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1994 & 1995 Commercial Energy Efficiency Incentives

Fourth Year Retention Evaluation

March 1999

Study ID Nos. 924 & 960

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1994 & 1995 COMMERCIAL ENERGY EFFICIENCY INCENTIVES PROGRAM:

FOURTH YEAR RETENTION EVALUATION

STUDY ID NOS. 924 & 960

Program Description

SDG&E's PY94 & PY95 Commercial Energy Efficiency Incentives (CEEI) Program was designed to help customers reduce energy costs and increase energy efficiency at their facilities while providing resource value to society.

The CEEI Program was supported through audits, Energy Service Representatives, and Account Executives. The CEEI Program was targeted to existing customers with retrofit opportunities that provided cost-effective DSM energy savings. SDG&E's main marketing strategy for its retrofit program was financial incentives. Three delivery techniques allowed SDG&E the flexibility needed to encourage the adoption of energy efficiency measures.

The first incentive technique offered customers monetary incentives for the installation of standard mechanical and complex custom energy efficient measures. The target market for this program was primarily large assigned customers. SDG&E Account Executives had established long-term business relationships with these customers, creating a trusting atmosphere that enabled the Account Executive to be involved and influential in assisting the customer with major retrofit applications.

The second delivery mechanism was the Power to Save Program marketed to the vast majority of commercial customers by promoting and encouraging the installation of energy efficient lighting and mechanical technologies. Customer participation began with an energy audit and recommendations for energy efficient equipment implementation based upon the audit. Potential program incentives offered under the CEEI Program were highlighted. Customers were encouraged to participate in the CEEI Program by installing the cost-effective energy measures and receiving incentives for those measures.

The third delivery mechanism was Commercial Rebates. These rebates were delivered through appliance/equipment dealers who gave commercial customers an instant cash incentive at the point of purchase. SDG&E reimbursed the dealer for the rebates upon submittal of the appropriate paperwork.

A customer who participated in SDG&E's CEEI was entered into SDG&E's project tracking system. Information regarding customer name, address, phone number, installed measures, measure costs, energy savings and participation date were kept in this database. The retention sample for this study was drawn from this population.

Sampling and Data Collection

The M&E Protocols require that retention studies evaluate the top 10 measures or 50% of the estimated resource value, whichever number of measures is less, excluding miscellaneous measures. For PY94, SDG&E's project tracking system did not carry resource values (and could not be constructed due to changes in data systems) but rather the "incentive basis"(IB) as defined in the shareholder mechanism in place at that time. In accordance with the retroactive waiver attached to the end of this report, SDG&E ranked the PY94 CEEI measures by descending IB. The top eight measures account for 51% of non-miscellaneous program IB. For PY95, ten different measures constitute 52.5% of resource value. These 18 measures were evaluated for measure retention.

The M&E Protocols require that PY94 and PY95 program years be combined for retention studies to increase sample sizes for retention measures. While there is no overlap between PY94 and PY95 measures to be studied, there are crossovers between years for "like" measures, which is discussed later.

649 commercial and 9 military customers installed the 8 retention measures to be studied for PY94 CEEI. SDG&E's sample design was to conduct an on-site audit of those customers who installed 3 or more of the 8 measures to be studied. Two additional customers were added to the sample in order to cover all 8-study measures. Altogether, a sample of 144 customers of the 649 commercial participants and all 9 military establishments were selected for on-site visits. One commercial customer refused to allow the auditors on-site because he was unhappy with SDG&E, resulting in the completion of 143 commercial surveys. Audits were successfully

completed at all 9 military sites. The affect on the sample design of the one customer refusal is insignificant and described in detail in M&E Table 7 section 2.b.

1,233 customers installed the 10 retention measures to be studied in PY95 (1203 commercial and 30 military). SDG&E's sample design was to conduct an on-site audit of those customers who installed 5 or more of the 10 measures to be studied. Customers who installed adjustable speed drives (ASDs) on air handlers were added to the sample in order to cover all 10-study measures. This technology was installed at 32 grocery stores throughout the service territory and these stores did not install any of the other measures to be studied. 11 of the 32 sites were visited and the ASD equipment was in place and operating in all cases. Altogether, a sample of 226 of the 1,203 commercial customers and 25 of the 30 military customers were selected and completed on-site audits. M&E Table 7 section 1.e. shows the sample coverage of the CEEI participants.

SDG&E contracted with Xenergy, Inc. to conduct the on-site audits of military sites and SDG&E contracted with VIEWtech, Inc. to conduct the on-site audits of commercial customers in the PY94 & PY95 CEEI program. The objective of the on-site visits was to verify the number of measures that were still in place and operable – the definition of effective useful life (EUL) per the M&E Protocols. Copies of the on-site data collection forms are provided at the end of this study.

Military Sampling

The 1994 and 1995 Commercial EEI Retention Evaluation for lighting measures in the Military Sector was based on a quota sample. The quota for this study was set at a minimum of 75% of the measures installed at the military facilities. The standard practice for issuing contracts under the program for the military sector was to have one contract per building. A sample point in the study was defined as a building with a contract number. This approach for identifying participant building units at military facilities has been used in previously filed first year load impact evaluations at SDG&E.

In PY94, 9 military sites with 230 buildings installed 28,213 lighting measures to be studied for retention. To verify that these measures were still in place and operable, 56 buildings at all 9 sites representing 21,229 measures were visited (75% of the total measures installed).

PY94 Military Quota Sample				
	Military Sites	Contracts/ Buildings	Lighting Measures	Percent Verified
Program	9	230	28,213	NA
Sample	9	56	21,229	75%

In PY95, 30 military sites with 1,814 buildings installed 331,317 lighting measures to be studied for retention. To verify that these measures were still in place and operable, 305 buildings at 25 sites representing 248,365 measures were visited (75% of the total measures installed).

PY95 Military Quota Sample				
	Military Sites	Contracts/ Buildings	Lighting Measures	Percent Verified
Program	30	1,814	331,317	NA
Sample	25	305	248,365	75%

The 5 military sites not visited for PY95 represent less than 0.35% of the total number of measures installed (1,147 measures out of a total of 331,318 measures installed at military sites in PY95).

Measures/"Like" Measures

In order to apply any changes in EUL to measures not studied, the M&E Protocols require that the utility identify any "like" measures within the program. For SDG&E's PY94 and PY95 CEEI Program, the "like" measures are all in the lighting end use. M&E Protocol Table 6 in this report identifies those measures that are determined to be "like" measures (those measures that were not studied but have similar characteristics to measures that were evaluated in this retention study).

Econometric Framework

Retention model for estimating median lifetime

The model for lifetime estimation involves the key concepts of the survivor function, the hazard function, and median lifetime. Once these concepts are established, they will be applied to the data and a maximum-likelihood framework (which brings the concepts and the data together) to produce estimated median lifetime.

The survivor function

For the lifetime of the equipment in question, the survivor function is,

$$S(j) = \text{prob}(\text{lifetime} \geq j)$$

It is the estimated survivor function that allows the formation of an expected median lifetime. Of course, the survivor function must be specified. This is done through a related function: the hazard function.

The hazard function

The hazard function $h(j)$ is the probability of equipment failure (removal, retirement, etc.) in the next unit of time, conditioned on having reached age j. It bears the following relationship to the survivor function.

$$h(j) = -\frac{dS(j)/dj}{S(j)}$$

The hazard function is generally the "intuitive starting point" of any lifetime analysis, since it is structured to reflect the general pattern of equipment failures. The quadratic hazard function allows for U-shaped and linear hazard curves ($b_2 = 0$, below), as well as an exponential survivor function ($b_1 = b_2 = 0$, below) as special cases:[1]

Equation 1 (The quadratic hazard function)

$$-\frac{dS(j)/dj}{S(j)} = h(j) = b_0 + b_1 j + b_2 j^2$$

Note that the hazard function is actually a differential equation in the survivor curve.

[1] Lawless, J.F. (1982). *Statistical Models and Methods for Lifetime Data*. New York: Wiley. 252-253.

Getting the survivor function from the hazard function

The exact structure of the survivor function can be obtained by solving the hazard function (a differential equation in the survivor function) for $S(j)$, imposing the constraint $S(0)=1$:

Equation 2 (The survivor function)

$$S(j)=e^{-\left(\beta_1 j+\beta_2 j^2+\beta_3 j^3\right)} \quad \left(\beta_1=b_0,\quad \beta_2=\frac{b_1}{2},\quad \beta_3=\frac{b_2}{3}\right)$$

The median lifetime

The median age at failure m is then given by the implicit expression,

Equation 3 (Definition of the median m)

$$S(m)=e^{-\left(\beta_1 m+\beta_2 m^2+\beta_3 m^3\right)}=\frac{1}{2}$$

We now show the steps necessary to estimate the median lifetime from actual data, by defining the "discrete failure function" and the likelihood function.

The discrete failure function

For uniform periods of time (months), the likelihood of failure at age j (before age j+1) is,

Equation 4 (The discrete failure function)

$$F(j)=S(j)-S(j+1)$$

The data, the likelihood function, and estimation

Consider an equipment sample of size n. Let n_j^F be the number of known failures at age j, and let n^Q be the number of known failures whose age at failure is unknown; then the number of survivors by observation at age J is $n-n^Q-\sum_{j=0}^{J} n_j^F$. Furthermore, let ω be the likelihood that the age at failure is unknown, given failure. The log-likelihood function (the log of the likelihood of observing the data) is then,

$$L(\beta,\omega)=\sum_{j=0}^{J} n_j^F \log\left[(1-\omega)F(j)\right]+n^Q \log\left\{\omega\left[1-S(J+1)\right]\right\}+\left(n-n^Q-\sum_{j=0}^{J} n_j^F\right)\log S(J+1).$$

The log-likelihood function can be maximized with respect to its arguments just as a sum-of-squares function can be minimized in a standard regression problem. Standard numerical and

grid-search methods can be used to maximize the log-likelihood function. Once estimates are obtained for the vector of coefficients β, the median lifetime can be estimated using Equation 3.

The estimated variance of β, on which the standard errors of its elements are based, is a fairly complex calculation and one which will not be expressly derived here, although the calculation is based on the expectation of the second-derivative matrix for the log-likelihood function:

$$\mathrm{VAR}(\beta)=\left(\mathrm{E}\frac{\partial^2 \mathrm{L}}{\partial\beta\partial\beta'}\right)^{-1}$$

The estimated median is a nonlinear function of β; as such, its standard error can be estimated dependably for large samples, based on $\mathrm{VAR}(\beta)$.

Solving data problems--developing independent and dependent failures

Lifetime estimation using maximum likelihood requires the statistical independence of failures. Sometimes equipment failures are indeed independent, as when failures occur due to age or manufacturing weaknesses. However, in many cases failures are not independent--that is, they are "dependent"--as when, for example, a "cluster" or "bank" of lighting measures are jointly removed during a remodeling.

Independent failures can easily be handled using the maximum likelihood framework described above. Fortunately, dependent failures can also be handled in a similar fashion. A cluster of dependent failures can be viewed as an independent failure in its own right, one of numerous observed clusters, each of which is subject to the possibility of independent failure. The maximum likelihood framework can simply be applied to the clustered data.

Modeling and estimating with independent and dependent failures

When any one piece of equipment is subject to both independent and dependent failure, the hazard function can be modified accordingly (ignoring the event of both types of failures occurring jointly):

$$\mathrm{h}(\mathrm{j})=\mathrm{h}_{\mathrm{ind}}(\mathrm{j})+\mathrm{h}_{\mathrm{dep}}(\mathrm{j})$$

Independent failures are bound to be age-dependent, so that,

$$\mathrm{h}_{\mathrm{ind}}(\mathrm{j})=\mathrm{b}_0^{\mathrm{ind}}+\mathrm{b}_1\mathrm{j}+\mathrm{b}_2\mathrm{j}^2$$

Dependent failures are mostly likely age-independent (with respect to the building-remodeling effect, we expect the age of the equipment to be irrelevant), so that,

$$h_{dep}(j) = b_0^{dep}$$

This yields a new survivor function (and, implicitly, a new median life that can be estimated based on the joint use of independent and dependent failure data):

$$S(j) = e^{-\left[\left(\beta_1^{ind} + \beta_1^{dep}\right)j + \beta_2 j^2 + \beta_3 j^3\right]}$$

The variance matrix for the joint estimation problem can be constructed, as can the standard error for the jointly estimated median lifetime, represented by the expression,

$$S(m) = e^{-\left[\left(\beta_1^{ind} + \beta_1^{dep}\right)j + \beta_2 m^2 + \beta_3 m^3\right]} = \frac{1}{2}$$

M&E PROTOCOLS TABLE 6

RESULTS USED TO SUPPORT

PY94 THIRD EARNINGS CLAIM

FOR

COMMERCIAL ENERGY EFFICIENCY INCENTIVES PROGRAM

FOURTH YEAR RETENTION EVALUATION

MARCH 1999

STUDY ID NOS. 924 & 960

TABLE 6 for RETENTION STUDIES
PROGRAM: CEEI
YEAR(S): PY94 & PY95

	1. Enduse	1. Measure	*2. ex-ante* EUL	*2. ex-ante* EUL Source	*3. ex-post* EUL from Study	*4. ex-post* EUL for 3rd & 4th claim	5. Standard Error	6. Upper & lower bounds @ 80% Conf Int		7. P Value	8. Realization Rate	9. "Like" Measures to be Adjusted
PY94	LIGHTING	2FO32/1B4T8-2L/1R4-D2	20	***	90.6	90.6	49.0	64.2	117.1	14.9%	4.53	1
PY94	HVAC	EMS (direct digital)	15	*	NA	15	NA	NA	NA	NA	1.00	2
PY94	LIGHTING	4FO32/1B4T8-4L	20	***	101.8	20	341.9	(82.7)	286.4	81.1%	1.00	3
PY94	LIGHTING	2FO32/1B4T8-2L/1R4-D1	20	***	85.0	85.0	75.9	44.0	126.0	39.2%	4.25	4
PY94	LIGHTING	2FO32/1B4T8-2L	20	***	37.9	37.9	12.3	31.3	44.5	14.5%	1.89	5
PY94	HVAC	Variable speed pump motor dri	15	*	NA	15	NA	NA	NA	NA	1.00	6
PY94	LIGHTING	Occupancy Sensors	8	*	75.8	75.8	71.4	37.2	114.3	34.2%	9.47	7
PY94	LIGHTING	1CF13H	20	***	13.0	13.0	6.0	9.8	16.3	24.3%	0.65	8
PY95	LIGHTING	T-8 El Bal (4ft/2la)	16	*	56.6	16	99.7	2.8	110.4	68.4%	1.00	9
PY95	LIGHTING	Opt Refl(4ft/2dlamp)	12	*	260.6	12	5,077.2	(2,480.3)	3,001.4	96.1%	1.00	10
PY95	LIGHTING	Exit Sign Kit (LED)	20	**	NA	20	NA	NA	NA	NA	1.00	11
PY95	LIGHTING	Delamp (4 ft)	16	**	16.1	16	10.5	10.5	21.8	98.9%	1.00	12
PY95	LIGHTING	T-8 El Bal (4ft/4la)	16	*	290.9	16	2,362.0	(984.2)	1,566.0	90.7%	1.00	13
PY95	LIGHTING	Opt Refl(4ft/1dlamp)	12	*	113.8	12	608.6	(214.7)	442.3	86.7%	1.00	14
PY95	LIGHTING	4FO32/1B4T8-4L	20	***	NA	20	NA	NA	NA	NA	1.00	15
PY95	LIGHTING	CF-13Q Hardwire Fxtr	14	**	394.1	14	3,362.9	(1,421.3)	2,209.5	91.0%	1.00	16
PY95	HVAC	ASD on Air Handler	15	*	NA	15	NA	NA	NA	NA	1.00	17
PY95	LIGHTING	2FO32/1B4T8-2L	20	***	NA	20	NA	NA	NA	NA	1.00	18

# above	9. "Like" Measures to be Adjusted	
1	2FO32/1B4T8-2L/2R4-D1	PY94
3	4FO32/1B4T8-4L/1R8-D0	PY94
3	4FO32/1B4T8-4L/2R4-D0	PY94
3	4FO32/2B4T8-2L/2R4-D2	PY94
3	4FO32/1B4T8-2L	PY94
4	1FO32/1B4T8-2L/1R4-D1	PY94
4	2FO32/1B4T8-2L/1R8-D1	PY94
4	2FO32/1B4T8-2L/1DLAMP8	PY94
4	3FO32/1B4T8-3L/1DLAMP	PY94
5	3FO32/1B4T8-3L	PY94
5	1FO32/1B4T8-2L	PY94
5	1FO32/.5B4T8-2L	PY94
8	1CFQ13H	PY94
8	1CF9H	PY94
11	1XLED1	PY94
3	4FO32/1B4T8-4L/2DLA	PY95
3	4FO32/1B4T8-4L/2DLAMP8	PY95
3	4FO32/1B4T8-4L/1R8-D0	PY95
7	Occupancy Sensors	PY95
8	1CFQ13H	PY95
8	2CFQ13H	PY95
9	T-8 El Bal (4ft/3la)	PY95
10	Opt Refl(2ft/1dlamp)	PY95
11	1XLED1	PY95
11	1XLED1T	PY95

*M&E Protocols Appendix "F"

**Advice Letter filing 926-E-A/934-G-A: March 23, 1995

*** Custom Job: Engineering Judgement

Note: NA indicates that no failures were observed

M&E PROTOCOLS TABLE 7

DATA QUALITY AND PROCESSING

DOCUMENTATION

FOR

COMMERCIAL ENERGY EFFICIENCY INCENTIVES PROGRAM

FOURTH YEAR RETENTION EVALUATION

MARCH 1999

STUDY ID NOS. 924 & 960

M&E PROTOCOLS TABLE 7

DATA QUALITY AND PROCESSING DOCUMENTATION

For Commercial Energy Efficiency Incentives Program

Fourth Year Retention Evaluation

March 1999

Study ID Nos 924 & 960

B. RETENTION STUDIES

1. OVERVIEW INFORMATION

a. **Study Title and Study ID:** 1994 & 1995 Commercial Energy Efficiency Incentives Program – Fourth Year Retention Evaluation, March 1999, Study ID Nos. 924 & 960.

b. **Program, Program Year(s), and Program Description (Design):** Commercial Energy Efficiency Incentives Program for the 1994 and 1995 program years. The Program was designed to help customers reduce energy costs and increase energy efficiency at their facilities while at the same time providing resource value to society.

c. **End Uses and Measures Covered:** Lighting and HVAC end uses. The measures are identified in Table 6.

d. **Methods and Models Used:** See the section of the report entitled Econometric Framework for a complete description of the final model specifications.

e. Analysis sample size:

Program Year	Measure	# of Customers in Program	# of Installations in Program	# of Measures Installed in Program	# of Measures in Sample Frame	Date of Retention Studies
PY94	2FO32/1B4T8-2L/1R4-D2	248	39,170	39,170	24,124	Mar-July '98
PY94	EMS (direct digital)	1	1	1	1	May '98
PY94	4FO32/1B4T8-4L	286	17,300	17,300	6,788	Mar-July '98
PY94	2FO32/1B4T8-2L/1R4-D1	98	30,504	30,504	19,814	Apr-July '98
PY94	2FO32/1B4T8-2L	457	61,624	61,624	42,212	Mar-July '98
PY94	Variable speed pump motor drives	1	1	1	1	May '98
PY94	Occupancy Sensors	33	1,967	1,967	812	Apr-Jun '98
PY94	1CF13H	94	4,318	4,318	2,659	Apr-Jun '98
PY95	T-8 El Bal (4ft/2la)	763	451,402	451,402	280,138	Mar-July '98
PY95	Opt Refl (4ft/2dlamp)	376	89,762	89,762	60,349	Mar-July '98
PY95	Exit Sign Kit (LED)	695	32,096	32,096	5,104	Mar-July '98
PY95	Delamp (4 ft)	250	62,378	62,378	42,398	Mar-July '98
PY95	T-8 El Bal (4ft/4la)	466	49,806	49,806	31,674	Mar-July '98
PY95	Opt Refl (4ft/1dlamp)	212	67,386	67,386	46,156	Mar-July '98
PY95	4FO32/1B4T8-4L	209	14,996	14,996	8,557	Mar-July '98
PY95	CF-13Q Hardwire Fxtr	143	13,975	13,975	7,455	Mar-July '98
PY95	ASD on Air Handler	32	32	32	11	May-Jun '98
PY95	2FO32/1B4T8-2L	160	13,493	13,493	9,479	Mar-July '98

2. DATABASE MANAGEMENT

a. **Data sources:** the data came from the following sources

- Customer name, address, phone number, installed measures, and participation date from the program tracking database

- Measures were determined to be in place and operable by the on-site data collection described in the section of the report entitled Sampling and Data Collection.

The data were merged together to form the dataset for the econometric analysis leading to the estimated Effective Useful Life

b. **Data Attrition:** There was minimal data attrition. For PY94, one customer who was unhappy with SDG&E refused to allow the auditors on their premises. This customer had installed 3 lighting measures to be studied: 1) 24 of 1CF13H, 2) 4 of 2FO32/1B4T8-2L/1R4-D2, and 3) 16 of 4FO32/1B4T8-4L. Given the large sample sizes detailed in 1.e. above, this customer's refusal was ignored in the analysis.

c. **Data Quality Checks:** The data sets for the analysis were merged in SAS by the appropriate key variables. Counts of the datasets before and after the merges were verified to ensure accurate merging.

d. **Unused collected data:** SDG&E was initially undecided whether or not to request a waiver asking to split CEEI participants into military and commercial for EUL analysis, as had been done in the past for load impact analysis. Since Xenergy was already scheduled to be at the military establishments, it was requested that their audit include three additional measures for PY94; measures that would be necessary only if it was later determined that the military would have to be treated separately from the commercial sector.

Final resolution with ORA on the load impact waiver required that the impacts from commercial and military be weighted together to get an overall commercial end use realization rate.

Once agreement was reached with the ORA, and it was determined that the EUL estimates for military and commercial retention studies would be brought together at the end of the analysis, it was no longer necessary to evaluate the three additional military measures to comply with the top 10/50% criteria.

The three measures installed at military bases in PY94 with data collected but not required per the M&E Protocols are: 1) 1FO32/1B4T8-2L/1R4-D1, 2) Chiller: 50<=Air Cool<100 ton, and 3) Lighting-Retrofit Metal Halide 1XU. This data resides in Excel spreadsheets.

3. SAMPLING

a. **Sampling procedures and protocols:** Refer to the Sampling and Data Collection section of the report. Section 1.e. above shows how the sample covered the participant population.

b. **Survey information:** Copies of the Surveys are attached at the end of the report. In PY94, 1 customer out of 144 refused to allow the surveyors on-site because he was unhappy with SDG&E. The response rate for PY94 was 143 out of 144, or 99.3%. The survey completed response rate was 100% for PY95.

c. **Statistical Descriptions:** See Failure Distribution Tables provided in Section 4.c

4. DATA SCREENING AND ANALYSIS

a. **Outliers and Missing Data Points:** No outliers and no missing data.

b. **Background Variables:** NA

c. **Screened Data:** In the following failure distribution tables,

NN = the quantity of the measure studied

NQ = the number of observed failures whose age at failure is unknown

NF = the number of observed failures whose age at failure is known

ND = the number of measures still in place and operable

FAILURE DISTRIBTION TABLES PER MEASURE

DATUM	DESCRIPTOR	AGE (MONTHS)
30402	NN94	NA
91	NQ94	47
1	NF94	35
153	NF94	43
30157	ND94	45
com94sam-2F032-1BT8-2L.xls--independent failures		

DATUM	DESCRIPTOR	AGE (MONTHS)
85	NN94	NA
2	NF94	23
3	NF94	35
1	NF94	41
3	NF94	42
2	NF94	43
74	ND94	45
com94sam-1cf13h.xls--dependent failures		

DATUM	DESCRIPTOR	AGE (MONTHS)
2307	NN94	NA
7	NQ94	45
17	NF94	23
2	NF94	32
10	NF94	33
10	NF94	35
2	NF94	37
2259	ND94	45
com94sam-1cf13h.xls--independent failures		

DATUM	DESCRIPTOR	AGE (MONTHS)
17696	NN94	NA
153	NQ94	47
17543	ND94	45
com94sam-2FO32-1B4T8-2L-1R4-D2.xls--independent failures		

DATUM	DESCRIPTOR	AGE (MONTHS)
69	NN94	NA
1	NQ94	47
1	NF94	18
67	ND94	45
com94sam-2FO32-1B4T8-2L-1R4-D1.xls--dependent failures		

DATUM	DESCRIPTOR	AGE (MONTHS)
243	NN94	NA
2	NF94	42
2	NF94	37
1	NF94	23
238	ND94	45
com94sam-2F032-1BT8-2L.xls--dependent failures		

DATUM	DESCRIPTOR	AGE (MONTHS)
402	NN95	NA
2	NF95	23
400	ND95	33
com95sam-C-13Q Hardwire Fxtr.xls--dependent failures		

DATUM	DESCRIPTOR	AGE (MONTHS)
7401	NN95	NA
3	NQ95	35
7398	ND95	33
com95sam-C-13Q Hardwire Fxtr.xls--independent failures		

DATUM	DESCRIPTOR	AGE (MONTHS)
29	NN94	NA
1	NQ94	47
28	ND94	45
com94sam-occupancy sensors.xls--dependent failures		

DATUM	DESCRIPTOR	AGE (MONTHS)
116	NN94	NA
1	NF94	42
2	NF94	23
113	ND94	45
Com94sam-4FO32-1B4T8-4L.xls--dependent failures		

DATUM	DESCRIPTOR	AGE (MONTHS)
6258	NN94	NA
17	NF94	23
2	NF94	35
2	NF94	45
6237	ND94	45
com94sam-4FO32-1B4T8-4L.xls--independent failures		

DATUM	DESCRIPTOR	AGE (MONTHS)
139	NN94	NA
2	NQ94	47
2	NF94	29
135	ND94	45
com94sam-2FO32-1B4T8-2L-1R4-D2.xls--dependent failures		

DATUM	DESCRIPTOR	AGE (MONTHS)
370	NN95	NA
1	NF95	23
1	NF95	35
368	ND95	33
Com95sam-T-8 El Bal-4ft-4la.xls--dependent failures		

DATUM	DESCRIPTOR	AGE (MONTHS)
1347	NN95	NA
1	NQ95	34
1	NF95	34
1	NF95	35
1344	ND95	33
Com95sam-T-8 EL BAL-4FT-2L.xls--dependent failures		

DATUM	DESCRIPTOR	AGE (MONTHS)
119586	NN95	NA
40	NQ95	34
38	NF95	35
119508	ND95	33
Com95sam-T-8 EL BAL-4FT-2L.xls--independent failures		

DATUM	DESCRIPTOR	AGE (MONTHS)
259	NN95	NA
1	NF95	23
258	ND95	33
Com95sam-Opt Refl-4ft-2dlamp.xls--dependent failures		

DATUM	DESCRIPTOR	AGE (MONTHS)
185	NN95	NA
1	NF95	23
1	NF95	34
183	ND95	33
Com95sam-Opt Refl-4ft-1dlamp.xls--dependent failures		

DATUM	DESCRIPTOR	AGE (MONTHS)
216	NN95	NA
11	NQ95	34
8	NQ95	35
197	ND95	33
M95_s2-Opt Refl-4ft-1dlamp.xls--dependent failures		

DATUM	DESCRIPTOR	AGE (MONTHS)
24790	NN95	NA
39	NQ95	34
24	NQ95	35
24727	ND95	33
m95_s2-Opt Refl-4ft-1dlamp.xls--independent failures		

DATUM	DESCRIPTOR	AGE (MONTHS)
186	NN95	NA
18	NQ95	34
3	NQ95	35
165	ND95	33
M95_s2-Delamp-4-ft.xls--dependent failures		

DATUM	DESCRIPTOR	AGE (MONTHS)
242	NN94	NA
9	NQ94	47
1	NQ94	46
1	NQ94	45
231	ND94	45
M94_2-2F032-1B4T8-2L.xls--dependent failures		

DATUM	DESCRIPTOR	AGE (MONTHS)
101	NN94	NA
1	NQ94	47
1	NQ94	46
1	NQ94	45
98	ND94	45
M94_2-2F032-1B4T8-2L-1R4-D2.xls--dependent failures		

DATUM	DESCRIPTOR	AGE (MONTHS)
56	NN94	NA
1	NQ94	45
1	NQ94	47
54	ND94	45
m94_2-2F032-1B4T8-2L-1R4-D1.xls--dependent failures		

DATUM	DESCRIPTOR	AGE (MONTHS)
53	NN94	NA
4	NQ94	47
49	ND94	45
m94_2-1F032-1B4T8-2L-1R4-D1.xls--dependent failures		

DATUM	DESCRIPTOR	AGE (MONTHS)
1300	NN95	NA
3	NQ95	33
66	NQ95	34
35	NQ95	35
1196	ND95	33
m95_s2-T-8-El-Bal-4ft-2la.xls--dependent failures		

DATUM	DESCRIPTOR	AGE (MONTHS)
155	NN95	NA
16	NQ95	34
6	NQ95	35
133	ND95	33
m95_s2-T-8 El-Bal-4ft-4la.xls--dependent failures		

DATUM	DESCRIPTOR	AGE (MONTHS)
6940	NN95	NA
37	NQ95	34
27	NQ95	35
6876	ND95	33
m95_s2-T-8 El-Bal-4ft-4la.xls--independent failures		

DATUM	DESCRIPTOR	AGE (MONTHS)
289	NN95	NA
1	NQ95	33
12	NQ95	34
8	NQ95	35
268	ND95	33
m95_s2-Opt-Refl-4ft-2-dlamp.xls--dependent failures		

d. **Model statistics:** See M&E Protocol Table 6.

e. **Specification:**

	Type of Data Used		Type of Specification Used		
Study	Independent Failures	Dependent Failures	Exponential Specification	Linear Specification	Combination Linear/Exponential Specification
CEEI	x	x	x	x	x

1) **Heterogeneity:** See section of the report entitled "Econometric Framework.."

2) **Omitted Factors:** None omitted.

f. **Error in Measuring Variables:** NA.

g. **Influential Data Points:** None.

h. **Missing Data:** None.

i. **Precision:** The calculation for the standard error is based on the expectation of the second-derivative matrix for the log-likelihood function.

MEASURE RETENTION SURVEYS

FOR

COMMERCIAL ENERGY EFFICIENCY INCENTIVES PROGRAM

FOURTH YEAR RETENTION EVALUATION

MARCH 1999

STUDY ID NO. 924 & 960

PY94 and PY95 SDG&E Retention Study
CEEI – Commercial Sector
April – June 1998

Site Name=>

Prem ID =>

Program=>

Site Address=>

1. Measure	New Qty	No. Verified	Plus %	No. Operable	No. Removed	Date Removed
2FO32/1B4T8-2L/1R4-D2						
EMS (direct digital)						
4FO32/1B4T8-4L						
2FO32/1B4T8-2L/1R4-D1						
2FO32/1B4T8-2L						
Variable speed pump motor drives						
Occupancy Sensors						
1CF13H						
T-8 El Bal (4ft/2la)						
Opt Refl(4ft/2dlamp)						
Exit Sign Kit (LED)						
Delamp (4 ft)						
T-8 El Bal (4ft/4la)						
Opt Refl(4ft/1dlamp)						
4FO32/1B4T8-4L						
CF-13Q Hardwire Fxtr						
ASD on Air Handler						
2FO32/1B4T8-2L						

VIEWtech
9/8/98

SDG&E CEEI – Military Survey for PY94 & PY95

April – July 1998

SDG&E PY94 & PY95 CEEI Program - Military Sector
Measure Retention Survey

Site_nbr: **Site_sec:** **PART:**
Site_nm:
Rank: **Address:**
Site_Cty:
Bldg_sz: **Bldg_lgt:**
ENDUSE:

Site Contact (DB): _____
Contact Ph: _____

Alternate contact name: _____
Alternate contact phone: _____

Surveyor: _____
Suvey Date: _____

Contract	MSR #	NEW DESC	kWh Sav.	kW Red.	Th. Sav.	MSR LOC	Ins. Qty	Run Hrs	Ver. Schedule (incl.date of change in schedule)

SDG&E PY94 & PY95 CEEI Program - Military Sector

Measure Retention Survey

Site_nbr: **Site_sec:** **PART:**

Site_nm:

Rank: **Address:**

Site_Ctv:

Bldg_sz: **Bldg_lgt:**

Site Contact (DB): _____
Contact Ph: _____

Alternate contact name: _____
Alternate contact phone: _____

Surveyor: _____
Suvey Date: _____

ENDUSE:

SURVEY DISPOSITION

Audit Completed?: [ ]Yes [ ]No (check one)

Reason for not completed: [ ]
1 = Unable to reach/contact.
2 = Changed mind about participation in study.
3 = Premise closed/not operating.
4 = Site/contact info incorrect and could not find alternate contact.
5 = Requested to call back, could not complete call.
6 = Rescheduled upon arrival at site.
7 = Other: Describe:

DISCREPANCIES

Reason for discrepance in counts (check one and describe if necessary)
[ ]=Removed, not replaced (include date of rernoval:,
[ ]=Never installed
[ ]=Exceeds tracking system counts (describe reasons for additional eqmt, eg, retrofits part of SDG&E Program in 1995).
[ ]=Removed, replace with more efficient equipment
[ ]=other, describe situation fully

Description/Comments:

SDG&E PY94 & PY95 CEEI Program - Military Sector

Measure Retention Survey

Site_nbr: **Site_sec:** **PART:**

Site_nm:

Rank: **Address:**

Site_Cty:

Bldg_sz: **Bldg_lgt:**

Site Contact (DB): _____
Contact Ph: _____

Alternate contact name: _____
Alternate contact phone: _____

Surveyor: _____
Suvey Date: _____

Facility Tenancy/Ownership:

Have Tenant and Owner remained the same? [ ] Yes [ ] No (check one)
If NO, what best describes the situation [ ] (select one, describe below)

1. New tenant-same owner.
2. Same tenant-New owner
3. New tenant-New owner
4. Premise closed.

Description/Comments:

Building/Facility Configuration:

Check one box that represents the facility layout (check all that apply, describe below):

[ ] Same as time of installation.
[ ] Same tenant, had tenant improvements
[ ] Same tenant, increased floorspace
[ ] Same tenant, decreased floorspace
[ ] New tenant, no tenant improvements
[ ] New tenant, and had tenant improvements
[ ] New tenant, increased floorspace
[ ] New tenant, decreased floorspace, ie, there is empty floorspace.

Description/Comments:

RETROACTIVE WAIVER

FOR

COMMERCIAL ENERGY EFFICIENCY INCENTIVES PROGRAM

FOURTH YEAR RETENTION EVALUATION

MARCH 1999

STUDY ID NOS. 924 & 960

SAN DIEGO GAS & ELECTRIC
RETROACTIVE WAIVER FOR
1994 RAEI-REFRIGERATOR, CEEI, IEEI, and NRNC PROGRAMS
(Study ID Nos. 915, 924/960, 927/963, and 936/972)

Approved by CADMAC on February 17, 1999

REQUEST

SDG&E is requesting a waiver for the PY94 RAEI-Refrigerator, CEEI, IEEI, and NRNC Programs identification of fourth year retention measure studies required by Table 9A of the Protocols. Protocol Table 9A defines retention study measures as "the top ten measures, excluding measures that have been identified as miscellaneous (per Table C-9), ranked by net resource value or the number of measures that constitutes the first 50% of resource value, whichever number of measures is less." SDG&E is requesting that (1) commercial measures for PY94 be identified by the top 50% of the "incentive basis" (IB) as defined in the shareholder mechanism in place at that time; and (2) that residential refrigerator measures be identified as the top 50% of gross kWh savings.

BACKGROUND

For PY94, SDG&E's project tracking system did not carry resource values (and could not be constructed due to changes in data systems), but rather the "incentive basis" (IB) as defined in the shareholder mechanism in place at that time. IB was a calculated as follows: IB = Benefits – (Administrative Costs + (.25 * Incentive Costs) + (.5 * Equipment Costs)). SDG&E ranked the PY94 measures by descending IB. PY94 residential programs did not carry the IB value; the refrigerators were ranked by percent of program gross kWh savings. SDG&E believes that the measures required to be included for the fourth year retention studies are most likely identified by the substitute criteria. By identifying the top 50% of IB, the measures constituting the greatest shareholder earnings are being evaluated. The number of measures, percentage of non-miscellaneous program IB/kWh savings, and program earnings are presented in the following table.

Program	Number of Retention Study Measures	Percent of Non-Miscellaneous IB	Program Earnings (Millions of $$)
CEEI	8	51.4%	3.413
NRNC	6	54%	1.110
IEEI	11	69%	1.707
RAEI-Refrigerators	1	52%of kWh	.65

CONCLUSION

SDG&E believes that it is reasonable to assume that the identified measures constitute the top 50% of program net resource value. This is a one-time request, has no effect on earnings, and does not affect future earnings claims. Therefore, SDG&E is requesting that it be granted this waiver to identify retention measures for the PY94 CEEI, NRNC, IEEI and RAEI-Refrigerator Programs as described above.