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Dr. Talina R. Mathews, Executive Director  
Kentucky Public Service Commission  
211 Sower Boulevard  
Frankfort, KY 40601

**Louisville Gas and Electric  
Company**  
State Regulation and Rates  
220 West Main Street  
PO Box 32010  
Louisville, Kentucky 40232

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April 3, 2017

**RE: *The Application of Louisville Gas and Electric Company for Approval  
of a Permanent Statistical Meter Sampling Plan***

**Case No. 2000-00278**

**And**

***The Application of Louisville Gas and Electric Company to Implement a  
Gas Regulator Inspection Program***

**Case No. 2012-00491**

Dear Dr. Mathews:

Enclosed please find Louisville Gas and Electric Company's 2016 Gas Meter Performance Control Plan and Residential Gas Regulator Performance Control Program pursuant to the Commission's Orders in the above mentioned proceedings.

Should you have any questions concerning the enclosed, please contact me at your convenience.

Sincerely,

Rick E. Lovekamp

Enclosure

LG&E

# Gas Meter Sampling Plan Results

# **Louisville Gas & Electric Company (LG&E) Year 2016 Gas Meter Sampling Plan Results**

## **I. Introduction**

The 2016 LG&E Gas Meter Performance Control Program required 9,461 gas meters within 156 control groups be tested and their accuracy performance documented.

Any sampled meter which proof tested beyond +/- 2% (fast or slow) was considered to be a failed meter. Of the control groups sampled during 2016, seven control groups failed the sampling criteria. This report summarizes the results of the 2016 LG&E Gas Meter Sampling Program.

## **II. Meter Performance**

The meter groups were separated into three capacity classifications. Meters with capacities up to and including 500 CFH, which consist of primarily residential meters, represented the largest group with one hundred nine (109) control groups and 8,283 meters to be tested. Meters with capacities which range from 501 CFH to 1500 CFH (Commercial), made up the second largest group with thirty-eight (38) control groups and 1,045 meters to be tested. Meters with capacities 1501 CFH (Industrial) and above comprised the balance of the sampling with nine (9) control groups and 133 meters to be tested.

A summary of each control group, along with statistical analysis data, is shown in appendix A. The sample groups are arranged from low to high capacity. The definitions of selected statistical categories including the reasons for not testing a particular meter are included.

Beginning in the 2003 test year, all Commercial and Industrial Class Control Groups, regardless of whether they meet the Limit Numbers For Reduced Inspection, Table VIII, under the American Standard – Sampling Procedures and Tables For Inspection By Attributes guidelines, have been placed on the Single Sampling Plan For Normal Inspection due to the small volume of meters in the Commercial Class Control Groups.

In the 2016 sampling program, 140 of the 156 control groups passed the sampling criteria, while there was one lot of one reported as prior, eight prior year failed meter lots, and seven 2016 failed meter lots.

A total of eight control groups had their remaining population removed through the sampling program in 2016.

## **Residential Class - Up to and including 500 cfh**

### *Strong Performing Groups*

The stronger performing meter groups in this capacity continue to be the American AL175, AC250, and the AL425 models. The 1,836 sample meters that make up the thirty control groups of AL175 meters, only thirty-two meters failed the sampling criteria, a 1.74% failure rate. The twenty-six AC250 control groups had a total of ten meter failures out of the 1,774 meters tested, a 0.56% failure rate. The sixteen AL425 control groups totaling 512 sample meters experienced seven meter failures, a 1.37% failure rate.

The American Meter Company AC250 residential model was the primary type of residential gas meter LG&E purchased as additional stock, which continues to improve the overall accuracy of the installed meter population.

### *Residential Reduced Sampling Requirements*

Test results from year 2016 were analyzed for the below groups to verify each model did not exceed the Limit Numbers For Reduced Inspection, Table VIII, under the American Standard – Sampling Procedures and Tables For Inspection By Attributes guidelines.

Model – American AL175 CFH – 033 and 33A  
Oldest 10 Control Groups Tested = 614 Meters Tested  
Limit Number For Reduced Testing - 25  
Actual Deviate Meters - 13

Model – American AL425CFH - 015  
Oldest 10 Control Groups Tested = 320 Meters Tested  
Limit Number For Reduced Testing - 14  
Actual Deviate Meters - 5

Model – American AC250 CFH - 078  
Oldest 10 Control Groups Tested = 584 Meters Tested  
Limit Number For Reduced Testing - 25  
Actual Deviate Meters - 2

The below models will remain on Reduced Sampling in year 2016.

American Model AL175 Model Code 033 and 33A  
American Model AL425 Model Code 015  
American Model AC250 Model Code 078

### *Weaker Performing Residential Group*

The Rockwell 175 CFH meters, size codes 024, 24T, and 24B, continue to be one of the weaker performing models. Out of the Twenty-nine of the thirty Rockwell R175 control groups consisted of 3,231 meters, 169 of the meters failed the sampling criteria for a 5.23% failure rate, resulting in one (1) failed meter group, size code/year 024 1993. The failed lot contained 3,033 meters, with a sample of 125, and had fifteen (15) failures. The remaining tested group was the failed meter group reported in 2015, size code/year 024 1997, which had 201 meters removed of the 242 total remaining population. The remaining will be removed in 2017.

The one Rockwell 200 meter was removed and passed its accuracy test.

Due to performance, all Rockwell R175 (meter codes 024, 024T, and 024B) have been targeted for full replacement beginning in 2017. Project will span multiple years, with a targeted completion date of December 2019.

The Actaris 250 Metris gas meter, size codes 018 and 18T, had six control groups tested this year and experienced thirteen failures out of 687 meters tested, which was a 1.89% failure rate. These models are not being refurbished and will be removed from service over the course of sampling.

### **Commercial Class - 501 CFH up to and including 1500 cfh**

In general, the hanging diaphragm commercial class control groups performed well in 2016. There were three failed pad-meter lots; two were Rockwell #3 EMCO's: 2012 and 2014, and one was American AL1400: 2007. In the Rockwell #3 EMCO 2012 lot, there were a total of forty-three meters, with a sample of eight, of which three meters failed. In the Rockwell #3 EMCO 2014 lot, there were a total of sixty-six meters, with a sample of thirteen, of which three meters failed. There were five #3 EMCO failed meter groups reported in 2015, size code/years 056 2006, 2008, 2010, 2011, and 2012, had 52 meters removed of the 126 total remaining population. The remaining will be removed in 2017.

The American AL800 gas meters within the eight control groups tested had one meter failure, out of the 86 meters measured, for a 1.16% failure rate.

The American AL1000 contained eight groups tested. There were eight meter failures out of the 334 sample meters measured, for a 2.4% failure rate.

The 2016 Gas Meter Sample Plan contained the balance of a 2014 failed meter group of 2005 AL1400 gas meters. The balance of American AL1400 meters experienced one meter failure within the remaining five control groups tested containing twenty two sample meters, resulting in a 4.55% failure rate. One sample group failed, size code/year 019 2007. The failed group contained six meters, two sampled, and had one meter fail.

The Rockwell #3 EMCO had the poorest performing groups. As mentioned above, there were five failed meter groups reported in 2015. The remaining three sample groups resulted in six meter failures out of twenty three sample meters tested for a 26.09% failure rate. Two of the three groups resulted in failed meter groups, size code/year 056 2012 and 2014.

The eight Rockwell R750 control groups demonstrated acceptable performance with five meter failures within the 262 meters tested for a 1.91% failure rate.

### **Industrial Class - Over 1500 cfh**

The nine control groups in this capacity range under-performed. One meter lot, 2010 #4 EMCO, will continue to be reported as a prior meter. The one 2015 failed meter group that contains fourteen meters was exhausted. The remaining seven groups contained 72 meters that were tested and resulted in eleven individual meter failures, for a 15.28% fail rate, resulting with three groups failing; 2011 and 2014 #4 EMCO and 2013 #10 EMCO. The 2011 #4 EMCO failed meter lot contained forty-six meters, a sample of eight meters, and had two meters fail (all but one meter was removed from service and tested). The 2014 #4 EMCO failed meter lot contained a total of fifty-two meters, a sample of thirteen meters, and had three individual meters fail. The 2013 #10 EMCO failed meter group contained seventeen meters, a sample of eight meters, and had two meters fail.

### **Failed Meter Groups Exhausted in 2016 Summary**

The failed 2005.AL1400 meter group reported in 2014 was completely exhausted within the 18 month period ending June 30, 2016. At the time of failure, the group consisted of nine meters. Of the total meters tested, there was one meter failure, an 11.11% failure rate. The failed test was reported as a slow accuracy test.

The failed 2006 #3 EMCO meter group reported in 2015 was completely exhausted in 2016. At the time of failure, the group consisted of five meters. Of the total meters tested, there were three meter failures, a 60% failure rate. Of the failed meters, all three were the result of slow accuracy tests.

The failed 2012 #10 EMCO meter group reported in 2015 was completely exhausted in 2016. At the time of failure, the group consisted of twenty six meters. Of the total meters tested, there were four meter failures, a 15.38% failure rate. Of the failed meters, all four were the result of fast accuracy tests.

### **Failed Groups of #3EMCO, #4XEMCO, and #10MEMCO also referred to as “Pad Meters”**

In 2017, LG&E will be develop a multi-year plan to remove all #3 EMCO, #4 EMCO, and #10 EMCO gas (pad) meters from service.

### **Prior Meters**

One industrial meter, the 2010 Rockwell #4XEMCO.

One industrial meter, the 2011 Rockwell #4XEMCO.

One industrial meter, the 2011 Rockwell #10MEMCO.

The above three meters will be classified as “Prior Meters” in service year 2017.

### III. Safety

As part of the LG&E Meter Sampling change-out activities, safety inspections were performed and “red-tags” were issued when deficiencies were found which resulted in a customer’s appliance being left off, branch line from the customer’s gas service left off, or the entire customer’s gas service left off until the deficiency was corrected by the customer or by LG&E. The results of these safety inspections that are directly associated with LG&E’s Meter Sampling Program are summarized in Table 1 below.

**Table 1: Year 2016 Safety Inspection**

<b>Type of Problem/Appliance</b>	<b># of "Red Tags"</b>
WATER HEATER NOT VENTED	46
FLEXLINE IN FURNACE WALL	34
WATER HEATER LEAKING	6
FIREPLACE LEAKING	5
BRASS FLEXLINE WATER HEATER	2
FURNACE LEAKING	2
HOUSELINE LEAK	2
BRASS FLEXLINE FURNACE	1
BRASS FLEXLINE ON SPACE HEATER	1
BRASS FLEXLINE SPACE HEATER	1
BRASS FLEXLINE WALL HEATER	1
COOKSTOVE LEAKING	1
DRYER LEAKING	1
FURNACE CONTROL NOT WORKING	1
FURNACE NOT VENTED	1
FURNACE VENT DETERIORATED	1
GAS GRILL LEAKING	1
RELIEF VALVE WATER HEATER NOT WORKING	1
WATER HEATER DAMAGED FACEPLATE	1
WATER HEATER OVERFLOW VALVE	1
WATER HEATER PANEL NOT INTACT	1
<b>Grand Total</b>	<b>111</b>

Additionally 680 Surveillance Notices were issued to correct outside deficiencies. Said deficiencies will be corrected by either the customer or by LG&E depending on ownership. The results of these surveillances directly associated with LG&E's Meter Sampling Program are summarized in Table 2 below.

**Table 2: Year 2016 Customer Surveillance Notices Issued**

<b>Type Of Customer Notice Issued</b>	<b>Number Issued</b>
Corrosion / Rust On Outside Meter Loop & Associated Piping	521
Gas Piping Not Properly Supported	97
Tree / Shrubbery Growing Inside / Against Meter Loop	21
Meter Not Protected From Vehicular Damage	9
Meter Loop Too Low - In Contact With Soil / Pavement	6
No Plastic Sleeve Around Riser Going Through Pavement	1
Other	25



#### IV. Year 2016 Residential Meter Sampling Savings

Table 3 highlights the estimated savings between a periodic change schedule and the LG&E Gas Meter Performance Control Program for the purchase of new/remanufactured residential class gas meters.

**Table 3: 2016 Residential Class Meter Sampling Program Estimated Savings**

<b>Meter Purchase Savings: Residential Gas Meters</b>		
<b>Periodic Program Costs (10-year Program):</b>		
Number of Meters under Periodic Program [1]		32,617
Unit Remanufacture Cost – Average Cost		\$33.93
Residential Meter Costs Under Periodic Program	(A)	<u>\$1,106,695</u>
<b>Sampling Program Costs:</b>		
Number of Meters Tested under Sampling Program		8,242
Number of poor performing meters scrapped		4,120
Number of Meters for Remanufacture		<u>4,122</u>
Remanufactured Meters		4,122
Average Unit Remanufacture Cost – All Models		\$33.93
Remanufactured Meter Costs	(B)	<u>\$139,859</u>
Replacement Meters for Meters Scrapped		4,120
Average Replacement Meter Cost (per unit)		\$49.50
Replacement Meter Costs	(C)	<u>\$203,940</u>
Total Residential Meter Costs Under 2016 Program	(B+C=D)	<u>\$343,799</u>
<b>Meter Cost Savings From 2016 Program</b>	<b>(A-D)</b>	<b>\$762,896</b>

[1] Based On Residential Meters On Line Beginning in Year 2016

# APPENDIX A

## Control Group Data/Analysis

### Statistical Definitions

#### MEAN

The mean is the average of all numbers.

#### STANDARD DEVIATION

The standard deviation is a measure of how widely values are dispersed from the average value (the mean).

#### SAMPLE MINIMUM AND MAXIMUM

The minimum and maximum are the values of the least and greatest elements a sample.

### Notes and Acronym Explanation

#### Prior

Prior indicates that a gas meter is out of compliance with its life expectancy. Meter lots will be listed as “prior” until all remaining meters in a particular lot are removed.

#### Exhaust

Exhaust indicates that the gas meter lot has reached its life expectancy and all meters were removed.

#### Missing

Missing indicates that a gas meter in the lot cannot be found and will be excluded from future sample selections.

#### Exh/Miss (Exhaust/Missing)

Exh/Miss indicates that the gas meter group has reached its life expectancy and contained a meter that is missing.

#### Exh/CGI (Exhaust/Can't Get In)

Exh/CGI indicates that the gas meter group has reached its life expectancy and contained a gas meter with no access.

#### FM (Failed Meter Group)

FM indicates a failed meter group followed in parenthesis by the date the meter group failed.

#### NT-Prior (No Test, Prior)

NT-Prior indicates meter removed, but no test for a meter that was out of compliance with its life expectancy.

LOUISVILLE GAS AND ELECTRIC COMPANY  
 GAS METER SAMPLING PLAN - 2016  
 CAPACITY <=500CFH  
 SINGLE SAMPLING PLAN

Manufacture	Type	Model	Install Year	Original Population	Meters Removed	Sampling	Sample Size	Meters Tested	Accept Level	Reject Level	Test Results			Statistics				Lot Status	Notes
											Slow Failures	Fast Failures	Total Failures	Mean Avg	Standard Deviation	Minimum	Maximum		
Schlumberger	018	250	2000	576	80	Single	80	80	10	11	3	0	3	0.15	1.04	-5.65	1.70	Pass	
Schlumberger	018	250	2001	291	50	Single	50	50	7	8	0	0	0	0.17	0.68	-1.25	1.70	Pass	
Schlumberger	018	250	2002	2745	125	Single	125	125	14	15	2	0	2	-0.38	0.81	-2.60	1.55	Pass	
Schlumberger	018	250	2003	3808	200	Single	200	200	21	22	2	0	2	-0.50	0.78	-2.65	1.50	Pass	
Schlumberger	018	250	2004	3780	200	Single	200	200	21	22	4	2	6	-0.24	1.03	-3.55	6.40	Pass	
Schlumberger	018T	250	2002	232	32	Single	32	32	5	6	0	0	0	-0.31	0.64	-1.70	1.15	Pass	
Rockwell	024	R175	1986	2652	125	Single	125	125	14	15	2	12	14	0.61	1.23	-2.70	4.55	Pass	
Rockwell	024	R175	1987	2555	125	Single	125	125	14	15	3	6	9	0.28	1.56	-11.40	6.40	Pass	
Rockwell	024	R175	1988	1774	125	Single	125	125	14	15	8	5	13	0.13	1.15	-2.95	2.50	Pass	
Rockwell	024	R175	1989	2686	125	Single	125	125	14	15	1	7	8	0.42	1.02	-2.85	2.95	Pass	
Rockwell	024	R175	1990	2285	125	Single	125	125	14	15	3	6	9	0.20	1.09	-4.65	2.90	Pass	
Rockwell	024	R175	1991	2570	125	Single	125	125	14	15	2	10	12	0.54	2.00	-18.05	3.15	Pass	
Rockwell	024	R175	1992	2866	125	Single	125	125	14	15	5	7	12	0.12	1.13	-3.30	2.65	Pass	
Rockwell	024	R175	1993	3033	125	Single	125	125	14	15	10	5	15	-0.14	1.53	-7.45	3.35	Fail	
Rockwell	024	R175	1994	2245	125	Single	125	125	14	15	4	3	7	0.07	1.24	-6.10	3.15	Pass	
Rockwell	024	R175	1995	2069	125	Single	125	125	14	15	2	1	3	0.12	0.93	-3.05	3.05	Pass	
Rockwell	024	R175	1996	749	80	Single	80	80	10	11	2	1	3	-0.19	1.00	-3.10	2.55	Pass	
Rockwell	024	R175	1997	242	201	Single		201											FM (2015)
Rockwell	024	R175	1998	506	80	Single	80	80	10	11	5	5	10	-0.19	1.29	-3.50	3.75	Pass	
Rockwell	024	R175	1999	1036	80	Single	80	80	10	11	4	1	5	-0.13	1.50	-6.80	2.35	Pass	
Rockwell	024	R175	2000	570	80	Single	80	80	10	11	2	1	3	0.03	0.99	-5.20	2.55	Pass	

LOUISVILLE GAS AND ELECTRIC COMPANY  
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Manufacture	Type	Model	Install Year	Original Population	Meters Removed	Sampling	Sample Size	Meters Tested	Accept Level	Reject Level	Test Results			Statistics				Lot Status	Notes
											Slow Failures	Fast Failures	Total Failures	Mean Avg	Standard Deviation	Minimum	Maximum		
Rockwell	024	R175	2001	639	80	Single	80	80	10	11	1	0	1	-0.02	0.96	-4.65	1.95	Pass	
Rockwell	024	R175	2002	957	80	Single	80	80	10	11	0	0	0	0.23	0.87	-2.00	1.95	Pass	
Rockwell	024	R175	2003	1563	125	Single	125	125	14	15	3	1	4	0.07	1.33	-10.95	2.05	Pass	
Rockwell	024	R175	2004	1978	125	Single	125	125	14	15	1	1	2	0.16	0.84	-2.75	2.60	Pass	
Rockwell	024	R175	2005	2609	125	Single	125	125	14	15	3	1	4	0.03	0.90	-2.85	2.75	Pass	
Rockwell	024	R175	2006	2846	125	Single	125	125	14	15	0	1	1	0.34	0.74	-1.75	2.65	Pass	
Rockwell	024	R175	2007	2311	125	Single	125	125	14	15	1	6	7	0.20	1.38	-11.80	2.80	Pass	
Rockwell	024	R175	2008	2440	125	Single	125	125	14	15	1	7	8	0.46	1.07	-4.20	4.55	Pass	
Rockwell	024	R175	2014	1	1	Single	1	1	0	1	0	0	0	0.15		0.15	0.15	Pass	
Rockwell	024B	R175	2010	2549	125	Single	125	125	14	15	1	1	2	0.14	0.94	-6.20	2.60	Pass	
Rockwell	024B	R175	2012	1735	125	Single	125	125	14	15	0	1	1	0.31	0.72	-1.35	2.30	Pass	
Rockwell	024B	R175	2014	1334	125	Single	125	125	14	15	2	1	3	0.28	0.84	-2.65	2.80	Pass	
Rockwell	024T	R175	2010	1719	125	Single	125	125	14	15	3	3	6	0.06	1.32	-9.00	3.00	Pass	
Rockwell	024T	R175	2012	1521	125	Single	125	125	14	15	0	6	6	0.51	0.89	-1.95	2.75	Pass	
Rockwell	024T	R175	2014	1377	125	Single	125	125	14	15	0	1	1	0.42	0.72	-1.70	2.75	Pass	
Rockwell	079	R200	1985	1	1	Single	1	1	0	1	0	0	0	0.20		0.20	0.20	Pass	Prior
<500 CFH Totals				64850	4120		3919	4120			80	102	182						
37 Control Groups																			

LOUISVILLE GAS AND ELECTRIC COMPANY  
 GAS METER SAMPLING PLAN - 2016  
 CAPACITY <=500CFH  
 REDUCED SAMPLING PLAN

Manufacture	Type	Model	Install Year	Original Population	Meters Removed	Meters Sampling	Sample Size	Meters Tested	Accept Level	Reject Level	Test Results			Statistics				Lot Status	Notes
											Slow Failures	Fast Failures	Total Failures	Mean Avg	Standard Deviation	Minimum	Maximum		
American	015	AL425	1996	199	32	Reduced	32	32	5	8	0	1	1	-0.43	0.83	-1.95	2.25	Pass	
American	015	AL425	1997	124	32	Reduced	32	32	5	8	0	0	0	-0.17	0.60	-2.00	0.95	Pass	
American	015	AL425	1998	206	32	Reduced	32	32	5	8	1	0	1	-0.18	0.88	-2.40	1.90	Pass	
American	015	AL425	1999	112	32	Reduced	32	32	5	8	1	0	1	-0.18	0.88	-2.10	1.85	Pass	
American	015	AL425	2000	146	32	Reduced	32	32	5	8	0	1	1	0.18	0.60	-1.10	2.05	Pass	
American	015	AL425	2001	259	32	Reduced	32	32	5	8	0	0	0	-0.15	0.74	-1.95	1.65	Pass	
American	015	AL425	2002	83	32	Reduced	32	32	5	8	0	0	0	0.01	0.52	-1.60	0.95	Pass	
American	015	AL425	2003	103	32	Reduced	32	32	5	8	0	1	1	0.08	0.91	-1.50	4.00	Pass	
American	015	AL425	2004	165	32	Reduced	32	32	5	8	0	0	0	-0.06	0.56	-1.35	1.20	Pass	
American	015	AL425	2005	294	32	Reduced	32	32	5	8	0	0	0	0.13	0.57	-1.20	1.05	Pass	
American	015	AL425	2006	366	32	Reduced	32	32	5	8	0	0	0	0.17	0.61	-0.95	1.45	Pass	
American	015	AL425	2007	334	32	Reduced	32	32	5	8	0	1	1	0.12	0.63	-1.25	2.15	Pass	
American	015	AL425	2008	358	32	Reduced	32	32	5	8	0	0	0	-0.01	0.55	-1.05	1.20	Pass	
American	015	AL425	2010	498	32	Reduced	32	32	5	8	0	1	1	0.19	0.65	-0.95	2.25	Pass	
American	015	AL425	2012	612	32	Reduced	32	32	5	8	0	0	0	0.07	0.59	-0.95	1.25	Pass	
American	015	AL425	2014	827	32	Reduced	32	32	5	8	0	0	0	0.22	0.38	-0.25	1.15	Pass	
American	033	AL175	1985	893	32	Reduced	32	32	5	8	0	1	1	0.53	0.85	-0.85	2.95	Pass	
American	033	AL175	1986	1387	50	Reduced	50	50	7	10	2	1	3	-0.39	3.17	-19.20	2.45	Pass	
American	033	AL175	1987	603	32	Reduced	32	32	5	8	0	0	0	0.27	0.60	-0.80	1.80	Pass	
American	033	AL175	1988	3019	50	Reduced	50	50	7	10	0	0	0	0.25	0.52	-1.20	1.30	Pass	
American	033	AL175	1989	1764	50	Reduced	50	50	7	10	0	1	1	0.46	0.57	-0.95	2.10	Pass	

**LOUISVILLE GAS AND ELECTRIC COMPANY  
GAS METER SAMPLING PLAN - 2016  
CAPACITY <=500CFH  
REDUCED SAMPLING PLAN**

Test Results		Statistics																												
Manufacture	Type	Model	Year	Install	Original	Population	Meters	Removed	Meters	Removed	Sampling	Sample	Meters	Tested	Accept	Level	Reject	Level	Slow	Failures	Fast	Failures	Total	Mean	Standard	Deviation	Minimum	Maximum	Lot Status	Notes

American	033	AL175	1990	5655	80	80	80	80	80	80	10	13	1	1	0.35	0.84	-2.80	2.05	Pass
American	033	AL175	1991	6999	80	80	80	80	80	10	13	0	3	3	0.64	0.72	-1.55	2.95	Pass
American	033	AL175	1992	6755	80	80	80	80	80	10	13	0	1	1	0.42	0.77	-1.65	2.65	Pass
American	033	AL175	1993	6796	80	80	80	80	80	10	13	0	2	2	0.44	0.71	-1.30	3.20	Pass
American	033	AL175	1994	7097	80	80	80	80	80	10	13	0	0	0	0.18	0.64	-1.95	1.70	Pass
American	033	AL175	1995	7058	80	80	80	80	80	10	13	0	1	1	0.22	0.71	-1.20	4.05	Pass
American	033	AL175	1996	4345	80	80	80	80	80	10	13	0	0	0	-0.15	0.77	-2.00	1.90	Pass
American	033	AL175	1997	8317	80	80	80	80	80	10	13	0	2	2	0.09	0.85	-1.95	4.10	Pass
American	033	AL175	1998	4937	80	80	80	80	80	10	13	2	0	2	-0.18	0.77	-3.70	1.60	Pass
American	033	AL175	1999	7568	80	80	80	80	80	10	13	2	0	2	-0.12	2.20	-18.50	1.70	Pass
American	033	AL175	2000	6879	80	80	80	80	80	10	13	0	0	0	0.16	0.64	-1.05	1.75	Pass
American	033	AL175	2001	3786	80	80	80	80	80	10	13	0	0	0	-0.01	0.57	-1.45	1.60	Pass
American	033	AL175	2002	2324	50	50	50	50	50	7	10	0	0	0	-0.22	0.53	-1.25	0.85	Pass
American	033	AL175	2003	2362	50	50	50	50	50	7	10	2	0	2	-0.37	0.94	-4.70	0.90	Pass
American	033	AL175	2004	1809	50	50	50	50	50	7	10	2	0	2	-0.32	0.78	-2.90	1.80	Pass
American	033	AL175	2005	1931	50	50	50	50	50	7	10	1	0	1	-0.30	0.73	-2.75	1.65	Pass
American	033	AL175	2006	1198	32	32	32	32	32	5	8	1	0	1	0.03	0.86	-2.85	1.85	Pass
American	033	AL175	2007	3029	50	50	50	50	50	7	10	0	0	0	-0.02	0.51	-0.90	1.55	Pass
American	033	AL175	2008	1822	50	50	50	50	50	7	10	0	0	0	-0.08	0.69	-1.85	1.95	Pass
American	033	AL175	2010	1622	50	50	50	50	50	7	10	0	1	1	-0.14	0.63	-1.60	2.40	Pass
American	033	AL175	2012	2069	50	50	50	50	50	7	10	1	0	1	-0.16	0.64	-2.15	1.15	Pass

LOUISVILLE GAS AND ELECTRIC COMPANY

GAS METER SAMPLING PLAN - 2016

CAPACITY <=500CFH

REDUCED SAMPLING PLAN

Test Results		Statistics																								
Manufacture	Type	Model	Year	Install	Original	Meters	Removed	Sampling	Size	Meters	Tested	Accept	Level	Reject	Slow	Failures	Fast	Failures	Total	Mean	Standard	Deviation	Minimum	Maximum	Lot Status	Notes

American	033A	AL175	2014	2663	50	50	50	7	10	0	1	1	0.09	0.69	-1.00	3.65	Pass
American	033A	AL175	1992	4225	80	80	10	13	0	0	0	0.35	0.53	-1.05	1.80	Pass	
American	033A	AL175	1993	1589	50	50	7	10	2	2	0.23	0.83	-2.65	1.65	Pass		
American	033A	AL175	1994	2175	50	50	7	10	1	0	1	0.02	1.55	-9.85	1.55	Pass	
American	078	AC250	1985	659	32	32	5	8	0	0	0.41	0.49	-0.55	1.35	Pass		
American	078	AC250	1986	3263	80	80	10	13	0	1	0.25	0.74	-1.75	2.20	Pass		
American	078	AC250	1987	2941	50	50	7	10	0	0	-0.38	0.59	-1.70	0.90	Pass		
American	078	AC250	1988	3397	80	80	10	13	0	0	-0.17	0.54	-1.45	1.70	Pass		
American	078	AC250	1989	2635	50	50	7	10	0	0	-0.44	0.55	-1.70	1.20	Pass		
American	078	AC250	1990	3570	80	80	10	13	0	1	-0.01	0.68	-1.85	2.55	Pass		
American	078	AC250	1991	2218	50	50	7	10	0	0	-0.58	0.66	-1.90	0.85	Pass		
American	078	AC250	1993	387	32	32	5	8	0	0	0.13	0.68	-1.60	1.85	Pass		
American	078	AC250	1994	1927	50	50	7	10	0	0	0.28	0.60	-0.90	1.65	Pass		
American	078	AC250	1995	3710	80	80	10	13	0	0	0.25	0.60	-1.90	1.75	Pass		
American	078	AC250	1996	8532	80	80	10	13	0	0	0.04	0.43	-1.10	1.30	Pass		
American	078	AC250	1997	7809	80	80	10	13	1	0	0.28	0.65	-2.70	1.85	Pass		
American	078	AC250	1998	5811	80	80	10	13	0	0	0.23	0.59	-2.00	1.55	Pass		
American	078	AC250	1999	4088	80	80	10	13	0	0	0.32	0.59	-1.25	1.75	Pass		
American	078	AC250	2000	4963	80	80	10	13	0	0	0.21	0.42	-0.75	1.55	Pass		
American	078	AC250	2001	4714	80	80	10	13	0	0	0.25	0.45	-0.80	1.25	Pass		
American	078	AC250	2002	2042	50	50	7	10	0	0	0.10	0.44	-1.25	0.95	Pass		

LOUISVILLE GAS AND ELECTRIC COMPANY  
 GAS METER SAMPLING PLAN - 2016  
 CAPACITY <=500CFH  
 REDUCED SAMPLING PLAN

Manufacture	Type	Model	Year	Install	Original Population	Meters Removed	Sampling	Sample Size	Meters Tested	Accept Level	Reject Level	Test Results			Total Failures	Mean Avg	Standard Deviation	Minimum	Maximum	Lot Status	Notes
												Slow Failures	Fast Failures	Failures							
American	078	AC250	2003	1778	50	80	Reduced	50	50	7	10	0	0	0	0.27	0.56	0.79	-1.80	2.30	Pass	
American	078	AC250	2004	3391	80	80	Reduced	80	80	10	13	0	2	2	0.56	0.70	0.81	-1.35	3.00	Pass	
American	078	AC250	2006	5853	80	80	Reduced	80	80	10	13	0	0	0	0.42	0.55	-1.25	1.70	Pass		
American	078	AC250	2007	4910	80	80	Reduced	80	80	10	13	0	2	2	0.53	0.76	-1.25	5.00	Pass		
American	078	AC250	2008	6543	80	80	Reduced	80	80	10	13	0	1	1	0.56	0.54	-1.10	2.05	Pass		
American	078	AC250	2010	2939	50	50	Reduced	50	50	7	10	0	0	0	-0.12	0.63	-1.85	1.85	Pass		
American	078	AC250	2012	3619	80	80	Reduced	80	80	10	13	0	0	0	0.11	0.45	-1.25	1.15	Pass		
American	078	AC250	2014	5286	80	80	Reduced	80	80	10	13	0	0	0	0.14	0.40	-0.95	1.20	Pass		
<500 CFH Totals																					
72 Control Groups																					
221131																					
4122																					
4122																					
4122																					
20																					
29																					
49																					

Test Results

Statistics



LOUISVILLE GAS AND ELECTRIC COMPANY  
 GAS METER SAMPLING PLAN - 2016  
 CAPACITY 501-1500CFH  
 SINGLE SAMPLING PLAN

Manufacture	Type	Model	Install Year	Original Population	Meters Removed	Sampling	Sample Size	Meters Tested	Accept Level	Reject Level	Test Results			Statistics				Lot Status	Notes
											Slow Failures	Fast Failures	Total Failures	Mean Avg	Standard Deviation	Minimum	Maximum		
American	014	AL1000	2006	96	96	Single	20	20	3	4	0	0	0	-0.33	0.82	-1.95	1.00	Pass	Exhaust
American	014	AL1000	2007	131	20	Single	20	20	3	4	0	0	0	-0.20	0.77	-1.80	1.50	Pass	
American	014	AL1000	2008	199	32	Single	32	32	5	6	2	0	2	-0.38	1.10	-3.30	1.60	Pass	
American	014	AL1000	2009	242	32	Single	32	32	5	6	1	0	1	-0.30	0.87	-2.60	1.45	Pass	
American	014	AL1000	2010	291	50	Single	50	50	7	8	4	0	4	-0.47	0.86	-2.65	1.70	Pass	
American	014	AL1000	2011	414	50	Single	50	50	7	8	0	0	0	-0.36	0.69	-2.00	1.05	Pass	
American	014	AL1000	2012	369	50	Single	50	50	7	8	1	0	1	-0.26	0.71	-2.35	1.00	Pass	
American	014	AL1000	2014	819	80	Single	80	80	10	11	0	0	0	-0.04	0.56	-1.75	1.10	Pass	
American	019	AL1400	2005	1	1	Single		1											FM (2014)
American	019	AL1400	2007	6	2	Single	2	2	0	1	1	0	1	-1.95	0.14	-2.05	-1.85	Fail	
American	019	AL1400	2008	5	2	Single	2	2	0	1	0	0	0	-0.98	0.32	-1.20	-0.75	Pass	
American	019	AL1400	2011	7	2	Single	2	2	0	1	0	0	0	-1.45	0.71	-1.95	-0.95	Pass	
American	019	AL1400	2012	25	8	Single	8	8	1	2	0	0	0	-1.11	0.65	-2.00	-0.45	Pass	
American	019	AL1400	2014	24	8	Single	8	8	1	2	0	0	0	-0.79	0.56	-1.75	-0.05	Pass	
Rockwell	056	3XEMCO	2006	3	3	Single		3											FM (2015)
Rockwell	056	3XEMCO	2007	11	2	Single	2	2	0	1	0	0	0	-0.03	0.11	-0.10	0.05	Pass	
Rockwell	056	3XEMCO	2008	9	3	Single		3											FM (2015)
Rockwell	056	3XEMCO	2010	30	12	Single		12											FM (2015)
Rockwell	056	3XEMCO	2011	35	14	Single		14											FM (2015)
Rockwell	056	3XEMCO	2012	43	8	Single	8	8	1	2	3	0	3	-1.40	1.96	-3.85	1.95	Fail	
Rockwell	056	3XEMCO	2013	49	20	Single		20											FM (2015)

# LOUISVILLE GAS AND ELECTRIC COMPANY

## GAS METER SAMPLING PLAN - 2016

### CAPACITY 501-1500CFH

### SINGLE SAMPLING PLAN

Manufacture	Type	Model	Install Year	Original Population	Meters Removed	Sampling	Sample Size	Meters Tested	Accept Level	Reject Level	Test Results			Statistics				Lot Status	Notes
											Slow Failures	Fast Failures	Total Failures	Mean Avg	Standard Deviation	Minimum	Maximum		
Rockwell	056	3XEMCO	2014	66	13	Single	13	13	2	3	1	2	3	-0.62	1.54	-2.45	2.40	Fail	
Rockwell	058	R750	2006	128	128	Single	20	20	3	4	0	1	1	0.57	0.85	-0.60	2.05	Pass	Exhaust
Rockwell	058	R750	2007	164	32	Single	32	32	5	6	0	0	0	0.30	0.89	-1.70	2.00	Pass	
Rockwell	058	R750	2008	177	32	Single	32	32	5	6	0	0	0	0.13	0.83	-1.70	1.45	Pass	
Rockwell	058	R750	2009	193	32	Single	32	32	5	6	1	0	1	0.07	0.89	-2.50	2.00	Pass	
Rockwell	058	R750	2010	206	32	Single	32	32	5	6	0	1	1	0.09	0.76	-1.35	2.20	Pass	
Rockwell	058	R750	2011	263	32	Single	32	32	5	6	1	1	2	-0.01	0.98	-3.80	2.50	Pass	
Rockwell	058	R750	2012	246	32	Single	32	32	5	6	0	0	0	0.52	0.57	-0.50	1.95	Pass	
Rockwell	058	R750	2014	328	50	Single	50	50	7	8	0	0	0	0.30	0.36	-0.40	0.95	Pass	
American	076	AL800	2006	9	9	Single	2	2	0	1	0	0	0	0.68	0.25	0.50	0.85	Pass	Exhaust
American	076	AL800	2007	14	2	Single	2	2	0	1	0	0	0	-0.18	0.25	-0.35	0.00	Pass	
American	076	AL800	2008	28	8	Single	8	8	1	2	0	0	0	-0.59	0.61	-1.50	0.35	Pass	
American	076	AL800	2009	49	8	Single	8	8	1	2	0	0	0	-0.44	0.37	-0.85	0.20	Pass	
American	076	AL800	2010	69	13	Single	13	13	2	3	0	0	0	-0.48	0.71	-1.35	0.70	Pass	
American	076	AL800	2011	94	20	Single	20	20	3	4	0	1	1	-0.01	1.15	-2.00	3.05	Pass	
American	076	AL800	2012	136	20	Single	20	20	3	4	0	0	0	-0.14	0.79	-1.60	1.75	Pass	
American	076	AL800	2014	85	13	Single	13	13	2	3	0	0	0	0.28	0.39	-0.35	0.80	Pass	
500-1500 CFH Totals				5064	971		727	780			15	6	21						
38 Control Groups																			

# LOUISVILLE GAS AND ELECTRIC COMPANY

## GAS METER SAMPLING PLAN - 2016

CAPACITY >1500CFH

### SINGLE SAMPLING PLAN

Manufacture	Type	Model	Install Year	Original Population	Meters Removed	Sampling	Sample Size	Meters Tested	Accept Level	Reject Level	Test Results			Statistics				Lot Status	Notes	
											Slow Failures	Fast Failures	Total Failures	Mean Avg	Standard Deviation	Minimum	Maximum			
Rockwell	028	4XEMCO	2010	1		Single	1		0	1										Prior
Rockwell	028	4XEMCO	2011	46	45	Single	8	8	1	2	1	1	2	0.35	1.69	-2.75	3.25	Fail	Exh/CGI	
Rockwell	028	4XEMCO	2012	55	13	Single	13	13	2	3	1	1	2	0.26	1.60	-3.60	3.10	Pass		
Rockwell	028	4XEMCO	2013	109	20	Single	20	20	3	4	1	1	2	-0.23	1.51	-4.55	2.50	Pass		
Rockwell	028	4XEMCO	2014	52	13	Single	13	13	2	3	2	1	3	-0.23	2.24	-2.75	6.20	Fail		
Rockwell	061	10MEMCO	2011	10	9	Single	2	2	0	1	0	0	0	-0.78	1.31	-1.70	0.15	Pass	Exh/CGI	
Rockwell	061	10MEMCO	2012	14	14	Single		14											FM (2015)	
Rockwell	061	10MEMCO	2013	17	8	Single	8	8	1	2	0	2	2	1.28	1.19	-0.40	3.10	Fail		
Rockwell	061	10MEMCO	2014	20	8	Single	8	8	1	2	0	0	0	0.04	1.07	-1.35	1.80	Pass		
>1500 CFH Totals				324	130		73	86			5	6	11							
9 Control Groups																				

LG&E

Residential Gas Regulator Performance  
Control Report

# **LOUISVILLE GAS AND ELECTRIC COMPANY 2016 RESIDENTIAL GAS REGULATOR PERFORMANCE CONTROL PROGRAM REPORT**

## **Introduction**

Louisville Gas and Electric Company's Residential Gas Regulator Performance Control Program is a procedure designed to provide a continuous high level of performance of gas regulators while controlling inspection and replacement costs. A summary of the program results are being submitted pursuant to Case No. 2000-00278 and Case No. 2012-00491.

## **General Description of Program**

LG&E's Residential Gas Regulator Performance Control Program leverages LG&E's Gas Meter Performance Control Program to test the protective capability of all classes of residential regulators. Under performance control, LG&E's residential gas regulator population will be classified into homogeneous control groups representing like regulators. A control group would be subject to random sample testing during LG&E's Gas Meter Performance Control Program activities. Specifically, when a meter serving a residential account is tested under the Gas Meter Performance Control Program, the associated regulator will also be tested if one is present.

## **2016 Sampling Criteria and Results**

There were 7,039 residential regulators tested as part of the Residential Gas Regulator Performance Control Program. No regulators tested as part of the program were excluded from the sample. There were no control groups rejected as a result of the program.

Ten regulators from three different control groups were removed from service as a result of failing the test criteria at the time of the meter change. The reject levels for the three control groups were 98, 136, and 506 respectively, therefore the control groups passed.

Table 1 summarizes key program data broken out by control group. The rows in the table listed in red are the control groups where the actual number of sampled regulators did not meet or exceed the required number. Per the Residential Gas Regulator Performance Control Program, the test period for those groups will be extended annually up to a maximum of 10 years until an adequate sample size is gathered. If an adequate sample has not been tested within 10 years, action will be taken the following year to acquire an adequate sampling. The control groups for which an adequate sample size was obtained last year represent approximately 99% of the regulators covered by the Residential Gas Regulator Performance Control Program.

**Table 1 – Key Program Data by Control Group**

Control Groups		Installed Residential Regulators as of Dec. 31, 2016	Minimum Sample Size	Actual Sample Size	Number Passing Inspection	Number Failing Inspection/ Removed from Service	Reject Failure Level
NATIONAL (or predecessor company)	61	31	8	1	1	0	1
NATIONAL (or predecessor company)	496	33,663	200	892	890	2	98
AMERICAN METER CO.	1803	4	2	0	NA	NA	NA
AMERICAN METER CO.	1883	140	20	3	3	0	4
AMERICAN METER CO.	1213B	55,627	200	1,242	1,240	2	136
AMERICAN METER CO.	1813B	269	32	5	5	0	6
BELGAS	P202H	1	1	0	NA	NA	NA
ITRON (or predecessor company)	B31	56	13	2	2	0	3
ITRON (or predecessor company)	B32	3	2	0	NA	NA	NA
ITRON (or predecessor company)	B34	3,550	200	225	225	0	6
ITRON (or predecessor company)	B35	1	1	0	NA	NA	NA
ITRON (or predecessor company)	B42	213,554	200	4,593	4,587	6	506
MOONEY	MOONEY	2	2	1	1	0	NA
FISHER	620	1	1	0	NA	NA	NA
FISHER	627	3	2	0	NA	NA	NA
FISHER	730	0	0	0	NA	NA	NA
FISHER	CS400IR	7	2	0	NA	NA	NA
FISHER	CS800IQ	2	1	0	NA	NA	NA
FISHER	CS820IQ	2	2	0	NA	NA	NA
FISHER	HSR	1,940	125	53	53	0	15
FISHER	S102	10	2	0	NA	NA	NA
FISHER	S201	1	1	0	NA	NA	NA
FISHER	S252	39	8	1	1	0	NA
FISHER	S302	243	32	21	21	0	6
ROCKWELL	143	1	1	0	NA	NA	
<b>OVERALL RESULTS</b>		309,150		7,039	7,029	10	