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CONFIDENTIAL

To: D. B. Losee **Date:** April 18, 1991

From: W. R. Raymond

Subject: **Weekly Summary; Project 2702; Week of 4/15/91**

Aerosol Generation Matrix Studies:

Accelerated "curing" studies were conducted with NaCMC-adhered cast tobacco sheet on BC420 carbon heaters, comparing ambient air, radiant heat, microwave and reduced humidity (30% R.H.; 23° C) drying. Coated carbons were evaluated for adhesion under thermal stress and for moisture content (Karl Fischer titration). Unexplained irregularities in moisture contents occurred for some of the experimental sets which will require remeasurement. However, only those samples held at 30% R. H. overnight exhibited consistent adhesion and uniform charring under thermal load (11 Joules). All other samples either showed partial charring or delaminated before charring occurred.

Beta tobacco blend development was begun using high alkaloid blend components to formulate Merit type blends. Blends with and without MT Oriental tobacco have been prepared and cast into sheet. Total blend casings and top flavor systems were requested from Flavor Technology based on benchmark smoking evaluations of unflavored and flavored Merit blend by Flavor Technology personnel.

Work also began on a mentholated system using polymic at approximately half the level used in Sigma. Initial subjective evaluations were promising but showed unacceptably high menthol delivery. Further work is in progress to evaluate reduced polymic addition levels. Other candidates to be evaluated for menthol release include menthyl-β-D-glucoside and menthylpolyitaconates.

Single Blade Carbon Heater Studies:

Temperature profile generation continued using various programmed RTX units, evaluating reproducability and thermocouple placement. The charge state of the battery pack has been found to be a major source of variability in RTX performance requiring testing only in the plateau region of the battery voltage discharge curve.

Weight loss data were generated as a function of power input using the Laser Mechanical 4-blade heater test fixture with Bright tobacco cast sheet adhered to carbon with NaCMC. Maximum weight loss without ashing (68%) was achieved at 9.2 Joules. Resistance also was measured as a function of time and temperature. Measurements were made at 3 and 6 watts power input delivered over intervals of 1, 2, and 3 seconds. Weight loss and resistance data were provided to the Energy Management Group in order to develop power, time and duty cycle settings to simulate RTX power delivery using a constant power supply and pulse generator system. This system will be used to develop power delivery windows for subsequent programmed RTX studies.

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Permanent Heater Concept Development:

Thermal loss potential was evaluated using a variety of tobacco matrix barrier materials, including 0.25 and 0.50 mil aluminum foil (continuous), foil/paper laminate with both foil and paper surfaces toward the heater, foil/paper laminate with aluminum slit and both surfaces toward the heater, low sidestream paper ($CaCO_3$ with KH_2PO_4), and two graphite fiber impregnated papers (9.57 and 19.13 g/sq meter). A direct heater/tobacco contact control was used. The tobacco sheet was ca. 7.5 mil thick ASTA (400 mesh) and the heater was a 20 mil thick BC420 carbon strip. Weight loss was evaluated at 17 and 22 Joules. The maximum weight loss (80% relative to control) was achieved with the low sidestream paper at 22 Joules. At 17 Joules, low sidestream and low basis weight graphite papers performed comparably (ca. 62% weight loss relative to control). See attached table. As previously demonstrated, thermal loss associated with barrier materials is a function of material mass and lateral heat conduction.

Tobacco sheet was cast directly onto low sidestream paper and the laminate tested for barrier integrity by firing on a nichrome heater. The low sidestream paper forms a brittle fused ash which tends to break easily. Further studies will be performed using low sidestream paper with increased potassium phosphate loadings to determine whether a more sturdy ash can be achieved and to evaluate barrier properties.