July 11, 2013

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

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 data request and a 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

Tony Wells
VP Technical Services

OATH

Commonwealth of Kentucky   )
) ss:

County of Barren   )

TONY WELLS   makes oath and says
(Name of Officer)

that he/she is   VICE PRESIDENT OF TECHNICAL SERVICES   of

FARMERS RURAL ELECTRIC COOPERATIVE CORPORATION

(Exact legal titel or name of respondent)

I, Tony Wells, makes oath and says that he is Vice President of Technical Services of Farmers Rural Electric Cooperative Corporation ("Farmers RECC"); that I have carefully examined the foregoing Smart Grid data request and to the best of my knowledge and belief the statements contained in this report are true, and is a correct and complete statement of the business and affairs of Farmers RECC in every respect.

(Signature of officer)

Subscribed and sworn to before me, a Notary Public in and for the State and County named in the above this _11_ day of July, 2013.

Apply seal here

My commission expires   _7-30-2015_

(Signature of officer authorized to administer oath)

(Persons making willful false statements in this report may be punished by fine or imprionment under KRS523.040 and 523.100)

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In re the Matter of:

APPLICATION OF FARMERS RURAL ELECTRIC	)	
COOPERATIVE FOR THE ADOPTION OF A SAMPLE	)	CASE NO.
METER TESTING PROCEDURE	)	2013-00136

RESPONSES TO COMMISSION STAFF'S

FIRST REQUEST FOR INFORMATION

DATED JUNE 18, 2013

1.   Refer to the section "Procedure" and the statement, "Each test group will be randomly sampled by a computerized process. The FRECC billing computer will be used for this process." Explain how the billing computer selects the meters randomly.

Response: The meter lot to be sampled is specified and number of units returned and then a skip factor is entered. The sample lot is then generated using the skip factor and a randomized start point. For example, if lot size is 1500 and number to be tested is 50 then the skip factor will be 30. If started at meter 15 then the meters selected will be 15, 45, 75, 105, ...

Person Responsible: Tony Wells

2.   Refer to the section "Rules and Regulation" and the statement, "FRECC will comply with PSC KAR 5:041E, Section 16 when implementing its sample meter testing program."

   a.   Refer to 807 KAR 5:041, Section 16, Sample Testing of Single Phase Meters. Explain in detail how Farmers' proposed sample testing plan will comply with each of the specific conditions required in Section 16(4)(a) and (b) and Section 16(5).

   Response: ANSI Z1.9-2008 directs, if the sample lot fails, then the entire must be tested thereby exceeding the requirement of 16(4)(a). Any meter with a test date approaching 25 yrs will be tested to ensure no meter's test date exceeds 25yrs, thereby meeting 16(4)(b). For meters that are more

than +/- 2 percent accuracy, refunds and back billing will be performed exactly as specified in 16(5).

Person Responsible: Tony Wells

b.   Explain why Farmers indicates in the application the 807 KAR 5:041, Section 16(4)(a) is not applicable.

Response: The method will not be used because a failing lot will be tested in its entirety per ANSI Z1.9-2008 thereby exceeding the requirement of 16(4)(a).

Person Responsible: Tony Wells

c.   Explain how Farmers intends to be in compliance with 807 KAR 5:041, Section 16 if the requirements of Section 16(4)(a) are not applied to the proposed plan.

Response: By exceeding the requirement.

Person Responsible: Tony Wells

3.   Refer to the section "Procedure" and the statement, "Due to a large group of similar meters installed during AMI installation, the groups will be further divided to groups of no larger than 1500 meters by serial number break points."

a.   When referencing the smaller sample selection of 1,500 meters, confirm whether the word "groups" should be used, or indicate whether it should be replaced with the word "lots" in this statement.

Response: The revised plan will use the word "lots"

Person Responsible: Tony Wells

b.)   Refer to the table titled "Meter Groups" in this section showing the
        proposed test groups into which Farmers proposes to divide its meters.
        Farmers indicates that Meter Group 1 would contain a population of
        25,080 meters. Based on Farmers' previously identified process of
        dividing up larger groups of meters, state whether Farmers agrees that
        Meter Group 1 would be further divided into a total of 17 smaller lots.

Response: Yes

Person Responsible: Tony Wells

i)   If so, provide a list showing each of the 17 lots and how they will
       be determined base on the serial number break points.

       Response:

Lot #	Begin Serial #		End Serial #
1	46769578	--	46766480
2	46766481	--	46768053
3	46768054	--	46769640
4	46769641	--	46771214
5	46771215	--	46772774
6	46772775	--	46774334
7	46774335	--	46775892

8	46775894	--	46777446
9	46777447	--	46778998
10	46778999	--	46780527
11	46780528	--	46782067
12	46782068	--	46783627
13	46783628	--	46785171
14	46785172	--	46786705
15	46786706	--	46788253
16	46788254	--	55123126
17	55123127	--	55301796

Person Responsible: Tony Wells

ii)   State whether Farmers anticipates utilizing the total meter

population of 25,080 in Meter Group 1 to determine the sample

size of meters tested for the entire group, or if Farmers will utilize

the number of meters in each of the 17 smaller lots to determine a

sample size within each lot of 1,500 meters.

Response: Farmers will use the number of meters in the smaller lots

sizes.

Person Responsible: Tony Wells

c.)   Farmers indicates that Meter Group 2 would contain a population of 1,895

meters. Based on Farmers previously identified process of dividing up

larger groups of meters, state whether Farmers agrees that Meter Group 2 would be further divided into a total of two smaller lots.

Response: Due to an error is identifying the different groups of meters, group 2 actually contains 582 meters. The application will be modified to represent this change. This group will not be sub-divided.

Person Responsible: Tony Wells

i.) If so, provide a list showing the two lots and explain how they will be determined based on the serial number break points.

Response: See Response to 3(c)(i).

Person Responsible: Tony Wells

ii.) State whether Farmers anticipates utilizing the total meter population of 1,895 in Meter Group 2 to determine the sample size of meters tested for the entire group, or if Farmers will utilize the number of meters in each of the 2 smaller lots to determine a sample size within each lot of 1,500 meters.

Response: See Response to 3(c)(i).

Person Responsible: Tony Wells

4.) Refer to the section "Procedure" and the statement, "Newly installed meters will be added to the proper group 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 group. As new meters are purchased in lots a sample test group will be established just for the new meter testing. An AQL of 1.0 will apply to the new meter testing." State whether Farmers will maintain and analyze all meter test results, and submit detailed test data to the Commission for review as a part of an approved sample meter testing plan,

Response: Yes, Farmers will supply data as requested by the Commission.

Person Responsible: Tony Wells

5.)   Refer to the section "Procedure (cont.)" and the statement, "Randomly selected meters (lot) from each group will be sent to the meter shop. All non-registering meters will be replaced by another random selection."

a.)   Provide Farmers' definition of a "non-registering" meter.

Response: A meter that no longer generates optical pulses on its test port and cannot be tested.

Person Responsible: Tony Wells

b.)   Explain why all non-registering meters will be replaced by another random selection and not selected per ANCI(sic)/ASQC Z1.9-2008, A7.2 (Drawing of Samples).[2]

Response: The statistical model is used to determine the probable number of registering meters that would have test results fall outside of a criteria based on a statistical sample of a larger lot. The statistical model is not

being used to predict the number of non-registering (as defined in the

response to 5(a)) meters.

Person Responsible: Tony Wells

c.)   Provide generally accepted statistical principles that support the statistical

validity of removing a non-registering (defective) unit randomly selected

from a lot and replacing it with a registering (functioning) unit.

Response: ANSI/ASQC Z1.9-2008 states in the introduction *"The 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". The single quality characteristic being

measured is per cent accuracy and meets the preceding statement. A non-

registering meter is unable to be tested therefore is a discontinuity in

regards to per cent accuracy thereby failing a primary constraint of the

sampling plan. Other methods are used to locate non-registering meters in

the field. Such method will include but not be limited to AMI meter reads

(daily and hourly where applicable), AMI communications reports, meter

data management application and billing reports.

Person Responsible: Tony Wells

d.)   Explain how the presence of non-registering meters randomly selected

from a lot may or may not represent the same meter conditions existing in

the lot being sampled.

Response: See Response to question 5(b)

Person Responsible: Tony Wells

e.)   Describe how billing adjustments for non-registering meters are handled
        in accordance with 807 KAR 5:041, Section 16(5).

Response: Determine length of time meter has been non-registering and
        estimate usage based on historical usage of location.

Person Responsible: Tony Wells

f.)   Identify any other meter condition that might be found in a randomly
        sampled test group that would warrant the selection of an acceptable
        replacement from the lot being sampled.

Response: None

Person Responsible: Tony Wells

6.)   Refer to the section "Procedure (cont.)" and the statement, "Full load test results
will be evaluated."

a.)   Explain why the Light Load and Power Factor test results would not be
        evaluated/analyzed along with the Full Load test results in accordance
        with 807 KAR 5:041, Section 17(1).

Response: The use of Full Load and Light load is consistent with other filed

and approved Sample Meter Testing Plans. The application will be

modified to incorporate those criteria.

Person Responsible: Tony Wells

b.)   Describe the parameters used by Farmers when testing a meter. Example:

revolutions per full load, light load, and power factor.

Response: 10 revolutions per full load, light load, and power factor.

Person Responsible: Tony Wells

c.)   Explain why meters tested under the proposed sampling plan are not being

held to the accuracy requirements of +/- 1 percent in accordance with 807

KAR 5:041, section 17(1).

Response: An AQL of 2.5 is consistent with the value used by Sample

Testing Plans currently on file and approved with the Commission.

Person Responsible: Tony Wells

d.)   Explain how using a +/- 2 percent accuracy threshold provides any

indication of the overall performance of the group being tested if the

Commission requires all meters to adhere to a minimum accuracy of +/- 1

percent.

Response: An AQL of 2.5 is consistent with the value used by Sample

Testing Plans currently on file and approved with the Commission

Person Responsible: Tony Wells

e.)   Provide the manufacturer's accuracy specifications and estimated service

life for each meter type that will be subject to the proposed sampling plan.

Response: All manufacturers meet ANSI C12.20 Class 0.5 with typical

accuracies of +/- 0.2 percent. The GE meter specification sheet indicated

meter designed for 20+ year life. Other manufacturers did not state

expected life.

Person Responsible: Tony Wells

f.)   Provide a copy of Famers' detailed meter testing procedures.

Response: Farmers R.E.C.C. procedure for meter testing

• All meter information is recorded to a card or paper.

• The meter test equipment is set to the appropriate settings for the

meter under test.

• The test is run for 10 revolutions for the full, light and power

factor loads.

• The as found results are recorded and dated.

• The average percent registration is calculated by adding the full

load and light load results and dividing by two. (FL + LL)/2

• Adjustments are made to the meter and tests reran as needed.

• The as left test results are recorded.

7.)   Refer to section "Procedures (cont.)" and the statement "No meter shall remain in service without periodic test for a period longer than twenty-five (25) years."

    a.)   If meters are randomly selected for testing, state whether Farmers believes that it is possible that some meters in its system may never be tested during a 25-year period.

    Response: Yes, but to meet the requirement in the application meter test dates will be monitored and any meter approaching 25 years in services will be tested. This will be accomplished with the assistance of contract labor.

    Person Responsible: Tony Wells

    b.)   State whether Famers believes it is possible that some meters may be tested multiple times within the span of 25 years.

    Response: Yes, it is statistically possible.

    Person Responsible: Tony Wells

8.)   Refer to the section "Cost Savings to Farmers RECC due to a change to Sample Metering"

    a.)   Explain how the $30 cost to test was derived.

    Response: Current Contractor price quote for field testing was used.

    Person Responsible: Tony Wells

b.) If additional testing is required per the sample plan (which may occur because of failure of a group or groups and/or a greater percentage of meters begin selected for testing because of the group's or groups' previous-year performance), state whether Farmers has a plan and the resources to perform the additional testing required within the defined time period.

Response: Contract labor will be used to accomplish any additional testing required.

Person Responsible: Tony Wells

c.) If additional meters are required to be tested along with the samples selected for that year, estimate the additional costs that could be incurred for testing these meters and explain whether the contracted costs would increase because of the additional demand.

Response: The $30 per meter cost could still be used as budgetary cost to any additional meters required to test. No additional cost increases due to higher demand would be expected.

Person Responsible: Tony Wells

9.) State whether every new meter will be tested by the manufacturer and whether the test results for each unit will be provided to Farmers. If not, explain why this information is not needed.

Response: Every new meter is tested by the manufacturer and the results are provided

to Farmers.

Person Responsible: Tony Wells

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

Farmers Rural Electric Cooperative Corporation
Glasgow, Kentucky

Prepared by
Tony Wells

July 11, 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 groups 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 group.

(4) (a)N/A

(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 groups based upon manufacturer and type. Due to a large group of similar meters installed during AMI installation, the groups will be further divided, to lots no larger than 1500 meters by serial number break points.

Meter Groups

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

*Meter Group 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 **Acceptance Quality Level** (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 ±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 group 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 group. As new meters are purchased in lots a sample test group 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-2[1]
Sample Size Code Letters[2]

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

[1]The 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.

[2]Sample 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 group 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 goups's test lot will be examined to determine meter accuracy. If a lot does not meet the AQL standards for the group size, the entire group 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		Cost to test	Annual Cost
	3400	$30.00	$102,000.00

Cost of Testing meters over 8 year cycle

$816,000.00

Proposed Sample Testing Costs

Number of meters		Cost to test	Annual Cost
	1050	$30.00	$31,500.00

Cost of Testing meters over 8 year cycle

$252,000.00

Potential Savings over 8 year cycle

$564,000.00