MASSACHUSETTS DEPARTMENT OF PUBLIC HEALTH

1997 CIGARETTE NICOTINE DISCLOSURE REPORT

AS REQUIRED BY MASSACHUSETTS GENERAL LAWS

CHAPTER 307B, CMR 660.000

JANUARY 16, 1998

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SUMMARY

Nicotine Yield Testing

- Massachusetts Department of Public Health developed a testing method which better simulates the smoking behavior of the average smoker under normal smoking conditions by increasing the amount of smoke inhaled with each puff by the smoking machine, reducing the amount of time taken between puffs, and requiring 50% of the cigarette filter to be covered.

- Massachusetts testing for nicotine yield revealed levels **about twice as high** as those found by the Federal Trade Commission. For the average smoker, 'low yield' cigarettes deliver moderate to high doses of nicotine sufficient to cause and maintain heavy dependence.

Nicotine Ranges

- Since smoking behaviors vary, Massachusetts has published the **range of nicotine** which a cigarette delivers under average smoking conditions-- whether *high*, *moderate*, *low*, or *nicotine free*. These ranges will allow smokers to compare nicotine levels among brands of cigarettes.

- ***85%** of the cigarettes tested in 1997 fell into the highest nicotine range*. Of 85 cigarette brands tested, 72 were rated as *high*, including many of the 'light' cigarettes tested, and even some of the 'ultra-light' cigarettes tested. 15% of cigarettes tested fell into the moderate range. *Cigarettes with moderate and high yields can cause heavy dependence on nicotine.*

Nicotine Content of Whole Tobacco

- According to 1997 data, there are no significant differences in the total nicotine content of full flavor, 'light,' or 'ultra-light' cigarettes.

- Whether a cigarette is classified as full flavor, 'light,' or 'ultra-light,' it is likely to contain similar amounts of nicotine in the unsmoked tobacco. Smokers who switch to 'lower yield' cigarettes to reduce their intake of nicotine, are faced with similar levels of nicotine content.

Percent Filter Ventilation

- Analysis of the filter ventilation in cigarettes shows an extremely high correlation between percent of filter ventilation and type of cigarette. Full flavor brands of cigarette have filter ventilation of 0-25%; 'light' cigarette brands have filter ventilation ranging from 25-40%; and 'ultra-light' cigarette brands have a filter ventilation greater than 50%.

- *This high level of correlation suggests that filter ventilation in cigarette design defines 'light' and 'ultra-light,' rather than the amount of nicotine in the cigarette itself.*

- When smokers place their lips and fingers over the vents, they keep outside air from diluting the smoke, and so take in higher levels of tar and nicotine.

BACKGROUND

M.G.L. Chapter 94, Section 307B requires tobacco manufacturers to file an annual report concerning nicotine yields with the Massachusetts Department of Public Health (MDPH) for each brand of tobacco product sold in the Commonwealth. This annual report provides nicotine yield ratings which accurately predict nicotine intake for average consumers, based on standards established by MDPH.

The national standard for testing tar and nicotine in mainstream smoke was developed by the Federal Trade Commission (FTC) over thirty years ago. According to the FTC method, tar and nicotine levels are measured by a smoking machine designed to take one puff of two-second duration every minute, with a volume of 35 mL of smoke per puff. Each cigarette is smoked to a given butt length (23 mm, or overwrap plus 3 mm). The FTC nicotine yield ratings produced by this method are meant to serve only as a relative measure of nicotine yield between cigarette brands. They are not reliable measures of how much nicotine a smoker actually takes into their body under normal smoking conditions.

Cigarette design has undergone significant changes in the period since the FTC testing standard was adopted. Technology has altered the manner in which tar and nicotine are delivered to the smoker, and the smoking practices of consumers have shifted accordingly. Since the introduction of 'low yield' cigarettes (i.e. light and ultra-light cigarettes) in the late 1970's, smokers have been found to compensate for lower levels of nicotine yield by smoking more frequently, by smoking more cigarettes, smoking more deeply, and increasing puff volume. These changes in smoking behavior result in much higher relative nicotine levels for lower yield cigarettes being delivered to the body than what is reported under the FTC testing system.

A recent report of the National Cancer Institute's Ad Hoc Committee of the President's Cancer Panel on the FTC test method concluded that current FTC ratings provided little information for consumers who wished to know how much nicotine they actually took into their body when smoking. MDPH testing standards draw heavily on that report and reflect current scientific knowledge about compensatory smoking and nicotine intake.

On December 15, 1997, four cigarette manufacturers delivered nicotine reporting information derived from new testing methods established by the Massachusetts Department of Public Health for 85 brands sold in Massachusetts. Only those cigarette brand families (e.g. Marlboro) with a U.S. market share of greater than 5% were required to submit nicotine yield information for 1997.

This report features the following information reported to Massachusetts for cigarette brands:

- total nicotine content (mg) of tobacco contained in the cigarette rod
- % filter ventilation (the amount of air allowed to dilute the smoke)
- nicotine yield based on MDPH developed test
- nicotine classification based on MDPH developed classification

NICOTINE YIELD TESTING

What Is Nicotine Yield?

- A cigarette does not deliver fixed amounts of tar and nicotine in the manner that a capsule delivers a fixed dose of medicine. *How a person smokes determines the amount of tar and nicotine which is delivered from the cigarette into the body.*

- Nicotine yield is a measure of the amount of nicotine in the smoke which a smoker inhales. It does not measure the amount of nicotine in a cigarette.

- *The amount of nicotine which smokers inhale is based on how long and how deeply they breathe in with each puff* (puff volume), *the amount of time between puffs* (puff interval), *and the percent filter ventilation of the smoke they breathe*-- the amount of pure air which is drawn in through vent holes in the filter tip during smoking and allowed to mix with the smoke, lessening its concentration.

The Massachusetts testing method better simulates the smoking behavior of the average smoker under normal smoking conditions by increasing the amount of smoke inhaled with each puff by the smoking machine, reducing the amount of time taken between puffs, and requiring that 50% of the cigarette filter is covered.

What Do Nicotine Yield Ratings Reflect?

- The Federal Trade Commission (FTC) uses a smoking machine to simulate the way in which a smoker smokes. FTC nicotine yields and tar levels are determined on the basis of the amount of smoke which is inhaled by the machine.

- *Because nicotine yield is based on the way in which an individual smokes, the FTC ratings reflect what you take into your body only if you smoke a cigarette in exactly the same way as the testing machine.*

	MA	FTC
Puff Volume	45 mL	35 mL
Puff Interval	30 sec	60 sec
Puff Duration	2 sec	2 sec
Filter Vent	50% blocked	unblocked

- Present FTC ratings cannot accurately reflect the effects of *vent blocking*-- blocking ventilation holes in the filter. An average smoker is likely to cover the vents placed around the filter, raising the levels of tar and nicotine which they inhale, while the FTC machine leaves filter vents open.

- The Massachusetts testing method was developed to reflect compensation techniques-- such as vent blocking, puffing more frequently, and inhaling more deeply-- which many smokers employ and which increase the amount of nicotine which they inhale.

What Were the Results of Massachusetts Nicotine Yield Testing?

- By adjusting parameters to more accurately reflect average smoking conditions, Massachusetts testing for nicotine yield produced numbers **about twice as high** as those found by the Federal Trade Commission. *The average smoker receives much greater levels of nicotine than is suggested by FTC ratings.*

- The degree of difference between Massachusetts and FTC testing *was greatest for 'ultra-light' cigarettes*, and greater for 'light' cigarettes than for full flavor cigarette. Nicotine yield for 'ultra-light' cigarettes was more than 150% greater in Massachusetts testing.

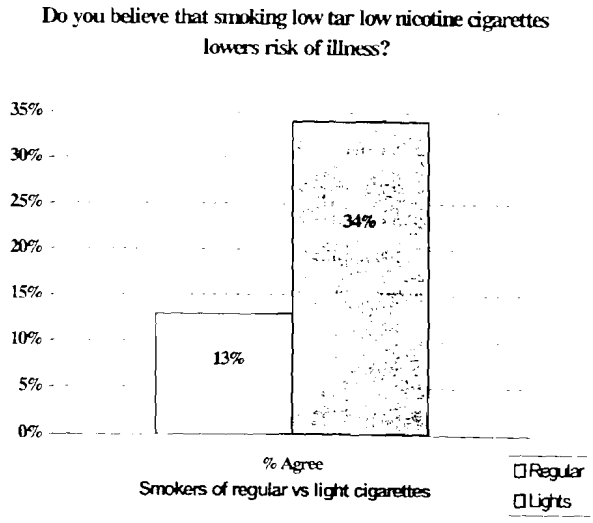
Table 1

Type	MA Nicotine Yield	FTC Nicotine Yield	%Difference
Full (Regular)	2.04	1.1	89%
Light	1.54	0.75	105%
Ultra-light	1.12	0.45	152%

- *Compensation techniques used by smokers alter levels of nicotine received from 'light' or 'ultra-light' cigarettes to a much greater degree than with regular cigarettes.* This is because cigarettes classified by FTC testing as 'low yield' depend more heavily on design factors such as filter ventilation which are not accounted for by the current FTC testing method.

- **For the average smoker, 'low yield' cigarettes deliver moderate to high doses of nicotine sufficient to cause and maintain heavy dependence.** All cigarettes tested for Massachusetts produced nicotine yields of .9 mg or greater per cigarette when smoked under average smoking conditions.

- Many smokers believe that they are smoking safer cigarettes when they use 'light' or 'ultra-light' cigarettes. Yet 'light' and 'ultra-light' cigarettes fall well over the recognized threshold for addiction.



NICOTINE CONTENT OF WHOLE TOBACCO

What Is Nicotine Content?

- The *nicotine content* of a cigarette is an important element in its design. Nicotine content is the amount of nicotine contained in the tobacco *before* it is burned and inhaled. A smoker extracts the nicotine contained within the tobacco by inhaling nicotine which is released into the smoke when the tobacco is burned.

- A cigarette with a higher nicotine content has a greater amount of nicotine which may potentially be extracted by the smoker and inhaled during smoking.

- *Consumers may believe that 'light' and 'ultra-light' cigarettes contain less nicotine than full flavor cigarettes. However, such classifications do not reflect the amount of nicotine in the cigarette*-- they are based solely on FTC ratings of nicotine yield.

Why Is Nicotine Content Important?

- Nicotine yield ratings-- based on the amount of nicotine 'inhaled' by a smoking machine-- suggest that 'light' cigarettes contain less nicotine than regular cigarettes. In reality, the difference in nicotine content across cigarette types is not significant. *'Light' and regular cigarettes offer similar amounts of nicotine to the smoker.*

According to 1997 data, there were no significant differences in the nicotine content of full flavor, 'light,' or 'ultra-light' cigarettes.

Whether a cigarette is classified as full flavor, 'light,' or 'ultra-light,' it is likely to contain similar amounts of nicotine in the unsmoked tobacco.

- Compensation techniques such as vent blocking or taking longer and deeper puffs on a cigarette are used by smokers as means of extracting a greater amount of nicotine than nicotine yield ratings suggest. When a cigarette has a high level of nicotine content, the smoker may be able to extract high levels of nicotine even though smoking cigarettes labeled with lower nicotine yields.

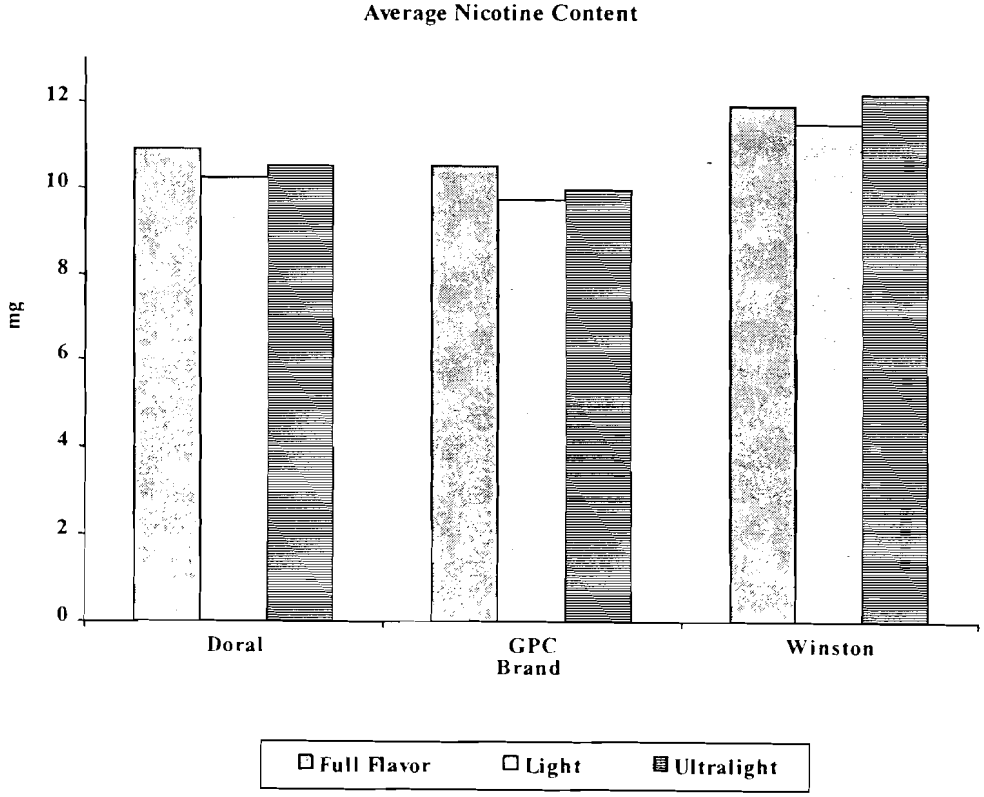
- A cigarette classified as 'light' according to the amount of nicotine which a standard smoking machine will extract from it, will contain levels of nicotine similar to that of a regular cigarette.

Smokers who switch to 'lower yield' cigarettes in order to reduce their intake of nicotine, are faced with similar levels of nicotine content in the 'low yield' cigarettes. Rather than reducing their amount of nicotine, they may simply smoke harder and longer on 'light'/'ultra-light' cigarettes in order to achieve the same impact and the same level of nicotine they obtained with 'higher' nicotine yield cigarettes.

Table 2 - Average Nicotine Content

13-Jan-98

Type	Brand		Average Nicotine Content
Full Flavor			
	Doral		10.91
	GPC		10.50
	Marlboro		13.79
	Newport		14.03
	Winston		11.87
	Winston Select		12.40
		Full Flavor	*12.19*
Light			
	Doral		10.23
	GPC		9.70
	Marlboro		13.11
	Newport		13.19
	Winston		11.45
	Winston Select		11.80
		Light	*11.75*
Ultralight			
	Doral		10.50
	GPC		9.96
	Winston		12.15
		Ultralight	*10.94*



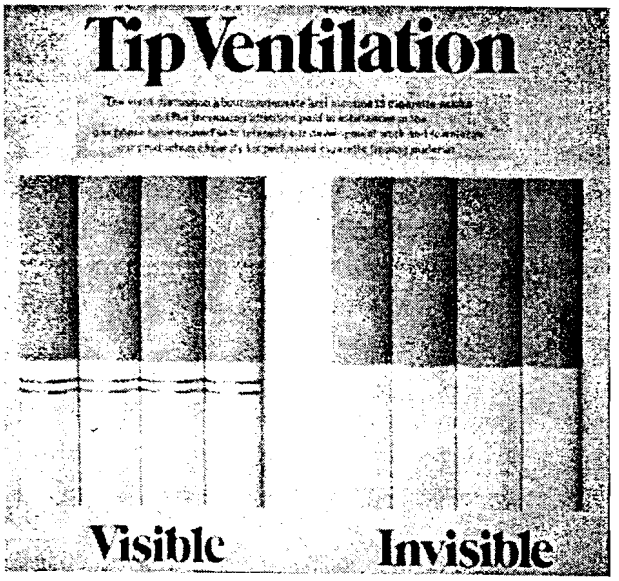
PERCENT FILTER VENTILATION

What Is Vent Blocking?

- Many cigarettes are made with tiny holes around the filter which allow air that has not been drawn through the end of the cigarette to mix with the tobacco smoke during smoking.
- *When smokers place their mouth or fingers over the vents, they keep outside air from diluting the mixture and so take in higher levels of tar and nicotine.*

How Can a Smoker Tell If They Are Vent Blocking?

- It is difficult for a smoker to know if they are covering up the vents. Many brands have vents that are so tiny they are invisible to the naked eye. Often the placement of the holes makes it difficult if not impossible for a smoker to smoke a cigarette without blocking some or all of the vents.
- *The cigarettes are designed so that it is 'natural' to cover up some or all of the filter vents, and 'natural' to breathe in heavier amounts of tar and nicotine.*



87% of smokers of ventilated cigarettes surveyed in Massachusetts did not know that their cigarettes had vents

What Does Vent Blocking Mean for 'Light' and 'Ultra-light' Cigarettes?

Analysis of the filter ventilation in cigarettes shows an extremely high correlation between percent of filter ventilation and type of cigarette. Full flavor brands of cigarette have filter ventilation of 0-25%; 'light' cigarette brands have filter ventilation ranging from 25-40%; and 'ultra-light' cigarette brands have a filter ventilation greater than 50%. This high level of correlation suggests that filter ventilation in cigarette design defines 'light' and 'ultra-light,' rather than the amount of nicotine in the cigarette itself.

- *Filter vents are more often found in 'light' and 'ultra-light' cigarettes.*
- *The filter vents reduce the amount of nicotine and tar measured by FTC testing, without reducing the amount of tar and nicotine in the cigarette, or the amounts which can be inhaled by the smoker.*
- A smoker will likely block at least some of the filter vents on a 'light' or 'ultra-light' cigarette, breathing in more of the dangerous and addictive substances in the smoke.

Table 3 - Filter Ventilation

13-Jan-98

Type	Brand		Filter Ventilation (%)
Full Flavor			
	Doral		11.67%
	GPC		0.00%
	Marlboro		8.83%
	Newport		0.00%
	Winston		17.33%
	Winston Select		25.00%
		Full Flavor	*12.65%*
Light			
	Doral		25.50%
	GPC		26.07%
	Marlboro		26.50%
	Newport		25.20%
	Winston		32.67%
	Winston Select		33.00%
		Light	*27.27%*
Ultralight			
	Doral		56.00%
	GPC		52.97%
	Winston		53.00%
		Ultralight	*53.36%*

Although ultra-light and light cigarettes have a higher percent filter ventilation than full flavor cigarettes, the average smoker blocks at least some of the filter vents, breathing in more of the potentially harmful or addictive substances in the smoke.

NICOTINE YIELD RATINGS

Why Publish Nicotine Ranges?

- The Federal Trade Commission (FTC) publishes for each cigarette brand a nicotine yield number as a result of testing performed by a smoking machine. Although the FTC developed this test to measure *relative* nicotine yields, many consumers believe that the classifications of cigarette brands based on the numbers published by the FTC accurately reflect the amount of nicotine or tar which they will receive from a given brand.

- Because of the differences in individual smoking patterns, no number is truly representative of the amount of nicotine any smoker will receive from a cigarette. Therefore, Massachusetts has developed ranges which classify levels of nicotine relative to each other. These ranges are *high (>1.2 mg)*, *moderate (>0.2-1.2)*, *low (.01-.2)* or *nicotine free (<.01)*.

Massachusetts is publishing the **range of nicotine** which a cigarette delivers under average smoking conditions-- whether *high*, *moderate*, *low*, or *nicotine free*. These ranges will allow smokers to compare nicotine levels among brands of cigarettes, without misleading them about the actual amount of nicotine delivered through their own smoking patterns.

What Do the Classifications Show?

85% of those cigarettes tested in 1997 fell into the highest nicotine range. Of 85 cigarette brands tested, 72 were rated as *high*, including many of the 'light' cigarettes tested, and even some of the 'ultra-light' cigarettes tested.

- **The remaining 13 brands (15% of cigarettes tested) were rated *moderate* by MDPH standards.** *This suggests that virtually all cigarettes on the marketplace today deliver moderate to high doses of nicotine sufficient to cause and maintain heavy dependence.*

- **Thirty-eight (38)**-- *more than half*-- of the brands rated as *high* were 'ultra-light,' 'light,' or 'medium.'

NO BRANDS TESTED FELL INTO THE LOW OR NICOTINE FREE CLASSIFICATION.

The results of testing performed in accordance with MDPH regulations demonstrates the highly addictive potential of nearly all brands of cigarettes-- whether, full flavor, 'light,' or 'ultra-light.' Brands rated according to the FTC method as low in nicotine are shown to have significantly greater levels of nicotine and to be potentially more addictive than the FTC ratings would suggest.

Table 4-- Nicotine Yield Ratings

HIGH (>1.2 mg)

Doral	Full Flavor
Doral	Full Flavor 100's
Doral	Full Flavor Box
Doral	Full Flavor Box 100's
Doral	Full Flavor Menthol
Doral	Full Flavor Menthol 100's
Doral	Full Flavor Menthol Box
Doral	Lights 100's
Doral	Lights Box 100's
Doral	Lights Menthol 100's
Doral	Non-Filter 85's
GPC	Full Flavor 100's
GPC	Full Flavor Box 100's
GPC	Full Flavor Box Kings
GPC	Full Flavor Kings
GPC	Full Flavor Menthol 100's
GPC	Full Flavor Menthol Kings
GPC	Lights 100's
GPC	Lights Box 100's
GPC	Lights Menthol 100's
GPC	Lights Menthol Kings
GPC	Med box 100
GPC	Med King box
GPC	Non-Filter
Marlboro	100 (Box)
Marlboro	100 (SP)
Marlboro	KING F HP
Marlboro	King Size (25/pack)
Marlboro	King Size (SP)
Marlboro	Lights 100 (Box)
Marlboro	Lights 100 (SP)
Marlboro	Lights King Size
Marlboro	Lights King Size (Box)
Marlboro	Lights King Size (SP)
Marlboro	Lights Menthol 100
Marlboro	Lights Menthol 100
Marlboro	Lights Menthol King
Marlboro	Lights Menthol King
Marlboro	Medium 100 (Box)
Marlboro	Medium 100 (SP)
Marlboro	Medium King Size
Marlboro	Medium King Size (SP)
Marlboro	Menthol King Size
Marlboro	Menthol King Size (SP)
Newport	Full Stripes 100's
Newport	Menthol Box
Newport	Menthol 100's
Newport	Menthol 25's 100's
Newport	Menthol Box 100's
Newport	Menthol King 25's
Newport	Menthol Kings
Newport	Menthol Lights
Newport	Menthol Lights 100's
Newport	Menthol Lights Box
Newport	Menthol Lights Box
Newport	Menthol Stripes 100's
Newport	Slim Lights Menthol 100's
Winston	100's
Winston	85's Hard Pack
Winston	85's Soft Pack
Winston	Lights 100's
Winston	Lights 100's Box
Winston	Lights 85's
Winston	Lights 85's Box
Winston	Ultra 100's
Winston	Ultra 100's Box
Winston Select	Full Flavor
Winston Select	Full flavor 100
Winston Select	Full flavor Box King
Winston Select	Light
Winston Select	Light 100
Winston Select	Light Box
Winston	Lights 100's Box
Winston	Lights 85's
Winston	Lights 85's Box
Winston	Ultra 100's
Winston	Ultra 100's Box
Winston Select	Full Flavor
Winston Select	Full flavor 100
Winston Select	Full flavor Box King
Winston Select	Light
Winston Select	Light 100
Winston Select	Light Box

MODERATE (>.2-1.2)

Doral	Lights
Doral	Lights Box
Doral	Lights Menthol
Doral	Ultra Lights
Doral	Ultra Lights 100's
GPC	Lights Box Kings
GPC	Lights Kings
GPC	Menthol Ultra Lights
GPC	Menthol Ultra Lights
GPC	Ultra Lights 100's
GPC	Ultra Lights Kings
Winston	Ultra 85's
Winston	Ultra 85's Box

The two brands smoked by over 85% of Massachusetts youth smokers deliver HIGH nicotine yield with their regular, 'light,' and 'ultra-light' cigarettes.

LOW (>.01-.2)

NONE

NICOTINE FREE (<.01)

NONE

APPENDIX

(A) Definitions

Nicotine yield-- The amount of nicotine in the smoke drawn from a cigarette.

Nicotine yield ratings-- Ratings intended to show the amount of nicotine that each tobacco product brand can be expected to provide to the average consumer, based on machine testing parameters that seek to reflect actual smoking behavior. Numbers yielded by machine testing have been classified according to ranges of high, moderate, low, and nicotine free delivery.

Compensation-- Behavior patterns adopted by the smoker to make up for lower levels of nicotine yield, increasing the amount of nicotine taken from the cigarette. Typical patterns of compensation include smoking more frequently, smoking more cigarettes, smoking more deeply, and increasing puff volume.

Nicotine content-- The amount of nicotine contained in the tobacco of a cigarette (or in smokeless tobacco) *before* it is burned and inhaled. A smoker extracts the nicotine contained within the tobacco by inhaling nicotine which is released into the smoke when the tobacco is burned.

Percent filter ventilation-- The level of air dilution of the whole smoke introduced through holes (vents) in the cigarette filter tip.

Vent blocking-- Covering the holes (vents) in the cigarette filter tip. Smokers may place their mouth or fingers over the vents, keeping outside air from diluting the mixture and taking in higher levels of tar and nicotine.

Appendix B: Nicotine Information Summary

12-Jan-98

Manufacturer	MA Nicotine Yield (mg)	FTC Nicotine Yield(mg)	FTC CO Rating(mg)	FTC Tar Rating(mg)	Classification	Type	Filter Ventilation (%)	MA Nicotine Content(mg/cig)	# Puffs
Brown and Williamson									
Brand: *GPC*									
Sub-Brand:									
Full Flavor 100's	1.66	0.9	16	15	High	Full Flavor	0.0%	10.43	11.2
Full Flavor Box 100's	1.6	0.9	15		High	Full Flavor	0.0%	10.26	10.7
Full Flavor Box Kings	1.7	1	14	16	High	Full Flavor	0.0%	9.33	9.9
Full Flavor Kings	1.69	0.9	15	16	High	Full Flavor	0.0%	9.4	9.9
Full Flavor Menthol 100's	1.78	0.9	14	13	High	Full Flavor	0.0%	11.19	10.3
Full Flavor Menthol Kings	1.82	1	13	15	High	Full Flavor	0.0%	10.12	9.5
Lights 100's	1.38	0.7	12	10	High	Light	26.1%	10.5	12.2
Lights Box 100's	1.22	0.7	12	10	High	Light	26.6%	10.28	11.5
Lights Box Kings	1.15	0.7	10	10	Moderate	Light	21.6%	8.51	9.4
Lights Kings	1.12	0.7	11	10	Moderate	Light	23.8%	8.3	9.1
Lights Menthol 100's	1.48	0.7	8	8	High	Light	36.5%	11.36	11.7
Lights Menthol Kings	1.41	0.7	9	9	High	Light	21.8%	9.24	8.8
Med box 100	1.52				High	Medium	20.5%	10.49	10.8
Med King box	1.28				High	Medium	15.9%	8.4	8.5
Menthol Ultra Lights 100's	1.14	0.4	6	5	Moderate	Ultralight	57.7%	11.4	12.4
Menthol Ultra Lights Kings	1.07	0.4	6	5	Moderate	Ultralight	43.6%	9.31	9.4
Non-Filter	2.26	1.3	15	23	High	Full Flavor	0.0%	12.75	11.6
Ultra Lights 100's	1.08	0.4	6	5	Moderate	Ultralight	59.1%	10.62	13.5
Ultra Lights Kings	0.92	0.5	7	6	Moderate	Ultralight	51.5%	8.49	10.5
Average:	***1.44***	***0.8***	***11***	***11***			***21.3%***	***10.02***	***10.6***
Lorillard									
Brand: *Newport*									
Sub-Brand:									
Full Stripes 100's	1.8	1	14	11	High	Light	20.0%	13.9	13.3
Menthol Box	2.3	1.1	16	16	High	Full Flavor	0.0%	12.5	10.9
Menthol 100's	2.8	1.4	19	18	High	Full Flavor	0.0%	15	13.1
Menthol 25's 100's	2.9	1.4	18	19	High	Full Flavor	0.0%	15.4	13.2
Menthol Box 100's	2.9	1.3	19	18	High	Full Flavor	0.0%	15.1	13.5
Menthol King 25's	2.4	1.2	17	17	High	Full Flavor	0.0%	12.7	11.5
Menthol Kings	2.4	1.2	17	17	High	Full Flavor	0.0%	13.5	11.6
Menthol Lights	1.5	0.7	11	9	High	Light	22.5%	12.1	10.2
Menthol Lights 100's	1.9	0.8	11	10	High	Light	33.4%	14.9	13.7
Menthol Lights Box	1.5	0.7	12	9	High	Light	20.1%	11.5	9.8
Menthol Lights Box 100's	1.9	0.8	11	9	High	Light	31.4%	14.8	13.4
Menthol Stripes 100's	1.8	0.9	14	12	High	Light	21.1%	13.7	13
Slim Lights Menthol 100's	1.8	0.8	10	10	High	Light	27.9%	11.4	13.1
Average:	***2.15***	***1.0***	***15***	***13***			***13.6%***	***13.58***	***12.3***
Philip Morris									
Brand: *Marlboro*									
Sub-Brand:									
100 (Box)	2.2	1.2			High	Full Flavor	12.0%	14.82	13.3
100 (SP)	2.3	1.1			High	Full Flavor	14.0%	15.48	13.6

Manufacturer	MA Nicotine Yield (mg)	FTC Nicotine Yield(mg)	FTC CO Rating(mg)	FTC Tar Rating(mg)	Classification	Type	Filter Ventilation (%)	MA Nicotine Content(mg/cig)	# Puffs
KING F HP	2.1	1.1			High	Full Flavor	13.0%	13.44	11.1
King Size (25/pack)	2.1	1.1	14	15	High	Full Flavor	10.0%	12.96	11.6
King Size (SP)	2.1	1.1	15	16	High	Full Flavor	13.0%	13.81	11.9
Lights 100 (Box)	1.7	0.8	12	10	High	Light	28.0%	14.43	13.4
Lights 100 (SP)	1.7	0.8	12	10	High	Light	30.0%	14.34	13.2
Lights King Size (25/pack)	1.6	0.8	11	10	High	Light	22.0%	11.45	10.9
Lights King Size (Box)	1.6	0.8	11	10	High	Light	22.0%	12.97	10.8
Lights King Size (SP)	1.6	0.8	11	10	High	Light	23.0%	13.4	10.8
Lights Menthol 100 (Box)	1.6	0.7	11	9	High	Light	30.0%	14.23	12.9
Lights Menthol 100 (SP)	1.6	0.8			High	Light	32.0%	12.97	12.9
Lights Menthol King Size (	1.6	0.7	10	9	High	Light	24.0%	12.72	10.3
Lights Menthol King Size (	1.6	0.8			High	Light	24.0%	11.48	10.4
Medium 100 (Box)	1.9	1	12	13	High	Medium	20.0%	14.6	12.9
Medium 100 (SP)	2	1	13	12	High	Medium	20.0%	13.9	13.1
Medium King Size (Box)	1.7	0.8	12	11	High	Medium	20.0%	12.29	10.6
Medium King Size (SP)	1.7	0.9	12	11	High	Medium	21.0%	12.69	10.8
Menthol King Size (Box)	2.2	1.1	14	16	High	Full Flavor	3.0%	13.28	10.8
Menthol King Size (SP)	2.2	1	15	16	High	Full Flavor	1.0%	12.77	11
Average:	***1.86***	***0.9***	***12***	***12***			***19.1%***	***13.40***	***11.8***
RJ Reynolds									
Brand: *Doral*									
Sub-Brand:									
Full Flavor	1.7	0.9	15	14	High	Full Flavor	14.0%	10.3	10.3
Full Flavor 100's	1.6	0.8	16	13	High	Full Flavor	14.0%	11.2	11.3
Full Flavor Box	1.6	0.9	15	14	High	Full Flavor	14.0%	10	10
Full Flavor Box 100's	1.7				High	Full Flavor	15.0%	10.5	11
Full Flavor Menthol	1.7	0.9	15	14	High	Full Flavor	14.0%	10.6	10.2
Full Flavor Menthol 100's	1.7	0.9	16	13	High	Full Flavor	14.0%	10.7	11.3
Full Flavor Menthol Box	1.6				High	Full Flavor	15.0%	9.9	9.9
Lights	1.2	0.6	10	8	Moderate	Light	24.0%	9.5	9.4
Lights 100's	1.5	0.7	11	10	High	Light	26.0%	11.2	11.6
Lights Box	1.1	0.6	10	8	Moderate	Light	27.0%	9.1	9
Lights Box 100's	1.7				High	Light	24.0%	10.9	11.3
Lights Menthol	1.2	0.6	10	8	Moderate	Light	25.0%	9.2	9.4
Lights Menthol 100's	1.5	0.6	12	8	High	Light	25.0%	11.5	11.7
Non-Filter 85's	2.1	1.2	17	22	High	Full Flavor	6.0%	14.1	9.9
Ultra Lights	0.9	0.4	6	4	Moderate	Ultralight	56.0%	9.7	10.6
Ultra Lights 100's	1.1	0.4	8	5	Moderate	Ultralight	56.0%	11.3	13.1
Average:	***1.49***	***0.7***	***12***	***11***			***23.1%***	***10.61***	***10.6***
Brand: *Winston*									
Sub-Brand:									
100's	2.3	1.2	17	16	High	Full Flavor	13.0%	13.3	13.4
85's Hard Pack	2.1	1.3	17	18	High	Full Flavor	20.0%	10.9	10.9
85's Soft Pack	2	1.2	13	15	High	Full Flavor	19.0%	11.4	10.9
Lights 100's	1.9	0.8	13	10	High	Light	36.0%	12.2	13.5
Lights 100's Box	1.7	0.8	10	9	High	Light	33.0%	12.8	12.5

Manufacturer	MA Nicotine Yield (mg)	FTC Nicotine Yield(mg)	FTC CO Rating(mg)	FTC Tar Rating(mg)	Classification	Type	Filter Ventilation (%)	MA Nicotine Content(mg/cig)	# Puffs
Lights 85's	1.5	0.7	11	10	High	Light	29.0%	10.9	10.7
Lights 85's Box	1.4	0.8	11	11	High	Light	29.0%	9.9	10.3
Ultra 100's	1.2	0.4	6	4	High	Ultralight	56.0%	13.5	13
Ultra 100's Box	1.4	0.6	8	6	High	Ultralight	52.0%	14	11.8
Ultra 85's	1.2	0.5	8	6	Moderate	Ultralight	52.0%	10.9	10.3
Ultra 85's Box	1.2	0.5	7	5	Moderate	Ultralight	51.0%	10.2	10
Average:	***1.63***	***0.8***	***11***	***10***			***35.5%***	***11.82***	***11.6***
Brand: ***Winston Select***									
Sub-Brand:									
Full Flavor	2.1	1.2			High	Full Flavor	19.0%	11.6	11.2
Full flavor 100	1.8				High	Full Flavor	35.0%	13.3	13.3
Full flavor Box King	2.1	1.3			High	Full Flavor	21.0%	12.3	11.2
Light	1.6	0.9			High	Light	30.0%	11.1	10.9
Light 100	1.8	0.8			High	Light	37.0%	12.8	12.1
Light Box	1.4	0.8			High	Light	32.0%	11.5	10.7
Average:	***1.80***	***1.0***					***29.0%***	***12.10***	***11.6***
Overall Average:	***1.70***	***0.9***	***12***	***11***			***22.3%***	***11.85***	***11.3***

(C) DPH Regulations-- Testing Method for Cigarettes
(from 105 CMR 660.000)

Cigarette manufacturers shall include in their annual report a rating for nicotine yield for each brand, sub-brand, and generic unbranded cigarette sold in the Commonwealth, which shall include:

(1) the most recent nicotine level reported for the brand, sub-brand, or generic unbranded cigarette to the Federal Trade Commission, as published in the Federal Trade Commission Report entitled "*Tar, Nicotine, and Carbon Monoxide of the Smoke of Varieties of Domestic Cigarettes*",

(2) total nicotine of the cigarette, reported in milligrams of nicotine, as determined under the testing method set forth in the appendix,

(3) percent filter ventilation; that is, the level of air dilution in the whole smoke, as provided by the ventilation holes in the cigarette filter, described in percent, as determined under the method described in the appendix,

(4) nicotine delivery under average smoking conditions, reported in milligrams of nicotine per cigarette. Manufacturers shall use the Federal Trade Commission testing method, as described and modified in 105 CMR 660.500(E), with the puff volume adjusted to 45 milliliters, puff interval adjusted to 30 seconds, and puff duration to two seconds. The average number of puffs per cigarette taken in this condition shall be reported. Cigarettes with ventilation holes must have the holes half blocked during testing (see appendix for hole blocking method). Manufacturers shall classify each brand, sub-brand or generic unbranded cigarette for nicotine yield according to the following standards:

Cigarette Nicotine Delivery	Average Smoking Conditions Nicotine (mg/cigarettes)
High Nicotine	>1.2mg
Moderate Nicotine	>0.2-1.2
Low Nicotine	.01-0.2
Nicotine Free	<0.01

(A) Sampling and Conditioning: Conditioning for testing of tobacco products shall be done in accordance with the International Organization for Standardization (ISO) 3402, third edition, 1991-07-01 entitled *Tobacco and Tobacco Products-Atmosphere for Conditioning and Testing*. Cigarettes shall be sampled using international standard ISO 8243:98 (E) entitled *Cigarette-Sampling*, with samples collected at point of sale and at a single point in time. At a minimum, for each brand sampled, 4 packages of cigarettes should be purchased from five retailers located in five separate counties in Massachusetts, for a total of 100 packages purchased. Two packs from each location will be mailed to the Department of Public Health from the location of purchase. If some varieties are not available in certain locations, additional packages will be purchased where they are available. Smokeless tobacco products will follow the sampling protocol outlined in "Protocol for Analysis of Nicotine, Total Moisture, and pH in Smokeless Tobacco Products" (see B below).

(B) Total Nicotine Content: The protocol for measuring nicotine content in cigarette and smokeless tobacco products and for moisture content and pH in smokeless tobacco products is described in "Protocol for Analysis of Nicotine, Total Moisture, and pH in Smokeless Tobacco Products," (or most recently amended version) as announced in the Federal Register of May 2, 1997, volume 62, no. 85, pp. 24115-24116. In measuring nicotine content, the cigarette manufacturer shall use the following sampling method: two cigarettes shall be randomly selected from each pack and conditioned, the tobacco rod split open, and the cigarette tobacco mixed thoroughly before weighing. The minimum sample size shall be 100 grams of tobacco. If the weight of the tobacco is less than 100 grams, additional cigarettes shall be randomly selected from each pack.

(C) Percent Filter Tip Ventilation means the level of air dilution in the whole smoke, as provided by the perforations made in the cigarette filter tip, described in percent. This shall be measured using the Filter Dilution (Ventilation) Testing Instrument (FDT) from Fidus Instrument Corporation, product no. FDT 232: or FIAL Tip and Envelope Ventilation/Pressure with manufacturer instructions. Two cigarettes shall be randomly selected from each sampled pack, conditioned, and tested for percent filter ventilation. The average percent filter ventilation shall be computed for the 100 cigarettes tested.

(D) Smoke pH Measurement shall be performed using the method described in Harris, J.L., Hayes, L.E., a method for measuring the pH of whole smoke. Tobacco Science, 1977: 60:81-83, or equal method approved by the Department, with the puff volume adjusted to 43 milliliters, puff interval adjusted to 30 seconds, puff duration to two seconds and ventilation holes half blocked during testing (see 105 CMR 660.500 (E) for Methods).

(E). Modified FTC Testing Method: Nicotine delivery under average smoking conditions shall be evaluated using the Cambridge Method, which has been approved by the Federal Trade Commission (FTC) as the standard for nicotine testing since 1966, and adopted for international purposes by the ISO. See *Federal Register* Vol. 32, No. 147, page 11178, dated August 1, 1967, as modified by the FTC in *Federal Register,* Vol. 45 No. 134 pages 46483-46487, dated July 10, 1980, ISO 10315, 91-08-01 entitled *Cigarettes-Determination of Nicotine in Smoke Condensates-Gas-Chromatographic Method,* ISO 3308, third edition, 1991-10-15, *Routine Analytical Cigarette-Smoking Machine-Definition of Standard Conditions*-and ISO 7201, second edition, 1997-01-15 *Routine Analytical Smoking Machine Additional Test Methods.* Two cigarettes shall be randomly selected from each pack for a sample of 100 cigarettes. The Department has modified the FTC and ISO conditions to require the following changes to the testing method:

(1) Puff volume as prescribed in the FTC method and in the ISO 3308: 4.3 shall be increased from 35 ml to 43 ml;

(2) Puff frequency as prescribed in the FTC method and ISO 3308: 4.4 shall be changed from one puff each minute to one puff each 30 seconds;

(3) Puff duration shall remain at two seconds;

(4) 50% of the ventilation holes must be blocked by placing a strip of mylar adhesive tape, Scotch Brand product no. 600 Transparent Tape (Acetate) or other method approved by the Department. The tape shall be cut so that it covers 50% of the circumference and is tightly secured from the end of the filter to the tipping overwrap seam.

D) Tobacco Industry Comments on Massachusetts Testing

In their submission to the Massachusetts Department of Public Health on December 15, tobacco industry manufacturers voiced concerns about some aspects of the Massachusetts testing method. The majority of these concerns focused on the ability of the different labs to reproduce tests in similar enough fashion to provide for accurate comparison across manufacturers.

RJ Reynolds and Philip Morris voiced concerns similar concerns about lack of validation for the procedures outlined in MDPH regulations. In particular, RJ Reynolds noted that the increased levels of smoke collection necessitated by Massachusetts testing may have exceeded the capacity of the standard Cambridge filter pad used in FTC testing, thereby underestimating the actual nicotine yield in some cases.

RJ Reynolds and Philip Morris both made note of a discrepancy in the regulations which makes it unclear whether testing should be conducted at 45 mL puff volume or 43 mL puff volume. Both companies tested nicotine yield at the more conservative 45 mL.

All major manufacturers requested a reevaluation of the pH testing method, as well as further examination of the CDC protocol for testing of nicotine content. Comments were submitted regarding minor differences in CDC requirements and requirements by MDPH, although these differences were resolved without apparent difficulty (cf. letter from Philip Morris, December 15, 1997, page 3, regarding whether nicotine content is to be reported on per cigarette or per gram basis.)