Cascade Natural Gas Corporation

Summary of Meter Performance for Program Year 2009

Residential and Small Commercial Meters

Summary of Meter Performance for Year 2009

Abstract

On September 30, 2009 Cascade completed its 2009 program year for the performance based Statistical Sample Program for residential and small commercial meters as described in the document under the same name dated August 18, 1995 (ref. section 6).

Following is a synopsis of meters in both Washington and Oregon:

Beginning of the program year	260,354
End of the program year	261,430
Total meters removed during year	5,895
Number meters qualifying for samples	4,925
Meters removed "for cause"	3,163
Meters removed to provide statistically valid sample	1,762

Meters were randomly selected as needed to provide a statistically valid sample of each family in service ten years or more. Test results of the sample meters were used to determine the actual proportion of each sample that met both the "accuracy" and "not fast" criteria as stipulated by the program.[1] The overall performance of each family was then established (with 90% confidence) to be the same as its representative sample.

All families were determined to be acceptable or were depleted during the course of the program year.

[1] The list of all meters removed (including the test results) is on file and is available upon request.

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Section 1

Program Status Report
For Year 2009

CASCADE NATURAL GAS

2009 METER SAMPLING PROGRAM

YEAR-END STATUS REPORT

FAMILY STATISTICS		SAMPLE STATISTICS			'ACCURACY' TEST RESULTS					'NOT FAST' TEST RESULTS					FURTHER ACTION OR STATUS	
METER FAMILY (CLS)	SIZE	MAX.SAMP	NO.RMVD	SAMP.CNT	OK.CNT	PCT.OK	OK.LMT	MIN.SAMP	CTL.RGN	NF.CNT	PCT.NF	NF.LMT	MIN.SAMP	CTL.RGN	ADD.REQ	DISP. OF FAMILY
1981*ROCKW*1***	65	40	28	26	26	100	10	9	I	26	100	8	18	I	0	ACCEPTABLE
1981*SPRAG*1***	72	50	26	25	25	100	11	10	I	25	100	8	18	I	0	ACCEPTABLE
1982*ROCKW*1***	163	70	27	26	26	100	12	10	I	26	100	9	21	I	0	ACCEPTABLE
1982*SPRAG*1***	201	70	32	30	30	100	11	10	I	30	100	8	22	I	0	ACCEPTABLE
1983*SPRAG*1***	510	90	36	34	34	100	11	11	I	34	100	8	23	I	0	ACCEPTABLE
1984*ROCKW*1***	7	7	7	6	6	100	0	7	I	6	100	0	7	I	0	FAMILY DEPLETED
1985*ROCKW*1***	85	50	33	32	32	100	9	10	I	32	100	7	19	I	0	ACCEPTABLE
1985*SPRAG*1***	0	0	2	1	1	100	0	2	I	1	100	0	2	I	0	FAMILY DEPLETED
1986*AMERI*1***	815	90	39	34	34	100	11	11	I	34	100	8	24	I	0	ACCEPTABLE
1986*ROCKW*1***	1879	100	53	48	48	100	9	11	I	48	100	7	24	I	0	ACCEPTABLE
1986*SPRAG*1***	1251	100	52	41	41	100	10	11	I	41	100	8	24	I	0	ACCEPTABLE
1987*AMERI*1***	2659	100	73	63	63	100	8	11	I	63	100	6	24	I	0	ACCEPTABLE
1987*ROCKW*1***	3087	100	68	61	60	98	8	13	I	61	100	6	24	I	0	ACCEPTABLE
1987*SPRAG*1***	1341	100	46	38	38	100	11	11	I	38	100	8	24	I	0	ACCEPTABLE

REPORT DATE: 10-02-09 ('<< >>' INDICATES VALUE OUT OF RANGE.)

FAMILY STATISTICS		SAMPLE STATISTICS			'ACCURACY' TEST RESULTS					'NOT FAST' TEST RESULTS					FURTHER ACTION OR STATUS	
METER FAMILY (CLS)	SIZE	MAX.SAMP	NO.RMVD	SAMP.CNT	OK.CNT	PCT.OK	OK.LMT	MIN.SAMP	CTL.RGN	NF.CNT	PCT.NF	NF.LMT	MIN.SAMP	CTL.RGN	ADD.REQ	DISP. OF FAMILY
1988*AMERI*1***	3571	125	86	72	72	100	8	11	I	72	100	6	24	I	0	ACCEPTABLE
1988*ROCKW*1***	2678	100	57	47	47	100	10	11	I	47	100	7	24	I	0	ACCEPTABLE
1988*SPRAG*1***	2107	100	42	31	31	100	12	11	I	31	100	9	24	I	0	ACCEPTABLE
1989*AMERI*1***	5515	125	104	76	76	100	7	11	I	76	100	6	24	I	0	ACCEPTABLE
1989*ROCKW*1***	5282	125	76	62	62	100	8	11	I	62	100	6	24	I	0	ACCEPTABLE
1989*SPRAG*1***	3503	125	101	57	57	100	9	11	I	57	100	6	24	I	0	ACCEPTABLE
1990*AMERI*1***	4111	125	91	80	80	100	7	11	I	80	100	5	24	I	0	ACCEPTABLE
1990*ROCKW*1***	6319	125	317	299	297	99	4	12	I	299	100	3	24	I	0	ACCEPTABLE
1990*ROCKW*2***	15	15	11	11	11	100	11	7	I	11	100	8	10	I	0	ACCEPTABLE
1990*SPRAG*1***	2903	100	66	48	48	100	9	11	I	48	100	7	24	I	0	ACCEPTABLE
1991*AMERI*1***	4799	125	101	82	82	100	7	11	I	82	100	5	24	I	0	ACCEPTABLE
1991*ROCKW*1***	3534	125	62	50	50	100	9	11	I	50	100	7	24	I	0	ACCEPTABLE
1991*SPRAG*1***	2448	100	62	45	44	97	10	15	I	45	100	7	24	I	0	ACCEPTABLE
1992*AMERI*1***	3271	125	69	53	53	100	9	11	I	53	100	7	24	I	0	ACCEPTABLE
1992*AMERI*3***	131	60	93	93	92	98	4	12	I	92	98	3	30	I	0	ACCEPTABLE
1992*ROCKW*1***	8399	125	99	80	80	100	7	11	I	80	100	5	24	I	0	ACCEPTABLE
1992*ROCKW*2***	99	50	33	31	31	100	10	10	I	31	100	7	20	I	0	ACCEPTABLE

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FAMILY STATISTICS		SAMPLE STATISTICS			'ACCURACY' TEST RESULTS					'NOT FAST' TEST RESULTS					FURTHER ACTION OR STATUS	
METER FAMILY (CLS)	SIZE	MAX.SAMP	NO.RMVD	SAMP.CNT	OK.CNT	PCT.OK	OK.LMT	MIN.SAMP	CTL.RGN	NF.CNT	PCT.NF	NF.LMT	MIN.SAMP	CTL.RGN	ADD.REQ	DISP. OF FAMILY
1992*SPRAG*1***	1964	100	57	38	38	100	11	11	I	38	100	8	24	I	0	ACCEPTABLE
1993*AMERI*1***	3631	125	105	87	87	100	7	11	I	87	100	5	24	I	0	ACCEPTABLE
1993*AMERI*3***	125	60	31	30	30	100	11	10	I	30	100	8	21	I	0	ACCEPTABLE
1993*ROCKW*1***	6024	125	89	74	74	100	8	11	I	74	100	6	24	I	0	ACCEPTABLE
1993*ROCKW*2***	163	70	34	31	31	100	11	10	I	31	100	8	21	I	0	ACCEPTABLE
1993*SPRAG*1***	6346	125	105	83	83	100	7	11	I	83	100	5	24	I	0	ACCEPTABLE
1993*SPRAG*3***	0	0	1	1	1	100	0	1	I	1	100	0	1	I	0	FAMILY DEPLETED
1994*AMERI*1***	5819	125	103	89	89	100	7	11	I	89	100	5	24	I	0	ACCEPTABLE
1994*AMERI*3***	157	70	34	33	33	100	10	10	I	33	100	8	21	I	0	ACCEPTABLE
1994*ROCKW*1***	4391	125	74	59	59	100	9	11	I	59	100	6	24	I	0	ACCEPTABLE
1994*ROCKW*2***	49	40	26	26	26	100	9	9	I	26	100	7	16	I	0	ACCEPTABLE
1994*SPRAG*1***	6241	125	125	91	91	100	7	11	I	91	100	5	24	I	0	ACCEPTABLE
1994*SPRAG*3***	5	5	5	5	5	100	0	5	I	5	100	0	5	I	0	FAMILY DEPLETED
1995*AMERI*1***	3422	125	57	43	43	100	10	11	I	43	100	7	24	I	0	ACCEPTABLE
1995*AMERI*3***	138	60	25	23	23	100	13	10	I	23	100	9	21	I	0	ACCEPTABLE
1995*ROCKW*1***	2807	100	62	55	55	100	9	11	I	55	100	7	24	I	0	ACCEPTABLE
1995*ROCKW*2***	176	70	37	30	30	100	11	10	I	30	100	8	21	I	0	ACCEPTABLE

FAMILY STATISTICS		SAMPLE STATISTICS			'ACCURACY' TEST RESULTS					'NOT FAST' TEST RESULTS					FURTHER ACTION OR STATUS	
METER FAMILY (CLS)	SIZE	MAX.SAMP	NO.RMVD	SAMP.CNT	OK.CNT	PCT.OK	OK.LMT	MIN.SAMP	CTL.RGN	NF.CNT	PCT.NF	NF.LMT	MIN.SAMP	CTL.RGN	ADD.REQ	DISP. OF FAMILY
1995*SPRAG*1***	10845	200	177	132	132	100	6	11	I	132	100	4	24	I	0	ACCEPTABLE
1995*SPRAG*3***	6	6	6	4	4	100	0	6	I	4	100	0	6	I	0	FAMILY DEPLETED
1996*AMERI*1***	566	90	39	33	33	100	11	11	I	33	100	8	23	I	0	ACCEPTABLE
1996*AMERI*3***	246	70	68	68	67	98	7	13	I	67	98	5	33	I	0	ACCEPTABLE
1996*ROCKW*1***	1148	90	42	38	38	100	11	11	I	38	100	8	24	I	0	ACCEPTABLE
1996*ROCKW*2***	178	70	36	33	33	100	10	10	I	33	100	8	22	I	0	ACCEPTABLE
1996*SPRAG*1***	4727	125	90	63	63	100	8	11	I	63	100	6	24	I	0	ACCEPTABLE
1996*SPRAG*3***	19	19	20	18	18	100	5	7	I	18	100	4	11	I	0	FAMILY DEPLETED
1997*AMERI*1***	253	70	43	40	40	100	10	10	I	40	100	7	22	I	0	ACCEPTABLE
1997*AMERI*3***	232	70	33	31	31	100	11	10	I	31	100	8	22	I	0	ACCEPTABLE
1997*ROCKW*1***	642	90	41	36	36	100	11	11	I	36	100	8	23	I	0	ACCEPTABLE
1997*ROCKW*2***	218	70	26	25	25	100	12	10	I	25	100	9	22	I	0	ACCEPTABLE
1997*SPRAG*1***	7343	125	104	88	88	100	7	11	I	88	100	5	24	I	0	ACCEPTABLE
1997*SPRAG*3***	59	40	28	25	25	100	10	9	I	25	100	8	17	I	0	ACCEPTABLE
1998*AMERI*1***	695	90	53	45	45	100	9	11	I	45	100	7	24	I	0	ACCEPTABLE
1998*AMERI*3***	121	60	30	30	30	100	10	10	I	30	100	8	20	I	0	ACCEPTABLE
1998*ROCKW*1***	7936	125	75	63	63	100	8	11	I	63	100	6	24	I	0	ACCEPTABLE

FAMILY STATISTICS		SAMPLE STATISTICS			'ACCURACY' TEST RESULTS					'NOT FAST' TEST RESULTS					FURTHER ACTION OR STATUS	
METER FAMILY (CLS)	SIZE	MAX.SAMP	NO.RMVD	SAMP.CNT	OK.CNT	PCT.OK	OK.LMT	MIN.SAMP	CTL.RGN	NF.CNT	PCT.NF	NF.LMT	MIN.SAMP	CTL.RGN	ADD.REQ	DISP. OF FAMILY
1998*ROCKW*2***	371	80	33	29	29	100	12	11	I	29	100	9	23	I	0	ACCEPTABLE
1998*SPRAG*1***	973	90	53	43	43	100	10	11	I	43	100	7	24	I	0	ACCEPTABLE
1998*SPRAG*3***	51	40	29	28	28	100	8	9	I	28	100	6	17	I	0	ACCEPTABLE
1999*AMERI*1***	7552	125	117	107	107	100	6	11	I	107	100	5	24	I	0	ACCEPTABLE
1999*AMERI*3***	324	80	28	28	28	100	12	11	I	28	100	9	23	I	0	ACCEPTABLE
1999*ROCKW*1***	693	90	37	32	32	100	11	11	I	32	100	9	24	I	0	ACCEPTABLE
1999*ROCKW*2***	276	70	30	27	27	100	12	10	I	27	100	9	22	I	0	ACCEPTABLE
1999*SPRAG*1***	665	90	45	38	38	100	10	11	I	38	100	8	24	I	0	ACCEPTABLE
1999*SPRAG*2***	19	19	19	19	19	100	0	7	I	19	100	0	11	I	0	FAMILY DEPLETED
1999*SPRAG*3***	69	50	34	27	27	100	10	9	I	27	100	7	18	I	0	ACCEPTABLE
2000*AMERI*1***	8750	125	124	109	109	100	6	11	I	109	100	5	24	I	0	ACCEPTABLE
2000*AMERI*3***	298	80	3	3	3	100	<< >>	10	IV	3	100	<< >>	23	IV	0	ACCEPTABLE
2000*ROCKW*1***	1114	90	22	16	16	100	16	11	I	16	100	<< >>	24	IV	0	ACCEPTABLE
2000*ROCKW*2***	346	80	7	3	3	100	<< >>	11	IV	3	100	<< >>	23	IV	0	ACCEPTABLE
2000*SPRAG*1***	206	70	4	4	4	100	<< >>	10	IV	4	100	<< >>	22	IV	0	ACCEPTABLE
2000*SPRAG*3***	95	50	1	0	0	N/A	N/A	25	N/A	0	N/A	N/A	25	N/A	0	ACCEPTABLE
2001*AMERI*1***	6929	125	77	65	65	100	8	11	I	65	100	6	24	I	0	ACCEPTABLE

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METER FAMILY (CLS)	SIZE	MAX.SAMP	NO.RMVD	SAMP.CNT	OK.CNT	PCT.OK	OK.LMT	MIN.SAMP	CTL.RGN	NF.CNT	PCT.NF	NF.LMT	MIN.SAMP	CTL.RGN	ADD.REQ	DISP. OF FAMILY
2001*AMERI*3***	412	80	9	8	8	100	<< >>	11	IV	8	100	<< >>	23	IV	0	ACCEPTABLE
2001*ROCKW*1***	280	70	6	6	6	100	<< >>	10	IV	6	100	<< >>	22	IV	0	ACCEPTABLE
2001*ROCKW*2***	394	80	16	11	11	100	20	11	I	11	100	<< >>	23	IV	0	ACCEPTABLE
2001*SPRAG*1***	1352	100	17	12	12	100	19	11	I	12	100	<< >>	24	IV	0	ACCEPTABLE
2001*SPRAG*3***	117	60	6	4	4	100	<< >>	10	IV	4	100	<< >>	20	IV	0	ACCEPTABLE
2002*ACTAR*1***	1012	90	6	2	2	100	<< >>	11	IV	2	100	<< >>	24	IV	0	ACCEPTABLE
2002*AMERI*1***	8340	125	103	86	86	100	7	11	I	86	100	5	24	I	0	ACCEPTABLE
2002*AMERI*3***	286	80	3	2	2	100	<< >>	10	IV	2	100	<< >>	23	IV	0	ACCEPTABLE
2002*ROCKW*1***	875	90	7	6	6	100	<< >>	11	IV	6	100	<< >>	24	IV	0	ACCEPTABLE
2002*ROCKW*2***	576	90	19	12	12	100	19	11	I	12	100	<< >>	23	IV	0	ACCEPTABLE
2002*SPRAG*1***	543	90	7	5	5	100	<< >>	11	IV	5	100	<< >>	23	IV	0	ACCEPTABLE
2002*SPRAG*2***	18	18	2	1	1	100	<< >>	7	IV	1	100	<< >>	11	IV	0	ACCEPTABLE
2002*SPRAG*3***	26	26	1	0	0	N/A	N/A	13	N/A	0	N/A	N/A	13	N/A	0	ACCEPTABLE
2003*AMERI*1***	10098	200	145	128	128	100	6	11	I	128	100	4	24	I	0	ACCEPTABLE
2003*AMERI*3***	494	80	8	6	6	100	<< >>	11	IV	6	100	<< >>	23	IV	0	ACCEPTABLE
2003*ROCKW*1***	413	80	2	1	1	100	<< >>	11	IV	1	100	<< >>	23	IV	0	ACCEPTABLE
2003*ROCKW*2***	263	70	8	5	5	100	<< >>	10	IV	5	100	<< >>	22	IV	0	ACCEPTABLE

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METER FAMILY (CLS)	SIZE	MAX.SAMP	NO.RMVD	SAMP.CNT	OK.CNT	PCT.OK	OK.LMT	MIN.SAMP	CTL.RGN	NF.CNT	PCT.NF	NF.LMT	MIN.SAMP	CTL.RGN	ADD.REQ	DISP. OF FAMILY
2003*SPRAG*1***	776	90	14	12	12	100	19	11	I	12	100	<< >>	24	IV	0	ACCEPTABLE
2004*AMERI*1***	14374	200	273	213	213	100	4	11	I	213	100	3	24	I	0	ACCEPTABLE
2004*AMERI*3***	383	80	7	5	5	100	<< >>	11	IV	5	100	<< >>	23	IV	0	ACCEPTABLE
2004*ROCKW*1***	417	80	5	5	5	100	<< >>	11	IV	5	100	<< >>	23	IV	0	ACCEPTABLE
2004*ROCKW*2***	401	80	12	6	6	100	<< >>	11	IV	6	100	<< >>	23	IV	0	ACCEPTABLE
2004*SPRAG*1***	134	60	3	1	1	100	<< >>	10	IV	1	100	<< >>	21	IV	0	ACCEPTABLE
2004*SPRAG*3***	115	60	3	2	2	100	<< >>	10	IV	2	100	<< >>	20	IV	0	ACCEPTABLE
2005*AMERI*1***	14456	200	265	226	226	100	4	11	I	226	100	3	24	I	0	ACCEPTABLE
2005*AMERI*3***	315	80	3	3	3	100	<< >>	10	IV	3	100	<< >>	23	IV	0	ACCEPTABLE
2005*ROCKW*1***	278	70	1	1	1	100	<< >>	10	IV	1	100	<< >>	22	IV	0	ACCEPTABLE
2005*ROCKW*2***	562	90	15	13	13	100	18	11	I	13	100	<< >>	23	IV	0	ACCEPTABLE
2005*SPRAG*1***	269	70	10	10	10	100	20	10	I	10	100	<< >>	22	IV	0	ACCEPTABLE
2005*SPRAG*2***	30	30	2	1	1	100	<< >>	8	IV	1	100	<< >>	14	IV	0	ACCEPTABLE
2005*SPRAG*3***	58	40	2	1	1	100	<< >>	9	IV	1	100	<< >>	17	IV	0	ACCEPTABLE
2006*AMERI*1***	14039	200	210	184	184	100	5	11	I	184	100	4	24	I	0	ACCEPTABLE
2006*AMERI*3***	470	80	9	8	8	100	<< >>	11	IV	8	100	<< >>	23	IV	0	ACCEPTABLE
2006*ROCKW*1***	167	70	2	1	1	100	<< >>	10	IV	1	100	<< >>	21	IV	0	ACCEPTABLE

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METER FAMILY (CLS)	SIZE	MAX.SAMP	NO.RMVD	SAMP.CNT	OK.CNT	PCT.OK	OK.LMT	MIN.SAMP	CTL.RGN	NF.CNT	PCT.NF	NF.LMT	MIN.SAMP	CTL.RGN	ADD.REQ	DISP. OF FAMILY
2006*ROCKW*2***	569	90	8	6	6	100	<< >>	11	IV	6	100	<< >>	23	IV	0	ACCEPTABLE
2006*SPRAG*1***	207	70	3	3	3	100	<< >>	10	IV	3	100	<< >>	22	IV	0	ACCEPTABLE
2006*SPRAG*2***	19	19	2	1	1	100	<< >>	7	IV	1	100	<< >>	11	IV	0	ACCEPTABLE
2006*SPRAG*3***	282	80	5	1	1	100	<< >>	10	IV	1	100	<< >>	22	IV	0	ACCEPTABLE
2007*AMERI*1***	2803	100	44	35	35	100	11	11	I	35	100	8	24	I	0	ACCEPTABLE
2007*AMERI*3***	231	70	3	3	3	100	<< >>	10	IV	3	100	<< >>	22	IV	0	ACCEPTABLE
2007*ROCKW*1***	329	80	2	2	2	100	<< >>	11	IV	2	100	<< >>	23	IV	0	ACCEPTABLE
2007*ROCKW*2***	406	80	11	6	6	100	<< >>	11	IV	6	100	<< >>	23	IV	0	ACCEPTABLE
2007*SPRAG*3***	62	40	2	1	1	100	<< >>	9	IV	1	100	<< >>	18	IV	0	ACCEPTABLE
2008*AMERI*1***	12595	200	54	33	33	100	11	11	I	33	100	9	24	I	0	ACCEPTABLE
2008*AMERI*3***	324	80	6	5	5	100	<< >>	11	IV	5	100	<< >>	23	IV	0	ACCEPTABLE
2008*ROCKW*1***	258	70	2	0	0	N/A	N/A	35	N/A	0	N/A	N/A	35	N/A	0	ACCEPTABLE
2008*ROCKW*2***	579	90	6	4	4	100	<< >>	11	IV	4	100	<< >>	23	IV	0	ACCEPTABLE
2008*SPRAG*2***	25	25	4	4	4	100	<< >>	8	IV	4	100	<< >>	13	IV	0	ACCEPTABLE
2008*SPRAG*3***	25	25	6	4	4	100	<< >>	8	IV	4	100	<< >>	13	IV	0	ACCEPTABLE
GRAND TOTALS	267700		5895	4925	4919					4923					0	

REPORT DATE: 10-02-09 ('<< >>' INDICATES VALUE OUT OF RANGE.)

Section 2

Key to Status Report

Key to Status Report and Column Headings

Overview

The year-end status report provided in the next section gives a thorough and concise recap of the 2009 Meter Sampling Program. It lists the pertinent statistics on all meter families in service along with the statistics on the representative sample drawn from each family. In addition, it summarizes the results of the "accuracy" and "not fast" tests performed on each sample, and specifies each family's status going into the 2009 program year.

The performance of each family was characterized by the regions on the control chart according to the following table (ref. program document):

	Meter Family < 10 years	Meter Family ≥ 10 years
Region I	Satisfactory	Satisfactory
Region II a	Satisfactory	Satisfactory
Region II b	Satisfactory	Satisfactory
Region III	At/Below Limits	At/Below Limits
Region IV	Satisfactory	Insufficient Sample

Column Headings

Following provides a brief explanation of each of the column headings in the status report:

FAMILY STATISTICS	**Statistics pertaining to each family.**
METER FAMILY (CLS)	Meter Families sorted by class. Each family is comprised of all meters of similar size and capacity, made by a single manufacturer, and last tested in same year. (e.g. 1982 Rockwell 250, 1982 Rockwell 275, and 1982 Rockwell 310)
SIZE	Total number of meters in each family at the beginning of the program year.

SAMPLE STATISTICS	**Statistics pertaining to representative sample taken from each family.**
MAX.SAMP	Maximum number of meters that would be required in a sample in order to make a valid determination of the family's future disposition.
NO.RMVD	Number of meters in the family removed during the course of the plan year.
SAMP.CNT	Number of meters used in the sample. Meters determined to be uniquely defective are excluded
'ACCURACY	**Compilation of test results to determine the**

TEST' RESULTS	proportion of the sample meeting the "accuracy" test (i.e. 98.0 to 102.0 percent accurate).
OK.CNT	Number of meters in the sample found 98.0 to 102.0 percent accurate.
PCT.OK	Percent or proportion of the sample found "accurate".
OK.LMT	The control limits above or below the 80% proportion threshold established for each family as determined by the following equation (ref. program document): $P_{.90} = p_t \pm 1.645\,[p_t(1-p_t)/n]^{.5} * [(N-n)/(N-1)]^{.5}$
MIN.SAMP	The minimum number of meters required in each sample to provide statistically valid results (i.e. sample falls in regions I, IIa, IIb, or III on the "meters accurate" control chart).
CTL.RGN	Control region in which the sample is determined to be on the "meters accurate" control chart.

'NOT FAST' TEST RESULTS	Compilation of test results to determine the proportion of the sample meeting the "not fast" test (i.e. not more than 102.0 percent accurate).
NF.CNT	Number of meters in the sample found not exceeding 102.0 percent accurate.
PCT.NF	Percent or proportion of sample found "not fast".
NF.LMT	The control limits above and below the 90% proportion threshold established for each family as determined by the following equation (ref. program document): $P_{.90} = p_t \pm 1.645\,[p_t(1-p_t)/n]^{.5} * [(N-n)/(N-1)]^{.5}$
MIN.SAMP	The minimum number of meters required in each sample to provide statistically valid results (i.e. sample falls in regions I, IIa, IIb, or III on the "meters not fast" control chart).
CTL.RGN	Control region in which the sample is determined to be on the "meters not fast" control chart.

FURTHER ACTION OR STATUS	Further action(s) that may be necessary to ensure the sample is of sufficient size and the family remains in compliance with program guidelines.
ADD.REQ	Additional number of meters that were required to meet or exceed minimum sample size.
DISP. OF FAMILY	Future disposition or status of each family as determined by the decision tree provided in the program document.

Section 3

Meter Families Found Below The Acceptable Performance Threshold (Regions IIb or III)

Meter Families Found Below Acceptable Performance Thresholds during the 2009 Program Year

No meter families were found below acceptable limits.

Section 4

Unanticipated Sample Deficiencies (Region IV)

Unanticipated Sample Deficiencies

No families were found to be deficient at the end of the plan year:

Section 5

Status of Meter Families Previously Scheduled For Removal

Status of Meters Previously Scheduled for Removal

No meter families were scheduled for removal in the 2009 plan year.

Section 6

Statistical Sample Program
(August 18, 1995)

Cascade Natural Gas Corporation
Statistical Sample Program
August 18, 1995

Program Description

Using knowledge of the operating histories of similar meters, the company may elect to keep particular meters in service for intervals beyond those specified in applicable state regulations, provided the meter performance meets the criteria of the company's Statistical Sample Program. Eligible meters are diaphragm type meters with a rated capacity of up to 3,000 ft^3/hr.

The maximum permissible error in the registration of meters placed in service is ±2.0% at both the open and check rates. For the purposes of the Statistical Sample Program, the definition of a meter registering with an error of -2.0% is one that registers 98.0% of accuracy and a meter registering with a +2.0% error is one that registers 102.0% of accuracy. A meter, therefore, must register between 98.0% and 102.0% of accuracy at each test rate, before being placed in service.

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

The program year shall begin on 1 October and end on 30 September of the following year.

Sample Selection and Evaluation

The performance evaluation of each meter family will be based on an evaluation of test results from random sampling of the family. 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. The performance and status, including disposition, of each meter family will be reported to the regulatory commissions as part of the annual meter report.

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.

All non-contaminated, testable meters will be tested in accordance with ANSI B109.1, and B109.2, using an average of the open and check in-test results to evaluate each meter's performance. 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.

A meter family will be considered to be acceptable if the sample of the family indicates:

a) a minimum proportion of .80 of the family measures between 98.0 percent and 102.0 percent accurate ("accuracy" requirement); and

b) a minimum proportion of .90 of the family measures no more than 102.0 percent accurate ("not fast" requirement).

To determine the significance of the proportions measured from sampling, the test results will be compared with threshold proportions and control limits on a control chart. The control limits will be defined as follows:

$$P_{.90} = p_t \pm 1.645 * [p_t(1-p_t)/n]^{.5} * [(N-n)/(N-1)]^{.5}$$

where:

$P_{.90}$ is the upper and lower proportion corresponding with an interval which will have a 90 percent probability of including the proportion from a random sample of size n (drawn without replacement) from a population of size N and a proportion equal to p_t. p_t is the threshold proportion, equal to the minimum acceptable proportion of the meter family and is:

= .80 for meters registering between 98.0% and 102% accurate, or

= .90 for meters registering no more than 102% accurate.

n is the sample size.

N is the meter family size prior to sampling.

1.645 is the factor necessary to provide the interval estimate associated with the threshold proportion, such that, nine times out of ten, the sample proportion will be included within that interval.

Each proportion measured from sampling will specify a particular region (I, II, III, or IV) on the control chart within which the sample data would plot. The regions (I, IIa, IIb, III, and IV) are outlined by the control limits and the threshold proportions, and will be as defined by figures 1 and 2. The vertical line between the regions II(a and b) and IV on the control chart will be established according to the following schedule:

Remaining Family Size			Division line between Regions II(a and b) and IV on the Control Chart
1	to	65	40 (or family size if less)
66	to	100	50
101	to	150	60
151	to	280	70
281	to	500	80
501	to	1200	90
1201	to	3200	100
3201	to	10000	125
10001 and over			200

The performance of each family will be characterized by the regions on the control chart according to the following table:

	Meter Family < 10 yrs old	Meter Family ≥ 10 yrs old
Region I	Satisfactory	Satisfactory
Region II a	Satisfactory	Satisfactory
Region II b	Satisfactory	Satisfactory
Region III	At/below Limits	At/below Limits
Region IV	Satisfactory	Insufficient Sample

Meter Family Disposition

Meter family disposition will be determined according to the following steps:

a. The proportion of the meters in the sample that measure between 98.0 percent and 102.0 percent accurate will be calculated, and the respective region on the "Accuracy" control chart determined.

b. The proportion of the meters in the sample which measure not more than 102.0 percent accurate will be calculated, and the respective region on the "Not Fast" control chart determined.

c. If the region is determined to be "IV" on either the "Accuracy" control chart or "Not Fast" control chart, an additional random sample will be obtained sufficient so the region determined from the combined sample data is not "IV".

d. The results from steps 1 and 2 (provided neither are region "IV") will be applied to the conditions outlined in the decision tree, shown in figures 3a and 3b.

e. Meters in families determined to be acceptable will be allowed to remain in service, subject to sample testing and review in succeeding years.

f. Meters in families that are subject to change-out at the company's option will be reviewed and a decision on whether they are to be removed will be made based on economic and operating factors. If the meters remain in service, they will be subject to sample testing and review in succeeding years.

g. Meters in families determined to require change-out will be changed by October of the second year following determination of the need for change-out (i.e. two years following the program year when the samples were taken.) However, if in any given year the total number of meters required for change-out exceeds four percent of the number of meters in the Statistical Sample Program, the company may, at its option and with Commission approval, extend the change-out schedule so that each meter family is changed within a maximum of four years from determination that change-out is required (i.e. four years following the program year when the samples were taken).

Decision Tree for Meter Families in Meter Sample Program

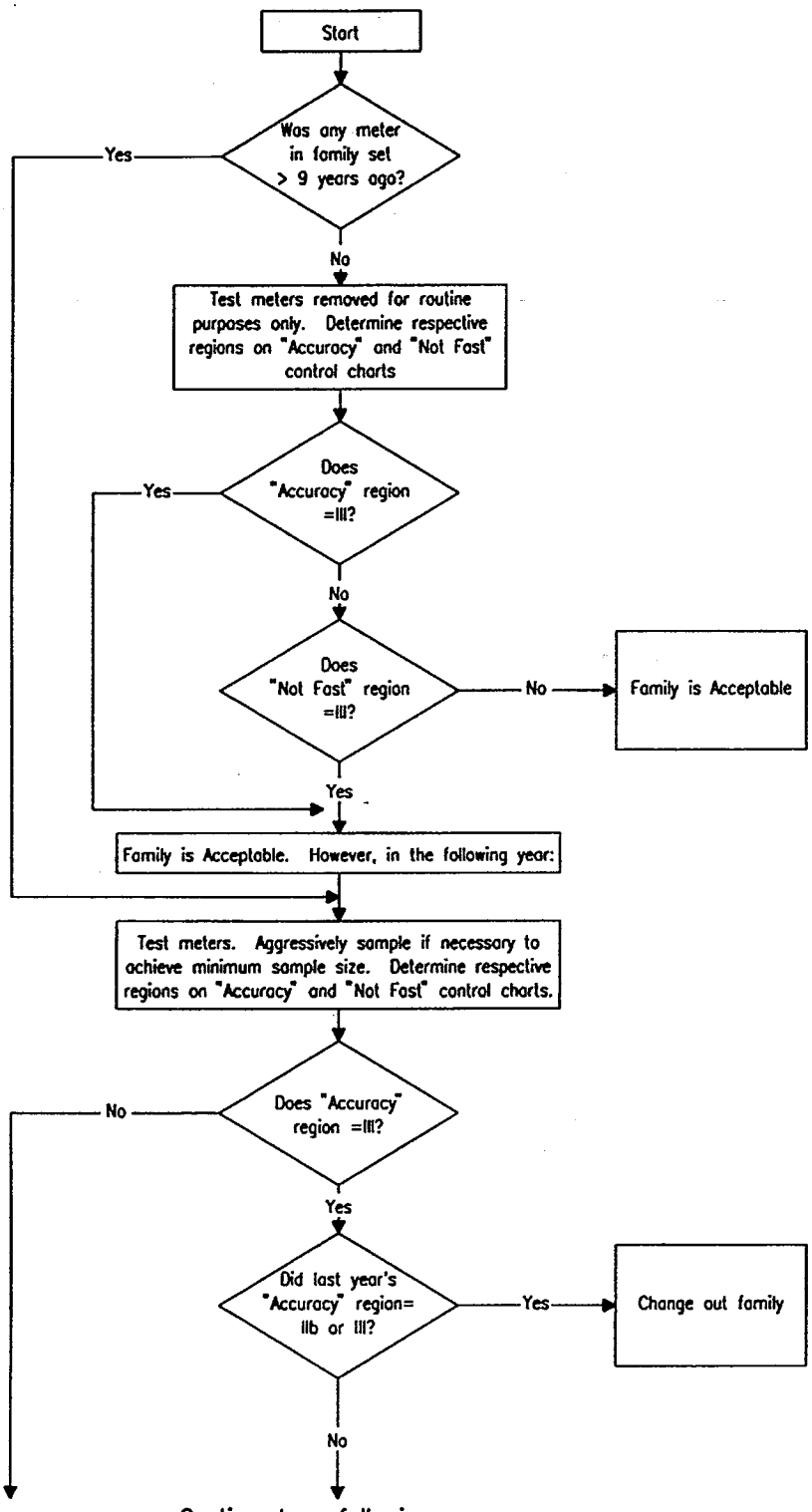

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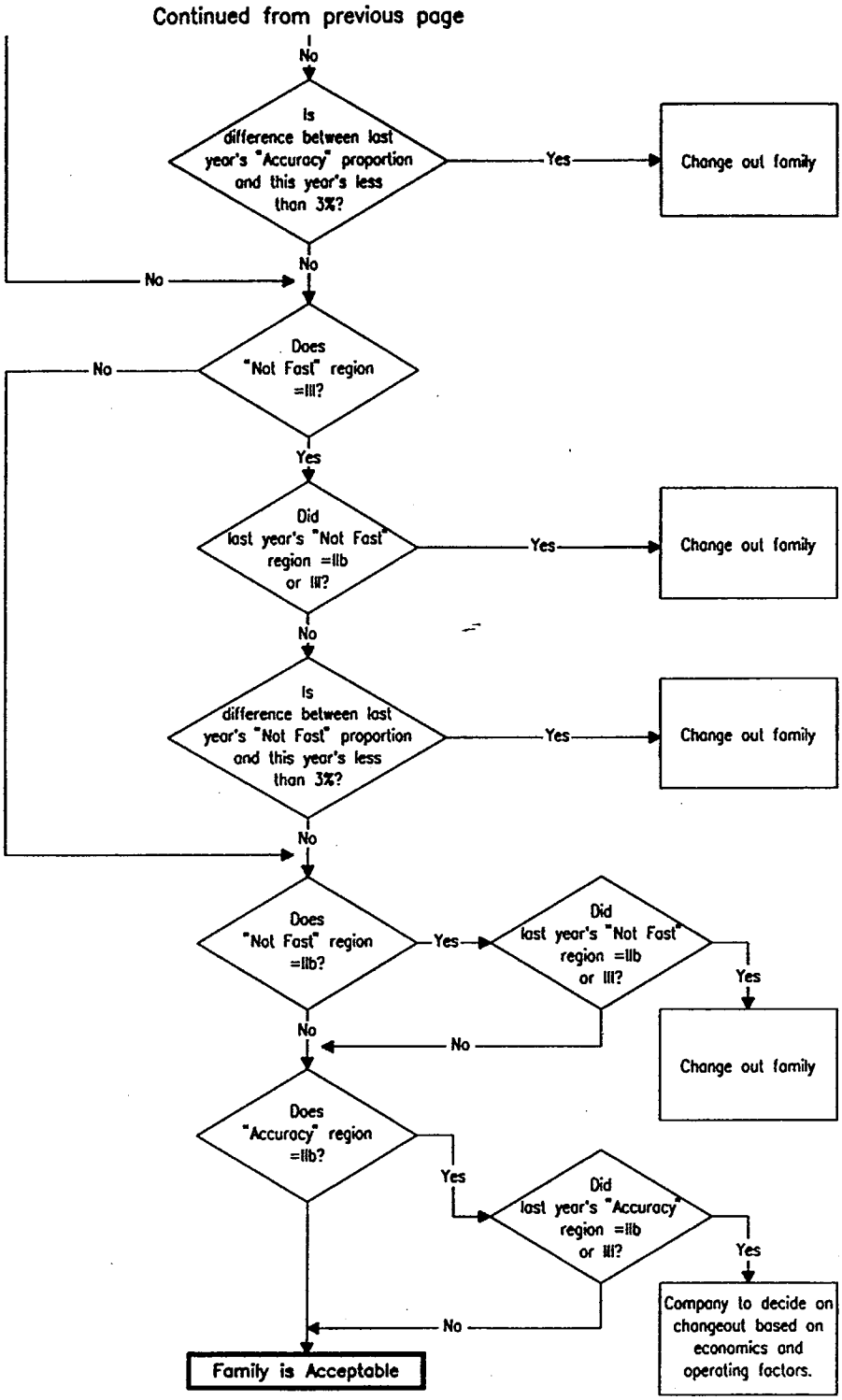
Figure 3.a.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No
Is difference between last year's "Accuracy" proportion and this year's less than 3%?
Yes
Change out family
No
No
Does "Not Fast" region =III?
No
Yes
Did last year's "Not Fast" region =IIb or III?
Yes
Change out family
No
Is difference between last year's "Not Fast" proportion and this year's less than 3%?
Yes
Change out family
No
Does "Not Fast" region =IIb?
Yes
Did last year's "Not Fast" region =IIb or III?
Yes
Change out family
No
No
Does "Accuracy" region =IIb?
Yes
Did last year's "Accuracy" region =IIb or III?
Yes
Company to decide on changeout based on economics and operating factors.
No
Family is Acceptable

Figure 3.b.

Meter Performance Control Charts

Figure 1. **For Meters Accurate**

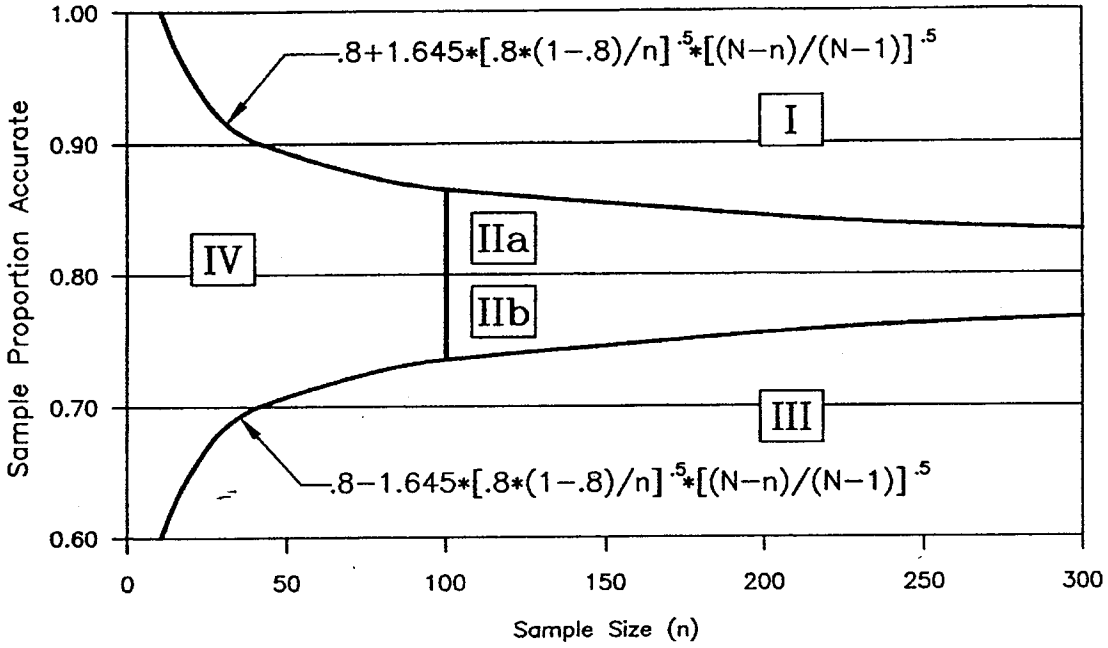
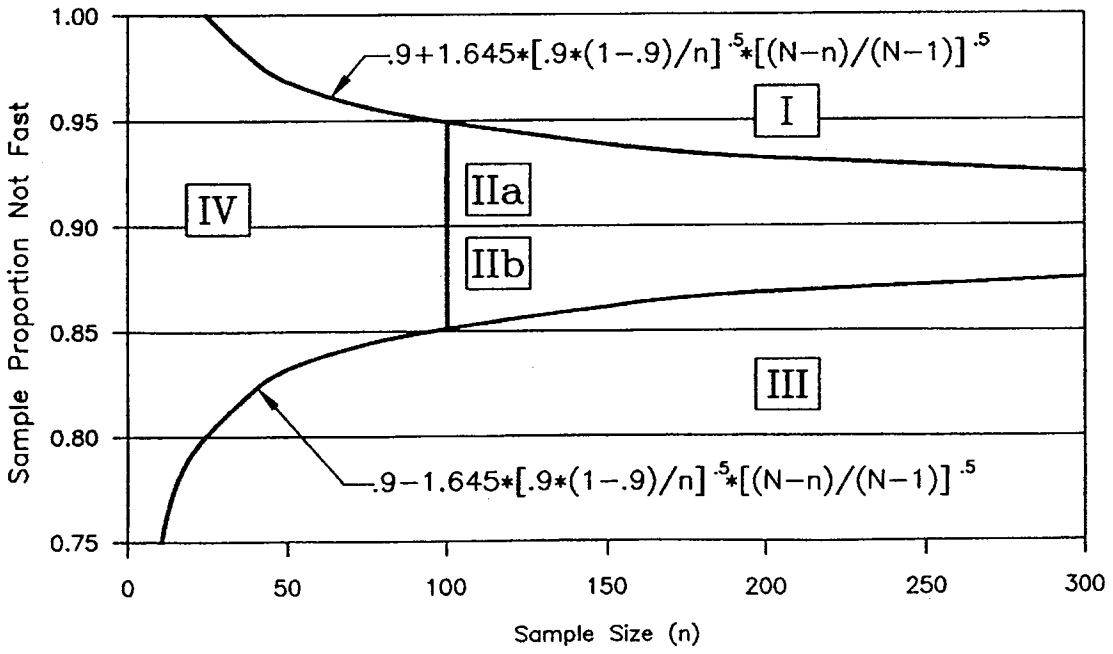


Figure 2. **For Meters Not Fast**



*Example where family size (N) = 3000