MEETING OF THE MEETING BETWEEN B.A.T. AND C.C. REPRESENTATIVES AT C.C. RESEARCH & DEVELOPMENT ESTABLISHMENT, WEMBLEY, MIDDX., IMPERIAL, ON 5TH MAY 1966.

PRESENT:

Mr. L.L. Bannam	C.C. London	(in the Chair)
Mr. P. Anderson	B.A.T. Northampton	
Mr. G. Bond	C.C. Alperton	
Mr. T. Brockwell	B.A.T. London	
Dr. G.R. Cooper	C.C. Alperton	
Mr. D.E. Davies	B.A.T. Liverpool	
Mr. E.T. Davis	B.A.T. London	
Dr. D.T. Walton	B.A.T. Southampton	
Mr. J. Farago	C.C. London	
Dr. I.W. Hughes	B.A.T. Southampton	
Mr. L.C. Laforte	I.T.C. Montreal	
Mr. F.W. O'Dell	C.C. London	
Mr. C.T. Williamson	C.C. Alperton	

Mr. P. Chinnock was unable to attend.

1. METHODS OF TEST FOR TAR AND NICOTINE.

2. COMPARISON OF FILTER RETENTIONS - KARL FISCHER V. NICOTINE.

3. RECONCILIATION OF ESTRON RETENTION FIGURES - B.A.T. AND C.C.

4. STANDARDISATION EXPERIMENT ON ESTRON.

These four items were dealt with together.

Mr. Anderson outlined the different methods employed by those immediately concerned:

A. B.A.T. Southampton: Electrostatic precipitation on both the B.A.T. and Ethel machines, followed by determination of dry weight precipitation after elimination of all volatiles.

B. B.A.T. Liverpool: Ethel Smoking Machine - determination of precipitation after allowing for water (Karl Fischer) but without removal of other volatiles.

C. I.T.C. Canada: Bird & Phipps Machine.

D. C.C. Alperton As for Liverpool.

The question of variations in the air flow for individual puffs had already been covered in a previous discussion in the Laboratory. Mr. Anderson attached considerable importance to achieving a "mass balance". This could be done by the volatile-free method but not using the Karl Fischer. Mr. Williamson said he had not had occasion to endeavour to achieve a "mass balance" on the lines described by Mr. Anderson. The C.C. retention testing method automatically gave a balance as the dry smoke collected from the filter and the dry smoke collected from the tube totalled the dry smoke presented to the filter. He went on to explain the method in detail, and also explained the reasons for the adoption of this method, which were - briefly - that the variation in characteristics of individual cigarettes were such that accurate results could not be attained by other methods

unless large quantities of cigarettes were smoked. Dr. Pelton and Mr. Laporte both indicated that they used 40 cigarettes per test, whilst Mr. Davies said that he used 5 cigarettes per test, the same as C.C. Mr. Williamson undertook to circulate a full description of the C.C. smoking method, and will also report the results of earlier tests designed to show the difference in retention results as between tips attached to the cigarette with Sellotape, and others not attached.

Dr. Hughes then outlined the Southampton method of nicotine determination and this was compared with the practices at Alperton, Liverpool and Montreal.

Mr. Anderson emphasised the advantages which he considered attended the volatile-free method of tar determination. The Chairman pointed out that this seemed to be a fundamental point, as C.C. had worked on the principle that they were concerned with what emerged from a cigarette and reached the smoker's tongue. The elimination of all volatiles from the tar created an entirely new situation. Mr. Anderson felt that for the sake of experimental accuracy the complete removal of all volatiles from the precipitated tars was essential. Mr. Williamson undertook to consider this point further.

It was considered that the discussion could not usefully be pursued without the benefit of accurately controlled experimental data, and it was agreed that tripartite tests should take place for this purpose in the Laboratories at B.A.T. Southampton, B.A.T. Liverpool and C.C. Alperton, as follows:

A. B.A.T. Tapered Brass Tube Holder v. C.C. Suction Holder.

B. Dry Weight Tar Determinations on a Volatile Free Basis v. Volatiles other than Water retained. (Karl Fischer)

In both series of tests the retentions to be determined both by reference to tar and by reference to nicotine. Each series to comprise Estron 5/100, TAF and Myria filters, 25 mm circumference; smoking cycle 35 ccs. of 2 seconds duration once per minute; filters 15 mm long; 9 mm butt; atmospheric conditions as near as possible to 70° F. 60% R.H.

On Dr. Cooper's suggestion it was agreed that B.A.T. Southampton should provide the cigarettes, fully selected, whilst C.C. should provide the 15 mm length filters, also fully selected, conditioned and ready for use. The filters would be selected to ± 2% for weight; ± 5% for pressure drop; and ± .1 mm for circumference. Mr. Williamson was asked to prepare a detailed programme of this test work for consideration by and agreement with Southampton and Liverpool.

2. EFFECT ON TAR AND NICOTINE FIGURES OF VARIATION IN SMOKING CYCLE PARAMETERS.

In reply to Mr. Anderson's inquiries Mr. Williamson said there was no information concerning the effects of varying smoking cycles on the retention capacity of filters, other than that published in the C.C. leaflet.

3. POSSIBLE VARIATION ON TAR PER CIGARETTE BY MACHINE DESIGN.

Mr. Anderson explained that there was a difference in the shape of the precipitation tubes at the entry end as between the B.A.T. and the Pthel machines. Different systems of holders were used - a tapered brass tube for the B.A.T. machine, and the suction holder for the Pthel machine.

The Ethel machine in equal conditions gave approx. 20% less dry weight tar precipitation in the tube. The Chairman suggested that this might be due to the effect of the different method of holding as between the tapered tube and the suction grip when the cigarette stubb becomes moist, or in the event of there being some peripheral shrinkage in the tip, the suction grip being designed to reproduce the action of human lips. This could easily be proved or disproved by changing round the two types of holder, and Dr. Felton agreed that this could be done.

Mr. Anderson also raised the question of the effect of changes in the shape of the pressure/time curve on the amount of retention. Mr. Williamson replied that Kymographic studies had been made of the pressure/time curve of different smoking machines and of human smokers, but he could not say whether and to what extent tar collection or filtration might be effected by changes in the shape of the curve. He added that he doubted whether a change in the shape of the Ethel curve could be induced - for experimental purposes - without altering the puff duration.

7. MEASUREMENT OF PRESSURE DROP RELATED TO CIGARETTE COMPONENTS THEORY OF END DISTORTION ON CUTTING, WITH PARTICULAR REFERENCE TO ESTRON.

Mr. Anderson said that the enhancement of pressure drop (known as C.D.R. - Cut Down Ratio) when full length rods are cut down to six short length filters, was not confirmed by their tests. Mr. Williamson said that an average C.D.R. value for Acetate filters was 1.08. Over 7,000 tests had been carried out on all qualities of filters, and these showed that there was considerable variation, but that for each quality of filter there was usually a typical value. For Myria, for example, the C.D.R. value would be 1.20 or greater - dependent on the quality. Supertex Cotton also had a high value.

It transpired that the Southampton tests consisted of reconnecting the six short length filters with Sellotape to give an aggregate, whilst Alperton measured each short length separately and obtained their aggregate by totalling these individual values. These observations suggested that the C.D.R. must be a function of re-entry turbulence rather than the consequence of surface distortion.

Mr. Anderson said that Southampton would repeat their test, leaving a gap between the short lengths when recombining them. Dr. Felton confirmed that B.A.T. pressure drop values for filters for testing were determined from the full length rod and not from the short length filters. The Chairman pointed out that the uncovering of this discrepancy in test procedure meant that all previous comparisons of test results between Alperton and Southampton were invalidated as the C.C. reported short length pressure drop values took into account the C.D.R. whilst Southampton's did not. In reply to an inquiry, Mr. Bond explained that the pressure drop of short length filters had, indeed, been found to vary after some days' lying, but the variation was not always in one direction, and appeared merely to reflect changes in atmospheric conditions.

8. WHAT VARIATIONS IN ESTRON SPECIFICATION CAN OCCUR DURING MANUFACTURE.

Dr. Felton expressed an interest in the extent of variation of crimp ratio in manufactured rods (residual crimp ratio). The Chairman estimated this as being of the order of ± 1½%. In reply to Mr. Lamorte he confirmed that adjustments to the residual crimp ratio would be made to bring the pressure drop values into line with specification. In reply to Mr. Felton, the Chairman explained that the crimp ratio was imparted to the tow by the raw material suppliers. It was intended to be constant, but he instanced some of the factors which could result in variations. Mr. Felton also inquired

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concerning variations in the spray pattern. The Chairman indicated that long term variations could occur, but it was a problem of manufacture to avoid them. There would be no significant short term variations. Short term variations in plasticiser content were the result of changes in the pattern of the material being sprayed. Mr. Williamson said that there was no statistical information on the extent of short term plasticiser variations (from 15 mm to 15 mm length). In his experience there was a good chance of even values as between individual rods of consecutive manufacture.

9. QUALITY CONTROL.

Dr. Evers quoted results obtained from tests carried out a few years ago. The Chairman stated that at the present time the variations normally found in manufacture are:

Circumference:	± .3 mm
Weight:	± 2%
Pressure Drop:	± 10%
Plasticiser:	± 2% (e.g. 6% - 10% of Pl.)

Dr. Evers remarked that these variation limits represented a significant improvement on earlier results: Mr. Odell agreed that this was so.

The Chairman then outlined the methods followed in the C.C. factories for continuous checks on quality in manufacture, and circulated some completed forms to illustrate how the system operated. Dr. Evers and Mr. Brockwell expressed themselves satisfied with this account.

The discussion terminated with Mr. Anderson gracefully expressing appreciation of the conduct of the meeting and of the arrangements made for B.A.T.'s reception.

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