Certificate of Analysis
1R6F Certified Reference Cigarette

Certificate Number: 2024-005CTRP
Certification Date: 10/31/2024
Validity: This document is valid until 10/31/2029 unless superseded by a new CoA at an earlier date.
Superseded CoA: **2023-004CTRP**

Description of CRM	Blended Cigarette, unflavored, 83 mm length
Lot/Batch Number	**1R6F**
Matrix	Tobacco blend
Major starting materials	Flue-cured, burley and Oriental tobacco types, reconstituted tobacco sheets, expanded flue-cured, expanded burley, glycerin, Isosweet (sugar), propyl1rne glycol

1R6F Reference Cigarette Certified Values and Uncertainties

Non-intense (ISO 3308:2012) formerly identified as International Organization for Standardization (ISO) Smoking Regime

Parameter	Certified Value	Certified Uncertainty (U_{CRM})	Coverage Factor of U_{CRM}	Unit	Number of accepted data points
Total Particulate Matter (TPM}	9.99	0.78	2.04	mg/cigarette	1080
Tar (Nicotine-free dry particulate matter)	8.58	0.65	1.99	mg/cigarette	1080
CO (Carbon monoxide)	10.1	0.9	2.10	mg/cigarette	1080
Nicotine	0.721	0.103	2.84	mg/cigarette	1080
Puff count	7.53	0.56	2.55	Puff/cigarette	1080
Acetaldehyde	522	71	2.20	µg/cigarette	207
Acrolein	43	14	2.69	µg/cigarette	207
Acrylonitrile	7.0	2.5	3.46	µg/cigarette	207
4-Aminobiphenyl	1.2	0.4	2.85	ng/cigarette	207
1-Aminonaphthalene	14	8	3.50	ng/cigarette	207
2-Aminonaphthalene	8.1	4.7	3.00	ng/cigarette	207
Ammonia	9.0	3.8	2.42	µg/cigarette	207
Benzene	33	8	3.58	µg/cigarette	207
Benzo[a]pyrene	6.8	1.4	2.21	ng/cigarette	207
1,3-Butadiene	38	5	2.27	µg/cigarette	207
Crotonaldehyde	11	2	2.21	µg/cigarette	207
Formaldehyde	27	10	2.75	µg/cigarette	207
Isoprene	320	95	3.38	µg/cigarette	207
NNK (4(methylnitrosamino}-1-(3-pyridyl)-1-butanone)	71	17	3.26	ng/cigarette	207
NNN (N-nitrosonornicotine}	85	8	2.01	ng/cigarette	207
Toluene	53	11	3.71	µg/cigarette	207

Intense (ISO 3308:2012) formerly identified as Health Canada Intense (HCI) Smoking Regime

Parameter	Certified Value	Certified Uncertainty (U_{CRM})	Coverage Factor of U_{CRM}	Unit	Number of accepted data points
Total Particulate Matter (TPM}	46.8	3.5	2.83	mg/cigarette	207
Tar (Nicotine-free dry particulate matter)	29.1	1.9	2.59	mg/cigarette	207
CO (Carbon monoxide)	28.0	2.9	3.39	mg/cigarette	207
Nicotine	1.896	0.130	2.94	mg/cigarette	207
Puff count	8.69	0.37	2.33	Puff/cigarette	207

Acetaldehyde	1552	239	3.66	µg/cigarette	207
Acrolein	154	33	3.43	µg/cigarette	207
Acrylonitrile	24	9	3.59	µg/cigarette	207
4-Aminobiphenyl	2.3	0.9	3.13	ng/cigarette	207
1-Aminonaphthalene	24	13	3.17	ng/cigarette	207
2-Aminonaphthalene	14	8	2.98	ng/cigarette	207
Ammonia	30	5	2.81	µg/cigarette	207
Benzene	88	13	2.88	µg/cigarette	207
Benzo[a]pyrene	15	2	2.62	ng/cigarette	207
1,3-Butadiene	103	10	2.23	µg/cigarette	207
Crotonaldehyde	51	13	3.89	µg/cigarette	207
Formaldehyde	104	34	3.64	µg/cigarette	207
Isoprene	881	286	3.77	µg/cigarette	207
NNK (4(methylnitrosamino}-1-(3-pyridyl)-1-butanone)	187	50	3.86	ng/cigarette	207
NNN (N-nitrosonornicotine}	212	44	2.43	ng/cigarette	207
Toluene	150	34	3.75	µg/cigarette	207

Tobacco Filler

Parameter	Certified Value	Certified Uncertainty (U_{CRM})	Coverage Factor of U_{CRM}	Unit	Number of accepted data points
Ammonia	956	368	4.06	µg/g	207
Arsenic	247	62	2.34	ng/g	182
Cadmium	939	152	3.02	ng/g	206
Total nicotine	17978	1047	2.00	µg/g	207
NNK (4(methylnitrosamino}-1-(3-pyridyl)-1-butanone)	676	387	3.73	ng/g	207
NNN (N-nitrosonornicotine}	2131	424	2.75	ng/g	207

Physical Attributes

Parameter	Certified Value	Certified Uncertainty (U_{CRM})	Coverage Factor of U_{CRM}	Unit	Number of accepted data points
Cigarette circumference	24.6	0.8	3.52	mm	1810
Resistance to draw	107	4	2.00	mm H_2O	1810
Cigarette length	83.0	0.1	2.03	mm	1810
Cigarette mass	0.887	0.019	2.49	g/cigarette	1809
Filter pressure drop	137	4	1.99	mm H_2O	1810
Total ventilation	33	6	2.24	%	1810
Air permeability (cigarette paper)	45	5	1.99	$cm^3(min^{-1} \cdot cm^{-2})$ at 1 kPa	1110
Tobacco filler mass	625	21	1.99	mg/cigarette	1810
Nominal diameter	7.83	0.28	3.52	mm	1370
Filter length	27.0	0.1	2.14	mm	1370
Tobacco filler moisture content	11.27	3.90	4.10	%	207
Tobacco filler pH	5.45	0.27	3.63	pH units	207
Apparent Filter density	0.123	0.005	2.37	g/cm³	1140
Tobacco rod length	56.0	0.1	2.02	mm	1370

CERTIFIED VALUES AND UNCERTAINTIES:

The "Certified Values" listed above are unweighted means of results submitted by three ISO 17025-accredited laboratories using a combination of methods and instrumentation that emulate actual methods and instrumentation techniques currently utilized in the analysis of each parameter in the analytical community. No assumptions were made regarding the accuracy or precision of each laboratory therefore no weighting was done on the results of each lab.

The "Certified Uncertainty", UCRM, listed above are expanded uncertainties intended to provide approximately 95% confidence interval around the respective reference values obtained by multiplying the combined standard uncertainty with a coverage factor k, equal to the t-value based on the approximated degrees of freedom using the Welch-Satterthwaite equation. Each "Certified uncertainty" includes an uncertainty component that accounts for systematic error among the methods used by different laboratories.

The Certified Values and Uncertainties for ISO and HCI smoke parameters contained herein are reflective only of data obtained from a Linear Smoking machine. A systematic review of data reported for the 1R6F Certified Reference Cigarette (proficiency testing results, CORESTA studies

for TSNA, and peer reviewed published data) was conducted in 2023. The results of the review showed no significant differences to the values reported in the Certificate of Analysis 2018-003CTRP.

STATEMENT OF TRACEABILITY:
The traceability of the reference values and uncertainties certified herein are maintained through an unbroken chain of comparisons to appropriate standards with suitable procedures and measurement uncertainties by virtue of the ISO 17025-accreditations possessed by the three participating laboratories. The accredited analytical methods used by participating laboratories are listed below.

LIST OF METHODS USED:
Smoking Regimes, Smoke Parameters and Physical Attributes

ISO smoking regime: Total Particulate Matter (TPM), Puff count - ISO 3308	EQU-037/T-115/ENT 508
HCI smoking regime, Total Particulate Matter (TPM), Puff count	EQU-037/T-115/ENT 508
Tar (Nicotine-free dry particulate matter)- ISO 4387/ ISO 3308/ ISO 4387	AM-008/T-115/ENT 181
Nicotine Mainstream smoke - ISO 10315	AM-001/T-115/ENT 181
Carbon Monoxide in Mainstream smoke - ISO 8454	AM-007 /T-115/ENT 508
Ammonia in Mainstream smoke	AM-011/T-101/ENT 304
Volatiles in Mainstream smoke	AM-015/TMS-00124/ENT 208
Tobacco Specific Nitrosamines {TSNAs) in Mainstream Smoke	AM-020/TMS-00135/ENT 211
Tobacco Specific Nitrosamines (TSNAs) in Tobacco	AM-031/TWT-00333/ENT 210
Polycyclic Aromatic Hydrocarbons (PAHs) in Mainstream Smoke and Sidestream Smoke by GC/MS	AM-044/T-103/ENT 204
Selected Metals in Tobacco	AM-052/T-306
pH of Tobacco by pH Meter/ Moisture and pH For Smokeless Tobacco Products [CDC Version] - FR Vol. 74, No. 4 January 7, 2009/ AOAC 966.02	AM-053 & AM-071/T-130/ENT 046
Carbonyls in Mainstream smoke	AM-076/T-104/ENT 302
Selected Alkaloids in Tobacco (Nicotine)	AM-100/T-301/ENT 182
Ammonia in Tobacco	AM-115/T-302/ENT 332
Polycyclic Aromatic Amines (PAAs) in Mainstream smoke	AM-199/T-102/ENT 213
Air permeability - ISO 2965	AM-057
Physical Properties - ISO 2971, ISO 6565, ISO 9512	AM-009 / ENT 506

INTENDED USE: This product may be used for analytical method development, assigning values to materials (when applicable), and equipment calibration to any applicable extent.

INSTRUCTIONS FOR CORRECT USE: This reference material may be stored at room temperature for a maximum of 10 days prior to conditioning. If this reference material is to be kept for 10 days to 3 months, store in the original packaging or in airtight containers just large enough to contain the sample in a cool dry place (~4°C). If it is to be kept for longer than 3 months, it is recommended that the reference material be stored frozen at, or below, -16 °C until needed. Conditioning of this material should be done following ISO 3402-1:1999. Smoke the reference cigarettes following ISO 3308:2012 "standard" (for the ISO smoking regime) or "Canadian modified" (for the HCI smoking regime). Any cigarettes found to have obvious defects, or which have been damaged during insertion, shall be discarded and replaced with spare, conditioned cigarettes.

HAZARD INFORMATION: N/A

HOMOGENEITY: Homogeneity of this material is reflected as an uncertainty component of "Certified Uncertainty" as indicated in this Certificate of Analysis.

NAMES AND SIGNATURES OF CERTIFYING OFFICERS:

Certificate Approved by:

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