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SOUTHAMPTON.

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**THE EFFECT OF CIGARETTE CIRCUMFERENCE
AND TOBACCO BLEND ON
AMES MUTAGENICITY**

REPORT NO: RD.2138

28 March 1989

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SUMMARY:

The Ames mutagenic activity of smoke condensate from flue-cured and U.S.-style cigarettes of 13 mm, 17 mm, 20 mm, 22 mm, 24.75 mm and 29 mm circumference has been measured. In both series the Ames activity was reduced as cigarette circumference was reduced. At each circumference, the activity from the flue-cured blend was consistently lower than that from the U.S.-style blend.

In contrast to previous studies using single grade tobacco cigarettes, there was no significant correlation between Ames activity and condensate nitrogen content. However, there was a significant correlation between Ames activity and smoke pH, as found in the single grade studies.

When the puff volume through the flue-cured cigarettes was modified to produce equal linear air flow at all circumferences, the condensate from low circumference cigarettes (13-20 mm) still had a lower Ames activity than that from high circumference products (22-29 mm). However, condensates from cigarettes of 22, 24.75 and 29 mm had similar Ames activity. Thus, differences in linear flow rates at different circumferences, under standard smoking conditions, may give only a partial explanation of observed Ames activity trends. Higher circumference/cross sectional area ratios may provide more oxygen during puffing of low circumference cigarettes. Smoking a standard circumference cigarette in 17% oxygen gave higher Ames activity than for 21% or 25% oxygen, suggesting that oxygen availability may be a factor associated with lower Ames activity at lower circumference.

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INDEX TERMS:

Cigarette circumference
Blend composition
Flue-cured tobacco
Air-cured tobacco
Ames test
Smoke chemical properties
Smoke condensate
Smoking regimes
Puff volume
Air flow

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