

CONFIDENTIAL

# **UK SMOKE CONSTITUENTS TESTING STUDY PROTOCOL**

## **Part 1 : Determination of NFDPM, Nicotine and Carbon Monoxide Yields in Cigarette Smoke**

COMMISSIONED BY :

Tobacco Manufacturers Association

55 Tufton Street

LONDON SW1P 3QL

Report Number FN40/M01/02

Report Date January 2002

Contact Point: IAN AXFORD

Tel: 020 8943 7375

Prepared by: Pete Houlgate

Consumer Safety & Tobacco Products Group



*Setting standards  
in analytical science*

## Contents

Contents.....	3
Determination of NFDPM, Nicotine and Carbon Monoxide Yields in Cigarette Smoke .....	4
1. Introduction.....	4
2. Summary.....	4
3. Samples .....	4
4. Smoking.....	4
5. Results & Discussion .....	5
6. Information provided in the Appendices.....	5
Tables .....	6
Summary of mean results for 25 cigarette brands plus 1R4F & 1R5F .....	6
Regression analysis of nicotine versus NFDPM for 25 cigarette brands .....	7
Regression analysis of carbon monoxide versus NFDPM for 25 cigarette brands .....	8
1R4F.....	9
1R5F.....	10
Benson & Hedges King Size .....	11
Berkely Superkings .....	12
Camel Ultra Lights.....	13
Consulate Menthol.....	14
Gitanes Caporal Filter .....	15
Lambert & Butler King Size .....	16
Lambert & Butler Lights King Size .....	17
Lambert & Butler Ultra Lights .....	18
Marlboro King Size.....	19
Marlboro Lights King Size .....	20
Mayfair Lights King Size .....	21
Mayfair Menthol King Size .....	22
Red Band Lights King Size.....	23
Regal Filter.....	24
Regal King Size .....	25
Rothman Royals 120s.....	26
Rothman Royals King Size .....	27
Senior Service .....	28
Silk Cut Extra Mild .....	29
Silk Cut King Size .....	30
Silk Cut Ultra King Size .....	31
Superkings.....	32
Superkings Lights .....	33
Superkings Ultra Lights.....	34
Vogue Superslims .....	35
Appendix 1: Selected smoke constituents for UK study .....	36
Appendix 2: Selected abbreviations and terms used in this report .....	37
Appendix 3: Description of brands (sold in the UK - Nov/Dec 2001) used in the benchmark study.....	38

## UK SMOKE CONSTITUENTS TESTING STUDY PROTOCOL

### Determination of NFDPM, Nicotine and Carbon Monoxide Yields in Cigarette Smoke

#### 1. Introduction

This work was undertaken by LGC Limited at the request of the Tobacco Manufacturers' Association in accordance with the Study Protocol provided by, and agreed with, the UK Department of Health.

#### 2. Summary

The objective of this study is to determine the yield ratings of selected smoke constituents (Appendix 1) in mainstream cigarette smoke as identified by the United Kingdom Department of Health. The study encompassed 25 brands of cigarettes representing a 58% market share (July 2001) of the UK market. In addition a Kentucky reference cigarette 1R4F will also be smoked as part of the study.

This report details the results for nicotine free dry particulate matter (NFDPM), nicotine and carbon monoxide.

#### 3. Samples

25 brands of cigarettes were selected because their design parameters are representative of the brands in the UK market place. The selection criteria include a range of "tar" values, ventilation, paper permeability, circumference, length, tobacco weight, blend and market share. The Kentucky reference cigarette 1R4F was also included in the study and for some determinations Kentucky 1R5F has been included.

2000 cigarettes of each brand were obtained from a single production batch of current specification (November/December 2001), and stored in plastic containers at 4°C. Cigarettes were selected from packets on a random basis for testing.

Cigarettes were conditioned<sup>1</sup> at a temperature<sup>\*</sup> of  $22 \pm 1^\circ\text{C}$  and  $60 \pm 2\%$  relative humidity<sup>\*</sup> for a minimum of 48 hours but not exceeding 10 days.

Butt marking was done in accordance with ISO butt length specifications<sup>2</sup>. Filtered cigarettes were smoked to a measured butt length equal to either the tipping paper + 3 mm or filter length + 8 mm whichever was longer. The minimum butt length was 23 mm and this was used for non filter brands. All smoking was conducted in an environment of temperature  $22 \pm 2^\circ\text{C}$  and  $60 \pm 5\%$  relative humidity<sup>1</sup>.

#### 4. Smoking

The cigarettes were smoked on a 20 channel Filtrona SM350 smoking machine or a Filtrona SM400 smoking machine.

5 cigarettes were sub-sampled from packets chosen on a random basis and smoked to determine total and nicotine-free dry particulate matter using the method described in ISO

---

<sup>\*</sup> The parameter is slightly more stringent than that specified in ISO

4387:2000<sup>2</sup>. 20 determinations were performed for each of the 25 brands & 1R4F. In addition the Kentucky Reference cigarette 1R5F was also tested. As far as was practicable brands were smoked on different channels on different smoking runs.

ISO conditions<sup>3</sup> for smoking cigarettes were used. The smoking machine puffing parameters was  $35 \pm 0.2 \text{ cm}^3$  puff volume\* with  $2.0 \pm 0.02$  second puff duration once every  $60.0 \pm 0.5$  seconds.

Carbon monoxide was determined in the vapour phase using a non-dispersive infrared analyser using the method described in ISO 8454: 1995<sup>4</sup>.

Nicotine was determined in the smoke condensate using a gas-chromatographic – flame ionisation detector method as described in ISO 10315: 2000<sup>5</sup>. NB The column used was a packed column 1/8inch OD  $\times$  2.0 metre nickel column packed with 10% Carbowax 20M + 2% potassium hydroxide on Chromosorb W-HP (acid washed and silanised) 80/100 mesh.

Water was determined in the smoke condensate using a gas chromatographic method as described in ISO 10362-1: 1999<sup>6</sup>

## 5. Results & Discussion

The results were tabulated for each brand (see Tables). The mean, standard deviation and relative standard deviation were determined for the set of results for each brand.

A summary of the results is included at the beginning (Page 6). Linear least squares regression analysis has been carried out for nicotine/NFDPM (Page 7) and carbon monoxide/NFDPM (Page 8) for the twenty five cigarette brands (excluding 1R4F & 1R5F).

Repeat analyses were only performed where a problem had been identified with the original smoking run. In this study there was a valve failure leading to faulty carbon monoxide yields for a few samples. The original results were discarded and the analysis repeated – denoted by an “r” at the end of the data. One result was excluded after being identified as an outlier using Dixon’s test – denoted by “excluded” at the end of the data.

## 6. Information provided in the Appendices

Appendix 1 lists the specific analytes to be determined in the study.

Appendix 2 contains a brief glossary of selected abbreviations and terms used in this report

Appendix 3 contains a brief description of the cigarettes used in this survey. It also lists the butt lengths determined for each brand of cigarette.

---

<sup>1</sup> ISO 3402: 2000 - Tobacco and tobacco products – atmosphere for conditioning and testing

<sup>2</sup> ISO 4387: 2000 - Methods for chemical analysis of tobacco and tobacco products: Determination of total and nicotine- free dry particulate matter using a routine analytical smoking machine

<sup>3</sup> ISO 3308:2000 – Routine analytical cigarette smoking machine: Definitions and standard conditions

<sup>4</sup> ISO 8454:1995 – Chemical analysis of tobacco and tobacco products: Determination of carbon monoxide in the vapour phase cigarette smoke (NDIR method)

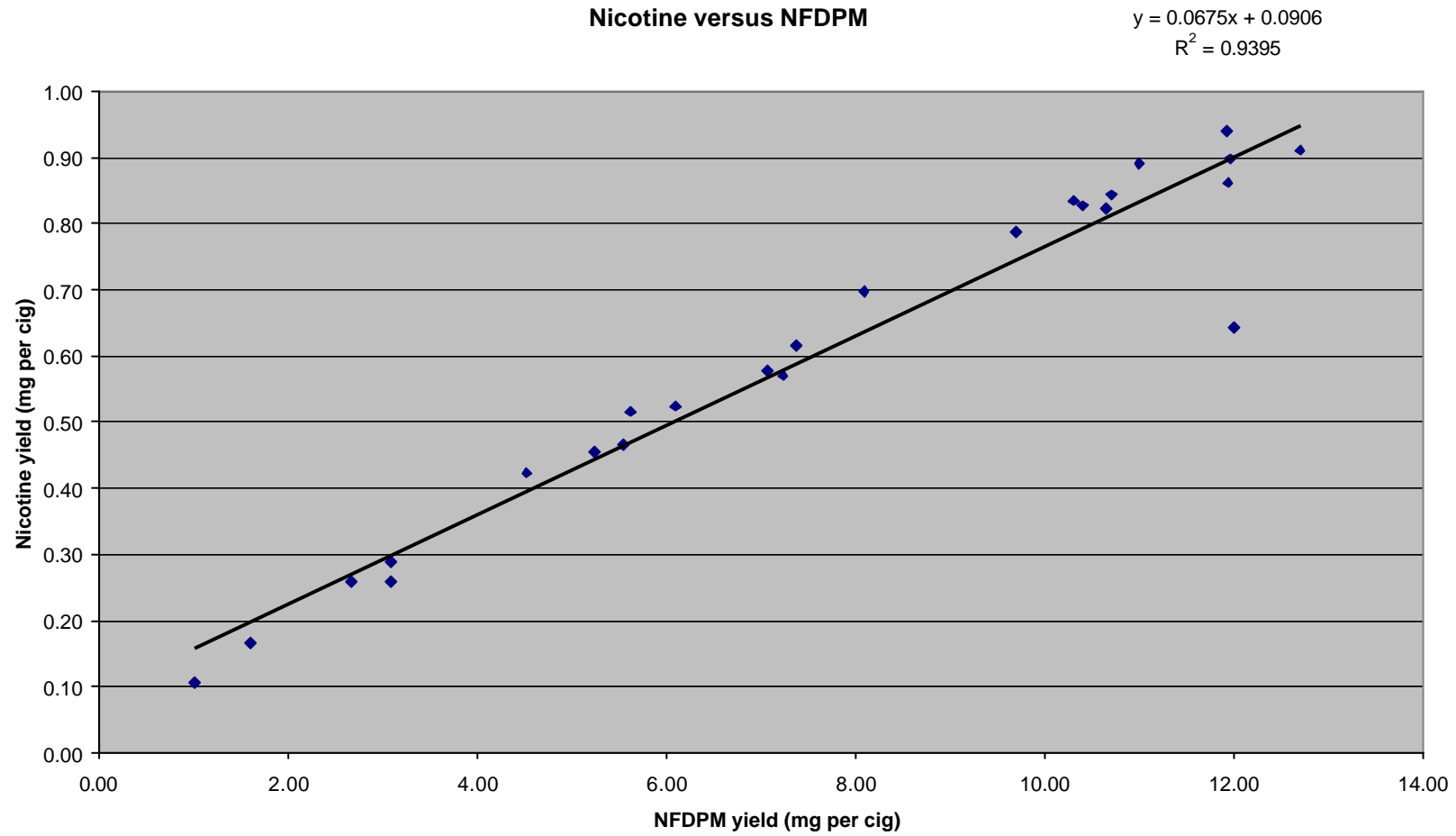
<sup>5</sup> ISO 10315:2000 – Chemical analysis of tobacco and tobacco products: Determination of nicotine in smoke condensate of cigarettes (gas-chromatographic method)

<sup>6</sup> ISO 10362-1:1999 – Chemical analysis of tobacco and tobacco products: Determination of water in smoke condensate of cigarettes (gas-chromatographic method)

**Tables****Summary of mean results for 25 cigarette brands plus 1R4F & 1R5F**

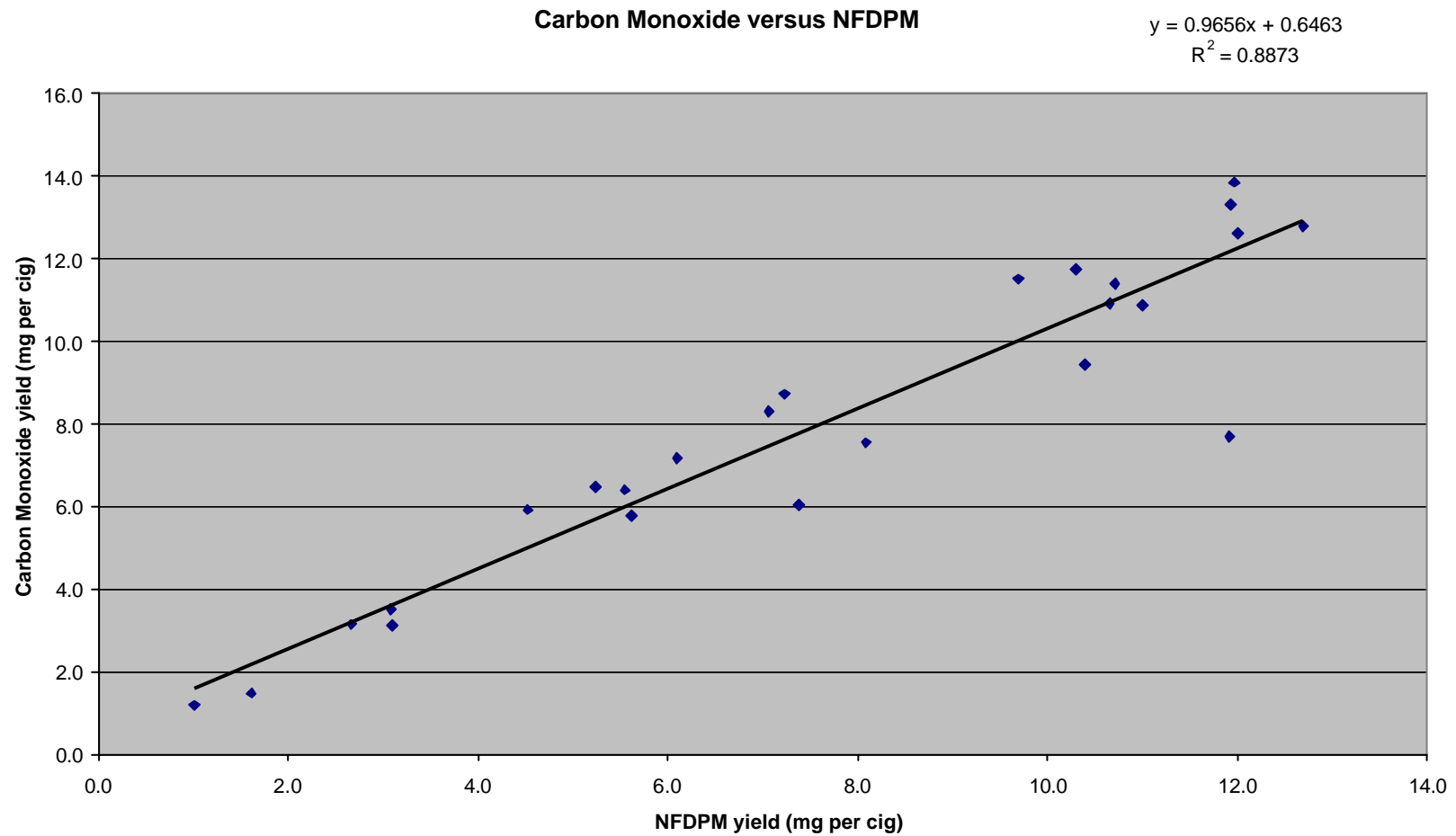
Brand	Puff per cig	Carbon Monoxide (CO)	TPM	Water	Nicotine	NFDPM	CO Yield
		Concentration % v/v	Yield < -----mg per cigarette ----- >	Yield	Yield	Yield	
<b>1R4F</b>	8.45	3.52	10.70	0.93	0.71	9.06	12.26
<b>1R5F</b>	6.58	1.23	2.28	0.21	0.16	1.92	3.36
<b>Benson &amp; Hedges King Size</b>	8.11	3.51	12.56	1.42	0.84	10.30	11.74
<b>Berkely Superkings</b>	8.62	3.24	11.52	1.04	0.79	9.69	11.50
<b>Camel Ultra Lights</b>	7.80	0.97	3.67	0.29	0.29	3.09	3.13
<b>Consulate Menthol</b>	7.16	2.80	8.17	0.53	0.58	7.06	8.30
<b>Gitanes Caporal Filter</b>	6.97	4.39	14.81	2.17	0.64	12.00	12.60
<b>Lambert &amp; Butler King Size</b>	7.33	4.39	14.97	2.17	0.86	11.93	13.30
<b>Lambert &amp; Butler Lights King Size</b>	6.26	2.50	6.11	0.41	0.45	5.24	6.48
<b>Lambert &amp; Butler Ultra Lights</b>	7.12	0.50	1.89	0.11	0.17	1.61	1.49
<b>Marlboro King Size</b>	8.58	3.62	15.69	2.08	0.91	12.69	12.79
<b>Marlboro Lights King Size</b>	7.64	2.28	7.20	0.58	0.52	6.10	7.19
<b>Mayfair Lights King Size</b>	7.44	2.84	8.53	0.73	0.57	7.23	8.73
<b>Mayfair Menthol King Size</b>	7.12	2.03	5.40	0.33	0.42	4.65	5.95
<b>Red Band Lights King Size</b>	8.23	1.89	6.35	0.34	0.47	5.55	6.41
<b>Regal Filter</b>	6.62	4.00	13.83	2.36	0.82	10.65	10.92
<b>Regal King Size</b>	7.68	4.37	15.14	2.28	0.90	11.96	13.86
<b>Rothman Royals 120s</b>	10.50	2.17	12.08	0.86	0.83	10.39	9.44
<b>Rothman Royals King Size</b>	8.02	3.27	13.28	1.40	0.89	11.00	10.86
<b>Senior Service</b>	6.77	2.76	13.97	1.12	0.94	11.92	7.71
<b>Silk Cut Extra Mild</b>	7.12	1.07	3.14	0.21	0.26	2.67	3.16
<b>Silk Cut King Size</b>	8.28	1.69	6.54	0.40	0.52	5.62	5.78
<b>Silk Cut Ultra King Size</b>	7.94	0.36	1.19	0.07	0.11	1.01	1.20
<b>Superkings</b>	7.77	3.54	12.90	1.35	0.84	10.71	11.41
<b>Superkings Lights</b>	7.99	2.28	9.39	0.61	0.70	8.09	7.54
<b>Superkings Ultra Lights</b>	6.54	1.31	3.57	0.23	0.26	3.08	3.53
<b>Vogue Superslims</b>	7.07	2.07	8.83	0.84	0.62	7.38	6.05

**Regression analysis of nicotine versus NFDPM for 25 cigarette brands**



The regression analysis trend line has been calculated on the basis of a linear relationship ( $y = mx + c$ )

**Regression analysis of carbon monoxide versus NFDPM for 25 cigarette brands**



The regression analysis trend line has been calculated on the basis of a linear relationship ( $y = mx + c$ )

**1R4F**

Run	Channel	Puffs per cigarette	CO (%v/v)	←-----Yield in Milligrams Per Cigarette-----→					
				CO	TPM	Water	Nicotine	NFDPM	
45	3	8.1	3.51	11.61	10.22	0.77	0.70	8.75	
46	2	8.5	3.49	11.94	10.46	0.85	0.71	8.90	
47	4	8.7	3.54	12.40	10.70	1.00	0.69	9.01	
48	5	8.2	3.76	12.64	10.84	0.84	0.72	9.28	
49	6	8.9	3.32	12.03	11.10	1.09	0.72	9.29	
50	12	8.1	3.50	11.84	10.14	0.76	0.66	8.72	
74	11	8.6	3.54	12.60	11.06	0.96	0.77	9.33	r
76	20	8.4	3.47	12.06	10.18	0.89	0.69	8.60	r
60	19	8.5	3.69	13.06	11.18	0.99	0.69	9.50	
61	18	8.4	3.44	12.07	10.56	0.80	0.67	9.09	
62	16	8.2	3.74	12.80	10.68	0.88	0.70	9.10	
63	15	8.2	3.60	12.35	11.22	1.04	0.75	9.43	
65	14	8.3	3.43	11.93	9.88	0.81	0.67	8.40	
67	13	8.6	3.42	12.19	10.74	1.10	0.71	8.93	
69	10	8.7	3.34	12.09	10.28	1.03	0.70	8.55	
71	8	8.6	3.56	12.64	11.14	1.09	0.73	9.32	
72	11	8.6	3.60	12.60	11.10	1.05	0.73	9.32	
73	17	8.7	3.43	12.19	10.86	0.97	0.72	9.17	
74	9	8.4	3.41	11.84	10.60	0.87	0.70	9.03	
75	7	8.3	3.57	12.29	10.96	0.88	0.70	9.38	
			<b>Mean</b>		<b>Standard Deviation</b>		<b>Relative Standard Deviation</b>		
		<b>Puffs</b>	8.45		0.23		2.67		
		<b>CO Concentration</b>	3.52		0.12		3.41		
		<b>TPM</b>	10.70		0.40		3.72		
		<b>Water</b>	0.93		0.11		11.99		
		<b>Nicotine</b>	0.71		0.03		3.77		
		<b>NFDPM</b>	9.06		0.32		3.51		
		<b>CO Yield</b>	12.26		0.37		3.04		

**1R5F**

Run	Channel	Puffs per cigarette	CO (%v/v)	CO	TPM	Water	Nicotine	NFDPM
←-----Yield in Milligrams Per Cigarette-----→								
50	3	6.5	1.17	3.17	2.28	0.17	0.15	1.96
51	9	6.7	1.13	3.14	2.20	0.23	0.15	1.82
52	6	7.0	1.30	3.77	2.50	0.17	0.18	2.15
54	4	6.6	1.05	2.89	1.52	0.25	0.14	1.13
55	18	6.3	1.21	3.16	2.04	0.24	0.16	1.64
56	17	6.4	1.24	3.29	2.22	0.20	0.16	1.86
57	16	6.6	1.14	3.13	2.36	0.18	0.16	2.02
76	13	6.6	1.25	3.39	2.42	0.17	0.16	2.09
59	13	6.4	1.24	3.30	1.98	0.18	0.15	1.65
60	12	6.3	1.19	3.14	2.54	0.20	0.17	2.17
61	11	6.4	1.35	3.62	2.42	0.19	0.17	2.06
63	10	6.5	1.29	3.51	2.36	0.22	0.16	1.98
66	8	6.5	1.21	3.26	2.28	0.16	0.15	1.97
67	7	6.4	1.34	3.53	1.98	0.25	0.14	1.59
68	20	6.8	1.34	3.80	2.28	0.24	0.18	1.86
69	17	6.5	1.24	3.34	2.36	0.22	0.15	1.99
70	5	6.6	1.25	3.40	2.24	0.18	0.17	1.89
71	1	6.9	1.25	3.59	2.94	0.32	0.19	2.43
73	2	6.7	1.27	3.46	2.44	0.21	0.15	2.08
73	14	6.8	1.21	3.37	2.28	0.16	0.16	1.96
			<b>Mean</b>	<b>Standard Deviation</b>	<b>Relative Standard Deviation</b>			
<b>Puffs</b>			6.58	0.19	2.96			
<b>CO Concentration</b>			1.23	0.07	6.08			
<b>TPM</b>			2.28	0.28	12.16			
<b>Water</b>			0.21	0.04	19.39			
<b>Nicotine</b>			0.16	0.01	8.36			
<b>NFDPM</b>			1.92	0.27	14.05			
<b>CO Yield</b>			3.36	0.23	6.86			

**Benson & Hedges King Size**

Run	Channel	Puffs per cigarette	CO (%v/v)	←-----Yield in Milligrams Per Cigarette-----→					
				CO	TPM	Water	Nicotine	NFDPM	
45	9	8.3	3.56	12.02	12.84	1.36	0.85	10.63	
46	8	7.9	3.50	11.20	11.18	0.98	0.77	9.43	
47	10	7.8	3.67	11.64	12.38	1.57	0.80	10.01	
48	11	8.4	3.48	11.89	13.42	1.65	0.89	10.88	
49	12	8.3	3.39	11.56	12.66	1.46	0.86	10.34	
75	16	8.0	3.47	11.42	12.62	1.39	0.83	10.40	
52	17	8.0	3.26	10.88	11.68	1.09	0.79	9.80	
53	7	7.9	3.91	12.96	14.58	2.41	0.88	11.29	
54	16	8.2	3.68	12.59	13.48	1.88	0.85	10.75	
55	6	8.1	3.55	11.92	12.62	1.47	0.84	10.31	
56	5	7.9	3.58	11.73	11.96	1.16	0.79	10.01	
57	4	8.2	3.30	11.28	11.52	0.94	0.81	9.77	
76	2	8.1	3.42	11.46	12.70	1.47	0.87	10.36	
59	2	8.2	3.53	12.01	12.92	1.43	0.86	10.63	
60	1	8.4	3.43	12.01	12.62	1.37	0.85	10.40	
68	15	8.0	3.45	11.41	12.34	1.11	0.84	10.39	
70	14	8.3	3.26	11.19	12.38	1.45	0.85	10.08	
71	13	7.9	3.59	11.77	11.52	1.12	0.77	9.63	
72	18	7.9	3.65	11.82	12.66	1.46	0.86	10.34	
73	20	8.4	3.50	11.99	13.06	1.67	0.84	10.55	
			<b>Mean</b>		<b>Standard Deviation</b>		<b>Relative Standard Deviation</b>		
<b>Puffs</b>			8.11		0.20		2.43		
<b>CO Concentration</b>			3.51		0.15		4.41		
<b>TPM</b>			12.56		0.78		6.19		
<b>Water</b>			1.42		0.34		23.56		
<b>Nicotine</b>			0.84		0.04		4.21		
<b>NFDPM</b>			10.30		0.45		4.33		
<b>CO Yield</b>			11.74		0.48		4.12		

**Berkely Superkings**

Run	Channel	Puffs per cigarette	CO (%v/v)	CO	TPM	Water	Nicotine	NFDPM	
←-----Yield in Milligrams Per Cigarette-----→									
64	14	8.0	3.35	11.16	11.64	0.83	0.81	10.00	
65	13	8.3	3.05	10.58	10.62	0.81	0.71	9.10	
66	12	8.3	3.32	11.38	10.82	0.78	0.73	9.31	
74	6	9.2	2.82	10.70	11.18	0.89	0.81	9.48	
67	11	8.8	3.14	11.42	11.72	1.14	0.80	9.78	
67	19	8.3	3.41	11.67	11.92	1.17	0.81	9.94	
68	10	8.6	3.18	11.31	10.86	0.87	0.78	9.21	
68	18	8.5	3.21	11.25	11.26	0.86	0.80	9.60	
69	7	8.4	3.24	11.28	10.40	0.98	0.74	8.68	
69	9	8.7	3.33	11.98	12.06	1.23	0.83	10.00	
69	15	8.2	3.34	11.35	10.94	0.96	0.76	9.22	
70	8	8.8	3.40	12.47	12.22	1.18	0.80	10.24	
70	16	9.0	3.37	12.56	12.86	1.42	0.81	10.63	
71	6	8.4	3.18	11.02	10.68	1.04	0.74	8.90	
71	17	8.5	3.53	12.43	12.38	1.31	0.81	10.26	
72	3	8.7	3.09	11.02	10.98	0.90	0.75	9.33	
73	1	8.9	3.30	11.99	12.32	1.21	0.84	10.27	
73	4	8.7	3.33	11.86	12.12	1.11	0.81	10.20	
73	7	9.0	3.19	11.66	12.16	1.08	0.84	10.24	
74	2	9.1	2.92	10.99	11.22	1.00	0.79	9.43	
			<b>Mean</b>	<b>Standard Deviation</b>		<b>Relative Standard Deviation</b>			
<b>Puffs</b>			8.62	0.33		3.78			
<b>CO Concentration</b>			3.24	0.17		5.31			
<b>TPM</b>			11.52	0.71		6.15			
<b>Water</b>			1.04	0.18		17.32			
<b>Nicotine</b>			0.79	0.04		4.77			
<b>NFDPM</b>			9.69	0.54		5.56			
<b>CO Yield</b>			11.50	0.57		4.92			

**Camel Ultra Lights**

Run	Channel	Puffs per cigarette	CO (%v/v)	CO	TPM	Water	Nicotine	NFDPM
←-----Yield in Milligrams Per Cigarette-----→								
55	3	8.1	0.86	2.88	3.54	0.33	0.29	2.92
56	2	7.7	0.98	3.14	3.80	0.29	0.31	3.20
57	1	8.0	0.85	2.81	3.68	0.21	0.29	3.18
62	20	8.0	0.96	3.21	3.08	0.28	0.28	2.52
64	13	7.7	1.00	3.23	3.68	0.24	0.29	3.15
65	12	7.6	1.07	3.38	3.68	0.27	0.28	3.13
66	11	7.7	0.93	2.96	3.68	0.25	0.29	3.14
67	10	8.0	1.06	3.51	3.86	0.39	0.29	3.18
67	18	7.7	1.00	3.21	3.68	0.34	0.28	3.06
68	9	7.9	0.91	2.97	3.54	0.30	0.31	2.93
68	19	7.8	0.94	3.03	3.84	0.29	0.29	3.26
69	8	7.7	1.05	3.35	4.06	0.27	0.30	3.49
69	14	8.1	0.99	3.35	3.84	0.35	0.29	3.20
70	7	7.9	0.96	3.15	3.92	0.28	0.30	3.34
70	15	7.8	1.03	3.32	4.14	0.28	0.30	3.56
71	5	7.5	0.98	3.06	3.14	0.37	0.28	2.49
71	16	7.5	0.98	3.06	3.28	0.27	0.27	2.74
72	17	7.7	0.90	2.85	3.60	0.31	0.27	3.02
73	6	8.0	0.98	3.21	3.70	0.29	0.29	3.12
74	5	7.6	0.96	3.00	3.66	0.15	0.29	3.22
			<b>Mean</b>	<b>Standard Deviation</b>	<b>Relative Standard Deviation</b>			
<b>Puffs</b>			7.80	0.19	2.43			
<b>CO Concentration</b>			0.97	0.06	6.19			
<b>TPM</b>			3.67	0.27	7.31			
<b>Water</b>			0.29	0.05	18.87			
<b>Nicotine</b>			0.29	0.01	3.80			
<b>NFDPM</b>			3.09	0.27	8.80			
<b>CO Yield</b>			3.13	0.19	6.14			

**Consulate Menthol**

Run	Channel	Puffs per cigarette	CO (%v/v)	CO	TPM	Water	Nicotine	NFDPM
←-----Yield in Milligrams Per Cigarette-----→								
50	4	7.1	2.73	8.05	7.92	0.49	0.60	6.83
51	8	7.2	2.65	7.96	7.72	0.54	0.54	6.64
52	5	7.3	2.65	8.04	7.92	0.51	0.59	6.82
54	6	6.9	2.67	7.66	7.42	0.31	0.53	6.58
55	19	7.0	2.99	8.68	8.12	0.50	0.59	7.03
56	18	6.9	2.70	7.76	7.62	0.47	0.56	6.59
57	17	7.0	2.93	8.45	7.90	0.47	0.52	6.91
76	15	7.3	2.70	8.12	7.78	0.45	0.55	6.78
59	15	7.2	2.81	8.39	8.70	0.70	0.60	7.40
60	13	7.0	2.88	8.40	8.52	0.52	0.58	7.42
61	12	7.2	2.86	8.56	8.32	0.49	0.59	7.24
62	11	7.0	2.84	8.28	7.92	0.44	0.55	6.93
64	10	7.1	2.96	8.73	8.46	0.55	0.57	7.34
65	9	6.9	3.08	8.84	8.48	0.56	0.60	7.32
68	7	7.1	2.72	8.05	7.90	0.51	0.58	6.81
69	20	7.1	2.90	8.58	8.26	0.52	0.58	7.16
71	2	7.4	2.84	8.71	8.62	0.65	0.62	7.35
72	1	8.0	2.53	8.28	9.10	0.73	0.62	7.75
73	3	7.3	2.83	8.48	8.80	0.68	0.58	7.54
74	14	7.2	2.68	7.92	7.92	0.49	0.59	6.84
			<b>Mean</b>	<b>Standard Deviation</b>	<b>Relative Standard Deviation</b>			
<b>Puffs</b>			7.16	0.25	3.43			
<b>CO Concentration</b>			2.80	0.14	4.93			
<b>TPM</b>			8.17	0.44	5.40			
<b>Water</b>			0.53	0.10	18.60			
<b>Nicotine</b>			0.58	0.03	4.81			
<b>NFDPM</b>			7.06	0.34	4.81			
<b>CO Yield</b>			8.30	0.34	4.10			

**Gitanes Caporal Filter**

Run	Channel	Puffs per cigarette	CO (%v/v)	CO	TPM	Water	Nicotine	NFDPM	
←-----Yield in Milligrams Per Cigarette-----→									
45	2	7.2	4.31	12.67	14.24	2.11	0.64	11.49	
46	1	7.3	4.20	12.35	14.20	1.88	0.65	11.67	
47	3	6.9	4.66	13.04	16.14	2.78	0.66	12.70	
48	4	6.5	4.71	12.41	14.74	1.83	0.63	12.28	
49	5	7.2	4.47	13.11	14.86	2.31	0.63	11.92	
50	10	7.1	4.53	13.45	16.98	3.34	0.66	12.98	
76	19	7.1	3.73	11.02	13.66	1.91	0.63	11.12	
74	12	6.8	4.22	11.76	13.82	1.69	0.62	11.51	
60	18	6.9	4.62	13.35	15.32	1.86	0.68	12.78	
61	17	6.8	4.27	12.04	13.80	1.75	0.61	11.44	
62	15	6.8	4.19	11.88	14.08	1.72	0.61	11.75	
63	14	6.9	4.46	12.83	14.78	2.16	0.63	11.99	
66	13	6.9	4.49	12.88	15.52	2.50	0.66	12.36	
67	12	7.1	4.38	12.90	15.46	2.40	0.65	12.41	
68	11	6.8	4.22	11.93	13.86	1.84	0.62	11.40	
70	9	7.0	4.52	13.11	15.20	2.42	0.66	12.12	
71	7	7.1	4.59	13.59	15.22	2.57	0.64	12.01	
72	6	7.1	4.36	12.71	15.86	2.79	0.66	12.41	
73	16	6.9	4.47	12.56	14.36	1.85	0.66	11.85	
74	8	6.9	4.38	12.43	14.18	1.70	0.67	11.81	
			<b>Mean</b>	<b>Standard Deviation</b>		<b>Relative Standard Deviation</b>			
<b>Puffs</b>			6.97	0.19		2.69			
<b>CO Concentration</b>			4.39	0.22		5.02			
<b>TPM</b>			14.81	0.89		6.03			
<b>Water</b>			2.17	0.46		20.97			
<b>Nicotine</b>			0.64	0.02		3.16			
<b>NFDPM</b>			12.00	0.50		4.19			
<b>CO Yield</b>			12.60	0.64		5.09			

**Lambert & Butler King Size**

Run	Channel	Puffs per cigarette	CO (%v/v)	CO	TPM	Water	Nicotine	NFDPM	
←-----Yield in Milligrams Per Cigarette-----→									
45	14	7.3	4.44	13.26	14.80	2.34	0.82	11.64	
46	13	7.5	4.24	12.86	14.66	2.05	0.87	11.74	
47	15	7.8	4.28	13.49	16.28	2.97	0.92	12.39	
48	16	7.2	4.36	12.76	14.28	1.73	0.82	11.73	
49	17	7.3	4.17	12.50	13.42	1.83	0.84	10.75	
51	19	7.3	4.55	13.79	15.14	2.18	0.86	12.10	
53	12	7.4	4.45	13.75	16.04	2.38	0.90	12.76	
55	11	7.5	4.26	13.28	14.34	1.95	0.88	11.51	
56	10	7.2	4.66	13.91	15.52	2.35	0.86	12.31	
57	9	7.6	4.24	13.38	15.90	2.38	0.94	12.58	
76	7	7.2	4.57	13.59	15.56	2.54	0.86	12.16	
59	7	7.0	4.56	13.25	13.94	2.00	0.81	11.13	
60	6	7.4	4.09	12.59	14.24	2.15	0.82	11.27	
61	5	7.1	4.62	13.75	16.00	2.42	0.88	12.70	
62	4	7.2	4.36	13.14	14.48	1.79	0.87	11.82	
63	3	6.9	4.58	13.23	14.00	1.84	0.80	11.36	
64	2	7.3	4.18	12.68	15.16	2.61	0.82	11.73	
75	10	7.4	4.49	13.79	15.16	1.90	0.87	12.39	
66	18	7.4	4.49	13.77	15.04	1.78	0.89	12.37	
67	20	7.5	4.23	13.22	15.36	2.28	0.92	12.16	
			<b>Mean</b>	<b>Standard Deviation</b>		<b>Relative Standard Deviation</b>			
<b>Puffs</b>			7.33	0.21		2.83			
<b>CO Concentration</b>			4.39	0.17		3.91			
<b>TPM</b>			14.97	0.79		5.28			
<b>Water</b>			2.17	0.33		15.20			
<b>Nicotine</b>			0.86	0.04		4.61			
<b>NFDPM</b>			11.93	0.55		4.62			
<b>CO Yield</b>			13.30	0.44		3.30			

**Lambert & Butler Lights King Size**

Run	Channel	Puffs per cigarette	CO (%v/v)	CO	TPM	Water	Nicotine	NFDPM	
←-----Yield in Milligrams Per Cigarette-----→									
45	17	6.0	2.48	6.12	5.86	0.37	0.43	5.06	
46	16	6.0	2.60	6.29	5.54	0.44	0.40	4.70	
47	18	6.2	2.47	6.19	5.68	0.48	0.43	4.77	
75	15	6.0	2.42	6.03	6.10	0.35	0.43	5.32	
49	20	6.3	2.39	6.17	5.68	0.43	0.46	4.79	
51	15	6.3	2.42	6.35	5.90	0.44	0.47	4.99	
52	14	6.2	2.56	6.66	6.42	0.40	0.47	5.55	
54	12	6.3	2.47	6.50	6.22	0.44	0.46	5.32	
55	13	6.2	2.75	7.04	6.38	0.43	0.47	5.48	
76	10	6.4	2.37	6.27	5.62	0.46	0.44	4.72	
59	10	6.2	2.55	6.53	6.14	0.45	0.46	5.23	
60	9	6.6	2.56	7.04	6.68	0.45	0.49	5.74	
61	8	6.2	2.69	7.00	6.64	0.44	0.47	5.73	
62	7	6.1	2.43	6.16	6.04	0.35	0.44	5.25	
63	6	6.2	2.49	6.47	6.36	0.41	0.46	5.49	
64	5	6.2	2.45	6.38	6.10	0.34	0.45	5.31	
65	4	6.0	2.60	6.49	6.22	0.40	0.46	5.36	
66	3	6.4	2.32	6.15	5.46	0.30	0.44	4.72	
68	2	6.8	2.33	6.52	6.38	0.39	0.47	5.52	
69	1	6.5	2.73	7.33	6.74	0.46	0.49	5.79	
			<b>Mean</b>	<b>Standard Deviation</b>	<b>Relative Standard Deviation</b>				
<b>Puffs</b>			6.26	0.21	3.34				
<b>CO Concentration</b>			2.50	0.12	4.97				
<b>TPM</b>			6.11	0.38	6.29				
<b>Water</b>			0.41	0.05	11.68				
<b>Nicotine</b>			0.45	0.02	4.87				
<b>NFDPM</b>			5.24	0.36	6.88				
<b>CO Yield</b>			6.48	0.36	5.58				

**Lambert & Butler Ultra Lights**

Run	Channel	Puffs per cigarette	CO (%v/v)	CO	TPM	Water	Nicotine	NFDPM
←-----Yield in Milligrams Per Cigarette----->								
45	12	6.9	0.47	1.33	1.84	-0.01	0.17	1.68
46	11	7.3	0.51	1.49	2.02	0.16	0.18	1.68
47	13	7.1	0.60	1.73	1.88	0.18	0.17	1.53
48	14	7.0	0.56	1.61	2.16	0.16	0.17	1.83
49	15	7.0	0.51	1.46	1.88	0.17	0.18	1.53
51	16	7.0	0.43	1.27	1.80	0.16	0.15	1.49
53	10	7.2	0.57	1.71	2.06	0.21	0.18	1.67
55	9	7.6	0.46	1.47	1.96	0.11	0.18	1.67
56	8	7.0	0.50	1.45	1.86	0.15	0.17	1.54
57	7	7.0	0.43	1.26	1.66	0.08	0.15	1.43
76	5	7.2	0.49	1.48	1.86	0.05	0.15	1.66
59	5	7.0	0.48	1.41	1.80	0.11	0.15	1.54
60	4	7.2	0.34	1.03	1.46	0.04	0.13	1.29
61	3	7.0	0.52	1.53	2.08	0.09	0.16	1.83
62	2	7.2	0.49	1.49	2.00	0.12	0.18	1.70
63	1	7.4	0.60	1.88	2.02	0.14	0.18	1.70
64	20	7.0	0.56	1.64	1.96	0.05	0.19	1.72
65	18	7.0	0.48	1.42	1.54	0.02	0.15	1.37
66	17	7.0	0.45	1.30	1.58	0.08	0.15	1.35
73	19	7.2	0.63	1.87	2.30	0.11	0.19	2.00
			<b>Mean</b>		<b>Standard Deviation</b>		<b>Relative Standard Deviation</b>	
<b>Puffs</b>			7.12		0.17		2.42	
<b>CO Concentration</b>			0.50		0.07		13.71	
<b>TPM</b>			1.89		0.21		11.14	
<b>Water</b>			0.11		0.06		53.82	
<b>Nicotine</b>			0.17		0.02		9.99	
<b>NFDPM</b>			1.61		0.18		10.98	
<b>CO Yield</b>			1.49		0.21		14.01	

**Marlboro King Size**

Run	Channel	Puffs per cigarette	CO (%v/v)	CO	TPM	Water	Nicotine	NFDPM
←-----Yield in Milligrams Per Cigarette----->								
47	1	8.3	3.46	11.56	14.04	1.48	0.83	11.73
48	2	8.7	3.69	13.06	16.32	2.24	0.92	13.16
49	3	9.3	3.25	12.40	15.08	2.01	0.89	12.18
51	10	8.4	3.38	11.94	14.98	1.86	0.90	12.22
53	18	8.7	3.55	12.88	16.76	2.72	0.93	13.11
54	8	8.7	3.41	12.43	15.24	1.86	0.90	12.48
55	16	8.6	3.80	13.64	16.72	2.76	0.95	13.01
56	15	8.5	3.63	12.79	16.54	2.46	0.93	13.15
57	14	8.4	3.75	13.02	15.70	1.85	0.93	12.92
59	11	8.5	3.83	13.47	15.90	1.92	0.93	13.05
64	9	8.5	3.77	13.41	15.70	2.14	0.91	12.65
66	7	8.8	3.30	12.02	15.00	1.68	0.92	12.40
67	6	8.0	3.95	13.07	14.96	2.15	0.85	11.96
68	5	8.6	3.73	13.26	16.40	2.22	0.96	13.22
69	4	8.5	3.67	12.86	16.40	2.34	0.93	13.13
71	19	8.4	3.74	12.96	15.60	2.08	0.90	12.62
72	13	8.6	3.67	12.89	16.08	2.19	0.93	12.96
72	20	9.0	3.48	12.79	15.64	1.85	0.95	12.84
73	12	8.7	3.56	12.67	15.06	1.72	0.87	12.47
76	11	8.3	3.69	12.72	15.60	2.12	0.90	12.58
			<b>Mean</b>	<b>Standard Deviation</b>	<b>Relative Standard Deviation</b>			
<b>Puffs</b>			8.58	0.27	3.19			
<b>CO Concentration</b>			3.62	0.19	5.16			
<b>TPM</b>			15.69	0.72	4.57			
<b>Water</b>			2.08	0.33	15.71			
<b>Nicotine</b>			0.91	0.03	3.62			
<b>NFDPM</b>			12.69	0.43	3.43			
<b>CO Yield</b>			12.79	0.52	4.08			

**Marlboro Lights King Size**

Run	Channel	Puffs per cigarette	CO (%v/v)	CO	TPM	Water	Nicotine	NFDPM
←-----Yield in Milligrams Per Cigarette----->								
45	20	7.9	2.14	6.88	7.02	0.53	0.53	5.96
46	19	8.0	2.30	7.42	7.26	0.66	0.54	6.06
48	1	8.0	2.23	7.29	7.62	0.71	0.55	6.36
49	2	7.9	2.39	7.71	7.90	0.77	0.57	6.56
51	11	7.2	2.32	7.00	7.12	0.55	0.51	6.06
52	10	7.7	2.26	7.29	7.10	0.51	0.51	6.08
53	17	7.6	2.12	6.74	7.02	0.58	0.53	5.91
55	15	7.3	2.33	7.04	6.42	0.61	0.52	5.29
56	14	7.4	2.22	6.81	7.08	0.57	0.50	6.01
57	13	7.9	2.33	7.59	7.52	0.51	0.55	6.46
63	9	7.5	2.29	7.17	7.16	0.57	0.52	6.07
64	8	7.2	2.11	6.29	6.48	0.46	0.46	5.56
65	7	7.4	2.47	7.65	7.18	0.60	0.52	6.06
66	6	8.0	2.22	7.34	7.22	0.51	0.50	6.21
67	5	7.5	2.34	7.25	7.42	0.66	0.54	6.22
68	4	7.7	2.19	6.97	6.88	0.46	0.52	5.90
69	16	7.8	2.28	7.38	7.56	0.64	0.55	6.37
70	3	7.4	2.26	6.92	6.92	0.49	0.50	5.93
71	18	7.5	2.46	7.70	7.36	0.61	0.52	6.23
72	12	7.9	2.28	7.36	7.84	0.65	0.55	6.64
			<b>Mean</b>		<b>Standard Deviation</b>		<b>Relative Standard Deviation</b>	
<b>Puffs</b>			7.64		0.27		3.59	
<b>CO Concentration</b>			2.28		0.10		4.32	
<b>TPM</b>			7.20		0.38		5.32	
<b>Water</b>			0.58		0.08		14.29	
<b>Nicotine</b>			0.52		0.02		4.73	
<b>NFDPM</b>			6.10		0.32		5.19	
<b>CO Yield</b>			7.19		0.36		5.04	

**Mayfair Lights King Size**

Run	Channel	Puffs per cigarette	CO (%v/v)	CO	TPM	Water	Nicotine	NFDPM
←-----Yield in Milligrams Per Cigarette----->								
45	8	7.6	2.61	8.11	8.16	0.56	0.56	7.04
46	7	7.4	2.70	8.09	7.90	0.54	0.56	6.80
47	9	7.4	3.08	9.22	8.74	0.77	0.56	7.41
48	10	7.4	2.94	8.88	8.82	0.74	0.58	7.50
49	11	7.8	2.70	8.59	8.40	0.70	0.57	7.13
50	18	7.5	2.97	9.33	8.90	0.85	0.59	7.46
52	19	7.3	2.89	8.80	8.80	0.72	0.56	7.52
53	6	7.5	2.86	8.90	8.46	0.74	0.54	7.18
54	17	7.2	2.68	8.03	8.06	0.61	0.55	6.90
55	5	7.3	2.98	9.00	8.32	0.65	0.57	7.10
56	4	7.4	2.74	8.37	7.78	0.56	0.56	6.66
57	3	7.6	2.70	8.50	9.30	0.74	0.64	7.92
76	1	7.3	2.93	8.82	8.24	0.75	0.56	6.93
59	1	7.1	2.76	8.18	8.30	0.64	0.58	7.08
63	20	7.2	2.76	8.24	8.00	0.63	0.53	6.84
66	16	7.6	2.85	8.97	8.96	0.96	0.59	7.41
67	15	7.8	3.00	9.68	9.56	1.14	0.61	7.81
68	14	7.0	2.82	8.18	7.66	0.50	0.51	6.65
70	13	7.7	2.89	9.23	9.34	0.82	0.62	7.90
71	12	7.7	2.96	9.43	8.94	1.00	0.58	7.36
			<b>Mean</b>	<b>Standard Deviation</b>		<b>Relative Standard Deviation</b>		
<b>Puffs</b>			7.44	0.23		3.03		
<b>CO Concentration</b>			2.84	0.13		4.56		
<b>TPM</b>			8.53	0.54		6.34		
<b>Water</b>			0.73	0.16		22.31		
<b>Nicotine</b>			0.57	0.03		5.27		
<b>NFDPM</b>			7.23	0.39		5.35		
<b>CO Yield</b>			8.73	0.50		5.74		

**Mayfair Menthol King Size**

Run	Channel	Puffs per cigarette	CO (%v/v)	CO	TPM	Water	Nicotine	NFDPM	
←-----Yield in Milligrams Per Cigarette----->									
45	10	7.2	1.99	5.84	5.52	0.29	0.45	4.78	
46	9	7.0	1.85	5.22	4.60	0.36	0.39	3.85	
47	11	7.1	2.11	6.07	5.40	0.47	0.43	4.50	
48	12	7.3	1.98	5.90	5.60	0.33	0.43	4.84	
49	13	7.2	1.85	5.42	4.98	0.34	0.40	4.24	
74	13	7.1	1.97	5.77	5.24	0.36	0.40	4.48	r
52	16	7.2	1.93	5.77	5.28	0.23	0.40	4.65	
54	14	7.0	1.94	5.66	5.00	0.39	0.39	4.22	
55	7	7.0	2.23	6.48	5.62	0.37	0.45	4.80	
56	6	7.0	2.08	6.04	5.38	0.33	0.42	4.63	
57	5	7.1	2.06	6.08	5.64	0.25	0.44	4.95	
76	3	7.0	2.05	5.94	5.38	0.26	0.42	4.70	
59	3	7.1	2.02	5.93	4.84	0.30	0.39	4.15	
75	12	7.2	2.08	6.18	5.66	0.35	0.43	4.88	r
64	17	6.9	2.01	5.79	5.48	0.26	0.43	4.79	
70	18	7.3	2.07	6.30	5.96	0.29	0.46	5.21	
71	15	7.2	2.09	6.24	5.38	0.34	0.43	4.61	
72	19	7.4	2.03	6.13	5.70	0.33	0.45	4.92	
73	8	7.0	2.22	6.35	6.02	0.34	0.45	5.23	
60	2	7.5	1.77	5.54	2.80	0.32	0.41	2.07	Excluded
			<b>Mean</b>	<b>Standard Deviation</b>	<b>Relative Standard Deviation</b>				
<b>Puffs</b>			7.12	0.13	1.85				
<b>CO Concentration</b>			2.03	0.10	5.00				
<b>TPM</b>			5.40	0.36	6.69				
<b>Water</b>			0.33	0.06	17.31				
<b>Nicotine</b>			0.42	0.02	5.46				
<b>NFDPM</b>			4.65	0.35	7.61				
<b>CO Yield</b>			5.95	0.31	5.28				

The Dixon's outlier test<sup>7</sup> (Appendix 2) was undertaken and the TPM (& NFDPM) result (run 60 channel 2) failed the 95% test criteria. In our opinion the TPM result is suspect as the nicotine, water and carbon dioxide analyses all pass the outlier test. Therefore the results for this analysis have been excluded and the mean and standard deviation calculated using 19 results.

**Red Band Lights King Size**

Run	Channel	Puffs per cigarette	CO (%v/v)	CO	TPM	Water	Nicotine	NFDPM
←-----Yield in Milligrams Per Cigarette----->								
45	11	8.0	1.97	6.43	6.12	0.26	0.44	5.42
46	10	8.2	1.89	6.25	5.74	0.36	0.45	4.93
47	12	8.2	1.90	6.30	6.00	0.49	0.44	5.07
48	13	8.1	1.94	6.39	6.66	0.37	0.48	5.81
49	14	8.2	1.77	5.95	6.02	0.53	0.42	5.07
52	15	8.0	1.81	6.04	5.82	0.27	0.43	5.12
55	8	8.5	1.92	6.80	7.10	0.42	0.50	6.18
56	7	8.1	1.88	6.30	5.92	0.32	0.45	5.15
57	6	8.1	1.88	6.34	6.56	0.24	0.47	5.85
76	4	8.2	1.82	6.20	5.96	0.35	0.45	5.16
59	4	8.3	2.00	6.84	6.74	0.33	0.50	5.91
60	3	8.3	1.92	6.64	6.86	0.31	0.49	6.06
61	2	8.0	1.68	5.62	6.26	0.32	0.46	5.48
62	1	8.3	1.82	6.32	6.32	0.30	0.50	5.52
64	18	8.0	1.83	6.12	5.94	0.28	0.45	5.21
65	17	8.0	1.97	6.60	6.36	0.27	0.46	5.63
67	16	8.3	2.01	6.90	6.62	0.43	0.47	5.72
70	19	8.9	1.89	6.99	7.06	0.35	0.51	6.20
71	20	8.2	1.91	6.50	6.32	0.31	0.46	5.55
73	9	8.6	1.91	6.69	6.68	0.29	0.49	5.90
			<b>Mean</b>		<b>Standard Deviation</b>	<b>Relative Standard Deviation</b>		
<b>Puffs</b>			8.23		0.23	2.79		
<b>CO Concentration</b>			1.89		0.08	4.26		
<b>TPM</b>			6.35		0.41	6.51		
<b>Water</b>			0.34		0.08	22.50		
<b>Nicotine</b>			0.47		0.03	5.54		
<b>NFDPM</b>			5.55		0.40	7.17		
<b>CO Yield</b>			6.41		0.34	5.37		

**Regal Filter**

Run	Channel	Puffs per cigarette	CO (%v/v)	←-----Yield in Milligrams Per Cigarette-----→					
			CO	CO	TPM	Water	Nicotine	NFDPM	
45	13	6.5	3.89	10.24	12.84	1.86	0.78	10.20	
46	12	6.4	4.00	10.33	11.84	1.39	0.78	9.67	
47	14	6.5	4.10	10.83	13.54	2.43	0.79	10.32	
48	15	6.7	3.72	10.20	13.34	2.34	0.80	10.20	
49	16	6.8	4.15	11.53	15.48	3.48	0.83	11.17	
72	10	6.7	3.87	10.55	13.94	2.60	0.81	10.53	r
53	2	6.8	4.24	12.03	15.74	3.24	0.87	11.63	
53	11	6.7	4.09	11.42	13.64	2.54	0.82	10.28	
56	9	6.2	4.24	10.91	12.56	1.84	0.76	9.96	
57	8	7.1	3.65	10.69	13.82	2.08	0.84	10.90	
76	6	6.5	3.99	10.79	14.24	2.45	0.85	10.94	
59	6	6.3	4.05	10.51	13.86	2.00	0.85	11.01	
60	5	7.0	3.86	11.21	14.54	2.45	0.88	11.21	
61	4	6.4	4.08	10.86	14.18	2.26	0.81	11.11	
62	3	6.7	3.75	10.43	13.56	2.19	0.85	10.52	
63	2	6.4	4.35	11.67	15.04	3.06	0.85	11.13	
64	1	7.0	3.76	10.98	14.38	2.90	0.86	10.62	
75	8	6.1	4.33	10.98	12.90	1.53	0.82	10.55	r
67	17	6.8	3.87	10.97	13.94	2.49	0.82	10.63	
70	20	6.8	3.99	11.25	13.20	2.02	0.81	10.37	
			<b>Mean</b>	<b>Standard Deviation</b>		<b>Relative Standard Deviation</b>			
<b>Puffs</b>			6.62	0.27		4.12			
<b>CO Concentration</b>			4.00	0.20		5.08			
<b>TPM</b>			13.83	0.95		6.88			
<b>Water</b>			2.36	0.54		22.72			
<b>Nicotine</b>			0.82	0.03		3.93			
<b>NFDPM</b>			10.65	0.49		4.56			
<b>CO Yield</b>			10.92	0.49		4.49			

**Regal King Size**

Run	Channel	Puffs per cigarette	CO (%v/v)	CO	TPM	Water	Nicotine	NFDPM
←-----Yield in Milligrams Per Cigarette-----→								
45	15	8.1	4.26	14.08	16.06	2.61	0.94	12.51
46	14	7.8	4.40	13.80	14.68	2.07	0.89	11.72
47	16	7.2	4.55	13.32	13.64	1.78	0.81	11.05
48	17	7.4	4.42	13.43	15.34	2.37	0.88	12.09
49	18	7.3	4.64	13.78	15.28	2.46	0.86	11.96
51	20	7.5	4.42	13.93	13.42	1.64	0.84	10.94
53	13	7.6	4.21	13.26	14.26	1.94	0.87	11.45
55	12	7.5	4.53	14.17	14.42	2.19	0.85	11.38
57	10	7.8	4.14	13.39	14.94	2.12	0.90	11.92
77	11	7.7	4.22	13.32	14.86	2.23	0.91	11.72
59	8	7.6	4.42	14.03	15.08	2.20	0.91	11.97
60	7	8.0	4.15	13.94	16.14	2.44	0.98	12.72
61	6	7.4	4.12	12.73	14.06	1.77	0.84	11.45
62	5	7.7	4.17	13.38	14.14	1.52	0.87	11.75
63	4	7.8	4.60	14.88	16.28	2.77	0.95	12.56
64	3	7.9	4.31	14.18	14.92	2.03	0.91	11.98
65	2	7.9	4.17	13.71	16.82	3.39	0.94	12.49
66	19	8.0	4.35	14.40	16.14	2.56	0.94	12.64
67	1	7.9	4.53	14.80	16.34	2.92	0.95	12.47
76	8	7.5	4.72	14.59	15.94	2.56	0.92	12.46
			<b>Mean</b>		<b>Standard Deviation</b>		<b>Relative Standard Deviation</b>	
<b>Puffs</b>			7.68		0.25		3.29	
<b>CO Concentration</b>			4.37		0.18		4.23	
<b>TPM</b>			15.14		0.98		6.46	
<b>Water</b>			2.28		0.46		20.08	
<b>Nicotine</b>			0.90		0.05		5.01	
<b>NFDPM</b>			11.96		0.53		4.46	
<b>CO Yield</b>			13.86		0.56		4.03	

**Rothman Royals 120s**

Run	Channel	Puffs per cigarette	CO (%v/v)	CO	TPM	Water	Nicotine	NFDPM
←-----Yield in Milligrams Per Cigarette-----→								
50	9	10.2	2.36	10.04	12.64	0.95	0.91	10.78
51	3	9.8	1.91	7.80	10.38	0.68	0.73	8.97
52	1	10.7	2.05	9.14	12.48	0.96	0.85	10.67
54	2	10.6	2.10	9.27	12.54	1.08	0.84	10.62
57	20	10.8	2.27	10.16	12.66	0.94	0.84	10.88
76	18	10.1	2.16	9.02	11.48	0.68	0.76	10.04
59	18	10.5	2.07	8.98	10.90	0.65	0.77	9.48
60	17	10.1	2.31	9.73	12.42	0.97	0.81	10.64
61	15	10.8	2.05	9.21	12.28	0.86	0.80	10.62
62	14	10.4	2.24	9.71	12.32	1.09	0.82	10.41
63	13	10.9	2.10	9.53	11.96	0.76	0.82	10.38
64	12	10.8	2.16	9.75	12.58	0.76	0.88	10.94
65	11	10.2	2.18	9.31	11.64	0.79	0.81	10.04
66	10	10.5	2.16	9.44	11.76	0.67	0.81	10.28
68	8	10.5	2.32	10.08	12.78	1.05	0.89	10.84
71	4	10.8	2.21	9.92	12.44	1.10	0.83	10.51
72	16	11.0	2.15	9.65	12.66	0.92	0.88	10.86
73	5	10.4	2.35	10.04	12.06	0.81	0.81	10.44
74	4	10.3	2.12	9.04	11.68	0.80	0.82	10.06
74	7	10.5	2.07	8.92	12.00	0.75	0.87	10.38
			<b>Mean</b>	<b>Standard Deviation</b>		<b>Relative Standard Deviation</b>		
<b>Puffs</b>			10.50	0.31		2.99		
<b>CO Concentration</b>			2.17	0.12		5.36		
<b>TPM</b>			12.08	0.63		5.22		
<b>Water</b>			0.86	0.15		17.28		
<b>Nicotine</b>			0.83	0.04		5.43		
<b>NFDPM</b>			10.39	0.49		4.73		
<b>CO Yield</b>			9.44	0.56		5.90		

**Rothman Royals King Size**

Run	Channel	Puffs per cigarette	CO (%v/v)	←-----Yield in Milligrams Per Cigarette-----→					
			CO	CO	TPM	Water	Nicotine	NFDPM	
50	8	7.7	3.43	11.07	13.96	1.75	0.92	11.29	
51	4	7.9	3.19	10.49	12.36	1.04	0.83	10.49	
52	2	8.0	3.22	10.71	13.58	1.58	0.87	11.13	
54	1	8.5	3.18	11.32	13.98	1.95	0.91	11.12	
56	20	8.2	3.33	10.64	12.88	1.14	0.93	10.81	
57	19	7.8	3.23	10.51	11.98	1.01	0.80	10.17	
76	17	8.4	3.08	10.65	13.92	1.65	0.94	11.33	
59	17	7.9	3.30	10.86	13.48	1.72	0.90	10.86	
60	16	8.0	3.12	10.44	12.86	1.21	0.88	10.77	
61	14	8.0	3.25	10.92	13.62	1.33	0.92	11.37	
62	13	8.1	3.18	10.73	13.40	1.23	0.91	11.26	
63	12	8.1	3.32	11.28	14.00	1.73	0.91	11.36	
64	11	7.9	3.23	10.59	12.94	1.31	0.88	10.75	
67	9	8.2	3.28	11.10	12.98	1.21	0.89	10.88	
70	6	8.3	3.37	11.59	13.82	1.56	0.92	11.34	
71	3	7.9	3.29	10.78	13.32	1.29	0.87	11.16	
72	5	7.9	3.29	10.64	12.82	1.27	0.88	10.67	
73	10	7.9	3.44	11.14	13.60	1.35	0.90	11.35	
74	15	7.9	3.31	10.85	13.10	1.49	0.86	10.75	
75	3	7.8	3.36	10.84	13.08	1.11	0.90	11.07	
			<b>Mean</b>	<b>Standard Deviation</b>		<b>Relative Standard Deviation</b>			
<b>Puffs</b>			8.02	0.21		2.61			
<b>CO Concentration</b>			3.27	0.09		2.89			
<b>TPM</b>			13.28	0.56		4.19			
<b>Water</b>			1.40	0.27		19.04			
<b>Nicotine</b>			0.89	0.03		3.82			
<b>NFDPM</b>			11.00	0.34		3.05			
<b>CO Yield</b>			10.86	0.31		2.84			

**Senior Service**

Run	Channel	Puffs per cigarette	CO (%v/v)	CO	TPM	Water	Nicotine	NFDPM	
←-----Yield in Milligrams Per Cigarette----->									
45	5	7.2	2.64	7.76	14.44	1.01	0.99	12.44	
46	4	7.0	2.75	7.76	13.74	1.03	0.96	11.75	
47	6	7.4	2.77	8.23	15.38	1.34	1.01	13.03	
48	7	6.8	2.72	7.58	13.98	0.99	0.95	12.04	
49	8	7.1	2.43	7.04	13.18	0.96	0.94	11.28	
50	14	6.8	2.86	8.06	15.12	1.15	1.00	12.97	
53	3	6.6	2.77	7.63	14.20	1.24	0.94	12.02	
55	2	6.7	3.12	8.71	14.96	1.49	1.00	12.47	
75	1	6.5	2.75	7.43	12.74	1.10	0.85	10.79	
74	10	6.5	2.57	6.87	12.40	0.86	0.81	10.73	
62	19	6.6	2.63	7.24	13.14	0.94	0.87	11.33	
63	17	6.6	2.94	8.11	14.86	1.29	1.00	12.57	
64	16	6.8	3.09	8.75	15.72	1.53	1.00	13.19	
65	15	6.5	2.74	7.43	13.92	0.92	0.94	12.06	
68	13	6.8	2.70	7.57	13.80	0.98	0.94	11.88	
69	12	6.8	2.54	7.19	13.06	1.05	0.90	11.11	
70	11	6.5	2.81	7.58	13.70	1.04	0.92	11.74	
71	10	6.9	3.05	8.77	14.96	1.41	1.00	12.55	
72	9	6.8	2.61	7.23	13.12	0.97	0.88	11.27	
73	18	6.5	2.77	7.30	12.98	1.00	0.90	11.08	
			<b>Mean</b>	<b>Standard Deviation</b>	<b>Relative Standard Deviation</b>				
<b>Puffs</b>			6.77	0.25	3.75				
<b>CO Concentration</b>			2.76	0.18	6.54				
<b>TPM</b>			13.97	0.96	6.85				
<b>Water</b>			1.12	0.20	17.84				
<b>Nicotine</b>			0.94	0.06	6.13				
<b>NFDPM</b>			11.92	0.75	6.29				
<b>CO Yield</b>			7.71	0.56	7.30				

**Silk Cut Extra Mild**

Run	Channel	Puffs per cigarette	CO (%v/v)	←-----Yield in Milligrams Per Cigarette-----→					
				CO	TPM	Water	Nicotine	NFDPM	
50	2	7.4	1.10	3.39	3.08	0.20	0.25	2.63	
51	1	7.6	1.07	3.39	3.64	0.33	0.29	3.02	
52	9	7.0	0.99	2.88	2.90	0.21	0.24	2.45	
53	20	7.0	1.00	2.92	2.96	0.29	0.28	2.39	
54	7	7.0	0.97	2.85	2.84	0.31	0.24	2.29	
55	17	7.1	1.07	3.17	3.20	0.21	0.26	2.73	
56	16	6.9	1.14	3.27	2.80	0.18	0.25	2.37	
57	15	7.1	1.07	3.15	3.30	0.18	0.25	2.87	
76	12	7.3	1.07	3.21	3.32	0.19	0.27	2.86	
59	12	7.0	1.04	3.02	3.04	0.20	0.26	2.58	
60	11	7.1	1.07	3.18	2.94	0.19	0.27	2.48	
62	10	6.9	1.08	3.10	3.18	0.15	0.26	2.77	
65	8	7.0	1.29	3.78	3.86	0.23	0.30	3.33	
68	6	7.3	1.07	3.23	3.62	0.20	0.28	3.14	
69	5	7.3	1.04	3.14	2.92	0.26	0.24	2.42	
69	19	7.0	1.14	3.31	3.30	0.18	0.25	2.87	
70	4	7.1	1.05	3.09	3.14	0.15	0.26	2.73	
73	13	7.0	1.06	3.04	2.86	0.18	0.23	2.45	
74	3	7.1	1.01	2.97	2.74	0.16	0.25	2.33	
74	18	7.2	1.02	3.01	3.06	0.15	0.25	2.66	
			<b>Mean</b>		<b>Standard Deviation</b>		<b>Relative Standard Deviation</b>		
		<b>Puffs</b>	7.12		0.18		2.52		
		<b>CO Concentration</b>	1.07		0.07		6.40		
		<b>TPM</b>	3.14		0.30		9.62		
		<b>Water</b>	0.21		0.05		25.11		
		<b>Nicotine</b>	0.26		0.02		6.96		
		<b>NFDPM</b>	2.67		0.29		10.69		
		<b>CO Yield</b>	3.16		0.21		6.77		

**Silk Cut King Size**

Run	Channel	Puffs per cigarette	CO (%v/v)	CO	TPM	Water	Nicotine	NFDPM
←-----Yield in Milligrams Per Cigarette----->								
45	7	8.8	1.66	5.98	7.12	0.37	0.59	6.16
46	6	8.6	1.75	6.04	7.02	0.47	0.56	5.99
47	8	8.0	1.76	5.69	6.14	0.42	0.50	5.22
48	9	8.1	1.89	6.26	6.96	0.42	0.55	5.99
49	10	8.0	1.65	5.38	5.70	0.41	0.47	4.82
50	17	8.4	1.78	6.23	6.70	0.45	0.53	5.72
52	20	8.5	1.61	5.75	6.84	0.35	0.53	5.96
53	5	8.2	1.63	5.54	6.48	0.39	0.50	5.59
54	18	8.2	1.49	5.10	5.98	0.42	0.47	5.09
55	4	8.2	1.57	5.39	6.18	0.29	0.48	5.41
56	3	8.1	1.78	5.96	7.02	0.33	0.53	6.16
57	2	8.0	1.60	5.29	5.98	0.25	0.48	5.25
58	1	8.8	1.43	5.24	7.08	0.64	0.58	5.86
63	19	8.0	1.83	6.14	6.68	0.52	0.51	5.65
65	16	8.0	1.77	5.91	6.40	0.33	0.52	5.55
66	15	8.3	1.70	5.83	6.52	0.33	0.50	5.69
67	14	8.4	1.67	5.78	6.32	0.41	0.51	5.40
69	13	8.3	1.88	6.46	6.70	0.45	0.53	5.72
70	12	8.4	1.76	6.08	6.80	0.39	0.52	5.89
71	11	8.2	1.65	5.61	6.10	0.42	0.47	5.21
			<b>Mean</b>	<b>Standard Deviation</b>		<b>Relative Standard Deviation</b>		
<b>Puffs</b>			8.28	0.25		3.06		
<b>CO Concentration</b>			1.69	0.12		7.12		
<b>TPM</b>			6.54	0.42		6.45		
<b>Water</b>			0.40	0.08		21.03		
<b>Nicotine</b>			0.52	0.03		6.77		
<b>NFDPM</b>			5.62	0.37		6.60		
<b>CO Yield</b>			5.78	0.38		6.49		

**Silk Cut Ultra King Size**

Run	Channel	Puffs per cigarette	CO (%v/v)	CO	TPM	Water	Nicotine	NFDPM
←-----Yield in Milligrams Per Cigarette----->								
45	4	8.4	0.32	1.10	1.28	0.01	0.12	1.15
46	3	7.6	0.37	1.16	1.24	0.09	0.11	1.04
47	5	7.9	0.40	1.27	1.06	0.22	0.10	0.74
48	6	8.0	0.43	1.42	1.40	0.03	0.12	1.25
49	7	8.0	0.33	1.10	0.94	0.14	0.09	0.71
50	13	8.0	0.41	1.37	1.14	0.04	0.11	0.99
55	1	8.4	0.33	1.16	1.22	0.11	0.10	1.01
60	20	8.5	0.33	1.18	0.92	0.03	0.12	0.77
61	19	7.6	0.36	1.15	1.58	0.03	0.12	1.43
62	18	7.6	0.40	1.27	1.38	0.06	0.12	1.20
63	16	8.0	0.41	1.37	1.06	0.13	0.11	0.82
64	15	7.8	0.35	1.14	1.24	0.02	0.10	1.12
66	14	7.9	0.32	1.06	1.14	0.05	0.09	1.00
68	12	7.8	0.35	1.13	1.34	0.08	0.11	1.15
69	11	8.0	0.36	1.20	1.10	0.08	0.10	0.92
70	10	7.9	0.33	1.10	1.28	0.07	0.10	1.11
71	9	8.0	0.38	1.28	0.90	0.12	0.09	0.69
72	8	7.8	0.33	1.07	1.28	0.05	0.11	1.12
74	17	7.6	0.32	1.02	0.64	0.01	0.11	0.52
75	11	8.0	0.41	1.36	1.62	0.05	0.11	1.46
			<b>Mean</b>	<b>Standard Deviation</b>		<b>Relative Standard Deviation</b>		
<b>Puffs</b>			7.94	0.26		3.28		
<b>CO Concentration</b>			0.36	0.04		10.12		
<b>TPM</b>			1.19	0.23		19.68		
<b>Water</b>			0.07	0.05		73.95		
<b>Nicotine</b>			0.11	0.01		9.64		
<b>NFDPM</b>			1.01	0.25		24.41		
<b>CO Yield</b>			1.20	0.12		9.81		

**Superkings**

Run	Channel	Puffs per cigarette	CO (%v/v)	CO	TPM	Water	Nicotine	NFDPM	
←-----Yield in Milligrams Per Cigarette-----→									
45	18	7.6	3.71	11.50	12.48	1.10	0.80	10.58	
46	17	7.7	3.80	11.86	13.12	1.31	0.89	10.92	
75	5	7.3	3.47	10.52	12.40	1.23	0.76	10.41	
75	14	7.7	3.45	10.94	12.64	1.18	0.81	10.65	
51	14	7.5	3.49	10.96	12.30	1.30	0.80	10.20	
52	12	7.7	3.68	11.90	13.74	1.81	0.86	11.07	
53	15	8.3	3.25	11.26	13.00	1.22	0.89	10.89	
54	11	7.6	3.28	10.41	11.76	1.08	0.79	9.89	
56	13	7.7	3.57	11.41	12.54	1.34	0.81	10.39	
60	10	7.6	3.46	10.94	12.34	1.04	0.80	10.50	
61	9	7.6	3.69	11.65	12.94	1.23	0.83	10.88	
62	8	7.9	3.38	11.16	12.14	0.94	0.85	10.35	
63	7	7.5	3.66	11.44	13.04	1.30	0.87	10.87	
64	6	7.8	3.48	11.28	12.42	1.23	0.83	10.36	
65	5	7.9	3.35	11.05	13.00	1.29	0.87	10.84	
66	4	7.7	3.68	11.81	12.94	1.34	0.86	10.74	
67	3	7.8	3.75	12.10	13.34	1.50	0.87	10.97	
68	16	8.0	3.66	12.07	13.98	1.71	0.88	11.39	
69	2	8.1	3.68	12.40	14.38	1.85	0.94	11.59	
70	1	8.3	3.34	11.55	13.40	1.91	0.86	10.63	
			<b>Mean</b>	<b>Standard Deviation</b>		<b>Relative Standard Deviation</b>			
<b>Puffs</b>			7.77	0.26		3.32			
<b>CO Concentration</b>			3.54	0.17		4.72			
<b>TPM</b>			12.90	0.65		5.03			
<b>Water</b>			1.35	0.27		20.36			
<b>Nicotine</b>			0.84	0.04		5.16			
<b>NFDPM</b>			10.71	0.40		3.73			
<b>CO Yield</b>			11.41	0.53		4.61			

**Superkings Lights**

Run	Channel	Puffs per cigarette	CO (%v/v)	←-----Yield in Milligrams Per Cigarette-----→					
			CO	CO	TPM	Water	Nicotine	NFDPM	
45	19	7.9	2.20	7.13	9.08	0.43	0.69	7.96	
46	18	8.1	2.35	7.72	9.62	0.58	0.72	8.32	
75	13	8.6	2.09	7.43	9.06	0.51	0.67	7.88	
49	1	8.2	2.36	7.90	10.26	0.86	0.73	8.67	
51	13	7.7	2.33	7.47	9.54	0.56	0.74	8.24	
52	11	7.8	2.22	7.23	8.92	0.62	0.65	7.65	
53	16	7.7	2.45	7.86	9.76	0.66	0.72	8.38	
55	14	8.0	2.12	7.05	9.18	0.65	0.69	7.84	
77	12	8.0	2.31	7.59	9.58	0.68	0.68	8.22	
61	10	7.7	2.39	7.71	9.44	0.58	0.70	8.16	
62	9	8.0	2.27	7.58	9.50	0.63	0.70	8.17	
63	8	8.0	2.38	7.94	9.80	0.59	0.72	8.49	
64	7	7.9	2.20	7.24	8.86	0.46	0.66	7.74	
65	6	8.1	2.20	7.43	8.92	0.50	0.67	7.75	
66	5	8.2	2.31	7.83	9.54	0.55	0.71	8.28	
67	4	7.7	2.33	7.40	8.98	0.62	0.67	7.69	
68	17	7.9	2.33	7.63	9.32	0.55	0.68	8.09	
69	3	7.8	2.44	7.94	9.88	0.77	0.74	8.37	
70	2	8.2	2.36	7.98	9.82	0.64	0.73	8.45	
72	15	8.3	2.00	6.82	8.76	0.70	0.69	7.37	
			<b>Mean</b>		<b>Standard Deviation</b>		<b>Relative Standard Deviation</b>		
		<b>Puffs</b>	7.99		0.24		2.95		
		<b>CO Concentration</b>	2.28		0.12		5.19		
		<b>TPM</b>	9.39		0.41		4.35		
		<b>Water</b>	0.61		0.10		16.71		
		<b>Nicotine</b>	0.70		0.03		3.91		
		<b>NFDPM</b>	8.09		0.34		4.17		
		<b>CO Yield</b>	7.54		0.33		4.37		

**Superkings Ultra Lights**

Run	Channel	Puffs per cigarette	CO (%v/v)	CO	TPM	Water	Nicotine	NFDPM
←-----Yield in Milligrams Per Cigarette----->								
45	16	7.0	1.17	3.33	3.76	0.14	0.27	3.35
46	15	6.8	1.26	3.47	3.50	0.28	0.25	2.97
47	17	6.6	1.47	3.92	3.72	0.34	0.27	3.11
48	18	6.0	1.49	3.66	3.76	0.21	0.26	3.29
49	19	6.5	1.30	3.46	3.60	0.20	0.25	3.15
54	13	6.5	1.06	2.86	3.02	0.28	0.24	2.50
56	12	6.6	1.35	3.68	3.86	0.29	0.27	3.30
57	11	6.5	1.28	3.44	3.68	0.20	0.26	3.22
76	9	6.6	1.30	3.54	3.20	0.20	0.24	2.76
59	9	6.4	1.32	3.51	3.18	0.20	0.25	2.73
60	8	6.8	1.28	3.63	3.96	0.23	0.27	3.46
61	7	6.3	1.42	3.73	3.78	0.21	0.26	3.31
62	6	6.6	1.21	3.33	3.58	0.15	0.25	3.18
63	5	6.5	1.35	3.69	3.62	0.26	0.25	3.11
64	4	6.5	1.21	3.30	3.44	0.21	0.25	2.98
65	3	6.2	1.29	3.33	3.40	0.23	0.24	2.93
66	2	6.5	1.37	3.69	3.62	0.22	0.26	3.14
68	1	6.8	1.32	3.71	3.50	0.25	0.27	2.98
72	14	6.2	1.32	3.36	3.68	0.29	0.27	3.12
74	20	6.9	1.36	3.90	3.60	0.22	0.29	3.09
			<b>Mean</b>		<b>Standard Deviation</b>		<b>Relative Standard Deviation</b>	
<b>Puffs</b>			6.54		0.25		3.79	
<b>CO Concentration</b>			1.31		0.10		7.58	
<b>TPM</b>			3.57		0.24		6.59	
<b>Water</b>			0.23		0.05		21.14	
<b>Nicotine</b>			0.26		0.01		5.06	
<b>NFDPM</b>			3.08		0.23		7.51	
<b>CO Yield</b>			3.53		0.24		6.91	

**Vogue Superslims**

Run	Channel	Puffs per cigarette	CO (%v/v)	CO	TPM	Water	Nicotine	NFDPM
←-----Yield in Milligrams Per Cigarette-----→								
50	7	7.2	2.03	6.07	9.16	0.91	0.62	7.63
51	5	7.1	2.06	6.12	8.90	0.95	0.62	7.33
52	4	7.0	2.10	6.15	9.00	0.79	0.62	7.59
54	3	7.0	1.96	5.74	8.38	0.74	0.62	7.02
55	20	7.0	2.25	6.53	8.90	0.88	0.60	7.42
75	2	7.3	1.91	5.74	8.58	0.79	0.62	7.17
57	18	7.0	2.16	6.23	9.18	0.88	0.61	7.69
76	16	7.3	1.86	5.60	8.02	0.64	0.62	6.76
59	16	7.0	1.98	5.74	8.32	0.71	0.58	7.03
60	14	7.0	2.00	5.85	8.76	0.81	0.59	7.36
61	13	7.0	2.09	6.11	9.04	0.86	0.63	7.55
62	12	7.1	2.10	6.19	9.18	0.90	0.64	7.64
63	11	6.8	2.12	5.98	8.76	0.74	0.62	7.40
65	10	7.0	2.13	6.22	9.02	0.86	0.60	7.56
66	9	7.0	2.22	6.44	9.00	0.74	0.65	7.61
67	8	7.0	2.19	6.36	9.22	0.97	0.62	7.63
69	6	7.0	2.12	6.14	8.96	1.00	0.63	7.33
72	2	7.0	2.03	5.80	8.60	0.75	0.58	7.27
73	15	7.1	2.06	5.98	9.16	0.85	0.62	7.69
74	1	7.4	1.94	5.94	8.54	1.10	0.61	6.83
			<b>Mean</b>	<b>Standard Deviation</b>	<b>Relative Standard Deviation</b>			
<b>Puffs</b>			7.07	0.14	1.96			
<b>CO Concentration</b>			2.07	0.10	5.00			
<b>TPM</b>			8.83	0.33	3.77			
<b>Water</b>			0.84	0.11	13.20			
<b>Nicotine</b>			0.62	0.02	2.91			
<b>NFDPM</b>			7.38	0.29	3.87			
<b>CO Yield</b>			6.05	0.25	4.16			

**Appendix 1: Selected smoke constituents for UK study**

<b>Type</b>	<b>Specific analyte(s)</b>
	nicotine free dry particulate matter
	nicotine
	carbon monoxide
	ammonia
Aromatic amines	1-aminonaphthalene
	2-aminonaphthalene
	3-aminobiphenyl
	4-aminobiphenyl
Aldehydes & Ketones	formaldehyde
	acetaldehyde
	acetone
	acrolein
	propionaldehyde
	crotonaldehyde
	methyl ethyl ketone
	butyraldehyde
	hydrogen cyanide
	nitrogen monoxide
Polyaromatic hydrocarbons	benzo[a]pyrene
Phenols	phenol
	catchechol
	hydroquinone
	resorcinol
	ortho-cresol
	meta-cresol
	para-cresol
Nitrosamines	n-nitrosanonicotine (nmn)
	n-nitrosoanatabine (nat)
	n-nitrosanabasine (nab)
	n-nitrosanormicotine ketone (nmk)
Volatile Organic Compounds	benzene
	toluene
	1,3-butadiene
	isoprene
	acrylonitrile
Semi Volatile Compounds	pyridine
	quinoline
	styrene
Trace Metals	arsenic
	cadmium
	chromium
	nickel
	lead
	selenium
	mercury

**Appendix 2: Selected abbreviations and terms used in this report**

<b>Term/Definition</b>	<b>Meaning</b>
Channel	The channel of the smoking machine that the cigarette was smoked on
CO	Carbon Monoxide
CO(%v/v)	Percentage volume of carbon monoxide in the total volume of mainstream smoke corrected for any clearing puffs
NFDPM	Nicotine free dry particulate matter
NIC	Nicotine
Overwrap	The wrapper applied to the mouth end of the cigarette
Run	The smoking run that the cigarette was smoked in
TPM	Total Particulate Matter
Yield	The concentration of analyte measured in the smoke (normally per cigarette)
°C	Degree Celsius
ng	Nanogram
µg	Microgram
mg	Milligram
mL	Millilitre
L	Litre
mm	Millimetre
cig <sup>-1</sup>	per cigarette

---

<sup>7</sup> The Dixon's test used was that specified in Annex B of ISO 5725-1986 (E) for H = 13 to 40 (sample size) "when it is not known at which end of a series of data an outlier may occur". Note: The Dixon test criterion varies depending on the size of sample.

**Appendix 3: Description of brands (sold in the UK - Nov/Dec 2001) used in the benchmark study**

<b>Brand</b>	<b>Length (mm)</b>	<b>Butt length used for the study (mm)</b>	<b>Description</b>
Benson & Hedges King Size	84	28	filter – typical UK blend
Berkeley Superkings	99	33	filter – typical UK blend
Camel Ultra Lights	84	35	filter – typical American blend
Consulate Menthol	84	35	filter – typical UK blend – menthol
Gitanes Caporal Filter	70	23	filter – dark air cured blend
Lambert & Butler King Size	84	30	filter – typical UK blend
Lambert & Butler Lights King Size	84	34 (overwrap + 3 mm)	filter – typical UK blend
Lambert & Butler Ultra Lights	84	34 (overwrap + 3 mm)	filter – typical UK blend
Marlboro King Size	84	29	filter – typical American blend
Marlboro Lights King Size	84	35	filter – typical American blend
Mayfair Lights King Size	84	28	filter – typical UK blend
Mayfair Menthol King Size	84	33	filter – typical UK blend – menthol
Red Band Lights King Size	84	33	filter – typical UK blend
Regal Filter	71	26	filter – typical UK blend
Regal King Size	84	30	filter – typical UK blend
Rothman Royals 120s	120	38	filter – typical UK blend
Rothman Royals King Size	84	30	filter – typical UK blend
Senior Service	69	23	plain - typical UK blend
Silk Cut Extra Mild	84	33	filter – typical UK blend
Silk Cut King Size	84	28	filter – typical UK blend
Silk Cut Ultra King Size	84	33 (overwrap + 3 mm)	filter – typical UK blend
Superkings	99	34	filter – typical UK blend
Superkings Lights	99	33	filter – typical UK blend
Superkings Ultra Lights	99	34	filter – typical UK blend
Vogue Superslims	99	38	filter – typical American blend