

THE BERNARD M. BARUCH COLLEGE

OF

THE CITY UNIVERSITY OF NEW YORK

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HERBERT ARKIN  
*Professor Emeritus*

August 3, 1981

Mr. H. Thomas Austern  
Covington & Burling  
888 Sixteenth Street NW  
Washington, DC

Dear Mr. Austern:

As requested, I have examined the data records consisting of laboratory determination calculation sheets and statistical summary sheets which you represented to me to be copies of the original laboratory data sheets compiled by the Federal Trade Commission and used as the basis for figures on "tar" TPM (Dry) and nicotine yields of various brands of cigarettes as well as the final reports on these data released by the Federal Trade Commission.

It was the laboratory data sheets for the "tar" and nicotine figures released by the Federal Trade Commission under the date March 1981 which I examined and upon which I report in this letter.

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The number of brands tested in the current report rose to 187 as compared with 176 in the prior report.

The data handling care in the FTC laboratory in this set of data (Test No. 23)<sup>1</sup> declined as compared with that for the prior test (Test No. 22).

The number of calculational errors increased to 16. There were 7 impossible figures. Further, there were 11 instances of incorrect posting to the summary sheets and 1 instance not posted to the summary sheets from the laboratory sheets.

The number of deletions of determinations rose considerably to a new high with 32.5% of the determinations deleted. The number of deletions excluding "deleted days" fell from 494 for Test No. 22 to 470 for the current test (No. 23).

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<sup>1</sup>The prior tests performed by the FTC laboratory were dated November 20, 1967-No. 1; June 11, 1968-No. 2; October 10, 1968-No. 3; February 27, 1969-No. 4; July 9, 1969-No. 5; November 19, 1969-No. 6; May 18, 1970-No. 7; October 21, 1970-No. 8; August 1971-No. 9; March 1972-No. 10; August 1972-No. 11; February 22, 1973-No. 12; September 18, 1973-No. 13; March 1974-No. 14; September 1974-No. 15; March 1975-No. 16; September 1975-No. 17; April 1976-No. 18; November 1976-No. 19; August 1977-No. 20; May 1978-No. 21; December 1979-No. 22.

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There continues to be evidence of variations resulting in wide swings in the daily levels of the reported data in spite of large scale deletions of all determinations for entire days. The phenomena are similar to those reported in my prior letters.

A. CARBON MONOXIDE MEASUREMENTS

Carbon monoxide (CO) measurements were included in the FTC report for the first time.

For these measurements, only a single figure was supplied arising from some kind of instrument reading. Since no backup data were supplied, an audit of the accuracy of the CO measurements was not possible.

However, a comparison was made between the carbon monoxide measurements of the FTC laboratory with those for the same brands and the same sample by the Tobacco Industry laboratory (TITL).

It was found that the FTC values average about 112% of the TITL values. The average CO measurement for the FTC measurements was 13.76 mgm while the TITL values averaged 12.32 mgm for the same brands and sample.

However, the absolute difference increased as the CO measurement increased.

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Carbon Monoxide Measurements  
by Federal Trade Commission and  
Tobacco Industry Laboratory  
For the Same Brands  
and Sample  
Report Dated March 1981

CO* Measurement mgm	Average CO (mgm)		Percent TITL of FTC	Number of Brands
	FTC	TITL		
0 - 11	7.4	6.7	109.9%	61
12 - 17	14.5	13.1	111.3%	66
18 - 26	<u>19.4</u>	<u>17.2</u>	<u>112.7%</u>	<u>60</u>
Overall	13.8	12.3	111.7%	187

\*As measured by FTC.

The difference is large and consistent while CO tests by TITL as compared to tests performed by one tobacco company (Philip Morris) revealed no difference of any consequence for another large group of brands (157).

There appears to be an important difference in CO measurement results by the two laboratories (FTC and TITL). I have been informed that the FTC and TITL machines were cross calibrated. It is therefore not a matter of calibration. It would appear useful to seek the cause of the disparity.

In my letter dated April 20, 1981, based on partial data, I observed that there was a correlation between the tar and CO values for the various brands tested.

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The present FTC data indicates this to be generally true with the reported CO value generally about 2 mgm higher than the value reported for TPM (dry) for the same brand. However, as previously reported in the above letter, when the TPM (dry) values are high (over 21 mgm) this relationship for most brands seems to reverse with the CO values lower than the TPM (dry) figures for the same brands.

TPM (Dry) and Carbon Monoxide Values  
for 187 Brands of Cigarettes  
as Reported in the FTC Report  
Dated March 1981

<u>TPM Level (mgm)</u>	<u>Average TPM (Dry) mgm</u>	<u>Average Carbon Monoxide mgm</u>	<u>Number of Brands</u>
0 - 21	11.4	13.2	168
22 and Over	<u>24.1</u>	<u>18.9</u>	<u>19</u>
Overall	12.7	13.8	187

This strange aberration is worthy of further investigation.

B. CALCULATION AND POSTING ERRORS

Although new equipment has been introduced in the Federal Trade Commission laboratory for the tests, the computations are still performed manually.

The level of calculational errors doubled over that in the prior test (Test No. 22). This was the greatest number since September 1973.

The history of calculational errors on the FTC laboratory sheets is shown in the table below:

Number of Calculational Errors\*  
"Tar" and Nicotine Determinations  
Federal Trade Commission  
Laboratory Sheets

<u>Date of Report</u>	<u>Brand Cigarettes</u>	<u>Monitor Cigarettes</u>	<u>Total</u>
October 10, 1968	65	**	
February 27, 1969	73	**	
July 9, 1969	42	**	
November 19, 1969	43	20	63
May 18, 1970	60	15	75
October 21, 1970	5	0	5
August 1971	4	18	22
March 1972	2	1	3
August 1972	4	4	8
February 22, 1973	12	3	15
September 1973	23	1	24
March 1974	2	1	3
September 1974	4	2	6
March 1975	6	4	10
September 1975	1	1	2
April 1976	0	0	0
November 1976	8	1	9
August 1977	6	5	11
May 1978	6	1	7
December 1979	7	1	8
March 1981	12	4	16

\*Calculational differences were counted only if the error was at least 0.2 mgms for TPM (Dry) and 0.02 for nicotine. The individual errors are listed in Appendix I.

\*\*Not counted for these reports.

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There were 9 instances in which data for monitor cigarettes were posted incorrectly to summary sheets plus one not posted at all. In addition, there were 2 brand determinations not properly posted to the summary sheets. These errors are noted in Appendix II.

In addition, there were 7 impossible figures as shown in Appendix III. In these determinations the value for TPM (Dry) was reported as a negative figure which were posted as zero values to the summary sheets.

The advent of such impossible figures would indicate an error in the determination method probably due to a nonlinearity in the true values.

C. DISCARDS

In my prior analyses it was noted that a considerable amount of data on the laboratory sheets were discarded by merely stamping the column for a determination "deleted". It was observed that the result of such a practice is to falsely give an impression of much greater uniformity of test results than actually exists in fact. ✓

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It was pointed out that the FTC follows the practice of discarding "unusual" nicotine and "tar" TPM (Dry) determinations and not including these values in the reported averages based on an outlier test as well as to discard entire day's determinations when the monitor averages for those days do not meet a certain test.

There was a tremendous increase in the total deletions as compared with the previous test to a new record high. The number of discards in the various tests are shown below: ✓

Nicotine and TPM Determinations  
Discarded in Tests 5 Through 23

<u>Test Number</u>	<u>Monitor Cigarettes</u>	<u>Brand Cigarettes</u>	<u>Total</u>
5	77	62	139
6	19	72	91
7	94	272	366
8	17	76	93
9	158	232	390
10	436	235	671
11	333	193	526
12	263	231	494
13	165	216	381(a)
14	283	163	446
15	202	533	735
16	106	294	400(b)
17	296	815	1111(c)
18	117	359	476(d)
19	156	581	737(e)
20	221	746	967(f)
21	163	587	750(g)
22	212	982	1194(h)
23	650	1934	2584(i)

(a) Includes 14 deletions on summary sheets not on lab sheets.

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- (b) Includes 186 deletions where it was indicated that all data for that day was deleted (stamped deleted day) and 2 instances where deletions were made on the summary sheets but not the lab sheets.
- (c) Includes 896 deletions where it was indicated that all data for that day was deleted and 2 instances where deletions were made on summary sheets but not lab sheets.
- (d) Includes 297 deletions where it was indicated that all data for that day was deleted and 2 instances where deletions were made on summary sheets but not on lab sheets.
- (e) Includes 439 deletions where it was indicated that all data for that day were deleted.
- (f) Includes 787 deletions where it was indicated that all data for that day were deleted.
- (g) Includes 292 deletions where it was indicated that all data for that day were deleted and 7 instances where deletions were made on the summary sheets but not on lab sheets.
- (h) Includes 700 deletions where it was indicated that all data for that day were deleted and 5 deletions were made on the summary sheets but not indicated on the lab sheets.
- (i) Includes 2114 deletions where it was indicated that all data for that day were deleted and 20 deletions were made on the summary sheets but not indicated on the lab sheets.

The 2584 deletions represented 32.5% of all determinations.

Thus, 1 in every 3 determinations noted on the laboratory sheets were deleted.

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It should be noted that the number of deletions arising from "deleted days" rose sharply from 700 for Test No. 22 to 2,114 for Test No. 23, the current test, while the total number of deletions of individual port results fell from 494 for the previous Test No. 22 to 470 for the current test No. 23. These individual deletions are the result of the application of the Dixon outrider test by the FTC laboratory.

In the FTC letter to Mr. Kornegay dated May 5, 1978, it is noted that "of approximately 5000 samples tested in 1974, there remained only 252 which were deleted..... giving a rate of 5.4% as predicted by the Dixon outrider test".

In the current test No. 23, the percent of determinations discarded as a result of the outlier test remained high. There were 470 such deletions out of a total of 5,839 determinations after removing the 2,114 for deleted days resulting in 8.0% of the determinations discarded because of the outlier test. This high rate beyond that predicted for the test gives rise to a question about the suitability of the outlier test for this purpose.

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As emphasized in my prior reports, in spite of the best efforts of cigarette manufacturers, cigarettes must vary considerably because of the inherent variability of the agricultural product used (tobacco) and the nature of the manufacturing process. Thus, individual wide variations may be expected from cigarette to cigarette. Since the consumer uses the cigarette as received, there seems to be little justification for discarding values, unless supported by specific evidence of laboratory mistakes.

Since the above differences in cigarettes will result in exclusion from the test results of unusual cigarettes, the use of the outlier test to exclude individual port results is highly questionable. It is suggested that outliers might more appropriately be excluded only on the basis of evidence of experimental error or impossible results (negative water, tar, nicotine, etc.).

#### D. VARIATIONS IN TEST LEVELS

In accordance with sound scientific methods, the FTC laboratory included control (monitor) cigarettes in their smoking runs for the determinations of nicotine and "tar" delivery levels of the brands of cigarettes tested.

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These cigarettes are samples of a homogeneous larger group of cigarettes prepared for this purpose. All smoking machine runs are said to have included several ports which are dedicated to the smoking of these monitor cigarettes, the results of which are processed in the same manner as the brands being tested.

The purpose of such control (or monitor) cigarettes is to detect shifts or unusual variations arising out of changes in laboratory conditions, such as variations in the smoking machines, laboratory conditions, etc..

As reported previously, there is continuing evidence of shifts in the results for individual days as evidenced by the value obtained for the monitor cigarettes for certain days as compared with others.

Federal Trade Commission  
Data Dated March 1981  
Nicotine Determinations

<u>Date</u>	<u>Monitor Cigarettes</u>		<u>Brand Cigarettes*</u>	
	<u>Average For Day</u>	<u>Overall** Average</u>	<u>Number Below Average</u>	<u>Number Above Average</u>
February 5, 1981	1.29	1.22	7	42
February 23, 1981	1.18	1.22	36	13

\*For those brands for which tests were conducted on the specified days. There were 5 brands with results equal to the average for February 5, 1981 and 5 for February 23, 1981.

\*\*Excluding values for specified day.

NOTE: The results for the brands for the specified days are given in Appendices IV and V.

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The table above illustrates one of these gyrations in the daily figures for TPM (Dry). The monitor runs for February 23, 1981 were below average. Similarly, a high percent of brand cigarettes tested on February 23, 1981 were below average with few above average. In similar fashion, the monitor average for February 5, 1981 was above average and a high percentage of the brand tests for that day were above average. The probability of these differences being an accident of sampling is less than .001.

E. ROUNDING ERRORS

In my analysis dated December 3, 1973, I first discussed the rounding error problem. The problem has arisen again.

The apparent rounding method intended was that if the TPM average in the tenths of a mgm position was exactly 5 or more the value would be rounded up, if less, rounded down (truncated). For instance, an average TPM of precisely 14.5000 would be rounded to 15 but 14.4999 would be truncated to 14. Similarly in the second decimal of the nicotine average, a reported figure of 1.25000 would be raised to 1.3 but 1.24999 would be truncated to 1.2. This is sound procedure.

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There were 11 errors in rounding according to this rule, which were found in the Report of "Tar", Nicotine and Carbon Monoxide Content of the Smoke of 187 Varieties of Cigarettes, March 1981, published by the FTC in the alphabetic listing of brands data. These errors are found in Appendix VI.

Sincerely,



Herbert Arkin

HA:de  
Encs.

Appendix I

Federal Trade Commission

"Tar", Nicotine and Carbon Monoxide Determinations

Data Dated March 1981

Calculation Errors on Laboratory Sheets

<u>Date</u>	<u>Cigarette No.</u>	<u>Run</u>	<u>Port</u>	<u>TPM (Dry)</u>		<u>Nicotine</u>		<u>See Notes*</u>
				<u>Original</u>	<u>Corrected</u>	<u>Original</u>	<u>Corrected</u>	
BRAND CIGARETTES								
8/14/80	59	5	4	2.2	2.6			1
9/08/80	174	3	11			.90	.92	2
11/4/80	140	2	6	6.2	6.9			3
11/21/80	126	2	10	7.8	8.5			4
12/29/80	168	2	20			.64	.68	5
1/05/81	167	2	9			.74	.67	6
1/07/81	85	2	8	20.3	22.8			7
1/07/81	19	2	14	25.8	26.0			8
2/04/81	20	2	9	26.4	26.0			9
2/06/81	153	2	11	11.8	12.1			10
2/18/81	131	4	19			1.16	1.13	11
2/26/81	23	1	17	12.0	13.9			12
MONITOR CIGARETTES								
11/10/80	17M	5	6			1.20	1.22	13
1/26/81	17M	4	6			1.15	1.18	14
2/18/81	17M	2	19	16.4	16.2	1.19	1.37	15
2/18/81	17M	5	1			1.19	1.16	16

\*NOTES:

1. TPM (Wet) Calculation:  $\frac{(33.3296 - 33.3145) \times 1000}{5} = 3.0$ , not 2.6. Therefore, TPM (Dry) = 3.0 - .11 - .31 = 2.6, not 2.2.
2. Nicotine Calculation:  $\frac{1.059 [438 - \frac{1}{2} (.197 + .082)] \times 500}{(34.3)(5)} = .92$  not .90.

Appendix I - continued

\*NOTES:

3. Water Calculation:  $\frac{(679 \div 4,250) + (-.0274)}{(.0166)(5)} = 1.59$ , not 2.28. Therefore,

TPM (Dry) =  $9.2 - 1.59 - .71 = 6.9$ , not 6.2.

4. Water Calculation:  $\frac{(.0236 \div .1896) + (-.0700)}{(.0146)(5)} = .75$ , not 1.40. Therefore,

TPM (Dry) =  $9.8 - .75 - .60 = 8.5$ , not 7.8.

5. Nicotine Calculation:  $\frac{1.059 [ .626 - \frac{1}{2} (.234 + .137) ] \times 250}{(34.3)(5)} = .68$ , not .64.

6. Nicotine Calculation:  $\frac{1.059 [ .607 - \frac{1}{2} (.222 + .129) ] \times 250}{34.3 (5)} = .67$ , not .74.

7. Water Calculation:  $\frac{(.0719 \div .1901) + (-.0773)}{(.0123)(5)} = 4.89$ , not 7.41. Therefore,

TPM (Dry) =  $29.1 - 4.89 - 1.43 = 22.8$ , not 20.3.

8. Water Calculation:  $\frac{(.0943 \div .1847) + (-.0773)}{(.0123)(5)} = 7.04$ , not 7.31. Therefore,

TPM (Dry) =  $34.5 - 7.04 - 1.43 = 26.0$ , not 25.8.

9. Water Calculation:  $\frac{(.0589 \div .1894) + (-.0531)}{(.0145)(5)} = 3.56$ , not 3.14. Therefore,

TPM (Dry) =  $31.4 - 3.56 - 1.84 = 26.0$ , not 26.4.

10. TPM (Dry) Subtraction Error:  $14.6 - 1.48 - 1.01 = 12.1$ , not 11.8.

Appendix I - continued

11. Nicotine Calculation:  $\frac{1.059 \left[ .500 - \frac{1}{2} (.172 + .096) \right] \times 500}{(34.3)(5)} = 1.13$ , not 1.16.

12. Water Calculation:  $\frac{(.0240 \div .1818) + (-.0587)}{(.0126)(5)} = 1.16$ , not 3.03. Therefore,

TPM (Dry) = 16.1 - 1.16 - 1.09 = 13.9, not 12.0.

13. Nicotine Calculation:  $\frac{1.059 \left[ .557 - \frac{1}{2} (.200 + .124) \right] \times 500}{(34.3)(5)} = 1.22$ , not 1.20.

14. Nicotine Calculation:  $\frac{1.059 \left[ .514 - \frac{1}{2} (.174 + .090) \right] \times 500}{(34.3)(5)} = 1.18$ , not 1.15.

15. Nicotine Calculation:  $\frac{1.059 \left[ .567 - \frac{1}{2} (.158 + .086) \right] \times 500}{(34.3)(5)} = 1.37$ , not 1.19. Therefore,

TPM (Dry) = 21.3 - 3.73 - 1.37 = 16.2, not 16.4.

16. Nicotine Calculation:  $\frac{1.059 \left[ .510 - \frac{1}{2} (.176 + .093) \right] \times 500}{(34.3)(5)} = 1.16$ , not 1.19.

Appendix II

Federal Trade Commission

"Tar", Nicotine and Carbon Monoxide Determinations

Data Dated March 1981

Posting Errors to Summary Sheets

<u>Date</u>	<u>Cigarette No.</u>	<u>Run</u>	<u>Port</u>	<u>TPM (Dry)</u>		<u>Nicotine</u>		<u>Carbon Monoxide</u>	
				<u>Posted</u>	<u>As Should Be</u>	<u>Posted</u>	<u>As Should Be</u>	<u>Posted</u>	<u>As Should Be</u>
MONITOR CIGARETTES									
8/22/80	17M	2	5					17.3	19.9
8/26/80	17M	2	4	15.2	15.5				
11/4/80	17M	2	9					19.3	19.6
11/4/80	17M	3	11					16.4	16.7
11/18/80	17M	3	6	16.6	16.1				
11/18/80	17M	3	11	16.1	16.6				
12/24/80	17M	1	6	16.1	16.3	1.47	1.28		
1/26/81	17M	2	13	15.2	15.5				
2/17/81	17M	1	11					19.5	19.7

BRAND CIGARETTES

2/5/81	98	3	19			.63	.65		
11/3/80	76	1	10	*	7.9	*	.70	*	6.0

MONITOR NOT POSTED

<u>Date</u>	<u>Cigarette No.</u>	<u>Run</u>	<u>Port</u>	<u>TPM (Dry)</u>		<u>Nicotine</u>		<u>Carbon Monoxide</u>	
				<u>Posted</u>	<u>As Should Be</u>	<u>Posted</u>	<u>As Should Be</u>	<u>Posted</u>	<u>As Should Be</u>
1/13/81	17M	5	19		17.4		1.26		21.5

\*Incorrectly posted determination to cigarette No. 71, instead of 76.

Appendix III

Federal Trade Commission

"Tar", Nicotine and Carbon Monoxide Determinations

Data Dated March 1981

Impossible Figures

<u>Date</u>	<u>Cigarette No.</u>	<u>Run</u>	<u>Port</u>	<u>Reason</u>
8/22/80	24	3	12	Negative Tar = -.06
9/11/80	24	1	2	Negative Tar = -.01
11/5/80	25	4	19	Negative Tar = -.08
2/4/81	24	2	4	Negative Tar = -.08
2/5/81	24	4	18	Negative Tar = -.01
2/9/81	24	1	15	Negative Tar = -.02
2/10/81	24	4	16	Negative Tar = -.09

Appendix IV

Federal Trade Commission

Data Dated March 1981

Nicotine Determinations

By Brands

<u>Sample Number</u>	<u>Brand Names</u>	<u>Nicotine in mgms</u>	
		<u>2/5/81</u>	<u>Overall Average Excluding 2/5/81</u>
1179-1	Alpine kf sp m 85mm	.96	.96
7	Aspen f sp m 100mm	.89	.83
10	Benson & Hedges reg. f hp 70mm	*.11	.12
13	Benson & Hedges 100's f hp m 100mm	1.23	1.11
15	Benson & Hedges 100's f sp m 100mm	*1.25	1.13
22	Camel Lights kf sp 85mm	.97	.90
24	Carlton kf hp 85mm	*.07	.06
25	Carlton kf sp 85mm	*.15	.13
27	Carlton f sp 100mm	.40	.39
28	Carlton f sp m 100mm	.35	.36
29	Chesterfield reg. nf sp 70mm	1.46	1.41
33	Decade kf sp 85mm	.33	.41
37	Doral kf sp m 85mm	1.08	.94
38	Doral II kf sp 85mm	*.42	.42
39	Doral II kf sp m 85mm	.54	.43
42	English Ovals kf f hp 85mm	2.54	2.24
49	Golden Lights kf sp 85mm	.82	.77
51	Golden Lights f sp 100mm	.93	.78
53	Half & Half kf sp 85mm	*1.67	1.64
61	Kent Micronite II f sp m 100mm	1.31	1.21
62	Kent III f sp 100mm	.44	.48
64	Kool kf hp m 80mm	1.31	1.27
70	Kool Super Lights f sp m 100mm	.81	.67
72	L & M kf hp 80mm	1.09	.97
80	Lark Lights kf sp 85mm	.63	.59
81	Lark f sp 100mm	1.38	1.19
83	Long Johns f sp 120mm	1.45	1.32
85	Lucky Strike reg. nf sp 70mm	1.34	1.32
87	Lucky 100's f sp 100mm	*.27	.30
90	Marlboro kf sp 85mm	1.07	1.09
96	Max f sp 120mm	1.59	1.51
98	Merit kf sp 85mm	** .64	.57
101	Merit 100's f sp m 100mm	*.83	.75
103	More f sp 120mm	*1.71	1.75
105	Multifilter kf sp 85mm	.81	.81
109	Newport Lights kf sp m 85mm	*.95	.85
110	Newport 100's f sp m 100mm	1.60	1.57
111	Now kf hp 85mm	*.20	.19
114	Now kf sp m 85mm	.23	.23
116	Old Gold Straight kn f sp 85mm	1.69	1.63

Could be Explained by fact that cigarettes smoked from day to day  
could and are most probably from diff. manuf. dates representing changes made in  
product

Appendix IV- continued

<u>Sample Number</u>	<u>Brand Name</u>	<u>Nicotine in mgms</u>	
		<u>2/5/81</u>	<u>Overall Average Excluding 2/5/81</u>
1179-120	Pall Mall kn f sp 85mm	1.52	1.51
126	Parliament Light kf hp 80mm	*.61	.61
129	Philip Morris reg. nf sp 70mm	*1.56	1.46
133	Picayune reg. nf sp 70mm	1.42	1.36
139	Raleigh f sp 100mm	1.28	1.13
142	Real kf sp m 85mm	.82	.80
152	Silva Thins f sp 100mm	1.15	1.06
156	Tall f sp m 120mm	1.41	1.21
158	Tareyton Lights kf sp 85mm	.62	.60
170	Vantage kf sp 85mm	.86	.81
177	Viceroy Rich Lights 100's f sp 100mm	.74	.71
178	Virginia Slims f sp 100mm	1.09	.98
179	Virginia Slims f sp m 100mm	1.08	.98
181	Virginia Slims Lights f hp m 100mm	.76	.67

\*Average used since more than one run made on specified day.  
\*\*Average used since more than one run made on specified day  
and corrected for posting error.

Appendix V  
Federal Trade Commission  
Data Dated March 1981  
Nicotine Determinations  
By Brands

<u>Sample Number</u>	<u>Brand Name</u>	<u>Nicotine in mgms</u>	
		<u>2/23/81</u>	<u>Overall Average Excluding 2/23/81</u>
1179-2	American Lights f sp 120mm	.65	.68
3	American Lights f sp m 120mm	.71	.83
9	Belair f sp m 100mm	.44	.66
11	Benson & Hedges kf hp 85mm	1.36	1.31
13	Benson & Hedges 100's f hp m 100mm	1.12	1.12
16	Benson & Hedges Lights f sp 100mm	.74	.77
17	Benson & Hedges Lights f sp m 100mm	.68	.77
20	Camel reg. nf sp 70mm	1.99	1.85
22	Camel Lights kf sp 85mm	.93	.90
30	Chesterfield kn f sp 85mm	1.40	1.70
36	Doral kf sp 85mm	.93	.94
38	Doral II kf sp 85mm	.32	.42
39	Doral II kf sp m 85mm	.42	.43
41	English Ovals reg. nf hp 70mm	*1.79	1.73
42	English Ovals kn f hp 85mm	*2.32	2.25
44	Eve f sp m 100mm	.91	1.07
45	Eve 120's f hp 120mm	.96	1.06
47	Fatima kn f sp 85mm	*1.50	1.69
48	Galaxy kf sp 85mm	1.12	1.03
50	Golden Lights kf sp m 85mm	*.70	.67
52	Golden Lights f sp m 100mm	.52	.81
53	Half & Half kf sp 85mm	1.58	1.65
56	Iceberg 100's f sp m 100mm	.16	.28
60	Kent Micronite II f sp 100mm	*1.19	1.14
62	Kent III f sp 100mm	.40	.49
66	Kool Milds kf sp m 85mm	.86	.89
67	Kool Super Lights kf sp m 85mm	.59	.59
69	Kool Milds 100's f sp m 100mm	1.07	1.04
79	Lark II kf sp 85mm	*.63	.63
80	Lark Lights kf sp 85mm	.38	.61
81	Lark f sp 100mm	.99	1.20
84	Long Johns f sp m 120mm	1.06	1.23
86	Lucky Ten kf sp 85mm	*.62	.65

Appendix V - continued

<u>Sample Number</u>	<u>Brand Name</u>	<u>Nicotine in mgms</u>	
		<u>2/23/81</u>	<u>Overall Average Excluding 2/23/81</u>
89	Marlboro kf hp m 80mm	.89	.96
106	Multifilter kf sp m 85mm	.56	.79
109	Newport Lights kf sp m 85mm	*.84	.86
115	Oasis kf sp m 85mm	.93	1.08
118	Old Gold Light kf sp 85mm	*.74	.82
121	Pall Mall kf sp 85mm	1.11	1.11
122	Pall Mall Extra Lights kf sp 85mm	.56	.59
124	Pall Mall Light f sp 100mm	*.86	.89
125	Pall Mall Light 100's f sp m 100mm	*.95	.97
128	Parliament Light 100's f sp 100mm	*.85	.92
131	Philip Morris International f hp 100mm	1.25	**1.20
145	Salem kf hp m 80mm	1.08	1.17
151	Saratoga f hp m 120mm	*.97	1.07
158	Tareyton Lights kf sp 85mm	.62	.60
162	Tempo kf sp 85mm	*.47	.56
165	True kf sp 85mm	.38	.43
166	True kf sp m 85mm	.35	.45
174	Viceroy kf sp 85mm	*1.16	** .98
175	Viceroy Rich Lights kf sp 85mm	.57	.70
181	Virginia Slims Lights f hp m 100mm	*.67	.67
182	Winston kf hp 80mm	1.42	1.28

\*Average used since more than one run made on specified day.  
\*\*Corrected for calculation error.

Appendix VI  
 Federal Trade Commission  
 Tar, Nicotine and Carbon Monoxide Determinations  
 Data Dated March 1981

Rounding Errors

<u>Brands</u>	<u>Average TPM (Dry)</u>	
	<u>FTC Report</u>	<u>Summary Sheet</u>
Belair F sp m 100mm	8.2	8.145
Carlton 100's f sp 100mm	4.0	3.945
English Ovals kn f hp 85mm	27.8	27.745
Lark kf sp 85mm	16.0	15.947
Long Johns f sp 120mm	16.5	16.445
True kf sp 85mm	4.9	4.845

<u>Brands</u>	<u>Carbon Monoxide</u>	
	<u>FTC Report</u>	<u>Summary Sheet</u>
Arctic Lights f sp m 100mm	10.9	10.847
Aspen f sp m 100mm	10.3	10.247
Benson & Hedges reg. f hp 70mm	1.3	1.245
Home Run reg. nf sp 70mm	21.1	21.045
Virginia Slims f sp m 100mm	16.1	16.045