UIEC Data Request 19.2

Class Cost of Service Allocation/Methodology & Procedures:
For each non-demand metered class for which peaks are inferred, please identify who designed the sample, when the sample was designed, when the sample was deployed or used, the accuracy of the sample, and provide a copy of the study or analysis that designed the sample and determined its accuracy.

Response to UIEC Data Request 19.2

This request has been interpreted as seeking information on those schedules and classes where load peaks are derived from sample data. This includes both non-demand metered classes (residential class, schedule 023) as well as demand metered classes (schedule 006, irrigation).

Utah Residential Class

Sample designed by:	The Company's meter data management group
Sample design date:	1991, updated in 1999
Sample deployed:	Winter, 1991
Accuracy of sample:	Designed to PURPA standards, 90% confidence level, ± 10% precision level.
Copy of study:	Please refer to Attachment UIEC 19.2 -1

Utah Schedule 006

Sample designed by:	The Company's meter data management group
Sample design date:	1990
Sample deployed:	Fall, 1990
Accuracy of sample:	Designed to PURPA standards, 90% confidence level, ± 10% precision level.
Copy of study:	Please refer to Attachment UIEC 19.2 -2

Utah Schedule 023

Sample designed by:	The Company's meter data management group
Sample design date:	1990
Sample deployed:	Fall, 1990
Accuracy of sample:	Designed to PURPA standards, 90% confidence level, ± 10% precision level.
Copy of study:	Please refer to Attachment UIEC 19.2 -3

Utah Irrigation Class

Sample designed by:	The Company's meter data management group
Sample design date:	Fall 2005
Sample deployed:	Spring 2006
Accuracy of sample:	Designed to PURPA standards, 90% confidence level, ± 10% precision level.
Copy of study:	Please refer to Attachment UIEC 19.2 -4

UTAH

07-035-93

GENERAL RATE CASE

ROCKY MOUNTAIN POWER

UIEC 19TH SET DATA REQUEST (1-28)

ATTACHMENT UIEC 19.2 –(1-4)

ON THE ENCLOSED CD

UT 07-035-93
UIEC Set 19 (1-28)
Attachment UIEC 19.2 –(1-4)

UTAH RESIDENTIAL SERVICE
Load Recorder Study
1991
Sampling Procedures

This paper describes the procedures used to develop the 1991 Utah Residential Class of Service load recorder study sample. This study will provide load data for use in support of cost studies and price filings before the state Public Utility Commissions and for use in other studies of residential service customer demand characteristics. The goal of the sample design is to provide relative precision of + or - 10 percent at the 90 percent confidence level for an estimate of the average of twelve monthly PacifiCorp system peaks.

Recorders will be placed in the field to be in service by December 1991. This will be an ongoing study with no removal date assigned at this time.

SAMPLING PLAN FOR UTAH RESIDENTIAL

The sampling plan includes several steps:

1. Specification of the target variable;
2. Choice of the stratification variable;
3. Choice of method for estimating kw;
4. Choice of the number of strata;
5. Construction of the strata boundaries;
6. Allocation of sample points to each stratum.

Specification of the Target Variable

Load studies are used primarily to support cost allocation studies. Current cost study methods use the average demand at the hours of the monthly PacifiCorp system peak for twelve consecutive months (PCS12AVG), as well as estimates of class, jurisdictional and individual customer maximum loads, each averaged over twelve consecutive months.

The current study design would normally use PCS12AVG as the target variable for the purpose of study design, because it is by far the most important peak measure for allocation of demand related costs. This however, presented some estimation problems. The previous Utah residential service load recorder study conducted in 1986 - 1990 was the source of data for estimates of means and residual variances required in the sample design. The choice of the new target variable incorporating data from 12 consecutive months presented some estimation problems because of the relatively large proportion of cases in the previous study with missing data in at least one month. This presented two options: use only sites with complete data, trusting that these customers are reasonably representative of all customers, or develop a

version of the target variable that does not require twelve months data.

An alternative variable available for a larger number of sites was chosen. The alternative was the monthly average peak kw based on all customers with at least nine months data (PCS09AVG). For this measure a larger number of load study sites had adequate data. KWh was also taken from load data records.

Choice of the Stratification Variable

A potential stratifying variable, according to Cochran, should meet three criteria:

1. Accessibility,
2. Sufficient variation in magnitude, and
3. Close relation to the estimated variable.

The sum of kWh for 12 months ending March 1991 was selected as the best available variable for this purpose. It is accessible for all residential customers and can range from 0 to over 2 million annual kWh for this customer group. Intuitively, there is also a high degree of correlation between KWHANN and the target variable, the average of 12 system hourly peaks.

Choice of Method for Estimating kW

Mean Per Unit was the method chosen for estimating PCS12AVG.

To estimate a peak demand for a population using Mean Per Unit, the mean peak demand value from the sample is multiplied by the number of elements in the entire population. Use of the Mean Per Unit method provides an unbiased estimate.

Choice of the Number of Strata

As the number of strata increases, precision of the estimate of the total contribution to demand (kW) at system peak also increases. However, the increase in precision per additional stratum diminishes after a relatively small number of strata (Cochran, 1977: 132). Desire for simplicity and for a reasonable number of sites in each stratum lead to a preference for a small number of strata. If a minimum sites policy is followed (eg. 10 sites minimum per stratum), then the addition of strata can actually lead to more, rather than fewer, total sites. If such a policy is not followed, the result can be strata with so few recorders that confidence in sample estimates is at risk from unexpected data problems. Variance estimates may not be sufficiently precise for future sample design purposes, and the sample may not be robust enough to be useful when analysis needs change.

A final decision on number of strata requires actual comparison of potential stratification schemes to evaluate effectiveness versus cost. For these studies, a four strata scheme was employed. The method described below was used to compare

stratification approaches.

Construction of the Strata Boundaries

Various methods might be used for definition of strata boundaries. Cochran (1961) found the "cumulative square root of f" rule to be superior in a comparative study of such methods applied to actual distributions exhibiting a range of skewness.

Steps in calculating strata boundaries under the cumulative square root of f rule (Cochran, 1977: 129-130) are as follows. First, tabulate frequencies of the stratifying variable. For this study annual kWh from customer accounting records for the year ending March 1991 was used. All residential customers, regardless of status (Active or Inactive) and who had annual kWh greater than 250 were included in this procedure and in population figures for the sample design. Second, multiply the number of customers in each interval by the interval factor. Third, take the square root of these frequencies. Fourth, sum the square roots. The resulting distribution of adjusted cumulative square roots of frequency is then partitioned into equal intervals by dividing by the number of strata. The stratification scheme for four strata is presented in Table 1, and shows the optimal boundaries resulting from the above procedure and adjustments made to accommodate the current cost analysis requirements.

Allocation of Sample Points to Each Stratum

Once the stratum boundaries have been determined, sample points (i.e., load recorders) must be assigned to strata. The Tschprow-Neyman allocation procedure (Cochran, 1977:96-99) allocates an optimal sampling rate to each stratum. Optimal allocation techniques minimize the variance of the population estimates by increasing the sample proportion in the strata having larger variances. This produces a sampling rate for each stratum which is proportional to the standard deviation within the stratum. The variance within each stratum was the ordinary variance of the mean.

Minimum recorder allocations and data loss adjustments are required for each stratum to maintain adequate data in case of recorder failure and to provide data for analysis of load characteristics other than the primary target variable, should such analysis be necessary. Minimums ranging from 5 to 12 sites per stratum have been used in past studies. In the present studies, a minimum of 10 sites was used. A minimum on the high side was selected, despite improvements in data quality due to solid-state recording equipment, because changing requirements of load research and other areas using this data may require unanticipated applications, and because overall sample efficiencies are bringing these studies in well below the budgeted number of sites even with the 10 site minimum. The final allocation of recorders reflected an additional twelve percent data loss adjustment per stratum over the optimal or minimum allocation.

The allocations were designed to achieve a 90 percent confidence level with + or - 10

percent relative precision. The design obtained for Utah residential using the optimal/minimum allocation before adjustments for data loss results in a relative precision of + or - 9.75 percent at the 90 percent confidence level (Table 2).

SAMPLE SELECTION

Systematic sample selections were used for each stratum to ensure a representative distribution. Eligible customers were then sorted by stratum, and by annual kWh. The number of customers available in the sampling frame for each stratum was then divided by the number of recorders to be allocated to that stratum, yielding the sampling interval size. A two-digit random number between 0 and 1 was chosen for each stratum and multiplied by the stratum interval size to obtain the starting selection point for each stratum (Table 3). Beginning with this site, additional sites were selected at the given intervals to obtain the desired number of sample sites. This procedure was repeated four times to provide a list of alternate selection sites.

NOTES

Stratum 1 was adjusted from 64 to 74 sites so that the stratum would fall within the 20 percent precision level desired by Load Research for all strata.

Stratum sample size was adjusted from 11 to 15 sites for stratum 4 due to the request from Ken Powell of the PSC that stratum 4 have at least a 15 percent precision level.

Because a total of 169 meters had been budgeted and ordered for this sample and because the total sample size was now 171, stratum 2 was reduced by 2 sites. This brought the total size to 169 and still kept stratum 2 below a 14 percent precision level.

UTAH RESIDENTIAL SERVICE LOAD STUDY DESIGN OPTION FOR 1991 — 4 STRATA - MEAN PER UNIT ESTIMATION - 9 MO AVG MERGED SYSTEM PEAK
EXCLUDING SCHEDULES 046 & 092

		a	b	c	d	e	f	g	h	i	j
		Sample Mean kW	Sample Mean kWh	1988 Pop N	Variance of Mean	Standard Deviation	Wted. Devtns. c*e	Proprtn. row f/ sum f	Optimal Allocation g*h total	Manually Adjusted Allocatn.	Final with Attrition
STRATUM 1	250- 6000 kwh	0.7841	5,872	210,486	0.6687	0.8177	172123	0.4291	57	66	74
STRATUM 2	6001- 12000 kwh	1.3285	9,256	191,095	0.7519	0.8671	165703	0.4131	55	55	60
STRATUM 3	12001- 25000 kwh	3.0609	17,552	45,380	1.3800	1.1747	53309	0.1329	18	18	20
STRATUM 4	> 25000 kwh	6.0303	41,073	4,895	4.1500	2.0372	9972	0.0249	3	13	15
EST POP MEAN (wtd by N)		1.2998	8,857	451,856			401107	1.0000	132	152	169

	Target Allocatn.	Final Target
	132	148

RELATIVE PRECISION OF SAMPLE KW ESTIMATE

		TOTAL KW Optimal n (col. h)	TOTAL KW Adjusted n (col. i)	MEAN KW Adj. n
Variance contributed by strata:	1	528,898,217	455,646,667	0.002232
	2	508,323,231	508,323,231	0.002490
	3	167,104,002	167,104,002	0.000818
	4	49,688,658	8,264,514	0.000040
Total Variance		1,254,014,105	1,139,338,414	0.005580
Standard Error		35,412	33,754	0.074701
Desired Conf Level		90%	90%	90%
(z two-tailed)		1.645	1.645	1.645
Conf Interval		58,253	55,525	0.122883
MPU Est. of KW		587,335	587,335	1.2998
Relative CI		9.92 %,+ or -	9.45 %,+ or -	9.45 %,+ or -

Final Sample Size Precision Level

	Stratum 1	Stratum 2	Stratum 3	Stratum 4
	19.9%	13.9%	14.1%	14.3%

Sample Size By Precision Level

	10.0%	12.5%	15.0%	17.5%	20.0%
Stratum 1	294	188	131	96	74
Stratum 2	115	74	51	38	29
Stratum 3	40	26	18	13	10
Stratum 4	31	20	14	10	8
Total	480	308	214	157	121
Total CI	5.7%	7.2%	8.6%	10.1%	11.6%

JDA
UTRES9A.WK1
28-Aug-91

Utah Schedule 006
Load Recorder Study
Sampling Procedures

This paper describes the procedures used to develop the 1990 Utah Schedule 006 sample. This study will provide load data for use in support of cost studies and price filings before the Utah Public Utility Commission, and for use in other studies of general service customer demand characteristics. The goal of the sample design is to provide relative precision of ± 10% at the 90% confidence level for an estimate of the average of the twelve monthly system peak hours, during twelve consecutive months.

Recorders will be placed in service effective no later than January 1st, 1991, and will be monitored on a continuous basis to insure no significant deviation from billing records.

Sampling Plan for Utah

The sampling plans includes several steps:

1. Formalization of the sample parameters;
2. Specification of the target variable;
3. Choice of the stratification variable;
4. Choice of method for estimating kW;
5. Choice of the number of strata;
6. Construction of the strata boundaries
7. Allocation of sample points to each stratum;
8. Selection of primary sample sites;
9. Selection of alternate sample sites.

Formalization of the sample parameters

This sample replaces the old Utah Schedule 006 sample, which is no longer providing load estimates at a statistically reliable level.

Specification of the target variable

Load studies in the state of Utah are used primarily to support cost allocation studies. Current cost study methods use the average demand at the hours of the PacifiCorp system peak for twelve consecutive months (12SYSPK), as well as estimates of distribution and individual customer maximum demands, each averaged over twelve consecutive months. These study designs treat 12SYSPK as the target variable because it is, by far, the most important peak measure for allocation of demand related costs.

The previous Utah Schedule 006 study was used as a source of data for estimates of means and residual variances required in these sample designs. This Utah study closely mirrors the tariff requirements defined by the current Utah Schedule 006 tariff in that it encompasses those commercial customers whose billed monthly demand lies between 0 and 1,000 kW.

Choice of the Stratification Variable

A potential stratifying variable, according to Cochran, should meet three criteria[1]:

1. *The population is composed of institutions varying widely in size.*
2. *The principle variables to be measured are closely related to the sizes of the institutions.*
3. *A good measure of size is available for setting up the strata.*

Annual billing kWh (KWH_ANN), which is the sum of the twelve consecutive months of billed energy was selected as the best available variable for this purpose. It is accessible for all commercial service customers and can range from 21 to 7,000,000 kWh for this customer group. Moreover, it has been shown that the probable average relationship of kWh usage versus coincidental peak demand is stable and doesn't fluctuate significantly over time[2] (the Second Law of Load Diversity).

Choice of Method for Estimating kW

To estimate a peak demand for a population using MPU, the mean peak demand value from the sample is multiplied by the number of elements in the entire population. Use of the MPU method provides an unbiased estimate.

For ratio estimation, the ratio of the target variable (12SYSPK) over the auxiliary variable (KWH_ANN) is calculated for the sample. This ratio is then multiplied by the total annual billed kWh for the population to get the estimated total group peak demand. Because energy usage and peak demand are correlated, a ratio estimate will have a smaller variance than a MPU estimate. However, a ratio estimate may be slightly biased.

With stratified sample designs, ratio estimators can be computed in two ways: separately for each stratum, or a combined ratio can be computed over all strata. Separate ratio estimation tends to result in smaller variance. However, the combined ratio method is more appropriate when stratum sample sizes are small, because the risk of bias is reduced.

Tables A.3 shows sample size needed for the Utah Schedule 006 study using a mean-per-unit method, assuming a four strata design. The sample design assumes optimal

---

[1] William G. Cochran, "Sampling Techniques", Third Edition, Wiley, pg.101

[2] Constantine W. Bary, "Report of Subcommittee on Coincidence Factors of the Special Committee on Load Studies of the AEIC", minutes 55th and 56th annual meetings (1939 & 1940)

allocation utilizing the Tschprow/Neyman method. The design as presented in Table A.2 was selected for this sample.

Choice of the Number of Strata

As the number of strata increases, precision of the estimate of the total contribution to demand (kW) at system peak also increases. However, the increase in precision per additional stratum diminishes after a relatively small number of strata[3]. Desire for simplicity, and for a reasonable number of sites in each stratum lead to a preference for a small number of strata. If a minimum number of sites policy is followed (eg. 10 sites minimum per stratum), then the addition of strata can actually lead to more, rather than fewer, total sites. If such a policy is not followed, the result can be strata with so few recorders that confidence in sample estimates is at risk from unexpected data problems, variance estimates may not be sufficiently precise for future sample design purposes, and the sample may not be robust enough to be useful when analysis needs change.

A final decision on the number of strata requires actual cost comparison of potential stratification schemes to evaluate effectiveness versus cost. For this study, a four strata scheme was employed (Table A.2). The method described below was used to compare stratification approaches.

Construction of Strata Boundaries

Various methods might be used for definition of strata boundaries. Cochran found the "cumulative square root of f"[4] rule, as defined by Dalenius and Hodges (1959), to be superior in a comparative study of such methods applied to actual distributions exhibiting a range of skewness.

Steps in calculating strata boundaries under the "cumulative square root of f" rule are as follows. First, tabulate frequencies of the stratifying variable. For these studies, annual energy usage (KWH_ANN) from customer billing records for the year ending 05/1990 were used. All Utah Schedule 006 customers, regardless of end of year status (active/inactive) or annual consumption were included in this procedure, and in population figures for the sample design. Second, multiply the number of customers in each interval by the interval factor. Third, take the square root of these frequencies. Fourth, cumulatively sum the square roots. The resulting distribution of adjusted cumulative square roots of frequency is then partitioned into equal intervals by dividing by the number of strata. The final stratification scheme of four strata is presented in

[3] William G. Cochran, "Sampling Techniques", Third Edition, Wiley, Pg. 132
[4] William G. Cochran, "Sampling Techniques", Third Edition, Wiley, Pgs. 129-130

Table D.2, and shows the optimal boundaries resulting from the above procedure, after adjustments made to accommodate prior cost analysis requirements.

Allocation of Sample Points to Each Stratum

Once the stratum boundaries have been determined, sample points (i.e., load recorders) must be assigned to the strata. The Tschprow-Neyman allocation procedure[5] allocates an optimal sampling rate to each stratum. Optimal allocation techniques minimize the variance of the population estimates by increasing the sample proportion in the strata having larger variances. This produces a sampling rate for each stratum which is proportional to the standard deviation within the stratum. The analogous procedure for a ratio sampling plan is allocation in proportion to the square root of the residual variance.

Data for estimating the variance of the 12SYSPK measure for each stratum were available for customers included in the previous Utah Schedule 006 load study. These data were used to provide like estimates for this Utah Schedule 006 sample design. For the mean-per-unit method, the variance within each stratum was the ordinary variance of the mean.

Minimum recorder allocations and data loss adjustments are required for each stratum to maintain adequate data in case of recorder failure and to provide data for analysis of load characteristics other than the primary target variable, should such analysis be necessary. Minimums ranging from 5 to 15 sites per stratum have been used in past studies. In the present studies, a minimum of 10 sites was used. A minimum on the high side was selected, despite improvements in data quality due to solid state recording equipment, because changing requirements for load research and other areas using this data may require unanticipated applications, and because overall sample efficiencies are bringing these studies in well below the budgeted number of sites, even with the 10 site minimum. The final allocation of recorders reflected an additional twelve percent data loss adjustment per stratum over the optimal or minimum allocation.

Sample Selection

Systematic sample selections were used for each stratum to ensure a representative distribution. For practical reasons, inactive customers, customers with no kWh meter installed (usually certain types of lighting customers with very predictable demand and consumption, indicated by absence of a kWh meter number), and customers with very low consumption (<250 kWh in the past 12 billing periods) were eliminated from the sampling frame. Eligible customers were then sorted by stratum and by annual billed energy (KWH_ANN) within stratum. The number of customers available in the sampling frame for each stratum was then divided by the number of recorders allocated to that stratum, yielding the sampling interval size. A two digit random number between 0

[5] William G. Cochran, "Sampling Techniques", Third Edition, Wiley, pgs. 96-99

and 1 was chosen for each stratum, and multiplied by the stratum interval size to obtain the starting selection point for each stratum (Table A.1). Beginning with this site, additional sites were selected at the given intervals to obtain the desired number of sample sites. This procedure was repeated four times to provide a list of alternate selection sites.

Utah Power & Light Company
Bill Frequency Summary
Utah General Service Rate 006
Based on 12 Months ending May 1990

Range	No. of Customers	Interval Factor	f	SQ Root Of f	Cummulative SQ Rt of f
201- 250	0	49	0	0.00	0.00
251- 300	16	49	784	28.00	28.00
301- 350	11	49	539	23.22	51.22
351- 400	13	49	637	25.24	76.46
401- 450	9	49	441	21.00	97.46
451- 500	12	49	588	24.25	121.70
501- 600	25	99	2475	49.75	171.45
601- 700	12	99	1188	34.47	205.92
701- 800	13	99	1287	35.87	241.80
801- 900	21	99	2079	45.60	287.39
901- 1000	12	99	1188	34.47	321.86
1001- 1250	43	249	10707	103.47	425.33
1251- 1500	37	249	9213	95.98	521.32
1501- 1750	43	249	10707	103.47	624.79
1751- 2000	45	249	11205	105.85	730.65
2001- 2250	39	249	9711	98.54	829.19
2251- 2500	33	249	8217	90.65	919.84
2501- 2750	42	249	10458	102.26	1022.10
2751- 3000	34	249	8466	92.01	1114.11
3001- 4000	127	999	126873	356.19	1470.31
4001- 5000	122	999	121878	349.11	1819.42
5001- 6000	114	999	113886	337.47	2156.89
6001- 7000	87	999	86913	294.81	2451.70
7001- 8000	95	999	94905	308.07	2759.76
8001- 9000	86	999	85914	293.11	3052.87
9001- 10000	79	999	78921	280.93	3333.80
10001- 11000	72	999	71928	268.19	3602.00
11001- 12000	68	999	67932	260.64	3862.63
12001- 13000	53	999	52947	230.10	4092.74
13001- 14000	59	999	58941	242.78	4335.51
14001- 15000	53	999	52947	230.10	4565.62
15001- 16000	58	999	57942	240.71	4806.33
16001- 17000	53	999	52947	230.10	5036.43
17001- 18000	40	999	39960	199.90	5236.33
18001- 19000	36	999	35964	189.64	5425.97
19001- 20000	47	999	46953	216.69	5642.66
20001- 21000	44	999	43956	209.66	5852.31
21001- 22000	35	999	34965	186.99	6039.30
22001- 23000	41	999	40959	202.38	6241.69
23001- 24000	43	999	42957	207.26	6448.95
24001- 25000	28	999	27972	167.25	6616.20
25001- 30000	175	4999	874825	935.32	7551.52
30001- 35000	167	4999	834833	913.69	8465.21
35001- 40000	166	4999	829834	910.95	9376.16
40001- 45000	166	4999	829834	910.95	10287.11
45001- 50000	143	4999	714857	845.49	11132.61
50001- 60000	255	9999	2549745	1596.79	12729.40
60001- 70000	265	9999	2649735	1627.80	14357.20
70001- 80000	261	9999	2609739	1615.47	15972.67
80001- 90000	221	9999	2209779	1486.53	17459.20
90001- 100000	229	9999	2289771	1513.20	18972.40
100001- 200000	1718	99999	171798282	13107.18	32079.58
200001- 300000	1002	99999	100198998	10009.94	42089.53
300001- 400000	537	99999	53699463	7327.99	49417.52
400001- 500000	321	99999	32099679	5665.66	55083.18
500001- 600000	231	99999	23099769	4806.22	59889.40
600001- 700000	163	99999	16299837	4037.31	63926.71
700001- 800000	118	99999	11799882	3435.10	67361.80
800001- 900000	90	99999	8999910	2999.98	70361.79
900001- 1000000	80	99999	7999920	2828.41	73190.20
1000001- 1250000	149	249999	37249851	6103.27	79293.46
1250001- 1500000	106	249999	26499894	5147.80	84441.27
1500001- 1750000	75	249999	18749925	4330.12	88771.39
1750001- 2000000	76	249999	18999924	4358.89	93130.28
2000001- 2250000	67	249999	16749933	4092.67	97222.95
2250001- 2500000	45	249999	11249955	3354.10	100577.04
2500001- 3000000	50	499999	24999950	4999.99	105577.04
3000001- 3500000	29	499999	14499971	3807.88	109384.92
3500001-4000000	16	499999	7999984	2828.42	112213.34
4000001-4500000	18	499999	8999982	3000.00	115213.34
4500001-5000000	4	499999	1999996	1414.21	116627.55
5000001- 6000000	5	999999	4999995	2236.07	118863.62
6000001- 7000000	5	999999	4999995	2236.07	121099.69
Total	8853				

	2	3	4	5
2 60549.84	60549.84	40366.56	30274.92	24219.94
3 40366.56	121099.69	80733.12	60549.84	48439.87
4 30274.92		121099.69	90824.76	72659.81
5 24219.94			121099.69	96879.75
				121099.69
1	2	3	4	5

UTAH GENERAL SERVICE 006 LOAD STUDY DESIGN

4 STRATA - MEAN PER UNIT ESTIMATION - 12 MO AVG SYSTEM PEAK

		a	b	c	d	e	f	g	h	i	j
		Sample Mean kW	Sample Mean kWh	1990 Pop N	Ratio Residual Variance	Ratio Resid SQ RT	Wted. Devtns. c*e	Proprtn. row f/ sum f	Optimal Allocation g*h total	Manually Adjusted Allocatn.	Final with Attrition
STRATUM 1	251 - 300,000 kWh	20.6789	115,920	6,668	216.9000	14.7275	98203	0.3515	24	24	27
STRATUM 2	300,001 - 800,000 kWh	105.8285	762,286	1,370	3536.0000	59.4643	81466	0.2916	20	20	22
STRATUM 3	800,001 - 2,000,000 kWh	204.4228	1,344,345	576	2490.0000	49.8999	28742	0.1029	7	10	11
STRATUM 4	GT 2,000,000 kWh	668.1779	4,383,055	239	88127.1190	296.8621	70950	0.2540	17	17	19
EST POP MEAN (wtd by N)		63.2909	411,067	8,853			279362	1.0000	67	71	79
										Target Allocatn.	Final Target
										67	75

RELATIVE PRECISION OF SAMPLE KW ESTIMATE

		TOTAL KW Optimal n (col. h)	TOTAL KW Adjusted n (col. i)	MEAN KW Adj. n
Variance contributed by strata:	1	417,788,932	417,788,932	5.330599
	2	344,201,684	344,201,684	4.391694
	3	136,013,760	90,197,760	1.150840
	4	292,240,542	292,240,542	3.728718
Total Variance		1,190,244,919	1,144,428,919	14.601850
Standard Error		34,500	33,829	3.821237
Desired Conf Level		90%	90%	90%
(z two-tailed)		1.645	1.645	1.645
Conf Interval		56,752	55,649	6.285934
MPU est. of kW		560,314	560,314	63.2909
Relative CI		10.13 %,+ or -	9.93 %,+ or -	9.93 %,+ or -

LRS : SDT
\utmpu4
22-Aug-90

UTAH GENERAL SERVICE 006 SAMPLE PARAMETERS

STRATUM	1	2	3	4	
SAMPLING FRAME	6,668	1,370	576	239	8,853
SAMPLE	27	22	11	19	79
INTERVAL	246.96	62.27	52.36	12.58	
RANDOM STARTS					
Primary					
Random No.(1)	0.87	0.46	0.89	0.62	
Start	215	29	47	8	
Alternate 1					
Random No.(1)	0.81	0.66	0.63	0.22	
Start	200	41	33	3	
Alternate 2					
Random No.(1)	0.01	0.21	0.07	0.29	
Start	2	13	4	4	
Alternate 3					
Random No.(1)	0.77	0.09	0.96	0.18	
Start	190	6	50	2	
Alternate 4					
Random No.(1)	0.10	0.72	0.71	0.93	
Start	25	45	37	12	

(1) Random numbers from Snedecor and Cochran (1967), p 19, beginning at row 14, cols. 12 and 13.

UTGS6PARM.XLS
22-Aug-90

PacifiCorp Electric Operations
Utah Power Division
Stratified Sample Specifications

State : Utah
Revenue Class : General Service
Rate Schedule : All Excluding Schedule 023
Based On : 12 Months Ended May 1990

	Population	Sample Size	Mean kW By Strata	Standard Deviation	Bound On The Mean	Precision Level
Stratum 1	6,668	27	21	15	4.7	22.5%
Stratum 2	1,370	22	106	59	20.9	19.7%
Stratum 3	576	11	204	50	24.7	12.1%
Stratum 4	239	19	668	297	112.0	16.8%
Total	8,853	79	63	34	6.3	9.9%

UTAH GENERAL SERVICE LOAD STUDY DESIGN EXCLUDING SCHEDULE 023

4 STRATA - MEAN PER UNIT ESTIMATION - 12 MO AVG SYSTEM PEAK

		a Sample Mean kW	b Sample Mean kWh	c 1988 Pop N	d Variance of Mean	e Standard Deviation	f Wted. Devtns. c*e	g Proprtn. row f/ sum f	h Optimal Allocation g*h total	i Manually Adjusted Allocatn.	j Final with Attrition
STRATUM 1	<= 300 MWH	20.6789	115,920	6,668	216.9000	14.7275	98203	0.3515	24	24	27
STRATUM 2	300 - 800 MWH	105.8285	762,286	1,370	3536.0000	59.4643	81466	0.2916	20	20	22
STRATUM 3	800 -2,000 MWH	204.4228	1,344,345	576	2490.0000	49.8999	28742	0.1029	7	10	11
STRATUM 4	> 2,000 MWH	668.1779	4,383,055	239	86127.1190	296.8621	70950	0.2540	17	17	19
EST POP MEAN (wtd by N)		63.2909	411,067	8,853			279362	1.0000	67	71	79

	Target Allocatn.	Final Target
	67	75

RELATIVE PRECISION OF SAMPLE KW ESTIMATE

		TOTAL KW Optimal n (col. h)	TOTAL KW Adjusted n (col. i)	MEAN KW Adj. n
Variance contributed by strata:	1	417,788,932	417,788,932	5.330509
	2	344,201,684	344,201,684	4.391694
	3	136,013,760	90,197,760	1.150840
	4	292,240,542	292,240,542	3.728718
Total Variance		1,190,244,919	1,144,428,919	14.601850
Standard Error		34,500	33,829	3.821237
Desired Conf Level (z two-tailed)		90% 1.645	90% 1.645	90% 1.645
Conf Interval		56,752	55,649	6.285934
MPU Est. of KW		560,314	560,314	63.2909
Relative CI		10.13 %,+ or -	9.93 %,+ or -	9.93 %,+ or -

LRS:SDT
\UTMPU4
22-Aug-90

UTAH GENERAL SERVICE LOAD STUDY DESIGN EXCLUDING SCHEDULE 023 4 STRATA - MEAN PER UNIT ESTIMATION - 12 MO AVG DIVISION PEAK

		a Sample Mean kW	b Sample Mean kWh	c 1988 Pop N	d Variance of Mean	e Standard Deviation	f Wted. Devtns. c*e	g Proprtn. row f/ sum f	h Optimal Allocation g*h total	i Manually Adjusted Allocatn.	j Final with Attrition
STRATUM 1	< = 300 MWH	20.6789	115,920	6,668	216.9000	14.7275	98203	0.3515	24	24	27
STRATUM 2	300 - 800 MWH	105.8285	762,286	1,370	3536.0000	59.4643	81466	0.2916	20	20	22
STRATUM 3	800 - 2000 MWH	204.4228	1,344,345	576	2490.0000	49.8999	28742	0.1029	7	10	11
STRATUM 4	> 2000 MWH	668.1779	4,383,055	239	88127.1190	296.8621	70950	0.2540	17	17	19
EST POP MEAN (wtd by N)		63.2909	411,067	8,853			279362	1.0000	67	71	79

Target Allocatn. 67 | Final Target 75

RELATIVE PRECISION OF SAMPLE KW ESTIMATE

		TOTAL KW Optimal n (col. h)	TOTAL KW Adjusted n (col. i)	MEAN KW Adj. n
Variance contributed by strata:	1	417,788,932	417,788,932	5.330599
	2	344,201,684	344,201,684	4.391694
	3	136,013,760	90,197,760	1.150840
	4	292,240,542	292,240,542	3.728718
Total Variance		1,190,244,919	1,144,428,919	14.601850
Standard Error		34,500	33,829	3.821237
Desired Conf Level		90%	90%	90%
(z two-tailed)		1.645	1.645	1.645
Conf Interval		56,752	55,649	6.285934
MPU Est. of KW		560,314	560,314	63.2909
Relative CI		10.13 %,+ or -	9.93 %,+ or -	9.93 %,+ or -

Final Sample Size

Precision Level	Stratum 1	Stratum 2	Stratum 3	Stratum 4
	22.5%	19.5%	12.0%	16.1%

Sample Size By Precision Level

	10.0%	12.5%	15.0%	17.5%	20.0%
Stratum 1	137	88	61	45	34
Stratum 2	85	55	38	28	21
Stratum 3	16	10	7	5	4
Stratum 4	53	34	24	17	13
Total	291	187	130	95	72
Total CI	4.8%	6.2%	7.6%	9.1%	10.5%

JDA
GSEX23.WK1
21-May-91

Utah Power & Light Company
Load Research Section
Stratified Sample Design

State: Utah
Revenue Class: General Service
Rate Schedule: Excluding Schedule 023
Based on: 12 months ended May 1990

Strata	Range	Population (N_h)	Weight (W_h)	KWH by Stratum ($\sum Y_{h_i}$)	Sum of Squares ($\sum Y_{h_i}^2$)
I	250- 300,000	6,668	0.753191	634,740,161	107,369,574,076,975
II	300,001- 800,000	1,370	0.154750	648,466,306	332,054,032,105,660
III	800,001-2,000,000	576	0.065063	727,645,119	9.86153487E+14
IV	GT 2,000,000	239	0.026996	693,439,362	2.21664089E+15
	Total	8853	1	2,704,290,948	3.64221799E+15

Strata	Variance (S_h^2)	Standard Deviation (S_h)	($W_h S_h^2$)	($W_h S_h$)	$\frac{W_h S_h}{\sum W_h S_h}$ *
I	7,041,757,569	83,915	5,303,788,487	63,204	0.481011
II	18,344,400,765	135,442	2,838,792,392	20,960	0.159511
III	116,416,030,026	341,198	7,574,340,144	22,199	0.168946
IV	860,008,875,556	927,367	23,217,228,200	25,036	0.190532
Total	1,001,811,063,916	1,487,922	38,934,149,223	131,399	1

Sample Distribution (1)
Boundries 90 ± 10%

Strata	(n_h)
I	24
II	8
III	9
IV	10
Total	51

$$n = \frac{(\sum W_h S_h)^2}{V + \frac{1}{N}\sum W_h S_h^2} = 49$$

V (Specified Variance) = $(d/t)^2$ where:

d = error margin of population mean
t = normal deviate for confidence level

(1) All proportional allocations to the strata have been rounded up.
* Neyman Allocation

Utah Power & Light Company
Load Research Section
Stratified Sample Design

State: Utah
Revenue Class: General Service
Rate Schedule: Excluding Schedule 023
Based on: 12 months ended May 1990

Strata	Range (N↑7h↓)	Population (W↑7h↓)	Weight (Y↑7hi↓)	KWH by Stratum (Y↑52↓↑7hi↓)	Sum of Squares
I	250- 300,000	6668	0.753191	634740161	107369574076975
II	300,001- 800,000	1370	0.154750	648466306	332054032105660
III	800,001-2,000,000	576	0.065063	727645119	9.8615348672E+14
IV	GT 2,000,000	239	0.026996	693439362	2.2166408939E+15
	Total	8853	1	2704290948	3.6422179868E+15

Strata	Variance (S↑7h↓↑52↓)	Standard Deviation (S↑7h↓)	W↑7h↓S↑7h↓ (W↑7h↓S↑7h↓↑52↓)	(W↑7h↓S↑7h↓)	W↑7h↓S↑7h↓ *
I	7041757569.267	83915.181	5303788486.6	63204.2	0.481011
II	18344400765.367	135441.503	2838792392.2	20959.5	0.159511
III	116416030025.706	341197.934	7574340144.0	22199.3	0.168946
IV	860008875556.373	927366.635	23217228200.4	25035.7	0.190532
Total	1001811063916.713	1487921.253	38934149223.2	131398.6	1

Boundries	90% ± 10%	90% ± 7.5%	90% ± 5%	95% ± 10%	95% ± 7.5%
Total Size	49	87	191	70	122
Strata					
I	24	42	92	34	59
II	8	14	31	12	20
III	9	15	33	12	21
IV	10	17	37	14	24
Total	51	88	193	72	124

Sample Distribution (1)

(1) All proportional allocations to the strata have been rounded up.
* Neyman Allocation

Utah Power & Light Company
Load Research Section
Stratified Sample Design

State: Utah
Revenue Class: General Service
Rate Schedule: Excluding Schedule 023
Based on: 12 months ended May 1990

Strata	Range	(N↑7h↓)	Population (W↑7h↓)	(Y↑7hi↓)	Weight (Y↑52↓↑7hi↓)	KWH by Stratum	Sum of Squares
I	250 - 300,000		6668		0.753191	634740161	107369574076975
II	300,001 - 800,000		1370		0.154750	648466306	332054032105660
III	800,001 -2,000,000		576		0.065063	727645119	9.8615348672E+14
IV	GT 2,000,000		239		0.026996	693439362	2.2166408939E+15
	Total		8853		1	2704290948	3.6422179868E+15

Strata	Variance (S↑7h↓↑52↓)	Standard Deviation (S↑7h↓)	W↑7h↓S↑7h↓ (W↑7h↓S↑7h↓↑52↓)	(W↑7h↓S↑7h↓)	W↑7h↓S↑7h↓ *
I	7041757569.267	83915.181	5303788486.6	63204.2	0.481011
II	18344400765.367	135441.503	2838792392.2	20959.5	0.159511
III	116416030025.706	341197.934	7574340144.0	22199.3	0.168946
IV	860008875556.373	927366.635	23217228200.4	25035.7	0.190532
Total	1001811063916.713	1487921.253	38934149223.224	131398.613	1.000

Confidence Level	± 10%	± 7.5%	± 5%	± 3%	± 1%
90%	49	87	191	487	2201
91%	53	93	203	516	2264
92%	56	99	217	548	2330
93%	60	105	228	575	2383
94%	64	113	245	613	2453
95%	70	122	265	658	2529
96%	76	134	288	708	2609
97%	85	149	320	777	2706
98%	98	171	365	869	2823
99%	119	207	438	1015	2977

* Neyman Allocation

Utah Power & Light Company
Bill Frequency Summary
Utah General Service Excluding Rate 23
Based on 12 Months Ending May 1990

Range	No. of Cuslomers	Interval Factor	f	SQ Root Of f	Cummulative SQ Rt of f
251- 300	16	49	784	28.00	28.00
301- 350	11	49	539	23.22	51.22
351- 400	13	49	637	25.24	76.46
401- 450	9	49	441	21.00	97.46
451- 500	12	49	588	24.25	121.70
501- 600	25	99	2475	49.75	171.45
601- 700	12	99	1188	34.47	205.92
701- 800	13	99	1287	35.87	241.80
801- 900	21	99	2079	45.60	287.39
901- 1000	12	99	1188	34.47	321.86
1001- 1250	43	249	10707	103.47	425.33
1251- 1500	37	249	9213	95.98	521.32
1501- 1750	43	249	10707	103.47	624.79
1751- 2000	45	249	11205	105.85	730.65
2001- 2250	39	249	9711	98.54	829.19
2251- 2500	33	249	8217	90.65	919.84
2501- 2750	42	249	10458	102.26	1022.10
2751- 3000	34	249	8466	92.01	1114.11
3001- 4000	127	999	126873	356.19	1470.31
4001- 5000	122	999	121878	349.11	1819.42
5001- 6000	114	999	113886	337.47	2156.89
6001- 7000	87	999	86913	294.81	2451.70
7001- 8000	95	999	94905	308.07	2759.76
8001- 9000	86	999	85914	293.11	3052.87
9001- 10000	79	999	78921	280.93	3333.80
10001- 11000	72	999	71928	268.19	3602.00
11001- 12000	68	999	67932	260.64	3862.63
12001- 13000	53	999	52947	230.10	4092.74
13001- 14000	59	999	58941	242.78	4335.51
14001- 15000	53	999	52947	230.10	4565.62
15001- 16000	58	999	57942	240.71	4806.33
16001- 17000	53	999	52947	230.10	5036.43
17001- 18000	40	999	39960	199.90	5236.33
18001- 19000	36	999	35964	189.64	5425.97
19001- 20000	47	999	46953	216.69	5642.66
20001- 21000	44	999	43956	209.66	5852.31
21001- 22000	35	999	34965	186.99	6039.30
22001- 23000	41	999	40959	202.38	6241.69
23001- 24000	43	999	42957	207.26	6448.95
24001- 25000	28	999	27972	167.25	6616.20
25001- 30000	175	4999	874825	935.32	7551.52
30001- 35000	167	4999	834833	913.69	8465.21
35001- 40000	166	4999	829834	910.95	9376.16
40001- 45000	166	4999	829834	910.95	10287.11
45001- 50000	143	4999	714857	845.49	11132.61
50001- 60000	255	9999	2549745	1596.79	12729.40
60001- 70000	265	9999	2649735	1627.80	14357.20
70001- 80000	261	9999	2609739	1615.47	15972.67
80001- 90000	221	9999	2209779	1486.53	17459.20
90001- 100000	229	9999	2289771	1513.20	18972.40
100001- 200000	1718	99999	171798282	13107.18	32079.58
200001- 300000	1002	99999	100198998	10009.94	42089.53
300001- 400000	537	99999	53699463	7327.99	49417.52
400001- 500000	321	99999	32099679	5665.66	55083.18
500001- 600000	231	99999	23099769	4806.22	59889.40
600001- 700000	163	99999	16299837	4037.31	63926.71
700001- 800000	118	99999	11799882	3435.10	67361.80
800001- 900000	90	99999	8999910	2999.98	70361.79
900001-1000000	80	99999	7999920	2828.41	73190.20
1000001-1250000	149	249999	37249851	6103.27	79293.46
1250001-1500000	106	249999	26499894	5147.80	84441.27
1500001-1750000	75	249999	18749925	4330.12	88771.39
1750001-2000000	76	249999	18999924	4358.89	93130.28
2000001-2250000	67	249999	16749933	4092.67	97222.95
2250001-2500000	45	249999	11249955	3354.10	100577.04
2500001-3000000	50	499999	24999950	4999.99	105577.04
3000001-3500000	29	499999	14499971	3807.88	109384.92
3500001-4000000	16	499999	7999984	2828.42	112213.34
4000001-4500000	18	499999	8999982	3000.00	115213.34
4500001-5000000	4	499999	1999996	1414.21	116627.55
5000001-6000000	5	999999	4999995	2236.07	118863.62
6000001-7000000	5	999999	4999995	2236.07	121099.69
Total	8853				

2	60549.84	1	2	3	4	5
3	40366.56	2	60549.84	40366.56	30274.92	24219.94
4	30274.92	3	121099.69	80733.12	60549.84	48439.87
5	24219.94	4		121099.69	90824.76	72659.81
		5			121099.69	96879.75
						121099.69

UTAH POWER & LIGHT COMPANY
BILL FREQUENCY DISTRIBUTION - ANNUAL KWH CONSUMPTION
UTAH GENERAL SERVICE EXCLUDING SCHEDULE 23 SERVICE
BASED ON THE TWELVE MONTHS ENDED MAY 1990

KWH RANGE	NO. ACCOUNTS	KWH	SUM OF KWH SQUARED	ACCUMULATED NO. ACCOUNTS	ACCUMULATED KWH	ACCUMULATED SUM OF KWH SQUARED
250- 300	16	4,447	1,241,335	16	4,447	1,241,335
300- 350	11	3,513	1,123,367	27	7,960	2,364,702
350- 400	13	4,827	1,794,509	40	12,787	4,159,211
400- 450	9	3,822	1,624,394	49	16,609	5,783,605
450- 500	12	5,668	2,679,268	61	22,277	8,462,873
500- 600	25	13,677	7,501,209	86	35,954	15,964,082
600- 700	12	7,900	5,207,750	98	43,854	21,171,832
700- 800	13	9,870	7,505,826	111	53,724	28,677,658
800- 900	21	17,942	15,352,136	132	71,666	44,029,794
900- 1000	12	11,566	11,156,000	144	83,232	55,185,794
1000- 1250	43	48,695	55,364,181	187	131,927	110,549,975
1250- 1500	37	50,650	69,519,264	224	182,577	180,069,239
1500- 1750	43	70,092	114,476,056	267	252,669	294,545,295
1750- 2000	45	83,419	154,859,247	312	336,088	449,404,542
2000- 2250	39	83,186	177,603,958	351	419,274	627,008,500
2250- 2500	33	78,886	188,730,868	384	498,160	815,739,368
2500- 2750	42	110,412	290,411,598	426	608,572	1,106,156,966
2750- 3000	34	97,157	277,822,465	460	705,729	1,383,979,431
3000- 4000	127	441,706	1,548,722,388	587	1,147,435	2,932,701,819
4000- 5000	122	549,575	2,485,739,301	709	1,697,010	5,418,441,120
5000- 6000	114	627,211	3,458,445,967	823	2,324,221	8,876,887,087
6000- 7000	87	567,005	3,703,638,457	910	2,891,226	12,580,525,544
7000- 8000	95	712,083	5,344,905,947	1,005	3,603,309	17,925,431,491
8000- 9000	86	728,963	6,186,854,063	1,091	4,332,272	24,112,285,554
9000- 10000	79	752,361	7,171,429,913	1,170	5,084,633	31,283,715,467
10000- 11000	72	756,118	7,946,669,010	1,242	5,840,751	39,230,384,477
11000- 12000	68	782,583	9,012,204,567	1,310	6,623,334	48,242,589,034
12000- 13000	53	662,293	8,280,029,019	1,363	7,285,627	56,522,618,053
13000- 14000	59	797,957	10,797,074,711	1,422	8,083,584	67,319,692,764
14000- 15000	53	769,476	11,176,975,642	1,475	8,853,060	78,496,668,406
15000- 16000	58	896,821	13,873,050,685	1,533	9,749,881	92,369,719,091
16000- 17000	53	874,735	14,441,934,425	1,586	10,624,616	106,811,653,516
17000- 18000	40	697,939	12,180,259,161	1,626	11,322,555	118,991,912,677
18000- 19000	36	667,312	12,372,095,984	1,662	11,989,867	131,364,008,661
19000- 20000	47	915,652	17,842,783,962	1,709	12,905,519	149,206,792,623
20000- 21000	44	901,804	18,486,454,212	1,753	13,807,323	167,693,246,835
21000- 22000	35	753,717	16,234,563,595	1,788	14,561,040	183,927,810,430
22000- 23000	41	922,837	20,774,646,783	1,829	15,483,877	204,702,457,213
23000- 24000	43	1,010,595	23,754,333,181	1,872	16,494,472	228,456,790,394
24000- 25000	28	685,916	16,805,096,256	1,900	17,180,388	245,261,886,650
25000- 30000	175	4,816,144	132,876,305,816	2,075	21,996,532	378,138,192,466
30000- 35000	167	5,405,734	175,353,928,032	2,242	27,402,266	553,492,120,498
35000- 40000	166	6,258,779	236,311,123,619	2,408	33,661,045	789,803,244,117
40000- 45000	166	7,061,998	300,759,692,638	2,574	40,723,043	1,090,562,936,755
45000- 50000	143	6,773,374	321,107,239,146	2,717	47,496,417	1,411,670,175,901
50000- 60000	255	14,040,954	775,337,861,184	2,972	61,537,371	2,187,008,037,085
60000- 70000	265	17,181,341	1,115,883,843,875	3,237	78,718,712	3,502,891,880,960
70000- 80000	261	19,561,199	1,468,247,513,719	3,498	98,279,911	5,187,139,394,679
80000- 90000	221	18,788,340	1,599,160,502,608	3,719	117,068,251	6,370,299,897,287
90000- 100000	229	21,830,008	2,082,927,786,576	3,948	138,898,259	8,453,227,683,863
100000- 200000	1,718	250,041,631	37,829,337,315,147	5,666	388,939,890	46,282,564,999,010
200000- 300000	1,002	245,800,271	61,087,009,077,965	6,668	634,740,161	107,369,574,076,975
300000- 400000	537	185,686,111	64,664,000,067,587	7,205	820,426,272	172,033,574,144,562
400000- 500000	321	142,809,048	63,815,190,577,142	7,526	963,235,320	235,848,764,721,704
500000- 600000	251	126,467,200	69,434,247,353,100	7,757	1,089,702,520	305,283,012,074,804
600000- 700000	163	105,502,315	68,417,374,940,271	7,920	1,195,204,835	373,700,387,015,075
700000- 800000	118	88,001,632	65,723,219,167,560	8,038	1,283,206,467	443,423,606,182,635
800000- 900000	90	76,291,042	64,751,759,204,434	8,128	1,359,497,509	504,175,365,387,069
900000-1000000	80	76,082,911	72,424,391,195,935	8,208	1,435,580,420	576,599,756,583,004
1000000-1250000	149	166,728,266	187,368,256,557,144	8,357	1,602,308,686	763,968,013,140,148
1250000-1500000	106	145,502,407	200,303,111,768,559	8,463	1,747,811,093	964,271,124,908,707
1500000-1750000	75	121,164,498	196,175,197,057,737	8,538	1,868,995,591	1,160,446,321,966,440
1750000-2000000	76	141,855,995	265,130,770,933,275	8,614	2,010,851,586	1,425,577,092,899,715
2000000-2250000	67	142,570,615	303,711,611,166,575	8,681	2,153,422,201	1,729,288,704,066,290
2250000-2500000	45	107,351,328	256,515,663,684,094	8,726	2,260,773,529	1,985,804,367,750,384
2500000-3000000	50	137,555,297	379,561,616,026,975	8,776	2,398,328,826	2,365,365,983,776,359
3000000-3500000	29	92,702,135	296,909,339,101,157	8,805	2,491,050,961	2,662,275,323,318,516
3500000-4000000	16	59,699,848	222,980,055,402,824	8,821	2,550,750,809	2,885,255,378,881,340
4000000-4500000	18	75,878,432	320,059,530,641,104	8,839	2,626,629,241	3,205,314,909,522,444
4500000-5000000	4	18,923,970	89,655,833,072,900	8,843	2,645,553,211	3,294,970,742,595,344
5000000-6000000	5	27,427,462	150,813,697,484,644	8,848	2,672,980,673	3,445,784,440,079,988
6000000-7000000		31,330,275	196,635,551,270,625	8,853	2,704,290,948	3,642,217,986,750,613

Strata				
1	6,668	634,740,161	107,369,574,076,975	
2	1,370	648,466,306	332,054,032,105,660	
3	576	727,645,119	986,763,486,717,080	
4	239	693,439,362	2,216,640,893,850,898	

UTAH POWER & LIGHT COMPANY
BILL FREQUENCY DISTRIBUTION - ANNUAL KWH CONSUMPTION
UTAH GENERAL SERVICE EXCLUDING SCHEDULE 23 SERVICE
BASED ON THE TWELVE MONTHS ENDED MAY 1990

KWH RANGE	NO. ACCOUNTS	KWH	SUM OF KWH SQUARED	ACCUMULATED NO. ACCOUNTS	ACCUMULATED KWH	ACCUMULATED SUM OF KWH SQUARED
250- 300	16	4,447	1,241,335	16	4,447	1,241,335
300- 350	11	3,513	1,123,367	27	7,960	2,364,702
350- 400	13	4,827	1,794,509	40	12,787	4,159,211
400- 450	9	3,822	1,624,394	49	16,609	5,783,605
450- 500	12	5,668	2,679,268	61	22,277	8,462,873
500- 600	25	13,677	7,501,209	86	35,954	15,964,082
600- 700	12	7,900	5,207,750	98	43,854	21,171,832
700- 800	13	9,870	7,505,826	111	53,724	28,677,658
800- 900	21	17,942	15,352,136	132	71,666	44,029,794
900- 1000	12	11,566	11,156,000	144	83,232	55,185,794
1000- 1250	43	48,695	55,364,181	187	131,927	110,549,975
1250- 1500	37	50,650	69,519,264	224	182,577	180,069,239
1500- 1750	43	70,092	114,476,056	267	252,669	294,545,295
1750- 2000	45	83,419	154,859,247	312	336,088	449,404,542
2000- 2250	39	83,186	177,603,958	351	419,274	627,008,500
2250- 2500	33	78,086	168,730,868	384	498,160	815,739,368
2500- 2750	42	110,412	290,417,598	426	608,572	1,106,156,966
2750- 3000	34	97,157	277,822,465	460	705,729	1,383,979,431
3000- 4000	127	441,706	1,548,726,388	587	1,147,435	2,932,701,819
4000- 5000	122	549,575	2,485,739,301	709	1,697,010	5,418,441,120
5000- 6000	114	627,211	3,458,445,967	823	2,324,221	8,876,887,087
6000- 7000	87	567,005	3,703,638,457	910	2,891,226	12,580,525,544
7000- 8000	95	712,083	5,344,905,947	1,005	3,603,309	17,925,431,491
8000- 9000	86	728,963	6,186,854,063	1,091	4,332,272	24,112,285,554
9000- 10000	79	752,361	7,171,429,913	1,170	5,084,633	31,283,715,467
10000- 11000	72	756,118	7,946,669,010	1,242	5,840,751	39,230,384,477
11000- 12000	68	782,583	9,012,204,557	1,310	6,623,334	48,242,589,034
12000- 13000	53	662,293	8,280,029,019	1,363	7,285,627	56,522,618,053
13000- 14000	59	795,957	10,797,074,711	1,422	8,081,584	67,319,692,764
14000- 15000	53	769,476	11,176,975,642	1,475	8,853,060	78,496,668,406
15000- 16000	58	896,821	13,873,050,685	1,533	9,749,881	92,369,719,091
16000- 17000	55	874,735	14,441,934,425	1,586	10,624,616	106,811,653,516
17000- 18000	40	697,939	12,180,259,161	1,626	11,322,555	118,991,912,677
18000- 19000	36	667,312	12,372,095,984	1,662	11,989,867	131,364,008,661
19000- 20000	47	915,652	17,842,703,962	1,709	12,905,519	149,206,792,623
20000- 21000	44	901,804	18,486,454,212	1,753	13,807,323	167,693,246,835
21000- 22000	35	753,717	16,234,563,595	1,788	14,561,040	183,927,810,430
22000- 23000	41	922,837	20,774,646,783	1,829	15,483,877	204,702,457,213
23000- 24000	43	1,010,595	23,754,333,181	1,872	16,494,472	228,456,790,394
24000- 25000	28	685,916	16,805,096,256	1,900	17,180,388	245,261,886,650
25000- 30000	175	4,816,144	132,876,305,816	2,075	21,996,532	378,138,192,466
30000- 35000	167	5,405,734	175,353,928,032	2,242	27,402,266	553,492,120,498
35000- 40000	166	6,258,779	226,331,123,619	2,408	33,661,045	789,803,244,117
40000- 45000	166	7,061,998	300,757,692,638	2,574	40,723,043	1,090,562,936,755
45000- 50000	142	6,773,374	321,107,239,146	2,717	47,496,417	1,411,670,175,901
50000- 60000	255	14,040,954	775,337,861,184	2,972	61,537,371	2,187,008,037,085
60000- 70000	265	17,181,341	1,115,883,843,875	3,237	78,718,712	3,302,891,880,960
70000- 80000	261	19,561,199	1,468,247,513,719	3,498	98,279,911	4,771,139,294,679
80000- 90000	221	18,788,340	1,599,160,502,608	3,719	117,068,251	6,370,299,897,287
90000- 100000	229	21,830,008	2,082,927,786,576	3,948	138,898,259	8,453,227,683,863
100000- 200000	1,718	250,041,631	37,829,337,315,147	5,666	388,939,890	46,282,564,999,010
200000- 300000	1,002	245,800,271	61,087,009,077,665	6,668	634,740,161	107,369,574,076,975
300000- 400000	537	185,686,111	64,664,000,067,587	7,205	820,426,272	172,033,574,144,562
400000- 500000	321	142,809,048	63,815,190,577,142	7,526	963,235,320	235,848,764,721,704
500000- 600000	231	126,467,200	69,434,247,353,100	7,757	1,089,702,520	305,283,012,074,804
600000- 700000	163	105,502,315	68,417,374,940,271	7,920	1,195,204,835	373,700,387,015,075
700000- 800000	118	88,001,632	65,723,219,167,560	8,038	1,283,206,467	439,423,606,182,635
800000- 900000	90	76,291,042	64,751,759,204,434	8,128	1,359,497,509	504,175,365,387,069
900000-1000000	80	76,082,911	72,424,391,195,935	8,208	1,435,580,420	576,599,756,583,004
1000000-1250000	149	166,728,266	187,368,256,557,144	8,357	1,602,308,686	763,968,013,140,148
1250000-1500000	106	145,502,407	200,303,111,768,559	8,463	1,747,811,093	964,271,124,908,707
1500000-1750000	75	121,184,498	198,175,197,057,734	8,538	1,868,995,591	1,162,446,321,266,940
1750000-2000000	76	141,855,995	265,130,770,933,275	8,614	2,010,851,586	1,427,577,092,199,715
2000000-2250000	67	142,570,615	303,711,611,162,575	8,681	2,153,422,201	1,731,288,704,066,290
2250000-2500000	45	107,351,328	256,315,663,684,094	8,726	2,260,773,529	1,987,604,367,750,384
2500000-3000000	50	137,555,297	379,561,612,026,975	8,776	2,398,328,826	2,367,165,979,777,359
3000000-3500000	29	92,702,135	296,909,329,101,157	8,805	2,491,030,961	2,664,075,318,878,516
3500000-4000000	17	59,699,848	222,980,055,402,824	8,821	2,550,730,809	2,887,055,374,281,340
4000000-4500000	18	75,878,432	320,059,530,641,104	8,839	2,626,609,241	3,207,114,904,922,444
4500000-5000000	4	18,923,970	89,653,833,072,900	8,843	2,645,533,211	3,294,768,737,995,344
5000000-6000000	5	27,427,462	150,812,697,484,644	8,848	2,672,960,673	3,445,582,435,479,988
6000000-7000000	5	31,330,275	196,635,551,270,625	8,853	2,704,290,948	3,642,217,986,750,613

UTAH GENERAL SERVICE SAMPLE PARAMETERS
EXCLUDING SCHEDULE 023

ACTIVE CUSTOMERS WITH KWH METERS

STRATUM	1	2	3	4	
SAMPLING FRAME	6,668	1,370	576	239	8,853
SAMPLE	27	22	11	19	79
INTERVAL	246.96	62.27	52.36	12.58	
RANDOM STARTS					
Primary					
Random No.(1)	0.87	0.46	0.89	0.62	
Start	215	29	47	8	
Alternate 1					
Random No.(1)	0.81	0.66	0.63	0.22	
Start	200	41	33	3	
Alternate 2					
Random No.(1)	0.01	0.21	0.07	0.29	
Start	2	13	4	4	
Alternate 3					
Random No.(1)	0.77	0.09	0.96	0.18	
Start	190	6	50	2	
Alternate 4					
Random No.(1)	0.10	0.72	0.71	0.93	
Start	25	45	37	12	

(1) Random numbers from Snedecor and Cochran (1967), p 19, beginning at row 14, cols. 12 and 13.

JA
UTGSPARM.WK1
11-Sep-90

UTAH POWER & LIGHT COMPANY
BILL FREQUENCY DISTRIBUTION - MONTHLY WITHOUT DEMAND
UTAH GENERAL SERVICE RATE 23 < 284,700
BASED ON THE THELVE MONTHS ENDED MAY 1990

RANGE	NO. ACCOUNTS	KWH	SUM OF KWH SQUARED	ACCUMULATED NO. ACCOUNTS	ACCUMULATED KWH	ACCUMULATED SUM OF KWH SQUARED
250- 300	507	139,567	38,538,415	507	139,567	38,538,415
301- 350	417	135,446	44,070,244	924	275,013	82,608,659
351- 400	420	157,196	58,920,444	1,344	432,209	141,529,103
401- 450	353	149,786	63,629,598	1,697	581,995	205,158,701
451- 500	304	144,454	68,698,784	2,001	726,449	273,857,485
501- 600	524	286,927	157,561,137	2,525	1,013,376	431,418,632
601- 700	463	300,667	195,655,813	2,988	1,314,043	627,074,445
701- 800	473	355,297	267,263,889	3,461	1,669,340	894,338,334
801- 900	457	388,410	330,510,228	3,918	2,057,750	1,224,848,562
901- 1,000	403	382,167	362,722,301	4,321	2,439,917	1,587,570,863
1,001- 1,250	915	1,028,201	1,160,317,361	5,236	3,468,118	2,747,888,224
1,251- 1,500	767	1,053,540	1,451,019,712	6,003	4,521,658	4,198,907,936
1,501- 1,750	694	1,124,123	1,824,593,649	6,697	5,645,781	6,023,501,585
1,751- 2,000	634	1,187,110	2,226,049,258	7,331	6,832,891	8,249,550,843
2,001- 2,250	574	1,222,499	2,606,805,443	7,905	8,055,390	10,856,356,286
2,251- 2,500	529	1,255,415	2,981,910,111	8,434	9,310,805	13,838,266,397
2,501- 2,750	493	1,293,116	3,394,176,458	8,927	10,603,921	17,232,442,855
2,751- 3,000	499	1,437,992	4,146,569,156	9,426	12,041,913	21,379,012,011
3,001- 4,000	1,683	5,872,008	20,629,296,326	11,109	17,913,921	42,008,308,337
4,001- 5,000	1,432	6,430,834	28,999,331,162	12,541	24,344,755	71,007,639,499
5,001- 6,000	1,256	6,897,015	37,980,602,423	13,797	31,241,770	108,988,241,922
6,001- 7,000	1,127	7,303,531	47,421,374,625	14,924	38,545,301	156,409,616,547
7,001- 8,000	965	7,219,924	54,103,377,718	15,889	45,765,225	210,513,001,325
8,001- 9,000	908	7,725,614	65,810,175,678	16,797	53,490,839	276,323,177,003
9,001- 10,000	805	7,630,174	72,392,701,134	17,602	61,121,013	348,715,878,137
10,001- 11,000	784	8,225,407	86,266,024,683	18,386	69,346,420	435,081,902,820
11,001- 12,000	726	8,326,664	95,561,769,438	19,112	77,673,084	530,643,672,258
12,001- 13,000	641	8,006,324	100,052,859,368	19,753	85,679,408	630,696,531,626
13,001- 14,000	558	7,546,643	102,110,619,107	20,311	93,226,051	732,807,150,733
14,001- 15,000	526	7,640,417	111,027,430,633	20,837	100,866,468	843,834,581,366
15,001- 16,000	538	8,341,159	129,368,884,229	21,375	109,207,627	973,203,465,595
16,001- 17,000	519	8,564,630	141,379,938,572	21,894	117,772,257	1,114,583,404,167
17,001- 18,000	407	7,116,541	124,465,204,715	22,301	124,888,798	1,239,048,608,880
18,001- 19,000	367	6,787,370	125,557,311,666	22,668	131,676,168	1,364,605,920,546
19,001- 20,000	392	7,635,662	148,765,843,748	23,060	139,311,830	1,513,371,764,294
20,001- 21,000	347	7,108,622	145,655,769,454	23,407	146,420,452	1,659,027,533,748
21,001- 22,000	365	7,839,446	168,407,208,298	23,772	154,259,898	1,827,434,742,046
22,001- 23,000	333	7,493,231	166,640,012,241	24,105	161,753,129	1,996,074,754,287
23,001- 24,000	314	7,368,747	172,951,518,497	24,419	169,121,876	2,168,026,272,784
24,001- 25,000	265	6,497,368	159,327,928,234	24,684	175,619,244	2,327,354,201,018
25,001- 30,000	1,138	31,110,342	852,833,156,046	25,822	206,729,586	3,180,187,357,064
30,001- 35,000	976	31,652,008	1,028,539,011,644	26,798	238,381,594	4,208,726,368,708
35,001- 40,000	773	28,906,858	1,082,623,339,798	27,571	267,288,452	5,291,349,708,506
40,001- 45,000	622	26,388,434	1,120,910,160,832	28,193	293,676,886	6,412,259,869,338
45,001- 50,000	514	24,349,228	1,154,627,791,460	28,707	318,026,114	7,567,887,660,798
50,001- 60,000	802	43,944,721	2,414,625,079,245	29,509	361,970,835	9,982,512,740,043
60,001- 70,000	555	35,934,351	2,331,219,881,869	30,064	397,905,186	12,313,732,621,912
70,001- 80,000	389	29,081,624	2,177,615,044,760	30,453	426,987,810	14,491,347,666,672
80,001- 90,000	265	22,421,874	1,899,342,896,650	30,718	449,409,684	16,390,690,563,322
90,001- 100,000	176	16,675,005	1,581,303,937,963	30,894	466,084,689	17,971,994,501,285
100,001- 200,000	394	49,605,676	6,450,680,331,708	31,288	515,690,365	24,422,674,833,993
200,001- 300,000	13	2,822,968	617,084,579,022	31,301	518,513,333	25,039,759,312,015

UTAH POWER & LIGHT COMPANY
BILL FREQUENCY DISTRIBUTION - MONTHLY WITHOUT DEMAND
UTAH GENERAL SERVICE RATE 23 < 284,700
BASED ON THE TWELVE MONTHS ENDED MAY 1990

RANGE	NO. ACCOUNTS	KWH	SUM OF KWH SQUARED	ACCUMULATED NO. ACCOUNTS	ACCUMULATED KWH	ACCUMULATED SUM OF KWH SQUARED
250- 300	507	139,567	38,538,415	507	139,567	38,538,415
301- 350	417	135,446	44,070,244	924	275,013	82,608,659
351- 400	420	157,196	58,920,444	1,344	432,209	141,529,103
401- 450	353	149,786	63,629,598	1,697	581,995	205,158,701
451- 500	304	144,454	68,698,794	2,001	726,449	273,857,495
501- 600	524	286,927	157,561,137	2,525	1,013,376	431,418,632
601- 700	463	300,667	195,655,813	2,988	1,314,043	627,074,445
701- 800	473	355,297	267,263,889	3,461	1,669,340	894,338,334
801- 900	457	388,410	330,510,228	3,918	2,057,750	1,224,848,562
901- 1,000	403	382,167	362,722,301	4,321	2,439,917	1,587,570,863
1,001- 1,250	915	1,028,201	1,160,317,361	5,236	3,468,118	2,747,888,224
1,251- 1,500	767	1,053,540	1,451,019,712	6,003	4,521,658	4,198,907,936
1,501- 1,750	694	1,124,123	1,824,593,649	6,697	5,645,781	6,023,501,585
1,751- 2,000	634	1,187,110	2,226,049,258	7,331	6,832,891	8,249,550,843
2,001- 2,250	574	1,222,499	2,606,805,463	7,905	8,055,390	10,856,356,306
2,251- 2,500	529	1,255,415	2,981,910,111	8,434	9,310,805	13,838,266,417
2,501- 2,750	493	1,293,116	3,394,176,498	8,927	10,603,921	17,232,442,915
2,751- 3,000	499	1,437,992	4,146,569,156	9,426	12,041,913	21,379,012,071
3,001- 4,000	1,683	5,872,008	20,629,296,326	11,109	17,913,921	42,008,308,397
4,001- 5,000	1,432	6,430,834	28,999,331,162	12,541	24,344,755	71,007,639,559
5,001- 6,000	1,256	6,897,015	37,280,609,423	13,797	31,241,770	108,988,248,982
6,001- 7,000	1,127	7,303,531	47,421,374,625	14,924	38,545,301	156,409,623,607
7,001- 8,000	965	7,215,924	54,103,377,718	15,889	45,761,225	210,513,001,325
8,001- 9,000	908	7,775,614	65,810,175,678	16,797	53,536,839	276,323,177,003
9,001- 10,000	805	7,670,174	72,392,701,134	17,602	61,207,013	348,715,878,137
10,001- 11,000	784	8,225,407	86,366,024,683	18,386	69,432,420	435,081,902,820
11,001- 12,000	726	8,326,664	95,561,769,438	19,112	77,759,084	530,643,672,258
12,001- 13,000	641	8,006,324	100,052,859,368	19,753	85,765,408	630,696,531,626
13,001- 14,000	558	7,546,643	102,110,619,107	20,311	93,226,051	732,807,150,733
14,001- 15,000	526	7,640,417	111,027,430,633	20,837	100,866,468	843,834,581,366
15,001- 16,000	538	8,341,159	129,268,884,249	21,375	109,207,627	973,103,465,615
16,001- 17,000	519	8,564,630	141,379,938,572	21,894	117,772,257	1,114,583,404,187
17,001- 18,000	407	7,116,541	124,465,204,713	22,301	124,888,798	1,239,048,608,880
18,001- 19,000	367	6,787,370	125,557,311,666	22,668	131,676,168	1,364,605,920,546
19,001- 20,000	392	7,635,662	148,765,843,748	23,060	139,311,830	1,513,371,764,294
20,001- 21,000	347	7,108,622	145,655,769,454	23,407	146,420,452	1,659,027,533,748
21,001- 22,000	365	7,839,446	168,407,208,298	23,772	154,259,898	1,827,434,742,046
22,001- 23,000	337	7,493,231	168,640,012,241	24,109	161,753,129	1,996,074,754,287
23,001- 24,000	314	7,368,747	172,951,518,497	24,419	169,121,876	2,169,026,272,784
24,001- 25,000	265	6,497,368	159,327,928,234	24,684	175,619,244	2,328,354,201,018
25,001- 30,000	1,138	31,110,342	852,833,156,046	25,822	206,729,586	3,181,187,357,064
30,001- 35,000	976	31,653,008	1,028,539,011,644	26,798	238,382,594	4,209,726,368,708
35,001- 40,000	773	28,906,858	1,082,623,339,798	27,571	267,289,452	5,292,349,708,506
40,001- 45,000	622	26,388,434	1,120,910,160,832	28,193	293,677,886	6,413,259,869,338
45,001- 50,000	514	24,349,228	1,156,627,791,460	28,707	318,027,114	7,557,887,660,798
50,001- 60,000	802	43,944,721	2,414,625,079,245	29,509	361,971,835	9,972,512,740,043
60,001- 70,000	555	35,934,351	2,331,219,881,869	30,064	397,906,186	12,303,732,621,912
70,001- 80,000	389	29,081,624	2,177,615,044,760	30,453	426,987,810	14,481,347,666,672
80,001- 90,000	265	22,421,874	1,899,342,896,650	30,718	449,409,684	16,380,690,563,322
90,001- 100,000	176	16,675,005	1,581,303,837,963	30,894	466,084,689	17,971,994,401,285
100,001- 200,000	394	49,605,676	6,450,680,321,708	31,288	515,690,365	24,422,674,732,993
200,001- 300,000	13	2,822,968	617,084,579,022	31,301	518,513,333	25,039,759,312,015

Strata 1	20,837	100,866,468	843,834,581,366
2	7,870	217,160,646	6,724,053,079,432
3	2,594	200,486,219	17,471,871,651,217

Utah Power & Light Company
Bill Frequency Summary
Utah General Service Rate 23 < 284,700 Annual Kwh
Based on 12 Months Ending May 1990

Range	No. of Customers	Interval Factor	f	SQ Root Of f	Cummulative SQ Rt of f
251- 300	507	49	24843	157.62	157.62
301- 350	417	49	20433	142.94	300.56
351- 400	420	49	20580	143.46	444.02
401- 450	353	49	17297	131.52	575.54
451- 500	304	49	14896	122.05	697.59
501- 600	524	99	51876	227.76	925.35
601- 700	463	99	45837	214.10	1139.44
701- 800	473	99	46827	216.40	1355.84
801- 900	457	99	45243	212.70	1568.54
901- 1000	403	99	39897	199.74	1768.29
1001- 1250	915	249	227835	477.32	2245.61
1251- 1500	767	249	190983	437.02	2682.62
1501- 1750	694	249	172806	415.70	3098.32
1751- 2000	634	249	157866	397.32	3495.65
2001- 2250	574	249	142926	378.06	3873.70
2251- 2500	529	249	131721	362.93	4236.63
2501- 2750	493	249	122757	350.37	4587.00
2751- 3000	499	249	124251	352.49	4939.49
3001- 4000	1683	999	1681317	1296.66	6236.15
4001- 5000	1432	999	1430568	1196.06	7432.21
5001- 6000	1256	999	1254744	1120.15	8552.37
6001- 7000	1127	999	1125873	1061.07	9613.44
7001- 8000	965	999	964035	981.85	10595.29
8001- 9000	908	999	907092	952.41	11547.71
9001- 10000	805	999	804195	896.77	12444.48
10001- 11000	784	999	783216	884.99	13329.47
11001- 12000	726	999	725274	851.63	14181.10
12001- 13000	641	999	640359	800.22	14981.32
13001- 14000	558	999	557442	746.62	15727.94
14001- 15000	526	999	525474	724.90	16452.84
15001- 16000	538	999	537462	733.12	17185.96
16001- 17000	519	999	518481	720.06	17906.01
17001- 18000	407	999	406593	637.65	18543.66
18001- 19000	367	999	366633	605.50	19149.16
19001- 20000	392	999	391608	625.79	19774.95
20001- 21000	347	999	346653	588.77	20363.72
21001- 22000	365	999	364635	603.85	20967.57
22001- 23000	333	999	332667	576.77	21544.35
23001- 24000	314	999	313686	560.08	22104.42
24001- 25000	265	999	264735	514.52	22618.95
25001- 30000	1138	4999	5688862	2385.13	25004.08
30001- 35000	976	4999	4879024	2208.85	27212.93
35001- 40000	773	4999	3864227	1965.76	29178.69
40001- 45000	622	4999	3109378	1763.34	30942.04
45001- 50000	514	4999	2569486	1602.96	32545.00
50001- 60000	802	9999	8019198	2831.82	35376.82
60001- 70000	555	9999	5549445	2355.73	37732.54
70001- 80000	389	9999	3889611	1972.21	39704.75
80001- 90000	265	9999	2649735	1627.80	41332.55
90001- 100000	176	9999	1759824	1326.58	42659.14
100001- 200000	394	99999	39399606	6276.91	48936.05
200001- 284700	13	84699	1101087	1049.33	49985.38
Total	31301				

2			2	3	4	5
3	24992.69	1	24992.69	16661.79	12496.34	9997.08
4	16661.79	2	49985.38	33323.58	24992.69	19994.15
5	12496.34	3		49985.38	37489.03	29991.23
	9997.08	4			49985.38	39988.30
		5				49985.38

PacifiCorp Electric Operations
Utah Power Division
Stratified Sample Specifications

State : Utah
Revenue Class : General Service
Rate Schedule : Schedule 023
Based On : 12 Months Ended May 1990

	Population	Sample Size	kWh By Strata	Weighted Standard Deviation	Bound On The Mean	Precision Level
Stratum 1	20,837	24	100,866,468	2,750	923.4	28.7%
Stratum 2	7,870	20	217,160,646	2,425	892.0	12.9%
Stratum 3	2,594	19	200,486,219	2,288	863.5	13.5%
Total	31,301	63	518,513,333	7,463	1,546.7	9.3%

Utah Power & Light Company
Load Research Section
Stratified Sample Design

State: Utah
Revenue Class: General Service
Rate Schedule: Schedule 023
Based on: 12 months ended May 1990

Strata	Range	Population (N_h)	Weight (W_h)	KWH by Stratum (ΣY_{h_i})	Sum of Squares ($\Sigma Y^2_{h_i}$)
I	250-15,000	20,837	0.665698	100,866,468	843,834,581,366
II	15,001-50,000	7,870	0.251430	217,160,646	6,724,053,079,432
III	GT-50,000	2,594	0.082873	200,486,219	17,471,871,651,217
	Total	31,301	1	518,513,333	25,039,759,312,015

Strata	Variance (S_h^2)	Standard Deviation (S_h)	($W_h S_h^2$)	($W_h S_h$)	$\frac{W_h S_h}{\Sigma W_h S_h}$ *
I	17,065,002	4,131	11,360,131	2,750	0.368493
II	93,002,451	9,644	23,383,575	2,425	0.324910
III	762,284,654	27,610	63,172,627	2,288	0.306598
Total	872,352,107	41,385	97,916,333	7,463	1

Sample Distribution (1)
Boundries 90 $\pm$ 10%

Strata	(n_h)
I	21
II	18
III	17
Total	56

$$n = \frac{(\Sigma W_h S_h)^2}{V + \frac{1}{N}\Sigma W_h S_h^2} = 55$$

V (Specified Variance) = $(d/t)^2$ where:

d = error margin of population mean
t = normal deviate for confidence level

(1) All proportional allocations to the strata have been rounded up.
* Neyman Allocation

Utah Power & Light Company
Load Research Section
Stratified Sample Design

State: Utah
Revenue Class: General Service
Rate Schedule: Schedule 023 < 284,700 Annual Kwh
Based on: 12 months ended May 1990

Strata	Range	(N_h)	Population (W_h)	Weight (Y_{hi})	KWH by Stratum $(Y_{52}Y_{hi})$	Sum of Squares
I	250 - 15,000		20837	0.665698	100866468	843834581366
II	15,001 - 50,000		7870	0.251430	217160646	6724053079432
III	GT - 50,000		2594	0.082873	200486219	17471871651217
		Total	31301	1	518513333	25039759312015

Strata	Variance (S_h^2)	Standard Deviation (S_h)	W_hS_h $(W_hS_hY_{52})$	(W_hS_h)	W_hS_h *
I	17065002.254	4130.981	11360130.7	2750.0	0.368493
II	93002450.773	9643.778	23383575.2	2424.7	0.324910
III	762284653.799	27609.503	63172626.8	2288.1	0.306598
Total	872352106.826	41384.262	97916332.753	7462.791	1.000

Boundries	Sample Distribution (1)				
Total Size	90% ± 10%	90% ± 7.5%	90% ± 5%	95% ± 10%	95% ± 7.5%
Strata	55	97	217	78	138
I	21	36	80	29	51
II	18	32	71	26	45
III	17	30	67	24	43
Total	56	98	218	79	139

(1) All proportional allocations to the strata have been rounded up.
* Neyman Allocation

Utah Power & Light Company
Load Research Section
Stratified Sample Design

State: Utah
Revenue Class: General Service
Rate Schedule: Rate 23
Based on: 12 months ended May 1990

Strata	Range	(N↑7h↓)	Population (W↑7h↓)	(Y↑7hi↓)	Weight (Y↑52↓↑7hi↓)	KWH by Stratum	Sum of Squares
I	250 - 15,000		20837	0.665698	100866468		843834581366
II	15,001 - 50,000		7870	0.251430	217160646		6724053079432
III	GT 50,000		2594	0.082873	200486219		17471871651217
		Total	31301	1	518513333		25039759312015

Strata	Variance (S↑7h↓↑52↓)	Standard Deviation (S↑7h↓)	W↑7h↓S↑7h↓ (W↑7h↓S↑7h↓↑52↓)	(W↑7h↓S↑7h↓)	W↑7h↓S↑7h↓	
I	17065002.254	4130.981	11360130.7	2750.0		0.368493
II	93002450.773	9643.778	23383575.2	2424.7		0.324910
III	762284653.799	27609.503	63172626.8	2288.1		0.306598
Total	872352106.826	41384.262	97916332.753	7462.791		1.000

Confidence Level	± 10%	± 7.5%	± 5%	± 3%	± 1%
90%	55	97	217	590	4197
91%	58	104	232	629	4412
92%	63	111	248	672	4646
93%	66	117	262	709	4841
94%	71	127	282	763	5113
95%	78	138	306	826	5422
96%	85	150	335	900	5767
97%	95	168	374	1002	6219
98%	110	194	430	1145	6806
99%	134	237	524	1384	7681

* Neyman Allocation