2019 ANNUAL METER TESTING REPORT

FOR

HARDIN COUNTY WATER DISTRICT NO. 2

5/8- x 3/4-INCH DISPLACEMENT METERS

CASE NO. 2016-00432

Hardin County Water District No. 2
Elizabethtown, KY

December 31, 2019

2019 ANNUAL METER TESTING REPORT

SECTION 1.0 EXECUTIVE SUMMARY

Hardin County Water District No. 2 ("HCWD2") is filing this 2019 Annual Meter Testing Report as required by the Public Service Commission's ("Commission") Order dated March 22, 2018 in Case No. 2016-00432.

This 2019 Annual Meter Testing Report provides information for the following meter lots:

- 2006 Meters (meters which were installed during calendar year 2006), Year 13 Test Results
- 2007 Meters (meters which were installed during calendar year 2007), Year 12 Test Results
- 2008 Meters (meters which were installed during calendar year 2008), Year 11 Test Results
- 2009 Meters (meters which were installed during calendar year 2009), Year 10 Test Results

All meter lots passed at each flow rate using the relevant ANSI Standard.

SECTION 2.0 INTRODUCTION

HCWD2 is a water utility located in Hardin County, Kentucky. Its territory includes all of Hardin County, except for the city of Radcliff and the northern part of Hardin County, and portions of Larue and Hart Counties.

On December 29, 2016, HCWD2 filed an application with the Commission requesting a declaratory order that the sample testing of 5/8- x 3/4-inch meters older than 10 years in accordance with its sample meter testing plan ("Plan") complies with the testing requirements of 807 KAR 5:066, Section 16(1). In the alternative, HCWD2 requested a deviation from the testing frequency requirements of 807 KAR 5:066, Section 16(1), in order to implement sample testing of 5/8- x 3/4-inch meters older than 10 years in accordance with the Plan. The case was assigned Case No. 2016-00432.

As part of HCWD2's Plan, HCWD2 committed to submitting an annual report to the Commission detailing the test results. The report would include the sample test results for each year and detail whether each sample was accepted using approved statistical testing methods. The report would also include any abnormal meter

results that were not used in determining the acceptability of the sample, along with an explanation of why the particular meter result was discarded.

On March 22, 2018, the Commission issued a final order in Case No. 2016-00432. The Commission approved HCWD2's Plan with limited modifications and granted HCWD2 a deviation from the testing frequency requirements of 807 KAR 5:066, Section 16(1). The Commission also required HCWD2's annual reports of its sample testing to include the following:

1. The serial number, manufacturer, and model/form/type of each meter tested;
2. The date that each meter was tested;
3. The total water flow through the meter from the date it was placed in service through the date of sample testing as recorded at the time of testing;
4. Any raw data collected from each test necessary for the Commission to perform the calculations detailed in the ANSI/ASQ Standards or on which Hardin No. 2 relied in conducting or analyzing its sample testing;
5. The results of Hardin No. 2's calculations and an explanation of whether each sample was passed at each flow rate using the relevant ANSI/ASQ Standards;
6. An explanation of any abnormal meter results that were excluded or otherwise not used in determining whether a sample passed;
7. A detailed explanation, as discussed above, of the basics of excluding a meter or a group of meters from a sample group or replacing them, including the test results at each flow level for the excluded meter;
8. The total number of meters in a particular lot in service at the time Hardin No. 2 performed the sample testing; and
9. Any other information Hardin No. 2 has deemed relevant and necessary to review the accuracy of the meters tested.

This 2019 Annual Meter Testing Report provides information for the following meter lots:

- 2006 Meters (meters which were installed during calendar year 2006), Year 13 Test Results
- 2007 Meters (meters which were installed during calendar year 2007), Year 12 Test Results
- 2008 Meters (meters which were installed during calendar year 2008), Year 11 Test Results
- 2009 Meters (meters which were installed during calendar year 2009), Year 10 Test Results

All meter lots passed at each flow rate using the relevant ANSI Standard.

SECTION 3.0 2006 METERS, YEAR 13 TEST RESULTS

HCWD2 began performing the year 13 testing for meters it installed during calendar year 2006 (the "2006 meters") in August 2019. At the time it performed the testing, HCWD2 had 1,002 13-year-old meters in service.[1] HCWD2 followed the same procedure set forth in the ANSI Standard as it detailed in HCWD2's Plan filed December 29, 2016. Following the procedure set forth in the ANSI Standard, HCWD2 again tested a sample size of 35 meters at maximum and intermediate flow rates and seven meters at minimum flow rates. All meters installed in 2006 were Sensus SR meters.

(A) Meters Tested

The following 2006 meters were tested in year 13:

Test Results of 2006 Sample Meters - Year 13

Serial No.	Maximum	Intermediate	Minimum	Total Water Flow	Testing Date
59510842	99.7	100		470,270.8	8/27/2019
59511044	99.8	100		640,155.7	8/27/2019
61012039	100.1	100		421,664.3	8/27/2019
33783497	100.0	100	98	660,685.8	9/3/2019
58857817	99.7	101		959,379.8	8/27/2019
59511144	100.4	100		679,500.7	8/27/2019
59511140	99.9	100	88	757,396.9	8/27/2019
59510887	100.3	101		784,211.6	8/27/2019
59510964	100.3	101		809,549.7	8/27/2019
58857768	99.3	100		751,390.3	8/28/2019
59510914	100.0	100		1,207,404.3	8/28/2019

[1] In the process of testing its 2006 meters, HCWD2 discovered that more meters were installed in 2006 than it previously represented. Apparently, 1,002 meters were installed in 2006 rather than 555 meters as HCWD2's computer records indicated. HCWD2 is not sure how this error occurred as HCWD2's Customer Service Manager, who oversaw the meter testing when HCWD2 requested the deviation, retired in December, 2018. One possible explanation is that the incorrect installation year was "keyed" into HCWD2's computer records. When HCWD2 staff started reviewing the "hard" or paper copy of the meter installation records, they discovered this mistake. This helps explain why HCWD2 originally represented to the Commission that it had installed 1,074 meters in 2007 while only 965 are still in service and that it had installed 1,487 meters in 2009 while only 1,316 remain in service. Apparently, some of the meters that were actually installed in 2006 were listed as having been installed in 2007, 2009, and in more recent years. Nevertheless, the error would not have changed the sample size, as the ANSI Standard requires the use of the same sample size for lot sizes of 501 to 1,200.

58857886	99.9	100		882,338.5	8/28/2019
58857890	99.2	100		810,003.7	8/28/2019
59510754	99.9	99		928,250.4	8/28/2019
59510881	100.2	101	98	1,186,161.1	8/27/2019
58857837	99.7	100		536,111.8	8/27/2019
59511050	99.8	100		695,970.2	8/28/2019
59066913	99.9	100		664,193.8	8/28/2019
59510976	99.9	101	90	392,235.5	8/28/2019
59510998	99.6	101		661,683.3	8/28/2019
59510686	99.7	101		928,250.4	8/28/2019
69065098	100.0	101		318,321.1	8/28/2019
33783484	99.8	100	98	509,362.6	8/28/2019
33783498	99.7	100		449,742.6	8/28/2019
33783485	99.9	99		584,102.8	8/28/2019
32525655	99.8	100	97	624,185.5	8/28/2019
33325978	99.4	101		426,973.3	8/28/2019
33326016	99.2	100		412,166.0	8/28/2019
33783490	99.9	100		427,047.6	8/27/2019
33783502	99.7	100		621,264.4	8/27/2019
33783501	99.8	101		687,365.5	8/28/2019
33911465	99.2	100		454,531.2	8/28/2019
33911488	99.0	100	96	587,438.6	8/28/2019
33911464	99.7	100		462,734.5	8/28/2019
33911457	99.2	100		1,072,397.0	8/28/2019

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(B) Maximum Flow Test Results

Meters were tested at a maximum flow rate using the same procedure set forth in the ANSI Standard and detailed in HCWD2's Plan filed December 29, 2016. Following the procedure set forth in the ANSI Standard, HCWD2 again tested a sample size of 35 meters at maximum flow rates. The sample was accepted.

ANSI Standard for Maximum Flow

1	Sample Size: n	35
2	Sum of Measurements	3491.6
3	Sum of Squared Measurements	348325.9
4	Correction Factor (CF)	348322
5	Corrected Sum of Squares (SS)	3.844
6	Variance (V)	0.113059
7	Estimate of Lot Standard Deviation	0.336242
8	Sample Mean	99.76
9	Upper Specification Limit	101.5
10	Lower Specification Limit	98.5
11	Quality Index: QU (upper)	5.174841
12	Quality Index: QL (lower)	3.747299
	ANSI Standard Table B-5 used to derive values below	
13	Est. of Lot Percent NcF above Upper	0.000%
14	Est. of Lot Percent NcF below Lower	0.001%
15	Total Est. Percent NcF in Lot (p)	0.001%
16	Max. Allowable Percent NcF (M)	5.580%
17	Acceptability Criterion (to accept, P<M)	**Accepted**

(C) Intermediate Flow Test Results

Meters were tested at an intermediate flow rate using the same procedure set forth in the ANSI Standard and detailed in HCWD2's Plan filed December 29, 2016. Following the procedure set forth in the ANSI Standard, HCWD2 again tested a sample size of 35 meters at intermediate flow rates. The sample was accepted.

ANSI Standard for Intermediate Flow

1	Sample Size: n	35
2	Sum of Measurements	3508
3	Sum of Squared Measurements	351612
4	Correction Factor (CF)	351601.8
5	Corrected Sum of Squares (SS)	10.17143
6	Variance (V)	0.29916
7	Estimate of Lot Standard Deviation	0.546955
8	Sample Mean	100.2286
9	Upper Specification Limit	101.5
10	Lower Specification Limit	98.5
11	Quality Index: QU (upper)	2.324558
12	Quality Index: QL (lower)	3.160355
ANSI Standard Table B-5 used to derive values below		
13	Est. of Lot Percent NcF above Upper	0.809%
14	Est. of Lot Percent NcF below Lower	0.031%
15	Total Est. Percent NcF in Lot (p)	0.840%
16	Max. Allowable Percent NcF (M)	5.580%
17	Acceptability Criterion (to accept, P<M)	**Accepted**

(D) Minimum Flow Test Results

Meters were tested at a minimum flow rate using the same procedure set forth in the ANSI Standard and detailed in HCWD2's Response to Commission Staff's Second Request for Information, Question No. 5 filed on June 5, 2017. Following the procedure set forth in the ANSI Standard, HCWD2 tested a sample size of seven meters at minimum flow rates. The sample was accepted.

ANSI Standard for Minimum Flow

1	Sample Size: n	7
2	Sum of Measurements	665
3	Sum of Squared Measurements	63281
4	Correction Factor (CF)	63175
5	Corrected Sum of Squares (SS)	106
6	Variance (V)	17.666667
7	Estimate of Lot Standard Deviation	4.2031734
8	Sample Mean	95
9	Lower Specification Limit	90
10	Quality Index: QL (lower)	1.1895774
ANSI Standard Table B-5 used to derive values below		
11	Est. of Lot Percent NcF	11.330%
12	Max. Allowable Percent NcF (M)	30.500%
13	Acceptability Criterion (to accept, P<M)	**Accepted**

(E) Abnormal Meter Results

There were no abnormal meter results with respect to the 2006 meters. None of the meters in the sample group had been damaged.

SECTION 4.0 2007 METERS, YEAR 12 TEST RESULTS

HCWD2 began performing the year 12 testing for meters it installed during calendar year 2007 (the "2007 meters") in October 2019. At the time it performed the testing, HCWD2 had 965 12-year-old meters. HCWD2 followed the same procedure set forth in the ANSI Standard as it detailed in HCWD2's Plan filed December 29, 2016. Following the procedure set forth in the ANSI Standard, HCWD2 tested a sample size of 35 meters at maximum and intermediate flow rates and seven meters at

minimum flow rates. As set forth in HCWD2's Plan, HCWD2 selected the meters using a random, computerized process. All meters installed in 2007 were Sensus SR meters.

(A) Meters Tested

The following 2007 meters were tested in year 12:

Test Results of 2007 Sample Meters - Year 12

Serial No.	Maximum	Intermediate	Minimum	Total Water Flow	Testing Date
55527044	99.7	101		429,801.7	10/7/2019
61471216	99.4	100		280,479.2	10/7/2019
62388294	99.2	100		723,806.3	10/7/2019
72070208	100.2	100	97	344,601.6	10/7/2019
62388100	99.6	100		627,809.1	10/8/2019
58946445	99.6	100		591,361.7	10/8/2019
59067021	99.4	101	91	368,520.7	10/8/2019
58857691	99.8	101		801,468.8	10/10/2019
62103179	99.4	101		639,787.2	10/8/2019
61512281	100.0	99		12,559.7	10/8/2019
61512182	99.5	101		1,279,139.4	10/7/2019
62388301	99.7	100	96	653,548.7	10/10/2019
62388274	100.0	101		412,097.1	10/10/2019
61471178	100.1	100		380,512.5	10/11/2019
60697629	100.2	101		480,599.4	10/10/2019
60697616	100.0	101		735,259.4	10/7/2019
62238284	99.5	100		622,489.5	10/10/2019
62238187	100.0	100	90	263,228.0	10/7/2019
61512303	99.3	101		556,044.4	10/10/2019
60697510	99.6	99	95	382,008.5	10/8/2019
06434871	100.0	100		510,885.6	10/8/2019
59510926	100.1	100		587,694.9	10/7/2019
61471365	99.3	101		596,175.3	10/10/2019
61512258	100.0	100	93	699,380.1	10/10/2019
62388273	99.3	100		507,808.3	10/10/2019
62388217	99.3	101		487,270.9	10/7/2019
61512164	99.7	99		612,128.7	10/10/2019
61512227	99.6	101		715,607.4	10/7/2019
58946455	99.8	100		591,361.7	10/8/2019

61512275	99.6	100		629,156.4	10/7/2019
57988478	99.8	101		237,604.2	10/10/2019
61471193	99.9	100		628,514.3	10/8/2019
58346522	100.1	101		853,433.2	10/7/2019
61471282	98.2	101		934,987.2	10/8/2019
59495744	100.0	101	92	348,388.8	10/8/2019

(B) Maximum Flow Test Results

Meters were tested at a maximum flow rate using the same procedure set forth in the ANSI Standard and detailed in HCWD2's Plan filed December 29, 2016. Following the procedure set forth in the ANSI Standard, HCWD2 again tested a sample size of 35 meters at maximum flow rates. The sample was accepted.

ANSI Standard for Maximum Flow

1	Sample Size: n	35
2	Sum of Measurements	3488.9
3	Sum of Squared Measurements	347788.7
4	Correction Factor (CF)	347783.5
5	Corrected Sum of Squares (SS)	5.209714
6	Variance (V)	0.153227
7	Estimate of Lot Standard Deviation	0.391442
8	Sample Mean	99.68286
9	Upper Specification Limit	101.5
10	Lower Specification Limit	98.5
11	Quality Index: QU (upper)	4.642176
12	Quality Index: QL (lower)	3.021794
	ANSI Standard Table B-5 used to derive values below	
13	Est. of Lot Percent NcF above Upper	0.000%
14	Est. of Lot Percent NcF below Lower	0.059%
15	Total Est. Percent NcF in Lot (p)	0.059%
16	Max. Allowable Percent NcF (M)	5.580%
17	Acceptability Criterion (to accept, P<M)	**Accepted**

(C) Intermediate Flow Test Results

Meters were tested at an intermediate flow rate using the same procedure set forth in the ANSI Standard and detailed in HCWD2's Plan filed December 29, 2016. Following the procedure set forth in the ANSI Standard, HCWD2 again tested a sample size of 35 meters at intermediate flow rates. The sample was accepted.

ANSI Standard for Intermediate Flow

1	Sample Size: n	35
2	Sum of Measurements	3513
3	Sum of Squared Measurements	352619
4	Correction Factor (CF)	352604.8
5	Corrected Sum of Squares (SS)	14.17143
6	Variance (V)	0.416807
7	Estimate of Lot Standard Deviation	0.645606
8	Sample Mean	100.3714
9	Upper Specification Limit	101.5
10	Lower Specification Limit	98.5
11	Quality Index: QU (upper)	1.748082
12	Quality Index: QL (lower)	2.898718
ANSI Standard Table B-5 used to derive values below		
13	Est. of Lot Percent NcF above Upper	3.770%
14	Est. of Lot Percent NcF below Lower	0.100%
15	Total Est. Percent NcF in Lot (p)	3.870%
16	Max. Allowable Percent NcF (M)	5.580%
17	Acceptability Criterion (to accept, P<M)	**Accepted**

(D) Minimum Flow Test Results

Meters were tested at a minimum flow rate using the same procedure set forth in the ANSI Standard and detailed in HCWD2's Response to Commission Staff's Second Request for Information, Question No. 5 filed on June 5, 2017. Following the procedure set forth in the ANSI Standard, HCWD2 tested a sample size of seven meters at minimum flow rates. The sample was accepted.

ANSI Standard for Minimum Flow

1	Sample Size: n	7
2	Sum of Measurements	654
3	Sum of Squared Measurements	61144
4	Correction Factor (CF)	61102.286
5	Corrected Sum of Squares (SS)	41.714286
6	Variance (V)	6.952381
7	Estimate of Lot Standard Deviation	2.6367368
8	Sample Mean	93.428571
9	Lower Specification Limit	90
10	Quality Index: QL (lower)	1.3003086
ANSI Standard Table B-5 used to derive values below		
11	Est. of Lot Percent NcF	8.930%
12	Max. Allowable Percent NcF (M)	30.500%
13	Acceptability Criterion (to accept, P<M)	**Accepted**

(E) Abnormal Meter Results

There were no abnormal meter results with respect to the 2007 meters. None of the meters in the sample group had been damaged.

SECTION 5.0 2008 METERS, YEAR 11 TEST RESULTS

HCWD2 began performing the year 11 testing for meters it installed during calendar year 2008 (the "2008 meters") in May 2019. At the time it performed the testing, HCWD2 had 1,337 11-year-old meters. HCWD2 followed the same procedure set forth in the ANSI Standard as it detailed in HCWD2's Plan filed December 29, 2016. Following the procedure set forth in the ANSI Standard, HCWD2 tested a sample

size of 50 meters at maximum and intermediate flow rates and ten meters at minimum flow rates. All meters installed in 2008 were Sensus SR meters.

(A) Meters Tested

The following 2008 meters were tested in year 11:

Test Results of 2008 Sample Meters - Year 11

Serial No.	Maximum	Intermediate	Minimum	Total Water Flow	Testing Date
63030870	99.6	99		307,367.5	5/1/2019
62758922	100.1	100		573,915.5	5/1/2019
63490587	100.2	100		747,556.2	5/1/2019
63727202	100.2	100	90	322,306.7	5/1/2019
63030997	99.9	101		959,471.1	5/1/2019
62758767	99.8	101	95	807,296.2	5/1/2019
62758862	99.8	101		349,517.8	5/1/2019
62759051	100.3	100		513,040.9	5/1/2019
62758997	99.5	101		1,433,236.7	5/1/2019
61512277	99.6	99		379,501.4	5/1/2019
62758762	99.6	99	91	937,514.1	5/1/2019
62238230	100.1	101		428,170.7	5/1/2019
62758994	100.0	100	91	624,098.7	5/1/2019
63727192	100.7	99		1,171,460.1	5/13/2019
63727120	99.5	101		319,437.5	5/1/2019
63490419	99.5	101		471,655.1	5/1/2019
63727163	99.9	100	89	374,717.5	5/1/2019
63490705	99.2	100		245,248.9	5/1/2019
62758764	98.9	100		483,791.3	5/1/2019
63031098	99.2	100		560,394.1	5/1/2019
62758976	99.7	101		953,856.4	5/1/2019
63031082	99.6	101		595,856.4	5/1/2019
63727209	100.4	100	91	501,857.3	5/1/2019
63031081	99.8	101		170,132.9	5/1/2019
63030818	99.4	101		890,557.7	5/1/2019
62758815	99.9	101		345,210.3	5/1/2019
62326932	100.7	101		301,692.5	5/1/2019
62326921	99.8	100		628,231.6	5/1/2019
63727242	99.4	101	95	676,662.9	5/1/2019
62326926	100.2	99		347,560.9	5/1/2019

63727199	99.8	101		573,529.5	5/1/2019
63030817	99.2	100		227,303.9	5/1/2019
63031079	99.7	101		662,538.6	5/1/2019
63030897	99.5	101		948,611.7	5/1/2019
63490717	99.7	100		225,677.2	5/1/2019
63490687	99.5	101		327,448.9	5/1/2019
63031026	99.7	100	88	479,205.2	5/1/2019
63030886	99.3	100		238,080.7	5/1/2019
63727233	99.9	101		497,224.6	5/1/2019
63727166	100.4	99		770,568.5	5/1/2019
61471304	99.9	100		529,700.5	5/1/2019
63031054	100.2	101		374,363.6	5/1/2019
62758775	99.2	100		655,534.5	5/1/2019
63490432	100.0	101	96	372,502.4	5/1/2019
63727206	99.6	101		229,222.9	5/1/2019
63030837	99.4	100		647,935.3	5/1/2019
62758842	100.2	101	92	1,050,747.8	5/1/2019
63030851	99.7	100		358,097.2	5/1/2019
63490617	100.2	100		587,013.4	5/1/2019
63490507	99.7	101		186,298.0	5/1/2019

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(B) Maximum Flow Test Results

Meters were tested at a maximum flow rate using the procedure set forth in the ANSI Standard and detailed in HCWD2's Plan filed December 29, 2016. Following the procedure set forth in the ANSI Standard, HCWD2 again tested a sample size of 50 meters at maximum flow rates. The sample was accepted.

ANSI Standard for Maximum Flow

1	Sample Size: n	50
2	Sum of Measurements	4989.3
3	Sum of Squared Measurements	497869.8
4	Correction Factor (CF)	497862.3
5	Corrected Sum of Squares (SS)	7.5402
6	Variance (V)	0.153882
7	Estimate of Lot Standard Deviation	0.392277
8	Sample Mean	99.786
9	Upper Specification Limit	101.5
10	Lower Specification Limit	98.5
11	Quality Index: QU (upper)	4.369356
12	Quality Index: QL (lower)	3.278292
	ANSI Standard Table B-5 used to derive values below	
13	Est. of Lot Percent NcF above Upper	0.000%
14	Est. of Lot Percent NcF below Lower	0.026%
15	Total Est. Percent NcF in Lot (p)	0.026%
16	Max. Allowable Percent NcF (M)	5.210%
17	Acceptability Criterion (to accept, P<M)	**Accepted**

(C) Intermediate Flow Test Results

Meters were tested at an intermediate flow rate using the procedure set forth in the ANSI Standard and detailed in HCWD2's Plan filed December 29, 2016. Following the procedure set forth in the ANSI Standard, HCWD2 again tested a sample size of 50 meters at intermediate flow rates. The sample was accepted.

ANSI Standard for Intermediate Flow

1	Sample Size: n	50
2	Sum of Measurements	5018.0
3	Sum of Squared Measurements	503630
4	Correction Factor (CF)	503606.5
5	Corrected Sum of Squares (SS)	23.52
6	Variance (V)	0.48
7	Estimate of Lot Standard Deviation	0.69282
8	Sample Mean	100.36
9	Upper Specification Limit	101.5
10	Lower Specification Limit	98.5
11	Quality Index: QU (upper)	1.645448
12	Quality Index: QL (lower)	2.684679
	ANSI Standard Table B-5 used to derive values below	
13	Est. of Lot Percent NcF above Upper	4.790%
14	Est. of Lot Percent NcF below Lower	0.277%
15	Total Est. Percent NcF in Lot (p)	5.067%
16	Max. Allowable Percent NcF (M)	5.210%
17	Acceptability Criterion (to accept, P<M)	**Accepted**

(D) Minimum Flow Test Results

Meters were tested at a minimum flow rate using the same procedure set forth in the ANSI Standard and detailed in HCWD2's Response to Commission Staff's Second Request for Information, Question No. 5 filed on June 5, 2017. Following the procedure set forth in the ANSI Standard, HCWD2 again tested a sample size of ten meters at minimum flow rates. The sample was accepted.

ANSI Standard for Minimum Flow

1	Sample Size: n	10
2	Sum of Measurements	918
3	Sum of Squared Measurements	84338
4	Correction Factor (CF)	84272.4
5	Corrected Sum of Squares (SS)	65.6
6	Variance (V)	7.2888889
7	Estimate of Lot Standard Deviation	2.6997942
8	Sample Mean	91.8
9	Lower Specification Limit	90
10	Quality Index: QL (lower)	0.6667175
ANSI Standard Table B-5 used to derive values below		
11	Est. of Lot Percent NcF (p)	25.630%
12	Max. Allowable Percent NcF (M)	27.650%
13	Acceptability Criterion (to accept, P<M)	**Accepted**

(E) Abnormal Meter Results

There were no abnormal meter results with respect to the 2008 meters. None of the meters in the sample group had been damaged.

SECTION 6.0 2009 METERS, YEAR 10 TEST RESULTS

HCWD2 began performing the year 10 testing for meters it installed during calendar year 2009 (the "2009 meters") in February 2019. At the time it performed the testing, HCWD2 had 1,316 10-year-old meters. HCWD2 followed the same procedure set forth in the ANSI Standard as it detailed in HCWD2's Plan filed December 29, 2016. Following the procedure set forth in the ANSI Standard, HCWD2 tested a sample size of 50 meters at maximum and intermediate flow rates

and ten meters at minimum flow rates. All meters installed in 2009 were Sensus SR meters.

(A) Meters Tested

The following 2009 meters were tested in year 10:

Test Results of 2009 Sample Meters - Year 10

Serial No.	Maximum	Intermediate	Minimum	Total Water Flow	Testing Date
65085123	100.0	100		227,621.9	2/19/2019
65085186	100.2	101		244,397.9	2/19/2019
65085182	99.8	101		279,989.0	2/19/2019
65085221	100.1	101		577,788.0	2/19/2019
65085114	100.2	101	95	305,098.8	2/19/2019
65085116	100.1	100		222,382.9	2/19/2019
65085220	99.9	101		550,565.1	2/19/2019
65085218	100.2	101	94	381,727.4	2/19/2019
65780317	100.0	101		507,621.7	2/19/2019
66925100	99.6	101		260,688.1	2/28/2019
65127870	99.9	101		1,990,069.3	3/4/2019
65922131	100.2	101		557,693.4	3/4/2019
66925143	100.1	101		557,008.6	3/4/2019
68634094	100.3	100		245,226.1	3/4/2019
65127885	100.7	101	94	715,973.5	3/4/2019
65127886	100.4	101		684,291.1	3/4/2019
65127847	100.2	101		466,569.9	3/4/2019
66925046	100.0	100		154,401.8	3/4/2019
65127925	100.1	101		740,233.9	3/4/2019
68634246	100.0	101		526,452.1	3/6/2019
68634168	100.2	101		708,280.3	3/6/2019
68634273	99.9	101		1,286,984.8	3/6/2019
68634201	99.7	101		639,522.8	3/6/2019
65780299	100.0	101	94	214,095.6	3/6/2019
65295739	100.1	100		374,718.9	3/7/2019
65127943	99.9	101		370,546.9	3/7/2019
65780339	100.4	100		326,570.5	3/7/2019
65295640	99.8	101	91	448,277.4	3/7/2019
65085209	101.1	101		391,509.4	3/7/2019
65780303	100.1	100		334,489.0	3/7/2019

65780279	100.0	100	94	557,656.4	3/7/2019
65578492	100.6	100		631,098.6	3/7/2019
62326835	100.5	100	92	704,851.2	3/7/2019
65780217	100.4	100		172,792.3	3/7/2019
65085042	100.9	101		275,326.4	3/7/2019
65295609	100.1	101		243,321.6	3/12/2019
66925005	100.1	100		361,137.3	3/12/2019
65780161	100.1	101		102,143.8	3/12/2019
65295722	100.0	101		446,817.3	3/12/2019
66925068	100.0	100		147,880.4	3/12/2019
65295721	99.7	101		435,280.1	3/12/2019
65295723	100.0	100	98	316,423.9	3/12/2019
66925123	99.8	101		424,519.7	3/12/2019
65295711	100.0	101		533,316.9	3/18/2019
66925153	100.5	101	92	559,019.2	3/18/2019
66925092	100.5	100	94	435,183.3	3/18/2019
66925120	100.3	101		252,580.9	3/18/2019
66925168	100.3	101		273,879.1	3/18/2019
68634227	100.1	101		999,158.8	3/18/2019
65085126	100.6	101		241,260.1	3/18/2019

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(B) Maximum Flow Test Results

Meters were tested at a maximum flow rate using the procedure set forth in the ANSI Standard and detailed in HCWD2's Plan filed December 29, 2016. Following the procedure set forth in the ANSI Standard, HCWD2 tested a sample size of 50 meters at maximum flow rates. The sample was accepted.

ANSI Standard for Maximum Flow

1	Sample Size: n	50
2	Sum of Measurements	5007.7
3	Sum of Squared Measurements	501545.6
4	Correction Factor (CF)	501541.2
5	Corrected Sum of Squares (SS)	4.3842
6	Variance (V)	0.089473
7	Estimate of Lot Standard Deviation	0.299121
8	Sample Mean	100.154
9	Upper Specification Limit	101.5
10	Lower Specification Limit	98.5
11	Quality Index: QU (upper)	4.499849
12	Quality Index: QL (lower)	5.529532
	ANSI Standard Table B-5 used to derive values below	
13	Est. of Lot Percent NcF above Upper	0.000%
14	Est. of Lot Percent NcF below Lower	0.000%
15	Total Est. Percent NcF in Lot (p)	0.000%
16	Max. Allowable Percent NcF (M)	5.210%
17	Acceptability Criterion (to accept, P<M)	**Accepted**

(C) Intermediate Flow Test Results

Meters were tested at an intermediate flow rate using the procedure set forth in the ANSI Standard and detailed in HCWD2's Plan filed December 29, 2016. Following the procedure set forth in the ANSI Standard, HCWD2 tested a sample size of 50 meters at intermediate flow rates. The sample was accepted.

ANSI Standard for Intermediate Flow

1	Sample Size: n	50
2	Sum of Measurements	5035.0
3	Sum of Squared Measurements	507035
4	Correction Factor (CF)	507024.5
5	Corrected Sum of Squares (SS)	10.5
6	Variance (V)	0.214286
7	Estimate of Lot Standard Deviation	0.46291
8	Sample Mean	100.7
9	Upper Specification Limit	101.5
10	Lower Specification Limit	98.5
11	Quality Index: QU (upper)	1.728198
12	Quality Index: QL (lower)	4.752543
	ANSI Standard Table B-5 used to derive values below	
13	Est. of Lot Percent NcF above Upper	4.020%
14	Est. of Lot Percent NcF below Lower	0.000%
15	Total Est. Percent NcF in Lot (p)	4.020%
16	Max. Allowable Percent NcF (M)	5.210%
17	Acceptability Criterion (to accept, P<M)	**Accepted**

(D) Minimum Flow Test Results

Meters were tested at a minimum flow rate using the same procedure set forth in the ANSI Standard and detailed in HCWD2's Response to Commission Staff's Second Request for Information, Question No. 5 filed on June 5, 2017. Following the procedure set forth in the ANSI Standard, HCWD2 tested a sample size of ten meters at minimum flow rates. The sample was accepted.

ANSI Standard for Minimum Flow

1	Sample Size: n	10
2	Sum of Measurements	938
3	Sum of Squared Measurements	88018
4	Correction Factor (CF)	87984.4
5	Corrected Sum of Squares (SS)	33.6
6	Variance (V)	3.7333333
7	Estimate of Lot Standard Deviation	1.9321836
8	Sample Mean	93.8
9	Lower Specification Limit	90
10	Quality Index: QL (lower)	1.9666868
ANSI Standard Table B-5 used to derive values below		
11	Est. of Lot Percent NcF (p)	1.330%
12	Max. Allowable Percent NcF (M)	27.650%
13	Acceptability Criterion (to accept, P<M)	**Accepted**

(E) Abnormal Meter Results

There were no abnormal meter results with respect to the 2009 meters. None of the meters in the sample group had been damaged.

SECTION 7.0 CONCLUSION

As shown above, HCWD2's 2019 Annual Meter Testing Report shows that the following meter lots passed at each flow rate using the relevant ANSI Standard:

- 2006 Meters, Year 13 Test Results
- 2007 Meters, Year 12 Test Results
- 2008 Meters, Year 11 Test Results
- 2009 Meters, Year 10 Test Results

In 2020, HCWD2 will perform sample meter testing for the 2006, 2007, 2008, 2009, and 2010 meters and will file a 2020 Annual Meter Testing Report that shows the Year 14 test results for the 2006 meters, Year 13 test results for the 2007 meters, Year 12 test results for the 2008 meters, the Year 11 test results for the 2009 meters, and the Year 10 test results for the 2010 meters.