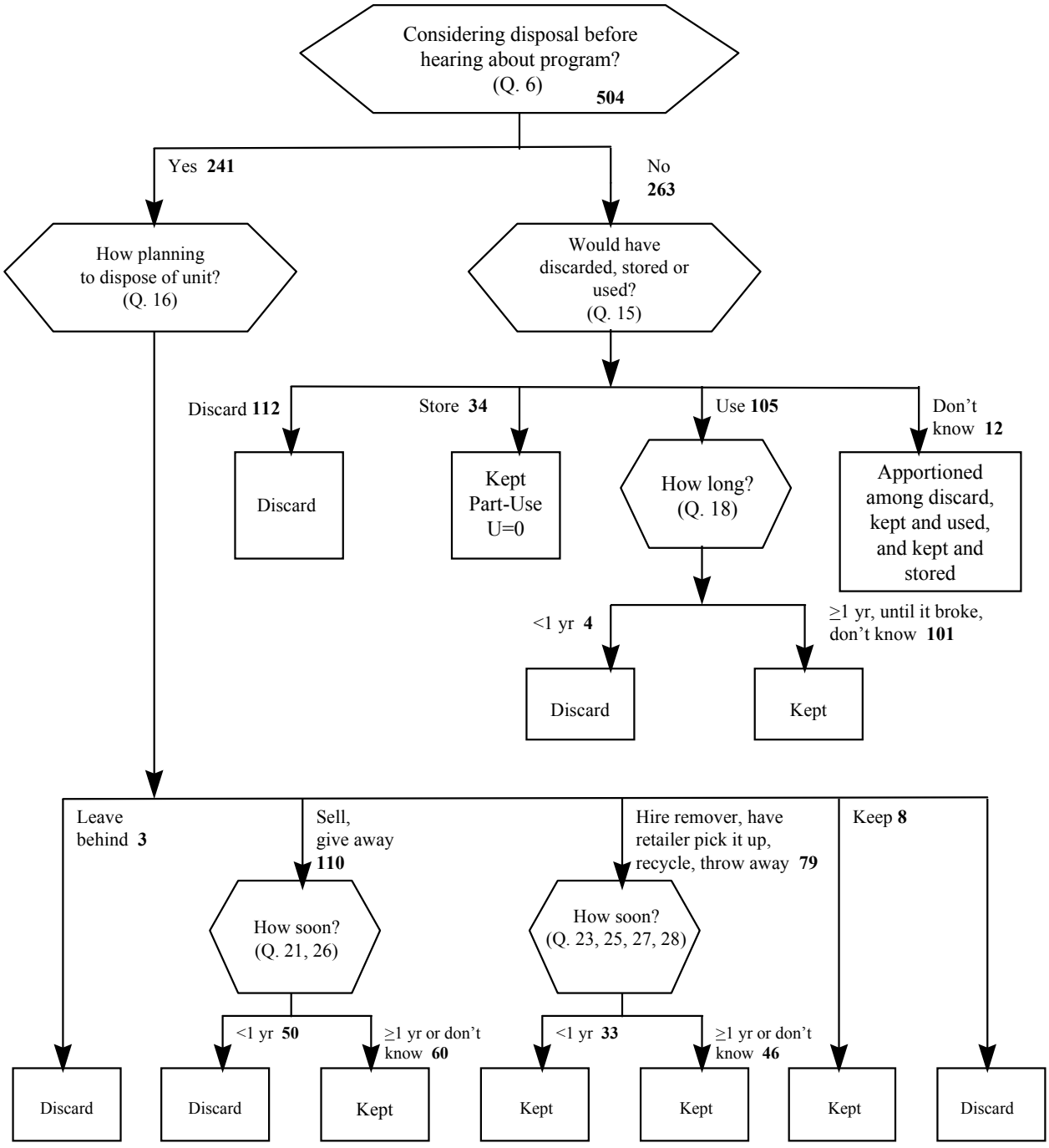
2. If the customer *was not* planning to discard the unit prior to hearing about the Program (Q.16)
    a. and would have kept the unit in use (Q.17);
        i. *and* would have kept it in use for a year or more, or until it broke, or for an unknown time (Q.18)

            Primary disposition = Kept

        ii. *and* would have kept it in use for less than a year (Q. 18)

            Primary disposition = Discard

Figure 2-1
Attribution Classification Based on Survey Responses
Both Refrigerators and Freezers



b. and would have stored the unit unplugged (Q.17)

Primary disposition = Kept
Usage = Stored
Part-Use = 0

c. and did not know if the unit would have been used or stored (Q.17);

Primary disposition = Kept

The questionnaire included additional questions (Q.20, 22, 24) designed to determine how realistic the stated intention to dispose of the unit was. These questions included an estimate of the cost of having the unit removed or the price that for which it would have been sold. Many customers indicated they did not know these costs, but those who did respond gave reasonable answers. These questions were not used as additional screens for the attribution classification.

2.3.2 Removal/Replacement

The Program was targeted to collect units that were currently in use as spares, not to provide convenient disposal for old units that were being replaced. If the targeting and screening were 100 percent effective, none of the picked-up units would have been replaced. To provide information on the effectiveness of the screening, units were classified as replacement or removal (without replacement) based on participant survey responses.

Questions 1 and 3 asked if the customer had acquired a new unit within the past two years and if this acquisition was a major reason for disposing of the old unit (Q.14 and 15). The unit was classified as a replacement if the customer answered yes to both questions. An additional question (Q.2 and 4) asked when the acquisition occurred. This question was intended to verify that the pick-up was within a short time of the new acquisition before classifying the unit as a replacement case. However, the date question was not used as part of the screening to determine replacement or removal assignment.

Table 2-2
Replacement Classification
Number of Units in Sample

	Replacement	Removal	Total
Refrigerators			
Replacement	140	286	426
Freezers			
Replacement	16	62	78

2.3.3 Main or Spare

Refrigerators were classified as main or spare based directly on the response to Question 9. This question asked if the refrigerator was being used as the main refrigerator or a spare at the time the customer called to participate in the Program.

2.4 RESULTS

2.4.1 Unit Classifications

Table 2-3 shows the proportions of replacers versus removers, main versus spare units, and disposition categories based on the survey data. The proportions are shown separately for refrigerators and freezers. For further perspective on the disposition decisions, the table presents cross-tabulations of the proportions as well as the proportions across all units collected.

Table 2-3
Distribution of Unit Classifications
(Percent of Column Total)

REFRIGERATORS								
n =	426	Replacement/ Removal		Main/Spare		Disposition		
	All Units	Replacement	Removal	Main	Spare	Keep and Use	Keep and Store	Discard
Replacement	32.9%	100.0%	0.0%	64.7%	22.8%	31.7%	31.1%	34.7%
Removal	67.1%	0.0%	100.0%	35.3%	77.2%	68.3%	68.9%	65.3%
Main	23.9%	47.1%	12.6%	100.0%	0.0%	14.6%	38.2%	29.5%
Spare	76.1%	52.9%	87.4%	0.0%	100.0%	85.4%	61.8%	70.5%
Keep and Use	45.3%	43.8%	46.1%	27.7%	50.9%	100.0%	0.0%	0.0%
Keep and Store	13.4%	12.7%	13.7%	21.3%	10.8%	0.0%	100.0%	0.0%
Discard	41.3%	43.6%	40.2%	51.0%	38.3%	0.0%	0.0%	100.0%
All Units	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

REFRIGERATORS								
n =	78	Replacement/ Removal				Disposition		
	All Units	Replacement	Removal			Keep and Use	Keep and Store	Discard
Replacement	79.5%	100.0%	0.0%			74.9%	73.6%	12.9%
Removal	20.5%	0.0%	100.0%			25.1%	26.4%	87.1%
Keep and Use	40.9%	50.0%	38.5%			100.0%	0.0%	0.0%
Keep and Store	19.4%	25.0%	18.0%			0.0%	100.0%	0.0%
Discard	39.7%	25.0%	43.5%			0.0%	0.0%	100.0%
All Units	100.0%	100.0%	100.0%			100.0%	100.0%	100.0%

The table shows that about 65 percent of the main refrigerators turned in were replaced as compared with about 23 percent of the spare refrigerators. Recall that a unit is classified as replaced if the acquisition of a new unit was a major reason the unit was disposed of by the

customer. Main refrigerators accounted for only about one-quarter of the total number of units collected by the Program.

The distribution of reported dispositions if the Program had not been available was similar for replacement and removal refrigerators, but not for freezers. Replaced freezers were more likely to have been kept in use, while removed freezers were about as likely to have been discarded as kept in use.

For about 48 percent of the units picked up, respondents indicated that they had been considering discarding the unit prior to learning about the Program. Nearly half of these units were assigned as "kept" because they indicated they would not have discarded the unit within a year. Overall, units kept in use accounted for 44.6 percent of the total. Stored units comprised 14.3 percent of all units and discarded units, 41.1 percent.

3 NET-TO-GROSS ANALYSIS

3.1 OVERVIEW

The Unit Energy Consumption (UEC) is specified for refrigerators and freezers collected by the Program as described in *Refrigerator/Freezer UEC Estimation, 1996 ARCA/SCE Turn-In Program: (In Support of XENERGY Inc.'s Evaluation of the 1996 Appliance Recycling Program)* by John Peterson of Athens Research. These UECs represent the energy consumed in a full year of operations for the average refrigerator or freezer collected by SCE's 1996 Spare Refrigerator Recycling Program. This consumption level is the gross savings associated with removing an average unit from use. The net savings is the reduction in energy use that can be attributed to the Program. This net savings differs from the gross savings number for two reasons:

1. The unit might have been taken out of use at about the same time even without the Program.
2. A unit removed may have operated less than a full year in the absence of the Program. As a result, its removal lowers energy use by less than the full-year UEC.

For this evaluation, net savings is determined by multiplying the gross, full-year UEC by a net-to-gross factor (NTG). This factor consists of two components:

- the attribution factor; and
- the part-use factor.

The attribution factor accounts for what the disposition of a recycled unit would have been in the absence of the Program. The part-use factor accounts for the fact that a unit that would have stayed in use would have been in use only part of the time. For example, the savings due to removal of a unit that would have been used only three months of the year is only one-quarter (3/12) the savings associated with full-year use (assuming essentially constant use over the year for a full-use unit). The net-to-gross factor, NTG, is thus given by

NTG = A*U,

where

A = the attribution factor
U = the part-use factor.

The participant survey is used to determine the part-use factor, as described in the previous section. That survey also provides the fractions of units that would otherwise have been kept in

use, stored, and discarded. The attribution factor utilizes these fractions. The attribution factor also utilizes information on the disposition of discarded units developed from the supplimental survey of acquirers and disposers.

3.2 PRINCIPLES FOR ASSIGNING ATTRIBUTION FACTORS

For a unit that would otherwise have been destroyed, we assign an attribution factor of zero; no credit for removal of this unit is attributed to the Program. For a unit that would otherwise have been left in place, the attribution factor is one; full credit for removal is attributed to the Program. A third possibility is that the unit would otherwise have been transferred to another owner by being sold, given away, or left in place when the original owner moved. For these units, the attribution factor is a fraction between zero and one; the Program is given partial credit for removing the unit.

The rationale for giving part credit for removal of units that would otherwise have been transferred is that preventing this transfer results in some savings to SCE on average. How much savings can be attributed to transfer cases depends on what proportions of different types of transfers occur.

Attribution Factors for Avoided Transfers

If the transfer would have been to a customer outside the service territory, the savings from removal are zero. However, if the transfer would have been to another SCE customer who would have used the unit for a second refrigerator and would not otherwise acquire a second refrigerator, the savings are the same as if the unit would have stayed in place and been used as a second refrigerator; the attribution factor would be one. In other cases, the recipient of the transfer would have used the refrigerator as a primary unit. Preventing this transfer by recycling the unit means that the would-be recipient must acquire a different unit. If the different unit is a new or newer one, the removal from the original customer has resulted in effectively moving the would-be recipient from an older unit to a newer one. In this case the Program deserves credit for the accelerated replacement of an older, less efficient unit by a new, more efficient one. The different possible dispositions and corresponding attribution factors are indicated in Table 3-2.

In the case of accelerated replacement, the attribution factor can be computed as the difference in UEC between a new unit and the average unit picked up by the Program expressed as a fraction of the Program's average UEC. Assuming a Program average UEC of 2,130 kWh per year and a newer-unit UEC around 900 kWh per year, the accelerated replacement factor would be around 50 percent.

Table 3-1
Attribution Factor for Transferred Refrigerators for Different Disposition Details

If unit had not been recycled		Actual actions by recipient	Program credited for	Attribution factor
Recipient location	**Recipient's use of unit**			
Outside SCE	Any	Any	None	0
In SCE	Second	No second	Full removal of second unit	1
In SCE	Second	Buy other second	None	0
In SCE	Main	New Main	Accelerated replacement of old by new	0.5
In SCE	Main	Buy other Used Main	None	0

The Program participant who would otherwise have given away or sold the recycled refrigerator typically cannot know how the would-be recipient would have used it, and often would not know who that recipient would have been. Thus, we cannot determine from the participant survey what the mix of attribution factors is among the transfer cases. This information is instead determined from the survey of nonparticipant acquirers and disposers discussed below.

Timing of Disposal

If the unit would not have been discarded until a year or more from the time of Program participation, the unit is considered to be kept instead of discarded. This classification makes sense for a first year impact analysis. Moreover, if the planned disposition is that far in the future, it is questionable whether it would have occurred even as soon as reportedly planned.

The analysis above uses the participant survey information to determine the fractions of units picked up by the Program that would otherwise have been kept in use, stored, or discarded. The participant survey is also the basis for estimating the fraction of the year the units would have been used if they were kept.

3.3 DETERMINING DISTRIBUTION AND ATTRIBUTION

The determination of how units would otherwise have been disposed of based on customers' reports of what they would have done is open to question. Customers who have not had to give serious thought to how to dispose of a unit may not give realistic responses. In particular, if they are unaware of how difficult or costly it may be to dispose of a unit, they may overstate their likelihood of doing so.

Supplemental data were collected to determine how units would otherwise have been disposed of and the Program credit for avoided transfers to other users. The analysis presented below uses

this additional information. The questions addressed in this empirical study and the basis for answering those questions are as follows.

3.3.1 Questions Addressed to the Acquirers/Disposers Survey

1. For units that have been disposed of outside the Program, what fractions have been disposed of by what means? Specifically, what fractions are destroyed, transferred outside of the SCE territory, or transferred to another user within SCE's territory?
2. For those customers who acquire used units, what fractions are acquired for use as spares and what fractions for use as main refrigerators?
3. What actions are taken by would-be recipients of a used unit when that unit is taken out of service?
4. What fraction of the units collected by the Program would have been transferable in the used market?

Background from Qualitative Findings

As a background to interpreting the survey results for these questions, qualitative findings developed in the previous evaluation of this Program were considered. These qualitative findings were based primarily on interviews with used appliance dealers, scrap and recycle dealers, and local governments. Because there was no indication that conditions were changed from the time of these interviews, this data collection was not repeated. The key qualitative findings were:

1. Regulatory requirements regarding CFC disposal are not an impediment to refrigerator recycling.
2. The dealer surveys indicated that the final disposition of the unit generally matches the initial disposition. That is, units that were taken by used refrigerator dealers are resold. Units given to recyclers and junk dealers are taken out of service. Based on this result, we can assume that the disposal means reported by customers who discarded a unit reflects the final disposition of the unit.
3. Dealers also indicated that there was little movement of refrigerators in and out of regions. Thus, transfers outside the SCE service territory are not a major factor. Likewise, there is likely to be little influx of used units from outside the territory to replace the supply removed by the Program.
4. Dealers reported that utility Refrigerator Recycling Programs have had little effect on the market for used refrigerators. These Programs are seen as disposing of older, low-value units. Dealers rarely take units more than 20 years old. (In fact, 56.1 percent of refrigerators and 50.1 percent of freezers collected by the program were 20 years old or older.)

An additional finding re-confirmed by the acquirers/disposers survey conducted for the present evaluation is that there are no substantial barriers to disposal of used refrigerators and freezers outside the Program. The survey of discarders indicates that disposing of a refrigerator or freezer is not at all difficult. Fewer than one percent of the discarders had to pay someone to

take the unit away. The majority of the discarded working units, 63 percent, were privately transferred either as gifts to a known recipient or through a private sale. Another 24 percent went to dealers. Given that used units can be sold for amounts averaging around $88, it is unlikely that someone who wanted to dispose of a working unit would have had difficulty doing so.

3.4 QUANTITATIVE ANALYSIS

The net-to-gross analysis uses the quantitative data collected in the original participant survey along with the supplemental data collected in the acquirers/disposers survey. The qualitative information summarized above is used to guide the interpretation of the quantitative survey data.

The supplemental survey instrument had separate question sequences for acquirers and disposers. Some respondents were in both categories and answered both sets of questions. For convenience, we refer to the portion of the survey related to acquisition of used units as the acquirers survey and the portion related to disposals as the disposers survey.

3.4.1 Framework for the Analysis

The net-to-gross analysis consists of the following steps.

1. Determine the fraction of units that would be kept or discarded in some way. These fractions are determined from the participant survey.
2. For units that would have been discarded in the absence of the Program, determine the fractions that would have been destroyed, transferred outside of SCE's service territory, or transferred within SCE. These fractions are determined from the supplemental survey of discarders.
3. For refrigerators that would have been transferred within SCE, determine what fraction would have been used as a main unit and what fraction as a spare. Also, for both refrigerators and freezers, determine the proportions of alternate actions that took place because the transfer did not occur. These determinations are based on the survey of customers who acquired used units in some way.
4. Assign attribution factors to the various possible dispositions, and compute the weighted average attribution based on the proportions determined in Steps 1 through 3.
5. Combine the attribution factor with the part-use factor for each group to determine the net-to-gross factor.

A base set of assumptions is used for the calculations at each of steps 1 through 5. The base assumptions and resulting net-to-gross factor are presented below. We then consider some alternate assumptions. The net-to-gross estimates for the various assumptions and final net savings calculations are presented in Section 4.

3.4.2 Base Assumptions for Calculating Attribution Factors

Proportions that would have been kept versus discarded

We recognize that participants may not have a good idea how they would have discarded a unit. However, we do consider it reasonable to think that they know whether or not they would have discarded it. Moreover, based on the qualitative findings discussed above, it is reasonable to assume that anyone who wanted to dispose of a unit could have. We therefore take the proportions of units that would have been kept or discarded from the participant survey classifications.

Effect of preventing transfers

We assume that the proportion of transferred units that would have been used as main and as spare refrigerators is the same as the proportions that were used in these ways for customers who actually did acquire used units. We also assume in the base case that what actually took place because the Program prevented the transfer follows the proportions of what these customers reported they would have done if the unit they acquired had not been available.

Attribution Factors

The following attribution factors are assigned to the various disposition possibilities.

Table 3-2
Attribution Factors

Classification	Attribution
What would have been done with unit?	
Keep	1
Discard--how?	
Taken out of Service	0
Transferred out of SCE	0
Transferred within SCE— how used and what happened instead?	
Main refrigerator or freezer	
Bought new	0.5
Bought or fixed similar	0
Bought worse	0
Acquired none	1
Spare refrigerator	
Bought new	0.5
Bought or fixed similar	0
Bought worse	0
Acquired none	1

Summary of Base Case Assumptions for Attribution Factors

The assumptions for the base case analysis are summarized as follows.

1. The fraction of participants who would have discarded the unit in some way without the Program is well estimated by the fraction who reported on the participant survey that they would have discarded the unit within a year without the Program.
2. The fraction of discarded units that would have been transferred versus taken out of service is well estimated by the fractions in each category in the supplemental survey of discarders.
3. The distribution of alternate actions taken because these units were not transferred is well estimated by what customers who did acquire used units report what they would otherwise have done if that particular unit had been unavailable.
4. The savings from accelerated replacement is equal to one-half the savings from full removal.

3.4.3 Part-Use Factors

The part-use factors assigned in the net-to-gross analysis are taken from the results of the participant survey. For refrigerators, survey respondents who stated that they were not planning on disposing prior to hearing of the Program and said that they would have kept the unit were asked how many months out of twelve it would be plugged in and running. This average was determined to be 0.86 for both main and spare refrigerators.

For freezers, survey respondents who stated that they were not planning on disposing prior to hearing of the Program who said that they would have kept the unit were asked how many months out of twelve it would be plugged in and running. This average was determined to be 0.91.

The supplemental data provide no further insight into the part-year usage. The participant survey collected good information on this question for a large sample of customers. The part-use factors used in the extended analysis are, therefore, based on the results of the participant survey.

3.4.4 Net-to-Gross Estimates under the Base Assumptions

Table 3-3 and Table 3-4 summarizes the attribution assignments and resulting average attribution for refrigerators and freezers. These calculations show an average attribution factor of 0.55 for the base case refrigerator analysis and 0.62 for the base case freezer analysis.

For transfers avoided by the Program, the acquirers survey included the alternate action of buying a lower quality unit. If removing the unit forces the would-be recipient to acquire a worse unit rather than a new one, the effect is actually an increase in energy usage rather than a decrease. Thus, we would in principle assign a negative attribution factor to this outcome. The assignment of zero attribution in this case is a simplifying assumption, and has negligible effect on the results.

Along with the attribution calculation, Table 3-3 and Table 3-4 show the average part-use and the resulting overall net-to-gross. The base case net-to-gross for refrigerators is 0.48 compared with 0.56 freezers.

Each of the base assumptions is subject to some question. Alternate assumptions are explored in Section 4.

Table 3-3
Base Case Net-To-Gross Calculations for Refrigerators

Refrigerators - Base Case															
	What Participants Would Have Done with Unit without Program	Percent of Units in Program	How Would Have Discarded	Percent of Discarded Units	Where Transferred	Percent of Trans-ferred Units	How Transferred Unit Would Have Been Used	What Was Done Because Transfer Wasn't Available	Percent of Units Trans-ferred within SCE	Attribution Assigned	Average Attribution A	Usage Factor U	Net-to-Gross
Basis:	**Participant Survey**		**Disposers Survey**		**Disposers Survey**		**Acquirers Survey**	**Acquirers Survey**				**Participant Survey**	**A x U**
All Units											0.55		0.48
	Keet Unused	13.4%								1	1.00	0.00	0.00
	Kept in Use	45.3%								1	1.00	0.86	0.86
	Discarded	41.3%									0.25		0.23
			Destroyed	8.9%						0	0.00		
			Transferred	91.1%							0.27		0.25
					Outside SCE	16.9%				0	0.00		0.00
					Inside SCE	83.1%					0.32		0.30
							Main				0.20	1.00	0.20
								Bought New	19.8%	0.5	0.50		
								Bought or Fixed Similar	40.5%	0	0.00		
								Bought Worse	8.1%	0	0.00		
								Acquired None	4.5%	1	1.00		
							Spare				0.67	0.86	0.57
								Bought New	3.6%	0.5	0.50		
								Bought or Fixed Similar	7.2%	0	0.00		
								Bought Worse	0.0%	0	0.00		
								Acquired None	16.2%	1	1.00		
		100%		100%		100%			100%				

Table 3-4
Base Case Net-To-Gross Calculations for Freezers

Freezers - Base Case														
	What Participants Would Have Done with Unit without Program	Percent of Units in Program	How Would Have Discarded	Percent of Discarded Units	Where Transferred	Percent of Trans-ferred Units	How Transferred Unit Would Have Been Used	What Was Done Because Transfer Wasn't Available	Percent of Units Trans-ferred within SCE	Attribution Assigned	Average Attribution A	Usage Factor U	Net-to-Gross
Basis:	1996 Participant Survey		1998 Disposers Survey		1998 Disposers Survey		1998 Acquirers Survey	1998 Acquirers Survey				Participant Survey	A x U
All Units											0.62		0.56
	Keet Unused	19.4%								1	1.00	0.00	0.00
	Kept in Use	40.9%								1	1.00	0.91	0.91
	Discarded	39.7%									0.53		0.49
			Destroyed	8.0%						0	0.00		
			Transferred	92.0%							0.58		0.53
					Outside SCE	13.0%				0	0.00		0.00
					Inside SCE	87.0%					0.67		0.61
											0.67	0.91	0.61
								Bought New	0.0%	0.5	0.50		
								Bought or Fixed Similar	33.3%	0	0.00		
								Bought Worse	0.0%	0	0.00		
								Acquired None	66.7%	1	1.00		
		81%		100%		100%			100.0%				

4 RESULTS

The framework for the net-to-gross analysis is described in Section 3 and applied to a base set of assumptions. In this section we explore alternate assumptions in this same framework and develop a best judgment set of assumptions. These assumptions are then applied to give the final estimate of net savings.

4.1 NET-TO-GROSS ESTIMATES UNDER ALTERNATE ASSUMPTIONS

4.1.1 Simple Alternate Assumptions

Alternate scenarios are constructed by re-assessing each of the base case assumptions. We first consider changing one of these assumptions at a time. We then consider combinations of these one-factor variations.

Each one-factor variation is numbered according to the number of the base assumption changed with letters A, B, and C denoting different ways of changing that assumption.

1. Fractions of units kept and discarded

1A. **Argument**: Customers who indicated on the participant survey that they intended to discard their unit within the year would not necessarily have done so. Some fraction of these customers would not have gotten around to it. However, this skepticism applies only to the customers who outright removed a unit without replacing it. For customers whose picked-up unit was replaced, their indication that they intended to discard the unit is believed.

Specific Assumptions: For replacers, the discard fraction is set equal to the fraction determined from the participant survey. For removers, the discard fraction is set equal to half the fraction from the participant survey. That is, over all, the fraction D of units that would have been discarded in the absence of the Program is computed as

$$D_{1A} = REP_0 \times D_{REP0} + (1\text{-}REP_0) \times D_{REM0}/2$$

where D_{REP0} and $D_{REM0,}$ respectively, indicate the discard fractions determined under the base assumptions for replacers and removers, and REP_0 indicates the fractions of units that were replaced, also based on the initial analysis.

1B. **Argument:** Assumption 1A is qualitatively reasonable, but may be too extreme. We often discount free rider statements if a customer indicates they intended to undertake the efficiency measure without the Program but had not investigated the cost of doing so. On

the other hand, the discarder survey indicates that in most cases disposing of a working unit actually doesn't cost anything and, in fact, pays money. Thus, for those who intend to discard but don't, the reason is mainly inertia, not difficulty or cost of disposal. In such cases, the unit may well be unplugged and unused even though it is not discarded.

Specific Assumption:

$$D_{1C} = REP \times D_{REP0} + (1\text{-}REP) \times (2/3)D_{REM0.}$$

2. Fractions of units transferred and destroyed

2A. **Argument:** Since the discarder survey included only 17 refrigerators and four freezers older than 20 years, we have little direct information on the disposition of such units when they are discarded. However, used refrigerator dealers indicated that they did not take units older than 20 years. Only one of the surveyed customers who acquired a used unit reporting getting one older than 20 years old. Based on these findings, it is likely that the overwhelming majority of units 20 years or older would not be transferred, but would be taken out of circulation. Some of these units actually would be transferred, but in exchange, some of the younger ones would be destroyed.

Specific Assumption: As a simple approximation, we assume that the fraction of units destroyed is equal to the fraction older than 20 years. This fraction was found to be 56.1 percent for refrigerators and 50.0 percent for freezers.

2B. **Argument:** Because of the small number of older units in the discarder survey, the results of this survey should be applied only to units 20 years old or less. Essentially all older units would be taken out of service.

Specific Assumption: The fraction destroyed determined from the discard survey applies to the portion of units 20 years old or younger. All older units are assumed destroyed. That is, the fraction J of units junked or scrapped is:

$$J_{2B} = (1\text{-}\ A_{>20}) \times J_O + \ A_{>20}$$

where J_O is the fraction destroyed determined under the base assumptions, and $A_{>20}$ is the fraction of picked up units older than 20 years.

3. Effect of removals on secondary market

3A. **Argument:** What acquirers say they would have done if a particular unit were unavailable is a poor reflection of what customers have done because a unit was taken out of circulation. Customers may report that they would have purchased a similar unit, but this claim begs the question of where that unit would have come from. Our estimate

of the distribution of alternate actions resulting from picking up the units must reflect the resulting change in the availability of used units.

Specific Assumptions: For customers who reported that they paid for the unit they got, what they would otherwise have done is based not on what they say they would do if the unit had been unavailable, but on what they say they would do if the cost were 25 percent higher. For customers who received the unit for free, their statement of what they would otherwise have done is used.

3B. **Argument:** Refrigerator markets are very localized. Units are not shipped in and out of local areas. Customers who indicated on the disposer survey that their unit ended up outside the SCE service territory were probably incorrect in their responses.

Specific Assumptions: 100 percent of transferred units stayed within SCE's territory.

3C. **Argument**: Because the freezer disposer sample was much smaller than the refrigerator disposer sample, a better estimate of the final disposition may be found by using the percent of refrigerators transferred out of SCE territory.

Specific Assumption: The percent of freezers transferred out of SCE territory is set equal to the base case percent of refrigerators transferred out of SCE territory.

4. Credit for accelerated replacement

4A. **Argument:** A recent study of new refrigerators in SCE territory found that the average UEC is around 700 kWh (XENERGY 1996). The savings due to acquiring a new standard efficiency refrigerator instead of using the old unit the Program picked up would be 2148 kWh - 700 kWh = 1448 kWh, or 67 percent of the savings for outright removal of the unit.

Specific Assumptions: The savings attributed to accelerated replacement is 2/3 the savings for full removal.

4B. **Argument:** Many of the customers who indicated that they would have bought a new unit if the one they acquired were not available would actually have bought a better quality used unit. One dealer indicated that the Program's removal of the lowest quality units forced low-income customers to buy better, more expensive ones. These customers would be unlikely to buy new units if a cheaper alternative was available. In addition, some of the customers buying new units would buy older stock that did not meet current Federal standards.

Specific Assumptions: The savings attributed to accelerated replacement is 1/3 the savings for full removal.

The results of the alternate scenarios and final net savings estimates are summarized in Table 4-1.

Table 4-1
Net-to-Gross Ratios for One-Factor Variations

Method	Assumption Description	Net-to-Gross	
		Refrigerator	Freezer
BASE	Base Case	0.48	0.57
	Keep/Discard Rates		
1A	For removers, discard rate = 1/2 base remover discard rate For replacers, discard rate = base replacer discard rate	0.54	0.58
1B	For removers, discard rate = 2/3 base remover discard rate	0.52	0.57
	Transfer/Destroy Rates		
2A	Fraction destroyed = fraction >20 years	0.43	0.48
2B	All units > 20 years destroyed. Base % transferred applies to ≤ 20 years only	0.43	0.47
	Effect on Secondary Market		
3A	For acquirers who paid, action taken beacuse unit not available based on what they would do if cost 25% more	0.52	0.61
3B	100% of transfers stay in SCE territory	0.50	0.59
3C	Freezer percent transfer out of SCE equals base case refrigerator transfer out of SCE	N/A	0.55
	Accelerated Replacement		
4A	Attribution for accelerated replacement = 0.67	0.50	0.57
4B	Attribution for accelerated replacement = 0.33	0.47	0.57

The refrigerator net-to-gross ratios range from 0.43 under Assumption 2B (all units older than 20 years are destroyed as well as some younger ones) to 0.54 under Assumption 1A (discard rate for removers is half that reported by participants). For freezers, the net-to-gross ranges from 0.48 to 0.61.

4.1.2 What Assumptions Are Most Plausible?

The detailed answer to this question remains a matter of judgment. Further accuracy requires knowledge of hypotheticals that are not knowable with the information currently available. We do not know

- what fraction of those who said they planned to discard their unit really would have;
- how the older units picked up by the Program would have been disposed of; and
- what actions have been taken because the units were picked up by the Program.

Review of Assumptions

Based on the considerations discussed above, the following appear to be reasonable assumptions.

Proportion of Discarders

- Assumption 1B, reducing the nominal discard rate among removers makes sense, but has only a subjective basis.

Proportions Destroyed versus Transferred

- SCE metering study found that the units picked up by the program that were more than 20 years old were in good working order. Therefore no adjustment is made for older units and the base assumption is retained.

Effect of Preventing Transfer of Old Units

- Assumption 3A is reasonable in principle. The fact that the effect is opposite from what was expected suggests that the self-reports of response to hypothetical price changes is a poor way to determine the effect of reduced supplies. This assumption is not recommended for the final analysis.
- Assumption 3B is too extreme.
- Assumption 3C is reasonable for freezers.

Credit Attributed for Accelerated Replacements

- The review of UEC assumptions makes 4A seem more reasonable than the base case.

4.1.3 Best Judgment Assumptions

Based on these considerations, we define the following combination scenario as the basis for the final estimates.

Best judgment: Assumptions 1B, 3C and 4A.

The net-to-gross ratios based on the best-judgment assumptions are summarized in Table 4-2.

Table 4-2
Net-To-Gross Ratios Best Judgment

		Refrigerator	Freezer
Best Judgement	Assumptions 1B, 3C, 4A	0.53	0.57

4.2 NET SAVINGS UNDER BEST JUDGMENT ASSUMPTIONS

Table 4-3 shows the 1996 net energy savings estimates under the best-judgment assumptions for 1994. Table 4-4 shows demand savings.

Table 4-3
Net Energy Savings for the 1996 Program

Unit Type	Number Collected	Full-Year UEC (kWh/year)	Net-to-Gross	Net Savings		Precision at 90% Confidence	
				Per Unit (kWh/year)	Program Total (GWh/year)	Relative (%)	Absolute (GWh/year)
Refrigerator	20,330	2,148	0.53	1,141	23.2	10.3%	3.94
Freezer	5,001	2,058	0.57	1,182	5.9	33.2%	3.23
All Units	25,331	2,130	0.54	1,149	29.1	17.5%	5.10

Table 4-4
Net Demand Savings for the 1996 Program

Unit Type	Number Collected	Average Gross Demand Per Unit (kW)	Gross Program Total (kW)	Net-to-Gross	Net Program Total (kW)	Precision at 90% Confidence	
						Relative (%)	Absolute (kW)
Refrigerator	20,330	0.33	6,679	0.53	3,548	10.3%	603
Freezer	5,001	0.31	1,575	0.57	904	33.2%	494
Total	25,331	0.33	8,253	0.54	4,452	17.5%	780

References

XENERGY Inc. *Residential Appliance Efficiency Incentives Program High Efficiency Refrigeration 1994 First Year Statewide Load Impact Study*. Final Report. Oakland, CA: February 1996.

A

SURVEY METHODOLOGY

A.1 PARTICIPANT SURVEY

The determination of the net impact of programs designed to remove spare refrigerators requires the consideration of a number of difficult to quantify factors. These factors include:

- Whether the picked up unit would otherwise have been kept in the participant's household, turned over to another user, or taken out of use;
- What fraction of the year units that would have been kept would have been in operation;
- The effect on nonparticipants of reducing the number of used units available to a secondary market; and
- Whether the picked up unit was replaced by a new one or represented outright removal of an excess appliance.

Taken together, these factors translate into a free rider effect that goes beyond simple yes-no classification of participants as free riders or not. Alternate interpretations of survey responses on these factors give rise to alternate estimates of the net impacts attributable to the program.

To gather some of the data necessary to assess the net-to-gross issues, XENERGY conducted a telephone survey program of Program participants. The data from these surveys were used in the analysis to help develop net-to-gross factors.

The participant survey took an average of approximately eleven minutes and was administered to a sample of 500 Spare Refrigerator Recycling Program participants. The sample was drawn from the program tracking database from 1996 participants. The survey was fielded in January 1998.

Survey development was an iterative process. SCE staff reviewed the surveys prior to implementation. A computer aided telephone interviewing system was used to conduct the survey.

Survey data were compiled into a SAS database for analysis.

A.2 ACQUIRERS AND DISPOSERS SURVEY

The supplemental survey of customers who acquired or disposed of a used refrigerator or freezer was conducted to complete the net-to-gross analysis. A systematic sample of non-participants was drawn from the SCE billing system by SCE. This sample contained a description of the type

of housing structure (single family, mobile home, tract, or multi-family). The sample had twice the required number for the potential pool of respondents. XENERGY randomly chose half of the sample. A total of 223 customers who recalled acquiring and/or disposing of a unit were interviewed. The average survey took approximately eight minutes. The survey was conducted in January 1998.

Survey data were compiled into a SAS data base for analysis.

B DETAILS OF NET-TO-GROSS ANALYSIS

B.1 DEVELOPMENT OF BASE CASE PROPORTIONS

Information came from the participant survey, the disposers survey, and the acquirers survey.

B.1.1 Keep/Discard

Figure B-1 shows the attribution classification based on participant survey responses for refrigerators. Figure B-2 is the same figure for freezers.

Figure B-1
Attribution Classification Based on Survey Responses
Refrigerators Only

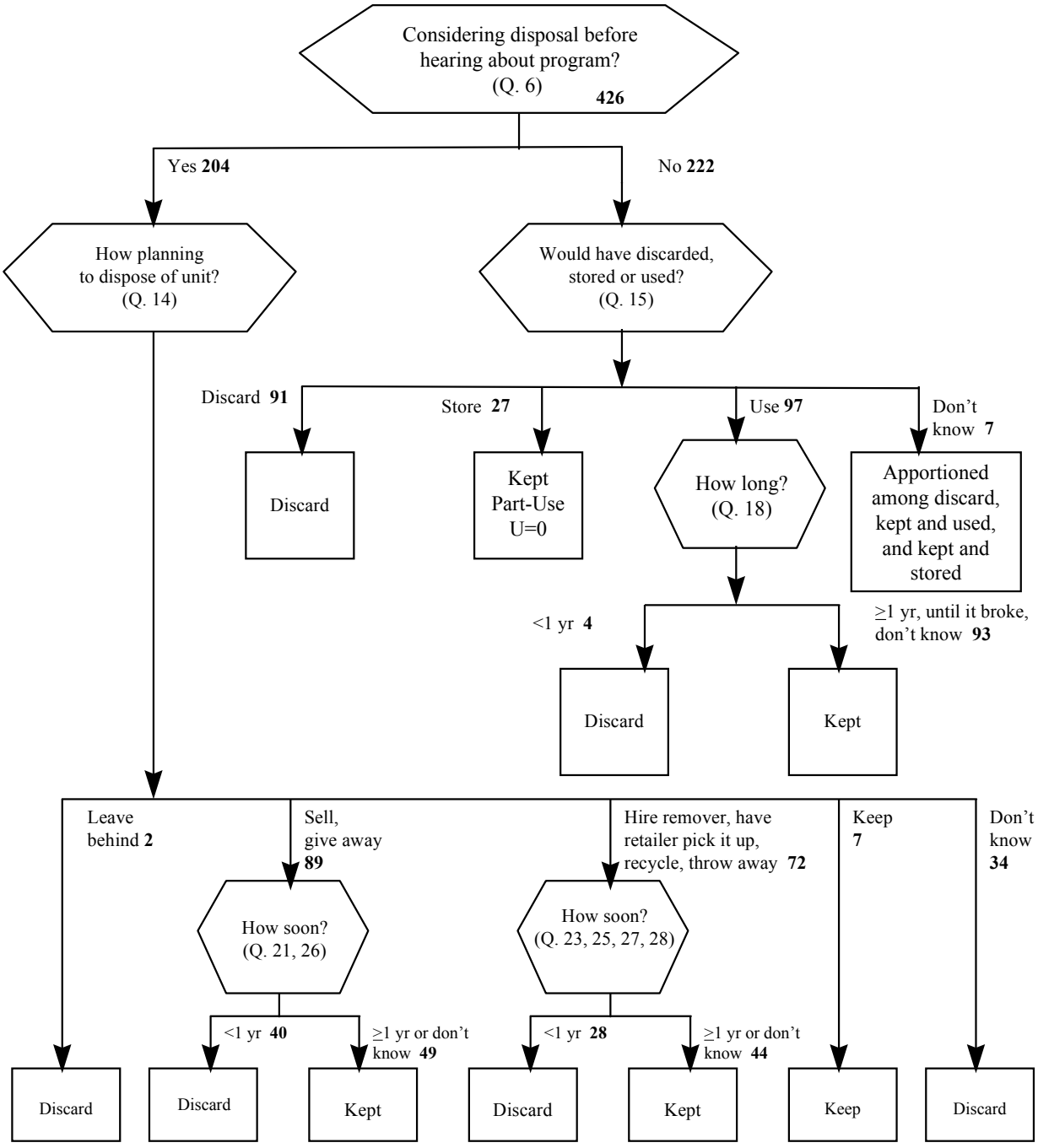
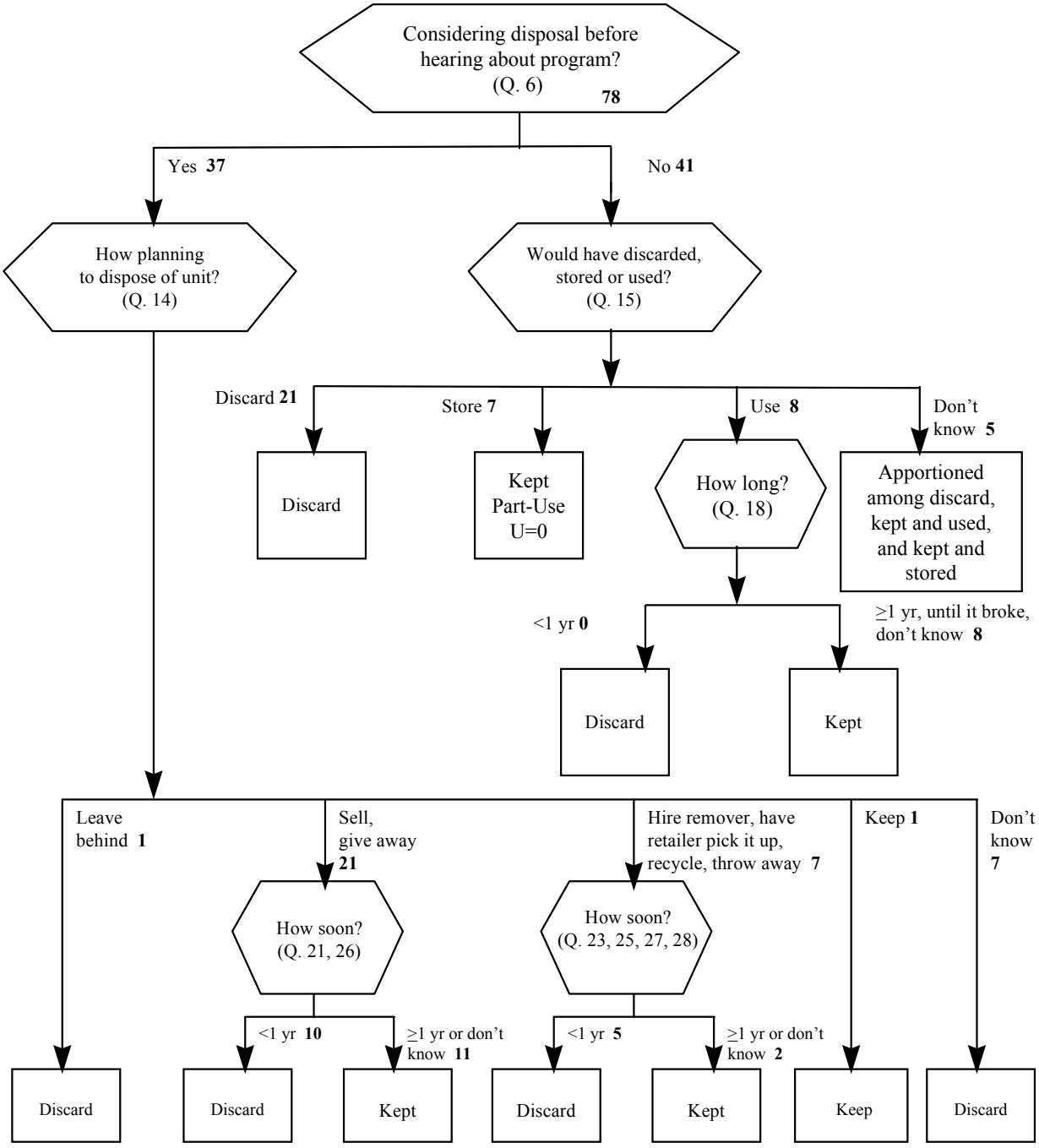


Figure B-2
Attribution Classification Based on Survey Responses
Freezers Only



B.1.2 Destroyed/Transferred

From Disposers survey. The assignments based on the survey responses and proportions in each category are summarized in Table B-1 and Table B-2.

Table B-1
Transfer Proportions Based on Disposers Survey—Refrigerators

How Disposed of Unit?	Who Took?	In SCE?	Assignment	#	%	% of all Discards		% of all Private	
						% Destroy	% Transfer	In	Out
Stored Unused			Taken Out of Service	8	4.2%	4.2%			
Left Behind			Transfer in SCE	5	2.6%		2.6%	3.0%	
Someone Took	Trashed, Recycled, Government		Taken Out of Service	17	8.9%	8.9%			
	Used Appliance Dealer		Transfer in SCE	48	25.1%		25.1%	28.9%	
Sold/Gave Away	Friend or Acquaintance	Yes	Transfer in SCE	85	44.5%		44.5%	51.2%	
	Friend or Acquaintance	No	Transfer Out of SCE	28	14.7%		14.7%		16.9%
			Total	**191**		**13.1%**	**86.9%**	**83.1%**	**16.9%**

Table B-2
Transfer Proportions Based on Disposers Survey—Freezers

How Disposed of Unit?	Who Took?	In SCE?	Assignment	#	%	% of all Discards		% of all Private Transfers	
						% Destroy	% Transfer	In	Out
Stored Unused			Taken Out of Service	0	0.0%	0.0%			
Left Behind			Transfer in SCE	0	0.0%		0.0%	0.0%	
Someone Took	Trashed, Recycled, Government		Taken Out of Service	3	11.5%	1.6%			
	Used Appliance Dealer		Transfer in SCE	4	15.4%		2.1%	17.4%	
Sold/Gave Away	Friend or Acquaintance	Yes	Transfer in SCE	16	61.5%		8.4%	69.6%	
	Friend or Acquaintance	No	Transfer Out of SCE	3	11.5%		1.6%		13.0%
			Total	**26**		**1.6%**	**12.0%**	**87.0%**	**13.0%**

B.1.3 Alternate Action Because Unit was Taken Out of Service

Based on the Acquirers Survey. Use as main or spare refrigerator was considered separately. Units were classified according to: Why did you acquire the refrigerator? The possible answers were:

Why did you acquire refrigerator?	#	%	Main	Spare
1. To replace my primary refrigerator	41	36.9	36.9	
2. I previously had no refrigerator	40	36.0	36.0	
3. To replace my secondary or backup refrigerator	11			9.9
4. To give me additional refrigerator capacity	19			17.1
		Total	73.0	27.0

Answers 1 and 2 were considered main. Answers 3 and 4 were considered spare.

The question as to what they would have done without the unit they acquired was answered with the question: If the particular refrigerator/freezer you acquired were not available, what would you most likely have done? Possible answers included:

For refrigerators:

What would you most likely have done?	Main		Spare	
	#	%	#	%
1. Bought a similar used model somewhere else or fixed the old unit	45	40.5	8	7.2
2. Not purchased at that time	5	4.5	18	16.2
3. Purchased a lower quality used unit	9	8.1	0	0
4. Bought a new unit	22	19.8	4	3.6

For freezers:

What would you most likely have done?	#	%
1. Bought a similar used model somewhere else or fixed the old unit	5	33.3
2. Not purchased at that time	10	67.7
3. Purchased a lower quality used unit	0	0
4. Bought a new unit	0	0

B.2 CALCULATED PROPORTIONS FOR ALTERNATE CASES

1A: Assumption 1A assumes that all of the replacers discard and ½ of the removers discard. The following tables show the replacers and removers for the refrigerators and freezers. Using these tables, the percent of refrigerators that are discarded is 27.8 percent, and the freezer discard percent is 30.1.

Refrigerators	Remover Main	Remover Spare	Replacer Main	Replacer Spare
Keep	15	156	35	44
Discard	21	94	31	30

Freezers	Remover	Replacer
Keep	35	12
Discard	27	4

1B: Assumption 1B recomputes percentage discarded according to:

$$\%\text{Disc} = \text{REP}_0 \times \text{D}_{\text{REP0}} + \left(1 - \text{REP}_0\right) \times \left(\tfrac{2}{3}\right) \times \text{D}_{\text{REM0}}$$

Disposition	Refrigerator Value	Freezer Value
$(\%\ Disc)_{Removers}$	40.2%	24.2%
$\%\ Removers_0$	67.1%	79.5%
$(\%\ Disc)_{Replacers}$	43.6%	100.0%
$\%\ Replacers_0$	32.9%	20.5%

This results in a value of 41.3 percent discarded for refrigerators and 39.7 percent discarded for freezers.

2A: Recompute percentage transferred and percentage destroyed according to $\%Destroyed_{2A}$=% of units >20 years old from the program data base

	Refrigerator		Freezer	
	#	%	#	%
Over 20 years old	11,405	56.1	2504	50.1

2B: Recompute percentage transferred, percentage destroyed according to:

$\%\ Destroyed_{refrig2B}=\%>20+\%Destroyed_{Ref0}*(1-\%>20)$
or
$\%\ Destroyed_{freeze}=\%>20+\%Destroyed_{freez0}*(1-\%>20)$

3A: Reassess what acquirers would otherwise have done if: a) they paid for unit, what if 25 percent more, and b) if they got unit for free, what if not available?

For refrigerators:

		#	%
Main	Fix or Buy Similar	23	20.7
	Not Purchase	21	18.9
	Purchase lower quality	21	18.9
	Buy new	16	14.4
Spare	Fix or Buy Similar	9	8.1
	Not Purchase	19	17.1
	Purchase lower quality	0	0.0
	Buy new	2	1.8
		111	100

and for freezers:

	#	%
Fix or Buy Similar	2	13.3
Not Purchase	12	80.0
Purchase lower quality	0	0
Buy new	1	6.7
		100.0

3B: Set Inside SCE=100 percent
3C: Set %Inside SCE=83.1 percent

4A. Set Attribution for buy new = 2/3.
4B. Set Attribution for buy new = 1/3.

C

SURVEY INSTRUMENTS

C.1 PARTICIPANT SURVEY

SOUTHERN CALIFORNIA EDISON COMPANY
SPARE REFRIGERATOR RECYCLING PROGRAM STUDY
PARTICIPANT QUESTIONNAIRE

Screening Questionnaire

(ASK TO SPEAK WITH NAME ON SAMPLE)

Good morning/afternoon/evening. I'm _____ calling from Luth Research, an independent market research company, on behalf of Southern California Edison. We are conducting a survey among customers who have participated in the Spare Refrigerator Recycling Program to learn more about your energy usage. (IF ASKED:) This will only take about 10 minutes of your time.

A. Have you been interviewed by Southern California Edison about your energy usage in the past few months?

THANK & TERMINATE	Yes	1
CONTINUE	No	2

B. Do you recall participating in Edison's Spare Refrigerator Recycling Program? (IF RESPONDENT IS UNSURE:) This program gave customers the opportunity to have their spare refrigerators and/or freezers removed and recycled. Do you recall participating in this program?

SKIP TO QUESTION D	Yes	1
CONTINUE	No	2
THANK AND TERMINATE	Refrigerator/freezer not picked up	3

C. Is there anyone else who might remember participating in the Spare Refrigerator Recycling Program? May I talk to them?

BEGIN AGAIN AT QUESTION A.	Yes	1
SCHEDULE A CALLBACK	Unavailable	2
THANK AND TERMINATE	No one else	3

D. And, are you the person or one of the people who made the decision to participate in the Spare Refrigerator Recycling Program?

CONTINUE	Yes	1
ASK TO SPEAK WITH THE PERSON WHO MADE THE DECISION, INTRODUCE YOURSELF, ASK Q.A., THEN CONTINUE. IF UNAVAILABLE, ARRANGE CALLBACK.	No	2

E. Was the address where you had the refrigerator/freezer(s) picked up:

SKIP TO Q.1	Your primary residence	1
SKIP TO Q.1	A second home	2
READ BOX A	A property you rent out	3
READ BOX A	Another property you're responsible for but don't live in	4
READ BOX A	Other (describe)_____	5

Box A

SOME OF THE QUESTIONS I'M GOING TO ASK REFER TO YOUR HOUSEHOLD AND THE WAY YOU USED THE REFRIGERATOR/FREEZER. PLEASE ANSWER TO THE BEST OF YOUR ABILITY FOR THE HOUSEHOLD WHERE THE REFRIGERATOR/FREEZER WAS IN USE AT THE TIME YOU CALLED FOR THE PICK-UP.

SOUTHERN CALIFORNIA EDISON COMPANY
SPARE REFRIGERATOR RECYCLING STUDY

Main Questionnaire

0.1. Now, I would like to ask you a few questions specifically about the Spare Refrigerator Recycling Program. As far as you can recall, how did you learn about the program? (PROBE) Anywhere else? (DO NOT READ LIST. MULTIPLES ACCEPTED.)

Newspaper advertisement	1
TV advertisement	2
Radio advertisement	3
Advertising on side of truck	4
Utility bill insert/information with utility bill	5
Separate mailing	6
Toll-free 800 telephone number	7
Media stories about the program	8
From a friend, relative or neighbor	9
Appliance retailer	10
Somewhere else (SPECIFY):_____ _____	11
Don't recall	12

0.2. Why did you decide to participate in the Spare Refrigerator Recycling Program? (PROBE) What other reasons? (DO NOT READ LIST. MULTIPLES ACCEPTED.)

Save electricity/electricity conservation	1
Save money on electric bill	2
$50 U.S. Savings Bond or $25 cash	3
Spare refrigerator/freezer unnecessary	4
Convenience of free pick-up service	5
Environmentally safe disposal	6
Needed to upgrade or replace existing refrigerator or freezer	7
Improve the environment	8
Recommendation of a friend/relative	9
Recommendation of retailer/dealer	10
Edison's sponsorship of the program	11
Other (SPECIFY):_____ ___ _____	12

Don't know	13

1. Did your household purchase or acquire a new refrigerator within the last two years that is, since January 1, 1996? (IF E='3', '4', or '5' READ: REMEMBER, BY "YOUR HOUSEHOLD" I MEAN THE HOUSEHOLD WHERE THE PICKED-UP UNITS WERE LAST USED.)

ASK Q.2	Yes	1
SKIP TO Q.3.	No	2

2. Approximately when did you get the new refrigerator?
(IF UNSURE, PROBE FOR SEASON.) Year:_____ Month:_____

3. Did your household purchase or acquire a new freezer within the last two years that is, since January 1, 1996? (IF E='3', '4', or '5' READ: REMEMBER, BY "YOUR HOUSEHOLD" I MEAN THE HOUSEHOLD WHERE THE PICKED-UP UNITS WERE LAST USED.)

ASK Q.4	Yes	1
SKIP TO Q.5.	No	2

4. Approximately when did you get the new freezer?
(IF UNSURE, PROBE FOR SEASON.) Year:_____ Month:_____

5A. According to the information I have, you had [NUMBER REFRIGERATORS] refrigerators and [NUMBER FREEZERS] picked up by the program during 1996. Does that sound right?

IF NUMBER REFRIG $\leq$ 1 AND NUMBER FREEZERS $\leq$ 1, SKIP TO BOX B. OTHERWISE CONTINUE	Yes	1
CONTINUE	No	2
CONTINUE	Don't Know	DK

5B. The information I have says the refrigerator(s) picked up (was/were) [READ REFRIGERATOR DESCRIPTIONS] and the freezer(s) (was/were) [READ FREEZER DESCRIPTIONS]
Could that be correct?

SKIP TO BOX B	Yes	1
CONTINUE	No	2
SKIP TO BOX B	Don't Know	DK

5C. How many refrigerators and how many freezers did you have picked up during 1996?

Refrigerators _____ Freezers _____

5D. Please give me the correct information for each refrigerator and each freezer you had picked up. (IF MORE THAN TWO REFRIGERATORS OR MORE THAN TWO FREEZERS WERE REPORTED AT Q. 5C, READ:) Just describe (two of the refrigerators/two of the freezers) REPLACE OR ADD FILE INFORMATION AS NECESSARY FOR EACH UNIT.

What was the [feature]? [ASK FOR EACH FEATURE. FOR EACH, READ LIST OF OPTIONS IF NECESSARY.

FEATURE		CATEGORY	
Color	1		
		Color =	
Size	2		
		Larger or two	a
		Smaller of two	b
		Size =	[CF]
Age	3		
		Older of two	a
		Younger of two	b
		Age =	[YEARS]
Style	4	REFRIGERATORS	
		Single door	a
		Side-by-side	b
		Top freezer	c
		Bottom freezer	d
		FREEZERS	
		Upright	a
		Chest	b
Defrost	5		
		Manual	a
		Automatic	b
		Partial	cq
Pickup date	6		
		First one picked up	a
		Last one picked up	b
		Picked up on ---	[DATE]

Box B

OK, let's go with this information. You had [FINAL NUMBER OF REFRIGERATORS] and [FINAL NUMBER OF FREEZERS] picked up by the program in 1996. I'm going to ask you a few questions about (this unit/each of the units you described). [IF MORE THAN ONE, READ:] Let's start with the ((first) refrigerator/(first) freezer). [IF TWO REFRIGERATORS/TWO FREEZERS READ:] That is the [colorR1], [sizeR1] cubic feet, about [ageR1] years old, [styleR1], [defrostR1] defrost one, picked up on [dateR1]. **[PROGRAMMER—THE INFO THAT GOES IN HERE IS THE ORIGINAL INFO IF Q. 5A AND Q. 5B = YES OR DK, THE REVISED INFO FR Q. 5D IF 1. 5A = NO.]**

ASK Q. 6 THROUGH Q. 29 FOR REFRIGERATOR 1. THEN START AGAIN AT BOX C FOR REFRIGERATOR 2.

Box C.

Now tell me about the ((second) refrigerator/ (second) freezer). [IF TWO REFRIGERATORS/TWO FREEZERS READ:] This was the one that was [colorR2], [sizeR2] cubic feet, about [ageR2] years old, [styleR2], [defrostR2] defrost one, picked up on [dateR2].
ASK Q. 6 THROUGH Q. 29 FOR REFRIGERATOR 2. THEN CONTINUE WITH FREEZERS, IF ANY, OR Q. 30.

6. Did you have any plans or intentions to discard the (refrigerator/freezer) BEFORE you heard about the program?

Yes	1
No	2

7. How old was the (refrigerator/freezer) when you disposed of it? (IF RESPONDENT IS UNSURE, READ LIST.)

RECORD # OF YEARS:_____

	5 years or less	1
	6 - 10 years	2
	11 - 15 years	3
	16 - 20 years	4
	21 - 30 years	5
DO NOT READ	Don't know	6
	Refused	7

8. How long had **you** owned the (refrigerator/freezer) that you had picked-up?

RECORD # OF MONTHS:_____

RECORD # OF YEARS:_____

(ASK Q.9 and Q.10 FOR REFRIGERATORS ONLY)

9. At the time you called to have this refrigerator picked up, was it the main refrigerator for your/the household or was it being used as a spare?

SKIP TO Q.11	Main refrigerator	1
ASK Q.10	Spare refrigerator	2

10. How long had your household been using the refrigerator as a spare?

RECORD # OF MONTHS:_____

RECORD # OF YEARS:_____

11. At the time the (refrigerator/freezer) was picked up, what condition was it in? Was it in working condition, working but in need of repairs, or not working?

In working condition	1
Working but in need of repairs	2
Not working	3

12. During the 12 months before you had this (refrigerator/freezer) picked up, about how many months was this (refrigerator/freezer) plugged in and running? (READ LIST IF NECESSARY.)

SKIP TO Q.14	None	1
CONTINUE	Less than one month	2
	1 - 3 months	3
	4 - 6 months	4
	7 - 9 months	5
	10 - 11 months	6
SKIP TO 14	All year/12 months	7
CONTINUE	Don't know	8

(IF LESS THAN A FULL YEAR, ASK:)

13. Was the (refrigerator/freezer) plugged in and running only during certain seasons, holiday times, or special events?

Yes (SPECIFY):_____ _____	1
No	2
Don't know	3

(ASK Q.14 FOR REFRIGERATORS ONLY)

14. (IF Q.1=NO THEN SKIP TO Q.15) You said earlier that you had bought a refrigerator in the last two years. Was getting the new refrigerator a major reason you decided to discard this old one?

Yes	1
No	2

(ASK Q.15 FOR FREEZERS ONLY.)

15. (IF Q3=NO THEN SKIP TO Q.16) You said earlier that you had bought a new freezer in the last two years. Was getting the new freezer a major reason you decided to discard this old one?

Yes	1
No	2

(IF RESPONDENT ANSWERED <u>YES</u> IN Q.6, ASK:)

16. If Edison had not picked up the (refrigerator/freezer), what would you have done with it? (DO NOT READ LIST. ACCEPT ONE ANSWER ONLY.)

SKIP TO Q.20	Sold the refrigerator/freezer	1
SKIP TO Q.26	Given the refrigerator/freezer away	2
SKIP TO Q.27	Thrown the refrigerator/freezer away	3
SKIP TO Q.22	Hired someone to pick it up	4
SKIP TO Q.30	Left in house when we moved	5
SKIP TO Q.28	Taken it to a recycling center	6
SKIP TO Q.30	Other (SPECIFY):_____ _____	7
SKIP TO Q.24	Have appliance retailer pick up	8

SKIP TO Q.29	Don’t know	DK

(IF RESPONDENT ANSWERED NO or DK IN Q.6, ASK:)

17. If Edison had not picked up the (refrigerator/freezer) would you have kept it and stored it unplugged, or would you have kept it in use at least part of the time?

SKIP TO Q.30	Store it	1
SKIP TO Q.18	Use it	2
ASK Q.17A	Discard it	3
SKIP TO Q.30	Don't know	DK

17A. How would you have discarded it?

SKIP TO Q.20	Sold the refrigerator/freezer	1
SKIP TO Q.26	Given the refrigerator/freezer away	2
SKIP TO Q.27	Thrown the refrigerator/freezer away	3
SKIP TO Q.22	Hired someone to pick it up	4
SKIP TO Q.30	Left in house when we moved	5
SKIP TO Q.28	Taken it to a recycling center	6
SKIP TO Q.30	Other (SPECIFY):_____ _____	7
SKIP TO Q.24	Have appliance retailer pick up	8
SKIP TO Q.29	Don't know	DK9

18. For how many years do you think you might have kept the (refrigerator/freezer) in use? (READ SCALE IF NECESSARY.)

	Less than one year	1
	1 - 3 years	2
	4 - 6 years	3
	7 - 9 years	4
	10 or more	5
DO NOT READ	Until it broke	6
	Don't know	DK

19. During the years that you kept the (refrigerator/freezer) in use, about how many months of the year would you have kept it plugged in and running?
(SKIP TO Q.30 IF NO FOR Q.6. AFTER ASKING THIS QUESTION)

None	1
Less than one month	2
1 - 3 months	3
4 - 6 months	4
7 - 9 months	5
10 - 11 months	6
All year/12 months	7
Don't know	8

(IF RESPONDENT WOULD HAVE SOLD IN Q.16, ASK Q.20 and Q.21:)

20. For what price do you think you would have sold your (refrigerator/freezer)?

RECORD: $_____

Don't know	DK
Refused	REF

21. When do you think you would have sold your (refrigerator/freezer)?

RECORD # OF MONTHS:_____

RECORD # OF YEARS:_____

Don't know	DK

RECORD # OF YEARS:_____

(IF RESPONDENT WOULD HAVE HIRED SOMEONE TO PICK UP IN Q.16, ASK Q.22 and Q.23.)

22. How much do you think it would have cost you to hire someone to dispose of the (refrigerator/freezer)?

RECORD: $_____
A RESPONSE OF "FREE" IS RECORDED $0.00.

Don't know	DK
Refused	REF

23. When do you think you would have hired someone to dispose of the (refrigerator/freezer)?

RECORD # OF MONTHS:_____

RECORD # OF YEARS:_____

Don't know	DK

(IF RESPONDENT WOULD HAVE HAD APPLIANCE RETAILER PICK UP, ASK Q.24 AND Q.25.)

24. How much do you think it would cost you to have the appliance retailer pick up the (refrigerator/freezer)?

RECORD: $_____
A RESPONSE OF "FREE" IS RECORDED $0.00.

Don't know	DK
Refused	REF

25. When do you think you would have had the appliance retailer pick up the (refrigerator/freezer)?

RECORD # OF MONTHS:_____

RECORD # OF YEARS:_____

Don't know	DK

(IF RESPONDENT WOULD HAVE GIVEN THE APPLIANCE AWAY, ASK Q.26:)

26. When do you think you would have given the (refrigerator/freezer) away?

RECORD # OF MONTHS:_____

Don't know	DK

(IF RESPONDENT WOULD HAVE THROWN THE APPLIANCE AWAY, ASK Q.27.)

27. When do you think you would have thrown the (refrigerator/freezer) away?

RECORD # OF MONTHS:_____

RECORD # OF YEARS:_____

Don't know	DK

(IF RESPONDENT WOULD HAVE TAKEN THE APPLIANCE TO A RECYCLING CENTER, ASK Q.28.)

28. When do you think you would have taken the (refrigerator/freezer) to a recycling center?

RECORD # OF MONTHS:_____

RECORD # OF YEARS:_____

Don't know	DK

(IF RESPONDENT ANSWERED DON'T KNOW TO Q.16, ASK Q.29.)

29. When do you think you would have discarded the (refrigerator/freezer)?

RECORD # OF MONTHS:_____

RECORD # OF YEARS:_____

Don't know	DK

(ASK Q.5 1/2 - Q.29 FOR NEXT APPLIANCE PICKED UP. IF NO MORE, CONTINUE.)
(ASK EVERYONE Q.30.)

30. If you had not been offered a $50 U.S. Savings Bond or $25 cash, how likely would you have been to participate in the Edison program anyway? Would you have been...(READ LIST)?

Very likely	1
Somewhat likely	2
Neither likely nor unlikely	3
Somewhat unlikely	4
Very unlikely	5
Don't know	6

31. How much money do you think it cost you on your electric bill each month to run (all of) the [refrigerator(s) and/or freezer(s)] you had Southern California Edison pick up when you had (it/them) plugged in?

Nothing	1
$1 to $5/month	2
$6 to $10	3
$11 to $15	4
$16 to $20	5
More than $20	6
Don't know	7

32. How many refrigerators do you now have (at that location) that are plugged in and running? And, how many stand-alone freezers?

REFRIGERATORS	
One	1
Two	2
Three or more	3
Refused	REF

FREEZERS	
None	1
One	2
Two or more	3
Refused	REF

(FOR EACH REFRIGERATOR AND FREEZER OWNED IN Q.32, ASK Q.33 THROUGH Q.35.)

33. How many months of the year is the (first/second/third) (refrigerator/freezer) plugged in and running? (READ LIST IF NECESSARY.)

	Less than one month a year	1
	1 - 3 months a year	2
	4 - 6 months a year	3
	7 - 9 months a year	4
	10 - 11 months a year	5
DO NOT READ	Don't know	6

34. Approximately how old is your...(READ)?

	# of Years	# of Months
First refrigerator		
Second refrigerator		
Third refrigerator		
First stand-alone freezer		
Second stand-alone freezer		

35. Is the freezer section of your (first/second/third) refrigerator manually defrosted or self defrosting? And, is your (first/second/third) stand-alone freezer manually defrosted or self-defrosting?

	Manual	Self	Don't Know
First refrigerator	1	2	3
Second refrigerator	1	2	3
Third refrigerator	1	2	3
First stand-alone freezer	1	2	3
Second stand-alone freezer	1	2	3

36. Using a 5 point scale where "5" means you were "very satisfied" and "1" means you were "very dissatisfied," please tell me how satisfied you were overall with the Spare Refrigerator Recycling Program?

Very Satisfied				Very Dissatisfied
5	4	3	2	1

(IF Q.36 IS "1" OR "2" ASK Q.37.)

37. Why were you dissatisfied with the program? (PROBE) What other reasons? (CLARIFY)

_____

_____

38. What, if anything do you feel could be done to improve the Spare Refrigerator Recycling Program in the future? (PROBE) Anything else?

_____

_____

_____

_____

My last few questions are for statistical purposes only.

39. Including yourself, how many people live in your household at least six months of the year?

RECORD #:_____

40. How many of these people are...(READ LIST)?

Under the age of 13	
13 - 19 years old	
20 - 25 years old	
26 - 35 years old	
36 - 45 years old	
46 - 55 years old	
56 - 65 years old	
Over the age of 65	

41. What is the age of the head of your household? (IF ONLY ONE IN HOUSEHOLD, ASK:) What is your age, please? (READ LIST IF NECESSARY.)

	Under 18	1
	18 to 25	2
	26 to 35	3
	36 to 45	4
	46 to 55	5
	56 to 65	6
	Over 65	7
DO NOT READ	Refused	8

42. Finally, what is your household's total annual income before taxes? Is it ..... (READ)

	Under $10,000	1
	$10,000 to under $20,000	2
	$20,000 to under $30,000	3
	$30,000 to under $40,000	4
	$40,000 to under $50,000	5
	$50,000 to under $75,000	6
	$75,000 or above	7
DO NOT READ	Don't know	8
DO NOT READ	Refused	9

43. RECORD FROM OBSERVATION

Male	1
Female	2

Those are all of my questions. I would like to thank you very much for taking the time do this survey.

INTERVIEWER:_____ DATE:_____

C.2 NON PARTICIPANT SURVEY

SOUTHERN CALIFORNIA EDISON COMPANY
SPARE REFRIGERATOR RECYCLING PROGRAM STUDY
NON PARTICIPANT QUESTIONNAIRE

"Hello, I'm ___, calling from Luth Research. I'm conducting a survey for Southern California Edison to analyze the market for used refrigerators and freezers. Is this the _____ residence? (IF YES, CONTINUE. IF NOT, THANK & TERMINATE). May we ask you a few questions about your refrigerator and freezer purchases? (IF YES, CONTINUE. IF NOT, THANK & RESCHEDULE OR TERMINATE)

1a. Have you been interviewed by Southern California Edison about your energy usage in the past few months?
_1_ Yes (THANK AND TERMINATE)
_2_ No (CONTINUE)

1b. Is the number I reached you at your home, a place of business, or both?
_1_ Home (CONTINUE)
_2_ Place of business (THANK AND TERMINATE)
_3_ Both (CONTINUE)

1c. Have you acquired any used refrigerators or stand-alone freezers since January 1, 1995, either as an additional unit or as a replacement for a previous one?
_1_ Yes
_2_ No

1d. Just to confirm, these units were used, not new, when you got them. Is that correct?
_1_ Yes
_2_ No (GO TO 1f)

1e. How many used refrigerators and stand-alone freezers have you acquired since January 1, 1995?
1e_1_ ___ (number of refrigerators) (COMPLETE SECTION A)
1e_2_ ___ (number of stand-alone freezers) (COMPLETE SECTION B)

1f. Have you gotten rid of any working refrigerators or stand-alone freezers since January 1, 1995, including any units that were replaced?
__1__ Yes
__2__ No

1g. Just to confirm, these units were working, not broken, when you got rid of them. Is that correct?
__1__ Yes (CONTINUE)
__2__ No (COMPLETE A OR B IF APPLICABLE ELSE THANK AND TERMINATE)

1h. How many working refrigerators and stand-alone freezers have you gotten rid of since January 1, 1995?
1h_1 ___ (number of refrigerators) (COMPLETE SECTION C)
1h_2 ___ (number of stand-alone freezers) (COMPLETE SECTION D)

IF RESPONDENT ANSWERED "NO" TO 1D AND 1G, THEN THANK AND TERMINATE. OTHERWISE, COMPLETE ALL APPLICABLE SURVEY SECTIONS.

SECTION A: ACQUIRED REFRIGERATORS

IF RESPONDENT HAS ACQUIRED MORE THAN ONE USED REFRIGERATOR, ASK QUESTIONS A1 THROUGH A16 FIRST FOR THE MOST RECENTLY ACQUIRED ONE, THEN FOR THE NEXT MOST RECENTLY ACQUIRED ONE. KEEP RESONSES FOR THE TWO UNITS SEPARATE. ASK ONLY FOR THE TWO MOST RECENTLY ACQUIRED.

A1 What type of refrigerator is it? (READ OPTIONS)
__1__ Single-door
__2__ Side-by-side
__3__ Top freezer
__4__ Bottom freezer

A2 Is it frost free or manual defrost?
__1__ Frost free
__2__ Manual defrost

A3 About how old is it now? ___ (age in years)

A4 What size is it in cubic feet?
_____ (size)
__DK__ Don't Know

A5 Approximately when did you acquire it?
___ (year)
___ (month) (IF MONTH=DK, PROBE FOR SEASON)

A6 What condition was it in when you got it? (READ OPTIONS)
__1__ Working condition
__2__ Working but in need of repairs
__3__ Not working

A7 How do you currently use the refrigerator? (READ OPTIONS)

1	plugged in and running all of the time	(GO TO A9)
2	plugged in most of the time, unplug it when it is not in use	
3	use only during certain months or seasons	
4	unit works but it is not plugged in and operating at all	(GO TO A9)
5	unit doesn't work	(GO TO A9)
6	no longer own the unit	(GO TO A9)

A8 How many months per year is it plugged in and running? ___ (number)

A9 How did you acquire the refrigerator? (READ OPTIONS IF NECESSARY)

1	Purchased it from a friend, acquaintance, or relative	
2	Purchased it from a used refrigerator/freezer dealer	
3	Purchased at a garage sale, estate sale, or newspaper ad	
4	Refrigerator was given to me	(GO TO A11)
5	Previous occupant of this house left it behind	(GO TO A11)

A10 How much did you pay for it? ___ ($)

A11 If the particular refrigerator you acquired had not been available, what would you most likely have done? (READ OPTIONS)

1 Bought a similar used refrigerator somewhere else
2 Not purchased a refrigerator at that time
3 Purchased a lower quality used refrigerator
4 Purchased a new refrigerator
5 Fixed the old refrigerator

ROTATE QUESTIONS A12, A13, AND A14.

A12 If the price for this or a similar unit had been 10% higher, what would you have done? (READ OPTIONS)

1 Bought the refrigerator anyway
2 Not purchased a refrigerator at that time
3 Purchased a lower quality used refrigerator
4 Purchased a new refrigerator
5 Fixed the old refrigerator

A13 If the price for this or a similar unit had been 25% higher, what would you have done? (READ OPTIONS IF NECESSARY)

1 Bought the refrigerator anyway
2 Not purchased a refrigerator at that time
3 Purchased a lower quality used refrigerator
4 Purchased a new refrigerator
5 Fixed the old refrigerator

A14 If the price for this or a similar unit had been 50% higher, what would you have done? (READ OPTIONS IF NECESSARY)

1 Bought the refrigerator anyway
2 Not purchased a refrigerator at that time
3 Purchased a lower quality used refrigerator
4 Purchased a new refrigerator
5 Fixed the old refrigerator

A15 Why did you acquire the refrigerator? (READ OPTIONS)
__1__ To replace my primary refrigerator
__2__ To replace my secondary or backup refrigerator
__3__ To give me additional refrigerator capacity (GO TO END OF A)
__4__ I previously had no refrigerator (GO TO END OF A)

A16 About the refrigerator you replaced, what did you do with it? (READ OPTIONS)
__1__ Discarded or got rid or it (COMPLETE SECTION C FOR REPLACED UNIT)
__2__ Still have it; store it unused
__3__ Use it as a backup refrigerator

END OF SECTION A

SECTION B: ACQUIRED STAND-ALONE FREEZERS

IF RESPONDENT HAS ACQUIRED MORE THAN ONE USED FREEZER, ASK QUESTIONS B1 THROUGH B15 FOR FIRST FOR THE MOST RECENTLY ACQUIRED ONE, THEN FOR THE NEXT MOST RECENTLY ACQUIRED. KEEP RESPONSES FOR THE TWO UNITS SEPARATE. ASK ONLY FOR THE TWO MOST RECENTLY ACQUIRED.

B1 What type of freezer is it? (READ OPTIONS)
__1__ Upright freezer
__2__ Chest freezer

B2 About how old is it now? ___ (age in years)

B3 What size is it in cubic feet?
_____ (size)
__DK__ Don't Know

B4 Approximately when did you acquire it?
___ (year)
___ (month) (IF MONTH = DK, PROBE FOR SEASON)

B5 What condition was it in when you got it? (READ OPTIONS)
__1__ Working condition
__2__ Working but in need of repairs
__3__ Not working

B6 How do you currently use the freezer? (READ OPTIONS)
__1__ plugged in and running all of the time (GO TO B8)
__2__ plugged in most of the time, unplug it when it is not in use
__3__ use only during certain months or seasons
__4__ keep it as spare; isn't plugged in and operating at all (GO TO B8)
__5__ unit doesn't work (GO TO B8)
__6__ no longer own the unit (GO TO B8)

B7 How many months per year is it plugged in and running? ___ (number)

B8 How did you acquire the freezer? (READ OPTIONS IF NECESSARY)
_1_ Purchased from a friend, acquaintance, or relative
_2_ Purchased from a used freezer dealership
_3_ Purchased at a garage sale, estate sale, or newspaper ad
_4_ Freezer was given to me (GO TO B10)
_5_ Previous occupant of this house left it behind (GO TO B10)

B9 How much did you pay for it? ___ ($)

B10 If the particular freezer you acquired had not been available, what would you most likely have done? (READ OPTIONS)
_1_ Bought a similar used freezer somewhere else
_2_ Not purchased a freezer at that time
_3_ Purchased a lower quality used freezer
_4_ Purchased a new freezer
_5_ Fixed the old freezer

ROTATE QUESTIONS B11, B12, AND B13.

B11 If the price for this or a similar unit had been 10% higher, what would you have done? (READ OPTIONS)
_1_ Bought the freezer anyway
_2_ Not purchased a freezer at that time
_3_ Purchased a lower quality used freezer
_4_ Purchased a new freezer
_5_ Fixed the old freezer

B12 If the price for this or a similar unit had been 25% higher, what would you have done? (READ OPTIONS IF NECESSARY)
_1_ Bought the freezer anyway
_2_ Not purchased a freezer at that time
_3_ Purchased a lower quality used freezer
_4_ Purchased a new freezer
_5_ Fixed the old freezer

B13 If the price for this or a similar unit had been 50% higher, what would you have done? (READ OPTIONS IF NECESSARY)
_1_ Bought the freezer anyway
_2_ Not purchased a freezer at that time
_3_ Purchased a lower quality used freezer
_4_ Purchased a new freezer
_5_ Fixed the old freezer

B14 Why did you acquire the freezer? (READ OPTIONS)
_1_ To replace an existing freezer
_2_ To give me additional freezer capacity (GO TO END OF B)
_3_ I previously had no freezer (GO TO END OF B)

B15 About the freezer you replaced, what did you do with it? (READ OPTIONS)
_1_ Discarded or got rid or it (COMPLETE SECTION D FOR REPLACED UNIT)
_2_ Still have it; store it unused
_3_ Use it as a backup freezer

END OF SECTION B

SECTION C: DISCARDED STAND-ALONE REFRIGERATORS

IF RESPONDENT HAS DISCARDED MORE THAN ONE WORKING REFRIGERATOR, ASK QUESTIONS C1 THROUGH C13 FIRST ABOUT THE MOST RECENTLY DISCARDED ONE, THEN FOR THE NEXT MOST RECENTLY DISCARDED. KEEP RESPONSES FOR THE TWO UNITS SEPARATE. ASK ONLY FOR THE TWO MOST RECENTLY DISCARDED.

C1 What type of refrigerator was it? (READ OPTIONS)
- 1 Single-door
- 2 Side-by-side
- 3 Top freezer
- 4 Bottom freezer

C2 Was it frost free or manual defrost?
- 1 Frost free
- 2 Manual defrost
- 3 Partial defrost

C3 About how old was it when you got rid of it? ___ (age in years)

C4 What size was it in cubic feet?
_____ (size)
DK Don't Know

C5 Approximately when did you get rid of it?
___ (year)
___ (month) (IF MONTH = DK, THEN PROBE FOR SEASON)

C6 What condition was it in when you got rid of it? (READ OPTIONS)
- 1 Working condition
- 2 Working but in need of repairs
- 3 Not working (GO TO END OF C)

C7 Had you been using the refrigerator as your primary unit or as a secondary or backup unit?
- 1 Primary
- 2 Secondary or backup

C8 How did you get rid of the refrigerator? (READ OPTIONS IF NECESSARY)
- 1 Took it to a recycler or scrap dealer (GO TO C10)
- 2 Took it to the landfill or threw it away (GO TO C10)
- 3 Sold it to a friend, acquaintance, or relative (GO TO C9 THEN C12)
- 4 Sold it to a used refrigerator/freezer dealer (GO TO C9)
- 5 Sold it via garage sale, estate sale, or newspaper ad (GO TO C9)
- 6 Hired someone to pick it up (GO TO C10)
- 7 Traded it for a replacement unit (GO TO C11)
- 8 Dealer I bought a new one from took it away (GO TO END OF C)
- 9 Gave it away (GO TO C12)
- 10 Still have it; store it unused (GO TO END OF C)
- 11 Left it behind when we moved (GO TO END OF C)

C9 How much did you sell it for? ____ ($) (GO TO C12 OR END OF C)

C10 How much did you pay to get rid of it? ____ ($) (GO TO END OF C)

C11 How much credit did you get in the trade? ____ ($) (GO TO END OF C)

IF RESPONDENT ANSWERED 3 OR 9 TO Q. C8:

C12 Do you think the refrigerator is still in the Southern California Edison service territory? (SCE service territory generally includes the southern part of the San Joaquin Valley, southern and eastern Sierras and Southern California, excluding Los Angeles and San Diego Counties)
_1_ Yes
_2_ No

C13 How do you think the refrigerator is currently used? (READ OPTIONS)
_1_ plugged in and running all of the time
_2_ plugged in most of the time, unplug it when it is not in use
_3_ use only during certain months or seasons
_4_ kept as spare; isn't plugged in and operating at all
_5_ unit doesn't work

END OF SECTION C

SECTION D: DISCARDED STAND-ALONE FREEZERS

IF RESPONDENT HAS DISCARDED MORE THAN ONE FREEZER, ASK QUESTIONS D1 THROUGH D11 FIRST ABOUT THE MOST RECENTLY DISCARDED ONE, THEN FOR THE NEXT MOST RECENTLY DISCARDED. KEEP RESPONSES FOR THE TWO UNITS SEPARATE. ASK ONLY FOR THE TWO MOST RECENTLY DISCARDED.

D1 What type of freezer was it? (READ OPTIONS)
_1_ Upright freezer
_2_ Chest freezer

D2 About how old was it when you got rid of it? ___ (age in years)

D3 What size was it in cubic feet?
_____ (size)
_DK_ Don't Know

D4 Approximately when did you get rid of it?
___ (year)
___ (month) (IF MONTH=DK, THEN PROBE FOR SEASON)

D5 What condition was it in when you got rid of it? (READ OPTIONS)
_1_ Working
_2_ Working but in need of repairs
_3_ Not working (GO TO END OF D)

D6 How did you get rid of the freezer? (READ OPTIONS IF NECESSARY)

1	Took it to a recycler or scrap dealer	(GO TO D8)
2	Took it to the landfill or threw it away	(GO TO D8)
3	Sold it to a friend, acquaintance, or relative	(GO TO D7 THEN D10)
4	Sold it to a used refrigerator/freezer dealer	(GO TO D7)
5	Sold it via garage sale, estate sale, or newspaper ad	(GO TO D7)
6	Hired someone to pick it up	(GO TO D8)
7	Traded it for a replacement unit	(GO TO D9)
8	Dealer I bought a new one from took it away	(GO TO END OF D)
9	Gave it away	(GO TO D10)
10	Still have it; store it unused	(GO TO END OF D)
11	Left it behind when we moved	(GO TO END OF D)

D7 How much did you sell it for? ____ ($) (GO TO D10 OR END OF D)

D8 How much did you pay to get rid of it? ____ ($) (GO TO END OF D)

D9 How much credit did you get in the trade? ____ ($) (GO TO END OF D)

IF RESPONDENT ANSWERED 3 OR 9 TO Q. D6:

D10 Do you think the freezer is still in the Southern California Edison service territory? (SCE service territory generally includes the southern part of the San Joaquin Valley, southern and eastern Sierras and Southern California, excluding Los Angeles and San Diego Counties)

1 Yes
2 No

D11 How do you think the freezer is currently used? (READ OPTIONS)

1 plugged in and running all of the time
2 plugged in most of the time, unplug it when it is not in use
3 use only during certain months or seasons
4 kept as spare; isn't plugged in and operating at all
5 unit doesn't work

END OF SECTION D

D

DETAILED NET-TO-GROSS ANALYSIS

Table D-1 contains the attribution factors and the percent of units classified as kept, used, discarded, etc. The resulting net-to-gross factors are shown in Table D-2.

Table D-1
Detailed Net to Gross Inputs

		Participants Survey		Disposers Survey		Acquirers Survey							
Assumption	Refrigerator or Freezer	%Kept of Collected Units	Of Kept % Used	Of Discard % Destroyed	Of Discard % Transferred Outside SCE	Of Used Acquirers % Main Would Purchase New	Of Used Acquirers % Main Would Fix or Buy Similar	Of Used Acquirers % Main Would Purchase a Lower Quality Used Unit	Of Used Acquirers % Main Would Buy None	Of Used Acquirers % Spare Would Purchase New	Of Used Acquirers % Spare Would Fix or Buy Similar	Of Used Acquirers % Spare Would Purchase a Lower Quality Used Unit	Of Used Acquirers % Spare Would Buy None
Base	Refrigerator	58.7%	77.2%	8.9%	16.9%	19.8%	40.5%	8.1%	4.5%	3.6%	7.2%	0.0%	16.2%
Base	Freezer	60.3%	67.8%	8.0%	13.0%	0.0%	33.3%	0.0%	66.7%				
1A	Refrigerator	72.2%	77.2%	8.9%	16.9%	19.8%	40.5%	8.1%	4.5%	3.6%	7.2%	0.0%	16.2%
1A	Freezer	69.9%	67.8%	8.0%	13.0%	0.0%	33.3%	0.0%	66.7%				
1B	Refrigerator	67.7%	77.2%	8.9%	16.9%	19.8%	40.5%	8.1%	4.5%	3.6%	7.2%	0.0%	16.2%
1B	Freezer	66.7%	67.8%	8.0%	13.0%	0.0%	33.3%	0.0%	66.7%				
2A	Refrigerator	58.7%	77.2%	56.1%	16.9%	19.8%	40.5%	8.1%	4.5%	3.6%	7.2%	0.0%	16.2%
2A	Freezer	60.3%	67.8%	50.1%	13.0%	0.0%	33.3%	0.0%	66.7%				
2B	Refrigerator	58.7%	77.2%	60.0%	16.9%	19.8%	40.5%	8.1%	4.5%	3.6%	7.2%	0.0%	16.2%
2B	Freezer	60.3%	67.8%	54.0%	13.0%	0.0%	33.3%	0.0%	66.7%				
3A	Refrigerator	58.7%	77.2%	8.9%	16.9%	14.4%	20.7%	18.9%	18.9%	1.8%	8.1%	0.0%	17.1%
3A	Freezer	60.3%	67.8%	8.0%	13.0%	6.7%	13.3%	0.0%	80.0%				
3B	Refrigerator	58.7%	77.2%	8.9%	0.0%	19.8%	40.5%	8.1%	4.5%	3.6%	7.2%	0.0%	16.2%
3B	Freezer	60.3%	67.8%	8.0%	0.0%	0.0%	33.3%	0.0%	66.7%				
3C	Freezer	58.7%	67.8%	8.0%	16.9%	0.0%	33.3%	0.0%	66.7%				
4A	Refrigerator	60.3%	77.2%	8.9%	16.9%	19.8%	40.5%	8.1%	4.5%	3.6%	7.2%	0.0%	16.2%
4A	Freezer	60.3%	67.8%	8.0%	13.0%	0.0%	33.3%	0.0%	66.7%				
4B	Refrigerator	58.7%	77.2%	8.9%	16.9%	19.8%	40.5%	8.1%	4.5%	3.6%	7.2%	0.0%	16.2%
4B	Freezer	60.3%	67.8%	8.0%	13.0%	0.0%	33.3%	0.0%	66.7%				
1A2b3C	Refrigerator	72.2%	77.2%	60.0%	16.9%	19.8%	40.5%	8.1%	4.5%	3.6%	7.2%	0.0%	16.2%
1A2b3C	Freezer	69.9%	67.8%	54.0%	16.9%	0.0%	33.3%	0.0%	66.7%				
1A3C4A	Refrigerator	72.2%	77.2%	8.9%	16.9%	19.8%	40.5%	8.1%	4.5%	3.6%	7.2%	0.0%	16.2%
1A3C4A	Freezer	69.9%	67.8%	8.0%	16.9%	0.0%	33.3%	0.0%	66.7%				
2B3A4B	Refrigerator	58.7%	77.2%	60.0%	16.9%	14.4%	20.7%	18.9%	18.9%	1.8%	8.1%	0.0%	17.1%
2B3A4B	Freezer	60.3%	67.8%	54.0%	13.0%	6.7%	13.3%	0.0%	80.0%				
1B2A	Refrigerator	67.7%	77.2%	56.1%	16.9%	19.8%	40.5%	8.1%	4.5%	3.6%	7.2%	0.0%	16.2%
1B2A	Freezer	66.7%	67.8%	50.1%	13.0%	0.0%	33.3%	0.0%	66.7%				
1B3C4A	Refrigerator	67.7%	77.2%	8.0%	16.9%	19.8%	40.5%	8.1%	4.5%	3.6%	7.2%	0.0%	16.2%
1B3C4A	Freezer	66.7%	67.8%	8.0%	13.0%	0.0%	33.3%	0.0%	66.7%				

Table D-2
Resulting Net-to-Gross Factors

Assumption	Refrigerator or Freezer	Net-to-Gross Overall
Base	Refrigerator	0.48
Base	Freezer	0.57
1A	Refrigerator	0.54
1A	Freezer	0.58
1B	Refrigerator	0.52
1B	Freezer	0.57
2A	Refrigerator	0.43
2A	Freezer	0.48
2B	Refrigerator	0.43
2B	Freezer	0.47
3A	Refrigerator	0.52
3A	Freezer	0.61
3B	Refrigerator	0.50
3B	Freezer	0.59
3C	Freezer	0.55
4A	Refrigerator	0.50
4A	Freezer	0.57
4B	Refrigerator	0.47
4B	Freezer	0.57
1A2b3C	Refrigerator	0.51
1A2b3C	Freezer	0.50
1A3C4A	Refrigerator	0.55
1A3C4A	Freezer	0.57
2B3A4B	Refrigerator	0.44
2B3A4B	Freezer	0.49
1B2A	Refrigerator	0.48
1B2A	Freezer	0.50
1B3C4A	Refrigerator	0.53
1B3C4A	Freezer	0.57

E

PARTICIPANT AND NONPARTICIPANT DATABASE RECORD LAYOUTS AND ANALYSIS DOCUMENTATION

This Appendix contains the data dictionary describing the variables for the database tabulations in Appendix D and provides analysis documentation.

E.1 PARTICIPANT DATA DICTIONARY

The respondents to this survey were questioned about up to two freezers and two refrigerators recycled the Program. Question Q6 through Q29 are therefore repeated in the survey responses. These questions are labeled R1_, R2_, F1_, and F2_ to distinguish between refrigerator 1, refrigerator 2, freezer 1, and freezer 2.

Variable Name	Type	Description
RESP_NO	Char	I.D. Number
DATE_INT	Char	Date surveyed.
Q7	Num	How old was the (refrigerator/stand-alone freezer) when you disposed of it? 1 > 5 years or less 2 > 6 - 10 years 3 > 11 - 15 years 4 > 16 - 20 years 5 > 21 - 30 years 15 > Don't know/Refused
Q8_M Q8_YS	Num	How long had you owned the (refrigerator/stand-alone freezer) that you had picked-up?
Q9	Num	At the time you called to participate in the program, (was the refrigerator/were the refrigerators) that you had picked up your main refrigerator or (was it a/were they) being used as a spare(s)? 1 > Main refrigerator 2 > Spare refrigerator
Q10_M Q10_Y	Num	How long had you been using the refrigerator as a spare?
Q1	Num	Did you purchase or acquire a refrigerator within the last two years? 1 > Yes 2 > No
Q3	Num	Did you purchase or acquire a freezer within the last two years? 1 > Yes 2 > No
Q6	Num	Did you have any plans or intentions to discard the refrigerator or freezer BEFORE you heard about the program?

Variable Name	Type	Description
Q12	Num	During the 12 months before you had this (refrigerator/freezer) picked up, about how many months was this (refrigerator/freezer) plugged in and running? 1 > None 2 > Less than one month 3 > 1 - 3 months 4 > 4 - 6 months 5 > 7 - 9 months 6 > 10 - 11 months 7 > All year/12 months 15 > Don't know
Q13	Num	Did you only have the (refrigerator/freezer) plugged in and running during certain seasons, holiday times, or special events? 1 > Yes 2 > No
Q14	Num	Was getting the new refrigerator a major reason you decided to discard the old one? 1 > Yes 2 > No
Q15	Num	Was getting the new freezer a major reason you decided discard the old one? 1 > Yes 2 > No
Q16	Num	(If respondent answered “Yes” to Q6): If Edison had not picked up the refrigerator or freezer, what would you have done with it? 1 > Sold the refrigerator/freezer 2 > Given the refrigerator/freezer away 3 > Thrown the refrigerator/freezer away 4 > Hired someone to pick it up 5 > Left in house when we moved 6 > Taken it to a recycling center 7 > Other (SPECIFY): 8 > Have appliance retailer pick-up 15 > Don't know
Q17	Num	(If respondent answered “No” to Q6: Would you have kept the (refrigerator/freezer) and stored it unplugged, or would you have kept it and used it as a spare? 1 > Store it 2 > Use it 3 > Discard it 15 > Don't know
Q17a	Num	(If respondent answered “Discard it” to Q17 : If Edison had not picked up the refrigerator or freezer, what would you have done with it? 1 > Sold the refrigerator/freezer 2 > Given the refrigerator/freezer away 3 > Thrown the refrigerator/freezer away 4 > Hired someone to pick it up 5 > Left in house when we moved 6 > Taken it to a recycling center 7 > Other (SPECIFY): 8 > Have appliance retailer pick-up 15 > Don't know

Variable Name	Type	Description
Q18	Num	For how many years do you think you might have kept the (refrigerator/freezer) to use? 1 > Less than one year 2 > 1 - 3 years 3 > 4 - 6 years 4 > 7 - 9 years 5 > 10 or more 6 > Until it broke 15 > Don't know
Q20	Num	(If respondent would have SOLD in Q.16 or 17a): For what price do you think you would have sold your (refrigerator/freezer)? > Amount given Recorded 999 > Don't know / Refused
Q21_M Q21_Y	Num	(If respondent would have SOLD in Q.16 or 17a): When do you think you would have sold your (refrigerator/freezer)?
Q22	Num	(If respondent would have HIRED SOMEONE TO PICKUP in Q.16 or 17a): How much do you think it would have cost you to hire someone to dispose of the (refrigerator/freezer)? > Amount given Recorded 999 > Don't know / Refused
Q23_M Q23_Y	Num	When do you think you would have hired someone to dispose of the (refrigerator/freezer)?
Q24	Num	(If respondent would have HAD APPLIANCE RETAILER PICKUP in Q.16 or 17a): How much do you think it would cost you to have the appliance retailer pick-up the refrigerator/freezer)?
Q25_M Q25_Y	Num	(If respondent would have HAD APPLIANCE RETAILER PICKUP in Q.16 or 17a): When do you think you would have had the appliance retailer pick-up the (refrigerator/freezer)?
Q26_M Q26_Y	Num	(If respondent would have GIVEN THE APPLIANCE AWAY in Q.16 or 17a): When do you think you would have given the (refrigerator/freezer) away?
Q27_M Q27_Y	Num	(If respondent would have THROWN THE APPLIANCE AWAY in Q.16 or 17a): When do you think you would have thrown the (refrigerator/freezer) away? (Months)
Q27_M Q27_Y	Num	(If respondent would have TAKEN THE APPLIANCE TO A RECYCLING CENTER in Q.16 or 17a): When do you think you would have taken the (refrigerator/freezer) to a recycling center?
Q2_Y	Num	Year new refrigerator was purchased.
Q2_M	Num	Month new refrigerator was purchased
Q4_Y	Num	Year new freezer was purchased
Q4_M	Num	Month new freezer was purchased
NOOFREFR	Num	Number of refrigerators picked up
NOOFFREE	Num	Number of freezers picked up
QA	Char	Screener Question A: Have you been interviewed by Southern California Edison about your energy usage in the past few months? 1 > Yes 2 > No

Variable Name	Type	Description
QB	Char	Screener Question B: Do you recall participating in the Spare Refrigerator Recycling Program? 1 > Yes 2 > No 3 > Refrigerator/freezer not picked up
QE	Char	Screener Question E: Was the address where you had the refrigerator/freezer picked up: 1> Your primary residence 2> A second home 3> A property you rent out 4> Another property you're responsible for but don't live in 5> Other
QD	Char	Screener Question DE: And, are you the person in your household who made the decision to participate in the program? 1 > Yes 2 > No
Q01_A1	Char	As far as you can recall, how did you learn about the program? (Multiple responses recorded in Q01_A1 through Q01_A5) 1 > Newspaper advertisement 2 > TV advertisement 3 > Radio advertisement 4 > Advertising on side of truck 5 > Utility bill insert/information with utility bill 6 > Separate mailing 7 > Toll-free 800 telephone number 8 > Media stories about the program 9 > From a friend, relative or neighbor 10 > Appliance retailer 11 > Somewhere else (SPECIFY): 12 > Don't recall
Q02_A1	Num	Why did you decide to participate in the Spare Refrigerator Recycling Program? (Multiple responses are recorded in Q02_A1 through Q02_A5). 1 > Save electricity/electricity conservation 2 > Save money on electric bill 3 > $50 U.S. Savings Bond or $25 cash 4 > Spare refrigerator/freezer unnecessary 5 > Convenience of free pick-up service 6 > Environmentally safe disposal 7 > Needed to upgrade or replace existing refrigerator or freezer 8 > Improve the environment 9 > Recommendation of a friend/relative 10 > Recommendation of retailer/dealer 11 > Edison's sponsorship of the program 12 > Other (SPECIFY): 13 > Don't know
Q21A	Num	How many refrigerators do you now have (at that location) that are plugged in and running?
Q21B	Num	Prior to participating in the Edison program, how many freezers did you have that were plugged in and running?
Q22A	Num	How many refrigerators do you now have that are plugged in and running?

Variable Name	Type	Description
Q30	Num	If you had not been offered a $50 U.S. Savings Bond or $25 cash, how likely would you have been to participate in the Edison program anyway? Would you have been 1 > Very likely 2 > Somewhat likely 3 > Neither likely nor unlikely 4 > Somewhat unlikely 5 > Very unlikely 15 > Don't know
Q31	Num	How much money do you think it cost you on your electric bill each month to run the [refrigerator(s) and/or freezer(s)] you had Southern California Edison pick-up when you had (it/them) plugged in? 1 > Nothing 2 > $1 to $5/month 3 > $6 to $10 4 > $11 to $15 5 > $16 to $20 6 > More than $20 15 > Don't know
Q32REF Q32FREEZ	Num	How many freezers do you now have that are plugged in and running? (Q32REF) And how many freezers (Q32FREEZ)
Q36	Num	Using a 5 point scale where "5" means you were "very satisfied" and "1" means you were "very dissatisfied", please tell me how satisfied you were overall with the Spare Refrigerator Recycling Program? 1 > 1 - Very Dissatisfied 2 > 2 3 > 3 4 > 4 5 > 5 - Very Satisfied
R1_Q31_Y R1_Q31_M	Num Num	(FOR EACH REFRIGERATOR AND FREEZER OWNED IN Q.32REF and Q32FREEZ, ASK Q.34 AND Q.35.) Approximately how old is your first refrigerator
R2_Q31_Y R2_Q31_M	Num Num	(Same as R1_Q31_Y and R1_Q31_M for second refrigerator owned)
R3_Q31_Y R3_Q31_M	Num Num,	(Same as R1_Q31_Y and R1_Q31_M for third refrigerator owned)
F1_Q31_Y F1_Q31_M	Num Num	(Same as R1_Q31_Y and R1_Q31_M for first freezer owned)
F2_Q31_Y F2_Q31_M	Num Num	(Same as R1_Q31_Y and R1_Q31_M for second freezer owned)
R1_Q35	Num	Is the freezer section of your FIRST refrigerator manually defrosted or self defrosting 1 > Manual 2 > Self 15 > Don't Know

Variable Name	Type	Description
R2_Q35	Num	Is the freezer section of your SECOND refrigerator manually defrosted or self defrosting 1 > Manual 2 > Self 15 > Don't Know
R3_Q35	Num	Is the freezer section of your THIRD refrigerator manually defrosted or self defrosting 1 > Manual 2 > Self 15 > Don't Know
F1_Q35	Num	Is your FIRST stand-alone freezer manually defrosted or self-defrosting? 1 > Manual 2 > Self 15 > Don't Know
F2_Q35	Num	Is your SECOND stand-alone freezer manually defrosted or self-defrosting? 1 > Manual 2 > Self 15 > Don't Know
Q39	Num	Including yourself, how many people live in your household at least six months out of the Year?
Q40UNDER Q4013_19 Q4020_25 Q4026_35 Q4036_45 Q4046_55 Q4056_65 Q40OVER6	Num	How many of these people are...? 1 > Under the age of 13 2 > 13 - 19 years old 3 > 20 - 25 years old 4 > 26 - 35 years old 5 > 36 - 45 years old 6 > 46 - 55 years old 7 > 56 - 65 years old 8 > Over the age of 65
Q41	Num	What is the age of the head of your household? 1 > Under 18 2 > 18 to 25 3 > 26 to 35 4 > 36 to 45 5 > 46 to 55 6 > 56 to 65 7 > Over 65 15 > Refused
Q42	Num	Finally, what is your household's total annual income before taxes? Is it ..... 1 > Under $10,000 2 > $10,000 to under $20,000 3 > $20,000 to under $30,000 4 > $30,000 to under $40,000 5 > $40,000 to under $50,000 6 > $50,000 to under $75,000 7 > $75,000 or above 15 > Don't know/Refused
Q43	Num	RECORD FROM OBSERVATION 1 > Male 2 > Female

Variable Name	Type	Description
Phone	Num	Respondent Phone Number
R1_ Color	Num	Tracking system refrigerator 1 color
R1_ Size	Num	Tracking system refrigerator 1 size
R1_ Age	Num	Tracking system refrigerator 1 age
R1_ Style	Num	Tracking system refrigerator 1 style
R1_ Defrost	Num	Tracking system refrigerator 1 defrost
R1_ Pickup date	Num	Tracking system refrigerator 1 pickup date
R2_ Color	Num	Tracking system refrigerator 2 color
R2_ Size	Num	Tracking system refrigerator 2 size
R2_ Age	Num	Tracking system refrigerator 2 age
R2_ Style	Num	Tracking system refrigerator 2 style
R2_ Defrost	Num	Tracking system refrigerator 2 defrost type
R2_ Pickup date	Num	Tracking system refrigerator 2 pickup date
F1_ Color	Num	Tracking system freezer 1 color
F1_ Size	Num	Tracking system freezer 1 size
F1_ Age	Num	Tracking system freezer 1 age
F1_ Style	Num	Tracking system freezer 1 style
F1_ Defrost	Num	Tracking system freezer 1 defrost
F1_ Pickup date	Num	Tracking system freezer 1 pickup date
F2_ Color	Num	Tracking system freezer 2 color
F2_ Size	Num	Tracking system freezer 2 size
F2_ Age	Num	Tracking system freezer 2 age
F2_ Style	Num	Tracking system freezer 2 style
F2_ Defrost	Num	Tracking system freezer 2 defrost
F2_ Pickup date	Num	Tracking system freezer 2 pickup date
Quota Cells	Num	Based on tracking system
Intro	Char	Description
Description - per respondent	Char	Remark Space
R1 Color	Num	Refrigerator 1 open description of color by respondent
R1 Size	Num	Refrigerator 1 closed end size description per respondent
R1 Specify size	Num	Open refrigerator 1 size description
R1 Age	Num	Closed end refrigerator 1 age description per respondent
R1 Specify Age	Num	Open end refrigerator 1 age description per respondent
R1 Style	Num	Refrigerator 1 style description per respondent
R1 Defrost	Num	Refrigerator 1 defrost type per respondent
R1 Pickup date	Num	Closed end refrigerator 1 pickup date per respondent
R1 Specify date	Num	Open end Refrigerator 1 pickup date per respondent
R2 Color	Num	Refrigerator 2 open description of color by respondent

Variable Name	Type	Description
R2 Size	Num	Refrigerator 2 closed end size description per respondent
R2 Specify size	Num	Open refrigerator 2 size description
R2 Age	Num	Closed end refrigerator 2 age description per respondent
R2 Specify age	Num	Open end refrigerator 2 age description per respondent
R2 Style	Num	Refrigerator 2 style description per respondent
R2 Defrost	Num	Refrigerator 2 defrost type per respondent
R2 Pickup date	Num	Closed end refrigerator 2 pickup date per respondent
R2 Specify date	Num	Open end Refrigerator 2 pickup date per respondent
F1 Color	Num	Freezer 1 open description of color by respondent
F1 Size	Num	Freezer 1 closed end size description per respondent
F1 Specify size	Num	Open Freezer 1 size description
F1 Age	Num	Closed end Freezer 1 age description per respondent
F1 Specify age	Num	Open end Freezer 1 age description per respondent
F1 Style	Num	Freezer 1 style description per respondent
F1 Defrost	Num	Freezer 1 defrost type per respondent
F1 Pickup date	Num	Closed end Freezer 1 pickup date per respondent
F1 Specify date	Num	Open end Freezer 1 pickup date per respondent
F2 Color	Num	Freezer 2 open description of color by respondent
F2 Size	Num	Freezer 2 closed end size description per respondent
F2 Specify size	Num	Open Freezer 2 size description
F2 Age	Num	Closed end Freezer 2 age description per respondent
F2 Specify age	Num	Open end Freezer 2 age description per respondent
F2 Style	Num	Freezer 2 style description per respondent
F2 Defrost	Num	Freezer 2 defrost type per respondent
F2 Pickup date	Num	Closed end Freezer 2 pickup date per respondent
F2 Specify date	Num	Open end Freezer 2 pickup date per respondent
Corrected no. of REF	Num	Number of refrigerators pickup up per respondent
Corrected no. of FREEZER	Num	Number of freezers pickup up per respondent
Tracking number	Num	Tracking Number

E.2 NONPARTICIPANT DATA DICTIONARY

Variable Name	Type	Description
Resp no	Num	Response Number
Intervie	Num	Interview date
Tracking	Num	Tracking Number
Category	Num	Type of House (Tract, Single, Mobile Home, or Multiple)
Single_M	Char	1=single, 2=multi
Intro1	Num	
Intro2	Num	
Q1a	Num	Have you been interviewed by Southern California Edison about your energy usage in the past three months? 1=yes 2=no
Q1b	Num	Is the number I reached you at your home, a place of business, or both? 1=Home 2=Place of business 3=Both
Q1c	Num	Have you acquired any used refrigerators or stand alone freezers since January 1, 1995, either as an additional unit or as a replacement for a previous one? 1=yes 2=no
Q1d	Num	Just to confirm, these units were used, not new when you got them, is that correct? 1=yes 2=no
Q1e_ref	Num	How many used refrigerators and stand-alone freezers have you acquired since January 1, 1995 (number of refrigerators)
Q1e_frz	Num	How many used refrigerators and stand-alone freezers have you acquired since January 1, 1995 (number of freezers)
Q1f	Num	Have you gotten rid of any working refrigerators or stand-alone freezers since January 1, 1995, including any units that were replaced? 1=yes 2=no
Q1g	Num	Just to confirm, these units were working, not broken, when you got rid of them. Is that correct? 1=yes 2=no
Q1h_refs	Num	How many working refrigerators and stand-alone freezers have you gotten rid since January 1, 1995? (number of refrigerators)
Q1h-frz	Num	How many working refrigerators and stand-alone freezers have you gotten rid since January 1, 1995? (number of freezers)
QA1_1	Num	Refrigerator 1 - What type of refrigerator is it? 1=single-door 2=side-by-side 3=top freezer 4=bottom freezer
QA2_1	Num	Refrigerator 1 - Is it frost free or manual defrost? 1=frost free 2=manual defrost
QA3_1	Num	Refrigerator 1 - About how old is it now? (open)
QA4_1	Num	Refrigerator 1 - What size is it in cubic feet? (open)
QA5_1a_Y	Num	Refrigerator 1 - Approximately when did you acquire it? (year)
QA5_1a_M	Num	Refrigerator 1 - Approximately when did you acquire it? (month)

Variable Name	Type	Description
QA5_1b_S	Num	Refrigerator 1 - Approximately when did you acquire it? (season)
QA6_1a	Num	Refrigerator 1 - What condition was it in when you got it? 1=working 2=working but in need of repairs 3=not working
QA7_1	Num	Refrigerator 1 - How do you currently use the refrigerator? 1=plugged and running all the time (goto A9) 2=plugged in most of the time, unplug it when not in use 3=use only during certain months or seasons 4=unit works but is not plugged in operating at all (goto A9) 5=unit doesn't work (goto A9) 6=no longer own the unit (goto A9)
QA8_1	Num	Refrigerator 1 - How many months per year is the unit plugged in and running?
QA9_1	Num	Refrigerator 1 - How did you acquire the refrigerator? 1=purchased it from a friend, acquaintance, or relative 2=purchased it from a used refrigerator/freezer dealer 3=purchased at a garage sale, estate sale, or newspaper ad 4=refrigerator was given to me (goto A11) 5=previous occupant of the house left it behind (goto A11)
QA10_1	Num	Refrigerator 1 - How much did you pay for it?
QA11_1	Num	Refrigerator 1 - If the particular refrigerator you acquired had not been available, what would you most likely have done? 1=bought a similar unit somewhere else 2=not purchased a refrigerator at that time 3=purchased a lower quality used refrigerator 4=purchased a new refrigerator 5=fixed the old refrigerator
QA12_1	Num	Refrigerator 1 - If the purchase price had been 10 percent higher, what would you have done? 1=bought a similar unit somewhere else 2=not purchased a refrigerator at that time 3=purchased a lower quality used refrigerator 4=purchased a new refrigerator 5=fixed the old refrigerator
QA13_1	Num	Refrigerator 1 - If the purchase price had been 25 percent higher, what would you have done? 1=bought a similar unit somewhere else 2=not purchased a refrigerator at that time 3=purchased a lower quality used refrigerator 4=purchased a new refrigerator 5=fixed the old refrigerator
QA14_1	Num	Refrigerator 1 - If the purchase price had been 50 percent higher, what would you have done? 1=bought a similar unit somewhere else 2=not purchased a refrigerator at that time 3=purchased a lower quality used refrigerator 4=purchased a new refrigerator 5=fixed the old refrigerator

QA15_1	Num	Refrigerator 1 - Why did you acquire the refrigerator? 1=to replace my primary refrigerator 2=to replace my secondary or backup refrigerator 3=to give me additional refrigerator capacity 4=I previously had no refrigerator

Variable Name	Type	Description
QA16_1a	Num	Refrigerator 1 - About the refrigerator you replaced, what did you do with it? 1=discarded or got rid of it 2=still have it, store it unused 3=use it as a back-up refrigerator
QA16_1b	Num	Refrigerator 1 - That refrigerator you just discarded, is it still working? 1=yes 2=no
QA17_1a	Num	Refrigerator 1 - Earlier you said that you disposed of X refrigerators since January 1, 1995. Were you counting this one? 1=yes 2=no
QA17_1b	Num	Refrigerator 1 - (ifQA17-1a=no) So, the correct number of refrigerators that you got rid of since January 1, 1995 is (open)?
QA1_2	Num	Refrigerator 2 - What type of refrigerator is it? 1=single-door 2=side-by-side 3=top freezer 4=bottom freezer
QA2_2	Num	Refrigerator 2 - Is it frost free or manual defrost? 1=frost free 2=manual defrost
QA3_2	Num	Refrigerator 2 - About how old is it now? (open)
QA4_2	Num	Refrigerator 2 - What size is it in cubic feet? (open)
QA5_2a_Y	Num	Refrigerator 2 - Approximately when did you acquire it? (year)
QA5_2a_M	Num	Refrigerator 2 - Approximately when did you acquire it? (month)
QA5_2b_S	Num	Refrigerator 2 - Approximately when did you acquire it? (season)
QA6_2	Num	Refrigerator 2 - What condition was it in when you got it? 1=working 2=working but in need of repairs 3=not working
QA7_2	Num	Refrigerator 2 - How do you currently use the refrigerator? 1=plugged and running all the time (goto A9) 2=plugged in most of the time, unplug it when not in use 3=use only during certain months or seasons 4=unit works but is not plugged in operating at all (goto A9) 5=unit doesn't work (goto A9) 6=no longer own the unit (goto A9)
QA8_2	Num	Refrigerator 2 - How many months per year is the unit plugged in and running?
QA9_2	Num	Refrigerator 2 - How did you acquire the refrigerator? 1=purchased it from a friend, acquaintance, or relative 2=purchased it from a used refrigerator/freezer dealer 3=purchased at a garage sale, estate sale, or newspaper ad 4=refrigerator was given to me (goto A11) 5=previous occupant of the house left it behind (goto A11)
QA10_2	Num	Refrigerator 2 - How much did you pay for it?
QA11_2	Num	Refrigerator 2 - If the particular refrigerator you acquired had not been available, what would you most likely have done? 1=bought a similar unit somewhere else 2=not purchased a refrigerator at that time 3=purchased a lower quality used refrigerator 4=purchased a new refrigerator 5=fixed the old refrigerator

Variable Name	Type	Description
QA12_2	Num	Refrigerator 2 - If the purchase price had been 10 percent higher, what would you have done? 1=bought a similar unit somewhere else 2=not purchased a refrigerator at that time 3=purchased a lower quality used refrigerator 4=purchased a new refrigerator 5=fixed the old refrigerator
QA13_2	Num	Refrigerator 2 - If the purchase price had been 25 percent higher, what would you have done? 1=bought a similar unit somewhere else 2=not purchased a refrigerator at that time 3=purchased a lower quality used refrigerator 4=purchased a new refrigerator 5=fixed the old refrigerator
QA14_2	Num	Refrigerator 2 - If the purchase price had been 50 percent higher, what would you have done? 1=bought a similar unit somewhere else 2=not purchased a refrigerator at that time 3=purchased a lower quality used refrigerator 4=purchased a new refrigerator 5=fixed the old refrigerator
QA15_2	Num	Refrigerator 2 - Why did you acquire the refrigerator? 1=to replace my primary refrigerator 2=to replace my secondary or backup refrigerator 3=to give me additional refrigerator capacity 4=I previously had no refrigerator
QA16_2a	Num	Refrigerator 2 - About the refrigerator you replaced, what did you do with it? 1=discarded or got rid of it 2=still have it, store it unused 3=use it as a back-up refrigerator
QA16_2b	Num	Refrigerator 2 - That refrigerator you just discarded, is it still working? 1=yes 2=no
QA17_2a	Num	Refrigerator 2 - Earlier you said that you disposed of X refrigerators since January 1, 1995. Were you counting this one? 1=yes 2=no
QA17_2b	Num	Refrigerator 2 - (if QA17-2a=no) So, the correct number of refrigerators that you got rid of since January 1, 1995 is (open)?
SectionB	Num	
QB1_1	Num	Freezer 1 - What type of freezer is it? 1=upright freezer 2=chest freezer
QB2_1	Num	Freezer 1 - About how old is it now? (open)
QB3_1	Num	Freezer 1 - What size is it in cubic feet? (open)
QB4_1a_Y	Num	Freezer 1 - Approximately when did you acquire it? (year)
QB4_1a_M	Num	Freezer 1 - Approximately when did you acquire it? (month)
QB4_1b_S	Num	Freezer 1 - Approximately when did you acquire it? (season)
QB5_1	Num	Freezer 1 - What condition was it in when you got it? 1=working 2=working but in need of repairs 3=not working

Variable Name	Type	Description
QB6_1	Num	Freezer 1 - How do you currently use the freezer? 1=plugged and running all the time (goto A9) 2=plugged in most of the time, unplug it when not in use 3=use only during certain months or seasons 4=unit works but is not plugged in operating at all (goto b8) 5=unit doesn't work (goto B8) 6=no longer own the unit (goto B8)
QB7_1	Num	Freezer 1 - How many months per year is the unit plugged in and running?
QB8_1	Num	Freezer 1 - How did you acquire the freezer? 1=purchased it from a friend, acquaintance, or relative 2=purchased it from a used refrigerator/freezer dealer 3=purchased at a garage sale, estate sale, or newspaper ad 4=Freezer was given to me (goto B10) 5=previous occupant of the house left it behind (goto B10)
QB9_1	Num	Freezer 1 - How much did you pay for it?
QB10_1	Num	Freezer 1 - If the particular freezer you acquired had not been available, what would you most likely have done? 1=bought a similar unit somewhere else 2=not purchased a freezer at that time 3=purchased a lower quality used refrigerator 4=purchased a new freezer 5=fixed the old freezer
QB11_1	Num	Freezer 1 - If the purchase price had been 10 percent higher, what would you have done? 1=bought a similar unit somewhere else 2=not purchased a freezer at that time 3=purchased a lower quality used freezer 4=purchased a new freezer 5=fixed the old freezer
QB12_1	Num	Freezer 1 - If the purchase price had been 25 percent higher, what would you have done? 1=bought a similar unit somewhere else 2=not purchased a freezer at that time 3=purchased a lower quality used freezer 4=purchased a new freezer 5=fixed the old freezer
QB13_1	Num	Freezer 1 - If the purchase price had been 50 percent higher, what would you have done? 1=bought a similar unit somewhere else 2=not purchased a freezer at that time 3=purchased a lower quality used freezer 4=purchased a new freezer 5=fixed the old freezer
QB14_1	Num	Freezer 1 - Why did you acquire the freezer? 1=to replace an existing freezer 2=to give me additional freezer capacity 4=I previously had no freezer
QB15_1a	Num	Freezer 1 - About the freezer you replaced, what did you do with it? 1=discarded or got rid of it 2=still have it, store it unused 3=use it as a back-up freezer
QB15_1b	Num	Freezer 1 - That freezer you just discarded, is it still working? 1=yes 2=no
QB16_1a	Num	Freezer 1 - Earlier you said that you disposed of X freezers since January 1, 1995. Were you counting this one? 1=yes 2=no

Variable Name	Type	Description
QB16_1b	Num	Freezer 1 - (ifQA16-1a=no) So, the correct number of freezers that you got rid of since January 1, 1995 is (open)?
QB1_2	Num	Freezer 2 - What type of Freezer is it? 1=upright freezer 2=chest freezer
QB2_2	Num	Freezer 2 - About how old is it now? (open)
QB3_2	Num	Freezer 2 - What size is it in cubic feet? (open)
QB4_2a_Y	Num	Freezer 2 - Approximately when did you acquire it? (year)
QB4_2a_M	Num	Freezer 2 - Approximately when did you acquire it? (month)
QB4_2b_S	Num	Freezer 2 - Approximately when did you acquire it? (season)
QB5_2	Num	Freezer 2 - What condition was it in when you got it? 1=working 2=working but in need of repairs 3=not working
QB6_2	Num	Freezer 2 - How do you currently use the freezer? 1=plugged and running all the time (goto A9) 2=plugged in most of the time, unplug it when not in use 3=use only during certain months or seasons 4=unit works but is not plugged in operating at all (goto b8) 5=unit doesn't work (goto B8) 6=no longer own the unit (goto B8)
QB7_2	Num	Freezer 2 - How many months per year is the unit plugged in and running?
QB8_2	Num	Freezer 2 - How did you acquire the freezer? 1=purchased it from a friend, acquaintance, or relative 2=purchased it from a used refrigerator/freezer dealer 3=purchased at a garage sale, estate sale, or newspaper ad 4=Freezer was given to me (goto B10) 5=previous occupant of the house left it behind (goto B10)
QB9_2	Num	Freezer 2 - How much did you pay for it?
QB10_2	Num	Freezer 2 - If the particular freezer you acquired had not been available, what would you most likely have done? 1=bought a similar unit somewhere else 2=not purchased a freezer at that time 3=purchased a lower quality used refrigerator 4=purchased a new freezer 5=fixed the old freezer
QB11_2	Num	Freezer 2 - If the purchase price had been 10 percent higher, what would you have done? 1=bought a similar unit somewhere else 2=not purchased a freezer at that time 3=purchased a lower quality used freezer 4=purchased a new freezer 5=fixed the old freezer
QB12_2	Num	Freezer 2 - If the purchase price had been 25 percent higher, what would you have done? 1=bought a similar unit somewhere else 2=not purchased a freezer at that time 3=purchased a lower quality used freezer 4=purchased a new freezer 5=fixed the old freezer
QB13_2	Num	Freezer 2 - If the purchase price had been 50 percent higher, what would you have done? 1=bought a similar unit somewhere else 2=not purchased a freezer at that time 3=purchased a lower quality used freezer 4=purchased a new freezer 5=fixed the old freezer

Variable Name	Type	Description
QB14_2	Num	Freezer 2 - Why did you acquire the freezer? 1=to replace an existing freezer 2=to give me additional freezer capacity 4=I previously had no freezer
QB15_2a	Num	Freezer 2 - About the freezer you replaced, what did you do with it? 1=discarded or got rid of it 2=still have it, store it unused 3=use it as a back-up freezer
QB15_2b	Num	Freezer 2 - That freezer you just discarded, is it still working? 1=yes 2=no
QB16_2a	Num	Freezer 2 - Earlier you said that you disposed of X freezers since January 1, 1995. Were you counting this one? 1=yes 2=no
QB16_2b	Num	Freezer 2 - (ifQA16-2a=no) So, the correct number of freezers that you got rid of since January 1, 1995 is (open)?
SectionC	Num	
QC1_1	Num	Refrigerator 1 - What type of refrigerator was it? 1=single-door 2=side-by-side 3=top freezer 4=bottom freezer
QC2_1	Num	Refrigerator 1 - Was it frost free or manual defrost ? 1=frost free 2=manual defrost 3=partial defrost
QC3_1	Num	Refrigerator 1 - About how old was it when you got rid of it (open)?
QC4_1	Num	Refrigerator 1 - What size was it in cubic feet? (open)
QC5_1a_Y	Num	Refrigerator 1 - Approximately when did you get rid of it? (year)
QC5_1a_M	Num	Refrigerator 1 - Approximately when did you get rid of it? (month)
QC5_1b_S	Num	Refrigerator 1 - Approximately when did you get rid of it? (season)
QC6_1	Num	Refrigerator 1 - What condition was it in when you got rid of it? 1=working 2=working but in need of repairs 3=not working
QC7_1	Num	Refrigerator 1 - Had you been using the refrigerator as your primary unit or as a secondary or backup unit? 1=primary 2=secondary or backup
QC8_1	Num	Refrigerator 1 - How did you get rid of the refrigerator? 1=took it to a recycler or scrap dealer (goto C10) 2=took it to a landfill or threw it away (goto C10) 3=sold it to a friend, acquaintance, or relative (goto C9 then C12) 4=sold it to a used refrigerator/freezer dealer (goto C9) 5=Sold it via garage sale, estate sale, or newspaper ad (goto C9) 6=Hired someone to pick it up (goto C10) 8=Dealer I bought a new one from took it away (goto end of C) 9=Gave it away (goto C12) 10=Still have it; store it unused (goto end of C) 11=Left it behind when we moved (goto end of C)
QC9_1	Num	Refrigerator 1 - How much did you sell it for? (goto C12 or end of C)
QC10_1	Num	Refrigerator 1 - How much did you pay to get rid of it? (goto end of C)
QC11_1	Num	Refrigerator 1 - How much credit did you get in the trade? (goto end of C)
QC12_1	Num	Refrigerator 1 - Do you think the refrigerator is still in the Southern California Edison service territory? 1=yes 2=no

Variable Name	Type	Description
QC13_1	Num	Refrigerator 1 - How do you think the refrigerator is currently used? 1=plugged in and running all of the time 2=plugged in most of the time, unplug it when it is not in use 3=use only during certain months or seasons 4=kept as spare; isn't plugged in and operating at all 5=unit doesn't work
QC1_2	Num	Refrigerator 2 - What type of refrigerator was it? 1=single-door 2=side-by-side 3=top freezer 4=bottom freezer
QC2_2	Num	Refrigerator 2 - Was it frost free or manual defrost ? 1=frost free 2=manual defrost 3=partial defrost
QC3_2	Num	Refrigerator 2 - About how old was it when you got rid of it (open)?
QC4_2	Num	Refrigerator 2 -What size was it in cubic feet? (open)
QC5_2a_Y	Num	Refrigerator 2 - Approximately when did you get rid of it? (year)
QC5_2a_M	Num	Refrigerator 2 - Approximately when did you get rid of it? (month)
QC5_2b_S	Num	Refrigerator 2 - Approximately when did you get rid of it? (season)
QC6_2	Num	Refrigerator 2 - What condition was it in when you got rid of it? 1=working 2=working but in need of repairs 3=not working
QC7_2	Num	Refrigerator 2 - Had you been using the refrigerator as your primary unit or as a secondary or backup unit? 1=primary 2=secondary or backup
QC8_2	Num	Refrigerator 2 - How did you get rid of the refrigerator? 1=took it to a recycler or scrap dealer (goto C10) 2=took it to a landfill or threw it away (goto C10) 3=sold it to a friend, acquaintance, or relative (goto C9 then C12) 4=sold it to a used refrigerator/freezer dealer (goto C9) 5=Sold it via garage sale, estate sale, or newspaper ad (goto C9) 6=Hired someone it pick it up (goto C10) 8=Dealer I bought a new one from took it away (goto end of C) 9=Gave it away (goto C12) 10=Still have it; store it unused (goto end of C) 11=Left it behind when we moved (goto end of C)
QC9_2	Num	Refrigerator 2 - How much did you sell it for? (goto C12 or end of C)
QC10_2	Num	Refrigerator 2 - How much did you pay to get rid of it? (goto end of C)
QC11_2	Num	Refrigerator 2 - How much credit did you get in the trade? (goto end of C)
QC12_2	Num	Refrigerator 2 - Do you think the refrigerator is still in the Southern California Edison service territory? 1=yes 2=no
QC13_2	Num	Refrigerator 2 - How do you think the refrigerator is currently used? 1=plugged in and running all of the time 2=plugged in most of the time, unplug it when it is not in use 3=use only during certain months or seasons 4=kept as spare; isn't plugged in and operating at all 5=unit doesn't work
SectionD	Num	
QD1_1	Num	Freezer 1 - What type of freezer was it? 1=upright freezer 2=chest freezer

QD2_1	Num	Freezer 1 - About how old was it when you got rid of it? (open)

Variable Name	Type	Description
QD3_1	Num	Freezer 1 - What size was it in cubic feet? (open)
QD4_1a_Y	Num	Freezer 1 - Approximately when did you get rid of it? (year)
QD4_1a_M	Num	Freezer 1 - Approximately when did you get rid of it? (month)
QD4_1b_S	Num	Freezer 1 - Approximately when did you get rid of it? (season)
QD5_1	Num	Freezer 1 - What condition was it in when you got rid of it? 1=Working 2=Working but in need of repairs 3=Not working
QD6_1	Num	Freezer 1 - How did you get rid of the freezer? 1=Took it to a recycler or scrap dealer (goto D8) 2=Took it to the landfill or threw it away (goto D8) 3=Sold it to a friend, acquaintance, or relative (goto D7 then D10) 4=Sold it to a used refrigerator/freezer dealer (goto D7) 5=Sold it via garage sale, state sale, or newspaper ad (goto D7) 6=Hired someone to pick it up (goto D8) 7=Traded it for a replacement unit (goto D9) 8=Dealer I bought a new one from took it away (goto end of D) 9=Gave it away (goto D10) 10=Still have it; store it unused (goto end of D) 11=Left it behind when we moved (goto end of D)
QD7_1	Num	Freezer 1 - How much did you sell it for? (goto D10 or end of D)
QD8_1	Num	Freezer 1 - How much did you pay to get rid of it? (goto end of D)
QD9_1	Num	Freezer 1 - How much credit did you get in the trade? (goto end of D)
QD10_1	Num	Freezer 1 - Do you think the freezer is still in the Southern California Edison service territory? 1=yes 2=no
QD11_1	Num	Freezer 1 - How do you think the freezer is currently used? 1=plugged in and running all of the time 2=plugged in most of the time, unplug it when it is not in use 3=use only during certain months or seasons 4=kept as spare; isn't plugged in and operating at all 5=unit doesn't work
QD1_2	Num	Freezer 2 - What type of freezer was it? 1=upright freezer 2=chest freezer
QD2_2	Num	Freezer 2 - About how old was it when you got rid of it? (open)
QD3_2	Num	Freezer 2 - What size was it in cubic feet? (open)
QD4_2a_Y	Num	Freezer 2 - Approximately when did you get rid of it? (open)
QD4_2a_M	Num	Freezer 2 - Approximately when did you get rid of it? (month)
QD4_2b_S	Num	Freezer 2 - Approximately when did you get rid of it? (season)
QD5_2	Num	Freezer 2 - What condition was it in when you got rid of it? 1=Working 2=Working but in need of repairs 3=Not working

Variable Name	Type	Description
QD6_2	Num	Freezer 2 - How did you get rid of the freezer? 1=Took it to a recycler or scrap dealer (goto D8) 2=Took it to the landfill or threw it away (goto D8) 3=Sold it to a friend, acquaintance, or relative (goto D7 then D10) 4=Sold it to a used refrigerator/freezer dealer (goto D7) 5=Sold it via garage sale, state sale, or newspaper ad (goto D7) 6=Hired someone to pick it up (goto D8) 7=Traded it for a replacement unit (goto D9) 8=Dealer I bought a new one from took it away (goto end of D) 9=Gave it away (goto D10) 10=Still have it; store it unused (goto end of D) 11=Left it behind when we moved (goto end of D)
QD7_2	Num	Freezer 2 - How much did you sell it for? (goto D10 or end of D)
QD8_2	Num	Freezer 2 - How much did you pay to get rid of it? (goto end of D)
QD9_2	Num	Freezer 2 - How much credit did you get in the trade? (goto end of D)
QD10_2	Num	Freezer 2 - Do you think the freezer is still in the Southern California Edison service territory? 1=yes 2=no
QD11_2	Num	Freezer 2 - How do you think the freezer is currently used? 1=plugged in and running all of the time 2=plugged in most of the time, unplug it when it is not in use 3=use only during certain months or seasons 4=kept as spare; isn't plugged in and operating at all 5=unit doesn't work
VerifiedP	Num	
Name	Char	

E.3 PARTICIPANT AND NONPARTICIPANT DATABASE RECORD LAYOUTS AND ANALYSIS DOCUMENTATION

E.3.1 Initial Analysis

SAS code summary

New variables created for the analysis:

Variable	Description	Values
R1_MODE, F1_MODE	Remover or replacer for refrigerator or freezer	REMOVER, REPLACER
DK_R1_M DK_F!_M	The number of months that someone who said don't know to Q16 would have kept	
R_or_F	Refrigerator or freezer	R, F
%kept	Percentage of respondents who would have kept their unit in the absence of the program	

%kept_a	Attribution factor for kept	1.0
%used	Percent of those who would have used their unit in the absence of the program	
%used_a	Attribution factor for used units	1.0
%destry	Percent of units that would have been destroyed in the absence of the program	
%destry_a	Attribution factor for destroyed units	0.0
%outSCE	Percent of units that would have been transferred outside of SCE territory in the absence of the program	
%out_a	Attribution factor for units transferred outside SCE territory	0.0
M_new%	Percent of main/freezer non-participant acquirers who would have acquired a new unit if the used one was not available	
M_new_a	Attribution factor for main/freezer acquirers who would have bought a new unit	0.5
M_sim%	Percent of main/freezer non-participant acquirers who would have fixed their unit or acquired a similar unit if the one they purchased were unavailable	
M_sim_a	Attribution factor for main/freezer acquirers who would have fixed/bought similar	0.0
M_wors%	Percent of main/freezer non-participant acquirers who would have bought a lower quality used unit if the one they purchased were unavailable	
M_wor_a	Attribution factor for lower quality used unit	0.0
M_none%	Percent of main/freezer non-participant acquirers who would not have bought a unit if the one they purchased were unavailable	
M_non_a	Attribution factor for those who would not have purchased a unit	1.0
S_new%	Percent of spare non-participant acquirers who would have acquired a new unit if the used one was not available	
S_new_a	Attribution factor for spare acquirers who would have bought a new unit	0.5
S_sim%	Percent of spare non-participant acquirers who would have fixed their unit or acquired a similar unit if the one they purchased were unavailable	
S_sim_a	Attribution factor for spare acquirers who would have fixed/bought similar	0.0
S_wors%	Percent of spare non-participant acquirers who would have bought a lower quality used unit if the one they purchased were unavailable	
S_wor_a	Attribution factor for lower quality used unit	0.0

S_none%	Percent of spare non-participant acquirers who would not have bought a unit if the one they purchased were unavailable	

Variable	Description	Values
S_non_a	Attribution factor for those who would not have purchased a unit	1.0
SPARE	Average Spare attribution factor	
MAIN	Average main/freezer attribution factor	
INSCE	Average attribution factor for units transferred inside SCE territory	
TRANS	Average attribution factor for transferred units	
DISCAED	Average attribution factor for discarded units	
ALL	Attribution Factor	
N2G_M	Main net-to-gross	
N2G_S	Spare net to gross	
N2G_IN	Inside SCE net-to-gross	
N2G_tran	Transferred net-to-gross	
N2G_disc	Discard net-to-gross	
N2G_use	Net-to-gross for units that would be kept in use	
N2G_all	Overall net-to-gross	

SAS code in order:

Analysis titles in Order of Use	Purpose of Code
One file Data cleaning.sas output: nor2s.sd2.	Cleaned up records prior to analysis, especially dates. Defined units as removed/replaced. Converted multi-unit records so all were single unit records..
For Analysis_don't know times into keep.sas input: Nor2s.sd2	Generated estimates of %kept, %used, %destry, and %outSCE.
Used to find part load (run data cleaning) first.sas input: nor2sw.sd2	Estimates part-load factors.
Acqanal.sas input: SCE2a.sd2, SCE2b.sd2	Analyzes what would have done if the used unit they purchased was unavailable.
An EXCEL spreadsheet was created with the results of Analysis_don't know times into keep.sas and Acqanal.sas.	
Calculating NTG factors.sas	Used EXCEL spreadsheet and part-use factors to calculate NTG factors

Attribution, use factors and net-to-gross estimates generated using proc mean by sub-groups were used as inputs for the Excel spreadsheets that generated the tables used in the report. The

Excel Workbook TBL_MAIN.XLS that contains all tables used in the report is included with the SAS data and code.

E.3.2 Extended Analysis

Analysis was done in Excel. Delivered Excel files include:

- ntg for conversion to SAS dataset 1998 analysis.xls: inputs for ntg2 scenarios
- from step2a - 1998 analysis results.xls
- secalc.xls: computes relative standard errors for best judgment 1996 case
- tbl_main.xls: main report tables
- tblmain2.xls: Table 6 analysis

E.3.3 Included Data and Code

The zipped file SCE.ZIP contains the code and data directories and all associated files.

All SAS code is located in the \code directory.
All SAS datasets are located in the \data directory.
All Excel workbooks are in the root directory.

F

SUMMARY TABLE

F.1 SUMMARY TABLE: IMPACT EVALUATION OF THE SPARE REFRIGERATOR RECYCLING PROGRAM, SOUTHERN CALIFORNIA EDISON

1. Study Title and Study ID: Impact Evaluation Of The Spare Refrigerator Recycling Program, Southern California Edison, Study #537.
2. Program, Program Year or Years, and Program Description: The Program evaluated in this study was Southern California Edison's Spare Refrigerator Recycling Program for 1996. Through the Spare Refrigerator Recycling Program, Southern California Edison's customers can schedule an appointment to have their working and operating spare refrigerator or freezer picked up and hauled away. The appliance is then taken to a recycling center where the metals, components and refrigerant are recycled using environmentally sound procedures. During 1996 approximately 25,000 refrigerators and freezers were recycled through the Program. For participating in the Program during 1996 customers received a $50 U. S. Savings Bond or $25 cash.
3. End Uses and/or Measures Covered: The Program covered spare refrigerators and freezers that were recycled through the Program.
4. Study Type: Load Impact Regression Model (LIRM)
5. Method(s) and Model(s) Used: The DOE Test Method as specified in 10 CFR, Section 430.23(b), 1997 will be used to establish annual energy consumption. The general approach is to carefully augment an existing sample of appliances picked up and metered by ARCA in other recycling programs. The regression results, when applied to population data for the 1996 program, will provide estimated DOE test means (UEC's) for that population overall and by size/configuration. Net-to-gross ratios were estimated through analysis of participant telephone survey data, with supplemental surveys. The methodology employed in this study is described in detail in Appendix A and Sections 2 and 3.
6. Program Participants: Program participants include all customers that were included in the Program tracking database for the 1996 program year.
7. Sample Strategy: The sample strategy employed for the metering study was a random sample of 150, 1998 Program participants. Additional metering data were from 1070 ARCA units. The sample strategy for the participant survey was a random sample of 1996 Program participants.
8. Billing Period and/or Metering Period: Not relevant
9. Summary of Results: See Section 1.
10. Utility Intentions for Use of Results: The results will be filed with the CPUC for the annual earning assessment proceedings.

F.2 TABLE 6: SOUTHERN CALIFORNIA EDISON M&E PROTOCOLS

Table F-1
RESULTS USED TO SUPPORT PY96 SECOND EARNINGS CLAIM FOR RESIDENTIAL REFRIGERATOR RECYCLING PROGRAM FIRST YEAR LOAD IMPACT EVALUATION, APRIL 1998, STUDY ID NO. 537

				5. A. 90% CONFIDENCE LEVEL				5. B. 80% CONFIDENCE LEVEL			
				LOWER BOUND	UPPER BOUND	LOWER BOUND	UPPER BOUND	LOWER BOUND	UPPER BOUND	LOWER BOUND	UPPER BOUND
1. Avg Participant Grp & Avg Comparison Grp		PART GRP	COMP GRP	PART GRP	PART GRP	COMP GRP	COMP GRP	PART GRP	PART GRP	COMP GRP	COMP GRP
A. Pre-install usage:	Pre-install kW										
	Pre-install kWh										
	Base kW										
	Base kWh										
	Base kW/ designated unit of measurement										
	Base kWh/ designated unit of measurement										
usage:	Impact Yr kW										
	Impact Yr kWh										
	Impact Yr kW/designated unit										
	Impact Yr kWh/designated unit										
2. Average Net and Gross End Use Load Impacts		AVG GROSS	AVG NET	AVG GROSS	AVG GROSS	AVG NET	AVG NET	AVG GROSS	AVG GROSS	AVG NET	AVG NET
	A. i. Load Impacts - kW	8,253	4,452	7,815	8,692	3,170	5,735	7,911	8,595	3,453	5,451
	A. ii. Load Impacts - kWh	53,954,149	##########	51,085,917	56,822,382	20,723,616	37,489,381	51,719,544	56,188,755	22,575,494	35,637,503
	B. i. Load Impacts/designated unit - kW	0.33	0.18	0.31	0.34	0.13	0.23	0.31	0.34	0.14	0.22
	B. ii. Load Impacts/designated unit - kWh	2,130	1,149	2,017	2,243	818	1,480	2,042	2,218	891	1,407
	C. i. a. % change in usage - Part Grp - kW										
	C. i. b. % change in usage - Part Grp - kWh										
	C. ii. a. % change in usage - Comp Grp - kW										
	C. ii. b. % change in usage - Comp Grp - kWh										
D. Realization Rate:	D.A. i. Load Impacts - kW, realization rate	1.83	0.989	1.74	1.93	0.704	1.274	1.76	1.91	0.767	1.211
	D.A. ii. Load Impacts - kWh, realization rate	1.36	0.732	1.29	1.43	0.521	0.943	1.30	1.41	0.568	0.897
	D.B. i. Load Impacts/designated unit - kW, real rate	1.36	0.732	1.29	1.43	0.521	0.943	1.30	1.41	0.568	0.897
	D.B. ii. Load Impacts/designated unit - kWh, real rate	1.36	0.732	1.29	1.43	0.521	0.943	1.30	1.41	0.568	0.897
3. Net-to-Gross Ratios		RATIO		RATIO	RATIO			RATIO	RATIO		
	A. i. Average Load Impacts - kW	0.539		0.384	0.695			0.418	0.661		
	kWh	0.539		0.384	0.695			0.418	0.661		
	Impacts/designated unit of measurement - kW	0.539		0.384	0.695			0.418	0.661		
	designated unit of measurement - kWh	0.539		0.384	0.695			0.418	0.661		
	% chg in usage in Impact year relative to Base usage in Impact year - kW										
	% chg in usage in Impact year relative to Base usage in Impact year - kWh										
4. Designated Unit Intermediate Data		PART GRP	COMP GRP	PART GRP	PART GRP	COMP GRP	COMP GRP	PART GRP	PART GRP	COMP GRP	COMP GRP
	A. Pre-install average value	N/A		N/A	N/A			N/A	N/A		
	B. Post-install average value	N/A		N/A	N/A			N/A	N/A		
6. Measure Count Data		NUMBER									
	A. Number of measures installed by participants in Part Group	25,331									
	B. Number of measures installed by all program participants in the 12 months of the program year	25,331									
	C. Number of measures installed by Comp Group										
7. Market Segment Data											
	Number of Participants	N/A									

F.3 TABLE 7: DOCUMENTATION OF PROTOCOLS FOR DATA QUALITY AND PROCESSING

F.3.1 A. Database Management

Flow chart

Figure F-1 shows the relationships among the data elements used in the analysis.

Figure F-1
Flow of Data Elements Used in Analysis
A. Gross Savings

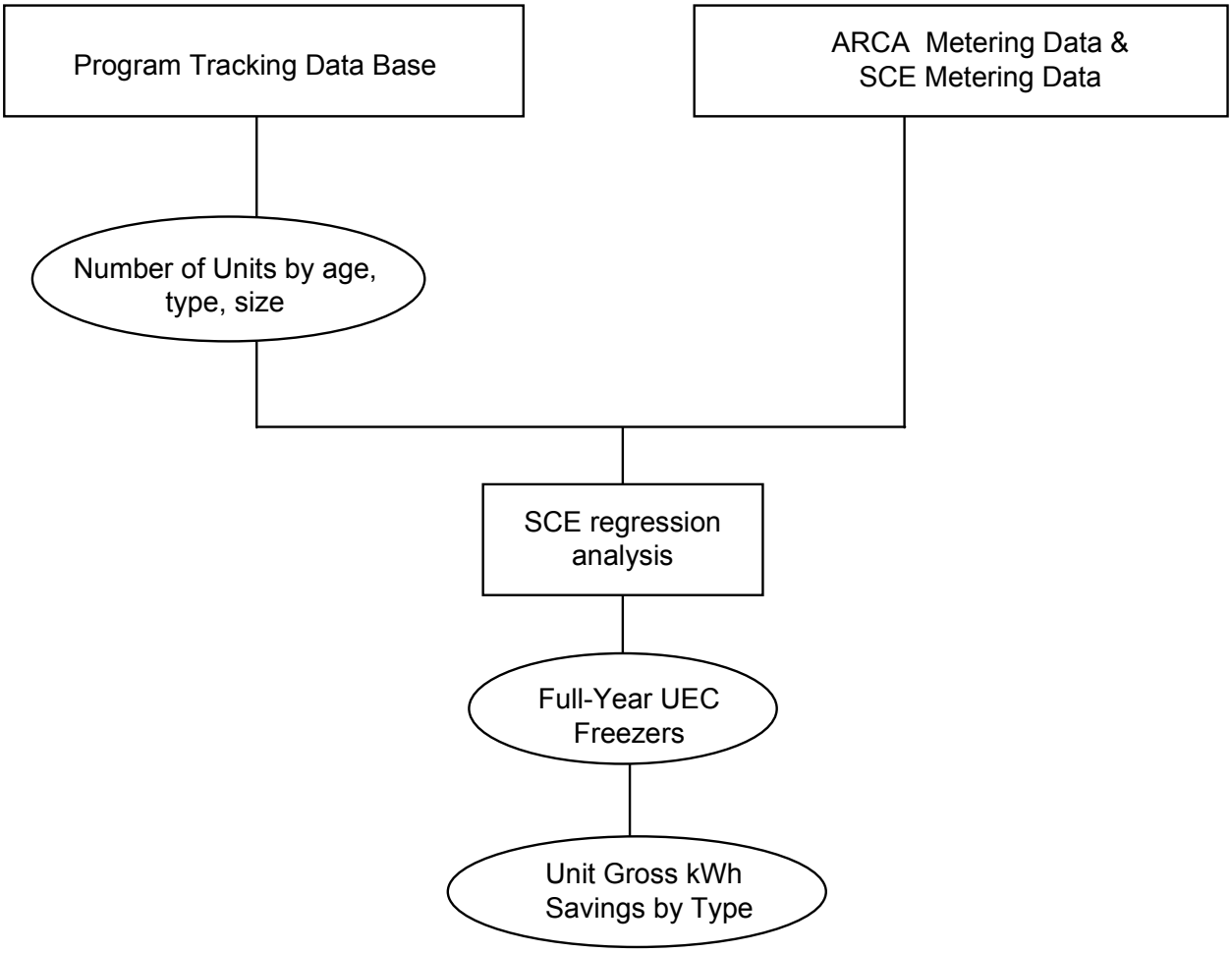


Figure F-1
Flow of Data Elements Used in Analysis
B. Net-to-Gross

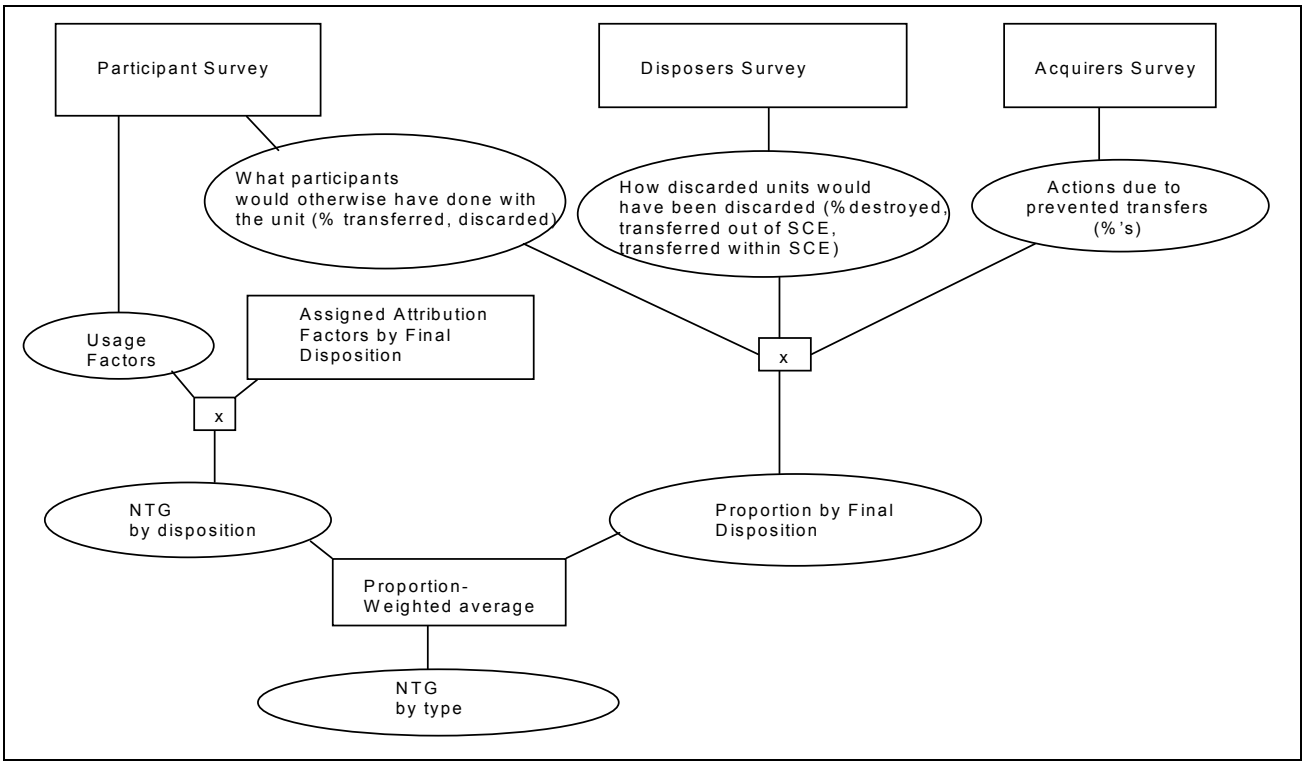
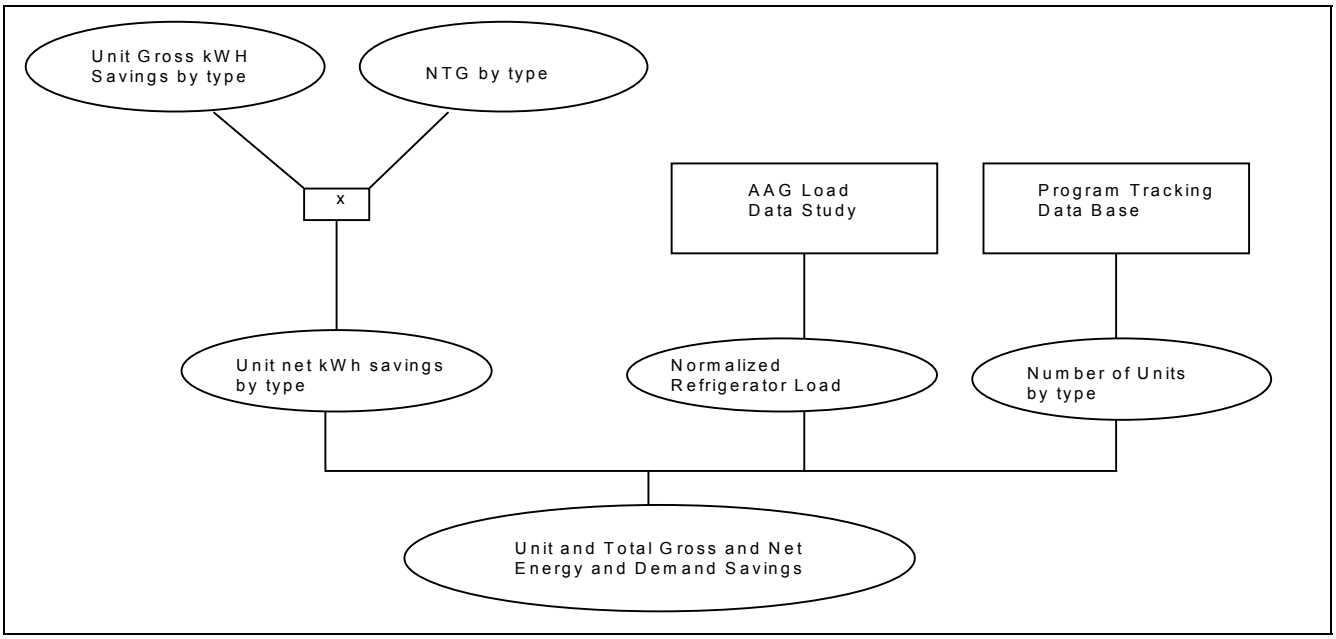


Figure F-1
Flow of Data Elements Used in Analysis
C. Final Impacts



Primary data sources

Primary data sources used in the study include:

ARCA metering data base. This study did not include direct analysis of the ARCA metering data. However, the SCE/BR Labs regression analysis described below did make use of these data.

SCE/BR Laboratories study. BR laboratories metered actual appliances picked up by the recycling program. The DOE Test Method as specified in 10 CFR, Section 430.23(b), 1995 was used to establish annual energy consumption.

The program tracking data base. In this analysis, the primary use of this data base was to determine the number of units picked up by the program, by type. Secondary sources used in the study also used the program tracking data as described below.

Participant survey. Analysis of survey responses determined for each unit picked up from surveyed customers whether that unit would have been discarded or kept in use in the absence of the program, and for what fraction of the year it would have been used. These results were then aggregated to give

1. the fraction of units picked up by the program that would otherwise have been kept in use, and the fraction that would otherwise have been discarded, by type; and
2. the fraction of the year a unit would be kept in use if it were kept.

Disposers survey. Analysis of this survey data determined the fractions of discarded units that would have been:

1. destroyed or taken out of use;
2. transferred to other users outside the SCE service territory; and
3. transferred to other users within the SCE service territory.

Acquirers survey. Results of this survey were used to determine for used units that were acquired.

1. How the unit would have been used (main or spare refrigerator).
2. If the unit were not available, what action would have been taken instead (acquire a new one, replace with a similar unit, acquire a worse unit, or not acquire any).

These results were then applied as estimates of what actions were taken as a result of the prevented transfers of units attributable to the program.

Secondary data sources

Secondary data sources include:

SCE regression analysis. This was an internal analysis conducted by SCE on the metering data provided by ARCA and the SCE/BR Laboratories study. This study provided the estimate of the full-year freezer UEC used as the basis for the unit gross savings estimate.

Extended Impact Evaluation of the Spare Refrigerator Recycling Program. XENERGY 1997. This was the evaluation of the 1994 Spare Refrigerator Recycling Program.

Combining elements

An attribution factor (credit due to the program as a fraction of the full-year UEC) was assigned for each final disposition category, based on logic and simple engineering analysis. Multiplying by the usage factor gave the net-to-gross ratio for each final disposition category.

Multiplying together the proportions in successive disposition subsets (eg., discard, transfer within SCE, use as main, if not available buy new) gave the estimated proportion in each final disposition category. Taking the weighted average net-to-gross, weighted by the proportion in the category, gave the average net-to-gross by type (refrigerator or freezer).

Multiplying the net-to-gross by the unit gross savings gave the unit net savings. Multiplying either unit savings by the number of units of each type gave the total savings. Multiplying the unit or total gross or net energy savings by the scalar factor based on the normalized refrigerator load factor gave the corresponding estimate of demand savings.

Supplemental Analysis

Additional data collection and analysis, conducted for the evaluation of the 1994 SCE Spare Refrigerator Recycling Program, were used to support the analysis. The additional efforts were:

- A study of the used refrigerator market
- A review of private refrigerator sales via classified newspaper ads.

These supplemental analyses did not provide explicit parameter estimates for use in subsequent analytic steps. Rather, the findings from these studies were used to provide qualitative justification and corroboration for some of the assumptions, approaches, and interpretations of the other components of the study.

F.3.2 B. Data screening and analysis criteria:

This study did not use load impact regression models. Screening and outlier detection procedures common to those models were not required. Data perturbation protocols were also not applicable.

Proportions estimated from survey data were based on complete responses for the relevant items.

The participant survey collected data on multiple units if more than one unit was picked up. The data base of individual customer responses was translated into a data base with one record for each picked up unit. The acquirers and disposers surveys asked about the two most recent unit acquired or disposed.

F.3.3 C. Data interpretation and application:

Net impact calculation

Net impacts were calculated by method E1B of Table 7 of the January 1997 CADMAC M&E Protocols:

> Average participant group load impacts per designated unit times the number of designated units times the NGR

Rationale

Billing analysis (a load impact regression model) was not used for this study because such an analysis cannot identify the savings attributable to avoided transfers. This component of savings was considered likely to be an important part of the total Program savings. Thus, a comparison group was not used. The approach followed instead was to determine the full-year UEC of the removed refrigerators as the gross savings, and determine the removal or suspension of use attributable to the Program as the net-to-gross factor.

Metering data from the current Program year, together with metered data from units picked up in a similar program run by the same implementation contractor, weighted to reflect the mix of sizes, types, and ages picked up by SCE's 1996 Program was considered the most meaningful basis for estimating the full-year UEC. The secondary sources used provided such estimates.

The estimation of the net-to-gross factor requires:

- the usage factor (fraction of the year a unit would have been in use if not picked up by the Program);
- the fraction of units that would have been kept in use if not picked up;
- the fraction of units that would have been transferred to another SCE customer if not picked up; and
- the alternate acquisitions made because a transferred unit was not available.

The rationale for developing estimates of these components of the net-to-gross ratio was as follows:

- The fraction of units that would have been kept in use if not picked up is best estimated by participants' reports of what they would otherwise have done. These estimates are therefore based on the participant survey. However, participant reports of how they would otherwise have disposed of a unit are not good indicators of how units not kept would have been discarded, since many participants would not have investigated alternative disposal means.
- How units would have been disposed of if discarded by participants outside the Program is best estimated by disposal means used by nonparticipants who discarded a unit. Thus, estimates of the percents of discarded units that would have been destroyed, transferred to another user outside SCE, or transferred to another user inside SCE's territory are developed from the disposers survey.
- What actions have been taken because transfers of old units to another customer have been prevented by the Program are best estimated from what customers who actually have acquired used units say they would do if these units were unavailable, or were available only at a higher cost. These estimates are developed from the acquirers survey.

Further discussion of the basis for the analytic approach and specific assumptions appears in Sections 2, 3, and 4.

SOUTHERN CALIFORNIA EDISON COMPANY
RETROACTIVE WAIVER FOR
1996 RESIDENTIAL REFRIGERATOR RECYCLING PROGRAM
(Study ID Number 537)
(Approved by CADMAC December 17, 1997)

Background/ Introduction

Southern California Edison will conduct an impact evaluation of 1996 Spare Refrigerator Recycling Program. This work will utilize customer survey methods previously developed to evaluate the 1994 Program. In addition, Edison will undertake a metering study of appliances picked up by the Program.

Summary of Edison Request

This waiver requests deviations from the Protocols by Southern California Edison for its 1996 Residential Refrigerator Recycling Program. Edison seeks approval to:

1. Use a combination of data from a secondary source and independently developed DOE test results to estimate unit energy consumption for appliances retired by the Program.
2. Replicate customer survey methods used in 1994 to develop the required net-to-gross ratio.
3. Extend the deadline for study completion to May 1, 1998.

PROGRAM SUMMARY

Number of Participants	26901
Administrative Costs	$958,000
Incentive Costs	$3,839,000
Resource Benefits, Net	$7,463,000
Earnings	$868,000

Parameter

Table C-3B, section B.2, specifying gross energy impacts.

Protocol Requirement

Gross energy impacts based on estimates of energy consumption from manufacturer test results obtained from DOE testing procedures.

Waiver Alternative

Expand the designated method to include not only manufacturer test results, but to also include independent laboratory results obtained using DOE testing procedures.

Rationale

Edison desires to assess and correct any bias resulting from a valuable secondary data source and to directly address recently advanced criticisms of the UEC estimation methods used previously (see below for elaboration of the rationale).

Estimation of Gross UEC
SCE will contract with an independent laboratory (BR Laboratories, Huntington Beach, CA.) to meter actual appliances picked up by the Recycling Program. The DOE Test Method as specified in 10 CFR, Section 430.23(b), 1995 will be used to establish annual energy consumption.

A necessary part of net savings estimation for the 1996 SCE Refrigerator Recycling Program is a valid and precise estimate of the per-appliance field consumption of the appliances in the population of recycled appliances. A method to estimate these UEC's is outlined below.

The general approach is to carefully augment an existing sample of approximately 1070 appliances picked up and metered by ARCA in other recycling programs. The augmented sample of 1220, including 150 appliances picked up in the Edison Program and DOE-metered independently, will be used to estimate a regression predicting tested consumption. The regression results, when applied to population data for the 1996 Program, will provide estimated DOE test means (UEC's) for that population overall and by size/configuration.

ARCA's metering procedure conformed to a protocol generally referred to as the "DOE test." Most of these appliances were picked up in Midwestern recycling programs, so that there is a logical possibility of sample bias in representing consumption-relevant features of the Edison spare refrigerator/freezer population. It is also logically possible that DOE tests conducted by ARCA are systematically different than tests conducted by an independent lab, yielding lower or higher consumption. The primary purpose of the probability-based sample augmentation with 150 independently metered Edison Program appliances is to build into the regression estimation of the UEC a capability for detecting and adjusting for these biases. Overall, the procedure capitalizes on the fact that

consumption-relevant variables (configuration, volume, appliance age, and amperage) are available in both the sample data set and the population file. It should also be noted that application of the regression parameters to the Program population data serves to reduce possible sample selection bias.

Inclusion of the bias-correcting term(s) in a regression estimated over the augmented sample will allow a great deal of precision gains over a UEC estimation procedure which fails to capitalize on auxiliary variables. The UEC developed from the regression will be further adjusted as necessary by a ratio of in situ electricity consumption to consumption as measured by the DOE test to assure that there is no overestimation. The ratio used will be based on metered comparisons.

Further Discussion

ORA reviewers have expressed concern over the approach Edison used to estimate UEC for appliances retired by the Recycling Program in 1994. Outstanding issues include (1) the use of secondary data; (2) the fact that the UEC estimate was based on metered data collected by the implementation contractor, a potentially interested party; and (3) the use of metered data obtained using DOE testing procedures.

SCE has taken the position that the use of secondary data and DOE test results are not at odds with the protocol governing residential refrigeration programs (Table C-3B). As such, a waiver should not necessarily be required.

However, Edison recognizes that the sole reliance on secondary data sources is not necessarily in keeping with the overall intend of the protocols. To address this concern, Edison proposes to use the above-mentioned approach.

Last, Edison also notes that there exists a substantial body of research comparing lab and field performance. A review of this literature provides a cost-effective and empirical basis for adjusting lab-based results for under/overstating consumption in the field.

Parameter

Table C-3B, section B.5, specifying acceptable methods to estimate first year net impacts.

Protocol Requirement

Acceptable methods to estimate first year net impacts include (a) modeling pre- and post-Program sales trends; (b) quasi-experimental design control area/treatment area comparisons, or (c) discrete choice models.

Waiver Alternative/(Clarification)

Expand designated methods (for residential refrigeration programs) to include the use of a surveys of Program participants and nonparticipants.

Rationale

The method Edison has used in the past to develop net impact estimates for this Program consists of the following components:

1. Determine the full-year adjustment to unit energy consumption (UEC) for an average refrigerator and an average freezer collected by the Program. The unadjusted UEC is determined in a separate study by analysis of metering data from a sample of picked up units.
2. Determine the part-use factor for picked up units. This factor is the fraction of the year the unit would have remained in use if not picked up.
3. Determine the attribution factor for picked up units. This factor is the credit assigned to the Program for the removal of the unit, expressed as a fraction. The attribution factor is determined from analysis of survey data from Program participants and from nonparticipant customers who disposed of and acquired used refrigerators or freezers during the Program year.
4. Calculate the net-to-gross ratio as the product of the part-use and attribution factors.
5. Calculate impacts as the product of the UEC and net-to-gross factor.

To support this analysis, three groups of customers will be surveyed:

- Program participants ("participant survey")
- Nonparticipants who disposed of a refrigerator or freezer during the Program year ("disposers survey")
- Nonparticipants who acquired a used refrigerator or freezer during the Program year ("acquirers survey").

A minimum of 400 participants and 200 nonparticipants will be surveyed. These numbers were selected to meet or exceed the CADMAC Protocol requirements for participant and nonparticipant sample sizes.

The proposed approach proved to be successful in the 1994 Program evaluation, producing a NTG ratio of 0.61. The survey design effectively measures the scope of alternative actions in the absence of the Program, including destruction of the appliance or transfer to other Edison customers. The survey design also controls for equipment that was inoperable when picked up or in use only part-time, and enables adjustment to the impact estimate when recycled units are replaced rather than being discarded without replacement.

Based on favorable review comments received in the past, Edison assumes this approach will not be contested by ORA in the future.

Filing Deadline Requirement

The filing deadline for all 1996 Program year impact evaluation studies is March 1, 1998.

Waiver Alternative

Extend the deadline for study completion to May 1, 1998.

Rationale

In an attempt to be responsive to ORA's recent criticism, Edison is proposing to undertake a costly and time-consuming end-use metering study. This research effort has only recently been procured and will take approximately 20 weeks to complete. As a consequence, Edison is requesting an additional two months to respond to the increased burden associated with this data collection effort.

Table G-1
Summary of Retroactive Waiver for Study 537
Impact Measurement Requirements - Table 3C-B

Parameter	Protocol Requirements	Waiver Alternative	Rationale
Gross energy impacts	Impacts based on estimates of energy consumption from manufacturer test results obtained from DOE testing procedures. Table C-3B, section B.2	Supplement existing DOE-metered sample of aged appliances with independently DOE-metered sample of participating appliances, sample-based regression applied to study year Program population characteristics to yield UEC.	Improve precision of estimates, address issue of sampling bias or bias of auspices in connection with existing sample.
Net energy impacts	(a) modeling pre and post-Program sales trends; (b) quasi-experimental design control area/treatment area comparisons; or (c) discrete choice models. Table C-3B section B.5	Replicate survey design used in the 1994 impact study.	The participant and nonparticipant survey design effectively measures the scope of alternative actions in the absence of the Program.
Filing deadline	March 1, 1998	Extend the deadline to May 1, 1998.	Allow Edison to conduct a time-consuming end-use metering study.