



Farmers Rural Electric Cooperative Corporation

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September 24, 2013

Mr. Jeff Derouen
Executive Director
Public Service Commission
P O Box 615
211 Sower Dr.
Frankfort, KY 40602

SEP 27 2013
10 10 AM
FRANKFORT, KY

Dear Mr. Derouen:

Pleased find the enclosed for filing with the Commission in the above-referenced case an original and six copies of responses to Commission Staff's second data request, Appendix A – Revision History and Appendix B - second revised Application to allow Farmers Rural Electric Cooperative Corporation to adopt a sample testing method of our single-phase meters.

Sincerely,

FARMERS RURAL ELECTRIC
COOPERATIVE CORPORATION

A handwritten signature in black ink that reads 'Tony Wells'. The signature is written in a cursive style with a large, sweeping 'T' and 'W'.

Tony Wells
VP Technical Services

www.farmersrecc.com

A Touchstone Energy® Cooperative The logo for Touchstone Energy, which is a stylized 'X' symbol similar to the one in the Farmers RECC logo.

**COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION**

SEP 7 2013
PUBLIC SERVICE
COMMISSION

In re the Matter of:

**APPLICATION OF FARMERS RURAL ELECTRIC)
COOPERATIVE FOR THE ADOPTION OF A SAMPLE)
METER TESTING PROCEDURE)**

**CASE NO.
2013-00136**

**RESPONSES TO COMMISSION STAFF'S
SECOND REQUEST FOR INFORMATION
DATED SEPTEMBER 24, 2013**



1. Confirm that the changes in Farmers' "revised" application, filed July 12, 2013 from Farmers' application filed May 13, 2013 consist of:

a. Changing the word "group" to "lot" or "lots" throughout the revised application;

Response: All instances of the word "group" has been changed to "lot".

Person Responsible: Tony Wells

b. Adding "Light Load" test results under "Procedures" at the fourth unnumbered page so that the second sentence of the second paragraph reads: "Full Load and Light Load test results will be evaluated."

Response: "Light Load" test has been added under "Procedures".

Person Responsible: Tony Wells



2. Identify and explain all other changes in Farmers' "revised" application, filed July 12, 2013 from its application filed May 13, 2013

Response: Changed the word "group" to "lot" where appropriate. Added "Light Load" test to procedures, and corrected error is lot size of "Meter lot 2".
Changes to 2nd revision are included in Appendix A.

Person Responsible: Tony Wells



3. In its response to Item 1 of Commission Staff's First Request for Information dated June 18, 2013 ("Staff's First Request"), Farmers provided an explanation of how its billing computer selects meters to be tested randomly. Farmers explains that the sample lot is generated using a skip factor, based upon the lot size and number of meters to be tested, and a randomized start point. Beginning at the randomized start point, each subsequent meter to be tested is based upon the skip factor for the given meter lot. In its application. Farmers states that "[e]ach test group will be randomly sampled by a computerized process."^ Does Farmers believe that each test group will be randomly sampled, or that only the start point of the sample lot is randomly sampled, based upon its description?

Response: The process described is "Systematic Random Selection". This process is an acceptable method of random selection with the assumption of a homogeneous population.

Person Responsible: Tony Wells



4. In its response to Items 2(a), (b) and (c) of the Staff's First Request, Farmers provided responses indicating how its proposed plan complies with 807 KAR 5:041, Section 16(4)(a). In response to Item 2(a), Farmers states that "if the sample lot fails, then the entire must be tested thereby exceeding the requirement of 16(4)(a)." Farmers reiterates in response to Item 2(b) that "a failing lot will be tested in its entirety...thereby exceeding the requirement of 16(4)(a)."

a. Explain how Farmers intends to meet the requirements of 807 KAR 5:041, Section 16(4)(a) in the event the sample lot does not fail.

Response: In the event that a lot does not fail, the table in Section 16(4)(a) will be followed. The application will be modified to incorporate this change.

Person Responsible: Tony Wells

b. Describe how Farmers will select additional meters to be tested the following test year based upon the meter test results from the previous test year in the event the sample lot does not fail.

Response: Additional tests as required for that lot will be selected from those in that lot longest in service since last test.

Person Responsible: Tony Wells



5. In response to Item 4 of the Staff's First Request, Farmers states that as part of an approved sample meter testing plan, it will supply detailed test data to the Commission for review "as requested by the Commission." Does Farmers intend to include this information as part of the Quarterly Meter Reports required by the Commission, or will the data only be supplied in response to a Commission request for the data as indicated?

Response: As requested or during annual inspection would be preferred.

Person Responsible: Tony Wells



6. In its response to Item 5(a) of the Staff's First Request, Farmers defines a "non-registering" meter as "[a] meter that no longer generates optical pulses on its test port and cannot be tested." In the event a meter is determined to have a failed or inaccurate meter display, or register, would Farmers classify that meter as "non-registering" as well?

Response: No

Person Responsible: Tony Wells



7. In its response to Items 5(b) and (c) of the Staff's First Request, Farmers describes its rationale for removing non-registering meters from the sample lot and replacing them with another random selection.

- a. Provide a description of the "random selection" process to determine which meter will be selected to replace the removed non-registering meter.

Response: Number the lot and utilizing the random number function in Microsoft Excel.

Person Responsible: Tony Wells

- b. Farmers indicates that it is not applying the ANSI/ASQC (American National Standards Institute/American Society of Quality Control) standard to meters it determines to be non-registering. Identify what process is used to determine whether the presence of a non-registering meter in a sample lot is indicative of a larger issue, or the existence of a larger number of non-registering meters, within that particular group

Response: Non-registering meters are located using the billing process by reporting usage that is 25% less from previous month and usage 50% less from last years. Non-registering meters are located with the AMI system by a reporting "zero use " meters and meters that are not communicating.

Person Responsible: Tony Wells

- c. In its response to Item 5(c), Farmers states that "[o]ther methods are used to locate non-registering meters in the field." Provide further description of the referenced methods utilized, along with the number of non-registering meters that have been identified to date utilizing those methods

Response: See Response to 7(b). Non-registering meters are reported on the "Quarterly meter report". These meters were located using this process.

Person Responsible: Tony Wells



8. In Items 6(c) and (d) of the Staff's First Request, Farmers was asked to explain why its proposed sampling plan was not being held to the +/- 1 percent accuracy requirement as set forth in 807 KAR, Section 17(1). In its response to Item 6(c), Farmers states that an "AQL of 2.5 is consistent with the value used by Sample Testing Plans currently on file and approved with the Commission."

a. In its application, Farmers states that "[d]ue to the +/-2 percent limits, the sample groups shall be tested using an AQL of 2.5."

(1) Explain how the +/- 2 percent limits, as cited by Farmers, determine the AQL value of 2.5 to be utilized.

Response: Refer to table A-1 "AQL conversion Table". For a range of 1.65 to 2.79 use an AQL value of 2.5.

Person Responsible: Tony Wells

(2) Does Farmers agree that the +/-2 percent requirement listed in 807 KAR 5:041, Section 16(5) is to be used for refunds and back billing purposes, as stated in the regulation? If so, explain why this same requirement is being utilized to determine meter accuracy under the proposed sample plan.

Response: Yes, the +/- 2 percent is used to determine refunds and back billing. Electronic meters have no method of adjusting the accuracy like the electro-mechanical meters provided. So, at +/- 1 percent no further requirements are

applicable but refunds or back billing are required at greater than +/- 2 percent.

Person Responsible: Tony Wells

- b. As identified in its response, Farmers notes that ANSI/ASQC Z1.9-2008 states in the introduction that "[t]he variables sampling plans apply to a single quality characteristic which can be measured on a continuous scale, and for which quality is expressed in terms of percent nonconforming." Does Farmers believe that an AQL of 2.5, identified by Farmers in its response, represents the "percent nonconforming" of a given lot of meters tested under the proposed sample plan?

Response: No, AQL (Acceptable Quality Limits) is used in determining percent non-conforming but does not specify the value.

Person Responsible: Tony Wells

- (1) If so, identify the "single quality characteristic" utilized by Farmers under its proposed sample plan to determine what percentage of units could be classified as nonconforming.

Response: N/A

Person Responsible: Tony Wells

- (2) If not, explain how Farmers defines the AQL value and how it is to be applied to a proposed sample plan.

Response: AQL is used in conjunction with the Table B-3 to determine maximum allowable percent nonconforming.

Person Responsible: Tony Wells

- (3) Would Farmers classify the AQL value as a measurement of the accuracy of a meter under the proposed sample plan, or as a percentage of the sample lot that would be tolerated as defective?

Response: Neither, it is an intermediate value used to determine maximum allowable percent non-conforming.

Person Responsible: Tony Wells

- c. If the "single quality characteristic" utilized by Farmers is the percent accuracy of the meter, indicate whether Farmers applies the requirements set forth 807 KAR 5:041, Section 16(5) regarding refunds and back billing, or the requirements of 807 KAR 5:041, Section 17(1) regarding meter accuracy.

Response: Yes

Person Responsible: Tony Wells

- d. Does Farmers believe that the Commission should approve each proposed sample plan filed for review based upon approvals given for previously filed sample plans?

Response: Yes, for such times that the methods used are the same as
previously filed and approved plans.

Person Responsible: Tony Wells



9. In its response to Item 6(f) of the Staff's First Request, Farmers provides detailed meter testing procedures which are utilized by the utility.

a. The third bullet point under the procedures states "[t]he test is run for 10 revolutions for the full, light and power factor loads." Indicate what type of test is being referenced in this specific step of Farmers' meter testing procedures.

Response: The test is for percent accuracy for full load, light load and power factor loads.

Person Responsible: Tony Wells

b. The fourth bullet point states that "[t]he as found results are recorded and dated." Provide a description of how Farmers defines an "as found" test.

Response: An "as found" is defined as the test on a meter before anything has been done to the meter.

Person Responsible: Tony Wells



10. In its response to Item 8(a) of the Staff's First Request, Farmers explains that the \$30 cost to test was derived by utilizing a "Current Contractor price quote for field testing."

a. Provide the number of quotes submitted to Farmers prior to the selection of the "Current Contractor price quote."

Response: Cost based on unsolicited quote from a company performing other work for Farmers.

Person Responsible: Tony Wells

b. Provide a list of the bids submitted.

Response: No bids have been solicited at this time. Bids may be solicited after approval of plan, if deemed necessary to meet testing requirements. The prices are for budgetary purposes only.

Person Responsible: Tony Wells

c. Identify the process utilized by Farmers to determine the final bid selected.

Response: See Responses to requests 10(a) and 10(b).

Person Responsible: Tony Wells



Appendix A

Revision History

Original to 1st Revision:

1. Changed “group” to “lot” where thought appropriate
2. Added Light Load under “Procedures”
3. Corrected lot size of the “Meter Lot 2”

1st Revision to 2nd Revision.

1. Changed all instances of “group” to “lot”
2. Added all of requirements of 807 KAR 5:041, Section 16(4)(a) into application.
3. “Acceptance Quality Level” has been changed to “Acceptable Quality Limit”



Appendix B

May 3, 2013

Mr. Jeff Derouen
Executive Director
Public Service Commission
P O Box 615
211 Sowers Dr.
Frankfort, KY 40602

Dear Mr. Derouen:

Please find the attached request to allow Farmers Rural Electric Cooperative Corporation to adopt a sample testing method of our single-phase meters.

The statistical methods in *American Nation Standard ANSI/ASQC Z1.9-2008 (Sampling Procedures and tables for Inspection)* will be used to analyze the test results. Future testing levels will be determined from this methodology.

A sample meter test program of our single-phase meters will allow our cooperative to save \$564,000 in operational cost over the eight year cycle with no sacrifice of meter testing accuracy or integrity. Along with our fully-automated meter reading program, this sample test program will further improve our revenue meter efficiency.

Sincerely,

FARMERS RURAL ELECTRIC
COOPERATIVE CORPORATION

William Prather
President

**REQUEST TO ADOPT SAMPLE TESTING METHOD FOR
FARMERS RURAL ELECTRIC COOPERATIVE
CORPORATION'S SINGLE-PHASE METERS**

2nd Revision

Farmers Rural Electric Cooperative Corporation
Glasgow, Kentucky

Prepared by
Tony Wells

September 26, 2013

INTRODUCTION

Farmers Rural Electric Cooperative Corporation (FRECC) is an electric distribution cooperative located in south central Kentucky. FRECC is presently on schedule with its eight-year meter testing program. Since 2006, FRECC has been fully automated in single-phase meter reading. By adopting a sample meter testing program, FRECC will take another significant step towards maximizing efficiency in the single-phase meter reading and testing of our operation. It is the purpose of this proposal to demonstrate the methods used and the cost savings achieved in sample testing.

RULES AND REGULATIONS

Kentucky Public Service Commission (PSC) rules regulations outline the required method and techniques of sample meter testing. FRECC will comply with **PSC KAR 5.041E, Section 16** when implementing its sample meter testing program.

Section 16. Sample Testing of Single Phase Meters. A utility desiring to adopt a scientific sample meter testing plan for single phase meters shall submit its application to the commission for approval. Upon approval the sample testing plan may be followed in lieu of the periodic test prescribed in Section 15(3) of this administrative regulation. The plan shall include the following:

(1) Meters shall be divided into separate lots to recognize differences in operating characteristics due to changes in design, taking into consideration date of manufacture and serial number.

(2) The sampling procedure shall be based upon accepted statistical principles.

(3) The same sampling procedure shall be applied to each lot.

(4) Each utility authorized to test meters by sample meter testing plan shall comply with the following conditions:

(a) The number of meters in addition to the sample shall be taken from those meters in each lot longest in service since last test unless a particular meter type is known to be increasing the percentage of meters requiring test for the sample lot. In such a case where a particular meter type is increasing the percentage of meters requiring test in any lot, these meters may be selected first regardless of test date with any additional tests as required for that lot coming from those in that lot longest in service since last test. Each year the utility shall use the following table to determine the percentage of the total meters in each lot to be tested.

Within Limits of 2% Fast or Slow (Indicated by Sample)		Percentage of Meters to be Tested the Next Year
99.0	100.0	2
98.0	98.9	4
97.0	97.9	6
96.0	96.9	8
95.0	95.9	10
93.0	94.9	12
91.0	92.9	14
Less than	91.0	16

(b) Provided, however, that no meter shall remain in service without periodic test for a period longer than twenty-five (25) years.

(5) Whenever a meter is found to be more than two (2) percent fast or slow, refunds or back billing shall be made for the period during which the meter error is known to have existed or if not known for one-half (1/2) the elapsed time since the last test but in no case to exceed three (3) years. This provision shall apply only when sample testing of single phase meters has been approved by the commission and utilized by the utility.

PROCEDURE

As shown in the table below, meters will be divided into various test lots based upon manufacturer and type. Due to a large lot of similar meters installed during AMI installation, the lots will be further divided, to lots no larger than 1500 meters by serial number break points.

Meter Lots

	Manufacturer	Type	Form	Population
1	Itron	C1S	2S	25080*
2	Itron	C1S	2SE	582
3	GE	I-210+	2S	100

*Meter lot 1 will be broken up into lots of 1500 based on serial number

The statistical meter sample testing will follow *American Nation Standard ANSI/ASQC Z1.9-2008 (Sample Procedures and Tables for Inspection)*. Each test lot will be randomly sampled by a computerized process. The FRECC billing computer will be used for this process.

Part A7. Sample Selection, from the above standard, states that **Inspection Level II** shall be used for the discrimination level. Unless otherwise required by the PSC, this level will be in effect for the FRECC program.

The **Acceptable Quality Limit (AQL)** is defined as the quality level that is the worst tolerable product average when a continuing series of lots is submitted for acceptance sampling. Due to the $\pm 2\%$ limits, the sample lots shall be tested using an AQL of 2.5. This value can be found in Table A-1.

Newly installed meters will be added to the proper lot and will be eligible for sample testing the following year. New meters from a different manufacturer or with different characteristics/features will require the formation of a new lot. As new meters are purchased in lots a sample test lot will be established just for the new meter testing. An AQL of 1.0 will apply to the new meter testing.

Table A-1
AQL Conversion Table

For specified AQL values falling within these ranges		Use this AQL value
—	to 0.109	0.10
0.110	to 0.164	0.15
0.165	to 0.279	0.25
0.280	to 0.439	0.40
0.440	to 0.669	0.65
0.700	to 1.09	1.0
1.10	to 1.64	1.5
1.65	to 2.79	2.5
2.80	to 4.39	4.0
4.40	to 6.99	6.5
7.00	to 10.9	10.0

Table A-2¹
Sample Size Code Letters²

Lot Size	Inspection Levels					
	Special		General			
	S3	S4	I	II	III	
2 to 8	B	B	B	B	C	
9 to 15	B	B	B	B	D	
16 to 25	B	B	B	C	E	
26 to 50	B	B	C	D	F	
51 to 90	B	B	D	E	G	
91 to 150	B	C	E	F	H	
151 to 280	B	D	F	G	I	
281 to 400	C	E	G	H	J	
401 to 500	C	E	G	I	J	
501 to 1,200	D	F	H	J	K	
1,201 to 3,200	E	G	I	K	L	
3,201 to 10,000	F	H	J	L	M	
10,001 to 35,000	G	I	K	M	N	
35,001 to 150,000	H	J	L	N	P	
150,001 to 500,000	H	K	M	P	P	
500,001 and over	H	K	N	P	P	

¹The theory governing inspection by variables depends on the properties of the normal distribution and, therefore, this method of inspection is only applicable when there is reason to believe that the frequency distribution is normal.

²Sample size code letters given in body of table are applicable when the indicated inspection levels are to be used.

PROCEDURE(cont.)

Randomly selected meters (lot) from each lot will be sent to the meter shop. All non-registering meters will be replaced by another random selection. The meters will be tested under full load, light load and 50% power factor.

For each lot, calculations will be based on the Double Specification Limit Variability Unknown-Standard Deviation Method. Full Load and Light Load test results will be evaluated. **Example B-4** in *ANSI/ASQC Z1.0-2008* demonstrates this calculation method. **Table B-3** is included in this proposal.

The results from each groups' test lot will be examined to determine meter accuracy. If a lot does not meet the AQL standards for the lot size, the entire lot will be tested within 18 months.

No meter shall remain in service without periodic test for a period longer than twenty-five (25) years.

ANSI/ASQ Z1.9-2008

Table B-3 Standard Deviation Method
Master Table for Normal and Tightened Inspection for Plans Based on Variability Unknown
(Double Specification Limit and Form 2—Single Specification Limit)

Sample Size Code Letter	Sample Size	Acceptance Quality Limits (normal inspection)											
		T	.10	.15	.25	.40	.65	1.00	1.50	2.50	4.00	6.50	10.00
		M	M	M	M	M	M	M	M	M	M	M	M
B	3	↓	↓	↓	↓	↓	↓	↓	↓	7.59	18.86	26.94	33.69
C	4	↓	↓	↓	↓	↓	↓	1.49	5.46	10.88	16.41	22.84	29.43
D	5	↓	↓	↓	↓	0.041	1.34	3.33	5.82	9.80	14.37	20.19	26.55
E	7	↓	0.005	0.087	0.421	1.05	2.13	3.54	5.34	8.40	12.19	17.34	23.30
F	10	0.077	0.179	0.349	0.714	1.27	2.14	3.27	4.72	7.26	10.53	15.17	20.73
G	15	0.186	0.311	0.491	0.839	1.33	2.09	3.06	4.32	6.55	9.48	13.74	18.97
H	20	0.228	0.356	0.531	0.864	1.33	2.03	2.93	4.10	6.18	8.95	13.01	18.07
I	25	0.250	0.378	0.551	0.874	1.32	2.00	2.86	3.97	5.98	8.65	12.60	17.55
J	35	0.253	0.373	0.534	0.833	1.24	1.87	2.66	3.70	5.58	8.11	11.89	16.67
K	50	0.243	0.355	0.503	0.778	1.16	1.73	2.47	3.44	5.21	7.61	11.23	15.87
L	75	0.225	0.326	0.461	0.711	1.06	1.59	2.27	3.17	4.83	7.10	10.58	15.07
M	100	0.218	0.315	0.444	0.684	1.02	1.52	2.18	3.06	4.67	6.88	10.29	14.71
N	150	0.202	0.292	0.412	0.636	0.946	1.42	2.05	2.88	4.42	6.56	9.86	14.18
P	200	0.204	0.294	0.414	0.637	0.945	1.42	2.04	2.86	4.39	6.52	9.80	14.11
		.10	.15	.25	.40	.65	1.00	1.50	2.50	4.00	6.50	10.00	
Acceptance Quality Limits (tightened inspection)													

All AQL values are in percent nonconforming. T denotes plan used exclusively on tightened inspection and provides symbol for identification of appropriate OC curve.

↓ Use first sampling plan below arrow; that is, both sample size as well as k value. When sample size equals or exceeds lot size, every item in the lot must be inspected.

COST SAVINGS/CONCLUSION

A substantial reduction in cost will be achieved by implementing the sample meter test method. Once the program is established, only a small percentage of the present labor and testing efforts will be required. This reduction results in a cost savings without compromising single-phase revenue metering accuracy.

Cost Savings to Farmers RECC due to a change to Sample Metering

Assumptions:

Needing to test 1050 sample meters annually

Current practice is to test approximately 3400 meters annually

Contract pricing to test single-phase meter \$30

Current Annual Costs

Number of meters	3400	Cost to test \$30.00	Annual Cost \$102,000.00
Cost of Testing meters over 8 year cycle			\$816,000.00

Proposed Sample Testing Costs

Number of meters	1050	Cost to test \$30.00	Annual Cost \$31,500.00
Cost of Testing meters over 8 year cycle			\$252,000.00

Potential Savings over 8 year cycle

\$564,000.00