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*In the Community to Serve®*

February 10, 2022

Public Utility Commission of Oregon  
Attn: Filing Center  
P.O. Box 1088  
Salem, OR 97308-1088

**RE: RG-65 Cascade's Gas Meter Statistical Sampling Program, 2021 Results**

Enclosed is Cascade Natural Gas Corporation's (Cascade's or Company's) Gas Meter Statistical Sampling Program for all residential and small commercial meters in service as of December 31, 2021. These meters fall within the scope of the Company's Statistical Sampling Program as established in Rule 8, Meter Testing in the Company's Tariff.

All larger meters were tested according to their required periodic schedule. The total number of meters Cascade had in service in Oregon at the end of 2021 was 82,653.

If you have any questions, please call me at (509) 379-3938.

Sincerely,

*/s/ Brett Hudson*

Brett Hudson  
Manager, Gas Measurement

*In the Community to Serve®*

CASCADE NATURAL GAS

GAS METER  
STATISTICAL SAMPLING  
PROGRAM

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2021 RESULTS

# GAS METER STATISTICAL SAMPLING PROGRAM

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**GAS METER PERFORMANCE FOR THE PERIOD JANUARY 1, 2021 – DECEMBER 31, 2021**

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## SCOPE

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This report covers the methodology, test results, and proceedings of Cascade Natural Gas Company gas meter statistical sampling program for residential and small commercial meters in the states of Washington and Oregon for the period of January 1, 2021 through December 31, 2021.

### Sampling Summary

Meters in the program for the plan year	<i>304,123</i>
Meters in the program at the end of the plan year	<i>309,646</i>
Total meters removed during the year	<i>6,375</i>
Meters qualifying for analysis	<i>3,839</i>

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## GENERAL

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### COMPLIANCE

Gas meter testing requirements for Cascade Natural Gas are promulgated by the Washington Administrative Code (WAC), Chapter 480-90, Section 348 “Frequency of Periodic Meter Tests” and by the Oregon Administrative Rules (OAR), Chapter 860, Division 023 “Service Standards”, Section 0015 (Testing Gas and Electric Meters). Cascade’s sampling program complies with Part IV (“In Service Performance”) of the 1992 version of ANSI standard B109.1 and B109.2 as specified in its Tariff Rule No. 7 filed in the state of Washington and Tariff Rule No. 8 filed in the state of Oregon. Cascade’s plan also conforms to generally accepted statistical methods within the industry for predicting the sampling distribution of the proportion of a population with a 90% degree of confidence.

### TESTING METHODOLOGY

Cascade Natural Gas current random meter measurement performance program is in accordance with its plan document entitled “Meter Testing” dated April, 18 2019 (appendix). Random sampling and testing is conducted for all domestic meters rated at 1000 CFH and smaller.

### METER PERFORMANCE REQUIREMENTS

**Random Sampling** – Meters in this program are randomly selected for inspection by attribute per the plan document. Conforming meters are found to register accurately with a tolerance of  $\pm 2.0\%$ . The intent of the testing standard is to verify the following parameter:

**Performance** – Verify with approximately 90% certainty, that the portion of non-conforming meters does not exceed 10% of any installed meter population. For overall performance, equal weight is given to both the upper and lower specification limit (i.e. check and open reads are equally weighted and are averaged).

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## DEFINITIONS

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**Meter Population (Meter Family)** – Grouping of meters as defined by each company, may include reference to sub families as allowed ANSI/ASQ Z1.4, ANSI/ASQ Z1.9.

**Open Test** – Meter proof test completed between 80 and 100 % of meter rated capacity or the maximum rated capacity of the test equipment.

**Check Test** – Meter proof test completed at approximately 20% of the meter rated capacity.

**Size / Class** – Grouping of meters, based on capacity, that display similar performance characteristics for all meters within the grouping. Size/Class may, at the company's discretion, include multiple-sized meters within the same size class as long as the meter performance testing of the individual meters is consistent with all meter in the size class.

**Random Meters** – Meters that are a selected at random to provide a statistically representative sample of a meter family.

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## RANDOM SAMPLING METER PERFORMANCE DATA

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### Random Sampling - Summary

#### Beginning of Report Year 2021, In-Service Meters on 1/1/21

Total Number of Meters For Random Sampling	<b>304,123</b>
Total Number of Test Families <sup>(a)</sup>	<b>164</b>
Number of Test Families $\geq$ 10 yrs old <sup>(b)</sup>	<b>97</b>

#### End of Report Year 2021 Meter Testing Quantities & Results

Number of Meters Tested	<b>3,839</b>
Number of Meters Passed, (+/-) 2%	<b>3,701</b>
Number of Meters Failed, (+/-) 2%	<b>138</b>
Meter Families With an Overall Fail Result	<b>0</b>
Meter Families With a Fast Fail Result	<b>0</b>
Meter Families Removed/Depleted During Report Year <sup>(c)</sup>	<b>3</b>

#### Transition to 2022 Test Year

Total Number of Meters For Random Sampling	<b>309,646</b>
Total Number of Test Families <sup>(a)</sup>	<b>167</b>
Number of Test Families $\geq$ 10 yrs old <sup>(b)</sup>	<b>100</b>

- a) Total number of meter populations includes meter test families that are less than 10 years old and are not yet subject to test requirements.
- b) Number of Meter Test Populations  $\geq$  10 years old (i.e. includes meters manufactured in the year 2011 and earlier for the 2021 test year).
- c) Total number of meter families depleted during the report year including those removed for administrative purposes.



**RANDOM SAMPLING METER PERFORMANCE DATA**

**Random Sampling Meter Families Statistical Results Summary**

<b>Lot</b>	<b>Lot</b>	<b>Group</b>	<b>Test</b>		<b>Lot</b>	<b>Meters</b>	<b>Percent</b>	<b>Lot</b>
<b>Number</b>	<b>Description</b>	<b>Text</b>	<b>Area</b>	<b>Test Group</b>	<b>Size</b>	<b>Tested</b>	<b>Done</b>	<b>Status</b>
20210001	2021:CNG:AMERI1:3:1	1987	CNG	AMERI1 - American 0-399	1227	52	100.00%	Accepted
20210002	2021:CNG:AMERI1:3:1	1988	CNG	AMERI1 - American 0-399	2781	52	100.00%	Accepted
20210003	2021:CNG:AMERI1:3:1	1989	CNG	AMERI1 - American 0-399	2917	51	100.00%	Accepted
20210004	2021:CNG:AMERI1:3:1	1990	CNG	AMERI1 - American 0-399	3129	54	100.00%	Accepted
20210005	2021:CNG:AMERI1:3:1	1991	CNG	AMERI1 - American 0-399	3481	81	100.00%	Accepted
20210006	2021:CNG:AMERI1:3:1	1992	CNG	AMERI1 - American 0-399	2008	54	100.00%	Accepted
20210007	2021:CNG:AMERI1:3:1	1993	CNG	AMERI1 - American 0-399	1653	55	100.00%	Accepted
20210008	2021:CNG:AMERI1:3:1	1994	CNG	AMERI1 - American 0-399	2657	54	100.00%	Accepted
20210009	2021:CNG:AMERI1:3:1	1995	CNG	AMERI1 - American 0-399	4607	79	100.00%	Accepted
20210010	2021:CNG:AMERI1:2:1	1996	CNG	AMERI1 - American 0-399	134	12	100.00%	Accepted
20210011	2021:CNG:AMERI1:1:1	1997	CNG	AMERI1 - American 0-399	29	5	100.00%	Accepted
20210012	2021:CNG:AMERI1:1:1	1998	CNG	AMERI1 - American 0-399	156	15	100.00%	Accepted
20210013	2021:CNG:AMERI1:3:1	1999	CNG	AMERI1 - American 0-399	4341	77	100.00%	Accepted
20210014	2021:CNG:AMERI1:3:1	2000	CNG	AMERI1 - American 0-399	6727	76	100.00%	Accepted
20210015	2021:CNG:AMERI1:3:1	2001	CNG	AMERI1 - American 0-399	6332	75	100.00%	Accepted
20210016	2021:CNG:AMERI1:3:1	2002	CNG	AMERI1 - American 0-399	7131	77	100.00%	Accepted
20210017	2021:CNG:AMERI1:2:1	2003	CNG	AMERI1 - American 0-399	2562	231	100.00%	Accepted
20210018	2021:CNG:AMERI1:3:1	2004	CNG	AMERI1 - American 0-399	609	36	100.00%	Accepted
20210019	2021:CNG:AMERI1:4:1	2005	CNG	AMERI1 - American 0-399	7490	82	100.00%	Accepted
20210020	2021:CNG:AMERI1:3:1	2006	CNG	AMERI1 - American 0-399	9711	80	100.00%	Accepted
20210021	2021:CNG:AMERI1:3:1	2007	CNG	AMERI1 - American 0-399	7467	80	100.00%	Accepted
20210022	2021:CNG:AMERI1:3:1	2008	CNG	AMERI1 - American 0-399	6404	82	100.00%	Accepted
20210023	2021:CNG:AMERI1:3:1	2009	CNG	AMERI1 - American 0-399	5235	81	100.00%	Accepted
20210024	2021:CNG:AMERI1:3:1	2010	CNG	AMERI1 - American 0-399	4122	79	100.00%	Accepted
20210025	2021:CNG:AMERI1:3:1	2011	CNG	AMERI1 - American 0-399	4945	78	100.00%	Accepted
20210026	2021:CNG:AMERI3:1:1	2001	CNG	AMERI3 - American 700-1000	1	1	100.00%	Depleted
20210028	2021:CNG:AMERI3:1:1	2005	CNG	AMERI3 - American 700-1000	31	5	100.00%	Accepted
20210029	2021:CNG:AMERI3:1:1	2006	CNG	AMERI3 - American 700-1000	64	7	100.00%	Accepted

20210030	2021:CNG:AMERI3:4:1	2007	CNG	AMERI3 - American 700-1000	110	27	100.00%	Accepted
20210032	2021:CNG:AMERI3:3:1	2009	CNG	AMERI3 - American 700-1000	302	22	100.00%	Accepted
20210033	2021:CNG:AMERI3:3:1	2010	CNG	AMERI3 - American 700-1000	228	16	100.00%	Accepted
20210034	2021:CNG:AMERI3:2:1	2011	CNG	AMERI3 - American 700-1000	240	16	100.00%	Accepted
20210036	2021:CNG:ROCKW1:3:1	1986	CNG	ROCKW1 - Rockwell 0-399	800	37	100.00%	Accepted
20210037	2021:CNG:ROCKW1:3:1	1987	CNG	ROCKW1 - Rockwell 0-399	1615	52	100.00%	Accepted
20210038	2021:CNG:ROCKW1:3:1	1988	CNG	ROCKW1 - Rockwell 0-399	2004	53	100.00%	Accepted
20210039	2021:CNG:ROCKW1:3:1	1989	CNG	ROCKW1 - Rockwell 0-399	3872	79	100.00%	Accepted
20210040	2021:CNG:ROCKW1:2:1	1990	CNG	ROCKW1 - Rockwell 0-399	2509	52	100.00%	Accepted
20210041	2021:CNG:ROCKW1:3:1	1991	CNG	ROCKW1 - Rockwell 0-399	4451	77	100.00%	Accepted
20210042	2021:CNG:ROCKW1:3:1	1992	CNG	ROCKW1 - Rockwell 0-399	6027	78	100.00%	Accepted
20210043	2021:CNG:ROCKW1:3:1	1993	CNG	ROCKW1 - Rockwell 0-399	5929	76	100.00%	Accepted
20210044	2021:CNG:ROCKW1:3:1	1994	CNG	ROCKW1 - Rockwell 0-399	2743	53	100.00%	Accepted
20210045	2021:CNG:ROCKW1:3:1	1995	CNG	ROCKW1 - Rockwell 0-399	1936	51	100.00%	Accepted
20210046	2021:CNG:ROCKW1:3:1	1996	CNG	ROCKW1 - Rockwell 0-399	1006	39	100.00%	Accepted
20210047	2021:CNG:ROCKW1:1:1	1997	CNG	ROCKW1 - Rockwell 0-399	259	15	100.00%	Accepted
20210048	2021:CNG:ROCKW1:4:1	1998	CNG	ROCKW1 - Rockwell 0-399	4004	76	100.00%	Accepted
20210049	2021:CNG:ROCKW1:4:1	1999	CNG	ROCKW1 - Rockwell 0-399	2459	58	100.00%	Accepted
20210050	2021:CNG:ROCKW1:2:1	2000	CNG	ROCKW1 - Rockwell 0-399	475	26	100.00%	Accepted
20210051	2021:CNG:ROCKW1:1:1	2001	CNG	ROCKW1 - Rockwell 0-399	79	7	100.00%	Accepted
20210052	2021:CNG:ROCKW1:2:1	2002	CNG	ROCKW1 - Rockwell 0-399	288	20	100.00%	Accepted
20210053	2021:CNG:ROCKW1:3:1	2003	CNG	ROCKW1 - Rockwell 0-399	434	29	100.00%	Accepted
20210054	2021:CNG:ROCKW1:2:1	2004	CNG	ROCKW1 - Rockwell 0-399	125	11	100.00%	Accepted
20210055	2021:CNG:ROCKW1:1:1	2005	CNG	ROCKW1 - Rockwell 0-399	68	7	100.00%	Accepted
20210056	2021:CNG:ROCKW1:1:1	2006	CNG	ROCKW1 - Rockwell 0-399	15	3	100.00%	Accepted
20210057	2021:CNG:ROCKW1:3:1	2007	CNG	ROCKW1 - Rockwell 0-399	166	17	100.00%	Accepted
20210058	2021:CNG:ROCKW1:2:1	2008	CNG	ROCKW1 - Rockwell 0-399	188	15	100.00%	Accepted
20210059	2021:CNG:ROCKW1:2:1	2009	CNG	ROCKW1 - Rockwell 0-399	229	15	100.00%	Accepted
20210060	2021:CNG:ROCKW1:2:1	2010	CNG	ROCKW1 - Rockwell 0-399	422	25	100.00%	Accepted
20210061	2021:CNG:ROCKW1:1:1	2011	CNG	ROCKW1 - Rockwell 0-399	131	10	100.00%	Accepted
20210062	2021:CNG:ROCKW2:1:1	2001	CNG	ROCKW2 - Rockwell 400-699	2	2	100.00%	Depleted
20210063	2021:CNG:ROCKW2:2:1	2002	CNG	ROCKW2 - Rockwell 400-699	46	5	100.00%	Accepted
20210064	2021:CNG:ROCKW2:2:1	2003	CNG	ROCKW2 - Rockwell 400-699	55	9	100.00%	Accepted
20210065	2021:CNG:ROCKW2:1:1	2004	CNG	ROCKW2 - Rockwell 400-699	6	3	100.00%	Accepted
20210066	2021:CNG:ROCKW2:2:1	2006	CNG	ROCKW2 - Rockwell 400-699	65	7	100.00%	Accepted
20210067	2021:CNG:ROCKW2:3:1	2007	CNG	ROCKW2 - Rockwell 400-699	185	15	100.00%	Accepted
20210068	2021:CNG:ROCKW2:3:1	2008	CNG	ROCKW2 - Rockwell 400-699	312	22	100.00%	Accepted
20210069	2021:CNG:ROCKW2:3:1	2009	CNG	ROCKW2 - Rockwell 400-699	336	21	100.00%	Accepted

20210070	2021:CNG:ROCKW2:2:1	2010	CNG	ROCKW2 - Rockwell 400-699	278	15	100.00%	Accepted
20210071	2021:CNG:ROCKW2:3:1	2011	CNG	ROCKW2 - Rockwell 400-699	415	27	100.00%	Accepted
20210072	2021:CNG:SPRAG1:2:1	1986	CNG	SPRAG1 - Sprague 0-399	422	26	100.00%	Accepted
20210073	2021:CNG:SPRAG1:3:1	1987	CNG	SPRAG1 - Sprague 0-399	728	37	100.00%	Accepted
20210074	2021:CNG:SPRAG1:3:1	1988	CNG	SPRAG1 - Sprague 0-399	1109	35	100.00%	Accepted
20210075	2021:CNG:SPRAG1:3:1	1989	CNG	SPRAG1 - Sprague 0-399	1897	50	100.00%	Accepted
20210076	2021:CNG:SPRAG1:3:1	1990	CNG	SPRAG1 - Sprague 0-399	1603	50	100.00%	Accepted
20210077	2021:CNG:SPRAG1:3:1	1991	CNG	SPRAG1 - Sprague 0-399	1173	38	100.00%	Accepted
20210078	2021:CNG:SPRAG1:2:1	1992	CNG	SPRAG1 - Sprague 0-399	1140	36	100.00%	Accepted
20210079	2021:CNG:SPRAG1:2:1	1993	CNG	SPRAG1 - Sprague 0-399	3337	76	100.00%	Accepted
20210080	2021:CNG:SPRAG1:2:1	1994	CNG	SPRAG1 - Sprague 0-399	4837	75	100.00%	Accepted
20210081	2021:CNG:SPRAG1:3:1	1995	CNG	SPRAG1 - Sprague 0-399	3931	75	100.00%	Accepted
20210082	2021:CNG:SPRAG1:2:1	1996	CNG	SPRAG1 - Sprague 0-399	5027	75	100.00%	Accepted
20210083	2021:CNG:SPRAG1:2:1	1997	CNG	SPRAG1 - Sprague 0-399	6621	75	100.00%	Accepted
20210084	2021:CNG:SPRAG1:3:1	1998	CNG	SPRAG1 - Sprague 0-399	2997	50	100.00%	Accepted
20210085	2021:CNG:SPRAG1:3:1	1999	CNG	SPRAG1 - Sprague 0-399	296	23	100.00%	Accepted
20210086	2021:CNG:SPRAG1:2:1	2000	CNG	SPRAG1 - Sprague 0-399	78	8	100.00%	Accepted
20210087	2021:CNG:SPRAG1:3:1	2001	CNG	SPRAG1 - Sprague 0-399	717	38	100.00%	Accepted
20210088	2021:CNG:SPRAG1:3:1	2002	CNG	SPRAG1 - Sprague 0-399	312	22	100.00%	Accepted
20210089	2021:CNG:SPRAG1:3:1	2003	CNG	SPRAG1 - Sprague 0-399	596	41	100.00%	Accepted
20210090	2021:CNG:SPRAG1:1:1	2004	CNG	SPRAG1 - Sprague 0-399	13	3	100.00%	Accepted
20210091	2021:CNG:SPRAG1:1:1	2005	CNG	SPRAG1 - Sprague 0-399	86	7	100.00%	Accepted
20210092	2021:CNG:SPRAG1:2:1	2006	CNG	SPRAG1 - Sprague 0-399	44	6	100.00%	Accepted
20210093	2021:CNG:SPRAG1:3:1	2007	CNG	SPRAG1 - Sprague 0-399	142	11	100.00%	Accepted
20210094	2021:CNG:SPRAG1:1:1	2008	CNG	SPRAG1 - Sprague 0-399	34	5	100.00%	Accepted
20210095	2021:CNG:SPRAG1:2:1	2009	CNG	SPRAG1 - Sprague 0-399	203	16	100.00%	Accepted
20210096	2021:CNG:SPRAG1:3:1	2010	CNG	SPRAG1 - Sprague 0-399	307	22	100.00%	Accepted
20210097	2021:CNG:SPRAG1:2:1	2011	CNG	SPRAG1 - Sprague 0-399	195	15	100.00%	Accepted
20210098	2021:CNG:SPRAG2:1:1	2011	CNG	SPRAG2 - Sprague400-699	2	2	100.00%	Depleted
20210206	2021:CNG:AMERI3:1:1	2004	CNG	AMERI3 - American 700-1000	12	3	100.00%	Accepted
20210207	2021:CNG:AMERI3:1:1	2008	CNG	AMERI3 - American 700-1000	322	20	100.00%	Accepted

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## RANDOM SAMPLING METER PERFORMANCE DATA

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**Notes for Random Sampling Meter Families Statistical Results Summary:**

**Lot Number:** The number designation for the individual meter families.

**Lot Description:** Meter family description breakdown. Included in the description is the sampling program year, CNG, the family designation by meter name and meter size, how many pulls were created.

**Group Text:** The family year the meters in that family were installed.

**Test Area:** CNG = Cascade Natural Gas.

**Test Group:** The first five letters are the first five letters of the brand of meter in that family; American, Rockwell, Sprague. The number at the end is the meter class. Class 1 is 0-399 CFH, class 2 is 400-699 CFH, class 3 is 700-1000 CFH.

**Lot Size:** Number of meters in the test family at the start of the test year being reported.

**Meters Tested:** Total number of meters tested for the random sample families.

**Lot Status:** Disposition of family.

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**RANDOM SAMPLING METER PERFORMANCE DATA**

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**METER FAMILIES BELOW ACCEPTABLE THRESHOLD LIMITS**

*Zero meter families in service ten or more years were found below the acceptable threshold limits.*

<b>Meter Family</b>	<b>Disposition Status</b>	<b>Year Disposition Initiated</b>	<b>Year Disposition Completed</b>

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**RANDOM SAMPLING METER PERFORMANCE DATA**

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**METER FAMILIES WITH INSUFFICIENTLY SIZED SAMPLE**

*Zero meter families in service ten or more years were found to have an insufficient sized sample.*

<b>Meter Family</b>	<b>Disposition Status</b>	<b>Year Disposition Initiated</b>	<b>Year Disposition Completed</b>

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**RANDOM SAMPLING METER PERFORMANCE DATA**

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**STATUS OF METER FAMILIES PREVIOUSLY SCHEDULED FOR REMOVAL**

*Zero meter families were previously scheduled for removal in 2021.*

<b>Meter Family</b>	<b>Disposition Status</b>	<b>Year Disposition Initiated</b>	<b>Year Disposition Completed</b>

## **METER SAMPLE PROGRAM**

Each meter in the Statistical Sample Program will be assigned to a meter group or "family" according to its manufacturer, meter class, and set year. At the option of the company, meters in any family may be further subdivided according to meter type, size, location, age, or other factors that may be disclosed by test data to influence the performance of the meters. Subsequently, meter families may be modified or combined as justified by the performance records.

The performance evaluation of each meter family will be based on an evaluation of test results from random sampling of the family. The random sample for each family will include meters which are removed from service on a routine basis, e.g. meters not in use, too large, too small, damaged index cover, service relocation or replacement, etc. If more meters are required for testing than have been removed from service for routine purposes, a random sample of meters within that family will be removed from service and included in the sample.

For purposes of evaluating the performance of each meter family, the analysis of the test results will exclude data on meters which are damaged, meters which do not register, meters which do not pass gas, and meters which measure either less than 90.0 percent accurate or more than 110.0 percent accurate.

Meters with 1000 cfh capacity and below that have been in service ten (10) or more years as established by last set date shall be tested within a prescribed sample size. Sample size and family disposition will be determined in accordance with ANSI/ASQ Z1.4, ANSI/ASQ Z1.9, or other generally accepted industry standard.

Corrective action shall consist of either a selective removal program to raise the accuracy performance of the group to acceptable standards or the removal of the entire group from service. The rate of removal will be such that the required corrective action is completed as soon as practical but not to exceed a period of two years after the year testing was performed. However, with Commission approval, the period for removal may be extended an additional two years in any year which the total number of meters required for removal exceeds four percent of the number of meters in the Statistical Sample Program.

If meters tested in the fourth quarter of the plan year cause a family to require additional samples that leave insufficient time to obtain the additional number of meters required to complete the sample, the company may elect to aggressive sampling in the following plan year so that a follow up determination is made within the first six months of the new plan year.

The program year shall begin on January 1 and end on December 31 of the same year. Sample data collected during a given program year will be analyzed, and a decision regarding meter family disposition will be made in the first quarter of the following calendar year.