



**B.A.T (U.K. and Export) Limited**

RESEARCH & DEVELOPMENT CENTRE  
SOUTHAMPTON ENGLAND

|     |   |               |                  |
|-----|---|---------------|------------------|
| TO  | Mr. A.L. Heard<br>Corporate R&D<br>Millbank | FROM          | I.C. Brown       |
|     |   | <u>SECRET</u> |                  |
| REF | ICB/PMW/                                    | DATE          | 16th August 1988 |

NICOTINE ADDITION IN GREENDOT PRODUCTS

Thank you for your note of 22nd July. I share your concern regarding the possible regulatory and legislative constraints on the incorporation of nicotine salts into tobacco reconstituted or synthetic, non-tobacco materials.

In order fully to address this important issue, I shall set out the current short-term technical objectives of the GREENDOT team and the reasoning behind our present technical options.

In the four months of the project to date, we have been carrying out a range of experimental studies to gain the information we require to select our most promising technical approaches to the GREENDOT objectives. In terms of the original objectives, we are seeking ways to produce a highly modified tar delivery in terms of dose, composition and quality. Our work has led us to define three broad technical options to meet this objective. We are pursuing these in order to produce our best prototype examples of each option by the end of the year (best, I hasten to add, in terms of quantitative delivery and smoke composition, rather than smoking quality).

Technical Options

A. All tobacco

The project proposal is to construct the ultimately modified delivery product using 100% tobacco materials. The purpose of this project is to ascertain how far we can progress to meeting the GREENDOT objectives using only tobacco. As we have little chance of meeting the numerical 1.0/0.8 ratio, the emphasis is on achieving modified delivery in terms of tar quality and composition. The Canadians in Project DAY are using the exhaustive extraction/add back route.

In GREENDOT we are looking at tobacco materials which give a low tar potential (treated or extracted tobaccos), blended with relatively small quantities of high nicotine-containing lamina (we have examples of Y1, fire cured, Burley and Rustica for this). In the short term, we are aiming at a tobacco rod which will give an overall delivery profile of 0.6-0.8 mg nicotine, 2-3 mg water, 2-3 mg glycerol and 3-5 mg PMWNGF.

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This prototype will have a tar/nicotine ratio of approximately 5:1, should have significantly reduced biological activity as measured by AMES activity, and reasonable sensory smoking properties. The advantages of this option are that it will be non-infringing (patents), non-contentious from legislative or regulatory constraints and a very useful starting material for cigarette design research (as well as a suitable vehicle for flavour formulation work).

**B. All Synthetic**

In the first months of the project we have learnt a great deal about the behaviour of smoke enhancers such as glycerol as well as nicotine transfer and incorporation from our work on synthetic sheet materials. We have in the last month been able to fabricate a prototype product which will deliver 4-6 mg TPM of which 2-3 mg is water, 2-3 mg is glycerol, 0.4-0.6 mg is nicotine and 0.1-0.5 mg is unidentified condensate. These prototypes have been AMES tested and show no detectable activity. The nicotine in such material has been added as a complex with alginate. For pragmatic reasons of speed and simplicity, we are using "bought" nicotine from chemical suppliers. P.C. Bevan is, however, investigating nicotine recovery routes as part of his tobacco extraction studies.

We are not suggesting at this early stage in the project that this is our major technical option; rather we are using it as a learning exercise for understanding the mechanisms of generation and control of smoke components. This work has, however, allowed us in a relatively short time to achieve and even "better" our GREENDOT technical objectives in terms of delivery, smoke composition and "tar" quality.

As a product option, however, it may be highly contentious with regard to regulatory or legislative constraints.

**C. Synthetic/Tobacco**

The objective of this option is to utilize the knowledge gained from the other two options to pursue a more pragmatic approach to innovative product design. We are investigating the use of combinations of tobacco and non-tobacco materials to meet our smoke delivery and quality targets. We are using sheet materials with indigenous nicotine as well as "added" nicotine to give prototypes covering a range of deliveries.

Once we have the technical ability to manufacture reasonable quantities of materials, we shall place more effort into the product design and sensory aspect of prototype products. Hopefully the information from the market research and concept testing will help in guiding our proposed product definitions.

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I hope this gives a clearer picture of the technical options we are currently taking in Project GREENDOT and demonstrates that we are not relying solely on nicotine from a bottle to provide the required levels in our prototype products.

We are hoping to provide four prototype products, which will cover the range of technical options outlined above, for the RPG Meeting in September.

I.C. BROWN

cc: Dr. R. Binns

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Part 1

GROUP-FUNDED WORK IN R&DC

Progress will be described under Work Areas given in the Work Programme or formulated at the March Review Meeting. This will not be a Section-by-Section Review.

|           |   |      | <u>Time</u><br>(minutes) |
|-----------|---|------|--------------------------|
| 0900-0905 | Introduction - Project areas following the March Review | RRB  | 5                        |
| 0905-0935 | <u>Smoke Quality</u>                                    |      |                          |
|           | Product Freshness                                       | DPR  | 10 ✓                     |
|           | Elution   | KJHM | 20 ✓                     |
| 0935-1020 | <u>Cigarette Physical Quality</u>                       |      |                          |
|           | Water/solvent loss                                      | TAW  | 20 ✓                     |
|           | Particle size/density studies                           | NB   | 15 ✓                     |
|           | Combustion control                                      | PDC  | 10                       |

PRODUCT RESEARCH FOR REGULATORY AUTHORITY ISSUES

|           |                                     |                                   |          |      |
|-----------|-------------------------------------|-----------------------------------|----------|------|
| 1020-1110 | <u>Passive Smoking Issues</u>       | Total sidestream reduction        | PDC      | 20 ✓ |
|           |                                     | ETS                               | CJF/NDW  | 30 ✓ |
| 1110-1240 | <u>Reduction of "Other Noxae"</u>   | Introduction                      | WDEI     | 5    |
|           |                                     | Nitrosamine research              | DAM      | 10   |
|           |                                     | General reduction                 | RLP      | 15   |
|           |                                     | Reduction by enzymes              | DAM      | 15   |
|           |                                     | Ames activity and smoke chemistry | WDEI/EDM | 20   |
|           |                                     | Pyrolysis studies                 | WDEI     | 10   |
|           |                                     | Analytical development            | GAF      | 15   |
| 1400-1414 | <u>Fire Safe Cigarette</u>          |                                   | DPR      | 15   |
| 1415-1445 | <u>Alternative Bioassays</u>        | In vitro bioassays                | EDM      | 15   |
|           |                                     | In vivo genotoxic activity        | GSJ      | 15   |
|           |                                     | Smoke toxicology research         | GSJ      |      |
| 1445-1455 | <u>Tobacco &amp; Smoke Database</u> |                                   | FSM/GAF  | 10   |

Part 2

OTHER WORK IN RESEARCH DEPARTMENT

|           |   |                                   |           |    |
|-----------|---|-----------------------------------|-----------|----|
| 1455-1520 | <u>Computing</u>                          | GRP database and current projects | BMW et al | 25 |
| 1520-1545 | <u>Library &amp; Information Services</u> | Progress in Central Records       | AE        | 15 |
|           |   | Spectrum of LIS users             | VR        | 10 |
| 1545-end  | <u>Non Group-Funded Projects</u>          | A/MGP                             | TGM       | 15 |
|           |   | Radioactivity in tobacco          | DPR       | 15 |
|           |   | Nitrosamines in snuff             | DAM       | 15 |

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