Smoke Analytes (SMA) Sub-Group Annual Report 2020

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SC Liaison: Martin Blumenstock, British American Tobacco Ltd, Germany

SMA SG
History and objectives

- Created in 1999 as Special Analytes (SPA) SG to deliver CORESTA Recommended Methods for a range of mainstream smoke analytes as prioritised by regulators
- The scope expanded in 2016 to include organisation and conduct of proficiency testing of analytes other then TNCO
- In 2017 the SG changed its name to Smoke Analytes (SMA) to clearly convey that SG work is focused on combustible tobacco products

- SMA objectives
  1. To propose and maintain CORESTA Recommended Methods (CRMs) and related documents for the analysis of smoke constituents from combustible tobacco products.
  2. To organise interlaboratory testing related to Objective 1.

SMA SG Overview

❖ Areas of work

Documents	• CRMs, Technical Reports • CRM reviews • ISO standardisation support
Cigarette Smoke	• Benzo[*a*]pyrene in Mainstream Cigarettes smoke by GC/MS (project 223) • Next analytes of interest – Volatile Organics (VOCs), HCN, NO/NOx
Cigar Smoke	• Collaborative study – B[*a*]P, TSNAs (project 198) • Next analytes of interest

❖ SG meetings

- **Generally 30-40 participants**
- **Usually two meetings per calendar year**
- **Last meeting virtual 25th April 2020, 59 participants**
- **Next meeting virtual, October 2020**

Documents Update 2019-2020

Area	Activity	Status
Technical reports	• 2019 Small group CS* on aromatic amines by GC/MS • 2017 Joint experiment aromatic amines by LC-MS/MS • 2014 CS Phenols by HPLC-FLD • 2019 CS B[*a*]P in ISO intense mainstream smoke • TobLabNet methods and CRMs comparison • 2014-2019 Aromatic amines project summary report • Cigar CS TSNA/B[*a*]P	• Completed • Completed • Completed • In progress** • In progress** • In progress** • In progress**
CRM	• Determination of aromatic amines by GC/MS(NCI)	• In progress**

**CS = Collaborative Study*

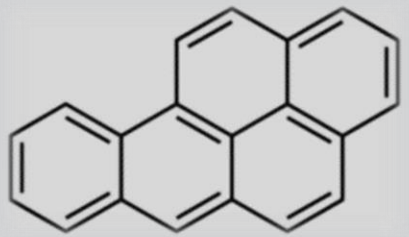
***Target completion end 2020*

ISO Standardisation

Method	Method ID	ISO smoking regime	Status	ISO intense smoking regime	Status
Selected VOCs by GC/MS	CRM 70	21330:2018	Published	23923	Publication
Selected carbonyls by HPLC	CRM 74	21160:2018	Published	23922	Publication
B[*a*]P by GC/MS (methanol)	CRM 58	22634/1:2017	Published	SMA Project 223	
B[*a*]P by GC/MS (cyclohexane)	22634/2	22634/2:2019	Published		
TSNAs by LC-MS/MS	CRM 75	19290:2016	Published	23921	Publication
Ammonia by IC	CRM 83	23919:2020	Published	23920:2020	Published
Phenolics by HPLC-FLD	CRM 78	23904:2020	Published	23905:2020	Published

B[a]P in Mainstream Cigarette Smoke (Project 223)

- **Objectives:**
  - **Support development of ISO 23906-2 (*B[a]P in MCS under intense smoking regime by GC/MS*) by providing r and R data**
  - **Collaborative Study under intense smoking regime (ISO 20778)**
    - ISO 23906-1 (CORESTA CRM 58) – methanol
    - ISO 23906-2 (ISO TC 126/WG14) – cyclohexane



- **Outputs:**
  - **Data for ISO 23906-2 development**
  - **CORESTA Technical Report**
  - **Updated CRM 58**

B[a]P in Mainstream Cigarette Smoke
CS set-up

- **Study lead: Kentaro Eguchi, JTI**
- **Statistical analysis: Alexander Hauleithner, JTI Ökolab**
- **Timelines**

Samples distribution	Collaborative Study	Statistical analysis	Review	Technical Report
End 2019	01-02/2020	03/2020	04/2020	Q4 2020

- **Samples: 2 controls, 4 products, 5 replicates/sample**
  - KR 1R6F
  - CM9
  - Sample 1 (Dark-air cured, ISO tar 9.5 mg)
  - Sample 2 (American blend, ISO tar 6mg)
  - Sample 3 (Virginia blend, ISO tar 9 mg)
  - Sample 4 (Charcoal filter, ISO tar 1mg)

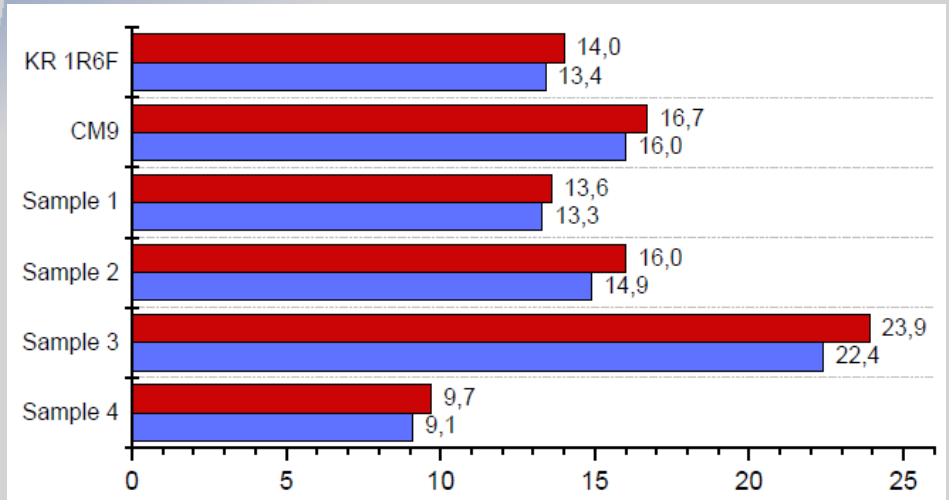
B[a]P in Mainstream Cigarette Smoke
CS set-up

- **Data received from 11 laboratories**

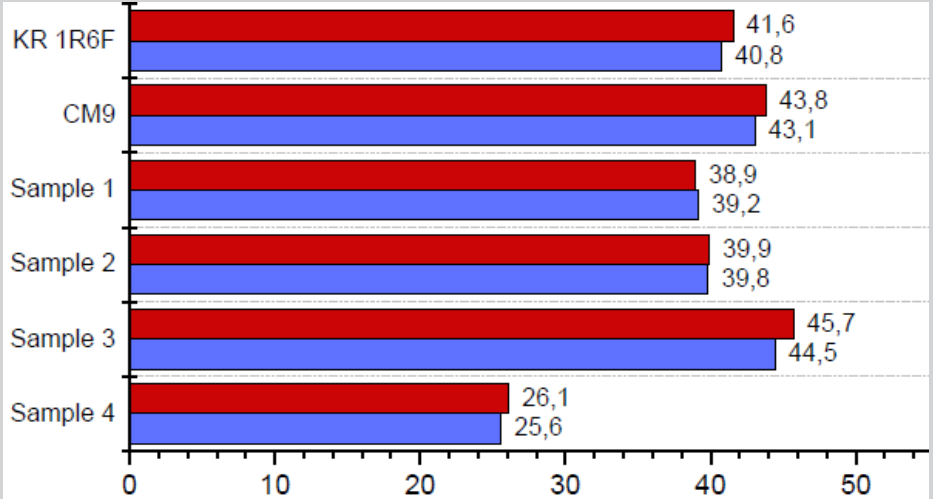
- British American Tobacco, Brazil
- CNTC, China
- Enthalpy Analytical, USA
- Imperial Tobacco, Germany
- Japan Tobacco, Japan
- JTI Ökolab, Austria
- Labstat International, Canada
- Liggett Group, USA
- Philip Morris International, Brazil
- Philip Morris International, Indonesia
- R.J. Reynolds Tobacco Co., USA
- University of Kentucky, USA

B[a]P in Mainstream Cigarette Smoke
Draft results

B[a]P (ng/cig)



Total Particulate Matter, TPM (mg/cig)



ISO 23906-2
ISO 23906-1 CRM58

Cyclohexane
Methanol

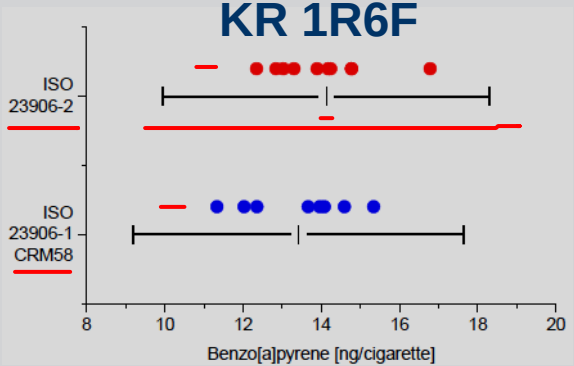
B[a]P in Mainstream Smoke CS results

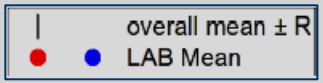
ISO 23906-2 (ISO TC 126/WG14) – cyclohexane

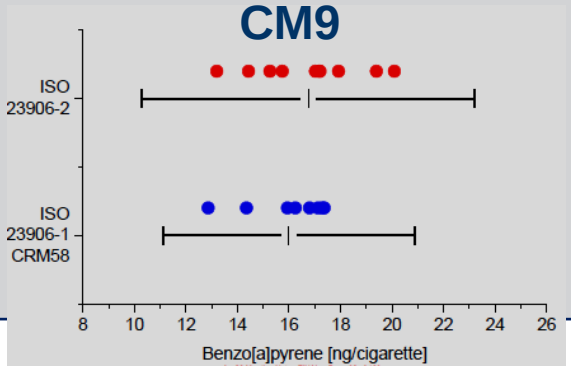
Sample	MEAN *	r *	R *	N
KR 1R6F	14,1	2,32	4,18	9
CM9	16,7	2,70	6,46	10
Sample 1	13,6	2,77	5,80	11
Sample 2	16,0	2,14	5,49	11
Sample 3	23,9	4,05	9,03	11
Sample 4	9,7	1,52	4,10	11

ISO 23906-1 (CORESTA CRM 58) – methanol

Sample	MEAN *	r*	R *	N
KR 1R6F	13,4	1,91	4,21	8
CM9	16,0	2,15	4,90	8
Sample 1	13,2	2,04	4,93	8
Sample 2	14,9	2,27	3,61	8
Sample 3	22,4	3,89	6,02	8
Sample 4	9,1	1,45	2,35	8







(ng/cigarette)

Cigarettes
Future studies

- **Survey for priority analytes**
- **Method survey and data mining (13 laboratories participated)**

Analytes	Interested participants	Status	Comment
HCN	General consensus	Active	NWIP pending (3Q 2020)
NO/NOx			Information sharing with HTP TF
PAHs*			NWIP in progress (3Q 2020)
PQS**/Semi-volatiles			Scoping
Metals	5	Pending	Pending review TTPA methods

**Polycyclic Aromatic Hydrocarbons*
***Pyridine, Quinoline, Styrene*

Cigars
Current Activities

- **Project 198 – 1. Testing of B[*a*]P and TSNAs CRMs on emissions from University of Kentucky (UofK) reference cigars**
  - Data received from 8 laboratories.
  - Completed. Technical Report in progress.

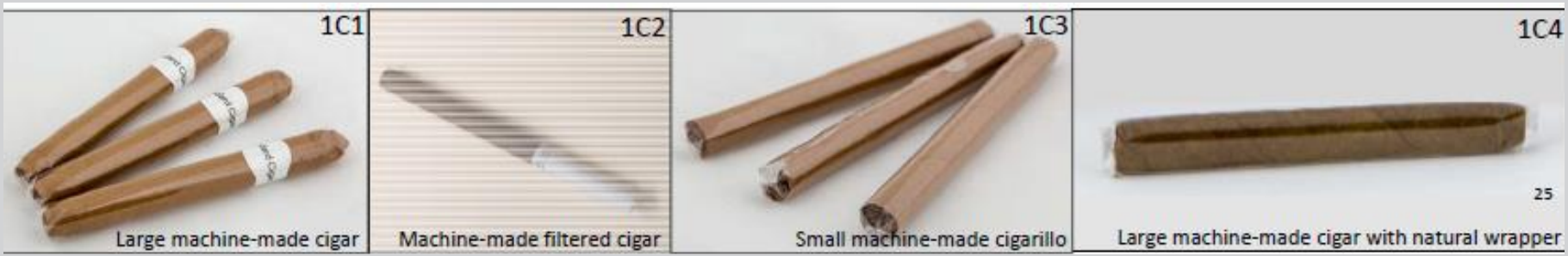
  - Altria Client Services, USA
  - British American Tobacco, Germany
  - CNTQSTC, China
  - Enthalpy Analytical, USA
  - Global Laboratory Services, USA
  - Imperial Tobacco, Germany
  - Manifatture Sigaro Toscano, Italy
  - University of Kentucky, USA

- **Project 198 – 2. Feasibility of combined methods (utilizing impingers and CFP)**
  - Completed. Next steps - expand scale of testing to include more laboratories.
- **SG agreed to priority list of analytes based on cigarette HPHCs**

Cigars
Reference Products

- University of Kentucky (UofK) reference products available since 2019

Product ID	Description	Diameter
1C1 Cigar	Large machine-made cigar	15.6 mm
1C2 Cigar	Machine-made filtered cigar	7.8 mm
1C3 Cigarillos	Small machine-made cigarillo	11.0 mm
1C4 Cigar	Large machine made with natural wrapper	12.8 mm



- UofK Certified Reference Products grant project - in progress as of 2020

Cigars
Future studies

- **Smoke methods for cigars**
  - **Combined methods (B[*a*]P, TSNAs, VOCs) – scope expansion to include more participants**
  - **Analytes priorities survey**
    - **B[*a*]P, TSNAs**
    - **Volatile Organics (VOCs)**
    - **Ammonia**
    - **Carbonyls**
    - **Aromatic Amines**

Organization of RAC, SMA and TTPA SGs (COR-080/20)

- The SC conducted a review of SGs workstreams to optimize the workload and the use of resources
- RAC and SMA would merge to form a new SG - **Smoke Analysis (SA)**
  - Co-Coordinators: Hiromoto Yamazaki and Jana Jeffery
  - Workstreams and leads:
    - *Reference Products – Thomas Schmidt*
    - *Cigarette smoke methods – Rana Tayyarah*
    - *Cigar smoke HPHC methods – Anthony Brown*
- The scope of work would not change including current NWIPs
- Transition of existing smoke analysis projects to the SA workstreams and the projects involving tobacco and unburned tobacco products to the TTPA
- SMA SG will be formally disbanded

Acknowledgements

- All laboratories participating in SMA projects
- All participants of SMA meetings, contributions and engagement
- Rana Tayyarah for hard work and support
- Thank you for your attention