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Sum of ... of D.S.H.'s memo 5/1/59

RESEARCH LABORATORY

RESEARCH & DEVELOPMENT DEPT.

November 24, 1958.

EVALUATION OF "DIPLOMAT" CIGARETTES

Samples of "Diplomat" cigarettes were given the laboratory by Dr. George F. Wright during his visit on October 31, 1958. These are 85 mm. plain end oval cigarettes, made by the North American Cigarette Manufacturers Inc., and are advertised as "The Safer Cigarette". It is claimed that the tobacco has been treated "to reduce the harmful physiological effects of nicotine" and to produce a lower temperature of combustion.

In view of these claims it was thought desirable to examine "Diplomat" cigarettes for whole tar and nicotine content of the smoke, nicotine content of the tobacco, smoke temperature, and temperature of combustion.

The results of this examination are outlined below:

THE TAR AND NICOTINE CONTENTS OF THE SMOKE

Analysis No. A-154

REFERENCE:- Modified Foster D. Snell Procedure for the Determination of Whole Tar and Nicotine in Smoke.

Due to an insufficient number of cigarettes only three whole tar and nicotine determinations were made on the smoke by a Modified Foster D. Snell Procedure.

For the sake of brevity the pertinent information on these cigarettes has been summarized below:-

- 1) Average weight of 134 cigarettes at 12.0% moisture - 1069 mg.
- 2) Weight range employed for selection of cigarettes for whole tar and nicotine determinations - 1070 ± 40 mg. (unusually wide due to sample limitations)
- 3) Average pressure drop of 114 cigarettes (for an air flow of 1050 cc/min.) - 3.5 inches of water. Pressure Drop Range - 1.3 - 5.8 inches of water.
- 4) Average pressure drop for 60 cigarettes employed for whole tar and nicotine determinations - 3.4 inches of water. Pressure Drop Range - 2.0 - 5.1 inches of water.
- 5) Average weight of 85 mm. cigarette papers - 50.64 mg.
- 6) Nicotine content of "Diplomat" tobacco - 1.57% (Average from individual results of 1.56% - 1.58%)
- 7) Average porosity of 8 cigarette papers - 100.2 cc/min. Porosity Range - 94.4 - 104.0 cc/min.
- 8) The cigarettes were smoked to 23 mm. butt lengths under standard conditions (one 35 cc. puff/min.)

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The smoke analysis results have been recorded in the accompanying table.

REMARKS:-

The whole tar and nicotine contents of the smoke as well as the nicotine content of the tobacco from Diplomat cigarettes were found to be higher than anticipated in view of their advertisement as "the safer cigarette". In fact, the smoke from these cigarettes contains as great a percentage of whole tar and nicotine as is contained by the smoke from 80 mm. Pall Mall plain end cigarettes (approximately 4.4% and .32% respectively). Hence it would appear that their advertisement is grossly misleading from the point of view of tar and nicotine contents of smoke. It is possible that the tobacco has been treated in some manner that might imply the statement "The safer cigarette". The nicotine content of the "Diplomat" tobacco is also fairly similar to a typical value for the Pall Mall blend. (*Canadian*)

The rather wide variation in the tar and nicotine results may be attributed to the unusual variability of these "Diplomat" cigarettes with respect to both weight and pressure drop.

It is noteworthy that two of the six packages opened by the laboratory contained only nineteen cigarettes.

COMBUSTION TEMPERATURE

The combustion temperature of "Diplomat" cigarettes was measured by our standard method, that is, during puffing at the rate of one puff per minute, 35 ml. volume, 2 second duration. As usual, the thermocouple wires were inserted at a distance of 15 mm. from the lighted end, perpendicular to the long axis of the cigarette, and in the case of this oval cigarette, along the minor axis of the cross-section. Because of the small number of cigarettes available, no selection by weight was possible.

The average of ten determinations gave a combustion temperature of 857°C., a value somewhat lower than that for "Player's Mild" (879°C.). In order to ascertain whether this apparent reduction in temperature is a function of the oval shape or of the tobacco used in the cigarette, similar measurements were made on "Virginia Ovals", yielding a result of 840°C.

There remained the possibility that oval cigarettes did, in fact, burn at a temperature similar to that of round cigarettes, and that we were recording an erroneously low value, due to excessive conduction of heat along the thermocouple wires.

Accordingly, another series of experiments was performed with Virginia Ovals in which the thermocouple wires were inserted along the major axis of the cigarette cross-section. This was expected to reduce the amount of conduction along the wire and hence to give a better approximation to the true combustion temperature.

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The result of this experiment was 853°C.

Since all three temperature values lie in a range of 17°C it can be concluded; first, that the measurements give a valid estimate of the temperature of combustion of oval cigarettes; secondly, that this temperature is significantly lower than that for a round cigarette; and thirdly, that "Diplomat" cigarettes do not exhibit a lower temperature of combustion than conventional cigarettes of oval shape.

SMOKE TEMPERATURE

Temperatures in the smoke of "Diplomat" cigarettes were determined in the usual way. Measurements were made with the thermojunction placed directly behind the cigarette at a distance of 1 mm. from the end and normal smoking conditions were observed. Although no selection of the cigarettes was possible, the results were reproducible and the determination was made on a sample of five cigarettes instead of the usual eight.

The results are shown on the accompanying graph, and the corresponding curve for "Buckingham" is shown as a reference. The difference in the base lines is due to a difference in room temperature at the time the experiments were performed. It should be noted that the butt length refers to the length at the beginning of a puff and that the puff consumes approximately 4 mm. of tobacco.

*Smith*  
*W. S. King*  
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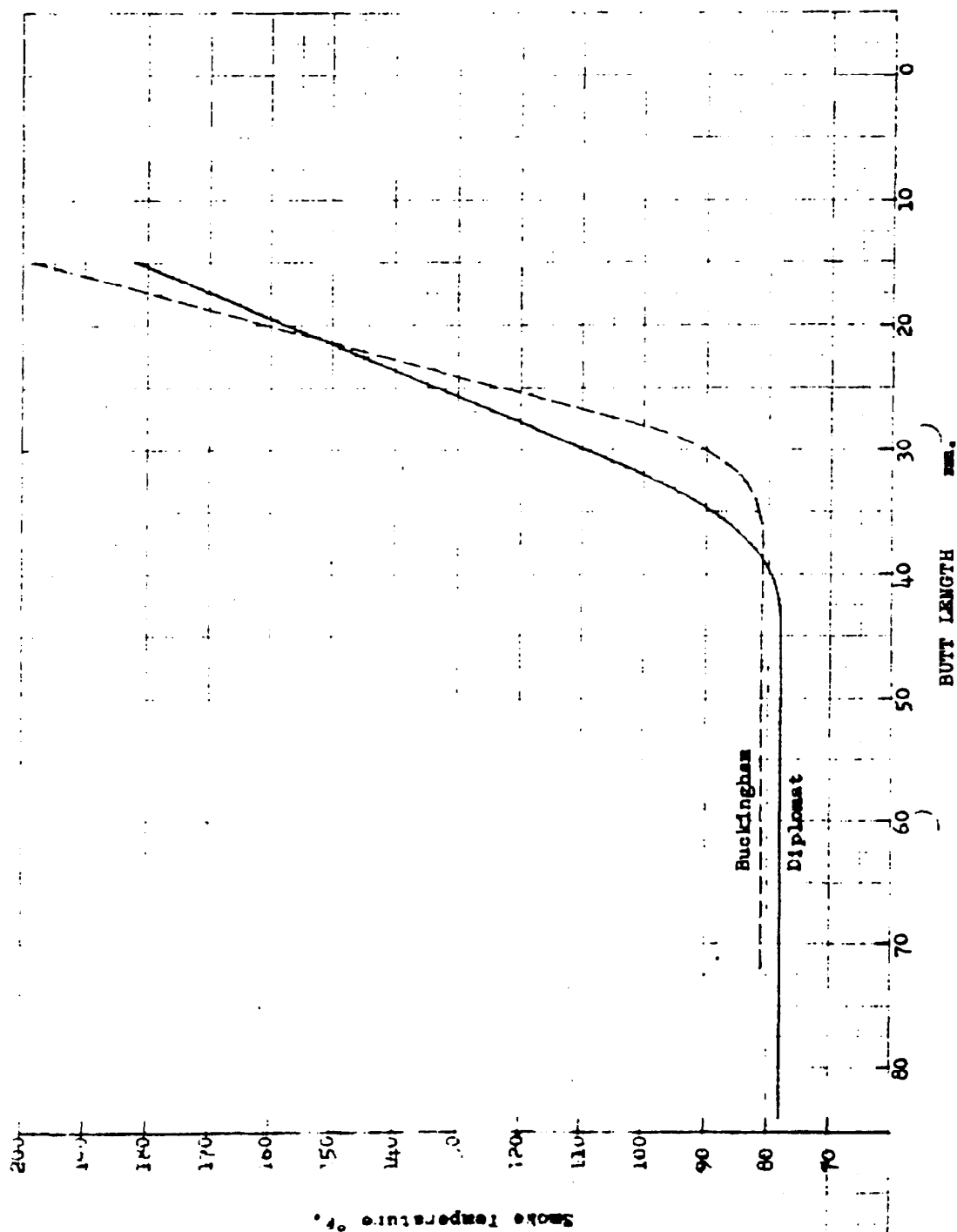
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SMOKE ANALYSIS RESULTS

Brand of Cigarette	Average weight in mg.	Whole Tar			Nicotine		
		Wt. of Tobacco Smoked/Cigt. in mg. (Moisture Free basis)	mg./Cigt.		Wt. of Tobacco Smoked/Cigt. in mg. (Moisture Free basis)	mg./Cigt.	
Diplomat Rec'd Nov. 4/58	1069	635.6	28.9	4.55	642.4	2.1	.328
		642.4	29.0	4.51	642.4	2.0	.308
		637.7	28.3	4.12	632.9	1.8	.278
		636.6	28.1	4.39	639.2	2.0	.305

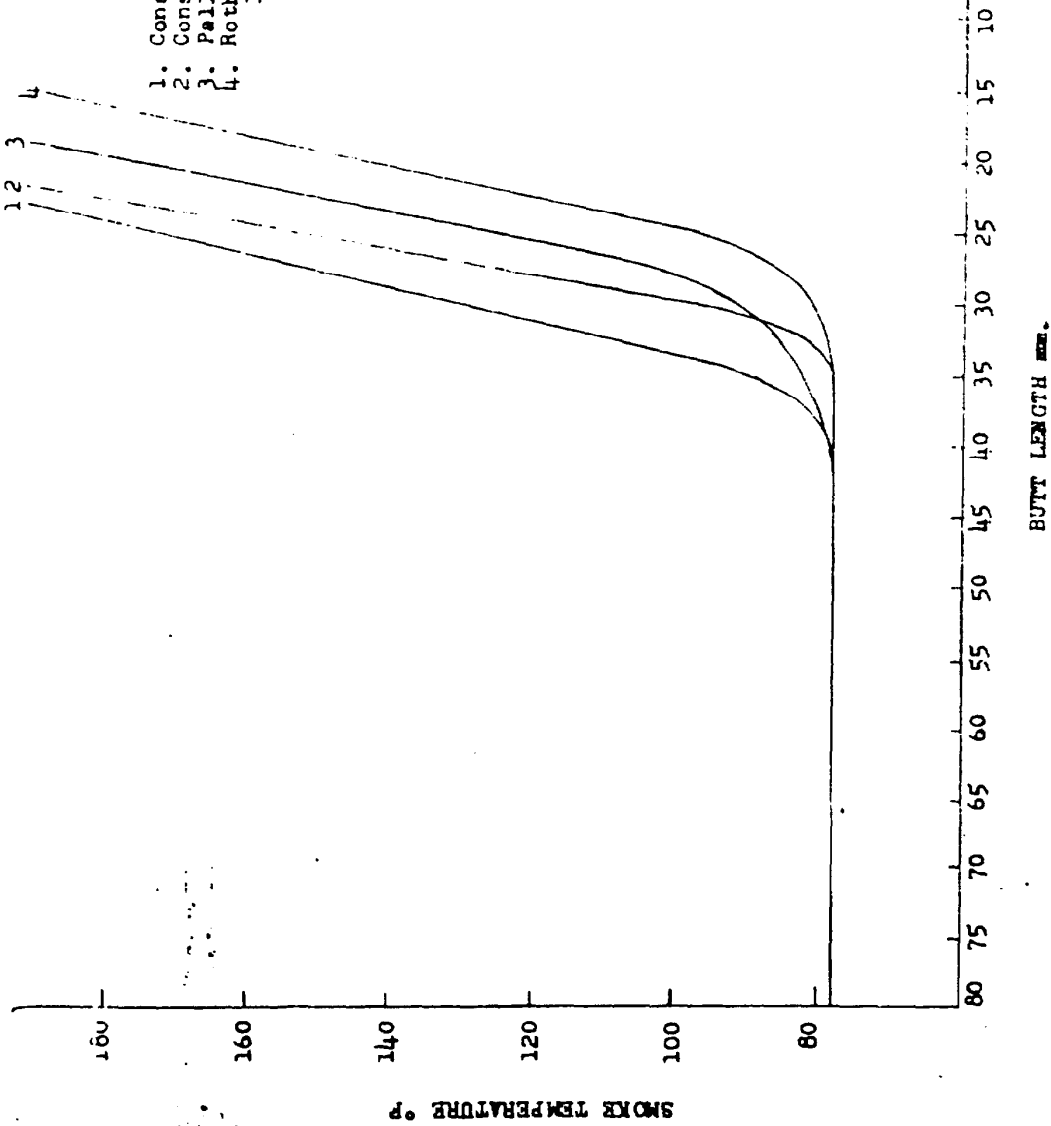
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GRAPH OF SMOKE TEMPERATURE VS BUTT LENGTH.



1. Consulate norms 1 wt
2. Consulate 2 1/2 lt
3. Pall Mall K.S. Plain
4. Rothmans K.S. Plain  
1b. M-1

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TABLE II

TEMPERATURES IN THE SMOKE OF SUCCESSIVE PUFFS IN OVER WEIGHT CIGARETTES AND COMPARATIVE NORMAL WEIGHT CIGARETTES.

Sample Puff No.	Consulate	Consulate	Rothmans K.S. Plain	Pall Mall K.S. Plain
Selection Wt. mgm.	1170 ± 15	1094 ± 50	1200 ± 15	1090 ± 20
1	77.5	78	76	78.5
2	77.5	78	76	78.5
3	77.5	78	76	78.5
4	77.5	78	76	78.5
5	77.5	78	76	78.5
6	77.5	78	76	78.5
7	77.5	78	76	78.5
8	77.5	82	76	82
9	78	116	76.5	90
10	94	158	81	118
11	150	197	102	174
12	198	198	147	198
13			178	

*Not done for selection R1 up*

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