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August 15, 2005

HAND DELIVERED

Ms. Blanca S. Bayo, Director
Division of Commission Clerk
and Administrative Services
Florida Public Service Commission
2540 Shumard Oak Boulevard
Tallahassee, FL 32399-0850

050000-OT

Re: Load Research Sampling Report – Tampa Electric Company

Dear Ms. Bayo:

In compliance with Rule 25-6.0437, enclosed are five copies of Tampa Electric Company's report entitled Load Research Sampling Plan – August 2005.

Please acknowledge receipt and filing of the above by stamping the duplicate copy of this letter and returning same to this writer.

Thank you for your assistance in connection with this matter.

Sincerely,

James D. Beasley

JDB/pp
Enclosure

cc: Angela Llewellyn

TAMPA ELECTRIC COMPANY

LOAD RESEARCH SAMPLING PLAN

AUGUST 2005

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APPLICABLE RATE CLASSES

Tampa Electric Company's rate classes and the respective annual MWH sales for each rate class are shown in the table below. Additionally, the third column provides the percent of total annual sales for each rate class and demonstrates the company's compliance with Rule 25-6.0437, Florida Administrative Code, which requires sampling of all rate classes that account for more than one percent of a utility's annual sales. The annual sales reported are for the twelve month period ending December 31, 2004.

PERCENTAGE OF ANNUAL MWH SALES BY RATE

Rate	Annual Sales (MWH)	Percent of Total Sales
Residential (RS & RST)	8,291,281	44.9
General Service Non-Demand (GS, GST, TS)	987,997	5.4
General Service Demand (GSD & GSDT)	5,049,860	27.3
General Service Large Demand (GSLD, GSLDT, SBFT)	2,285,253	12.4
Interruptible Service (IS-1, IST-1, IS-3, IST-3, SBIT-1, SBIT-3)	1,654,420	9.0
All Other Rate Classes	195,188	1.1
Total	**18,463,999**	**100.0**

EXISTING SAMPLE METHODOLOGY

In 2005, Tampa Electric discontinued using the overlapping sampling methodology, which had been in place since the 1996 Load Research Sampling Plan, to improve response time for annual load research analyses and reduce administrative upkeep. The RS, GS, and GSD overlapping samples selected and installed in 2002 and 2003 were removed and replaced with an entirely new sample which was selected and installed prior to December 31, 2004.

For subsequent years, samples for one or two rate classes will be selected and installed every year and data will be collected from the samples for twenty-four months. Once the new sample is fully installed and data collection has begun, the previously selected sample for the class(s) will be retired and removed. This will eliminate the complexity of computing combined statistics from two or three independent, overlapping samples, as well as maintain operational efficiency.

EXISTING SAMPLE DESIGN

The Residential Service (RS) class sample was pre-stratified by three categories of housing type: single family detached, multi-family and mobile home. The stratification is needed because the load patterns for the three housing types are dissimilar and the percentage of mobile homes in the population changes with the seasons. For example, the percentage of mobile homes was 11.8% and 11.3% in the winter and summer, respectively. Because the sample is stratified by housing type and the inter-strata migration is insignificant, changes are made to the stratum weights on a month by month basis when estimating class demands. Thus, the estimated demands reflect the seasonal changes in the housing type mix.

The sample points were allocated to the strata using Neyman allocation with stratum means and variances estimated from previous sample results. In the multi-family and mobile home categories, a minimum sample size of 50 was used to ensure more accurate data for those sub-populations. The resulting allocation is shown below.

RS SAMPLE

Stratum	Total
Single Family Detached	175
Multi-family	50
Mobile Home	50
Total	**275**

The General Service Non-Demand (GS) class was stratified on the basis of annual kilowatt-hour consumption at the time of sample selection. The sample is comprised of two strata: annual usage below 15,000 kWh and annual usage at or above 15,000 kWh. The sample points were allocated to the strata using Neyman allocation with stratum variances estimated from the previous sample results. The allocation is shown below.

GS SAMPLE

Stratum	Total
0 – 14,999 kWh	257
15,000 – infinity kWh	243
Total	**500**

The General Service Demand (GSD) class was stratified by several different variables. For cost of service analysis, class demands are separated by primary and secondary voltage level. First, customers metered at secondary voltage were stratified by kW boundaries of 200 kW and 300 kW. All customers over 300 kW were included in a 100% sampled stratum. Subsequently, in cases where customers exceeded the 300 kW threshold, recorders were installed on their meters and they were included in the sample as well. In 2005, the threshold for the 100% sampled stratum was raised from 300kW to 500kW because internal business needs no longer required the need for 100% sampling below 500kW. Secondly, all customers metered at primary voltage were included in either a 100% sampled stratum for primary customers served at primary voltage or a 100% sampled stratum for primary customers served at secondary voltage. The sample points were allocated using Neyman allocation. The allocation is shown below and reflects totals in the 100% sampled strata as of December 2004.

GSD SAMPLE

Stratum	**Total**
Secondary 0 – 199 kW	70
Secondary 200 – 299 kW	70
Secondary over 299 kW (100%)	972 (1)
Primary Metered/Primary Served (100%)	56 (1)
Primary Metered/Secondary Served (100%)	32 (1)
Total	**1,200**

1. 100% sampled stratum; therefore, size will vary depending upon the number of customers meeting the criteria.

Samples for the General Service Large Demand (GSLD) and Interruptible Service (IS) classes are not needed because all of the customers have recorders on the meters for billing purposes. The data collected by the recorders is also used for load research purposes.

EXISTING SAMPLE ACCURACY

The accuracy achieved for the three classes sampled was calculated for each month's coincident peak for 2004 and the average of the twelve monthly coincident peaks as well. The accuracy for each class was calculated in the conventional manner for combined ratio analysis. The results are shown below.

2004 COINCIDENT PEAK PERCENTAGE ACCURACIES AT 90% CONFIDENCE LEVEL USING COMBINEDRATIO ESTIMATION

Month	RS	GS	GSD
January	7.5	10.2	7.4
February	7.5	9.2	6.4
March	7.0	6.0	3.5
April	6.5	5.8	3.8
May	5.2	5.7	4.3
June	4.2	5.1	3.7
July	5.0	4.8	3.6
August	5.2	5.1	4.1
September	5.0	5.3	4.1
October	4.6	6.1	4.3
November	5.6	6.0	4.9
December	7.7	10.0	7.1
12 Coincident Peak Average	**2.8**	**4.2**	**3.0**

The 2004 annual system winter peak occurred in January and the summer peak occurred in June. The RS and GSD samples achieved better accuracy than the target of ±10% accuracy at the 90% confidence limit for the winter coincident peak, the summer coincident peak and the 12 coincident peak average. The GS sample achieved better accuracy than the target of ±15% accuracy at the 90% confidence limit for the winter coincident peak, the summer coincident peak and the 12 coincident peak average.

PROPOSED SAMPLING PLAN FOR 2007 LOAD RESEARCH STUDY

The Residential Service (RS) class sample met the required levels of accuracy for 2004; therefore, no changes are required in this sample design. Proposed sample allocations for this class remain the same and are shown in the table below.

PROPOSED RS SAMPLE

Stratum	2007 Sample Size
Single Family Detached	175
Multi-family	50
Mobile Home	50
Total	**275**

The General Service Non-Demand (GS) class sample also met the required levels of accuracy for the 2004 winter coincident peak, summer coincident peak and 12 coincident peak average; therefore, no changes are required in the sample design. Proposed sample allocations for this class are shown in the table below.

PROPOSED GS SAMPLE

Stratum	2007 Sample Size
0 – 14,999 kWh	257
15,000 – infinity kWh	243
Total	**500**

The General Service Demand (GSD) class sample also met the required winter coincident peak, summer coincident peak and 12 coincident peak average levels of accuracy for 2004; therefore, no changes are required in the sample design. The proposed GSD sample allocation is shown below and reflects totals in the 100% sampled strata as of May 2005.

PROPOSED GSD SAMPLE

Stratum	2007 Sample Size
Secondary 0 – 199 kW	70
Secondary 200 – 299 kW	70
Secondary over 299 kW (100%)	435 (1)
Primary Metered/Primary Served (100%)	56 (1)
Primary Metered/Secondary Served (100%)	32 (1)
Total	**663**

1. 100% sampled stratum; therefore size will vary depending upon the number of customers meeting the criteria.

Samples for the General Service Large Demand (GSLD) and Interruptible Service (IS) classes are not needed because all of the customers have recorders on the meters for billing purposes. The data collected by the recorders is also used for load research purposes. Under this plan, the collection of load data for the GSLD and IS classes will continue in this manner.

SAMPLE REMOVALS AND REPLACEMENTS

Tampa Electric is also proposing another modification to the maintenance of the sample design. In order to improve operational efficiency, the company proposes to minimize the number of meter replacements (drop outs) after the sample has been installed and data collection has begun.

Previously, the proposed number of sampling meters was maintained throughout the year by replacing removed sampling meters with the next randomly selected customer. Going forward, Tampa Electric proposes to allow a specific number of removals per class that will not require replacements. Therefore, the RS class will be allowed 5 removals per stratum, before installation of replacements begins. The GS class and the GSD class will be allowed 10 and 5 removals per stratum, respectively.

There is no expectation that accuracy levels will be impacted by this change. Sample sizes are well above the computed sample size levels for meeting accuracy requirements.

FORMULAS AND DEFINITIONS

Combined Ratio Estimate:

$$\hat{R}_c = \frac{\sum_h W_h \bar{y}_h}{\sum_h W_h \bar{x}_h}$$

Where,

$\hat{R}_c$ = combined ratio estimate
W_h = stratum weight for stratum h
$\bar{Y}_h$ = mean coincident demand for stratum h
$\bar{X}_h$ = mean billed energy for stratum h

Coincident Peak Estimate:

$$\hat{Y}_{rc} = \hat{R}_c X$$

Where,

$\hat{R}_c$ = combined ratio estimate
$\hat{Y}_{rc}$ = estimated class total coincident peak
X = class total billed energy

Standard Deviation of Sample Residuals:

$$s_{dh}^2 = \frac{\sum_{i=1}^{n_h} (y_{hi} - \hat{R}_c x_{hi})^2}{n_h - 1}$$

Where,

$\hat{R}_c$ = combined ratio estimate
n_h = sample size for stratum h
s_{dh} = standard deviation of sample residuals
y_{hi} = coincident demand for sample Customer i of stratum h
x_{hi} = billed energy for Customer i of stratum h

Variance of Coincident Peak Estimate:

$$\hat{V}(\hat{Y}_{rc}) = \sum_h \frac{N_h^2\left(1 - \frac{n_h}{N_h}\right)}{n_h} s_{dh}^2$$

Where,

$\hat{V}(\hat{Y}_{rc})$ = *variance of coincident estimate*

N_h = *population size for stratum h*

n_h = *sample size for stratum h*

s_{dh} = *standard deviation of sample residuals*

Accuracy at 90% Confidence Level:

$$A = \frac{1.645\sqrt{\hat{V}(\hat{Y}_{rc})}}{\hat{Y}_{rc}}$$

Where,

$\hat{Y}_{rc}$ = *estimated class total coincident peak*

$\hat{V}(\hat{Y}_{rc})$ = *variance of coincident estimate*

A = *accuracy at 90% confidence level*

Sample Size:

$$n = \frac{\left(\sum_h W_h s_{dh}\right)^2}{\left(\frac{d}{1.645}\right)^2\left(\frac{\hat{Y}_{rc}}{N}\right)^2}$$

W_h = stratum weight for stratum h

$\hat{Y}_{rc}$ = estimated class total coincident peak

N = population size

s_{dh} = standard deviation of sample residuals

n = total sample size

d = desired relative accuracy

Where,

Sample Allocation (Neyman):

$$n_h = n \frac{W_h s_{dh}}{\sum_h W_h s_{dh}}$$

Where,

W_h = stratum weight for stratum h

n_h = sample size for stratum h

s_{dh} = standard deviation of sample residuals

n = total sample size

Twelve Coincident Peak Estimate:

$$12\hat{C}P = \frac{1}{12} \sum_{m=1}^{12} \hat{Y}_{rcm}$$

Where,

$\hat{Y}_{rcm}$ = Coincident Peak Estimate for Month M

Variance of Twelve Coincident Peak:

$$VAR(12\hat{C}P) = \left(\frac{1}{12}\right)^2 \left(\sum_{m=1}^{12} \hat{V}(\hat{Y}_{rcm}) + 2 \sum_{m=1}^{12} \sum_{k<m} \hat{C}(\hat{Y}_{rcm}, \hat{Y}_{rck}) \right)$$

Where,

$$\hat{V}(\hat{Y}_{rcm}) = Variance\ of\ Coincident\ Peak\ Estimate\ Month\ m$$

$$\hat{C}(\hat{Y}_{rcm}, \hat{Y}_{rck}) = Covariance\ of\ Month\ m\ and\ Month\ k\ Estimates$$

Month-To-Month Covariance:

$$\hat{C}(\hat{Y}_{rcm}, \hat{Y}_{rck}) = \sum_{h=1}^{I} \frac{N_{hm} N_{hk}}{\bar{n}_{hmk}} (fpc_{mk})\, s_{hd_m d_k}$$

Where,

$$N_{hm} = Population\ Size\ in\ Month\ m$$

$$N_{hk} = Population\ Size\ in\ Month\ k$$

$$\bar{n}_{hmk} = Average\ Sample\ Size\ in\ Months\ m\ and\ k$$

$$fpc_{mk} = 1 - \min\left(\frac{n_m}{N_m}, \frac{n_k}{N_k}\right)$$

$$s_{hd_m d_k} = \sum_{i=1}^{n_{hmk}} \frac{(y_{hmi} - \hat{R}_m x_{hmi})(y_{hki} - \hat{R}_k x_{hki})}{n'_{hmk} - 1}$$

$$n'_{hmk} = Sample\ Size\ with\ good\ data\ in\ Month\ m\ and\ k$$

Combining Estimates from Two Samples:

$$\hat{Y}_{rc} = \alpha \hat{Y}_{rcA} + (1 - \alpha) \hat{Y}_{rcB}$$

Where,

$$\hat{Y}_{rcA} = Sample\ A\ Estimate$$

$$\hat{Y}_{rcB} = Sample\ B\ Estimate$$

$$\alpha = Weighting\ factor$$

Combining Variances from Two Samples:

$$\hat{V}(\hat{Y}_{rc}) = \alpha^2 \hat{V}(\hat{Y}_{rcA}) + (1 - \alpha)^2 \hat{V}(\hat{Y}_{rcB})$$

Where,

$$\hat{V}(\hat{Y}_{rcA}) = Variance\ of\ Sample\ A\ Estimate$$
$$\hat{V}(\hat{Y}_{rcB}) = Variance\ of\ Sample\ B\ Estimate$$
$$\alpha = Weighting\ factor$$

Weight to Obtain Minimum Variance:

$$\alpha = \frac{\hat{V}(\hat{Y}_{rcA})}{\hat{V}(\hat{Y}_{rcA}) + \hat{V}(\hat{Y}_{rcB})}$$

Where,

$$\hat{V}(\hat{Y}_{rcA}) = Variance\ of\ Sample\ A\ Estimate$$
$$\hat{V}(\hat{Y}_{rcB}) = Variance\ of\ Sample\ B\ Estimate$$
$$\alpha = Weighting\ factor$$

Twelve Coincident Peak -- Three Samples Equal / Weighting:

$$12\hat{C}P = \left(\frac{1}{24}\right)\left(\sum_{m=1}^{l} \hat{Y}_{mA} + \sum_{m=1}^{12} \hat{Y}_{mB} + \sum_{m=l+1}^{12} \hat{Y}_{mC}\right)$$

Where,

Sample A is in place for the first l months, sample B is in place for all 12 months and sample C is in place for the last 12 - l months.

$$\hat{Y}_{mA} = Sample\ A\ Estimate\ for\ Month\ m$$
$$\hat{Y}_{mB} = Sample\ B\ Estimate\ for\ Month\ m$$
$$\hat{Y}_{mC} = Sample\ C\ Estimate\ for\ Month\ m$$

Variance of Twelve Coincident Peak:

$$VAR(12\hat{C}P) = \left(\frac{1}{24}\right)^2 \{ \sum_{m=1}^{l} \hat{V}(\hat{Y}_{rcmA}) + 2 \sum_{m=1}^{l} \sum_{k<m} \hat{C}(\hat{Y}_{rcmA}, \hat{Y}_{rckA}) \}$$

$$+ \left(\frac{1}{24}\right)^2 \{ \sum_{m=1}^{12} \hat{V}(\hat{Y}_{rcmB}) + 2 (\sum_{m=1}^{12} \sum_{k<m} \hat{C}(\hat{Y}_{rcmB}, \hat{Y}_{rckB}) \}$$

$$+ \left(\frac{1}{24}\right)^2 \{ \sum_{m=l+1}^{12} \hat{V}(\hat{Y}_{rcmC}) + 2 \sum_{m=l+1}^{12} \sum_{k<m} \hat{C}(\hat{Y}_{rcmC}, \hat{Y}_{rckC}) \}$$