PHILIP MORRIS

U.S.A.

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November 25, 2004

BY OVERNIGHT DELIVERY

Gregory N. Connolly, D.M.D., M.P.H.
Director, Massachusetts Tobacco Control Program
Massachusetts Department of Public Health
250 Washington Street, Fourth Floor
Boston, MA 02108-4619

Re: 2004 Annual Report of Philip Morris USA Inc.
Nicotine Yield Rating Information

Dear Dr. Connolly:

In accordance with Massachusetts General Laws, Chapter 94, Section 307B, and the regulations promulgated by the Massachusetts Department of Public Health ("MA DPH") pursuant thereto (105 Code of Massachusetts Regulations ["CMR"] 660.000 *et seq.*), Philip Morris USA Inc. ("PM USA") hereby submits its 2004 annual report to the MA DPH. In addition to this hard copy submission, PM USA submits the enclosed disc containing its report for electronic review.

PM USA has summarized the information contained in its report on the enclosed spreadsheet, labeled Attachment A, for each brand style manufactured by PM USA and distributed within the Commonwealth of Massachusetts. The brand styles, designated "Marlboro King F HP 25's" and "Marlboro King F HP Lt 25's" on the list of brand styles sent to your attention on February 23, 2004, are infrequently produced and therefore were not available for testing during this reporting period.

Attachment A includes "the most recent nicotine level" reported by the Federal Trade Commission ("FTC"), as published in the FTC Report in 2000 entitled "'*Tar,' Nicotine, and Carbon Monoxide of the Smoke of 1294 Varieties of Domestic Cigarettes for the Year 1998*" (the "FTC Report", Market Sample #41), for each cigarette brand style and generic cigarette manufactured by PM USA and distributed within the Commonwealth of Massachusetts. For those PM USA brand styles distributed within the Commonwealth of Massachusetts that either were not included in this most recent FTC Report or had genuine product changes resulting in changes to the tar and

nicotine yield values since brand sampling for Market Sample #41, the average per cigarette nicotine yield is that determined by PM USA in accordance with the FTC method. This is consistent with the way PM USA reports tar and nicotine values not yet reflected in an FTC Report, pursuant to the voluntary tar and nicotine disclosure program used by the cigarette industry.

Attachment A also includes measured nicotine yield rating information, per requirements of 105 CMR 660.000 *et seq.* This information was determined for each cigarette brand style and generic cigarette manufactured by PM USA and distributed within the Commonwealth of Massachusetts with a national brand family market share of three percent or greater of the United States cigarette market, as reported in the third-quarter 2003 Maxwell Consumer Report.[1] Fifteen additional cigarette brand styles (from brand families with less than three percent national market share) were also designated by the MA DPH for testing. A copy of the MA DPH additional brand styles designation is included in Attachment B-1.

This nicotine yield rating information for each of the brand styles tested encompasses: (i) nicotine yield determined under MA DPH-defined "average smoking conditions" and the corresponding nicotine yield classification, per 105 CMR 660.102 (B)(4), (ii) total tobacco nicotine content on both a milligram per cigarette and a milligram per gram of tobacco basis, (iii) percent filter ventilation, (iv) puff count determined under MA DPH-defined "average smoking conditions," (v) tobacco weight per cigarette, and (vi) "pH" of smoke on a puff-by-puff basis for six sub-brands designated by the MA DPH. Attachment B-1 also includes the MA DPH designation of brand styles for testing "pH" of smoke on a puff-by-puff basis. Since a brand style selected by the MA DPH for puff-by-puff "pH", designated by the MA DPH as "Basic King F HP MEN Lights," is not sold in Massachusetts, the MA DPH agreed that PM USA would test brand style "Basic King F SP Menthol LT" as an alternative. Attachments B-2 and B-3 are copies of correspondence between PM USA and the MA DPH regarding testing of the alternate brand style.

For PM USA brand styles distributed in the Commonwealth of Massachusetts with a brand family market share of less than three percent, and not specifically designated by the MA DPH for testing, a numerical factor was used for calculating nicotine yields at MA DPH-defined "average smoking conditions." This "numerical factor" is a quadratic equation that was developed in accordance with 105 CMR 660.102 (B)(6). PM USA continues to develop and use a numerical factor based on

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[1] The Marlboro and Basic brand families of cigarettes are the PM USA brand families satisfying the criterion of a national market share of three percent or greater. Therefore, PM USA provides the information included in Attachment A with respect to all Marlboro and Basic brand styles manufactured by PM USA and currently distributed within the Commonwealth of Massachusetts.

test data for PM USA brands only. PM USA believes that the approach of using only PM USA data is optimal for ensuring that brands used to develop the numerical factor are similar in design features and quality to those brands whose yields are calculated from the numerical factor. PM USA developed this year's numerical factor using its 2003 test data for brands in the Marlboro and Basic brand families, the additional brand styles selected for testing by the MA DPH in 2003 and the additional brand styles selected for testing by the Texas Department of Health in 2003. The resultant calculated nicotine yields are included in Attachment A. Additional details of the quadratic equation and its application are provided in Attachment C.

Nicotine Delivery Under MA DPH-Defined "Average Smoking Conditions"

PM USA tested sixty cigarettes of each brand style, smoking three cigarettes per each of twenty ports, in order to determine nicotine yield under MA DPH-defined "average smoking conditions."

Nicotine Content Measurement

PM USA measured the quantity of nicotine contained in the cigarette filler with a methodology equivalent to the Centers for Disease Control and Prevention's "Protocol for Analysis of Nicotine, Total Moisture and pH in Smokeless Tobacco Products" originally published in the Federal Register on May 2, 1997, Vol. 62, No. 85, pp. 24115-24119 and as amended and published in the Federal Register on March 23, 1999, Vol. 64, No. 55, pp. 14086-14096 (the "CDC Protocol").

The equivalent method used by PM USA for measuring the quantity of nicotine contained in the cigarette filler is CORESTA Recommended Method No. 35, "Determination of Total Alkaloids (as nicotine) in Tobacco by Continuous Flow Analysis", November 1994 ("CORESTA Method 35"). Minor modifications were made to CORESTA Method 35 to accommodate existing laboratory equipment and related procedural requirements. PM USA submits, as Attachment D, a description of the methodology reflecting the procedure followed by PM USA.

Please note that, as was true for the test results reported by PM USA in six previous years (1998-2003) and as can be seen in Attachment A, in each of these reports nicotine content in the cigarette is not a reliable predictor of nicotine yield under MA DPH-defined "average smoking conditions." Since the test results reported do not disclose a meaningful basis for distinguishing among the brand styles tested, PM USA respectfully requests that the MA DPH eliminate from the regulations the obligation to measure and report the quantity of nicotine in the cigarette filler as it provides no meaningful data to the MA DPH.

Filter Tip Ventilation Measurement

PM USA measured Percent Filter Tip Ventilation using a Cerulean (formerly Fidus/Filtrona) instrument in accordance with 105 CMR 660.102(B)(3). This instrument is equivalent in functionality and produces similar results to the Filter Dilution (Ventilation) Testing Instrument (FDT) product no. FDT 232, or equivalent, required per 105 CMR 660.102(B)(3). In order for the number of cigarettes measured for percent filter tip ventilation to be consistent with the number of cigarettes tested for smoke nicotine yield, PM USA computed the average percent filter tip ventilation for a 60-cigarette sample.

PM USA continues to urge consideration of the International Organization of Standardization (ISO) method 9512, 2002 ed., "Cigarettes – Determination of ventilation – Definitions and measurement principles," for measuring percent filter tip ventilation, the method used by PM USA for product monitoring.

"pH" Measurement Pursuant to a Puff-by-Puff Method

The measurement of pH is, by definition, a measurement of the degree of the acidity or alkalinity of a dilute aqueous solution. Cigarette smoke, which is an aerosol comprising a vapor phase and a particulate phase, is not a dilute aqueous solution. Therefore, cigarette smoke does not meet this criterion for pH measurement. The "pH" of smoke is reported in quotes to indicate that the measurements are empirical and dependent upon the conditions under which they are made. As noted in its prior submissions, PM USA does not believe that smoke "pH" data provide meaningful information about the chemical nature of smoke.

PM USA is not aware of a standard method for a "pH" of smoke measurement. However, given the requirements of 105 CMR 660.500 (E) that a "puff-by-puff" method be applied, PM USA developed and has used the method detailed in Attachment E since 1998. The results obtained with this method for the six sub-brands designated by the MA DPH are provided in Attachment A.

PM USA reported the "pH" test results on a per cigarette basis in 1997 and on a puff-by-puff basis for five previous years (1998 – 2003) and again this year. However, none of these test results, individually or cumulatively, have provided any meaningful basis for distinguishing among the brand styles tested, as the results indicated no differences among brand styles. PM USA therefore respectfully reiterates its request that the requirement for testing the "pH" of smoke be eliminated in its entirety from the regulations as it provides no meaningful data to the MA DPH.

Sampling and Conditioning

The cigarettes tested for total nicotine content, percent filter tip ventilation, "pH" of cigarette smoke measured pursuant to a puff-by-puff method, and nicotine yield under MA DPH-defined "average smoking conditions," were collected through a market sampling conducted at the wholesale level in accordance with MA DPH's advanced approval. The samples were conditioned in accordance with the guidelines set forth in ISO Standard 3402, 1999, 4th ed., "Tobacco and tobacco products - Atmosphere for conditioning and testing." On March 16, 2004, and on August 20, 2004, PM USA delivered samples to the MA DPH, for a total of thirty samples of each brand style.

Miscellaneous

Please note, when reviewing the reported puff counts for nicotine yield under MA DPH-defined "average smoking conditions" and "pH" of smoke, that variation associated with the smoking processes can result in reported puff counts that differ by as much as one puff per cigarette for samples of the same cigarette brand style.

Designated Contact

The complete name, title, business address and telephone number of the individual designated by PM USA as the MA DPH contact person for inquiries related to 105 CMR 660.000 *et seq.* follows:

Dr. Jane Y. Lewis
Vice President, Product Assessment
Philip Morris USA Research, Development & Engineering
2000 Bells Road
Gate S/Door 100
Richmond, VA 23234
(804) 274-4404

Dr. Lewis is familiar with the nicotine yield rating information set forth herein.

Please acknowledge your receipt of the 2004 Annual Report of Philip Morris USA Inc. by signing and returning one copy of this letter in the pre-addressed, postage paid mailer provided for your convenience.

Sincerely,

Philip Morris USA Inc.

By: _____
Jane Y. Lewis, Ph.D.

Title: Vice President,
Product Assessment

ACKNOWLEDGMENT OF RECEIPT

Commonwealth of Massachusetts

By: _____

Title: _____

2004 Massachusetts Compliance Data

Brand	Sub-Brand				FTC MS #41 Nicotine (mg/cigt.)	MA Smoke Nicotine Measured (mg/cigt.)	MA Smoke Nicotine Calculated (mg/cigt.)	MA Classification	Tobacco Nicotine (mg/cigt.)	Tobacco Nicotine (mg/g)	Ventilation (%)	Number of Puffs	Tobacco Weight (g)	"pH" Puff by Puff														
														Puff 1	Puff 2	Puff 3	Puff 4	Puff 5	Puff 6	Puff 7	Puff 8	Puff 9	Puff 10	Puff 11	Puff 12	Puff 13	Puff 14	Puff 15	Mean "pH"
Marlboro	100	F	HP		1.1	2.37	NA	High	14.58	18.35	12	13.1	0.794	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Marlboro	100	F	HP	Menthol	1.1	2.22	NA	High	14.11	17.40	13	13.1	0.811	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Marlboro	100	F	SP		1.2	2.41	NA	High	15.52	18.50	14	13.7	0.839	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Marlboro	100	F	HP	Lt	0.8	1.77	NA	High	13.88	18.20	28	13.1	0.762	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Marlboro	100	F	SP	Lt	0.8	1.85	NA	High	14.59	18.60	29	12.8	0.784	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Marlboro	100	F	HP	Lt Menthol	0.8	1.65	NA	High	13.50	17.90	30	13.0	0.754	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Marlboro	100	F	SP	Lt Menthol	0.7	1.60	NA	High	13.29	17.10	27	13.2	0.777	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Marlboro	100	F	HP	Medium	1.0	2.11	NA	High	13.98	18.10	17	13.1	0.772	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Marlboro	100	F	SP	Medium	1.0	2.19	NA	High	14.07	18.30	18	13.1	0.769	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Marlboro*	100	F	HP	Mild Menthol	1.0	2.19	NA	High	14.70	19.40	13	12.3	0.758	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Marlboro	100	F	HP	Ultra-Lt	0.5	1.38	NA	High	14.02	19.15	47	13.2	0.732	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Marlboro*	100	F	HP	Ultra-Lt Menthol	0.5	1.26	NA	High	13.77	19.20	50	13.4	0.718	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Marlboro	King	F	HP		1.1	2.27	NA	High	13.09	18.75	8	10.7	0.698	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Marlboro	King	F	HP	Menthol	1.1	2.08	NA	High	12.31	17.05	18	11.9	0.722	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Marlboro	King	F	SP		1.1	2.24	NA	High	13.25	18.15	10	11.8	0.730	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Marlboro	King	F	SP	Menthol	1.1	2.19	NA	High	12.93	17.75	19	11.8	0.728	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Marlboro	King	F	HP	Lt	0.8	1.67	NA	High	12.23	18.40	17	10.9	0.665	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Marlboro	King	F	HP	Lt Menthol	0.8	1.53	NA	High	10.83	16.70	26	10.5	0.649	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Marlboro	King	F	SP	Lt	0.8	1.69	NA	High	12.21	18.45	21	10.4	0.662	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Marlboro	King	F	SP	Lt Menthol	0.8	1.53	NA	High	11.04	16.90	29	10.4	0.653	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Marlboro	King	F	HP	Medium	0.9	1.78	NA	High	11.91	18.25	16	10.3	0.653	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Marlboro	King	F	SP	Medium	0.8	1.81	NA	High	12.22	18.70	20	10.0	0.653	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Marlboro*	King	F	HP	Mild Menthol	0.9	1.66	NA	High	11.82	18.20	15	10.1	0.649	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Marlboro	King	F	HP	Ultra-Lt	0.5	1.34	NA	High	12.11	19.50	43	10.4	0.621	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Marlboro*	King	F	HP	Ultra-Lt Menthol	0.5	1.26	NA	High	11.77	19.35	45	10.4	0.608	4.7	4.8	4.8	4.8	4.9	4.8	4.8	4.8	4.8	4.7	NA	NA	NA	NA	NA	4.8
Marlboro*	King	F	HP	Blend No. 27	1.0	1.73	NA	High	10.85	16.65	11	9.9	0.651	4.8	4.8	4.8	4.8	4.7	4.8	4.7	4.7	4.8	NA	NA	NA	NA	NA	NA	4.8
Marlboro*	King	F	SP	Blend No. 27	1.0	1.85	NA	High	11.48	17.25	13	10.3	0.665	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Marlboro*	72	F	HP	Menthol Green	1.0	1.96	NA	High	11.25	18.75	13	9.8	0.600	4.7	4.8	4.8	4.7	4.8	4.8	4.8	4.7	4.9	NA	NA	NA	NA	NA	NA	4.8
Basic	100	F	HP		1.0	2.03	NA	High	13.16	16.60	0	12.1	0.792	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Basic	100	F	SP		1.0	2.11	NA	High	13.65	16.75	0	12.3	0.815	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Basic	100	F	SP	FF Menthol	1.0	2.20	NA	High	14.12	17.05	2	12.2	0.828	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Basic	100	F	HP	Lt	0.8	1.62	NA	High	12.27	16.50	17	12.2	0.744	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Basic	100	F	SP	Lt	0.8	1.69	NA	High	13.33	17.00	16	12.4	0.784	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Basic	100	F	SP	Lt Menthol	0.8	1.71	NA	High	12.89	16.85	16	12.4	0.765	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Basic*	100	F	HP	Ultra-Lt	0.5	1.35	NA	High	12.84	16.85	47	13.0	0.762	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

*From Philip Morris USA internal testing.
NA = Not Applicable

2004 Massachusetts Compliance Data

Brand	Sub-Brand				FTC MS #41 Nicotine (mg/cigt.)	MA Smoke Nicotine Measured (mg/cigt.)	MA Smoke Nicotine Calculated (mg/cigt.)	MA Classification	Tobacco Nicotine (mg/cigt.)	Tobacco Nicotine (mg/g)	Ventilation (%)	Number of Puffs	Tobacco Weight (g)	"pH" Puff by Puff														
														Puff 1	Puff 2	Puff 3	Puff 4	Puff 5	Puff 6	Puff 7	Puff 8	Puff 9	Puff 10	Puff 11	Puff 12	Puff 13	Puff 14	Puff 15	Mean "pH"
Basic	100	F	SP	Ultra-Lt	0.5	1.27	NA	High	12.56	16.30	52	13.3	0.770	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Basic*	100	F	HP	Ultra-Lt Menthol	0.5	1.33	NA	High	12.64	16.85	49	13.1	0.750	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Basic*	King	NF	SP		1.3	2.52	NA	High	15.06	17.40	NA	10.4	0.865	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Basic	King	F	HP		1.0	2.11	NA	High	12.20	17.05	2	10.8	0.716	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Basic	King	F	HP	FF Menthol	1.0	2.04	NA	High	12.16	17.20	0	10.2	0.707	4.8	4.8	4.7	4.7	4.7	4.8	4.7	4.8	4.8	4.9	NA	NA	NA	NA	NA	4.8
Basic	King	F	SP		1.0	2.06	NA	High	12.54	17.35	2	10.9	0.723	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Basic	King	F	SP	FF Menthol	1.0	2.19	NA	High	12.30	17.10	2	11.1	0.720	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Basic	King	F	HP	Lt	0.7	1.55	NA	High	10.97	17.25	14	9.4	0.636	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Basic	King	F	SP	Lt	0.7	1.53	NA	High	10.88	16.85	18	10.1	0.646	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Basic	King	F	SP	Lt Menthol	0.7	1.53	NA	High	11.27	17.45	12	10.0	0.645	4.7	4.7	4.7	4.8	4.7	4.7	4.7	4.8	4.7	NA	NA	NA	NA	NA	NA	4.7
Basic*	King	F	HP	Ultra-Lt	0.5	1.14	NA	Moderate	10.98	17.35	41	10.1	0.633	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Basic*	King	F	HP	Ultra-Lt Menthol	0.5	1.12	NA	Moderate	10.92	17.05	42	10.4	0.641	4.7	4.8	4.8	4.7	4.9	4.8	4.8	4.8	4.8	4.8	NA	NA	NA	NA	NA	4.8
Basic	King	F	SP	Ultra-Lt	0.5	1.20	NA	Moderate	11.27	17.30	40	10.8	0.651	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benson & Hedges	100	F	SP	Menthol	1.1	2.28	NA	High	15.22	17.85	19	14.1	0.853	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benson & Hedges	100	F	HP	Lt Menthol	0.8	1.77	NA	High	12.97	17.75	28	12.2	0.731	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benson & Hedges	100	F	SP	Lt Menthol	0.8	1.79	NA	High	14.74	18.25	26	13.4	0.808	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benson & Hedges	100	F	HP	Ultra-Lt Dlx	0.5	1.34	NA	High	12.50	17.85	55	13.3	0.700	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Merit	100	F	SP	Lt	0.8	1.81	NA	High	15.21	18.85	30	13.6	0.807	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Merit	100	F	SP	Ultra-Lt	0.5	1.35	NA	High	14.35	19.75	55	13.3	0.726	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Merit	King	F	SP	Ultima	0.1	0.77	NA	Moderate	11.69	23.60	69	9.7	0.495	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Parliament	100	F	HP	Lt	1.0	2.12	NA	High	14.44	18.15	28	12.3	0.796	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Parliament	King	F	HP	Lt	0.7	1.49	NA	High	11.76	18.65	35	9.8	0.631	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Parliament	King	F	HP	Lt Menthol	0.7	1.43	NA	High	10.50	16.85	22	9.2	0.623	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Virginia Slims*	120	F	HP	Luxury Lt Slim	1.1	2.34	NA	High	16.57	18.30	32	17.0	0.905	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Virginia Slims	100	F	HP	Lt Slim	0.7	1.70	NA	High	12.48	18.30	39	12.4	0.682	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Virginia Slims	100	F	HP	Lt Menthol Slim	0.7	1.70	NA	High	12.15	18.25	39	12.1	0.666	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Virginia Slims	100	F	HP	Super-Slim Menthol	0.5	1.51	NA	High	8.46	19.55	64	10.0	0.432	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Virginia Slims	100	F	HP	Ultra-Lt Menthol Slim	0.5	1.37	NA	High	11.94	17.85	57	13.2	0.669	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

*From Philip Morris USA internal testing.
NA = Not Applicable

2004 Massachusetts Compliance Data

Brand	Sub-Brand				FTC MS #41 Nicotine (mg/cigt.)	MA Smoke Nicotine Measured (mg/cigt.)	MA Smoke Nicotine Calculated (mg/cigt.)	MA Classification	Tobacco Nicotine (mg/cigt.)	Tobacco Nicotine (mg/g)	Ventilation (%)	Number of Puffs	Tobacco Weight (g)	"pH" Puff by Puff														
														Puff 1	Puff 2	Puff 3	Puff 4	Puff 5	Puff 6	Puff 7	Puff 8	Puff 9	Puff 10	Puff 11	Puff 12	Puff 13	Puff 14	Puff 15	Mean "pH"
Alpine	100	F	SP	Menthol	1.1	NA	2.2	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benson & Hedges	100	F	HP	Lt	0.8	NA	1.7	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benson & Hedges	100	F	HP	Menthol	1.1	NA	2.2	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benson & Hedges	100	F	HP	Ultra-Lt Menthol Dlx	0.5	NA	1.3	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benson & Hedges	100	F	HP		1.1	NA	2.2	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benson & Hedges	100	F	SP	Lt	0.8	NA	1.7	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benson & Hedges	100	F	SP		1.1	NA	2.2	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benson & Hedges	King	F	HP		1.1	NA	2.2	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benson & Hedges	King	F	SP	M-Filter	0.9	NA	1.9	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Best Buy	100	F	HP	FF Generic	1.0	NA	2.1	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Best Buy*	100	F	HP	FF Menthol Generic	1.0	NA	2.1	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Best Buy	100	F	SP	FF Generic	1.0	NA	2.1	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Best Buy	100	F	SP	FF Menthol Generic	1.0	NA	2.1	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Best Buy	100	F	SP	Lt Generic	0.8	NA	1.7	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Best Buy	100	F	SP	Lt Menthol Generic	0.8	NA	1.7	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Best Buy	100	F	SP	Ultra-Lt Generic	0.5	NA	1.3	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Best Buy	King	F	HP	FF Generic	0.9	NA	1.9	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Best Buy*	King	F	HP	FF Menthol Generic	1.0	NA	2.1	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Best Buy*	King	F	HP	Lt Generic	0.8	NA	1.7	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Best Buy	King	F	SP	FF Generic	0.9	NA	1.9	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Best Buy	King	F	SP	FF Menthol Generic	0.9	NA	1.9	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Best Buy	King	F	SP	Lt Generic	0.7	NA	1.6	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Best Buy	King	F	SP	Lt Menthol Generic	0.7	NA	1.6	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Best Buy	King	F	SP	Ultra-Lt Generic	0.5	NA	1.3	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Best Buy*	King	NF	SP	Generic	1.2	NA	2.4	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bristol	100	F	SP		1.0	NA	2.1	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cambridge*	100	F	SP	FF	0.9	NA	1.9	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cambridge*	100	F	SP	Lt	0.7	NA	1.6	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cambridge*	100	F	SP	Lt Menthol	0.7	NA	1.6	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cambridge*	100	F	SP	Ultra-Lt	0.5	NA	1.3	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cambridge*	King	F	SP	Lt	0.7	NA	1.6	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cambridge*	King	F	SP	Lt Menthol	0.7	NA	1.6	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Canadian Players	King	F	HP	Lt	1.5	NA	3.0	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Canadian Players	Reg	F	HP	Lt	1.3	NA	2.6	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Canadian Players	Reg	F	HP		1.5	NA	3.0	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

*From Philip Morris USA internal testing.
NA = Not Applicable

2004 Massachusetts Compliance Data

Brand	Sub-Brand				FTC MS #41 Nicotine (mg/cigt.)	MA Smoke Nicotine Measured (mg/cigt.)	MA Smoke Nicotine Calculated (mg/cigt.)	MA Classification	Tobacco Nicotine (mg/cigt.)	Tobacco Nicotine (mg/g)	Ventilation (%)	Number of Puffs	Tobacco Weight (g)	"pH" Puff by Puff														
														Puff 1	Puff 2	Puff 3	Puff 4	Puff 5	Puff 6	Puff 7	Puff 8	Puff 9	Puff 10	Puff 11	Puff 12	Puff 13	Puff 14	Puff 15	Mean "pH"
Chesterfield*	King	NF	SP		1.3	NA	2.6	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chesterfield*	Reg	NF	SP		1.2	NA	2.4	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Commander*	King	NF	SP		1.3	NA	2.6	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
English Ovals*	King	NF	HP		1.4	NA	2.8	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Genco*	100	F	HP	FF Generic	1.0	NA	2.1	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Genco	100	F	SP	FF Generic	1.0	NA	2.1	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Genco	100	F	SP	FF Menthol Generic	1.0	NA	2.1	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Genco	100	F	SP	Lt Generic	0.8	NA	1.7	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Genco	100	F	SP	Lt Menthol Generic	0.8	NA	1.7	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Genco	100	F	SP	Ultra-Lt Generic	0.5	NA	1.3	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Genco*	King	F	HP	FF Generic	1.0	NA	2.1	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Genco*	King	F	HP	Lt Generic	0.8	NA	1.7	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Genco	King	F	SP	FF Generic	0.9	NA	1.9	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Genco	King	F	SP	FF Menthol Generic	0.9	NA	1.9	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Genco	King	F	SP	Lt Generic	0.7	NA	1.6	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Genco	King	F	SP	Lt Menthol Generic	0.7	NA	1.6	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Genco	King	F	SP	Ultra-Lt Generic	0.5	NA	1.3	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Genco*	King	NF	SP	Generic	1.2	NA	2.4	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
L&M*	100	F	SP	FF	1.0	NA	2.1	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
L&M*	King	F	SP	FF	1.0	NA	2.1	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lark*	100	F	SP	FF	1.0	NA	2.1	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lark*	100	F	SP	Lt	0.8	NA	1.7	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lark*	King	F	SP	FF	1.0	NA	2.1	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lark*	King	F	SP	Lt	0.8	NA	1.7	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Merit	100	F	HP	Ultima	0.2	NA	0.9	Moderate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Merit	100	F	HP	Ultra-Lt	0.6	NA	1.4	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Merit	100	F	SP	Lt Menthol	0.7	NA	1.6	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Merit	100	F	SP	Ultima	0.2	NA	0.9	Moderate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Merit	100	F	SP	Ultra-Lt Menthol	0.5	NA	1.3	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Merit	King	F	HP	Lt	0.6	NA	1.4	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Merit	King	F	HP	Ultima	0.1	NA	0.8	Moderate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Merit	King	F	HP	Ultra-Lt	0.5	NA	1.3	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Merit	King	F	SP	Lt	0.6	NA	1.4	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Merit	King	F	SP	Lt Menthol	0.6	NA	1.4	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Merit	King	F	SP	Ultra-Lt	0.5	NA	1.3	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

*From Philip Morris USA internal testing.
NA = Not Applicable

2004 Massachusetts Compliance Data

Brand	Sub-Brand				FTC MS #41 Nicotine (mg/cigt.)	MA Smoke Nicotine Measured (mg/cigt.)	MA Smoke Nicotine Calculated (mg/cigt.)	MA Classification	Tobacco Nicotine (mg/cigt.)	Tobacco Nicotine (mg/g)	Ventilation (%)	Number of Puffs	Tobacco Weight (g)	"pH" Puff by Puff														
														Puff 1	Puff 2	Puff 3	Puff 4	Puff 5	Puff 6	Puff 7	Puff 8	Puff 9	Puff 10	Puff 11	Puff 12	Puff 13	Puff 14	Puff 15	Mean "pH"
Merit	King	F	SP	Ultra-Lt Menthol	0.5	NA	1.3	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Parliament	100	F	HP	Lt Menthol	1.0	NA	2.1	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Parliament	100	F	SP	Lt	1.0	NA	2.1	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Parliament*	King	F	HP	Menthol	1.0	NA	2.1	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Parliament*	King	F	HP	Ultra-Lt	0.5	NA	1.3	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Parliament*	King	F	HP	Ultra-Lt Menthol	0.5	NA	1.3	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Parliament*	King	F	HP		1.1	NA	2.2	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Parliament	King	F	SP	Lt	0.7	NA	1.6	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Players	100	F	HP	Lt	1.0	NA	2.1	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Players	100	F	HP	Lt Menthol	1.0	NA	2.1	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Players	King	F	HP	Lt	0.8	NA	1.7	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Players	King	F	HP	Lt Menthol	0.8	NA	1.7	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Players*	Reg	NF	HP		1.3	NA	2.6	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Rothmans	King	F	HP	25-pk	1.2	NA	2.4	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Rothmans	King	F	HP	Spec-Mild	1.2	NA	2.4	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Rothmans	King	F	HP		1.3	NA	2.6	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Saratoga	120	F	HP	Menthol	1.1	NA	2.2	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Saratoga	120	F	HP		1.1	NA	2.2	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Virginia Slims*	100	F	HP	Menthol Slim	1.1	NA	2.2	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Virginia Slims*	100	F	HP	Slim	1.1	NA	2.2	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Virginia Slims	100	F	HP	Sup-Slim	0.6	NA	1.4	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Virginia Slims	100	F	HP	Ultra-Lt Slim	0.5	NA	1.3	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Virginia Slims	100	F	SP	Menthol Slim	1.1	NA	2.2	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Virginia Slims	100	F	SP	Slim	1.1	NA	2.2	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Virginia Slims*	120	F	HP	Luxury Lt Menthol Slim	1.1	NA	2.2	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

*From Philip Morris USA internal testing.
NA = Not Applicable

The Commonwealth of Massachusetts
Executive Office of Health and Human Services
Department of Public Health
250 Washington Street, Boston, MA 02108-4619

MITT ROMNEY
GOVERNOR

KERRY HEALEY
LIEUTENANT GOVERNOR

RONALD PRESTON
SECRETARY

CHRISTINE C. FERGUSON
COMMISSIONER

March 10, 2004

Dr. Jane Lewis
Vice President, Scientific Technical Services
Philip Morris Research, Development & Engineering
2000 Bells Road
Gate S/Door 100
Richmond, VA 23234

Dear Dr. Lewis:

The Massachusetts Department of Public Health has selected the following additional brands, to be sampled and tested in accordance with 105 CMR 660.102(A)(1). Nicotine rating information gathered for these brands should be submitted as part of the December 2001 report.

Benson & Hedges 100 F SP LT MEN
Benson & Hedges 100 F HP LT MEN
Benson & Hedges 100 F HP Deluxe UL
Benson & Hedges 100 F SP MEN
Merit K F SP Ultima
Merit 100 F SP
Merit 100 F SP UL
Parliament K F HP LT MEN
Parliament 100 F HP LT
Parliament K F HP LT
Virginia Slims 120 F HP LT Slim
Virginia Slims 100 F HP UL MEN Slim
Virginia Slims 100 F HP LT MEN Slim
Virginia Slims 100 F HP MEN Super Slim
Virginia Slims 100 F HP LT Slim

In addition, the following sub-brands have been selected for testing of pH on a puff-by-puff basis, as required pursuant to 660.102(B)(5) based on overall market share:

Marlboro KFHP Blend No. 27
Basic KFHP MEN
Marlboro FHP 72 Menthol Green
Basic KFHP MEN Lights
Marlboro KFHP MEN UL
Basic KFHP MEN UL

Please notify the Department as soon as possible if any of the above brand styles have been discontinued, and we will provide you with an alternative.

Sincerely,

Gregory N. Connolly, D.M.D., M.P.H.
Scientific Advisor, Massachusetts Department of Public Health

PHILIP MORRIS

U.S.A.

OPERATIONS CENTER, RICHMOND, VIRGINIA 23261-6583

JANE Y. LEWIS
VICE PRESIDENT
PRODUCT ASSESSMENT

P. O. BOX 26603
(804) 274-4404
FAX: (804) 274-3933

August 25, 2004

Gregory N. Connolly, D.M.D., M.P.H.
Director, Massachusetts Tobacco Control Program
Massachusetts Department of Public Health
250 Washington Street, Fourth Floor
Boston, MA 02108

Dear Dr. Connolly:

On February 23, 2004, Philip Morris USA Inc. ("PM USA") submitted to your office a list of PM USA products sold in the Commonwealth of Massachusetts, in accordance with the Massachusetts nicotine yield rating reporting requirements. Your office replied with a list of brand styles from the Marlboro and Basic brand families to be tested for puff-by-puff "smoke pH." That list included "Basic King FHP MEN Lights," a brand style version not sold in Massachusetts and not included on our list as originally submitted.

PM USA does sell in Massachusetts a Basic brand style designated as "Basic King F SP Menthol LT" on our original list. PM USA proposes to test this brand style, in place of the "Basic King FHP MEN Lights" for puff-by-puff "smoke pH" as part of its 2004 Report to the Massachusetts Department of Public Health. If your office does not agree with this proposal, we request that your office designate an alternative Basic brand style from our original list by September 15, 2004.

Thank you for consideration in this matter.

Sincerely,

Jane Y Lewis

Dr. Jane Y. Lewis
Vice President, Product Assessment
Philip Morris USA Research, Development & Engineering
2000 Bells Road
Gate S/Door 100
Richmond, VA 23234
(804) 274-4404

The Commonwealth of Massachusetts
Executive Office of Health and Human Services
Department of Public Health
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September 8, 2004

Dr. Jane Y. Lewis
Vice President, Product Assessment
Philip Morris USA Research
Development & Engineering
2000 Bells Road
Gate S/Door 100
Richmond, Virginia 23234

Dear Dr. Lewis:

Thank you for your letter of August 25, 2004. Please be advised that you have our permission to substitute "Basic King F SP Menthol LT" for testing in lieu of "Basic King FHP MEN Lights" for puff-by-puff "smoke pH" for the 2004 annual report.

Sincerely,

Gregory N. Connolly, D.M.D., M.P.H.

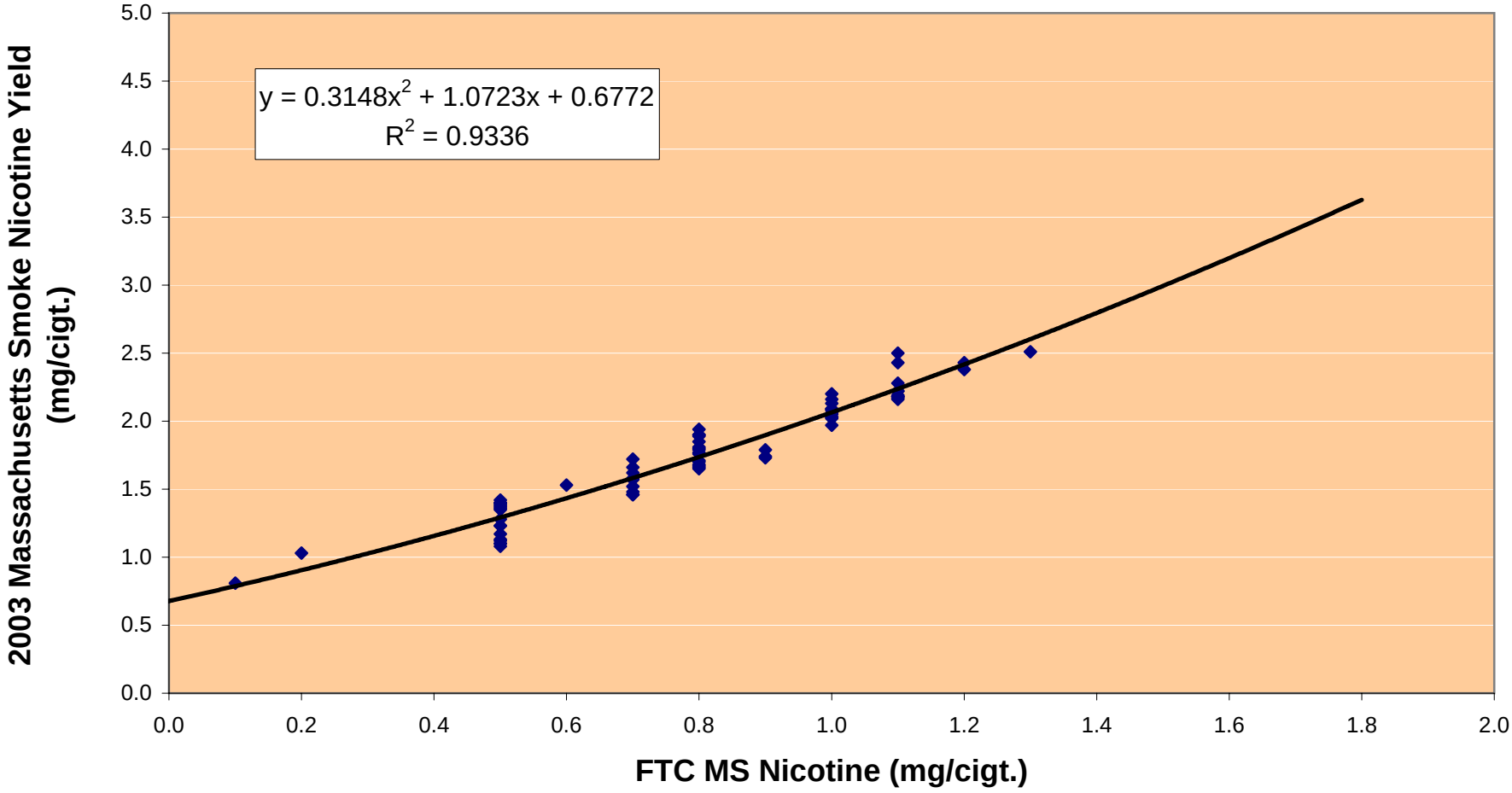
CC: H. Saxner
R. Lunden

Attachment C to December 1, 2004 annual report of Nicotine Yield Rating Information submitted by Philip Morris USA Inc. to the Massachusetts Department of Public Health

Computing the Multiplier Equation

1. Open a New Excel (version 2002) Spreadsheet
2. List FTC Nicotine Data in Column A
3. List Massachusetts Nicotine Data in Column B
4. Highlight all Data and Column Titles (Column Description Titles not Column A, B, C, etc.)
5. Select the ChartWizard
6. ChartWizard Dialog Box Step 1 of 4 is displayed
7. Select Standard Types tab and select XY (Scatter) chart type
8. Press Next
9. ChartWizard Dialog Box Step 2 of 4 is displayed
10. Verify Range entry of data location, if not correct then enter cell locations of data
11. Press Next
12. ChartWizard Dialog Box Step 3 of 4 is displayed
13. Select Titles tab and enter Chart, X axis and Y axis titles
14. Press Next
15. ChartWizard Dialog Box Step 4 of 4 is displayed
16. Select Place chart as new sheet
17. Press Finish
18. Click on any Data Points on the Graph until some Points are Highlighted
19. Select Chart from the Menu
20. Select Add Trendline from the Pull-down Menu
21. Select the TYPE Tab
22. Highlight the Polynomial Chart
23. Verify Order: 2
24. Select the OPTIONS Tab
25. Set Forecast Forward to 0.5 Units
26. Set Forecast Backward to 0.4 Units
27. Select Display Equation on Chart
28. Select R-squared Value on Chart
29. Press OK

Comparison of Massachusetts Smoke Nicotine Yields with FTC Smoke Nicotine Yields



FTC & Massachusetts Nicotine Data

Brand	Sub-Brand	FTC Market Sample #41 Nicotine (mg/cigt.)	2003 MA Smoke Nicotine Measured (mg/cigt.)
Marlboro	100 F HP	1.1	2.3
Marlboro	100 F HP Menthol	1.1	2.2
Marlboro	100 F SP	1.2	2.4
Marlboro	100 F HP Lt	0.8	1.9
Marlboro	100 F SP Lt	0.8	1.9
Marlboro	100 F HP Lt Menthol	0.8	1.8
Marlboro	100 F SP Lt Menthol	0.7	1.7
Marlboro	100 F HP Medium	1.0	2.1
Marlboro	100 F SP Medium	1.0	2.1
Marlboro*	100 F HP Mild Menthol	1.0	2.1
Marlboro	100 F HP Ultra-Lt	0.5	1.4
Marlboro*	100 F HP Ultra-Lt Menthol	0.5	1.4
Marlboro	King F HP	1.1	2.2
Marlboro	King F HP Menthol	1.1	2.2
Marlboro	King F SP	1.1	2.2
Marlboro	King F SP Menthol	1.1	2.2
Marlboro	King F HP Lt	0.8	1.7
Marlboro*	King F HP Lt 25-pk	0.8	1.8
Marlboro	King F HP Lt Menthol	0.8	1.7
Marlboro	King F SP Lt	0.8	1.7
Marlboro	King F SP Lt Menthol	0.8	1.7
Marlboro	King F HP Medium	0.9	1.8
Marlboro	King F SP Medium	0.8	1.9
Marlboro*	King F HP Mild Menthol	0.9	1.7
Marlboro	King F HP Ultra-Lt	0.5	1.2
Marlboro*	King F HP Ultra-Lt Menthol	0.5	1.2
Basic	100 F HP	1.0	2.0
Basic	100 F SP	1.0	2.2
Basic	100 F SP FF Menthol	1.0	2.1
Basic	100 F HP Lt	0.8	1.7
Basic	100 F SP Lt	0.8	1.8
Basic	100 F SP Lt Menthol	0.8	1.7
Basic*	100 F HP Ultra-Lt	0.5	1.4
Basic	100 F SP Ultra-Lt	0.5	1.3
Basic*	100 F HP Ultra-Lt Menthol	0.5	1.4
Basic**	King NF SP	1.3	2.5
Basic	King F HP	1.0	2.1
Basic	King F HP FF Menthol	1.0	2.0
Basic	King F SP	1.0	2.0
Basic	King F SP FF Menthol	1.0	2.1
Basic	King F HP Lt	0.7	1.5
Basic	King F SP Lt	0.7	1.6
Basic	King F SP Lt Menthol	0.7	1.6
Basic*	King F HP Ultra-Lt	0.5	1.2
Basic*	King F HP Ultra-Lt Menthol	0.5	1.1
Basic	King F SP Ultra-Lt	0.5	1.1
Benson & Hedges	100 F SP Menthol	1.1	2.2
Benson & Hedges	100 F HP Lt Menthol	0.8	1.8
Benson & Hedges	100 F SP Lt Menthol	0.8	1.8

FTC & Massachusetts Nicotine Data

Brand				Sub-Brand	FTC Market Sample #41 Nicotine (mg/cigt.)	2003 MA Smoke Nicotine Measured (mg/cigt.)
Benson & Hedges	100	F	HP	Ultra-Lt Dlx	0.5	1.4
Benson & Hedges	100	F	HP	Ultra-Lt Menthol Dlx	0.5	1.4
Benson & Hedges	100	F	SP	Lt	0.8	1.9
Benson & Hedges	King	F	SP	M-Filter	0.9	1.7
Cambridge*	100	F	SP	Lt Menthol	0.7	1.7
Cambridge*	King	F	SP	Lt	0.7	1.5
Genco*	100	F	HP	FF Generic	1.0	2.0
Merit	100	F	SP	Lt	0.8	1.9
Merit	100	F	SP	Ultra-Lt	0.5	1.4
Merit	King	F	SP	Ultima	0.1	0.8
Merit	100	F	HP	Ultima	0.2	1.0
Merit	King	F	HP	Ultra-Lt	0.5	1.1
Merit	King	F	SP	Ultra-Lt Menthol	0.5	1.1
Merit	King	F	SP	Ultra-Lt	0.5	1.1
Parliament	100	F	SP	Lt	1.0	2.2
Parliament	King	F	HP	Lt	0.7	1.5
Parliament	King	F	HP	Lt Menthol	0.7	1.5
Rothmans	King	F	HP	Spec-Mild	1.2	2.4
Virginia Slims*	120	F	HP	Luxury Lt Slim	1.1	2.4
Virginia Slims	100	F	HP	Lt Slim	0.7	1.6
Virginia Slims	100	F	SP	Slim	1.1	2.2
Virginia Slims	100	F	HP	Super-Slim	0.6	1.5
Virginia Slims	100	F	HP	Ultra-Lt Menthol Slim	0.5	1.4
Virginia Slims	100	F	SP	Menthol Slim	1.1	2.2
Virginia Slims*	120	F	HP	Luxury Lt Menthol Slim	1.1	2.5

*From Philip Morris USA internal testing.

**Philip Morris USA data for Basic King NF SP reflect a reformulation of that brand that occurred subsequent to the most recent FTC report (which was based on brand styles in the marketplace in 1998). This is consistent with the way Philip Morris USA reports “tar” and nicotine data for instances where a genuine product change has resulted in a change in "tar" and nicotine values not yet reflected in an FTC report, pursuant to the voluntary “tar” and nicotine disclosure program used by the industry.

An Example Using the Multiplier Equation to Predict Non-tested Brands

	A	B	C	D
1			$y = 0.3148x^2 + 1.0723x + 0.6772$ $R^2 = 0.9336$	
2	**Brand**	**FTC MS #41 Nicotine (mg/cigt.)**	**Calculated Nicotine (mg/cigt.) Value Using the Multiplier Equation**	
3	Alpine 100 F SP Menthol	1.1	2.2	
4	Benson & Hedges 100 F HP Lt	0.8	1.7	
5	Benson & Hedges 100 F HP Menthol	1.1	2.2	
6	Benson & Hedges 100 F HP Ultra-Lt Menthol Dlx	0.5	1.3	
7	Benson & Hedges 100 F HP	1.1	2.2	
8	Benson & Hedges 100 F SP Lt	0.8	1.7	
9	Benson & Hedges 100 F SP	1.1	2.2	
10	Benson & Hedges King F HP	1.1	2.2	
11	Benson & Hedges King F SP M-Filter	0.9	1.9	
12	Best Buy 100 F HP FF Generic	1.0	2.1	
13	Best Buy 100 F HP FF Menthol Generic	1.0	2.1	
14	Best Buy 100 F SP FF Generic	1.0	2.1	
15	Best Buy 100 F SP FF Menthol Generic	1.0	2.1	
16	Best Buy 100 F SP Lt Generic	0.8	1.7	
17	Best Buy 100 F SP Lt Menthol Generic	0.8	1.7	

1. Enter the list of Brands in Column A Starting in Cell A2 with the Column Title
2. Enter the list of FTC Nicotine Results in Column B Starting in Cell B2 with the Column Title
3. Enter the Multiplier Equation in Cell C1
4. Enter the Column Title in Cell C2
5. Enter the Computation Formula in Cell C3 (Example: =ROUND(((0.3148*(B3^2))+(1.0723*B3)+0.6772),1)
   a. This Formula Replaces the X in the Multiplier Equation with the Data in Cell B2 and Computes the Results Based on the Equation
   b. Results are Rounded to 1 Decimal Place
6. Copy the Formula from Cell C3 Down Column C for the Remaining Brands

Minor modifications were made to this method to accommodate existing laboratory equipment and related procedural requirements.

Key to Revisions:

Deletions - Strike-through
Additions - Bold and underlined

RM 35 - Determination of total alkaloids in tobacco by continuous flow analysis

CORESTA RECOMMENDED METHOD N° 35

**DETERMINATION OF TOTAL ALKALOIDS (AS NICOTINE)
IN TOBACCO BY CONTINUOUS FLOW ANALYSIS
(November 1994)**

Published in Bulletin 1994-3/4

0. Introduction

Studies carried out by a CORESTA Task Force between 1989 and 1993 have shown that the two procedures for determination of total alkaloids in tobacco as described in CORESTA Recommended Method N° 20 and the present Method may not produce identical results for some dark tobaccos or those containing significant levels of alkaloids other than nicotine.

The studies have indicated that these differences may be due to the fact that the recoveries and detection sensitivities of the two methods towards the alkaloids other than nicotine are different.

Therefore, when reporting results it is important to specify the method used.

1. Field of Application

This method is applicable to unmanufactured and manufactured tobacco.

2. References

CORESTA Recommended Method N° 20:1968
Determination of alkaloids in manufactured tobacco.

CORESTA Recommended Method N° 39:1994
Determination of the purity of nicotine and nicotine salts by gravimetric analysis - Tungstosilicic acid method.

3. Principle

An aqueous (see note 1) extract of the tobacco is prepared and the total alkaloids (as nicotine) content of the extract is determined by reaction with sulphanilic acid and cyanogen chloride. Cyanogen chloride is generated in situ by the reaction of potassium cyanide and chloramine T (see appendix 1). The developed colour is measured at 460 nm.

Note 1 : Collaborative studies have shown that this method gives equivalent results for water and 5% acetic acid extracts. It is recommended that 5% acetic acid extracts should be used if total alkaloids (as nicotine) and reducing substances (see CORESTA Recommended Method N° 37) or reducing carbohydrates (see CORESTA Recommended Method N° 38) analysis are to be carried out simultaneously.

4. Safety Precautions

Potassium cyanide is poisonous and irritant, thus all safety precautions must be observed when handling this material. Solutions shall be prepared by a designated responsible person. Gloves and safety glasses shall always be used when making up solutions and bottles of the made-up reagent shall always be carried in a suitable safety carrier. ~~To prevent the escape of vapour into the laboratory, reagent pick-up tubes shall pass through a soda-lime trap into the reagent bottle (see diagram 2).~~

~~The cyanide neutralising agents A and B are pumped as shown in the flow diagram (see diagram 1) and mixed in a 2 dm^3 Buchner flask with magnetic stirring (see diagram 3). All waste solutions containing cyanogen chloride are run into this flask where conversion to the "Prussian Blue" complex occurs. The contents of the Buchner flask are allowed to over-flow into a storage flask, the contents of which are stored overnight in a fume cupboard and then disposed of as waste.~~

Run all lines from the alkaloid colorimeter and debubbler into a waste vessel containing a caustic hypochlorite solution to oxidize the cyanide to cyanate. The waste should be handled for disposal by trained personnel.

~~Suitable cyanide poisoning treatment kits are available from laboratory suppliers and shall be located in the vicinity of the analyzer to be used by a competent person.~~

5. Reagents

All reagents shall be used according to good laboratory practice and existing national regulations.

5.1 *Brij 35 Solution (Polyoxyethylene Lauryl Ether)*

Add 1 dm^3 distilled water to 250 g Brij 35, warm and stir until dissolved.

5.2 *Buffer Solution A*

Dissolve 2.35 g sodium chloride (NaCl) and 7.60 g sodium tetraborate ($Na_2B_4O_3.10H_2O$) in distilled water. Transfer to a 1 dm^3 volumetric flask, add 1 cm^3 Brij 35 solution (5.1) and dilute to volume with distilled water. Filter the solution through a Whatman N° 1 (or equivalent) filter paper before use.

5.3 *Buffer Solution B*

Dissolve 26 g anhydrous disodium hydrogen orthophosphate (Na_2HPO_4), 10.4 g citric acid ($COH(COOH)(CH_2COOH)_2.H_2O$) and 7 g sulphanilic acid ($NH_2C_6H_4SO_3H)_2$ in distilled water, transfer to a 1 dm^3 volumetric flask, add 1 cm^3 Brij 35 solution (5.1) and dilute to volume with distilled water. Filter the solution through a Whatman N° 1 (or equivalent) filter paper before use.

5.4 *Chloramine T Solution (N-chloro-4-methyl benzenesulphonamide sodium salt), ($CH_3C_6H_4SO_2N(Na)Cl.3H_2O$)*

Dissolve 8.65 g chloramine T in distilled water, transfer to a 500 cm^3 volumetric flask and dilute to volume with distilled water. Filter the solution through a Whatman N° 1 (or equivalent) filter paper before use.

~~**5.5** *Cyanide Neutralising Solution A*~~

~~Dissolve 1 g citric acid (5.3) and 10 g ferrous sulphate ($FeSO_4.7H_2O$) in distilled water and dilute to 1 dm^3.~~

~~**5.6** *Cyanide Neutralising Solution B*~~

~~Dissolve 10 g anhydrous sodium carbonate (Na_2CO_3) in distilled water and dilute to 1 dm^3.~~

Caustic Hypochlorite Solution

Dissolve approximately 1 g sodium hydroxide in 300 mL of water in a 10-liter plastic bottle. Add approximately 100 mL of Clorox™.

5.7 *Potassium Cyanide Solution (KCN)*

CARE: POTASSIUM CYANIDE IS EXTREMELY TOXIC! SEE SAFETY PRECAUTIONS.

In a fume cupboard, weigh 2 g potassium cyanide into a 1 dm^3 beaker. Add 500 cm^3 distilled water and stir (magnetic stirrer) until all of the solid has dissolved. Store in a brown glass bottle.

~~**5.8** *Nicotine Hydrogen Tartrate ($C_{10}H_{14}N_2(C_4H_6O_6)_2.2H_2O$) for the Preparation of Standards*~~
***l*-Nicotine; $C_{10}H_{14}N_2$; F.W. 162.23. 99+% purity (e.g. Acros 18142-0250).**

5.9 *Standard Nicotine Solutions*

~~**5.9.1** Check the purity of the nicotine hydrogen tartrate according to CORESTA Recommended Method N° 39.~~

~~**5.9.2** Stock Solution: Weigh, to the nearest 0.0001 g, approximately 1.3 g of nicotine hydrogen tartrate in distilled water and dilute to 250 cm^3 in a volumetric flask. This solution contains approximately 1.6 mg nicotine per cm^3. Store in a refrigerator. Prepare a fresh solution every month.~~

Stock Solution, 3.0 mg/mL: Weigh 1.50 g of nicotine and transfer into a 500 mL volumetric flask. Dissolve and dilute to volume with the 5% acetic acid extraction solution. After opening, date and store the unused portion in a plastic container in the refrigerator.

~~**5.9.3** Working Standards: From the stock solution produce a series of at least five calibration solutions whose concentrations cover the range expected to be found in the samples *e.g.* 0.04-0.80 mg nicotine per cm^3. Calculate the exact concentration for each standard taking into account the purity of the nicotine hydrogen tartrate. Store in a refrigerator. Prepare fresh solutions every two weeks.~~

Working Standards: Pipet into six separate 200 mL volumetric flasks 1, 3, 5, 7, 10, and 15 mL of the nicotine standard stock. Dilute all to volume with the 5% acetic acid extraction solution. Each flask contains 0.015, 0.045, 0.075, 0.105, 0.150, and 0.225 mg/mL of nicotine respectively.

Note 2 : The method can also be standardized by using nicotine or other nicotine salts of known purity. In this case an amount equivalent to the above used nicotine hydrogen tartrate shall be used.

6. Apparatus

6.1 The necessary general laboratory equipment, for the preparation of samples, standards and reagents.

6.2 Continuous flow analyzer (see diagram 1) consisting of:

Sampler
Proportioning pump
Dialyser
Delay coils
Colorimeter (or equivalent) with 460 nm filter(s)
Recorder

6.3 Coil for cyanogen chloride generation

A commercially available microbore mixing coil can be used for the *in situ* generation of cyanogen chloride. Alternatively a ~~five turn~~ mixing coil can be prepared (see appendix 2)

7. Analysis of Tobacco Samples

7.1 Prepare the tobacco for analysis by grinding (the sample should totally pass through a 1 mm sieve) and determine the moisture content. If the tobacco is too wet for grinding it can be dried at a temperature not exceeding 40 °C.

~~**7.2** Weigh, to the nearest 0.0001 g, approximately 250 mg of the tobacco in a 50 cm^3 dry conical flask. Add 25 cm^3 distilled water, stopper the flask and shake for 30 minutes.~~

Weigh 0.500 g of ground tobacco directly into a disposable specimen bottle. Add 100 mL of 5% acetic acid extraction solution. Cap and shake at 250 rpms on the gyratory shaker for 30 minutes.

~~**7.3** Filter the extract through a Whatman N° 40 (or equivalent) filter paper, reject the first few cm^3 of the filtrate, then collect the filtrate in an analyzer cup.~~

Pour extract into a glass disposable test tube. Push a Technicon Seraclear® filter into the test tube and analyze the filtrate.

7.4 Run the samples and standards through the system in the normal manner (*e.g.* priming with ~~6~~ 4 tobacco extracts, calibration standards and samples ~~with 1 intermediate calibration solution after every 6 samples~~). If sample concentrations lie outside the range of the standards, the samples shall be diluted and run again.

8. Calculation

8.1 Plot a graph of peak height against equivalent nicotine concentrations for all the calibration solutions.

8.2 ~~Calculate the percentage nicotine (dry weight basis) in the tobacco using the formula:~~

$$\text{~~\% Nicotine (dwb)~~} = \frac{\text{~~c x V x 100~~}}{\text{m}} \text{ ~~x~~ } \frac{\text{~~100~~}}{\text{~~100 - M~~}}$$

~~c is the nicotine concentration, expressed in milligrams per millilitre, obtained from the calibration curve (8.1);~~
~~V is the volume, in millilitres, of extract prepared (7.2) (normally 25 millilitres);~~
~~m is the mass, in milligrams, of the sample (7.2);~~
~~M is the moisture content, expressed as percentage by mass, of the tobacco (7.1).~~

Weight % Alkaloids = mg nicotine/mL x 100 mL x 100%
mg sample

"Weight % Alkaloids is expressed as g of nicotine per 100 g of filler"

Nicotine (mg/g) = g nicotine x 1000 mg
100 g filler g

The test result shall be expressed to two decimal places.

Notes :

3 When using 5% acetic acid extracts the standard nicotine solutions (5.9) must be made up with 5% acetic acid and the wash cycle must be with 5% acetic acid.

4 If this method is performed simultaneously with CORESTA Recommended Method N° 36, CORESTA Recommended Method N° 37 or CORESTA Recommended Method N° 38 combined standards may be prepared.

9. Repeatability and Reproducibility

An international collaborative study involving 12 laboratories and 3 samples conducted in 1993 showed that when single grades of tobacco were analyzed by this method, the following values for repeatability (r) and reproducibility (R) were obtained.

The difference between two single results found on different extractions by one operator using the same apparatus within a short time interval (the time it takes to analyze 40 sample cups) and without recalibration of the equipment during the time of analysis will exceed the repeatability value (r) on average not more than once in 20 cases in the normal and correct operation of the method.

Single results reported by two laboratories will differ by more than the reproducibility value (R) on average not more than once in 20 cases in the normal and correct operation of the method.

Data analysis gave the estimates as summarized in table 1 and 2.

Table 1 : Extraction with water

Tobacco Type	Mean Content of Nicotine %(dwb)	Repeatability Conditions r	Reproducibility Conditions R
Oriental	1.17	0.05	0.19
Flue-Cured	2.90	0.08	0.41
Burley	3.97	0.12	0.55

Table 2 : Extraction with 5% Acetic Acid

Tobacco Type	Mean Content of Nicotine %(dwb)	Repeatability Conditions r	Reproducibility Conditions R
Oriental	1.17	0.07	0.21
Flue-Cured	2.90	0.11	0.67
Burley	3.97	0.13	0.97

For the purpose of calculating r and R, one test result was defined as the yield obtained from analyzing a single extract once.

Appendix 1

Several collaborative studies, carried out by a CORESTA Task Force during 1989 and 1990, have shown that two other procedures give equivalent results to the Recommended Method. It may be necessary to use one of these alternative procedures, if so, the following comments should be considered before use:

- Cyanogen chloride can be alternatively generated *in situ* by the reaction of potassium thiocyanate and sodium hypochlorite. In order for this reaction to be successful the sodium hypochlorite must have an available chlorine content of 10% - 14% (m/m). It has been found that sodium hypochlorite with this amount of available chlorine is sometimes difficult to obtain.

- Cyanogen bromide in reaction with aniline can also be used in the determination of total alkaloids. Because of the hazardous nature of the cyanogen bromide, some countries have found problems with the importation and use of this substance.

Appendix 2

Preparation of a Microbore ~~Five Turn~~ Mixing Coil

~~1~~. ~~Loop a standard orange-white (0.64 mm id) pump tube 5 times around a glass tube (*e.g.* test tube, glass rod) with an external diameter of approximately 12 mm.~~

~~2~~. ~~While holding the loops in place brush them thoroughly with cyclohexanone.~~

~~3~~. ~~Use adhesive tape to hold the loops in place while the cyclohexanone sets the tubing, (about 10 hours).~~

~~4~~. ~~Remove the glass tube from the coil~~.

1. Coil 20 inches of 0.040” ID EVA (ethylvinyl acetate) tubing.

~~**Diagrams**~~

~~**Diagram 1**~~
~~See picture in file RM35_01.PCX, repertory IMAGES.~~

~~Diagram 2~~
~~Soda Lime Trap~~

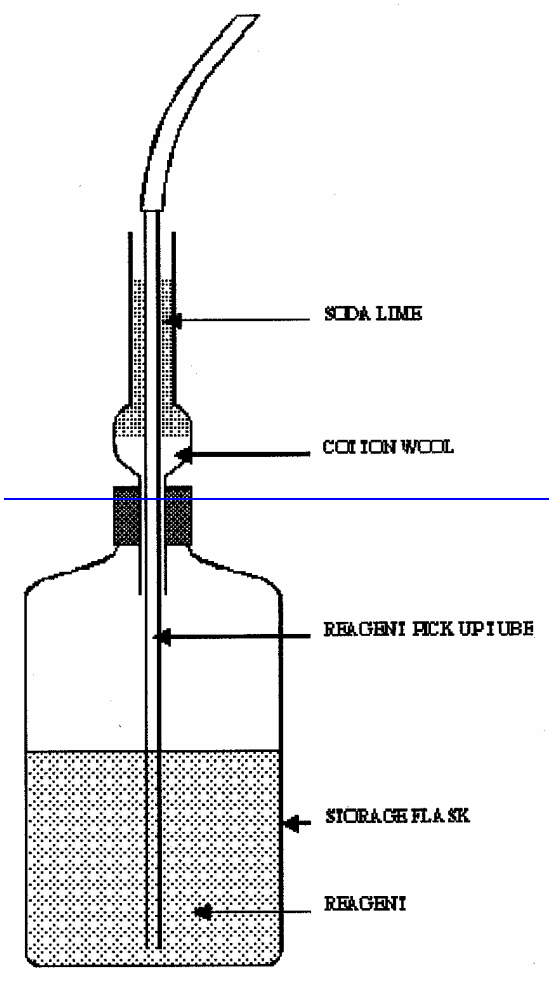
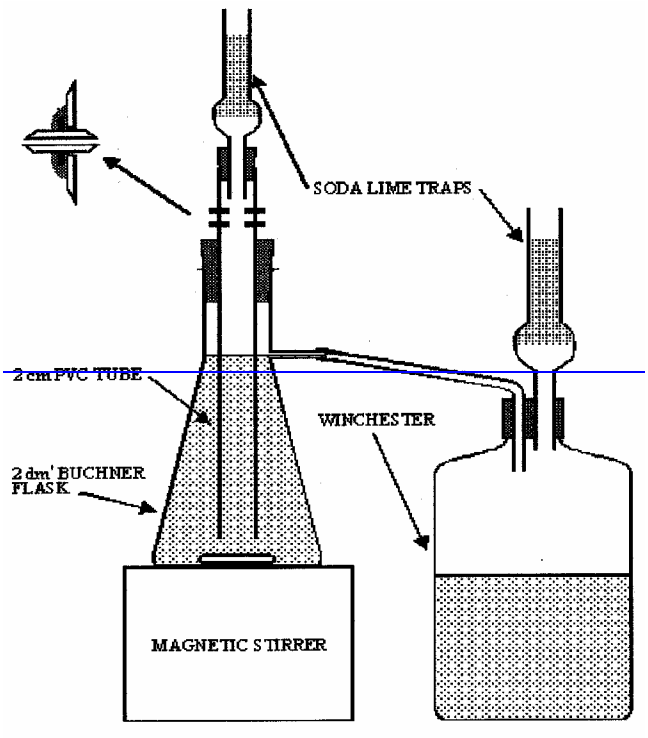


Diagram 3

On-Line Cyanogen Chloride Destruction Apparatus



The apparatus consists of a 2 dm^3 Buchner flask on a magnetic stirrer, with a 2 cm diameter PVC tube inserted into it, through a rubber bung, such that the tube is just above the magnetic follower in the flask. Four holes are drilled in the tube and nipples attached by gluing into position. The pullback line and the debubble line containing the cyanogen chloride are attached to the nipples, together with the two neutralising agents. This arrangement ensures that the cyanogen chloride has to pass down the tube and through the bulk of the flask before overflowing to waste, thus ensuring complete neutralisation.

Puff by puff determination of pH of an aqueous solution of mainstream cigarette smoke using a routine linear analytical smoking machine

1 Scope

This procedure specifies the method for trapping a single puff of mainstream cigarette smoke in degassed 0.1 N KCl solution and the subsequent pH analysis of the aqueous solution. The puff of mainstream cigarette smoke is generated and collected using a linear analytical smoking machine.

2 Normative references

At the time this procedure was written, the editions indicated were valid.

ISO 3308:1991. Routine analytical cigarette - smoking machine - Definitions and standard conditions.

ISO 3402:1991. Tobacco and tobacco products - Atmosphere for conditioning and testing.

ISO 7210:1997. Routine analytical cigarette - smoking machine - Additional test methods.

Federal Register, Volume 32, No.147, p. 11178, August 1, 1967.

Federal Register, Volume 45, No. 134, p. 46483, July 10, 1980.

105 CMR 660.000 Cigarette and Smokeless Tobacco Products: Reports of Added Constituents and Nicotine Ratings, Massachusetts Department of Public Health, August 19, 1997.

3 Definitions

For the purpose of this procedure, the following definitions apply.

3.1 pH: A measure of the acidity or basicity of an aqueous solution measured as the negative logarithm of the activity of hydrogen ions.

3.2 Total particulate matter: That portion of the mainstream smoke which is trapped in the smoke trap, expressed as milligrams per cigarette (mg/cigt.).

3.3 Smoking process: The use of a smoking machine to smoke cigarettes from lighting to final puff.

3.4 Laboratory sample: The sample intended for laboratory inspection or testing and which is representative of the gross sample or the sub-period sample.

3.5 Conditioning sample: The cigarettes selected from the test sample for conditioning prior to tests for total particulate matter yield.

No interlaboratory validation process has been conducted using this analytical method.

3.6 Test portion: A group of cigarettes prepared for a single determination and which is a random sample from the test sample or conditioned sample as appropriate.

3.7 Conditioned sample: Conditioned cigarettes for total particulate matter yield tests.

4 Principle

Sampling of the test cigarettes. Conditioning of the test cigarettes. Smoking of test cigarettes on a linear analytical smoking machine equipped with a trap containing degassed 0.1 N KCl solution with the collection of a single puff of mainstream smoke at various specified intervals during the smoking process. Determination of pH of the aqueous solution.

5 Apparatus and reagents

Normal laboratory apparatus and reagents and in particular the following items:

5.1 Smoke trap apparatus. Manufactured by Research Glass, Richmond, VA, part number pm030496. The apparatus consists of a single glass trap, (referred to as an impinger). The impinger consists of two pieces; the trap body which has a 24/40 ground glass joint and a trap insert. The impinger trap insert is a glass sampling tube with a ground glass fitting at the neck for a tight connection to the trap body. The top of the impinger trap insert is equipped with a 12/5 socket joint on one end and a hose connection on the other end. The volume of the impinger is approximately 90 mL. The cigarette is inserted into a rubber cigarette holder that is mounted on a 0.5 inch diameter, medium wall glass tube, (referred to as the impinger inlet tube). This glass inlet tube has a 90° bend at a distance of 125 mm from the rubber cigarette holder, (this allows placement of the apparatus within the smoking machine hood behind the Filtrona smoking bar / ashtray assembly with the glass inlet tube passing through the smoking bar). A glass ball joint is used to attach the glass inlet tube to the impinger. An approximately two inch section of ¼ inch I.D. polyvinyl chloride (PVC) tubing is attached to the exit end of the impinger. The other end of the PVC tubing is inserted, to a 9 mm insertion length, into the harmonized filter pad holder that is mounted onto the carrier eccentrics, carrier slide, and PVC tubing assembly that is reassembled behind the smoking bar.

NOTE 1 A drawing of the smoking trap apparatus is given in Figure 1.

NOTE 2 All glassware is washed prior to each use with a laboratory soap solution, (Alconox or equivalent), and dried at 100°C for a minimum of 3 hours.

5.2 Filtrona smoking machine. Modified to comply with the requirements of ISO 3308. The filter carrier slide is removed from the smoking bar for the port(s) utilized for the smoking portion of this procedure.

NOTE 3 In order to trap a single puff of mainstream smoke two ports of the smoking machine are utilized for a single determination (one port is used to capture the specified puff and the other to divert the preceding puffs). Ports 4 and 5 were utilized within this procedure.

No interlaboratory validation process has been conducted using this analytical method.

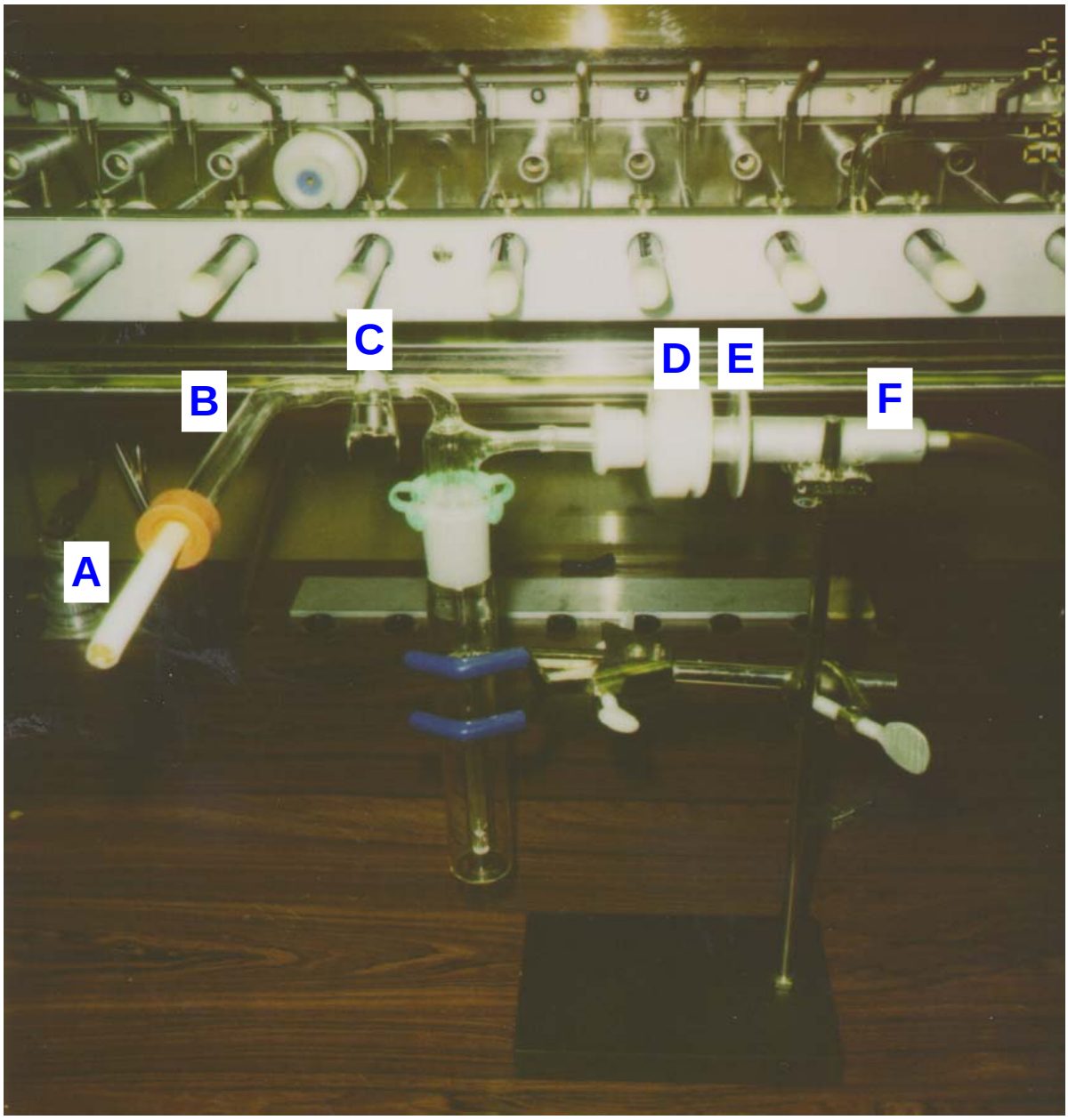


Figure 1 - Picture of the pH smoke trap apparatus. Where: A is the rubber cigarette holder; B is the impinger inlet tube; C is the glass ball joint with clamp; D is the harmonized glass fiber filter pad holder with PVC tubing inserted; E is the Filtrona carrier eccentric; and, F is the Filtrona carrier slide.

Note 4 Due to the positioning of the smoke trap apparatus, (5.1), within the smoking machine hood, a maximum of four ports (two per determination) of the twenty available smoking machine ports may be utilized with this procedure. No criteria exist for which ports are utilized except for smoke trap spacing.

5.3 44 mm glass fiber filter pads. Manufactured by Whatman International Ltd. and certified to comply with the requirements of ISO 3308.

No interlaboratory validation process has been conducted using this analytical method.

5.4 Filtrona harmonized filter pad holders. Manufactured by Filtrona to comply with the requirements of ISO 3308.

5.5 Omnidirectional air velocity probe and meter. Manufactured by Schiltknecht.

5.6 Soap bubble flow meter. Manufactured by Borgwaldt, graduated at 40 to 80 mL with a resolution of 0.2 mL.

5.7 Ruler. Certified for measurements to the nearest 0.5 mm.

5.8 pH meter. Model AB 15 Accumet pH/ion meter manufactured by Fisher Scientific.

5.9 Accumet Combination Solid State Electrode, Epoxy body, gel filled Ag/AgCl. Manufactured by Fisher Scientific.

5.10 50 mL Optifix solvent dispenser. Manufactured by EM Science. A calibration check of the dispenser is performed each shift, (to an accuracy of 50.0 ± 1.0 mL), using a certified 100 mL graduated cylinder.

5.11 Degassed 0.1 N KCl. 0.1 N KC1 is prepared using 7.4 g of certified ACS grade KCl per liter of HPLC grade water (available from Fisher Scientific). Prior to use, gas chromatography grade helium gas is bubbled, at a slow continuous stream, through the KCl solution for a minimum of 4 hours.

6 Sampling and sample preparation

6.1 Sampling

Remove one cigarette from each pack of the laboratory sample to form the conditioning sample.

6.2 Cigarette marking

The cigarette butt length is determined following FTC protocol as the overwrap, (tipping paper), length plus 3 millimeters. The 9 mm insertion and determined butt length are marked on each cigarette using a soft felt tip pen to avoid damage to the cigarette.

NOTE 5 Butt length is defined in ISO 3308 as the length of unburnt cigarette remaining at the moment when smoking is stopped.

NOTE 6 If the determination of butt length has been performed on the laboratory sample as part of the total particulate matter determination, (ISO 4387), this determination does not need to be repeated on this test sample.

6.3 Cigarette taping

One-half of the cigarette overwrap is covered with Number 600, Scotch Brand tape. The width of the tape used is one-half the known circumference of the cigarette brand. The tape is applied lengthwise over the cigarette overwrap starting at the cigarette rod end and ending flush with the mouth end of the cigarette. Any tape extending past the end of the cigarette is cut off using a razor blade.

No interlaboratory validation process has been conducted using this analytical method.

NOTE 7 For cigarettes of 24.8 to 25.2 mm circumference, the theoretical width of applied Scotch tape should be 12.4 to 12.6 mm. Commercially available, one-half inch (12.7 mm) Scotch tape is used to tape these cigarettes. The 12.7 mm commercially available tape is also used for cigarettes of 23.8 to 24.2 mm circumference. In addition, for cigarettes of 22.8 to 23.2 mm circumference, the tape is cut to an 11.7 mm tape width; and for cigarettes of 16.8 to 17.2 mm circumference, the tape is cut to an 8.7 mm tape width.

The actual coverage of the overwrap for cigarettes of these circumferences is thus slightly greater than one-half. The intent of this process is to cover one-half of the cigarette ventilation holes and this variance in tape width reflects ventilation hole coverage of slightly more than one-half.

6.4 Sample equilibration

The cigarettes are placed in an equilibration tray. This conditioning sample is equilibrated in a conditioning environment specified in ISO 3402 for a minimum of 48 hours and a maximum of 10 days.

7 Standard smoking conditions

The standard smoking conditions used are in accordance with ISO 3308:1991. 4, except for the following deviations specified per 105 CMR 660.000.

7.1 Puff volume

The standard puff volume measured in series with a pressure drop of 1 kPa is 45.0 mL ± 1.0 mL, (see Note 8). In order to achieve a puff volume of 45.0 mL at the entrance end of the smoke trap apparatus, the smoking machine is set at a puff volume of approximately 47.0 mL as measured from the harmonized filter pad holder as described in ISO 4387:1991. 7.5.3.3.

NOTE 8 ISO 4387:1991. 7.5.3.3 states that puff volume be set to 35.0 mL ± 0.3 mL. Due to the larger puff volume utilized in this procedure and the variation associated with measuring the puff volume through an aqueous solution a puff volume range of ± 1.0 mL was applied.

7.2 Puff frequency

The standard puff frequency is one puff every 30 seconds with a standard deviation of not greater than 0.5 seconds.

8 Smoking process

8.1 Laboratory environment

The testing atmosphere in the laboratory where the smoking is carried out is in accordance with ISO 3402.

8.2 Smoking plan

No interlaboratory validation process has been conducted using this analytical method.

The test portion is comprised of one cigarette randomly selected from the conditioning sample which comprises one determination of one puff collected at any selected point during the smoking process. Individual cigarettes are used for each puff collected from a test sample. For example, ten individual cigarettes are utilized to collect puffs 1 through 10 of a test sample.

8.3 Smoking process

The smoking machine set up is in accordance with ISO 4387 except for those changes noted in clauses 5.1 and 5.2 and section 7. Port 4 is set up as a conventional smoking port. Port 5 is equipped with the smoke trap apparatus. Fifty mL of degassed 0.1 N KCl solution is dispensed, (see clause 5.10), into the impinger trap. The impinger is secured with a 24/40 ground glass fitting clamp. The smoke trap apparatus is assembled per clause 5.1 for collection of the first puff. For collection of all subsequent puffs, the filter pad holder is placed on the carrier eccentric but is not attached to either the impinger or the carrier slide. All glass ball joints are secured with clamps. String is applied to the puff termination device on the smoking machine per ISO 4387 for those ports being utilized. For collection of the first puff, the test cigarette is inserted to the insertion mark into the rubber cigarette holder on port 5. The cigarette is lit and the puff is collected in the pH smoke trap apparatus. To collect subsequent puffs, a test cigarette is inserted to the insertion mark into the filter pad holder on port 4. The cigarette is lit and smoked on port 4, until ready to capture the designated puff. At that time, the carrier eccentric (which is attached to the rear of the filter pad holder) is then attached to the carrier slide and the front of the filter pad holder is attached to the exit end of the impinger trap. The lit cigarette is removed from port 4 and placed into the rubber cigarette holder on port 5 and the puff is collected in the pH smoke trap apparatus. After collection of the designated puff, the string is broken to terminate the smoking process and a timer is activated to track the time for the pH determination.

NOTE 9 Transfer of the lit cigarette and the assembly of the smoke trap apparatus must take place during the 30 second puff interval.

The smoke trap apparatus is disassembled. The impinger insert is removed from the impinger trap body. The aqueous solution in the impinger trap is transferred to a disposable beaker and a magnetic stirring bar is added. The activated timer and the aqueous solution so collected are utilized for the pH determination.

9 pH determination

9.1 Daily pH calibration

Calibration of the pH meter is performed at the beginning of each shift. Calibration is performed as a three point standardization using pH 4, pH 7 and pH 10 buffers. The slope or efficiency must be within 95% to 105% before proceeding.

9.2 Calibration standard check

A calibration standard check is performed using a pH 7 buffer before each test sample measurement. The buffer response must be 7.00 ± 0.05 pH units or recalibration is required.

9.3 pH determination of test samples

No interlaboratory validation process has been conducted using this analytical method.

The disposable beaker containing the so collected aqueous solution and magnetic stirring bar from clause 8.3 is placed on a magnetic stirrer. At or before 10 minutes after the puff is collected, as indicated by the activated timer, the pH electrode is submerged into the test solution. At 15 ± 0.5 minutes after the puff is collected, the pH value is recorded.

NOTE 10 An automatic temperature compensation function of the pH meter corrects for minor variations in laboratory temperature.

10 Test report

The sample data are reported to 0.1 pH units.

The appropriate information concerning the characteristic data about the cigarette, sampling, and description of test is recorded in accordance with ISO 4387.

11 Repeatability and reproducibility

A total of seven samples with FTC tar levels varying from 2 mg to 22 mg were analyzed. Each sample was tested three times by one operator. The pH results for the seven samples were found to be not statistically different from one another.

Therefore, the difference between two single results found on identical test material by one operator using the same apparatus within the shortest feasible time interval will exceed the repeatability value (r=0.14) on average not more than once in 20 cases in the normal and correct operation of the method.

A collaborative study involving a suitable number of laboratories has not been performed for the determination of the method reproducibility (R) value.

12 Revision History

12.1 April 1998

Original procedure written by C. H. Callicutt and J. M. Garman.

12.2 September 1998

Document revised by C. H. Callicutt - Revisions include: (1) Addition of method repeatability values.

12.3 August 1999

Document revised by C. H. Callicutt – Revisions include: (1) Changed the minimum hours required to degas the 0.1 N KCl solution in 5.11. (2) Removed the reference to measuring cigarettes for butt length in 6.2. (3) Changed the puff volume range in 7.1.

12.4 November 2001

No interlaboratory validation process has been conducted using this analytical method.

Document revised by S. W. Laffoon – Revisions include: (1) Removed reference to interface of pH meter with personal computer. (2) Removed reference to the performance of pH measurements under controlled environmental conditions and replaced with NOTE 10.

12.5 November 2002

Document revised by S. W. Laffoon – Revisions include: (1) Removed reference to Filtrona smoking machine model number in 5.1 and 5.2. (2) Updated pH 7 buffer standard calibration check requirement in 9.2.

12.6 October 2003

Document revised by S. W. Laffoon – Revisions include: (1) Updated puff volume setting in 7.1. (2) Revised reference to treatment of aqueous solution in 8.3 and 9.3. (3) Changed daily calibration to a three point standardization in 9.1.

12.7 November 2004

Document revised by H. N. Choksi – Revisions include: Updated equipment used in 5.8 and 5.9.

No interlaboratory validation process has been conducted using this analytical method.