Characterization of Tobacco and Tobacco Smoke

Analytical Test Report



Prepared for *Philip Morris International*

Project Code: NS335-H

Date: September 20, 2016

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2 USE OF LABSTAT'S[1] ANALYTICAL REPORTS

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3 ADMINISTRATIVE INFORMATION

3.1 QUOTATION IDENTIFICATION

Quotation Number: T5680

Date of Quotation: June 24, 2016

Recipient's Name: Cyril Jeannet

3.2 CLIENT IDENTIFICATION

Philip Morris International

Quai Jeanrenaud 56

2000 Neuchatel

Switzerland

4 SAMPLE HANDLING

4.1 CHAIN OF CUSTODY

The samples to be tested for project NS335-H were received on August 18, 2016 via DHL.

4.2 SAMPLE CHARACTERIZATION AND CODING

4.2.1 SAMPLE CHARACTERISTICS

The shipment received on August 18, 2016 consisted of 88 stick packages for each of 3 products and one plastic container for each of 3 products. There was no physical damage to the containers or packages.

4.2.2 SAMPLE IDENTIFICATION

The following sample codes have been used to identify the products associated with the results in each of the tables that are part of this report.

Labstat Sample ID	SMP Description	Batch #	Qty/Type Received	Type of Product	Type of Analysis
1682837	SMP067931	41-2572271	88 packages	sticks	mainstream smoke
1682838	SMP067932	41-2572272	88 packages	sticks	mainstream smoke
1682839	SMP067933	41-2572273	88 packages	sticks	mainstream smoke
1682840	SMP067934	41-2572144	One plastic container	sticks	tobacco constituents
1682841	SMP067935	41-2572144	One plastic container	sticks	tobacco constituents
1682842	SMP067936	41-2572144	One plastic container	sticks	tobacco constituents

4.2.3 PHYSICAL MEASUREMENTS

Physical measurements were performed on the sticks and tobacco rods.

A representative test sample of 10 sticks was selected haphazardly from the client-submitted laboratory sample. The sticks from the test sample went through a physical characterization process, based on 10 observations (1 observation per stick) in which the measurements were recorded to the nearest 0.5mm. The following represents the characteristics which were recorded for this process:

- Total Stick Length (mm)
- Filter Length (mm)
- Overwrap Length (mm)
- Stick Diameter (at 9.0mm from the mouth end)
- Weight of Tobacco (g/unit)

These 10 observations were averaged and recorded to the nearest 0.1mm. The expected measurement variability is mean ± 1mm or mean ± 0.1g, depending on the parameter measured.

For the tobacco rods, the weight of tobacco per rod was measured.

For this project, the variability of the physical parameters measured was within the acceptance limits.

5 PROJECT-SPECIFIC INSTRUCTIONS

5.1 PLATFORM I TESTING

Test sticks were used in conjunction with a “tobacco heating system” by inserting the consumable (test stick) into a cigarette holder (CH). The CH was used in conjunction with a lighter bar to smoke the test sticks. Therefore, the following requirements of the ISO standard (see section 6.2.3) were either not applicable or could not be fulfilled for technical reasons:

- Air velocity control since the consumable is inserted into the CH.
- Butt length requirement since the heating of the consumable has no effect on the consumable length which remains unchanged after smoking.
- There was no ignition of the cigarette by an external lighter.

The use of the CH, in conjunction with the lighter bar for the test samples, required the reference cigarettes to be smoked on an independent run. All reference cigarettes were smoked to the ISO standard requirements for air velocity, butt length and ignition.

5.2 PLATFORM I END POINTS

Test sticks are puffed to a fixed puff number: 6 puffs per stick under ISO standard smoking regime[2] and 12 puffs per stick under Health Canada Intense (HCI) smoking regime[3].

6 EXPERIMENTAL DESIGN AND METHODS

The following is a summary of the instructions that have been received from the client in regard to the smoking and analysis of the tobacco products in this project.

6.1 PREPARATION OF LABORATORY COMPOSITE

A minimum sample size of 100g of tobacco is required for the testing of commercially available products. If this amount is not available, a smaller but adequate amount of sample is prepared for all analytical testing. Tobacco product is ground and sieved to ensure ≤4mm particle size, with analyses such as moisture, pH, nitrate, nitrite, eugenol and menthol being initiated as soon as possible following the preparation of the laboratory composite.

6.2 SAMPLE GENERATION

All tobacco products were conditioned and smoked under the smoking regimes outlined in the following sub-sections.

6.2.1 CIGARETTE BUTT MARKING

Prior to testing, reference cigarettes were marked with the standard butt length as specified in ISO 4387 (2000) *"Cigarettes -- Determination of total and nicotine-free dry particulate matter using a routine analytical smoking machine".* Test cigarettes did not require butt marking since these cigarettes were smoked to a pre-determined puff count (12 puffs for "Canadian Modified" and 6 puffs for "ISO").

6.2.2 CIGARETTE CONDITIONING AND SMOKING ENVIRONMENTS

Cigarettes were conditioned and smoked under the environmental conditions specified in ISO 3402 (1999) *"Tobacco and tobacco products – Atmosphere for conditioning and testing".* With respect to conditioning, this document states "*The conditioning atmosphere shall be as follows: temperature 22 ± 1℃; relative humidity 60 ± 3%*". Smoking requires an environment in which the temperature is 22 ± 2°C and the relative humidity 60 ± 5%.

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[2] ISO 3308:2012: (35.0±0.3)ml puff volume, (60±0.5)s puff frequency, (2.00±0.02)s puff duration, bell-shaped puff profile, no vent blocking

[3] Health Canada Intense: (55.0±0.5)ml puff volume, (30±0.5)s puff frequency, (2.00±0.02)s puff duration, bell-shaped puff profile, no vent blocking; Canadian Tobacco Reporting Regulations: 21 June, 2000, Part 3(6)(b)(iii) - *Canada Gazette Part II, Vol. 134, No. 15*

6.2.3 MACHINE SMOKING CONDITIONS

Smoking of test and reference cigarettes were carried out on either a rotary smoking machine or a linear smoking machine. The smoking parameters and smoking machine specifications which were used are set out in the International Organization for Standardization standard ISO 3308:12, ***Routine analytical cigarette-smoking machine - Definitions and standard conditions*** with modifications as noted in the table below.

The following table is a summary of the smoking parameters that were employed in this project.

Variable	"ISO"	"Canadian Modified"
Puff Volume (ml)	35	55
Interval (sec)	60	30
Duration (sec)	2	2
Vents[4]	"open"	"fully blocked"

Note: Test samples did not have any vent blocking applied. Vent blocking for "Canadian Modified" was only applied to the reference cigarettes.

Mainstream yields (MS) were obtained under "ISO" and "Canadian Modified" conditions (as defined above). Yields obtained using "ISO" smoking parameters are referred to as "standard" (s) and yields obtained using "Canadian Modified" smoking parameters are referred to as "non-standard" (n). Data files ending in (s) or (n) denote results obtained under the various conditions as noted in the previous sentence and in the above table.

6.3 ANALYTICAL METHODS[5]

6.3.1 SMOKE ANALYSIS

Test methods for the analysis of mainstream tobacco smoke are referenced in the table(s) below and were practiced as written unless otherwise indicated (see "Method Modifications").

[4] Health Canada 100% Vent Blocking Method
6(b)(iii) all ventilation holes must be blocked by placing over them a strip of Mylar adhesive tape, Scotch Brand product no. 600 Transparent Tape, and the tape must be cut so that it covers the circumference and is tightly secured from the end of the filter to the tipping overwrap seam, or by another method of equivalent efficiency.

[5] The most current version available at the time of testing was used for all test methods listed.

OFFICIAL METHODS FOR THE COLLECTION OF EMISSION DATA ON MAINSTREAM SMOKE[6]

Item	Emission	Official Method	Method Description
1.	Ammonia	T-101	*Determination of Ammonia in Mainstream Tobacco Smoke*
2.	*(a)* Formaldehyde *(b)* Acetaldehyde *(c)* Acrolein *(d)* Crotonaldehyde	T-104	*Determination of Selected Carbonyls in Mainstream Tobacco Smoke*
3.	*(a)* Tar *(b)* Nicotine *(c)* Carbon Monoxide *(d)* Glycerol	T-115	*Determination of "Tar", Nicotine and Carbon Monoxide in Mainstream Tobacco Smoke*

OTHER METHODS FOR THE COLLECTION OF EMISSION DATA ON MAINSTREAM SMOKE

Item	Emission	Labstat Method	Method Description
1.	Benzo(a)pyrene	TMS-00120	*Determination of Selected Polynuclear Aromatic Hydrocarbons in Mainstream Tobacco Smoke*
2.	*(a)* 1,3-Butadiene *(b)* Isoprene *(c)* Acrylonitrile *(d)* Benzene *(e)* Toluene	TMS-00124	*Determination of Vinyl Chloride, 1,3-Butadiene, Isoprene, Acrylonitrile, Benzene, Toluene, Styrene, and Acetamide in Mainstream Tobacco Smoke (expanded list)*
3.	*(a)* 1- aminonaphthalene *(b)* 2- aminonaphthalene *(c)* 4- aminobiphenyl	TMS-00128	*Determination of Aromatic Amines in Mainstream Tobacco Smoke (expanded list)*
4.	*(a)* *N*-nitrosonornicotine *(b)* 4-(*N*-nitrosomethylamino)-1-(3-pyridyl)-1-butanone	TMS-00135	*Determination of Tobacco Specific Nitrosamines in Mainstream Tobacco Smoke by High-Performance Liquid Chromatography-Tandem Mass Spectrometry*

6.3.2 CONSTITUENT ANALYSIS

Test methods for the analysis of processed tobacco are referenced in the table(s) below and were practiced as written unless otherwise indicated (see "Method Modifications").

[6] Canadian Tobacco Reporting Regulations: 2000-07-19 Canada Gazette Part II, Vol. 134, No. 15 Part 3: Emissions from Designated Tobacco Products. Test method numbers refer to Health Canada methodologies which have been posted by Health Canada on the internet at site http://www.hc-sc.gc.ca/hl-vs/tobac-tabac/legislation/reg/indust/index_e.html

OFFICIAL METHODS FOR THE COLLECTION OF DATA ON CONSTITUENTS[7]

Item	Constituent	Official Method	Method Description
1.	Nicotine	T-301	*Determination of Alkaloids in Whole Tobacco*
2.	Ammonia	T-302	*Determination of Ammonia in Whole Tobacco*
3.	*(a)* Cadmium *(b)* Arsenic	T-306	*Determination of Ni, Pb, Cd, Cr, As, Se and Hg in Whole Tobacco*
4.	Moisture	AOAC 966.02	*Loss on Drying (Moisture) in Tobacco, Gravimetric Method*

OTHER METHODS FOR THE COLLECTION OF DATA ON CONSTITUENTS

Item	Constituent	Labstat Method	Method Description
1.	*(a)* *N*-nitrosonornicotine *(b)* 4-(*N*-nitrosomethylamino)-1 -(3-pyridyl)-1-butanone	TWT-00333	*Determination of Tobacco Specific Nitrosamines in Tobacco Products by Liquid Chromatography-Tandem Mass Spectrometry*

6.3.3 INTERNAL METHOD REFERENCES AND SYNOPSES

6.3.3.1 POLYNUCLEAR AROMATIC HYDROCARBONS (LABSTAT METHOD TMS-00120)

6.3.3.1.1 REFERENCE(S)

G. Gmeiner, G. Stehlkik, H. Tausch, Determination of Seventeen Polycyclic Aromatic Hydrocarbons in Tobacco Smoke Condensate, *J. Chromatogr.* A 767 (1997) 163-169.

TMS-00115 Labstat Test Method: Determination of "Tar", Nicotine and Carbon Monoxide in Mainstream Tobacco Smoke.

6.3.3.1.2 METHOD SYNOPSIS

Ten conditioned sticks (cigarettes) were smoked using a standard rotary smoking machine, onto a conditioned, pre-weighed 92mm glass fiber filter disc (pad). The pad was spiked with internal standards (d12-benzo[a]pyrene, d14-dibenz[a,h]anthracene, d10-anthracene and d10-pyrene) and extracted with 50 mL of methanol. The methanol extracts were filtered through a filter paper. A portion of filtered extract was cleaned up by Solid Phase

[7] Canadian Tobacco Reporting Regulations: 2000-07-19 Canada Gazette Part II, Vol. 134, No. 15 Part 3: Emissions from Designated Tobacco Products. Test method numbers refer to Health Canada methodologies which have been posted by Health Canada on the internet at site http://www.hc-sc.gc.ca/hl-vs/tobac-tabac/legislation/reg/indust/index_e.html

Extraction (SPE) using a RapidTrace SPE Workstation and analyzed by gas chromatography-mass spectrometry for quantification. The mass detector was operated under Selected Ion Monitoring (SIM) mode. The ions of interest (i.e. molecular ions and in some cases specific fragment ions) were mass-selected and used for quantification.

For the analysis of "heat-not-burn" products, five sticks were smoked per port on a standard 20 port linear smoking machine using a 44mm pad instead of a rotary smoking machine. After adding the internal standards solution to the pad, the pad was extracted with 20mL of methanol. The sample was then analyzed by GC/MS as described above.

6.3.3.2 VOLATILE ORGANICS (LABSTAT METHOD TMS-00124)

6.3.3.2.1 REFERENCE(S)

T-116 Health Canada Test Method: Determination of Selected Volatiles (1,3-Butadiene, Isoprene, Acrylonitrile, Benzene and Toluene) in Mainstream Smoke.

Byrd, G.D., K.W. Fowler, R.D. Hicks, M.E. Lovette and M.F. Borgerding (1990). Isotope dilution gas chromatography-mass spectrometry in the determination of benzene, toluene, styrene and acrylonitrile in mainstream cigarette smoke. *J. Chromat.* 503, 359-368.

Brunnemann, K.D., M.R. Kagan, J.E. Cox, and D. Hoffmann (1990). Analysis of 1,3-butadiene and other selected gas phase components in cigarette mainstream and sidestream smoke by gas chromatography-mass selective detection. *Carcinogenesis* 11, 1863-1868.

Brunnemann, K.D., M.R. Kagan, J.E. Cox, and D. Hoffmann (1989). Determination of benzene, toluene and 1,3-butadiene in cigarette smoke by GC-MSD. *Exp. Pathol.* 11, 108-113.

T-115 Health Canada Test Method: Determination of "Tar", Nicotine and Carbon Monoxide in Mainstream Tobacco Smoke.

6.3.3.2.2 METHOD SYNOPSIS

Ten conditioned sticks (cigarettes) were smoked on a standard rotary smoking machine. The mainstream smoke was passed through a conditioned, pre-weighed 92mm glass fiber filter disc (pad) and then into two cryogenic traps placed in series after the pad, each containing 10mL of methanol. An aliquot of the solution from the two traps was spiked with the internal standards (d6-benzene, d8-styrene and d5-pyridine) and analyzed by gas chromatography – mass spectrometry (GC/MS) with ion trap under full scan mode.

A second aliquot of the solution from the two traps was derivatized with 48% hydrobromic acid, then spiked with internal standards (d6-benzene and d4-2-bromoethanol) and analyzed for ethylene oxide via gas chromatography – mass spectrometry (GC/MS) operating under selective ion monitoring (SIM) mode.

For the analysis of "heat-not-burn" products, ten sticks were smoked per port on a standard 20 port linear smoking machine using a 44mm pad instead of a rotary smoking machine. The pad was replaced after five sticks were smoked per port for HCI smoking conditions (two pads per replicate for HCI). Lower calibrations standards were

prepared and analysis of the trapping solution was done by gas chromatography – mass spectrometry (GC/MS) using a single quadrupole mass detector operating under selective ion monitoring (SIM) mode.

The instrument operating parameters are presented in the following table:

GC/MS in SIM mode: Peak Areas Used for Quantification and Qualification

Component	Target (m/z)	Qualifier ion(s) (m/z)	Dwell Time (ms)
1,3-butadiene	53	54, 51	50
Isoprene	67	68, 53	50
Acrylonitrile	52	53	50
Benzene	78	77, 51	50
Toluene	91	92	50
D6-benzene	84		50

6.3.3.3 AROMATIC AMINES (LABSTAT METHOD TMS-00128)

6.3.3.3.1 REFERENCE(S)

Pieraccini, G., F. Luceri, and G. Moneti (1992). New Gas-Chromatographic/Mass-Spectrometric Method for the Quantitative Analysis of Primary Amines in Main- and Sidestream Cigarette Smoke. I. *Rapid Communications in Mass Spectrometry. 6, 406-409.*

TMS-00115 Labstat Test Method: Determination of "Tar", Nicotine and Carbon Monoxide in Mainstream Tobacco Smoke.

6.3.3.3.2 METHOD SYNOPSIS

Ten conditioned sticks (cigarettes) were smoked on a standard rotary smoking machine. The mainstream total particulate matter (TPM) was collected on a conditioned, pre-weighed 92mm glass fiber filter disc (pad). The pad was quartered and extracted with 100mL of 5% hydrochloric acid solution. The extraction flask was shaken for 30 minutes on a wrist-action shaker and the contents filtered into a 500mL separatory funnel. The internal standards (d5-aniline, d9-o-toluidine, d7-o-anisidine, d7-4-aminobiphenyl, d8-benzidine) were spiked into the solution. The filtrate was washed with dichloromethane, made basic with sodium hydroxide solution and extracted with hexane. The hexane extracts were dried with sodium sulphate, derivatized with pentafluoropropionic acid anhydride (PFPA) and trimethylamine, concentrated by rotary evaporation, passed through a florisil column, and quantified using gas chromatography – mass spectrometry (GC/MS) with ion trap under full scan mode.

For the analysis of "heat-not-burn" products, a standard 20 port linear smoking machine and a 44mm pad was used instead of a rotary smoking machine. The 44mm pad was replaced after five sticks were smoked per port for HCI smoking conditions (two pads per replicate for HCI). Lower calibrations standards were prepared with the addition of d7-1-aminonaphthalene, d7-2-aminonaphthalene as internal standards. Quantification was achieved using negative chemical ionization (NCI) gas chromatography – mass spectrometry (GC/MS) operating in selective ion monitoring (SIM) mode.

The instrument operating parameters are presented in the following table:

NCI-GC/MS in SIM mode: Peak Areas Used for Quantification

Component	Retention Time (min)	Target (m/z)	Dwell Time (ms)
1-aminonaphthalene	13.035	269	100
2-aminonaphthalene	13.8	269	100
3-aminobiphenyl	15.601	295	100
4-aminobiphenyl	15.95	295	100
o-toluidine	7.532	233	100
benzidine	19.279	456	100
D7-1-aminonaphthalene	12.997	276	100
D7-2-aminonaphthalene	13.761	275	100
D7-4-aminobiphenyl	15.911	304	100
D9-o-toluidine	7.453	240	100
D8-benzidine	19.268	464	100

6.3.3.4 TOBACCO SPECIFIC NITROSAMINES (LABSTAT METHOD TMS-00135)

6.3.3.4.1 REFERENCE(S)

Wu, W.; Ashley, D. L.; Watson, C. H. Anal. Chem. 2003, 75, 4827-4832.

Wagner, K. A.; Finkel, N. H.; Fossett, J. E.; Gillman, I. G. Anal. Chem. 2005, 77, 1001-1006.

Lee, J-M.; Shin, J-W.; Oh, I-H.; Lee U-C.; Rhee M-S. 2004 CORESTA Congress Kyoto. Paper SS20; full text available on CORESTA CD-ROM Vol. 22; abstract available on the Internet at http://www.coresta.org/Past_Abstracts/Kyoto2004-SmokeTech.pdf (accessed December 29, 2006).

Chwojdak, C. A.; Self, D. A.; Wheeler, H. R. A Collaborative, Harmonized LC-MS/MS Method for the Determination of Tobacco Specific Nitrosamines (TSNA) in Tobacco and Tobacco Related Materials. 61st Tobacco Science Research Conference, Charlotte, NC. USA. September 24, 2007.

NIH Guidelines for the Laboratory Use of Chemical Carcinogens; NIH Publication 81-2385, 1981.

Wu. J.; Joza, P.; Sharifi, M.; Rickert, W. S.; Lauterbach, J. H. Anal. Chem. 2008, 80, 1341-1345.

6.3.3.4.2 METHOD SYNOPSIS

Five conditioned sticks (cigarettes) were smoked per port on a standard 20 port linear smoking machine. The mainstream total particulate matter (TPM) was collected on a conditioned, pre-weighed 44mm glass fiber filter disc (pad). The pad was spiked with a deuterium labeled internal standard solution (containing NNN-d4, NAT-d4, NAB-d4, and NNK-d4) and then extracted with a 100mM ammonium acetate solution. The extract was then filtered and subject to LC-MS/MS analysis with positive electrospray ionization (ESI). Two mass transition pairs for each

analyte can be used to assist analyte confirmation and quantification. The most intense pairs are used for quantification while the less intense transition pairs are used as qualifiers for further compound confirmation.

For the analysis of "heat-not-burn" products, no additional changes to the sample generation, collection or sample preparation of the base method for cigarettes were required.

6.3.3.5 CONSTITUENT TOBACCO SPECIFIC NITROSAMINES (LABSTAT METHOD TWT-00333)

6.3.3.5.1 REFERENCE(S)

Wu, W.; Ashley, D. L.; Watson, C. H. *Anal. Chem*. **2003**, *75*, 4827-4832.

Wagner, K. A.; Finkel, N. H.; Fossett, J. E.; Gillman, I. G. *Anal. Chem.* **2005**, *77*, 1001-1006.

Lee, J-M.; Shin, J-W.; Oh, I-H.; Lee U-C.; Rhee M-S. **2004** CORESTA Congress Kyoto. Paper SS20; full text available on CORESTA CD-ROM Vol. 22; abstract available on the Internet at http://www.coresta.org/Past_Abstracts/Kyoto2004-SmokeTech.pdf (accessed December 29, **2006**).

Chwojdak, C. A.; Self, D. A.; Wheeler, H. R. *A Collaborative, Harmonized LC-MS/MS Method for the Determination of Tobacco Specific Nitrosamines (TSNA) in Tobacco and Tobacco Related Materials.* 61st Tobacco Science Research Conference, Charlotte, NC. USA. September 24, **2007**.

NIH Guidelines for the Laboratory Use of Chemical Carcinogens; NIH Publication 81-2385, **1981**.

Wu. J.; Joza, P.; Sharifi, M.; Rickert, W. S.; Lauterbach, J. H. Anal. Chem. **2008**, 80, 1341-1345.

Nicotine and Total Reducing Sugars", Technicon Industrial Systems Corp., 1025 Busch Parkway, Buffalo Grove, Illinois, USA 60090 - 4516

6.3.3.5.2 METHOD SYNOPSIS

Two (2) grams of tobacco product was ground using a bench-top grinder and a #40 screen (40 sections / square inch). Seven hundred fifty milligrams of ground tobacco product was spiked with the internal standards solution (d4-NNN and d4-NNK) and extracted with 30mL of an aqueous ammonium acetate solution on a wrist action shaker for 30 minutes. The extract was then filtered and subject to LC-MS/MS analysis with positive electrospray ionization (ESI). Two mass transition pairs for each analyte can be used to assist analyte confirmation and quantification. The most intense pairs are used for quantification while the less intense transition pairs are used as qualifiers for further compound confirmation.

6.4 METHOD MODIFICATIONS

6.4.1 CONSTITUENT METALS (HEALTH CANADA METHOD T-306)

For the analysis of the filler from the "heat-not-burn" products, samples were digested using 0.5g of ground, freeze-dried sample, 4mL of nitric acid (Ultrapure Fisher Optima chemical grade) and 2mL of Type I water. An

Ultrawave digestion system was used for the digestion of the samples. This digestion system is a pressure vessel with microwave heating where samples are digested at 230°C and 40bar pressure.

7 ACCEPTANCE OF DATA

7.1 EVALUATION OF RESULTS FROM CONTROL MATERIALS

Data obtained using control materials are deemed acceptable if the data are in keeping with Labstat's database for the control material and the specific method of analysis[8]. This is not a simple problem since there is no "yes" or "no" answer but rather one which is phrased in terms of probabilities. In the approach taken by Labstat, the measure of random variation in the procedure is taken to be the sample standard deviation (S.D. or "s").

To evaluate control data accuracy, a "*Z score*" statistic is determined as follows:

$$Z\text{ - }score = \frac{\text{Sample Average - Historical Average}}{\text{Historical Standard Deviation}}$$

To evaluate control data precision, a "*Chi-square*" statistic is determined as follows:

$$Chi\text{ - }square = (\text{Sample Size - 1}) \times \frac{(\text{Sample Standard Deviation})^2}{(\text{Historical Standard Deviation})^2}$$

P values are generated and the cut-off point (α) chosen in such a way as to minimize the chance of rejecting data which are legitimate members of the set (i.e. type 1 error). Thus, in most cases where the number of observed control samples is greater than or equal to 5, z-score p-values are generated from the Standard Normal distribution.

The standard deviation rather than the standard error for the mean has been chosen when determining the 'Z score'. This allows for both project-to-project variation, which is inherent in the historical data, and the 'normal' run-to-run variability, which is present in the data set. The cut-off point for P values is a matter of judgment and has been set at 0.005 assuming the probability of falsely rejecting a data point is 0.5% (i.e. α=0.01) or less for a two tailed test.

In instances where expected values are not known, a decision to accept the data is made based on observed levels of precision in comparison with that determined for similar analyses. Also, there are circumstances where the expected value may be "Below Detection Limits". In this case the decision to accept or reject the data is made upon the ability of the method to recover the analyte of interest either in the form of a laboratory fortified blank (LFB) or laboratory fortified matrix (LFM). Acceptable recoveries are close to 100%, but vary depending on the analyte.

[8] A minimum of 30 results is normally required for the purpose of this comparison.

7.2 IDENTIFICATION OF OUTLIERS[9]

7.2.1 OUTLIER DEFINITION

An outlying observation, or "outlier," is one that appears to deviate markedly from other members of the sample in which it occurs. In this case, there are two alternatives:

1. An outlying observation may be merely an extreme manifestation of the random variability inherent in the data. If this is true, the value is retained and processed in the same manner as the other observations in the sample.
2. The observation may be the result of gross deviation from prescribed experimental procedure or an error in calculating or recording the numerical value. In such cases, an investigation must be carried out. When the experimenter is clearly aware that a gross deviation from prescribed experimental procedure has taken place, the resultant observation is discarded (assignable cause) without recourse to a statistical test. A statistical test may always be used to support a judgment that a physical reason does actually exist for an outlier, or the statistical criterion may be used routinely as a basis to initiate action to find a physical cause.

7.2.2 STATISTICAL CRITERIA

There are a number of criteria for testing outliers. In all of these, the doubtful observation is included in the calculation of the numerical value of a sample criterion (or statistic) that is then compared with a critical value. The critical value is that which would be exceeded by chance with some specified (small) probability on the assumption that all the observations did indeed constitute a random sample from a single parent population, distribution or universe. The specified small probability is called the "significance level" and can be thought of as the risk of erroneously rejecting a good observation. A level of significance of 0.02 has been chosen in conjunction with the statistical test and tables described in ASTM E178-08[10].

Significant departures from the expected results (i.e. “outliers”) are viewed seriously, requiring an investigation for an assignable cause. This is a documented procedure that, at a minimum, consists of the following steps:

1. Review of all associated calculations to ensure that arithmetic errors have not been made
2. Review of linearity range for any standards
3. Assessment of instrument status
4. Review of reagents, columns, standards etc. to ensure that contamination or decomposition has not occurred
5. Review of sample preparation and handling procedures as they relate to the result in question

[9] The term "outlier" has been defined in International Standard ISO 3534-1:2006 entitled "*Statistics - Vocabulary and symbols - Part 1: General statistical terms and terms used in probability*"

[10] ASTM Designation: E178-08. Standard Practice for Dealing with Outlying Observations

If the outlier is present in the analyte data and an assignable cause is found, the test result is removed from the data set but recorded in the quality control section of the laboratory's record of test results for that project. The analysis must then be repeated. If the outlier is present in the ancillary[11] data and an assignable cause is found, the test result is not removed, but rather the outlying observation is replaced by the designation "AC" (Assignable Cause). If this investigation fails to determine an assignable cause, the test result is assumed to be a legitimate member of the data set and is included in all subsequent calculations.

8 RESULTS

8.1 QUALITY CONTROL

The control results for the variables of interest were acceptable as defined in section 7.1. Consequently it is reasonable to assume that the values determined for the test samples are reflective of the characteristics of the products as received and tested as described in the Analytical Methods section.

8.2 ANALYTICAL DATA

Individual results and the corresponding sample statistics (consisting of means, standard deviations, and coefficients of variation or 95% confidence limits) may be found in the data files, labeled *NS335-H_ms_dataCF.xls, NS335-H_ms_controlsCF.xls, NS335-H_wt_dataCF.xls,* and *NS335-H_wt_controlsCF.xls*, which accompany this report.

8.2.1 SAMPLE STATISTIC CALCULATIONS

In cases where a sample result is below the limit of detection (LOD), the average of the value zero (0) and the LOD is used in the sample statistic calculation. In cases where a sample result is between the LOD and the limit of quantification (LOQ), the average of the LOD and the LOQ is used in the sample statistic calculation.

[11] Data, which are related, but not normally required as part of the reporting process (e.g. puff counts, TPM, cigarette weights etc.). Outliers in the analyte data that have an assignable cause are always repeated.

9 ACCREDITATION

Labstat International ULC has been accredited by the Standards Council of Canada to International Standard ISO/IEC 17025:2005 "*General requirements for the competence of testing and calibration laboratories*" with a scope[12] that includes all of the mandated tobacco-related Health Canada methods (see Tobacco Reporting Regulations dated 26 June 2000, Canada Gazette Part II, Vol. 134, No. 15 Schedules 1, 2 and 3 pages 1780 – 1785). The testing included in this report is within the scope of this accreditation, unless otherwise noted.

Accredited LAB 368

(SCC Accreditation & Design Mark is an Official Mark of the Standards Council of Canada, used under license)

10 AUTHORIZATION

This report has been reviewed by me and is certified, to the best of my knowledge, to be a true and accurate description of the procedures, protocols and test methods used to arrive at the data and/or findings that accompany this report.

Dated: September 20, 2016

Peter Joza,

Director, Science & Technology

Labstat International ULC=

11 APPENDIX A: "RAW" DATA AND SUMMARY STATISTICS: MAINSTREAM SMOKE

[12] Labstat's accreditation scope is available on Standards Council of Canada website at: http://palcan.scc.ca/specs/pdf/180_e.pdf

Labstat Sample ID	SMP Description	Batch #	Qty/Type Received	Type of Product	Type of Analysis
1682837	SMP067931	41-2572271	88 packages	sticks	mainstream smoke
1682838	SMP067932	41-2572272	88 packages	sticks	mainstream smoke
1682839	SMP067933	41-2572273	88 packages	sticks	mainstream smoke

Limits of Detection (LOD) and Limits of Quantification (LOQ) Determined for Selected Mainstream Constituents of Tobacco Smoke

Health Canada Method	Analyte	Units	Mainstream ('ISO')		Mainstream ('Intense')	
			LOD	LOQ	LOD	LOQ
	Ammonia					
T-101	Ammonia	µg/cig	0.184	0.613	0.184	0.613
	Selected Carbonyls					
T-104	Formaldehyde	µg/cig	0.361	1.20	0.361	1.20
T-104	Acetaldehyde	µg/cig	0.973	3.24	0.973	3.24
T-104	Acrolein	µg/cig	0.713	2.38	0.713	2.38
T-104	Crotonaldehyde	µg/cig	0.988	3.29	0.988	3.29
	Tar, Nicotine, and Carbon Monoxide					
T-115	Tar	mg/cig	0.071	0.237	0.071	0.237
T-115	Nicotine	mg/cig	0.001	0.004	0.001	0.004
T-115	CO	mg/cig	0.067	0.223	0.067	0.223
T-115	Water	mg/cig	0.038	0.128	0.038	0.128
T-115	TPM	mg/cig	0.060	0.200	0.060	0.200

Abbreviations: BDL, below detection limit; NQ, below quantitation limit; N/A, not applicable
Date of last review: May 30, 2012

For further information regarding the terms 'ISO' and 'Intense' ('Modified'), please refer to Health Canada's website at: http://www.hc-sc.gc.ca/hl-vs/tobac-tabac/legislation/reg/indust/constitu_e.html

LOD Definition: The limit of detection (LOD) for a particular analyte is a statistically defined decision point that, with a specified probability, measured results falling at or above this point are interpreted to indicate an analyteconcentration greater than zero within the sample.

LOQ Definition: The limit of quantification for a particular analyte is another statistically defined decision point that results falling at or above this point can be assigned a statistically significant numerical value with an associated level of precision. Values falling between the LOD and LOQ are interpreted as a positive but not quantifiable result for the analyte in question.

Limits of Detection (LOD) and Limits of Quantification (LOQ) Determined for

Labstat Method	Analyte	Units	Mainstream ('ISO')		Mainstream ('Intense')	
			LOD	LOQ	LOD	LOQ
PAH						
TMS-00120	Benzo(a)pyrene	ng/cig	0.106	0.354	0.106	0.354

Abbreviations: BDL, below detection limit; NQ, below quantitation limit; N/A, not applicable
Date of last review: May 30, 2012

For further information regarding the terms 'ISO' and 'Intense' ('Modified'), please refer to Health Canada's website at: http://www.hc-sc.gc.ca/hl-vs/tobac-tabac/legislation/reg/indust/constitu_e.html

LOD Definition: The limit of detection (LOD) for a particular analyte is a statistically defined decision point that, with a specified probability, measured results falling at or above this point are interpreted to indicate an analyte concentration greater than zero within the sample.

LOQ Definition: The limit of quanitification for a particular analyte is another statistically defined decision point that results falling at or above this point can be assigned a statistically significant numerical value with an associated level of precision. Values falling between the LOD and LOQ are intrepreted as a positive but not quantifiable result for the analyte in question.

Limits of Detection (LOD) and Limits of Quantification (LOQ) Determined for Selected Mainstream Constituents of Tobacco Smoke

Labstat Method	Analyte	Units	Mainstream ('ISO')		Mainstream ('Intense')	
			LOD	LOQ	LOD	LOQ
	Volatiles (Gas Phase)					
TMS-00124	1,3-butadiene	µg/cig	0.029	0.095	0.029	0.095
TMS-00124	Isoprene	µg/cig	0.041	0.135	0.041	0.135
TMS-00124	Acrylonitrile	µg/cig	0.032	0.107	0.032	0.107
TMS-00124	Benzene	µg/cig	0.017	0.056	0.017	0.056
TMS-00124	Toluene	µg/cig	0.061	0.204	0.061	0.204
	Aromatic Amines (HPHC)					
TMS-00128	1-aminonaphthalene	ng/cig	0.008	0.027	0.008	0.027
TMS-00128	2-aminonaphthalene	ng/cig	0.004	0.012	0.004	0.012
TMS-00128	4-aminobiphenyl	ng/cig	0.001	0.005	0.001	0.005

Abbreviations: BDL, below detection limit; NQ, below quantitation limit; N/A, not applicable
Date of last review: May 30, 2012

For further information regarding the terms 'ISO' and 'Intense' ('Modified'), please refer to Health Canada's website at: http://www.hc-sc.gc.ca/hl-vs/tobac-tabac/legislation/reg/indust/constitu_e.html

LOD Definition: The limit of detection (LOD) for a particular analyte is a statistically defined decision point that, with a specified probability, measured results falling at or above this point are interpreted to indicate an analyte concentration greater than zero within the sample.

LOQ Definition: The limit of quantification for a particular analyte is another statistically defined decision point that results falling at or above this point can be assigned a statistically significant numerical value with an associated level of precision. Values falling between the LOD and LOQ are interpreted as a positive but not quantifiable result for the analyte in question.

Limits of Detection (LOD) and Limits of Quantification (LOQ) Determined for Selected Mainstream Constituents of Tobacco Smoke

Labstat Method	Analyte	Units	Mainstream ('ISO')		Mainstream ('Intense')	
			LOD	LOQ	LOD	LOQ
	Triacetin, Humectants, Menthol					
T-115*/TMS-00115a	Glycerol	mg/cig	0.014	0.048	0.014	0.048
	Tobacco Specific Nitrosamines (LC-MS/MS)					
TMS-00135	Nitrosonornicotine (NNN)	ng/cig	0.098	0.328	0.098	0.328
TMS-00135	4-(N-nitrosomethylamino)-1-(3-pyridyl)-1-butanone (NNK)	ng/cig	0.151	0.502	0.151	0.502

Abbreviations: BDL, below detection limit; NQ, below quantitation limit; N/A, not applicable
Date of last review: May 01, 2013

For further information regarding the terms 'ISO' and 'Intense' ('Modified'), please refer to Health Canada's website at: http://www.hc-sc.gc.ca/hl-vs/tobac-tabac/legislation/reg/indust/constitu_e.html

LOD Definition: The limit of detection (LOD) for a particular analyte is a statistically defined decision point that, with a specified probability, measured results falling at or above this point are interpreted to indicate an analyte concentration greater than zero within the sample.

LOQ Definition: The limit of quantification for a particular analyte is another statistically defined decision point that results falling at or above this point can be assigned a statistically significant numerical value with an associated level of precision. Values falling between the LOD and LOQ are interpreted as a positive but not quantifiable result for the analyte in question.

* Methods have been modified from the standard methods.

Weight of Tobacco in Bidi, Cigarette, Cigar, Tobacco Stick or Kretek Samples (milligrams of tobacco per unit 'as received')*

	Sample ID		
Obs.	1682837	1682838	1682839
1	287.4	292.0	301.3
2	280.5	279.2	292.3
3	291.5	280.1	293.6
4	294.1	296.0	284.2
5	290.4	281.1	308.2
6	298.0	283.5	316.0
7	303.1	309.7	301.8
8	300.0	285.2	286.0
9	315.4	300.0	313.4
10	296.1	291.9	311.0
Average	295.7	289.9	300.8
Std. Dev	9.5	9.9	11.4
L. Limit (95%)	288.8	282.8	292.6
U. Limit (95%)	302.5	297.0	308.9

Weight of Tobacco in Bidi, Cigarette, Cigar, Tobacco Stick or Kretek Samples (milligrams of tobacco per unit 'dry weight')**

Sample ID	Tobacco Weight (mg/unit)	Dry Matter (%)	Tobacco Weight (mg/unit) 'dry weight'
1682837	295.7	n/a	n/a
1682838	289.9	n/a	n/a
1682839	300.8	n/a	n/a

* as required in part 3, section 14 (2)c of the Canadian Tobacco Reporting Regulations

** as required in part 2, section 12 (6) and 12 (7)ci. of the Canadian Tobacco Reporting Regulations

n/a: not applicable

Smoke Constituent	Matrix Code / Sample ID / Condition / Unit	MS 1682837 S Average	MS 1682837 S Std. Dev.	MS 1682837 S L. Limit (95%)	MS 1682837 S U. Limit (95%)	MS 1682837 N Average	MS 1682837 N Std. Dev.	MS 1682837 N L. Limit (95%)	MS 1682837 N U. Limit (95%)
Ammonia									
Ammonia	[µg/cig]	2.71	0.77	2.01	3.42	12.0	0.9	11.1	12.8
Selected Carbonyls									
Formaldehyde	[µg/cig]	7.50	0.39	7.14	7.85	9.84	0.99	8.92	10.8
Acetaldehyde	[µg/cig]	150	11	140	160	202	12	191	213
Acrolein	[µg/cig]	5.10	0.47	4.66	5.53	9.83	1.13	8.79	10.9
Crotonaldehyde	[µg/cig]	NQ	NQ	N/A	N/A	NQ	NQ	N/A	N/A
Tar, Nicotine, and Carbon Monoxide									
CO	[mg/cig]	NQ	NQ	N/A	N/A	0.476	0.018	0.468	0.484
Nicotine	[mg/cig]	0.463	0.030	0.449	0.477	1.25	0.06	1.22	1.28
Tar	[mg/cig]	11.9	0.8	11.5	12.2	23.8	2.0	22.9	24.7
Triacetin, Humectants, Menthol									
Glycerol	[mg/cig]	1.78	0.14	1.71	1.85	4.38	0.30	4.25	4.52
PAH									
Benzo(a)pyrene	[ng/cig]	NQ	NQ	N/A	N/A	0.553	0.112	0.450	0.656
Volatiles (Gas Phase)									
1,3-butadiene	[µg/cig]	0.120	0.045	0.079	0.162	0.212	0.061	0.155	0.269
Isoprene	[µg/cig]	1.05	0.39	0.685	1.41	1.74	0.58	1.20	2.27
Acrylonitrile	[µg/cig]	BDL	BDL	N/A	N/A	0.120	0.039	0.084	0.156
Benzene	[µg/cig]	0.194	0.038	0.158	0.229	0.473	0.075	0.404	0.542
Toluene	[µg/cig]	0.655	0.243	0.430	0.880	1.48	0.23	1.26	1.69
Aromatic Amines (HPHC)									
1-aminonaphthalene	[ng/cig]	NQ	NQ	N/A	N/A	NQ	NQ	N/A	N/A
2-aminonaphthalene	[ng/cig]	0.022	0.023	0.001	0.043	0.017	0.007	0.010	0.024
4-aminobiphenyl	[ng/cig]	0.006	0.004	0.002	0.010	0.009	0.005	0.005	0.014
Tobacco Specific Nitrosamines (LC-MS/MS)									
Nitrosonornicotine (NNN)	[ng/cig]	3.03	0.23	2.82	3.24	7.44	0.38	7.09	7.79
4-(N-nitrosomethylamino)-1-(3-pyridyl)-1-butanone (NNK)	[ng/cig]	1.83	0.32	1.54	2.12	5.67	0.55	5.16	6.19

Glossary of Abbreviations

Condition:

S: puff volume, 35mL; interval, 60 sec; duration, 2 sec; vent blocking, none.

N: puff volume, 55mL; interval, 30 sec; duration, 2 sec; vent blocking, 100%.

BDL: Below the Limit of Detection

NQ: Below the Limit of Quantification

N/A: Not Applicable

L. Limit (95%): lower limit of the 95% confidence interval

U. Limit (95%): upper limit of the 95% confidence interval

Smoke Constituent	Matrix Code Sample ID Condition Unit	MS 1682838 S Average	MS 1682838 S Std. Dev.	MS 1682838 S L. Limit (95%)	MS 1682838 S U. Limit (95%)	MS 1682838 N Average	MS 1682838 N Std. Dev.	MS 1682838 N L. Limit (95%)	MS 1682838 N U. Limit (95%)
Ammonia									
Ammonia	[µg/cig]	3.08	0.93	2.22	3.94	11.3	1.0	10.4	12.2
Selected Carbonyls									
Formaldehyde	[µg/cig]	7.47	0.39	7.11	7.83	10.5	0.9	9.68	11.3
Acetaldehyde	[µg/cig]	151	7	144	157	212	10	203	222
Acrolein	[µg/cig]	5.13	0.33	4.83	5.43	10.6	0.8	9.85	11.3
Crotonaldehyde	[µg/cig]	NQ	NQ	N/A	N/A	NQ	NQ	N/A	N/A
Tar, Nicotine, and Carbon Monoxide									
CO	[mg/cig]	NQ	NQ	N/A	N/A	0.480	0.000	0.480	0.480
Nicotine	[mg/cig]	0.465	0.027	0.453	0.478	1.30	0.05	1.27	1.32
Tar	[mg/cig]	11.8	0.7	11.5	12.1	24.9	1.2	24.3	25.4
Triacetin, Humectants, Menthol									
Glycerol	[mg/cig]	1.83	0.13	1.77	1.89	4.57	0.23	4.46	4.68
PAH									
Benzo(a)pyrene	[ng/cig]	NQ	NQ	N/A	N/A	0.544	0.029	0.517	0.571
Volatiles (Gas Phase)									
1,3-butadiene	[µg/cig]	0.114	0.044	0.073	0.154	0.204	0.017	0.189	0.220
Isoprene	[µg/cig]	0.943	0.141	0.812	1.07	1.90	0.44	1.49	2.31
Acrylonitrile	[µg/cig]	NQ	NQ	N/A	N/A	0.150	0.050	0.104	0.196
Benzene	[µg/cig]	0.224	0.051	0.177	0.271	0.473	0.033	0.442	0.503
Toluene	[µg/cig]	0.926	0.306	0.643	1.21	1.36	0.20	1.18	1.54
Aromatic Amines (HPHC)									
1-aminonaphthalene	[ng/cig]	NQ	NQ	N/A	N/A	0.029	0.005	0.024	0.034
2-aminonaphthalene	[ng/cig]	0.020	0.010	0.011	0.030	0.017	0.003	0.014	0.019
4-aminobiphenyl	[ng/cig]	0.008	0.004	0.004	0.012	0.009	0.002	0.007	0.011
Tobacco Specific Nitrosamines (LC-MS/MS)									
Nitrosonornicotine (NNN)	[ng/cig]	3.02	0.27	2.76	3.27	8.69	0.52	8.20	9.17
4-(N-nitrosomethylamino)-1-(3-pyridyl)-1-butanone (NNK)	[ng/cig]	1.61	0.29	1.34	1.87	6.22	0.55	5.71	6.72

Glossary of Abbreviations

Condition:
S: puff volume, 35mL; interval, 60 sec; duration, 2 sec; vent blocking, none.
N: puff volume, 55mL; interval, 30 sec; duration, 2 sec; vent blocking, 100%.
BDL: Below the Limit of Detection
NQ: Below the Limit of Quantification
N/A: Not Applicable
L. Limit (95%): lower limit of the 95% confidence interval
U. Limit (95%): upper limit of the 95% confidence interval

Smoke Constituent	Matrix Code / Sample ID / Condition / Unit	MS 1682839 S Average	MS 1682839 S Std. Dev.	MS 1682839 S L. Limit (95%)	MS 1682839 S U. Limit (95%)	MS 1682839 N Average	MS 1682839 N Std. Dev.	MS 1682839 N L. Limit (95%)	MS 1682839 N U. Limit (95%)
Ammonia									
Ammonia	[µg/cig]	2.09	0.40	1.72	2.46	11.3	1.5	9.87	12.7
Selected Carbonyls									
Formaldehyde	[µg/cig]	7.23	0.57	6.71	7.76	10.2	0.7	9.53	10.9
Acetaldehyde	[µg/cig]	149	6	143	155	213	9	205	221
Acrolein	[µg/cig]	4.95	0.37	4.61	5.29	10.7	0.6	10.1	11.2
Crotonaldehyde	[µg/cig]	NQ	NQ	N/A	N/A	NQ	NQ	N/A	N/A
Tar, Nicotine, and Carbon Monoxide									
CO	[mg/cig]	NQ	NQ	N/A	N/A	0.480	0.026	0.468	0.492
Nicotine	[mg/cig]	0.474	0.026	0.462	0.486	1.28	0.07	1.25	1.32
Tar	[mg/cig]	11.7	0.7	11.4	12.1	24.5	1.1	23.9	25.0
Triacetin, Humectants, Menthol									
Glycerol	[mg/cig]	1.82	0.13	1.76	1.88	4.52	0.28	4.39	4.65
PAH									
Benzo(a)pyrene	[ng/cig]	NQ	NQ	N/A	N/A	0.514	0.064	0.455	0.573
Volatiles (Gas Phase)									
1,3-butadiene	[µg/cig]	0.141	0.056	0.090	0.193	0.225	0.071	0.160	0.291
Isoprene	[µg/cig]	1.17	0.28	0.914	1.43	1.63	0.44	1.22	2.04
Acrylonitrile	[µg/cig]	BDL	BDL	N/A	N/A	0.122	0.062	0.064	0.179
Benzene	[µg/cig]	0.193	0.038	0.158	0.229	0.491	0.035	0.459	0.524
Toluene	[µg/cig]	0.686	0.245	0.460	0.913	1.35	0.30	1.07	1.62
Aromatic Amines (HPHC)									
1-aminonaphthalene	[ng/cig]	0.030	0.015	0.016	0.043	0.029	0.010	0.020	0.039
2-aminonaphthalene	[ng/cig]	0.025	0.021	0.005	0.045	0.018	0.007	0.012	0.025
4-aminobiphenyl	[ng/cig]	0.006	0.004	0.003	0.010	0.009	0.002	0.007	0.010
Tobacco Specific Nitrosamines (LC-MS/MS)									
Nitrosonornicotine (NNN)	[ng/cig]	3.20	0.27	2.95	3.46	7.74	0.49	7.28	8.19
4-(N-nitrosomethylamino)-1-(3-pyridyl)-1-butanone (NNK)	[ng/cig]	1.69	0.20	1.51	1.88	5.73	0.54	5.23	6.22

Glossary of Abbreviations

Condition:
S: puff volume, 35mL; interval, 60 sec; duration, 2 sec; vent blocking, none.
N: puff volume, 55mL; interval, 30 sec; duration, 2 sec; vent blocking, 100%.
BDL: Below the Limit of Detection
NQ: Below the Limit of Quantification
N/A: Not Applicable
L. Limit (95%): lower limit of the 95% confidence interval
U. Limit (95%): upper limit of the 95% confidence interval

AEROSOL (ISO REGIMEN) REPORT WORKSHEET (1682837)

HPHC Name	CAS Code	FDA UNII Code	Smoking Machine	Number of Cigarettes per Smoke Trap	Number of Smoke Traps per Replicate	Number of Replicate Measurements	Test Start Date	Test End Date
Acetaldehyde	75-07-0	GO1N1ZPR3B	Linear	2	1	7	2016-08-30	2016-09-01
Acrolein	107-02-8	7864XYD3JJ	Linear	2	1	7	2016-08-30	2016-09-01
Acrylonitrile	107-13-1	MP1U0D42PE	Linear	10	1	7	2016-08-30	2016-09-14
4-Aminobiphenyl	92-67-1	16054949HJ	Linear	10	1	7	2016-08-30	2016-09-06
1-Aminonaphthalene	134-32-7	9753I242R5	Linear	10	1	7	2016-08-30	2016-09-06
2-Aminonaphthalene	91-59-8	CKR7XL41N4	Linear	10	1	7	2016-08-30	2016-09-06
Ammonia	7664-41-7	5138Q19F1X	Linear	5	1	7	2016-08-31	2016-09-03
Benzene	71-43-2	J64922108F	Linear	10	1	7	2016-08-30	2016-09-14
Benzo[a]pyrene	50-32-8	3417WMA06D	Linear	5	1	7	2016-08-31	2016-09-13
1,3-Butadiene	106-99-0	JSD5FGP5VD	Linear	10	1	7	2016-08-30	2016-09-14
Carbon monoxide	630-08-0	7U1EE4V452	Linear	5	1	20	2016-09-02	2016-09-14
Crotonaldehyde	4170-30-3	9G72074TUW	Linear	2	1	7	2016-08-30	2016-09-01
Formaldehyde	50-00-0	1HG84L3525	Linear	2	1	7	2016-08-30	2016-09-01
Isoprene	78-79-5	0A62964IBU	Linear	10	1	7	2016-08-30	2016-09-14
Nicotine (total)	54-11-5	6M3C89ZY6R	Linear	5	1	20	2016-09-02	2016-09-14
4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK)	64091-91-4	7S395EDO61	Linear	5	1	7	2016-09-02	2016-09-07
N-nitrosonornicotine (NNN)	16543-55-8	X656TZ86DX	Linear	5	1	7	2016-09-02	2016-09-07
Toluene	108-88-3	3FPU23BG52	Linear	10	1	7	2016-08-30	2016-09-14

HPHC Name	Method of Extraction	Method of Separation	If "Other" Method of Separation, Specify	Method of Detection	If "Other" Method of Detection, Specify
Acetaldehyde	Health Canada Method T-104; 12mM acidified DNPH in acetonitrile trap	HPLC	Not Applicable	UVD	Not Applicable
Acrolein	Health Canada Method T-104; 12mM acidified DNPH in acetonitrile trap	HPLC	Not Applicable	UVD	Not Applicable
Acrylonitrile	Health Canada Method T-116; Gas phase collected into cryogenic methanol trap	GC	Not Applicable	MSD	Not Applicable
4-Aminobiphenyl	NS235_Report.pdf Section 6.3.3.2; Extract in 5% HCl, 30 min.	GC	Not Applicable	MSD	Not Applicable
1-Aminonaphthalene	NS235_Report.pdf Section 6.3.3.2; Extract in 5% HCl, 30 min.	GC	Not Applicable	MSD	Not Applicable
2-Aminonaphthalene	NS235_Report.pdf Section 6.3.3.2; Extract in 5% HCl, 30 min.	GC	Not Applicable	MSD	Not Applicable
Ammonia	Health Canada Method T-101; Extract with 0.05N H2SO4, 30 min.	IC	Not Applicable	Other	CD: Conductivity detection
Benzene	Health Canada Method T-116; Gas phase collected into cryogenic methanol trap	GC	Not Applicable	MSD	Not Applicable
Benzo[a]pyrene	NS235_Report.pdf Section 6.3.3.1; methanol, shake 30 min + sonicate 15 min.	GC	Not Applicable	MSD	Not Applicable
1,3-Butadiene	Health Canada Method T-116; Gas phase collected into cryogenic methanol trap	GC	Not Applicable	MSD	Not Applicable
Carbon monoxide	Health Canada Method T-115 (ISO 4387, 8454); direct vapour phase collection	Not Applicable	Not Applicable	NDIR	Not Applicable
Crotonaldehyde	Health Canada Method T-104; 12mM acidified DNPH in acetonitrile trap	HPLC	Not Applicable	UVD	Not Applicable
Formaldehyde	Health Canada Method T-104; 12mM acidified DNPH in acetonitrile trap	HPLC	Not Applicable	UVD	Not Applicable
Isoprene	Health Canada Method T-116; Gas phase collected into cryogenic methanol trap	GC	Not Applicable	MSD	Not Applicable
Nicotine (total)	Health Canada Method T-115 (ISO 4387, 10315); isopropanol, 45 min.	GC	Not Applicable	FID	Not Applicable
4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK)	NS235_Report.pdf Section 6.3.3.3; Extract in 100 mM ammonium acetate, 30 min.	HPLC	Not Applicable	MSMS	Not Applicable
N-nitrosonornicotine (NNN)	NS235_Report.pdf Section 6.3.3.3; Extract in 100 mM ammonium acetate, 30 min.	HPLC	Not Applicable	MSMS	Not Applicable
Toluene	Health Canada Method T-116; Gas phase collected into cryogenic methanol trap	GC	Not Applicable	MSD	Not Applicable

HPHC Name	Mean Quantity of HPHC per Cigarette	Variance of Mean HPHC Quantity	Type of Variance	Unit of Measurement - Mean & Variance	If "Other" Unit of Measurement Mean & Variance, Specify
Acetaldehyde	149.986	11.088	standard deviation	µg/cig	Not Applicable
Acrolein	5.097	0.472	standard deviation	µg/cig	Not Applicable
Acrylonitrile	0.000	Not Applicable	Not Applicable	Not Applicable	Not Applicable
4-Aminobiphenyl	0.006	0.004	Not Applicable	Not Applicable	Not Applicable
1-Aminonaphthalene	0.000	Not Applicable	Not Applicable	Not Applicable	Not Applicable
2-Aminonaphthalene	0.022	0.023	Not Applicable	Not Applicable	Not Applicable
Ammonia	2.713	0.765	standard deviation	µg/cig	Not Applicable
Benzene	0.194	0.038	standard deviation	µg/cig	Not Applicable
Benzo[a]pyrene	0.000	Not Applicable	Not Applicable	Not Applicable	Not Applicable
1,3-Butadiene	0.120	0.045	Not Applicable	Not Applicable	Not Applicable
Carbon monoxide	0.000	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Crotonaldehyde	0.000	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Formaldehyde	7.495	0.388	standard deviation	µg/cig	Not Applicable
Isoprene	1.049	0.393	standard deviation	µg/cig	Not Applicable
Nicotine (total)	0.463	0.030	standard deviation	mg/cig	Not Applicable
4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK)	1.830	0.318	standard deviation	ng/cig	Not Applicable
N-nitrosonornicotine (NNN)	3.031	0.226	standard deviation	ng/cig	Not Applicable
Toluene	0.655	0.243	standard deviation	µg/cig	Not Applicable

AEROSOL REPORT (INTENSE REGIMEN) WORKSHEET (1682837)

HPHC Name	CAS Code	FDA UNII Code	Smoking Machine	Number of Cigarettes per Smoke Trap	Number of Smoke Traps per Replicate	Number of Replicate Measurements	Test Start Date	Test End Date
Acetaldehyde	75-07-0	GO1N1ZPR3B	Linear	2	1	7	2016-08-28	2016-08-31
Acrolein	107-02-8	7864XYD3JJ	Linear	2	1	7	2016-08-28	2016-08-31
Acrylonitrile	107-13-1	MP1U0D42PE	Linear	10	1	7	2016-08-29	2016-09-14
4-Aminobiphenyl	92-67-1	16054949HJ	Linear	10	1	7	2016-08-29	2016-09-13
1-Aminonaphthalene	134-32-7	9753I242R5	Linear	10	1	7	2016-08-29	2016-09-13
2-Aminonaphthalene	91-59-8	CKR7XL41N4	Linear	10	1	7	2016-08-29	2016-09-13
Ammonia	7664-41-7	5138Q19F1X	Linear	5	1	7	2016-09-01	2016-09-07
Benzene	71-43-2	J64922108F	Linear	10	1	7	2016-08-29	2016-09-14
Benzo[a]pyrene	50-32-8	3417WMA06D	Linear	5	1	7	2016-08-29	2016-09-13
1,3-Butadiene	106-99-0	JSD5FGP5VD	Linear	10	1	7	2016-08-29	2016-09-14
Carbon monoxide	630-08-0	7U1EE4V452	Linear	5	1	20	2016-09-01	2016-09-19
Crotonaldehyde	4170-30-3	9G72074TUW	Linear	2	1	7	2016-08-28	2016-08-31
Formaldehyde	50-00-0	1HG84L3525	Linear	2	1	7	2016-08-28	2016-08-31
Isoprene	78-79-5	0A62964IBU	Linear	10	1	7	2016-08-29	2016-09-14
Nicotine (total)	54-11-5	6M3C89ZY6R	Linear	5	1	20	2016-09-01	2016-09-19
4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK)	64091-91-4	7S395EDO61	Linear	5	1	7	2016-08-31	2016-09-07
N-nitrosonornicotine (NNN)	16543-55-8	X656TZ86DX	Linear	5	1	7	2016-08-31	2016-09-07
Toluene	108-88-3	3FPU23BG52	Linear	10	1	7	2016-08-29	2016-09-14

HPHC Name	Method of Extraction	Method of Separation	If "Other" Method of Separation, Specify	Method of Detection	If "Other" Method of Detection, Specify
Acetaldehyde	Health Canada Method T-104; 12mM acidified DNPH in acetonitrile trap	HPLC	Not Applicable	UVD	Not Applicable
Acrolein	Health Canada Method T-104; 12mM acidified DNPH in acetonitrile trap	HPLC	Not Applicable	UVD	Not Applicable
Acrylonitrile	Health Canada Method T-116; Gas phase collected into cryogenic methanol trap	GC	Not Applicable	MSD	Not Applicable
4-Aminobiphenyl	NS235_Report.pdf Section 6.3.3.2; Extract in 5% HCl, 30 min.	GC	Not Applicable	MSD	Not Applicable
1-Aminonaphthalene	NS235_Report.pdf Section 6.3.3.2; Extract in 5% HCl, 30 min.	GC	Not Applicable	MSD	Not Applicable
2-Aminonaphthalene	NS235_Report.pdf Section 6.3.3.2; Extract in 5% HCl, 30 min.	GC	Not Applicable	MSD	Not Applicable
Ammonia	Health Canada Method T-101; Extract with 0.05N H2SO4, 30 min.	IC	Not Applicable	Other	CD: Conductivity detection
Benzene	Health Canada Method T-116; Gas phase collected into cryogenic methanol trap	GC	Not Applicable	MSD	Not Applicable
Benzo[a]pyrene	NS235_Report.pdf Section 6.3.3.1; methanol, shake 30 min + sonicate 15 min.	GC	Not Applicable	MSD	Not Applicable
1,3-Butadiene	Health Canada Method T-116; Gas phase collected into cryogenic methanol trap	GC	Not Applicable	MSD	Not Applicable
Carbon monoxide	Health Canada Method T-115 (ISO 4387, 8454); direct vapour phase collection	Not Applicable	Not Applicable	NDIR	Not Applicable
Crotonaldehyde	Health Canada Method T-104; 12mM acidified DNPH in acetonitrile trap	HPLC	Not Applicable	UVD	Not Applicable
Formaldehyde	Health Canada Method T-104; 12mM acidified DNPH in acetonitrile trap	HPLC	Not Applicable	UVD	Not Applicable
Isoprene	Health Canada Method T-116; Gas phase collected into cryogenic methanol trap	GC	Not Applicable	MSD	Not Applicable
Nicotine (total)	Health Canada Method T-115 (ISO 4387, 10315); isopropanol, 45 min.	GC	Not Applicable	FID	Not Applicable
4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK)	NS235_Report.pdf Section 6.3.3.3; Extract in 100 mM ammonium acetate, 30 min.	HPLC	Not Applicable	MSMS	Not Applicable
N-nitrosonornicotine (NNN)	NS235_Report.pdf Section 6.3.3.3; Extract in 100 mM ammonium acetate, 30 min.	HPLC	Not Applicable	MSMS	Not Applicable
Toluene	Health Canada Method T-116; Gas phase collected into cryogenic methanol trap	GC	Not Applicable	MSD	Not Applicable

HPHC Name	Mean Quantity of HPHC per Cigarette	Variance of Mean HPHC Quantity	Type of Variance	Unit of Measurement - Mean & Variance	If "Other" Unit of Measurement Mean & Variance, Specify
Acetaldehyde	202.264	12.032	standard deviation	µg/cig	Not Applicable
Acrolein	9.830	1.130	standard deviation	µg/cig	Not Applicable
Acrylonitrile	0.120	0.039	standard deviation	µg/cig	Not Applicable
4-Aminobiphenyl	0.009	0.005	standard deviation	ng/cig	Not Applicable
1-Aminonaphthalene	0.000	Not Applicable	standard deviation	ng/cig	Not Applicable
2-Aminonaphthalene	0.017	0.007	standard deviation	ng/cig	Not Applicable
Ammonia	11.963	0.887	standard deviation	µg/cig	Not Applicable
Benzene	0.473	0.075	standard deviation	µg/cig	Not Applicable
Benzo[a]pyrene	0.553	0.112	standard deviation	ng/cig	Not Applicable
1,3-Butadiene	0.212	0.061	standard deviation	µg/cig	Not Applicable
Carbon monoxide	0.476	0.018	standard deviation	mg/cig	Not Applicable
Crotonaldehyde	0.000	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Formaldehyde	9.836	0.993	standard deviation	µg/cig	Not Applicable
Isoprene	1.737	0.579	standard deviation	µg/cig	Not Applicable
Nicotine (total)	1.252	0.058	standard deviation	mg/cig	Not Applicable
4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK)	5.674	0.555	standard deviation	ng/cig	Not Applicable
N-nitrosonornicotine (NNN)	7.440	0.381	standard deviation	ng/cig	Not Applicable
Toluene	1.477	0.232	standard deviation	µg/cig	Not Applicable

AEROSOL (ISO REGIMEN) REPORT WORKSHEET (1682838)

HPHC Name	CAS Code	FDA UNII Code	Smoking Machine	Number of Cigarettes per Smoke Trap	Number of Smoke Traps per Replicate	Number of Replicate Measurements	Test Start Date	Test End Date
Acetaldehyde	75-07-0	GO1N1ZPR3B	Linear	2	1	7	2016-08-30	2016-09-01
Acrolein	107-02-8	7864XYD3JJ	Linear	2	1	7	2016-08-30	2016-09-01
Acrylonitrile	107-13-1	MP1U0D42PE	Linear	10	1	7	2016-08-30	2016-09-14
4-Aminobiphenyl	92-67-1	16054949HJ	Linear	10	1	7	2016-08-30	2016-09-06
1-Aminonaphthalene	134-32-7	9753I242R5	Linear	10	1	7	2016-08-30	2016-09-06
2-Aminonaphthalene	91-59-8	CKR7XL41N4	Linear	10	1	7	2016-08-30	2016-09-06
Ammonia	7664-41-7	5138Q19F1X	Linear	5	1	7	2016-08-31	2016-09-03
Benzene	71-43-2	J64922108F	Linear	10	1	7	2016-08-30	2016-09-14
Benzo[a]pyrene	50-32-8	3417WMA06D	Linear	5	1	7	2016-08-31	2016-09-13
1,3-Butadiene	106-99-0	JSD5FGP5VD	Linear	10	1	7	2016-08-30	2016-09-14
Carbon monoxide	630-08-0	7U1EE4V452	Linear	5	1	20	2016-09-02	2016-09-14
Crotonaldehyde	4170-30-3	9G72074TUW	Linear	2	1	7	2016-08-30	2016-09-01
Formaldehyde	50-00-0	1HG84L3525	Linear	2	1	7	2016-08-30	2016-09-01
Isoprene	78-79-5	0A62964IBU	Linear	10	1	7	2016-08-30	2016-09-14
Nicotine (total)	54-11-5	6M3C89ZY6R	Linear	5	1	20	2016-09-02	2016-09-14
4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK)	64091-91-4	7S395EDO61	Linear	5	1	7	2016-09-02	2016-09-07
N-nitrosonornicotine (NNN)	16543-55-8	X656TZ86DX	Linear	5	1	7	2016-09-02	2016-09-07
Toluene	108-88-3	3FPU23BG52	Linear	10	1	7	2016-08-30	2016-09-14

HPHC Name	Method of Extraction	Method of Separation	If "Other" Method of Separation, Specify	Method of Detection	If "Other" Method of Detection, Specify
Acetaldehyde	Health Canada Method T-104; 12mM acidified DNPH in acetonitrile trap	HPLC	Not Applicable	UVD	Not Applicable
Acrolein	Health Canada Method T-104; 12mM acidified DNPH in acetonitrile trap	HPLC	Not Applicable	UVD	Not Applicable
Acrylonitrile	Health Canada Method T-116; Gas phase collected into cryogenic methanol trap	GC	Not Applicable	MSD	Not Applicable
4-Aminobiphenyl	NS235_Report.pdf Section 6.3.3.2; Extract in 5% HCl, 30 min.	GC	Not Applicable	MSD	Not Applicable
1-Aminonaphthalene	NS235_Report.pdf Section 6.3.3.2; Extract in 5% HCl, 30 min.	GC	Not Applicable	MSD	Not Applicable
2-Aminonaphthalene	NS235_Report.pdf Section 6.3.3.2; Extract in 5% HCl, 30 min.	GC	Not Applicable	MSD	Not Applicable
Ammonia	Health Canada Method T-101; Extract with 0.05N H2SO4, 30 min.	IC	Not Applicable	Other	CD: Conductivity detection
Benzene	Health Canada Method T-116; Gas phase collected into cryogenic methanol trap	GC	Not Applicable	MSD	Not Applicable
Benzo[a]pyrene	NS235_Report.pdf Section 6.3.3.1; methanol, shake 30 min + sonicate 15 min.	GC	Not Applicable	MSD	Not Applicable
1,3-Butadiene	Health Canada Method T-116; Gas phase collected into cryogenic methanol trap	GC	Not Applicable	MSD	Not Applicable
Carbon monoxide	Health Canada Method T-115 (ISO 4387, 8454); direct vapour phase collection	Not Applicable	Not Applicable	NDIR	Not Applicable
Crotonaldehyde	Health Canada Method T-104; 12mM acidified DNPH in acetonitrile trap	HPLC	Not Applicable	UVD	Not Applicable
Formaldehyde	Health Canada Method T-104; 12mM acidified DNPH in acetonitrile trap	HPLC	Not Applicable	UVD	Not Applicable
Isoprene	Health Canada Method T-116; Gas phase collected into cryogenic methanol trap	GC	Not Applicable	MSD	Not Applicable
Nicotine (total)	Health Canada Method T-115 (ISO 4387, 10315); isopropanol, 45 min.	GC	Not Applicable	FID	Not Applicable
4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK)	NS235_Report.pdf Section 6.3.3.3; Extract in 100 mM ammonium acetate, 30 min.	HPLC	Not Applicable	MSMS	Not Applicable
N-nitrosonornicotine (NNN)	NS235_Report.pdf Section 6.3.3.3; Extract in 100 mM ammonium acetate, 30 min.	HPLC	Not Applicable	MSMS	Not Applicable
Toluene	Health Canada Method T-116; Gas phase collected into cryogenic methanol trap	GC	Not Applicable	MSD	Not Applicable

HPHC Name	Mean Quantity of HPHC per Cigarette	Variance of Mean HPHC Quantity	Type of Variance	Unit of Measurement - Mean & Variance	If "Other" Unit of Measurement Mean & Variance, Specify
Acetaldehyde	150.769	7.253	standard deviation	µg/cig	Not Applicable
Acrolein	5.129	0.328	standard deviation	µg/cig	Not Applicable
Acrylonitrile	0.000	Not Applicable	Not Applicable	Not Applicable	Not Applicable
4-Aminobiphenyl	0.008	0.004	Not Applicable	Not Applicable	Not Applicable
1-Aminonaphthalene	0.000	Not Applicable	Not Applicable	Not Applicable	Not Applicable
2-Aminonaphthalene	0.020	0.010	Not Applicable	Not Applicable	Not Applicable
Ammonia	3.083	0.932	standard deviation	µg/cig	Not Applicable
Benzene	0.224	0.051	standard deviation	µg/cig	Not Applicable
Benzo[a]pyrene	NQ	NQ	Not Applicable	Not Applicable	Not Applicable
1,3-Butadiene	0.114	0.044	Not Applicable	Not Applicable	Not Applicable
Carbon monoxide	0.000	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Crotonaldehyde	0.000	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Formaldehyde	7.469	0.391	standard deviation	µg/cig	Not Applicable
Isoprene	0.943	0.141	standard deviation	µg/cig	Not Applicable
Nicotine (total)	0.465	0.027	standard deviation	mg/cig	Not Applicable
4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK)	1.606	0.290	standard deviation	ng/cig	Not Applicable
N-nitrosonornicotine (NNN)	3.015	0.275	standard deviation	ng/cig	Not Applicable
Toluene	0.926	0.306	standard deviation	µg/cig	Not Applicable

AEROSOL REPORT (INTENSE REGIMEN) WORKSHEET (1682838)

HPHC Name	CAS Code	FDA UNII Code	Smoking Machine	Number of Cigarettes per Smoke Trap	Number of Smoke Traps per Replicate	Number of Replicate Measurements	Test Start Date	Test End Date
Acetaldehyde	75-07-0	GO1N1ZPR3B	Linear	2	1	7	2016-08-28	2016-08-31
Acrolein	107-02-8	7864XYD3JJ	Linear	2	1	7	2016-08-28	2016-08-31
Acrylonitrile	107-13-1	MP1U0D42PE	Linear	10	1	7	2016-08-29	2016-09-14
4-Aminobiphenyl	92-67-1	16054949HJ	Linear	10	1	7	2016-08-29	2016-09-13
1-Aminonaphthalene	134-32-7	9753I242R5	Linear	10	1	7	2016-08-29	2016-09-13
2-Aminonaphthalene	91-59-8	CKR7XL41N4	Linear	10	1	7	2016-08-29	2016-09-13
Ammonia	7664-41-7	5138Q19F1X	Linear	5	1	7	2016-09-01	2016-09-07
Benzene	71-43-2	J64922108F	Linear	10	1	7	2016-08-29	2016-09-14
Benzo[a]pyrene	50-32-8	3417WMA06D	Linear	5	1	7	2016-08-29	2016-09-13
1,3-Butadiene	106-99-0	JSD5FGP5VD	Linear	10	1	7	2016-08-29	2016-09-14
Carbon monoxide	630-08-0	7U1EE4V452	Linear	5	1	20	2016-09-01	2016-09-19
Crotonaldehyde	4170-30-3	9G72074TUW	Linear	2	1	7	2016-08-28	2016-08-31
Formaldehyde	50-00-0	1HG84L3525	Linear	2	1	7	2016-08-28	2016-08-31
Isoprene	78-79-5	0A62964IBU	Linear	10	1	7	2016-08-29	2016-09-14
Nicotine (total)	54-11-5	6M3C89ZY6R	Linear	5	1	20	2016-09-01	2016-09-19
4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK)	64091-91-4	7S395EDO61	Linear	5	1	7	2016-08-31	2016-09-07
N-nitrosonornicotine (NNN)	16543-55-8	X656TZ86DX	Linear	5	1	7	2016-08-31	2016-09-07
Toluene	108-88-3	3FPU23BG52	Linear	10	1	7	2016-08-29	2016-09-14

HPHC Name	Method of Extraction	Method of Separation	If "Other" Method of Separation, Specify	Method of Detection	If "Other" Method of Detection, Specify
Acetaldehyde	Health Canada Method T-104; 12mM acidified DNPH in acetonitrile trap	HPLC	Not Applicable	UVD	Not Applicable
Acrolein	Health Canada Method T-104; 12mM acidified DNPH in acetonitrile trap	HPLC	Not Applicable	UVD	Not Applicable
Acrylonitrile	Health Canada Method T-116; Gas phase collected into cryogenic methanol trap	GC	Not Applicable	MSD	Not Applicable
4-Aminobiphenyl	NS235_Report.pdf Section 6.3.3.2; Extract in 5% HCl, 30 min.	GC	Not Applicable	MSD	Not Applicable
1-Aminonaphthalene	NS235_Report.pdf Section 6.3.3.2; Extract in 5% HCl, 30 min.	GC	Not Applicable	MSD	Not Applicable
2-Aminonaphthalene	NS235_Report.pdf Section 6.3.3.2; Extract in 5% HCl, 30 min.	GC	Not Applicable	MSD	Not Applicable
Ammonia	Health Canada Method T-101; Extract with 0.05N H2SO4, 30 min.	IC	Not Applicable	Other	CD: Conductivity detection
Benzene	Health Canada Method T-116; Gas phase collected into cryogenic methanol trap	GC	Not Applicable	MSD	Not Applicable
Benzo[a]pyrene	NS235_Report.pdf Section 6.3.3.1; methanol, shake 30 min + sonicate 15 min.	GC	Not Applicable	MSD	Not Applicable
1,3-Butadiene	Health Canada Method T-116; Gas phase collected into cryogenic methanol trap	GC	Not Applicable	MSD	Not Applicable
Carbon monoxide	Health Canada Method T-115 (ISO 4387, 8454); direct vapour phase collection	Not Applicable	Not Applicable	NDIR	Not Applicable
Crotonaldehyde	Health Canada Method T-104; 12mM acidified DNPH in acetonitrile trap	HPLC	Not Applicable	UVD	Not Applicable
Formaldehyde	Health Canada Method T-104; 12mM acidified DNPH in acetonitrile trap	HPLC	Not Applicable	UVD	Not Applicable
Isoprene	Health Canada Method T-116; Gas phase collected into cryogenic methanol trap	GC	Not Applicable	MSD	Not Applicable
Nicotine (total)	Health Canada Method T-115 (ISO 4387, 10315); isopropanol, 45 min.	GC	Not Applicable	FID	Not Applicable
4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK)	NS235_Report.pdf Section 6.3.3.3; Extract in 100 mM ammonium acetate, 30 min.	HPLC	Not Applicable	MSMS	Not Applicable
N-nitrosonornicotine (NNN)	NS235_Report.pdf Section 6.3.3.3; Extract in 100 mM ammonium acetate, 30 min.	HPLC	Not Applicable	MSMS	Not Applicable
Toluene	Health Canada Method T-116; Gas phase collected into cryogenic methanol trap	GC	Not Applicable	MSD	Not Applicable

HPHC Name	Mean Quantity of HPHC per Cigarette	Variance of Mean HPHC Quantity	Type of Variance	Unit of Measurement - Mean & Variance	If "Other" Unit of Measurement Mean & Variance, Specify
Acetaldehyde	212.181	10.126	standard deviation	µg/cig	Not Applicable
Acrolein	10.587	0.792	standard deviation	µg/cig	Not Applicable
Acrylonitrile	0.150	0.050	standard deviation	µg/cig	Not Applicable
4-Aminobiphenyl	0.009	0.002	standard deviation	ng/cig	Not Applicable
1-Aminonaphthalene	0.029	0.005	standard deviation	ng/cig	Not Applicable
2-Aminonaphthalene	0.017	0.003	standard deviation	ng/cig	Not Applicable
Ammonia	11.331	0.984	standard deviation	µg/cig	Not Applicable
Benzene	0.473	0.033	standard deviation	µg/cig	Not Applicable
Benzo[a]pyrene	0.544	0.029	standard deviation	ng/cig	Not Applicable
1,3-Butadiene	0.204	0.017	standard deviation	µg/cig	Not Applicable
Carbon monoxide	0.480	0.000	standard deviation	mg/cig	Not Applicable
Crotonaldehyde	0.000	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Formaldehyde	10.494	0.877	standard deviation	µg/cig	Not Applicable
Isoprene	1.900	0.440	standard deviation	µg/cig	Not Applicable
Nicotine (total)	1.296	0.048	standard deviation	mg/cig	Not Applicable
4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK)	6.217	0.547	standard deviation	ng/cig	Not Applicable
N-nitrosonornicotine (NNN)	8.686	0.523	standard deviation	ng/cig	Not Applicable
Toluene	1.356	0.195	standard deviation	µg/cig	Not Applicable

AEROSOL (ISO REGIMEN) REPORT WORKSHEET (1682839)

HPHC Name	CAS Code	FDA UNII Code	Smoking Machine	Number of Cigarettes per Smoke Trap	Number of Smoke Traps per Replicate	Number of Replicate Measurements	Test Start Date	Test End Date
Acetaldehyde	75-07-0	GO1N1ZPR3B	Linear	2	1	7	2016-08-30	2016-09-01
Acrolein	107-02-8	7864XYD3JJ	Linear	2	1	7	2016-08-30	2016-09-01
Acrylonitrile	107-13-1	MP1U0D42PE	Linear	10	1	7	2016-08-30	2016-09-14
4-Aminobiphenyl	92-67-1	16054949HJ	Linear	10	1	7	2016-08-30	2016-09-06
1-Aminonaphthalene	134-32-7	9753I242R5	Linear	10	1	7	2016-08-30	2016-09-06
2-Aminonaphthalene	91-59-8	CKR7XL41N4	Linear	10	1	7	2016-08-30	2016-09-06
Ammonia	7664-41-7	5138Q19F1X	Linear	5	1	7	2016-08-31	2016-09-03
Benzene	71-43-2	J64922108F	Linear	10	1	7	2016-08-30	2016-09-14
Benzo[a]pyrene	50-32-8	3417WMA06D	Linear	5	1	7	2016-08-31	2016-09-13
1,3-Butadiene	106-99-0	JSD5FGP5VD	Linear	10	1	7	2016-08-30	2016-09-14
Carbon monoxide	630-08-0	7U1EE4V452	Linear	5	1	20	2016-09-02	2016-09-14
Crotonaldehyde	4170-30-3	9G72074TUW	Linear	2	1	7	2016-08-30	2016-09-01
Formaldehyde	50-00-0	1HG84L3525	Linear	2	1	7	2016-08-30	2016-09-01
Isoprene	78-79-5	0A62964IBU	Linear	10	1	7	2016-08-30	2016-09-14
Nicotine (total)	54-11-5	6M3C89ZY6R	Linear	5	1	20	2016-09-02	2016-09-14
4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK)	64091-91-4	7S395EDO61	Linear	5	1	7	2016-09-02	2016-09-07
N-nitrosonornicotine (NNN)	16543-55-8	X656TZ86DX	Linear	5	1	7	2016-09-02	2016-09-07
Toluene	108-88-3	3FPU23BG52	Linear	10	1	7	2016-08-30	2016-09-14

HPHC Name	Method of Extraction	Method of Separation	If "Other" Method of Separation, Specify	Method of Detection	If "Other" Method of Detection, Specify
Acetaldehyde	Health Canada Method T-104; 12mM acidified DNPH in acetonitrile trap	HPLC	Not Applicable	UVD	Not Applicable
Acrolein	Health Canada Method T-104; 12mM acidified DNPH in acetonitrile trap	HPLC	Not Applicable	UVD	Not Applicable
Acrylonitrile	Health Canada Method T-116; Gas phase collected into cryogenic methanol trap	GC	Not Applicable	MSD	Not Applicable
4-Aminobiphenyl	NS235_Report.pdf Section 6.3.3.2; Extract in 5% HCl, 30 min.	GC	Not Applicable	MSD	Not Applicable
1-Aminonaphthalene	NS235_Report.pdf Section 6.3.3.2; Extract in 5% HCl, 30 min.	GC	Not Applicable	MSD	Not Applicable
2-Aminonaphthalene	NS235_Report.pdf Section 6.3.3.2; Extract in 5% HCl, 30 min.	GC	Not Applicable	MSD	Not Applicable
Ammonia	Health Canada Method T-101; Extract with 0.05N H2SO4, 30 min.	IC	Not Applicable	Other	CD: Conductivity detection
Benzene	Health Canada Method T-116; Gas phase collected into cryogenic methanol trap	GC	Not Applicable	MSD	Not Applicable
Benzo[a]pyrene	NS235_Report.pdf Section 6.3.3.1; methanol, shake 30 min + sonicate 15 min.	GC	Not Applicable	MSD	Not Applicable
1,3-Butadiene	Health Canada Method T-116; Gas phase collected into cryogenic methanol trap	GC	Not Applicable	MSD	Not Applicable
Carbon monoxide	Health Canada Method T-115 (ISO 4387, 8454); direct vapour phase collection	Not Applicable	Not Applicable	NDIR	Not Applicable
Crotonaldehyde	Health Canada Method T-104; 12mM acidified DNPH in acetonitrile trap	HPLC	Not Applicable	UVD	Not Applicable
Formaldehyde	Health Canada Method T-104; 12mM acidified DNPH in acetonitrile trap	HPLC	Not Applicable	UVD	Not Applicable
Isoprene	Health Canada Method T-116; Gas phase collected into cryogenic methanol trap	GC	Not Applicable	MSD	Not Applicable
Nicotine (total)	Health Canada Method T-115 (ISO 4387, 10315); isopropanol, 45 min.	GC	Not Applicable	FID	Not Applicable
4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK)	NS235_Report.pdf Section 6.3.3.3; Extract in 100 mM ammonium acetate, 30 min.	HPLC	Not Applicable	MSMS	Not Applicable
N-nitrosonornicotine (NNN)	NS235_Report.pdf Section 6.3.3.3; Extract in 100 mM ammonium acetate, 30 min.	HPLC	Not Applicable	MSMS	Not Applicable
Toluene	Health Canada Method T-116; Gas phase collected into cryogenic methanol trap	GC	Not Applicable	MSD	Not Applicable

HPHC Name	Mean Quantity of HPHC per Cigarette	Variance of Mean HPHC Quantity	Type of Variance	Unit of Measurement - Mean & Variance	If "Other" Unit of Measurement Mean & Variance, Specify
Acetaldehyde	148.848	6.221	standard deviation	µg/cig	Not Applicable
Acrolein	4.953	0.368	standard deviation	µg/cig	Not Applicable
Acrylonitrile	0.000	Not Applicable	Not Applicable	Not Applicable	Not Applicable
4-Aminobiphenyl	0.006	0.004	standard deviation	ng/cig	Not Applicable
1-Aminonaphthalene	0.030	0.015	standard deviation	ng/cig	Not Applicable
2-Aminonaphthalene	0.025	0.021	standard deviation	ng/cig	Not Applicable
Ammonia	2.090	0.397	standard deviation	µg/cig	Not Applicable
Benzene	0.193	0.038	standard deviation	µg/cig	Not Applicable
Benzo[a]pyrene	0.000	Not Applicable	Not Applicable	Not Applicable	Not Applicable
1,3-Butadiene	0.141	0.056	standard deviation	µg/cig	Not Applicable
Carbon monoxide	0.000	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Crotonaldehyde	0.000	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Formaldehyde	7.232	0.569	standard deviation	µg/cig	Not Applicable
Isoprene	1.174	0.281	standard deviation	µg/cig	Not Applicable
Nicotine (total)	0.474	0.026	standard deviation	mg/cig	Not Applicable
4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK)	1.694	0.203	standard deviation	ng/cig	Not Applicable
N-nitrosonornicotine (NNN)	3.205	0.271	standard deviation	ng/cig	Not Applicable
Toluene	0.686	0.245	standard deviation	µg/cig	Not Applicable

AEROSOL REPORT (INTENSE REGIMEN) WORKSHEET (1682839)

HPHC Name	CAS Code	FDA UNII Code	Smoking Machine	Number of Cigarettes per Smoke Trap	Number of Smoke Traps per Replicate	Number of Replicate Measurements	Test Start Date	Test End Date
Acetaldehyde	75-07-0	GO1N1ZPR3B	Linear	2	1	7	2016-08-28	2016-08-31
Acrolein	107-02-8	7864XYD3JJ	Linear	2	1	7	2016-08-28	2016-08-31
Acrylonitrile	107-13-1	MP1U0D42PE	Linear	10	1	7	2016-08-29	2016-09-14
4-Aminobiphenyl	92-67-1	16054949HJ	Linear	10	1	7	2016-08-29	2016-09-13
1-Aminonaphthalene	134-32-7	9753I242R5	Linear	10	1	7	2016-08-29	2016-09-13
2-Aminonaphthalene	91-59-8	CKR7XL41N4	Linear	10	1	7	2016-08-29	2016-09-13
Ammonia	7664-41-7	5138Q19F1X	Linear	5	1	7	2016-09-01	2016-09-07
Benzene	71-43-2	J64922108F	Linear	10	1	7	2016-08-29	2016-09-14
Benzo[a]pyrene	50-32-8	3417WMA06D	Linear	5	1	7	2016-08-29	2016-09-13
1,3-Butadiene	106-99-0	JSD5FGP5VD	Linear	10	1	7	2016-08-29	2016-09-14
Carbon monoxide	630-08-0	7U1EE4V452	Linear	5	1	20	2016-09-01	2016-09-19
Crotonaldehyde	4170-30-3	9G72074TUW	Linear	2	1	7	2016-08-28	2016-08-31
Formaldehyde	50-00-0	1HG84L3525	Linear	2	1	7	2016-08-28	2016-08-31
Isoprene	78-79-5	0A62964IBU	Linear	10	1	7	2016-08-29	2016-09-14
Nicotine (total)	54-11-5	6M3C89ZY6R	Linear	5	1	20	2016-09-01	2016-09-19
4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK)	64091-91-4	7S395EDO61	Linear	5	1	7	2016-08-31	2016-09-07
N-nitrosonornicotine (NNN)	16543-55-8	X656TZ86DX	Linear	5	1	7	2016-08-31	2016-09-07
Toluene	108-88-3	3FPU23BG52	Linear	10	1	7	2016-08-29	2016-09-14

HPHC Name	Method of Extraction	Method of Separation	If "Other" Method of Separation, Specify	Method of Detection	If "Other" Method of Detection, Specify
Acetaldehyde	Health Canada Method T-104; 12mM acidified DNPH in acetonitrile trap	HPLC	Not Applicable	UVD	Not Applicable
Acrolein	Health Canada Method T-104; 12mM acidified DNPH in acetonitrile trap	HPLC	Not Applicable	UVD	Not Applicable
Acrylonitrile	Health Canada Method T-116; Gas phase collected into cryogenic methanol trap	GC	Not Applicable	MSD	Not Applicable
4-Aminobiphenyl	NS235_Report.pdf Section 6.3.3.2; Extract in 5% HCl, 30 min.	GC	Not Applicable	MSD	Not Applicable
1-Aminonaphthalene	NS235_Report.pdf Section 6.3.3.2; Extract in 5% HCl, 30 min.	GC	Not Applicable	MSD	Not Applicable
2-Aminonaphthalene	NS235_Report.pdf Section 6.3.3.2; Extract in 5% HCl, 30 min.	GC	Not Applicable	MSD	Not Applicable
Ammonia	Health Canada Method T-101; Extract with 0.05N H2SO4, 30 min.	IC	Not Applicable	Other	CD: Conductivity detection
Benzene	Health Canada Method T-116; Gas phase collected into cryogenic methanol trap	GC	Not Applicable	MSD	Not Applicable
Benzo[a]pyrene	NS235_Report.pdf Section 6.3.3.1; methanol, shake 30 min + sonicate 15 min.	GC	Not Applicable	MSD	Not Applicable
1,3-Butadiene	Health Canada Method T-116; Gas phase collected into cryogenic methanol trap	GC	Not Applicable	MSD	Not Applicable
Carbon monoxide	Health Canada Method T-115 (ISO 4387, 8454); direct vapour phase collection	Not Applicable	Not Applicable	NDIR	Not Applicable
Crotonaldehyde	Health Canada Method T-104; 12mM acidified DNPH in acetonitrile trap	HPLC	Not Applicable	UVD	Not Applicable
Formaldehyde	Health Canada Method T-104; 12mM acidified DNPH in acetonitrile trap	HPLC	Not Applicable	UVD	Not Applicable
Isoprene	Health Canada Method T-116; Gas phase collected into cryogenic methanol trap	GC	Not Applicable	MSD	Not Applicable
Nicotine (total)	Health Canada Method T-115 (ISO 4387, 10315); isopropanol, 45 min.	GC	Not Applicable	FID	Not Applicable
4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK)	NS235_Report.pdf Section 6.3.3.3; Extract in 100 mM ammonium acetate, 30 min.	HPLC	Not Applicable	MSMS	Not Applicable
N-nitrosonornicotine (NNN)	NS235_Report.pdf Section 6.3.3.3; Extract in 100 mM ammonium acetate, 30 min.	HPLC	Not Applicable	MSMS	Not Applicable
Toluene	Health Canada Method T-116; Gas phase collected into cryogenic methanol trap	GC	Not Applicable	MSD	Not Applicable

HPHC Name	Mean Quantity of HPHC per Cigarette	Variance of Mean HPHC Quantity	Type of Variance	Unit of Measurement - Mean & Variance	If "Other" Unit of Measurement Mean & Variance, Specify
Acetaldehyde	212.873	9.007	standard deviation	µg/cig	Not Applicable
Acrolein	10.673	0.598	standard deviation	µg/cig	Not Applicable
Acrylonitrile	0.122	0.062	standard deviation	µg/cig	Not Applicable
4-Aminobiphenyl	0.009	0.002	standard deviation	ng/cig	Not Applicable
1-Aminonaphthalene	0.029	0.010	standard deviation	ng/cig	Not Applicable
2-Aminonaphthalene	0.018	0.007	standard deviation	ng/cig	Not Applicable
Ammonia	11.300	1.545	standard deviation	µg/cig	Not Applicable
Benzene	0.491	0.035	standard deviation	µg/cig	Not Applicable
Benzo[a]pyrene	0.514	0.064	standard deviation	ng/cig	Not Applicable
1,3-Butadiene	0.225	0.071	standard deviation	µg/cig	Not Applicable
Carbon monoxide	0.480	0.026	standard deviation	mg/cig	Not Applicable
Crotonaldehyde	0.000	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Formaldehyde	10.200	0.728	standard deviation	µg/cig	Not Applicable
Isoprene	1.634	0.444	standard deviation	µg/cig	Not Applicable
Nicotine (total)	1.282	0.071	standard deviation	mg/cig	Not Applicable
4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK)	5.726	0.540	standard deviation	ng/cig	Not Applicable
N-nitrosonornicotine (NNN)	7.737	0.495	standard deviation	ng/cig	Not Applicable
Toluene	1.347	0.298	standard deviation	µg/cig	Not Applicable

Table 1a: **Yields of 'Tar', Nicotine and CO in Mainstream Tobacco Smoke: 'ISO' Conditions***

Sample ID	Weight [mg/cig]	Puff Count [per cig]	MS TPM [mg/cig]	CO [mg/cig]	Water [mg/cig]	Nicotine [mg/cig]	Tar [mg/cig]
1682837	834	6.0	23.3	< 0.223 but ≥ 0.067	11.8	0.467	11.0
1682837	834	6.0	24.8	< 0.223 but ≥ 0.067	11.3	0.517	12.9
1682837	837	6.0	22.8	< 0.223 but ≥ 0.067	11.2	0.459	11.1
1682837	839	6.0	21.6	< 0.223 but ≥ 0.067	10.5	0.425	10.6
1682837	842	6.0	21.4	< 0.223 but ≥ 0.067	9.93	0.411	11.1
1682837	843	6.0	24.0	< 0.223 but ≥ 0.067	11.6	0.529	11.9
1682837	829	6.0	22.8	< 0.223 but ≥ 0.067	10.6	0.456	11.7
1682837	840	6.0	23.7	< 0.223 but ≥ 0.067	11.7	0.466	11.5
1682837	841	6.0	23.8	< 0.223 but ≥ 0.067	11.1	0.460	12.3
1682837	823	6.0	23.7	< 0.223 but ≥ 0.067	11.7	0.451	11.5
1682837	841	6.0	25.6	< 0.223 but ≥ 0.067	12.8	0.481	12.3
1682837	848	6.0	24.1	< 0.223 but ≥ 0.067	11.6	0.477	12.0
1682837	818	6.0	24.5	< 0.223 but ≥ 0.067	12.2	0.477	11.8
1682837	856	6.0	25.5	< 0.223 but ≥ 0.067	12.4	0.478	12.6
1682837	852	6.0	24.6	< 0.223 but ≥ 0.067	12.0	0.490	12.1
1682837	838	6.0	24.7	< 0.223 but ≥ 0.067	11.0	0.447	13.3
1682837	831	6.0	24.5	< 0.223 but ≥ 0.067	11.0	0.454	13.1
1682837	839	6.0	25.0	< 0.223 but ≥ 0.067	12.4	0.476	12.1
1682837	841	6.0	24.9	0.250	12.5	0.416	12.0
1682837	832	6.0	25.4	0.250	15.2	0.426	9.83
Average	838	6.0	24.0	**NQ**	11.7	0.463	11.9
Std. Dev.	9	0.0	1.2	**NQ**	1.1	0.030	0.8
L. Limit (95%)	834	6.0	23.5	N/A	11.2	0.449	11.5
U. Limit (95%)	842	6.0	24.6	N/A	12.2	0.477	12.2

Table 1a: **Yields of 'Tar', Nicotine and CO in Mainstream Tobacco Smoke: 'ISO' Conditions***

Sample ID	Weight [mg/cig]	Puff Count [per cig]	MS TPM [mg/cig]	CO [mg/cig]	Water [mg/cig]	Nicotine [mg/cig]	Tar [mg/cig]
1682838	848	6.0	22.3	< 0.223 but ≥ 0.067	11.3	0.470	10.5
1682838	849	6.0	21.2	< 0.223 but ≥ 0.067	9.79	0.438	10.9
1682838	849	6.0	22.4	< 0.223 but ≥ 0.067	10.9	0.470	11.0
1682838	840	6.0	23.0	< 0.223 but ≥ 0.067	10.7	0.489	11.8
1682838	842	6.0	23.0	< 0.223 but ≥ 0.067	10.9	0.457	11.6
1682838	850	6.0	23.9	< 0.223 but ≥ 0.067	11.5	0.498	11.9
1682838	860	6.0	25.6	< 0.223 but ≥ 0.067	13.0	0.490	12.1
1682838	849	6.0	22.6	< 0.223 but ≥ 0.067	10.9	0.432	11.2
1682838	863	6.0	24.1	< 0.223 but ≥ 0.067	11.5	0.487	12.1
1682838	841	6.0	24.1	< 0.223 but ≥ 0.067	11.9	0.495	11.7
1682838	846	6.0	24.3	< 0.223 but ≥ 0.067	11.9	0.476	12.0
1682838	857	6.0	23.5	< 0.223 but ≥ 0.067	11.3	0.454	11.7
1682838	848	6.0	23.8	< 0.223 but ≥ 0.067	12.1	0.482	11.3
1682838	847	6.0	24.4	< 0.223 but ≥ 0.067	11.1	0.463	12.8
1682838	845	6.0	25.4	< 0.223 but ≥ 0.067	12.2	0.481	12.7
1682838	844	6.0	23.4	< 0.223 but ≥ 0.067	11.4	0.414	11.6
1682838	850	6.0	23.0	< 0.223 but ≥ 0.067	10.7	0.428	11.9
1682838	859	6.0	26.6	< 0.223 but ≥ 0.067	12.7	0.503	13.4
1682838	853	6.0	24.7	< 0.223 but ≥ 0.067	11.8	0.447	12.5
1682838	844	6.0	25.5	0.280	13.2	0.428	11.8
Average	849	6.0	23.8	**NQ**	11.5	0.465	11.8
Std. Dev.	6	0.0	1.3	**NQ**	0.8	0.027	0.7
L. Limit (95%)	846	6.0	23.2	N/A	11.2	0.453	11.5
U. Limit (95%)	852	6.0	24.4	N/A	11.9	0.478	12.1

Table 1a: **Yields of 'Tar', Nicotine and CO in Mainstream Tobacco Smoke: 'ISO' Conditions***

Sample ID	Weight [mg/cig]	Puff Count [per cig]	MS TPM [mg/cig]	CO [mg/cig]	Water [mg/cig]	Nicotine [mg/cig]	Tar [mg/cig]
1682839	853	6.0	23.2	< 0.223 but ≥ 0.067	10.8	0.482	12.0
1682839	848	6.0	23.2	< 0.223 but ≥ 0.067	11.1	0.485	11.6
1682839	859	6.0	23.9	< 0.223 but ≥ 0.067	11.1	0.488	12.3
1682839	849	6.0	24.3	< 0.223 but ≥ 0.067	12.0	0.510	11.8
1682839	849	6.0	23.3	< 0.223 but ≥ 0.067	11.1	0.481	11.7
1682839	861	6.0	22.7	< 0.223 but ≥ 0.067	11.3	0.480	10.9
1682839	850	6.0	21.6	< 0.223 but ≥ 0.067	10.6	0.436	10.6
1682839	839	6.0	24.4	< 0.223 but ≥ 0.067	12.2	0.493	11.7
1682839	851	6.0	24.7	< 0.223 but ≥ 0.067	12.1	0.498	12.0
1682839	836	6.0	22.0	< 0.223 but ≥ 0.067	10.6	0.412	10.9
1682839	844	6.0	23.1	< 0.223 but ≥ 0.067	11.7	0.479	11.0
1682839	867	6.0	22.4	< 0.223 but ≥ 0.067	11.3	0.433	10.7
1682839	851	6.0	24.7	0.250	10.8	0.514	13.4
1682839	839	6.0	23.2	< 0.223 but ≥ 0.067	11.2	0.468	11.6
1682839	846	6.0	24.8	< 0.223 but ≥ 0.067	12.2	0.487	12.1
1682839	860	6.0	25.9	< 0.223 but ≥ 0.067	13.0	0.471	12.4
1682839	856	6.0	24.8	< 0.223 but ≥ 0.067	12.2	0.489	12.1
1682839	841	6.0	25.0	< 0.223 but ≥ 0.067	12.2	0.464	12.3
1682839	854	6.0	25.4	< 0.223 but ≥ 0.067	12.2	0.465	12.8
1682839	830	6.0	24.6	0.280	13.4	0.441	10.8
Average	849	6.0	23.9	**NQ**	11.7	0.474	11.7
Std. Dev.	9	0.0	1.2	**NQ**	0.8	0.026	0.7
L. Limit (95%)	845	6.0	23.3	N/A	11.3	0.462	11.4
U. Limit (95%)	853	6.0	24.4	N/A	12.0	0.486	12.1

* puff volume, 35mL; interval, 60 sec; duration, 2 sec; vent blocking, 0%
See text for additional details.

Glossary of Abbreviations
NQ: Below the Limit of Quantification
N/A: Not Applicable

Table 1b: **Yields of 'Tar', Nicotine and CO in Mainstream Tobacco Smoke: 'Intense' Conditions***

Sample ID	Weight [mg/cig]	Puff Count [per cig]	MS TPM [mg/cig]	CO [mg/cig]	Water [mg/cig]	Nicotine [mg/cig]	Tar [mg/cig]
1682837	834	12.0	52.6	0.480	27.2	1.23	24.1
1682837	841	12.0	52.5	0.480	27.2	1.22	24.0
1682837	842	12.0	54.1	0.400	28.1	1.24	24.7
1682837	834	12.0	52.7	0.480	27.8	1.28	23.6
1682837	820	12.0	53.8	0.480	25.5	1.24	27.0
1682837	842	12.0	54.0	0.480	27.0	1.28	25.7
1682837	831	12.0	52.6	0.480	27.7	1.18	23.7
1682837	824	12.0	52.1	0.480	25.1	1.25	25.8
1682837	824	12.0	52.4	0.480	27.9	1.17	23.4
1682837	836	12.0	52.2	0.480	28.0	1.25	22.9
1682837	842	12.0	53.3	0.480	25.7	1.25	26.3
1682837	830	12.0	52.0	0.480	27.8	1.22	23.0
1682837	835	12.0	53.5	0.480	29.7	1.32	22.4
1682837	838	12.0	53.6	0.480	28.7	1.27	23.6
1682837	830	12.0	54.0	0.480	28.9	1.34	23.7
1682837	835	12.0	51.2	0.480	27.8	1.17	22.2
1682837	839	12.0	53.3	0.480	28.7	1.25	23.4
1682837	844	12.0	56.6	0.480	30.5	1.39	24.7
1682837	843	12.0	55.1	0.480	29.3	1.30	24.5
1682837	835	12.0	53.7	0.480	35.0	1.17	17.5
Average	835	12.0	53.3	0.476	28.2	1.25	23.8
Std. Dev.	7	0.0	1.2	0.018	2.1	0.06	2.0
L. Limit (95%)	832	12.0	52.7	0.468	27.2	1.22	22.9
U. Limit (95%)	838	12.0	53.8	0.484	29.2	1.28	24.7

Table 1b: **Yields of 'Tar', Nicotine and CO in Mainstream Tobacco Smoke: 'Intense' Conditions***

Sample ID	Weight [mg/cig]	Puff Count [per cig]	MS TPM [mg/cig]	CO [mg/cig]	Water [mg/cig]	Nicotine [mg/cig]	Tar [mg/cig]
1682838	845	12.0	54.4	0.480	28.5	1.33	24.5
1682838	838	12.0	53.2	0.480	27.6	1.31	24.3
1682838	832	12.0	51.8	0.480	27.3	1.21	23.3
1682838	842	12.0	53.8	0.480	27.8	1.28	24.6
1682838	828	12.0	53.2	0.480	27.9	1.32	24.0
1682838	852	12.0	54.5	0.480	28.3	1.27	24.9
1682838	831	12.0	55.7	0.480	28.8	1.35	25.6
1682838	851	12.0	52.9	0.480	28.0	1.26	23.6
1682838	851	12.0	54.0	0.480	26.1	1.34	26.6
1682838	848	12.0	53.8	0.480	28.0	1.31	24.4
1682838	849	12.0	53.9	0.480	26.1	1.30	26.5
1682838	862	12.0	55.6	0.480	29.5	1.36	24.8
1682838	854	12.0	52.9	0.480	27.6	1.27	24.0
1682838	832	12.0	52.4	0.480	28.1	1.23	23.1
1682838	845	12.0	53.2	0.480	27.8	1.27	24.1
1682838	844	12.0	56.1	0.480	29.7	1.38	25.0
1682838	848	12.0	54.9	0.480	29.7	1.29	23.9
1682838	849	12.0	55.6	0.480	27.4	1.21	26.9
1682838	854	12.0	55.9	0.480	27.7	1.32	26.8
1682838	832	12.0	55.2	0.480	27.7	1.31	26.2
Average	844	12.0	54.1	0.480	28.0	1.30	24.9
Std. Dev.	9	0.0	1.3	0.000	1.0	0.05	1.2
L. Limit (95%)	840	12.0	53.6	0.480	27.5	1.27	24.3
U. Limit (95%)	849	12.0	54.7	0.480	28.4	1.32	25.4

Table 1b: **Yields of 'Tar', Nicotine and CO in Mainstream Tobacco Smoke: 'Intense' Conditions***

Sample ID	Weight [mg/cig]	Puff Count [per cig]	MS TPM [mg/cig]	CO [mg/cig]	Water [mg/cig]	Nicotine [mg/cig]	Tar [mg/cig]
1682839	849	12.0	56.2	0.560	28.4	1.37	26.4
1682839	849	12.0	55.7	0.480	29.1	1.42	25.2
1682839	850	12.0	53.9	0.480	27.7	1.27	24.9
1682839	870	12.0	51.9	0.480	27.0	1.17	23.7
1682839	839	12.0	53.1	0.480	29.1	1.23	22.8
1682839	832	12.0	52.3	0.480	27.6	1.25	23.4
1682839	849	12.0	56.1	0.480	30.1	1.27	24.8
1682839	843	12.0	55.5	0.480	28.1	1.22	26.2
1682839	842	12.0	55.8	0.480	27.1	1.43	27.3
1682839	836	12.0	54.3	0.480	29.4	1.28	23.6
1682839	833	12.0	52.8	0.480	28.0	1.17	23.6
1682839	845	12.0	54.6	0.480	28.5	1.27	24.8
1682839	846	12.0	54.0	0.480	28.6	1.20	24.2
1682839	851	12.0	54.6	0.480	29.3	1.25	24.0
1682839	843	12.0	55.3	0.480	29.8	1.33	24.2
1682839	859	12.0	54.4	0.400	28.7	1.28	24.4
1682839	849	12.0	55.2	0.480	29.8	1.28	24.1
1682839	836	12.0	55.2	0.480	30.1	1.36	23.8
1682839	838	12.0	55.9	0.480	30.7	1.31	23.9
1682839	852	12.0	55.6	0.480	30.4	1.29	23.9
Average	846	12.0	54.6	0.480	28.9	1.28	24.5
Std. Dev.	9	0.0	1.3	0.026	1.1	0.07	1.1
L. Limit (95%)	841	12.0	54.0	0.468	28.4	1.25	23.9
U. Limit (95%)	850	12.0	55.2	0.492	29.4	1.32	25.0

* puff volume, 55mL; interval, 30 sec; duration, 2 sec; vent blocking, 0%
See text for additional details.

Table 2a: **Yields of Selected 'Carbonyls' in Mainstream Tobacco Smoke: 'ISO' Conditions***

Sample ID	Weight [mg/cig]	Puff Count [per cig]	Formaldehyde [µg/cig]	Acetaldehyde [µg/cig]	Acrolein [µg/cig]	Crotonaldehyde [µg/cig]
1682837	848	6.0	7.78	163	5.21	< 3.29 but ≥ 0.988
1682837	851	6.0	8.00	163	5.96	< 3.29 but ≥ 0.988
1682837	817	6.0	7.48	138	4.74	< 3.29 but ≥ 0.988
1682837	858	6.0	7.32	157	5.31	< 3.29 but ≥ 0.988
1682837	837	6.0	7.14	138	4.53	< 3.29 but ≥ 0.988
1682837	854	6.0	6.94	143	4.83	< 3.29 but ≥ 0.988
1682837	845	6.0	7.81	147	5.10	< 3.29 but ≥ 0.988
Average	844	6.0	7.50	150	5.10	**NQ**
Std. Dev.	14	0.0	0.39	11	0.47	**NQ**
L. Limit (95%)	832	6.0	7.14	140	4.66	N/A
U. Limit (95%)	857	6.0	7.85	160	5.53	N/A
1682838	855	6.0	7.62	161	5.25	< 3.29 but ≥ 0.988
1682838	858	6.0	7.40	155	5.42	< 3.29 but ≥ 0.988
1682838	855	6.0	7.83	152	5.22	< 3.29 but ≥ 0.988
1682838	866	6.0	7.71	150	5.18	< 3.29 but ≥ 0.988
1682838	854	6.0	7.84	152	5.42	< 3.29 but ≥ 0.988
1682838	858	6.0	6.90	137	4.92	< 3.29 but ≥ 0.988
1682838	859	6.0	6.98	147	4.49	< 3.29 but ≥ 0.988
Average	858	6.0	7.47	151	5.13	**NQ**
Std. Dev.	4	0.0	0.39	7	0.33	**NQ**
L. Limit (95%)	854	6.0	7.11	144	4.83	N/A
U. Limit (95%)	861	6.0	7.83	157	5.43	N/A

Table 2a: **Yields of Selected 'Carbonyls' in Mainstream Tobacco Smoke: 'ISO' Conditions***

Sample ID	Weight [mg/cig]	Puff Count [per cig]	Formaldehyde [µg/cig]	Acetaldehyde [µg/cig]	Acrolein [µg/cig]	Crotonaldehyde [µg/cig]
1682839	869	6.0	7.21	157	5.25	< 3.29 but ≥ 0.988
1682839	851	6.0	7.99	150	4.98	< 3.29 but ≥ 0.988
1682839	851	6.0	7.70	152	5.04	< 3.29 but ≥ 0.988
1682839	833	6.0	7.24	138	4.51	< 3.29 but ≥ 0.988
1682839	852	6.0	7.47	152	5.54	< 3.29 but ≥ 0.988
1682839	865	6.0	6.60	147	4.59	< 3.29 but ≥ 0.988
1682839	859	6.0	6.41	146	4.75	< 3.29 but ≥ 0.988
Average	854	6.0	7.23	149	4.95	**NQ**
Std. Dev.	12	0.0	0.57	6	0.37	**NQ**
L. Limit (95%)	843	6.0	6.71	143	4.61	N/A
U. Limit (95%)	865	6.0	7.76	155	5.29	N/A

* puff volume, 35mL; interval, 60 sec; duration, 2 sec; vent blocking, 0%
See text for additional details.

Glossary of Abbreviations
NQ: Below the Limit of Quantification
N/A: Not Applicable

Note Regarding EZ Isomerism of Acetaldehyde:
Recent studies have demonstrated a previously unidentified peak to be an isomer of the acetaldehyde hydrazone. Consistent with current practice and the Coresta recommended method (CRM 74), results for acetaldehyde will be increased to reflect the inclusion of this isomer. For comparison to historical data, results from previous projects should be adjusted by 1.27 which takes into account the typical average contribution of the isomer.

Table 2a: **Yields of Selected 'Carbonyls' in Laboratory Reagent BLank: 'ISO' Conditions***

Sample ID	Formaldehyde [µg/cig]	Acetaldehyde [µg/cig]	Acrolein [µg/cig]	Crotonaldehyde [µg/cig]
LRB	3.15	< 3.24 but ≥ 0.973	< 0.713	< 0.988
Average	3.15	**NQ**	**BDL**	**BDL**
Std. Dev.	ND	**NQ**	**BDL**	**BDL**
L. Limit (95%)	ND	ND	ND	ND
U. Limit (95%)	ND	ND	ND	ND

* puff volume, 35mL; interval, 60 sec; duration, 2 sec; vent blocking, 0%
See text for additional details.

Glossary of Abbreviations
BDL: Below the Limit of Detection
NQ: Below the Limit of Quantification
ND: Not Defined

Note Regarding EZ Isomerism of Acetaldehyde:
Recent studies have demonstrated a previously unidentified peak to be an isomer of the acetaldehyde hydrazone. Consistent with current practice and the Coresta recommended method (CRM 74), results for acetaldehyde will be increased to reflect the inclusion of this isomer. For comparison to historical data, results from previous projects should be adjusted by 1.27 which takes into account the typical average contribution of the isomer.

Table 2g: **Yields of Selected 'Carbonyls' in Mainstream Tobacco Smoke: 'Client-Defined' Conditions***

Sample ID	Weight [mg/cig]	Puff Count [per cig]	Formaldehyde [µg/cig]	Acetaldehyde [µg/cig]	Acrolein [µg/cig]	Crotonaldehyde [µg/cig]
1682837	833	12.0	9.44	193	8.88	< 3.29 but ≥ 0.988
1682837	833	12.0	10.6	212	10.9	< 3.29 but ≥ 0.988
1682837	848	12.0	9.09	200	9.24	< 3.29 but ≥ 0.988
1682837	828	12.0	10.9	192	10.3	< 3.29 but ≥ 0.988
1682837	839	12.0	10.4	222	11.2	< 3.29 but ≥ 0.988
1682837	828	12.0	10.3	206	10.3	< 3.29 but ≥ 0.988
1682837	835	12.0	8.11	189	8.08	< 3.29 but ≥ 0.988
Average	835	12.0	9.84	202	9.83	**NQ**
Std. Dev.	7	0.0	0.99	12	1.13	**NQ**
L. Limit (95%)	828	12.0	8.92	191	8.79	N/A
U. Limit (95%)	841	12.0	10.75	213	10.88	N/A
1682838	848	12.0	10.7	217	11.1	< 3.29 but ≥ 0.988
1682838	861	12.0	12.0	233	12.0	< 3.29 but ≥ 0.988
1682838	834	12.0	11.3	206	10.3	< 3.29 but ≥ 0.988
1682838	840	12.0	9.89	206	10.7	< 3.29 but ≥ 0.988
1682838	849	12.0	10.1	205	10.0	< 3.29 but ≥ 0.988
1682838	832	12.0	9.56	208	9.59	< 3.29 but ≥ 0.988
1682838	844	12.0	9.96	211	10.4	< 3.29 but ≥ 0.988
Average	844	12.0	10.5	212	10.6	**NQ**
Std. Dev.	10	0.0	0.9	10	0.8	**NQ**
L. Limit (95%)	835	12.0	9.7	203	9.9	N/A
U. Limit (95%)	853	12.0	11.3	222	11.3	N/A

Table 2g: **Yields of Selected 'Carbonyls' in Mainstream Tobacco Smoke: 'Client-Defined' Conditions***

Sample ID	Weight [mg/cig]	Puff Count [per cig]	Formaldehyde [µg/cig]	Acetaldehyde [µg/cig]	Acrolein [µg/cig]	Crotonaldehyde [µg/cig]
1682839	849	12.0	10.4	196	10.8	< 3.29 but ≥ 0.988
1682839	868	12.0	9.64	221	10.9	< 3.29 but ≥ 0.988
1682839	844	12.0	10.2	217	10.5	< 3.29 but ≥ 0.988
1682839	836	12.0	10.4	212	10.8	< 3.29 but ≥ 0.988
1682839	826	12.0	8.98	205	9.42	< 3.29 but ≥ 0.988
1682839	845	12.0	10.4	218	11.0	< 3.29 but ≥ 0.988
1682839	848	12.0	11.3	219	11.3	< 3.29 but ≥ 0.988
Average	845	12.0	10.2	213	10.7	**NQ**
Std. Dev.	13	0.0	0.7	9	0.6	**NQ**
L. Limit (95%)	833	12.0	9.5	205	10.1	N/A
U. Limit (95%)	857	12.0	10.9	221	11.2	N/A

* puff volume, 55mL; interval, 30 sec; duration, 2 sec; vent blocking, 0%
See text for additional details.

Glossary of Abbreviations
NQ: Below the Limit of Quantification
N/A: Not Applicable

Note Regarding EZ Isomerism of Acetaldehyde:
Recent studies have demonstrated a previously unidentified peak to be an isomer of the acetaldehyde hydrazone. Consistent with current practice and the Coresta recommended method (CRM 74), results for acetaldehyde will be increased to reflect the inclusion of this isomer. For comparison to historical data, results from previous projects should be adjusted by 1.27 which takes into account the typical average contribution of the isomer.

Table 2b: **Yields of Selected 'Carbonyls' in Laboratory Reagent Blank: 'Intense' Conditions***

Sample ID	Formaldehyde [µg/cig]	Acetaldehyde [µg/cig]	Acrolein [µg/cig]	Crotonaldehyde [µg/cig]
LRB	3.12	< 3.24 but ≥ 0.973	< 0.713	< 0.988
Average	3.12	**NQ**	**BDL**	**BDL**
Std. Dev.	ND	**NQ**	**BDL**	**BDL**
L. Limit (95%)	ND	ND	ND	ND
U. Limit (95%)	ND	ND	ND	ND

* puff volume, 55mL; interval, 30 sec; duration, 2 sec; vent blocking, 100%
See text for additional details.

Glossary of Abbreviations
BDL: Below the Limit of Detection
NQ: Below the Limit of Quantification
ND: Not Defined

Note Regarding EZ Isomerism of Acetaldehyde:
Recent studies have demonstrated a previously unidentified peak to be an isomer of the acetaldehyde hydrazone. Consistent with current practice and the Coresta recommended method (CRM 74), results for acetaldehyde will be increased to reflect the inclusion of this isomer. For comparison to historical data, results from previous projects should be adjusted by 1.27 which takes into account the typical average contribution of the isomer.

Table 8a: Yields of Ammonia in Mainstream Tobacco Smoke: 'ISO' Conditions*

Sample ID	Weight [mg/cig]	Puff Count [per cig]	MS TPM [mg/cig]	Ammonia [µg/cig]
1682837	850	6.0	27.1	3.73
1682837	847	6.0	20.5	1.61
1682837	857	6.0	25.1	2.15
1682837	836	6.0	25.9	3.60
1682837	842	6.0	24.7	2.42
1682837	859	6.0	26.0	2.93
1682837	847	6.0	28.7	2.56
Average	848	6.0	25.4	2.71
Std. Dev.	8	0.0	2.5	0.77
L. Limit (95%)	841	6.0	23.1	2.01
U. Limit (95%)	856	6.0	27.8	3.42
1682838	849	6.0	26.5	4.30
1682838	857	6.0	26.1	2.55
1682838	850	6.0	25.9	4.55
1682838	855	6.0	24.5	2.29
1682838	855	6.0	25.8	2.49
1682838	851	6.0	27.9	2.59
1682838	850	6.0	26.0	2.81
Average	852	6.0	26.1	3.08
Std. Dev.	3	0.0	1.0	0.93
L. Limit (95%)	849	6.0	25.1	2.22
U. Limit (95%)	855	6.0	27.0	3.94
1682839	871	6.0	25.3	1.69
1682839	860	6.0	25.9	2.10
1682839	863	6.0	25.4	1.59
1682839	856	6.0	24.4	2.47
1682839	853	6.0	25.8	2.62
1682839	848	6.0	25.0	1.84
1682839	852	6.0	26.1	2.32
Average	858	6.0	25.4	2.09
Std. Dev.	8	0.0	0.6	0.40
L. Limit (95%)	850	6.0	24.9	1.72
U. Limit (95%)	865	6.0	26.0	2.46

* puff volume, 35mL; interval, 60 sec; duration, 2 sec; vent blocking, 0%
See text for additional details.

Table 8g: Yields of Ammonia in Mainstream Tobacco Smoke: 'Client-Defined' Conditions*

Sample ID	Weight [mg/cig]	Puff Count [per cig]	MS TPM [mg/cig]	Ammonia [µg/cig]
1682837	848	12.0	55.8	11.0
1682837	855	12.0	59.9	13.6
1682837	843	12.0	58.3	12.4
1682837	852	12.0	58.0	11.1
1682837	845	12.0	56.7	12.1
1682837	839	12.0	58.7	11.6
1682837	849	12.0	60.9	11.8
Average	847	12.0	58.3	12.0
Std. Dev.	5	0.0	1.8	0.9
L. Limit (95%)	842	12.0	56.7	11.1
U. Limit (95%)	852	12.0	60.0	12.8
1682838	852	12.0	56.8	11.6
1682838	849	12.0	56.0	10.9
1682838	848	12.0	58.1	10.5
1682838	857	12.0	56.0	9.84
1682838	842	12.0	58.7	12.6
1682838	854	12.0	57.2	12.3
1682838	831	12.0	56.9	11.6
Average	848	12.0	57.1	11.3
Std. Dev.	9	0.0	1.0	1.0
L. Limit (95%)	840	12.0	56.2	10.4
U. Limit (95%)	856	12.0	58.0	12.2
1682839	861	12.0	58.5	10.7
1682839	854	12.0	55.6	9.91
1682839	837	12.0	56.3	12.1
1682839	859	12.0	60.3	8.99
1682839	858	12.0	59.5	13.6
1682839	849	12.0	60.8	12.2
1682839	856	12.0	59.5	11.6
Average	853	12.0	58.7	11.3
Std. Dev.	8	0.0	2.0	1.5
L. Limit (95%)	846	12.0	56.8	9.9
U. Limit (95%)	861	12.0	60.5	12.7

* puff volume, 55mL; interval, 30 sec; duration, 2 sec; vent blocking, 0%
See text for additional details.

Table 16a: Yields of Selected Polynuclear Aromatic Hydrocarbons in Particulate Phase of Mainstream Tobacco Smoke: 'ISO' Conditions*

Sample ID	Weight [mg/cig]	Puff Count [per cig]	MS TPM [mg/cig]	Benzo(a) pyrene [ng/cig]
1682837	845	6.0	26.5	< 0.354 but ≥ 0.106
1682837	831	6.0	24.7	< 0.354 but ≥ 0.106
1682837	849	6.0	27.3	< 0.354 but ≥ 0.106
1682837	836	6.0	24.7	< 0.354 but ≥ 0.106
1682837	850	6.0	25.2	< 0.354 but ≥ 0.106
1682837	850	6.0	26.8	< 0.354 but ≥ 0.106
1682837	851	6.0	26.9	< 0.354 but ≥ 0.106
Average	845	6.0	26.0	**NQ**
Std. Dev.	8	0.0	1.1	**NQ**
L. Limit (95%)	837	6.0	25.0	N/A
U. Limit (95%)	852	6.0	27.0	N/A
1682838	838	6.0	27.4	< 0.354 but ≥ 0.106
1682838	829	6.0	26.5	< 0.354 but ≥ 0.106
1682838	851	6.0	28.2	< 0.354 but ≥ 0.106
1682838	847	6.0	26.6	< 0.354 but ≥ 0.106
1682838	833	6.0	27.0	< 0.354 but ≥ 0.106
1682838	851	6.0	26.3	< 0.354 but ≥ 0.106
1682838	838	6.0	27.1	< 0.354 but ≥ 0.106
Average	841	6.0	27.0	**NQ**
Std. Dev.	9	0.0	0.7	**NQ**
L. Limit (95%)	833	6.0	26.4	N/A
U. Limit (95%)	849	6.0	27.6	N/A
1682839	864	6.0	25.5	< 0.354 but ≥ 0.106
1682839	855	6.0	28.2	< 0.354 but ≥ 0.106
1682839	847	6.0	23.5	< 0.354 but ≥ 0.106
1682839	861	6.0	25.9	< 0.354 but ≥ 0.106
1682839	864	6.0	28.0	< 0.354 but ≥ 0.106
1682839	858	6.0	27.4	< 0.354 but ≥ 0.106
1682839	860	6.0	26.9	< 0.354 but ≥ 0.106
Average	858	6.0	26.5	**NQ**
Std. Dev.	6	0.0	1.6	**NQ**
L. Limit (95%)	853	6.0	25.0	N/A
U. Limit (95%)	864	6.0	28.0	N/A

* puff volume, 35mL; interval, 60 sec; duration, 2 sec; vent blocking, 0%
See text for additional details.

Glossary of Abbreviations
NQ: Below the Limit of Quantification
N/A: Not Applicable

Table 16a: Yields of Benzo(a)pyrene in Particulate Phase of Laboratory Reagent Blank: 'ISO' Conditions*

Sample ID	Benzo(a) pyrene [ng/cig]
LRB	< 0.106
Average	**BDL**
Std. Dev.	**BDL**
L. Limit (95%)	ND
U. Limit (95%)	ND

* puff volume, 35mL; interval, 60 sec; duration, 2 sec; vent blocking, 0%
See text for additional details.

Glossary of Abbreviations
BDL: Below the Limit of Detection
ND: Not Defined

Table 16g: **Yields of Selected Polynuclear Aromatic Hydrocarbons in Particulate Phase of Mainstream Tobacco Smoke: 'Client-Defined' Conditions***

Sample ID	Weight [mg/cig]	Puff Count [per cig]	MS TPM [mg/cig]	Benzo(a) pyrene [ng/cig]
1682837	853	12.0	54.9	0.464
1682837	843	12.0	56.6	0.592
1682837	850	12.0	55.8	0.672
1682837	839	12.0	54.4	0.592
1682837	839	12.0	53.7	0.688
1682837	827	12.0	53.2	0.464
1682837	828	12.0	57.5	0.400
Average	840	12.0	55.1	0.553
Std. Dev.	10	0.0	1.6	0.112
L. Limit (95%)	830	12.0	53.7	0.450
U. Limit (95%)	849	12.0	56.6	0.656
1682838	848	12.0	54.4	0.544
1682838	854	12.0	53.9	0.528
1682838	846	12.0	54.4	0.512
1682838	855	12.0	53.7	0.576
1682838	844	12.0	54.6	0.592
1682838	834	12.0	53.9	0.528
1682838	837	12.0	53.0	0.528
Average	846	12.0	54.0	0.544
Std. Dev.	8	0.0	0.5	0.029
L. Limit (95%)	838	12.0	53.5	0.517
U. Limit (95%)	853	12.0	54.5	0.571
1682839	842	12.0	53.9	0.528
1682839	855	12.0	56.0	0.640
1682839	850	12.0	53.4	0.480
1682839	859	12.0	58.0	0.496
1682839	842	12.0	54.9	0.512
1682839	860	12.0	55.4	0.432
1682839	854	12.0	57.7	0.512
Average	852	12.0	55.6	0.514
Std. Dev.	7	0.0	1.8	0.064
L. Limit (95%)	845	12.0	54.0	0.455
U. Limit (95%)	859	12.0	57.3	0.573

* puff volume, 55mL; interval, 30 sec; duration, 2 sec; vent blocking, 0%
See text for additional details.

Table 16g: Yields of Benzo(a)pyrene in Particulate Phase of Laboratory Reagent Blank: 'Intense' Conditions*

Sample ID	Benzo(a) pyrene [ng/cig]
LRB	< 0.106
Average	**BDL**
Std. Dev.	**BDL**
L. Limit (95%)	ND
U. Limit (95%)	ND

* puff volume, 55mL; interval, 30 sec; duration, 2 sec; vent blocking, 0%
See text for additional details.

Glossary of Abbreviations
BDL: Below the Limit of Detection
ND: Not Defined

Table 18a: **Yields of Selected Aromatic Amines in Mainstream Tobacco Smoke: 'ISO' Conditions***

Sample ID	Weight [mg/cig]	Puff Count [per cig]	MS TPM [mg/cig]	1-amino-naphthalene [ng/cig]	2-amino-naphthalene [ng/cig]	4-amino-biphenyl [ng/cig]
1682837	842	6.0	24.6	< 0.027 but ≥ 0.008	0.022	0.006
1682837	833	6.0	25.3	0.069	0.072	0.014
1682837	835	6.0	22.8	< 0.027 but ≥ 0.008	0.012	< 0.005 but ≥ 0.001
1682837	832	6.0	24.4	< 0.027 but ≥ 0.008	< 0.012 but ≥ 0.004	< 0.005 but ≥ 0.001
1682837	834	6.0	21.8	< 0.027 but ≥ 0.008	0.024	0.007
1682837	849	6.0	23.9	< 0.027 but ≥ 0.008	< 0.012 but ≥ 0.004	< 0.005 but ≥ 0.001
1682837	847	6.0	23.9	< 0.027 but ≥ 0.008	< 0.012 but ≥ 0.004	< 0.005 but ≥ 0.001
Average	839	6.0	23.8	**NQ**	0.022	0.006
Std. Dev.	7	0.0	1.2	**NQ**	0.023	0.004
L. Limit (95%)	832	6.0	22.7	N/A	0.001	0.002
U. Limit (95%)	845	6.0	24.9	N/A	0.043	0.010
1682838	843	6.0	24.0	0.033	0.029	0.009
1682838	846	6.0	23.3	0.040	0.038	0.015
1682838	849	6.0	25.2	0.037	0.020	0.008
1682838	846	6.0	24.7	< 0.027 but ≥ 0.008	0.014	0.005
1682838	840	6.0	23.5	< 0.027 but ≥ 0.008	0.021	0.009
1682838	847	6.0	27.6	< 0.027 but ≥ 0.008	< 0.012 but ≥ 0.004	< 0.005 but ≥ 0.001
1682838	841	6.0	26.0	< 0.027 but ≥ 0.008	0.013	< 0.005 but ≥ 0.001
Average	845	6.0	24.9	**NQ**	0.020	0.008
Std. Dev.	3	0.0	1.5	**NQ**	0.010	0.004
L. Limit (95%)	842	6.0	23.5	N/A	0.011	0.004
U. Limit (95%)	847	6.0	26.3	N/A	0.030	0.012

Table 18a: **Yields of Selected Aromatic Amines in Mainstream Tobacco Smoke: 'ISO' Conditions***

Sample ID	Weight [mg/cig]	Puff Count [per cig]	MS TPM [mg/cig]	1-amino-naphthalene [ng/cig]	2-amino-naphthalene [ng/cig]	4-amino-biphenyl [ng/cig]
1682839	862	6.0	23.1	0.059	0.064	0.013
1682839	855	6.0	25.5	0.034	0.024	0.005
1682839	849	6.0	22.9	0.030	0.046	0.011
1682839	856	6.0	25.8	< 0.027 but ≥ 0.008	< 0.012 but ≥ 0.004	< 0.005 but ≥ 0.001
1682839	863	6.0	22.9	< 0.027 but ≥ 0.008	0.014	0.006
1682839	859	6.0	24.7	0.032	0.014	< 0.005 but ≥ 0.001
1682839	855	6.0	22.9	< 0.027 but ≥ 0.008	< 0.012 but ≥ 0.004	< 0.005 but ≥ 0.001
Average	857	6.0	24.0	0.030	0.025	0.006
Std. Dev.	5	0.0	1.3	0.015	0.021	0.004
L. Limit (95%)	853	6.0	22.8	0.016	0.005	0.003
U. Limit (95%)	861	6.0	25.2	0.043	0.045	0.010

* puff volume, 35mL; interval, 60 sec; duration, 2 sec; vent blocking, 0%
See text for additional details.

Glossary of Abbreviations
NQ: Below the Limit of Quantification
N/A: Not Applicable

Table 18b: **Yields of Selected Aromatic Amines in Laboratory Reagent Blank: 'ISO' Conditions***

Sample ID	1-amino-naphthalene [ng/cig]	2-amino-naphthalene [ng/cig]	4-amino-biphenyl [ng/cig]
LRB	< 0.027 but ≥ 0.008	< 0.012 but ≥ 0.004	< 0.005 but ≥ 0.001
Average	**NQ**	**NQ**	**NQ**
Std. Dev.	**NQ**	**NQ**	**NQ**
L. Limit (95%)	ND	ND	ND
U. Limit (95%)	ND	ND	ND

* puff volume, 55mL; interval, 30 sec; duration, 2 sec; vent blocking, 0%
See text for additional details.

Glossary of Abbreviations
BDL: Below the Limit of Detection
ND: Not Defined

Table 18b: **Yields of Selected Aromatic Amines in Mainstream Tobacco Smoke: 'Intense' Conditions***

Sample ID	Weight [mg/cig]	Puff Count [per cig]	MS TPM [mg/cig]	1-amino-naphthalene [ng/cig]	2-amino-naphthalene [ng/cig]	4-amino-biphenyl [ng/cig]
1682837	840	12.0	55.0	0.030	0.032	0.018
1682837	843	12.0	55.7	0.028	0.018	0.008
1682837	835	12.0	53.6	0.030	0.020	0.008
1682837	843	12.0	54.1	0.031	0.014	0.013
1682837	847	12.0	55.0	< 0.027 but ≥ 0.008	0.016	0.008
1682837	848	12.0	53.2	< 0.027 but ≥ 0.008	0.013	< 0.005 but ≥ 0.001
1682837	838	12.0	51.8	< 0.027 but ≥ 0.008	< 0.012 but ≥ 0.004	0.007
Average	842	12.0	54.0	**NQ**	0.017	0.009
Std. Dev.	5	0.0	1.3	**NQ**	0.007	0.005
L. Limit (95%)	838	12.0	52.8	N/A	0.010	0.005
U. Limit (95%)	847	12.0	55.2	N/A	0.024	0.014
1682838	845	12.0	57.8	0.029	0.021	0.010
1682838	849	12.0	54.8	0.031	0.020	0.009
1682838	844	12.0	53.0	< 0.027 but ≥ 0.008	0.017	0.006
1682838	848	12.0	53.6	0.034	0.014	0.012
1682838	838	12.0	53.7	0.031	0.016	0.010
1682838	843	12.0	57.2	0.029	0.015	0.008
1682838	855	12.0	57.4	0.031	0.014	0.007
Average	846	12.0	55.3	0.029	0.017	0.009
Std. Dev.	5	0.0	2.1	0.005	0.003	0.002
L. Limit (95%)	841	12.0	53.4	0.024	0.014	0.007
U. Limit (95%)	851	12.0	57.2	0.034	0.019	0.011

Table 18b: **Yields of Selected Aromatic Amines in Mainstream Tobacco Smoke: 'Intense' Conditions***

Sample ID	Weight [mg/cig]	Puff Count [per cig]	MS TPM [mg/cig]	1-amino-naphthalene [ng/cig]	2-amino-naphthalene [ng/cig]	4-amino-biphenyl [ng/cig]
1682839	845	12.0	54.4	0.033	0.014	0.011
1682839	849	12.0	53.8	< 0.027 but ≥ 0.008	0.026	0.010
1682839	842	12.0	54.9	0.031	0.016	0.008
1682839	853	12.0	54.0	< 0.027 but ≥ 0.008	0.013	0.006
1682839	853	12.0	55.3	0.028	0.016	0.009
1682839	844	12.0	55.5	0.030	0.014	0.009
1682839	835	12.0	53.8	0.047	0.030	0.008
Average	846	12.0	54.5	0.029	0.018	0.009
Std. Dev.	7	0.0	0.7	0.010	0.007	0.002
L. Limit (95%)	840	12.0	53.9	0.020	0.012	0.007
U. Limit (95%)	852	12.0	55.2	0.039	0.025	0.010

* puff volume, 55mL; interval, 30 sec; duration, 2 sec; vent blocking, 0%
See text for additional details.

Glossary of Abbreviations
NQ: Below the Limit of Quantification
N/A: Not Applicable

Table 18b: **Yields of Selected Aromatic Amines in Laboratory Reagent Blank: 'Intense' Conditions***

Sample ID	1-amino-naphthalene [ng/cig]	2-amino-naphthalene [ng/cig]	4-amino-biphenyl [ng/cig]
LRB	< 0.008	< 0.012 but ≥ 0.004	< 0.001
Average	**BDL**	**NQ**	**BDL**
Std. Dev.	**BDL**	**NQ**	**BDL**
L. Limit (95%)	ND	ND	ND
U. Limit (95%)	ND	ND	ND

* puff volume, 55mL; interval, 30 sec; duration, 2 sec; vent blocking, 0%
See text for additional details.

Glossary of Abbreviations
BDL: Below the Limit of Detection
ND: Not Defined

Table 19a: **Yields of Various Volatile Organics in Mainstream Tobacco Smoke: 'ISO' Conditions***

Sample ID	Weight [mg/cig]	Puff Count [per cig]	MS TPM [mg/cig]	Gas Phase				
				1,3-butadiene [µg/cig]	Isoprene [µg/cig]	Acrylonitrile [µg/cig]	Benzene [µg/cig]	Toluene [µg/cig]
1682837	833	6.0	25.3	0.169	1.72	< 0.032	0.218	0.734
1682837	835	6.0	22.8	< 0.095 but ≥ 0.029	0.540	< 0.032	0.259	0.890
1682837	832	6.0	24.4	0.160	1.34	< 0.032	0.206	0.988
1682837	834	6.0	21.8	< 0.095 but ≥ 0.029	0.740	< 0.032	0.143	0.410
1682837	842	6.0	23.9	0.117	0.860	< 0.032	0.170	0.417
1682837	849	6.0	23.9	0.156	1.04	< 0.032	0.167	0.411
1682837	847	6.0	23.9	0.117	1.10	< 0.032	0.192	0.733
Average	839	6.0	23.7	0.120	1.05	**BDL**	0.194	0.655
Std. Dev.	7	0.0	1.1	0.045	0.39	**BDL**	0.038	0.243
L. Limit (95%)	832	6.0	22.7	0.079	0.68	N/A	0.158	0.430
U. Limit (95%)	845	6.0	24.7	0.162	1.41	N/A	0.229	0.880
1682838	843	6.0	24.0	0.135	0.940	< 0.107 but ≥ 0.032	0.324	1.35
1682838	846	6.0	23.3	0.108	0.980	< 0.107 but ≥ 0.032	0.196	0.678
1682838	849	6.0	25.2	0.142	0.760	< 0.032	0.175	0.900
1682838	846	6.0	24.7	< 0.095 but ≥ 0.029	1.22	0.128	0.242	1.04
1682838	840	6.0	23.5	0.183	0.940	< 0.107 but ≥ 0.032	0.235	1.23
1682838	847	6.0	27.6	0.106	0.880	< 0.107 but ≥ 0.032	0.180	0.466
1682838	841	6.0	26.0	< 0.095 but ≥ 0.029	0.880	< 0.107 but ≥ 0.032	0.219	0.830
Average	845	6.0	24.9	0.114	0.943	**NQ**	0.224	0.926
Std. Dev.	3	0.0	1.5	0.044	0.141	**NQ**	0.051	0.306
L. Limit (95%)	842	6.0	23.5	0.073	0.812	N/A	0.177	0.643
U. Limit (95%)	847	6.0	26.3	0.154	1.073	N/A	0.271	1.210

Table 19a: **Yields of Various Volatile Organics in Mainstream Tobacco Smoke: 'ISO' Conditions***

Sample ID	Weight	Puff Count	MS TPM	Gas Phase				
				1,3-butadiene	Isoprene	Acrylonitrile	Benzene	Toluene
	[mg/cig]	[per cig]	[mg/cig]	[µg/cig]	[µg/cig]	[µg/cig]	[µg/cig]	[µg/cig]
1682839	849	6.0	22.9	0.241	1.68	< 0.032	0.202	0.490
1682839	856	6.0	25.8	0.174	0.840	< 0.107 but ≥ 0.032	0.147	0.555
1682839	863	6.0	22.9	0.134	1.38	< 0.032	0.213	0.686
1682839	859	6.0	24.7	0.121	1.04	< 0.032	0.162	0.490
1682839	855	6.0	22.9	< 0.095 but ≥ 0.029	1.18	< 0.032	0.171	0.641
1682839	852	6.0	25.5	0.112	1.14	< 0.032	0.197	0.749
1682839	862	6.0	23.1	0.144	0.960	< 0.032	0.262	1.20
Average	857	6.0	24.0	0.141	1.17	**BDL**	0.193	0.686
Std. Dev.	5	0.0	1.3	0.056	0.28	**BDL**	0.038	0.245
L. Limit (95%)	852	6.0	22.7	0.090	0.91	N/A	0.158	0.460
U. Limit (95%)	861	6.0	25.2	0.193	1.43	N/A	0.229	0.913

* puff volume, 35mL; interval, 60 sec; duration, 2 sec; vent blocking, 0%
See text for additional details.

Glossary of Abbreviations
BDL: Below the Limit of Detection
NQ: Below the Limit of Quantification
N/A: Not Applicable

Table 19a: Yields of Various Volatile Organics in Laboratory Reagent Blank: 'ISO' Conditions*

Sample ID	Gas Phase				
	1,3-butadiene [µg/cig]	Isoprene [µg/cig]	Acrylonitrile [µg/cig]	Benzene [µg/cig]	Toluene [µg/cig]
LRB	< 0.029	< 0.041	< 0.032	< 0.017	< 0.061
Average	**BDL**	**BDL**	**BDL**	**BDL**	**BDL**
Std. Dev.	**BDL**	**BDL**	**BDL**	**BDL**	**BDL**
L. Limit (95%)	ND	ND	ND	ND	ND
U. Limit (95%)	ND	ND	ND	ND	ND

* puff volume, 35mL; interval, 60 sec; duration, 2 sec; vent blocking, 0%
See text for additional details.

Glossary of Abbreviations
BDL: Below the Limit of Detection
ND: Not Defined

Table 19b: **Yields of Various Volatile Organics in Mainstream Tobacco Smoke: 'Intense' Conditions***

Sample ID	Weight	Puff Count	MS TPM	Gas Phase				
				1,3-butadiene	Isoprene	Acrylonitrile	Benzene	Toluene
	[mg/cig]	[per cig]	[mg/cig]	[µg/cig]	[µg/cig]	[µg/cig]	[µg/cig]	[µg/cig]
1682837	853	12.0	61.2	0.152	1.52	0.136	0.563	1.86
1682837	857	12.0	58.8	0.182	1.56	0.170	0.559	1.68
1682837	847	12.0	57.6	0.203	2.42	0.129	0.425	1.27
1682837	846	12.0	57.2	0.284	2.68	0.154	0.446	1.41
1682837	840	12.0	57.1	0.188	1.16	0.115	0.514	1.57
1682837	834	12.0	46.3	0.162	1.28	< 0.107 but ≥ 0.032	0.362	1.26
1682837	847	12.0	58.8	0.311	1.54	< 0.107 but ≥ 0.032	0.442	1.29
Average	846	12.0	56.7	0.212	1.74	0.120	0.473	1.48
Std. Dev.	8	0.0	4.8	0.061	0.58	0.039	0.075	0.23
L. Limit (95%)	839	12.0	52.3	0.155	1.20	0.084	0.404	1.26
U. Limit (95%)	853	12.0	61.1	0.269	2.27	0.156	0.542	1.69
1682838	849	12.0	52.4	0.195	2.30	0.201	0.433	1.14
1682838	847	12.0	57.1	0.214	1.74	0.137	0.514	1.45
1682838	861	12.0	58.5	0.185	1.56	0.135	0.440	1.23
1682838	852	12.0	58.3	0.222	1.58	0.136	0.442	1.13
1682838	848	12.0	55.2	0.194	1.64	< 0.107 but ≥ 0.032	0.489	1.55
1682838	855	12.0	56.6	0.228	1.76	0.222	0.504	1.37
1682838	857	12.0	55.6	0.192	2.72	0.151	0.486	1.62
Average	853	12.0	56.3	0.204	1.90	0.150	0.473	1.36
Std. Dev.	5	0.0	2.1	0.017	0.44	0.050	0.033	0.20
L. Limit (95%)	848	12.0	54.3	0.189	1.49	0.104	0.442	1.18
U. Limit (95%)	857	12.0	58.2	0.220	2.31	0.196	0.503	1.54

Table 19b: **Yields of Various Volatile Organics in Mainstream Tobacco Smoke: 'Intense' Conditions***

Sample ID	Weight [mg/cig]	Puff Count [per cig]	MS TPM [mg/cig]	Gas Phase				
				1,3-butadiene [µg/cig]	Isoprene [µg/cig]	Acrylonitrile [µg/cig]	Benzene [µg/cig]	Toluene [µg/cig]
1682839	841	12.0	52.0	0.119	1.08	0.107	0.505	1.02
1682839	855	12.0	57.6	0.201	1.80	0.148	0.536	1.91
1682839	851	12.0	54.9	0.205	1.16	< 0.107 but ≥ 0.032	0.448	1.25
1682839	863	12.0	58.8	0.185	1.94	0.144	0.500	1.36
1682839	854	12.0	58.5	0.342	2.34	0.186	0.528	1.38
1682839	853	12.0	59.7	0.256	1.46	0.181	0.452	1.05
1682839	855	12.0	56.1	0.268	1.66	< 0.032	0.471	1.45
Average	853	12.0	56.8	0.225	1.63	0.122	0.491	1.35
Std. Dev.	7	0.0	2.7	0.071	0.44	0.062	0.035	0.30
L. Limit (95%)	847	12.0	54.3	0.160	1.22	0.064	0.459	1.07
U. Limit (95%)	859	12.0	59.3	0.291	2.04	0.179	0.524	1.62

* puff volume, 55mL; interval, 30 sec; duration, 2 sec; vent blocking,0%
See text for additional details.

Table 19b: Yields of Various Volatile Organics in Laboratory Reagent Blank: 'Intense' Conditions*

Sample ID	Gas Phase				
	1,3-butadiene [µg/cig]	Isoprene [µg/cig]	Acrylonitrile [µg/cig]	Benzene [µg/cig]	Toluene [µg/cig]
LRB	< 0.029	< 0.041	< 0.032	< 0.017	< 0.061
Average	**BDL**	**BDL**	**BDL**	**BDL**	**BDL**
Std. Dev.	**BDL**	**BDL**	**BDL**	**BDL**	**BDL**
L. Limit (95%)	ND	ND	ND	ND	ND
U. Limit (95%)	ND	ND	ND	ND	ND

* puff volume, 55mL; interval, 30 sec; duration, 2 sec; vent blocking, 0%
See text for additional details.

Glossary of Abbreviations
BDL: Below the Limit of Detection
ND: Not Defined

Yields of Tobacco Specific Nitrosamines in Mainstream Tobacco Smoke (LC-MS/MS Method): 'ISO' Conditions*

Sample ID	Weight [mg/cig]	Puff Count [per cig]	MS TPM [mg/cig]	NNN [ng/cig]	NNK [ng/cig]
1682837	850	6.0	24.1	2.91	1.22
1682837	849	6.0	27.9	3.22	2.04
1682837	840	6.0	25.4	2.90	1.82
1682837	853	6.0	24.2	2.72	1.89
1682837	848	6.0	25.0	3.19	1.92
1682837	829	6.0	26.2	3.36	2.22
1682837	845	6.0	26.4	2.93	1.70
Average	845	6.0	25.6	3.03	1.83
Std. Dev.	8	0.0	1.4	0.23	0.32
L. Limit (95%)	837	6.0	24.3	2.82	1.54
U. Limit (95%)	853	6.0	26.8	3.24	2.12
1682838	857	6.0	24.8	2.74	1.33
1682838	851	6.0	25.3	2.87	2.04
1682838	846	6.0	23.2	2.91	1.22
1682838	846	6.0	24.7	2.97	1.55
1682838	859	6.0	26.1	3.56	1.79
1682838	872	6.0	25.3	2.88	1.50
1682838	851	6.0	28.5	3.19	1.82
Average	854	6.0	25.4	3.02	1.61
Std. Dev.	9	0.0	1.6	0.27	0.29
L. Limit (95%)	846	6.0	23.9	2.76	1.34
U. Limit (95%)	863	6.0	26.9	3.27	1.87
1682839	846	6.0	24.1	3.47	1.64
1682839	861	6.0	24.6	3.24	1.74
1682839	859	6.0	25.1	3.27	2.02
1682839	849	6.0	27.8	3.38	1.83
1682839	864	6.0	24.7	3.02	1.58
1682839	870	6.0	25.7	3.37	1.67
1682839	849	6.0	23.3	2.68	1.37
Average	857	6.0	25.0	3.20	1.69
Std. Dev.	9	0.0	1.4	0.27	0.20
L. Limit (95%)	849	6.0	23.7	2.95	1.51
U. Limit (95%)	865	6.0	26.4	3.46	1.88

* puff volume, 35mL; interval, 60 sec; duration, 2 sec; vent blocking, 0%
See text for additional details.

Yields of Tobacco Specific Nitrosamines in Laboratory Reagent Blank (LC-MS/MS Method): 'ISO' Conditions*

Sample ID	NNN [ng/cig]	NNK [ng/cig]
LRB	< 0.098	< 0.151
Average	**BDL**	**BDL**
Std. Dev.	**BDL**	**BDL**
L. Limit (95%)	ND	ND
U. Limit (95%)	ND	ND

* puff volume, 35mL; interval, 60 sec; duration, 2 sec; vent blocking, 0%
See text for additional details.

Glossary of Abbreviations
BDL: Below the Limit of Detection
ND: Not Defined

Yields of Tobacco Specific Nitrosamines in Mainstream Tobacco Smoke

Sample ID	Weight [mg/cig]	Puff Count [per cig]	MS TPM [mg/cig]	NNN [ng/cig]	NNK [ng/cig]
1682837	849	12.0	56.9	7.28	6.08
1682837	837	12.0	55.2	7.84	5.00
1682837	850	12.0	54.9	6.80	5.68
1682837	846	12.0	56.8	7.68	5.84
1682837	844	12.0	54.6	7.68	6.60
1682837	857	12.0	53.9	7.12	5.28
1682837	844	12.0	57.4	7.68	5.24
Average	847	12.0	55.7	7.44	5.67
Std. Dev.	6	0.0	1.3	0.38	0.55
L. Limit (95%)	841	12.0	54.4	7.09	5.16
U. Limit (95%)	853	12.0	56.9	7.79	6.19
1682838	853	12.0	60.0	8.72	6.40
1682838	835	12.0	56.0	7.60	6.20
1682838	845	12.0	55.5	8.84	5.40
1682838	843	12.0	56.9	9.24	6.44
1682838	857	12.0	58.6	8.72	7.08
1682838	844	12.0	57.1	9.04	6.32
1682838	855	12.0	56.9	8.64	5.68
Average	848	12.0	57.3	8.69	6.22
Std. Dev.	8	0.0	1.5	0.52	0.55
L. Limit (95%)	840	12.0	55.9	8.20	5.71
U. Limit (95%)	855	12.0	58.7	9.17	6.72
1682839	850	12.0	58.2	7.12	5.04
1682839	863	12.0	57.1	7.84	5.92
1682839	855	12.0	57.0	7.08	5.00
1682839	855	12.0	58.6	7.80	5.68
1682839	845	12.0	59.6	8.12	6.44
1682839	858	12.0	56.8	8.44	6.16
1682839	863	12.0	54.5	7.76	5.84
Average	856	12.0	57.4	7.74	5.73
Std. Dev.	6	0.0	1.6	0.49	0.54
L. Limit (95%)	850	12.0	55.9	7.28	5.23
U. Limit (95%)	861	12.0	58.9	8.19	6.22

* puff volume, 55mL; interval, 30 sec; duration, 2 sec; vent blocking, 0%
See text for additional details.

Yields of Tobacco Specific Nitrosamines in Laboratory Reagent Blank (LC-MS/MS Method): 'Intense' Conditions*

Sample ID	NNN [ng/cig]	NNK [ng/cig]
LRB	< 0.098	< 0.151
Average	**BDL**	**BDL**
Std. Dev.	**BDL**	**BDL**
L. Limit (95%)	ND	ND
U. Limit (95%)	ND	ND

* puff volume, 55mL; interval, 30 sec; duration, 2 sec; vent blocking, 0%
See text for additional details.

Glossary of Abbreviations
BDL: Below the Limit of Detection
ND: Not Defined

Yields of Triacetin, Humectants and Menthol in Mainstream Tobacco Smoke: 'ISO' Conditions*

Sample ID	Weight [mg/cig]	Puff Count [per cig]	MS TPM [mg/cig]	Glycerol [mg/cig]
1682837	834	6.0	23.3	1.78
1682837	834	6.0	24.8	2.03
1682837	837	6.0	22.8	1.70
1682837	839	6.0	21.6	1.58
1682837	842	6.0	21.4	1.44
1682837	843	6.0	24.0	1.98
1682837	829	6.0	22.8	1.83
1682837	840	6.0	23.7	1.84
1682837	841	6.0	23.8	1.73
1682837	823	6.0	23.7	1.83
1682837	841	6.0	25.6	1.95
1682837	848	6.0	24.1	1.83
1682837	818	6.0	24.5	1.88
1682837	856	6.0	25.5	1.89
1682837	852	6.0	24.6	1.87
1682837	838	6.0	24.7	1.58
1682837	831	6.0	24.5	1.70
1682837	839	6.0	25.0	1.77
1682837	841	6.0	24.9	1.66
1682837	832	6.0	25.4	1.74
Average	838	6.0	24.0	1.78
Std. Dev.	9	0.0	1.2	0.14
L. Limit (95%)	834	6.0	23.5	1.71
U. Limit (95%)	842	6.0	24.6	1.85

Yields of Triacetin, Humectants and Menthol in Mainstream Tobacco Smoke: 'ISO' Conditions*

Sample ID	Weight [mg/cig]	Puff Count [per cig]	MS TPM [mg/cig]	Glycerol [mg/cig]
1682838	848	6.0	22.3	1.80
1682838	849	6.0	21.2	1.61
1682838	849	6.0	22.4	1.90
1682838	840	6.0	23.0	1.92
1682838	842	6.0	23.0	1.83
1682838	850	6.0	23.9	1.88
1682838	860	6.0	25.6	1.88
1682838	849	6.0	22.6	1.64
1682838	863	6.0	24.1	1.91
1682838	841	6.0	24.1	2.03
1682838	846	6.0	24.3	1.83
1682838	857	6.0	23.5	1.78
1682838	848	6.0	23.8	1.83
1682838	847	6.0	24.4	1.83
1682838	845	6.0	25.4	1.95
1682838	844	6.0	23.4	1.61
1682838	850	6.0	23.0	1.79
1682838	859	6.0	26.6	2.07
1682838	853	6.0	24.7	1.68
1682838	844	6.0	25.5	1.87
Average	849	6.0	23.8	1.83
Std. Dev.	6	0.0	1.3	0.13
L. Limit (95%)	846	6.0	23.2	1.77
U. Limit (95%)	852	6.0	24.4	1.89

Yields of Triacetin, Humectants and Menthol in Mainstream Tobacco Smoke: 'ISO' Conditions*

Sample ID	Weight [mg/cig]	Puff Count [per cig]	MS TPM [mg/cig]	Glycerol [mg/cig]
1682839	853	6.0	23.2	1.74
1682839	848	6.0	23.2	1.89
1682839	859	6.0	23.9	1.90
1682839	849	6.0	24.3	1.90
1682839	849	6.0	23.3	1.80
1682839	861	6.0	22.7	1.77
1682839	850	6.0	21.6	1.66
1682839	839	6.0	24.4	1.92
1682839	851	6.0	24.7	1.87
1682839	836	6.0	22.0	1.49
1682839	844	6.0	23.1	1.89
1682839	867	6.0	22.4	1.63
1682839	851	6.0	24.7	2.00
1682839	839	6.0	23.2	1.80
1682839	846	6.0	24.8	1.93
1682839	860	6.0	25.9	1.77
1682839	856	6.0	24.8	1.97
1682839	841	6.0	25.0	1.68
1682839	854	6.0	25.4	1.82
1682839	830	6.0	24.6	1.86
Average	849	6.0	23.9	1.82
Std. Dev.	9	0.0	1.2	0.13
L. Limit (95%)	845	6.0	23.3	1.76
U. Limit (95%)	853	6.0	24.4	1.88

* puff volume, 35mL; interval, 60 sec; duration, 2 sec; vent blocking, 0%
See text for additional details.

Yields of Glycerol in Laboratory Reagent Blank: 'ISO' Conditions*

Sample ID	Glycerol [mg/cig]
LRB	< 0.014
Average	**BDL**
Std. Dev.	**BDL**
L. Limit (95%)	ND
U. Limit (95%)	ND

* puff volume, 35mL; interval, 60 sec; duration, 2 sec; vent blocking, 0%
See text for additional details.

Glossary of Abbreviations
BDL: Below the Limit of Detection
ND: Not Defined

Yields of Triacetin, Humectants and Menthol in Mainstream Tobacco Smoke: 'Intense' Conditions*

Sample ID	Weight [mg/cig]	Puff Count [per cig]	MS TPM [mg/cig]	Glycerol [mg/cig]
1682837	834	12.0	52.6	4.33
1682837	841	12.0	52.5	4.23
1682837	842	12.0	54.1	4.28
1682837	834	12.0	52.7	4.28
1682837	820	12.0	53.8	4.56
1682837	835	12.0	53.7	4.02
1682837	842	12.0	54.0	4.71
1682837	831	12.0	52.6	4.13
1682837	824	12.0	52.1	4.53
1682837	824	12.0	52.4	4.32
1682837	836	12.0	52.2	4.23
1682837	842	12.0	53.3	4.11
1682837	830	12.0	52.0	4.15
1682837	835	12.0	53.5	4.59
1682837	838	12.0	53.6	4.34
1682837	830	12.0	54.0	4.88
1682837	835	12.0	51.2	4.26
1682837	839	12.0	53.3	4.09
1682837	844	12.0	56.6	5.23
1682837	843	12.0	55.1	4.42
Average	835	12.0	53.3	4.38
Std. Dev.	7	0.0	1.2	0.30
L. Limit (95%)	832	12.0	52.7	4.2
U. Limit (95%)	838	12.0	53.8	4.5

Yields of Triacetin, Humectants and Menthol in Mainstream Tobacco Smoke: 'Intense' Conditions*

Sample ID	Weight [mg/cig]	Puff Count [per cig]	MS TPM [mg/cig]	Glycerol [mg/cig]
1682838	845	12.0	54.4	4.62
1682838	838	12.0	53.2	4.63
1682838	832	12.0	51.8	4.35
1682838	842	12.0	53.8	4.58
1682838	828	12.0	53.2	4.57
1682838	852	12.0	54.5	4.29
1682838	831	12.0	55.7	4.53
1682838	851	12.0	52.9	4.19
1682838	851	12.0	54.0	4.20
1682838	848	12.0	53.8	4.46
1682838	849	12.0	53.9	4.67
1682838	862	12.0	55.6	4.79
1682838	854	12.0	52.9	4.34
1682838	832	12.0	52.4	4.38
1682838	845	12.0	53.2	4.78
1682838	844	12.0	56.1	4.82
1682838	848	12.0	54.9	4.99
1682838	849	12.0	55.6	4.76
1682838	854	12.0	55.9	4.58
1682838	832	12.0	55.2	4.96
Average	844	12.0	54.1	4.57
Std. Dev.	9	0.0	1.3	0.23
L. Limit (95%)	840	12.0	53.6	4.5
U. Limit (95%)	849	12.0	54.7	4.7

Yields of Triacetin, Humectants and Menthol in Mainstream Tobacco Smoke: 'Intense' Conditions*

Sample ID	Weight [mg/cig]	Puff Count [per cig]	MS TPM [mg/cig]	Glycerol [mg/cig]
1682839	849	12.0	56.2	4.62
1682839	849	12.0	55.7	5.04
1682839	850	12.0	53.9	4.53
1682839	870	12.0	51.9	4.00
1682839	839	12.0	53.1	4.30
1682839	832	12.0	52.3	4.38
1682839	849	12.0	56.1	4.60
1682839	843	12.0	55.5	4.42
1682839	842	12.0	55.8	4.68
1682839	836	12.0	54.3	4.71
1682839	833	12.0	52.8	3.93
1682839	845	12.0	54.6	4.57
1682839	846	12.0	54.0	4.35
1682839	851	12.0	54.6	4.22
1682839	843	12.0	55.3	4.78
1682839	859	12.0	54.4	4.36
1682839	849	12.0	55.2	4.52
1682839	836	12.0	55.2	4.72
1682839	838	12.0	55.9	4.79
1682839	852	12.0	55.6	4.87
Average	846	12.0	54.6	4.52
Std. Dev.	9	0.0	1.3	0.28
L. Limit (95%)	841	12.0	54.0	4.4
U. Limit (95%)	850	12.0	55.2	4.7

* puff volume, 55mL; interval, 30 sec; duration, 2 sec; vent blocking, 0%
See text for additional details.

Yields of Glycerol in Laboratory Reagent Blank: 'Intense' Conditions*

Sample ID	Glycerol [mg/cig]
LRB	< 0.014
Average	**BDL**
Std. Dev.	**BDL**
L. Limit (95%)	ND
U. Limit (95%)	ND

* puff volume, 35mL; interval, 60 sec; duration, 2 sec; vent blocking, 0%
See text for additional details.

Glossary of Abbreviations
BDL: Below the Limit of Detection
ND: Not Defined

12 APPENDIX B: "RAW" DATA AND SUMMARY STATISTIC

Labstat Sample ID	SMP Description	Batch #	Qty/Type Received	Type of Product	Type of Analysis
1682840	SMP067934	41-2572144	One plastic container	sticks	tobacco constituents
1682841	SMP067935	41-2572144	One plastic container	sticks	tobacco constituents
1682842	SMP067936	41-2572144	One plastic container	sticks	tobacco constituents

Limits of Detection (LOD) and Limits of Quantification (LOQ) Determined for Selected Constituents in Processed Tobacco

Health Canada Method	Analyte	Units	Processed Tobacco	
			LOD	LOQ
	Alkaloids			
T-301	Nicotine	µg/g (dry wt)	75.0	250
	Ammonia			
T-302	Ammonia	µg/g (dry wt)	18.0	60.0
	Toxic Trace Metals			
T-306*	Cadmium	ng/g (dry wt)	8.23	27.4
T-306*	Arsenic	ng/g (dry wt)	7.01	23.4

Abbreviations: BDL, below detection limit; NQ, below quantitation limit; N/A, not applicable
Date of last review: May 30, 2012

NOTE: The above limits referred to samples processed as required by the referenced Health Canada Method (ie. either "as received" or "dried"). Corrections for the moisture content, determined independently, must be applied where applicable in order to convert the "as received" limits to limits expressed on a "dry weight" basis.

*NOTE: The LOD and LOQ are based on the lowest standard concentration used for calibration of the instruments as referenced in the Health Canada Method.

LOD Definition: The limit of detection (LOD) for a particular analyte is a statistically defined decision point that, with a specified probability, measured results falling at or above this point are interpreted to indicate an analyte concentration greater than zero within the sample.

LOQ Definition: The limit of quantification for a particular analyte is another statistically defined decision point that results falling at or above this point can be assigned a statistically significant numerical value with an associated level of precision. Values falling between the LOD and LOQ are interpreted as a positive but not quantifiable result for the analyte in question.

*Methods have been modified from the standard methods.

Limits of Detection (LOD) and Limits of Quantification (LOQ) Determined for Selected Constituents in Processed Tobacco

Labstat Method	Analyte	Units	Processed Tobacco	
			LOD	LOQ
	Tobacco Specific Nitrosamines (LC-MS/MS)			
TWT-00333	Nitrosonornicotine (NNN)	ng/g (as rec'd)	0.985	3.28
TWT-00333	4-(N-nitrosomethylamino)-1-(3-pyridyl)-1-butanone (NNK)	ng/g (as rec'd)	1.51	5.02

Abbreviations: BDL, below detection limit; NQ, below quantitation limit; N/A, not applicable
Date of last review: August 12, 2013

NOTE: The above limits referred to samples processed as required by the referenced Health Canada Method (i.e. either "as received" or "dried"). Corrections for the moisture content, determined independently, must be applied where applicable in order to convert the "as received" limits to limits expressed on a "dry weight" basis.

**NOTE: The LOD and LOQ are based on the lowest standard concentration used for calibration of the instruments as referenced in the Health Canada Method.

LOD Definition: The limit of detection (LOD) for a particular analyte is a statistically defined decision point that, with a specified probability, measured results falling at or above this point are interpreted to indicate an analyte concentration greater than zero within the sample.

LOQ Definition: The limit of quantification for a particular analyte is another statistically defined decision point that results falling at or above this point can be assigned a statistically significant numerical value with an associated level of precision. Values falling between the LOD and LOQ are interpreted as a positive but not quantifiable result for the analyte in question.

*Methods have been modified from the standard methods.

Weight of Tobacco in Bidi, Cigarette, Cigar, Tobacco Stick or Kretek Samples (milligrams of tobacco per unit 'as received')*

	Sample ID		
Obs.	1682840	1682841	1682842
1	3164.5	3287.3	3002.6
2	3258.1	3287.7	3135.2
3	3268.4	3192.8	3221.2
4	3101.2	3384.9	3291.7
5	3095.0	3333.5	3128.3
6	3185.7	3181.1	3150.7
7	3193.3	3275.6	2991.3
8	3237.7	2949.7	3266.7
9	3309.4	3279.1	3246.3
10	3380.8	3370.0	3226.1
Average	3219.4	3254.2	3166.0
Std. Dev	89.9	125.6	104.8
L. Limit (95%)	3155.1	3164.3	3091.0
U. Limit (95%)	3283.7	3344.0	3241.0

Weight of Tobacco in Bidi, Cigarette, Cigar, Tobacco Stick or Kretek Samples (milligrams of tobacco per unit 'dry weight')**

Sample ID	Tobacco Weight (mg/unit)	Dry Matter (%)	Tobacco Weight (mg/unit) 'dry weight'
1682840	3219.4	82.8	2666.3
1682841	3254.2	82.5	2683.8
1682842	3166.0	82.6	2615.9

* as required in part 3, section 14 (2)c of the Canadian Tobacco Reporting Regulations

** as required in part 2, section 12 (6) and 12 (7)ci. of the Canadian Tobacco Reporting Regulations

Tobacco Constituent	Matrix Code Sample ID Unit	WT 1682840 Average	WT 1682840 Std. Dev.	WT 1682840 L. Limit (95%)	WT 1682840 U. Limit (95%)
Alkaloids					
Nicotine	[µg/g]	18000	406	17624	18376
Ammonia					
Ammonia	[µg/g]	421	17	405	437
Toxic Trace Metals					
Cadmium	[ng/g]	708	20	689	726
Arsenic	[ng/g]	143	5	138	147
Tobacco Specific Nitrosamines (LC-MS/MS)					
Nitrosonornicotine (NNN)	[ng/g]	242	27	217	268
4-(N-nitrosomethylamino)-1-(3-pyridyl)-1-butanone (NNK)	[ng/g]	204	12	193	215
Water					
Dry Matter	(%)	82.8	0.4	82.4	83.2
Moisture	(%)	17.2	0.4	16.8	17.6

Glossary of Abbreviations

L. Limit (95%): lower limit of the 95% confidence interval

U. Limit (95%): upper limit of the 95% confidence interval

Tobacco Constituent	Matrix Code Sample ID Unit	WT 1682841 Average	WT 1682841 Std. Dev.	WT 1682841 L. Limit (95%)	WT 1682841 U. Limit (95%)
Alkaloids					
Nicotine	[µg/g]	17591	689	16954	18228
Ammonia					
Ammonia	[µg/g]	427	13	415	440
Toxic Trace Metals					
Cadmium	[ng/g]	682	19	664	700
Arsenic	[ng/g]	138	4	134	142
Tobacco Specific Nitrosamines (LC-MS/MS)					
Nitrosonornicotine (NNN)	[ng/g]	255	16	240	270
4-(N-nitrosomethylamino)-1-(3-pyridyl)-1-butanone (NNK)	[ng/g]	198	11	188	209
Water					
Dry Matter	(%)	82.5	0.5	82.0	82.9
Moisture	(%)	17.5	0.5	17.1	18.0

Glossary of Abbreviations

L. Limit (95%): lower limit of the 95% confidence interval

U. Limit (95%): upper limit of the 95% confidence interval

Tobacco Constituent	Matrix Code Sample ID Unit	WT 1682842 Average	WT 1682842 Std. Dev.	WT 1682842 L. Limit (95%)	WT 1682842 U. Limit (95%)
Alkaloids					
Nicotine	[µg/g]	17759	272	17508	18010
Ammonia					
Ammonia	[µg/g]	426	7	420	432
Toxic Trace Metals					
Cadmium	[ng/g]	688	16	673	702
Arsenic	[ng/g]	141	11	131	151
Tobacco Specific Nitrosamines (LC-MS/MS)					
Nitrosonornicotine (NNN)	[ng/g]	247	10	238	257
4-(N-nitrosomethylamino)-1-(3-pyridyl)-1-butanone (NNK)	[ng/g]	196	8	189	203
Water					
Dry Matter	(%)	82.6	0.3	82.4	82.9
Moisture	(%)	17.4	0.3	17.1	17.6

Glossary of Abbreviations

L. Limit (95%): lower limit of the 95% confidence interval

U. Limit (95%): upper limit of the 95% confidence interval

Tobacco Constituent	Matrix Code Sample ID Unit	WT 1682840 Average	WT 1682840 Std. Dev.	WT 1682840 L. Limit (95%)	WT 1682840 U. Limit (95%)
Alkaloids					
Nicotine	[µg/unit]	47993	1083	46991	48995
Ammonia					
Ammonia	[µg/unit]	1122	46	1079	1164
Toxic Trace Metals					
Cadmium	[ng/unit]	1887	53	1838	1935
Arsenic	[ng/unit]	380	13	368	392
Tobacco Specific Nitrosamines (LC-MS/MS)					
Nitrosonornicotine (NNN)	[ng/unit]	646	73	579	713
4-(N-nitrosomethylamino)-1-(3-pyridyl)-1-butanone (NNK)	[ng/unit]	543	32	514	573
Water					
Dry Matter	(%)	82.8	0.4	82.4	83.2
Moisture	(%)	17.2	0.4	16.8	17.6

Glossary of Abbreviations

L. Limit (95%): lower limit of the 95% confidence interval

U. Limit (95%): upper limit of the 95% confidence interval

Tobacco Constituent	Matrix Code Sample ID Unit	WT 1682841 Average	WT 1682841 Std. Dev.	WT 1682841 L. Limit (95%)	WT 1682841 U. Limit (95%)
Alkaloids					
Nicotine	[µg/unit]	47209	1848	45500	48919
Ammonia					
Ammonia	[µg/unit]	1147	36	1114	1180
Toxic Trace Metals					
Cadmium	[ng/unit]	1830	52	1782	1878
Arsenic	[ng/unit]	371	12	360	382
Tobacco Specific Nitrosamines (LC-MS/MS)					
Nitrosonornicotine (NNN)	[ng/unit]	684	43	644	724
4-(N-nitrosomethylamino)-1-(3-pyridyl)-1-butanone (NNK)	[ng/unit]	533	30	505	560
Water					
Dry Matter	(%)	82.5	0.5	82.0	82.9
Moisture	(%)	17.5	0.5	17.1	18.0

Glossary of Abbreviations

L. Limit (95%): lower limit of the 95% confidence interval

U. Limit (95%): upper limit of the 95% confidence interval

Tobacco Constituent	Matrix Code Sample ID Unit	WT 1682842 Average	WT 1682842 Std. Dev.	WT 1682842 L. Limit (95%)	WT 1682842 U. Limit (95%)
Alkaloids					
Nicotine	[µg/unit]	46456	710	45799	47113
Ammonia					
Ammonia	[µg/unit]	1114	18	1097	1130
Toxic Trace Metals					
Cadmium	[ng/unit]	1799	41	1762	1837
Arsenic	[ng/unit]	369	28	344	395
Tobacco Specific Nitrosamines (LC-MS/MS)					
Nitrosonornicotine (NNN)	[ng/unit]	647	26	622	671
4-(N-nitrosomethylamino)-1-(3-pyridyl)-1-butanone (NNK)	[ng/unit]	513	21	494	532
Water					
Dry Matter	(%)	82.6	0.3	82.4	82.9
Moisture	(%)	17.4	0.3	17.1	17.6

Glossary of Abbreviations

L. Limit (95%): lower limit of the 95% confidence interval

U. Limit (95%): upper limit of the 95% confidence interval

FILLER REPORT WORKSHEET (1682840)

HPHC Name	CAS Code	FDA UNII Code	Number of Replicate Measurements	Test Start Date	Test End Date	Method of Extraction
Ammonia	7664-41-7	5138Q19F1X	7	2016-08-30	2016-09-14	Health Canada Method T-302; Extract with 0.025N H2SO4, 60 min.
Arsenic	7440-38-2	N712M78A8G	7	2016-08-31	2016-09-07	Health Canada Method T-306; nitric acid microwave digestion; 230°C, 40bar.
Cadmium	7440-43-9	00BH33GNGH	7	2016-08-31	2016-09-07	Health Canada Method T-306; nitric acid microwave digestion; 230°C, 40bar.
Nicotine (total)	54-11-5	6M3C89ZY6R	7	2016-08-30	2016-09-08	Health Canada Method T-306; methanolic KOH, sonicate 3 hours + shake 0.5 hours
4-(Methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK)	64091-91-4	7S395EDO61	7	2016-09-02	2016-09-07	NS235_Report.pdf Section 6.3.3.3; Extract in 100 mM ammonium acetate, 30 min.
N-Nitrosonornicotine (NNN)	16543-55-8	X656TZ86DX	7	2016-09-02	2016-09-07	NS235_Report.pdf Section 6.3.3.3; Extract in 100 mM ammonium acetate, 30 min.

HPHC Name	Method of Separation	If "Other" Method of Separation, Specify	Method of Detection	If "Other" Method of Detection, Specify	Mean Quantity of HPHC per Cigarette	Variance of Mean HPHC Quantity	Type of Variance
Ammonia	IC	N/A	other	CD: Suppressed Conductivity Detection	1121.602	45.657	Standard Deviation
Arsenic	N/A	Inductively Coupled Argon Plasma	MSD	Not Applicable	380.148	13.284	Standard Deviation
Cadmium	N/A	Inductively Coupled Argon Plasma	MSD	Not Applicable	1886.584	52.787	Standard Deviation
Nicotine (total)	GC	N/A	NPD	Not Applicable	47.993	1.083	Standard Deviation
4-(Methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK)	HPLC	N/A	MSMS	Not Applicable	543.483	31.801	Standard Deviation
N-Nitrosonornicotine (NNN)	HPLC	N/A	MSMS	Not Applicable	646.111	72.634	Standard Deviation

HPHC Name	Unit of Measurement - Mean & Variance	If "Other" Unit of Measurement Mean & Variance, Specify
Ammonia	[µg/unit]	Not Applicable
Arsenic	[ng/unit]	Not Applicable
Cadmium	[ng/unit]	Not Applicable
Nicotine (total)	[mg/unit]	Not Applicable
4-(Methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK)	[ng/unit]	Not Applicable
N-Nitrosonornicotine (NNN)	[ng/unit]	Not Applicable

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HPHC Name	CAS Code	FDA UNII Code	Number of Replicate Measurements	Test Start Date	Test End Date	Method of Extraction
Ammonia	7664-41-7	5138Q19F1X	7	2016-08-30	2016-09-14	Health Canada Method T-302; Extract with 0.025N H2SO4, 60 min.
Arsenic	7440-38-2	N712M78A8G	7	2016-08-31	2016-09-07	Health Canada Method T-306; nitric acid microwave digestion; 230°C, 40bar.
Cadmium	7440-43-9	00BH33GNGH	7	2016-08-31	2016-09-07	Health Canada Method T-306; nitric acid microwave digestion; 230°C, 40bar.
Nicotine (total)	54-11-5	6M3C89ZY6R	7	2016-08-30	2016-09-08	Health Canada Method T-306; methanolic KOH, sonicate 3 hours + shake 0.5 hours
4-(Methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK)	64091-91-4	7S395EDO61	7	2016-09-02	2016-09-07	NS235_Report.pdf Section 6.3.3.3; Extract in 100 mM ammonium acetate, 30 min.
N-Nitrosonornicotine (NNN)	16543-55-8	X656TZ86DX	7	2016-09-02	2016-09-07	NS235_Report.pdf Section 6.3.3.3; Extract in 100 mM ammonium acetate, 30 min.

HPHC Name	Method of Separation	If "Other" Method of Separation, Specify	Method of Detection	If "Other" Method of Detection, Specify	Mean Quantity of HPHC per Cigarette	Variance of Mean HPHC Quantity	Type of Variance
Ammonia	IC	N/A	other	CD: Suppressed Conductivity Detection	1146.977	35.558	Standard Deviation
Arsenic	N/A	Inductively Coupled Argon Plasma	MSD	Not Applicable	371.067	11.817	Standard Deviation
Cadmium	N/A	Inductively Coupled Argon Plasma	MSD	Not Applicable	1830.016	51.807	Standard Deviation
Nicotine (total)	GC	N/A	NPD	Not Applicable	47.209	1.848	Standard Deviation
4-(Methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK)	HPLC	N/A	MSMS	Not Applicable	532.592	30.046	Standard Deviation
N-Nitrosonornicotine (NNN)	HPLC	N/A	MSMS	Not Applicable	683.676	43.182	Standard Deviation

HPHC Name	Unit of Measurement - Mean & Variance	If "Other" Unit of Measurement Mean & Variance, Specify
Ammonia	[µg/unit]	Not Applicable
Arsenic	[ng/unit]	Not Applicable
Cadmium	[ng/unit]	Not Applicable
Nicotine (total)	[mg/unit]	Not Applicable
4-(Methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK)	[ng/unit]	Not Applicable
N-Nitrosonornicotine (NNN)	[ng/unit]	Not Applicable

FILLER REPORT WORKSHEET (1682842)

HPHC Name	CAS Code	FDA UNII Code	Number of Replicate Measurements	Test Start Date	Test End Date	Method of Extraction
Ammonia	7664-41-7	5138Q19F1X	7	2016-08-30	2016-09-14	Health Canada Method T-302; Extract with 0.025N H2SO4, 60 min.
Arsenic	7440-38-2	N712M78A8G	7	2016-08-31	2016-09-07	Health Canada Method T-306; nitric acid microwave digestion; 230°C, 40bar.
Cadmium	7440-43-9	00BH33GNGH	7	2016-08-31	2016-09-07	Health Canada Method T-306; nitric acid microwave digestion; 230°C, 40bar.
Nicotine (total)	54-11-5	6M3C89ZY6R	7	2016-08-30	2016-09-08	Health Canada Method T-306; methanolic KOH, sonicate 3 hours + shake 0.5 hours
4-(Methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK)	64091-91-4	7S395EDO61	7	2016-09-02	2016-09-07	NS235_Report.pdf Section 6.3.3.3; Extract in 100 mM ammonium acetate, 30 min.
N-Nitrosonornicotine (NNN)	16543-55-8	X656TZ86DX	7	2016-09-02	2016-09-07	NS235_Report.pdf Section 6.3.3.3; Extract in 100 mM ammonium acetate, 30 min.

HPHC Name	Method of Separation	If "Other" Method of Separation, Specify	Method of Detection	If "Other" Method of Detection, Specify	Mean Quantity of HPHC per Cigarette	Variance of Mean HPHC Quantity	Type of Variance
Ammonia	IC	N/A	other	CD: Suppressed Conductivity Detection	1113.896	17.820	Standard Deviation
Arsenic	N/A	Inductively Coupled Argon Plasma	MSD	Not Applicable	369.148	27.694	Standard Deviation
Cadmium	N/A	Inductively Coupled Argon Plasma	MSD	Not Applicable	1799.484	41.053	Standard Deviation
Nicotine (total)	GC	N/A	NPD	Not Applicable	46.456	0.710	Standard Deviation
4-(Methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK)	HPLC	N/A	MSMS	Not Applicable	513.128	20.710	Standard Deviation
N-Nitrosonornicotine (NNN)	HPLC	N/A	MSMS	Not Applicable	646.615	26.452	Standard Deviation

HPHC Name	Unit of Measurement - Mean & Variance	If "Other" Unit of Measurement Mean & Variance, Specify
Ammonia	[µg/unit]	Not Applicable
Arsenic	[ng/unit]	Not Applicable
Cadmium	[ng/unit]	Not Applicable
Nicotine (total)	[mg/unit]	Not Applicable
4-(Methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK)	[ng/unit]	Not Applicable
N-Nitrosonornicotine (NNN)	[ng/unit]	Not Applicable

Table 1: **Nicotine and Nicotine Related Contents of Processed Tobacco (per gram 'Dry Weight' Basis)**

Sample ID	Nicotine [µg/g]
1682840	17448
1682840	18021
1682840	17898
1682840	18600
1682840	18005
1682840	18411
1682840	17619
Average	18000
Std. Dev.	406
L. Limit (95%)	17624
U. Limit (95%)	18376
1682841	17821
1682841	18182
1682841	16083
1682841	17606
1682841	17735
1682841	17779
1682841	17928
Average	17591
Std. Dev.	689
L. Limit (95%)	16954
U. Limit (95%)	18228
1682842	17725
1682842	17918
1682842	17987
1682842	17972
1682842	17777
1682842	17195
1682842	17741
Average	17759
Std. Dev.	272
L. Limit (95%)	17508
U. Limit (95%)	18010

Table 2: Ammonia Content of Processed Tobacco (per gram 'Dry Weight' Basis)

Sample ID	Ammonia [µg/g]
1682840	457
1682840	414
1682840	424
1682840	411
1682840	421
1682840	407
1682840	411
Average	421
Std. Dev.	17
L. Limit (95%)	405
U. Limit (95%)	437
1682841	442
1682841	424
1682841	421
1682841	422
1682841	405
1682841	441
1682841	437
Average	427
Std. Dev.	13
L. Limit (95%)	415
U. Limit (95%)	440
1682842	423
1682842	427
1682842	425
1682842	434
1682842	435
1682842	416
1682842	421
Average	426
Std. Dev.	7
L. Limit (95%)	420
U. Limit (95%)	432

Table 4: Toxic Trace Metals Content of Processed Tobacco (per gram 'Dry Weight' Basis)

Sample ID	Cd [ng/g]	As [ng/g]
1682840	713	141
1682840	709	136
1682840	710	147
1682840	724	143
1682840	723	151
1682840	665	140
1682840	710	140
Average	708	143
Std. Dev.	20	5
L. Limit (95%)	689	138
U. Limit (95%)	726	147
1682841	681	137
1682841	673	132
1682841	701	140
1682841	657	133
1682841	661	144
1682841	708	142
1682841	692	140
Average	682	138
Std. Dev.	19	4
L. Limit (95%)	664	134
U. Limit (95%)	700	142

Table 4: **Toxic Trace Metals Content of Processed Tobacco (per gram 'Dry Weight' Basis)**

Sample ID	Cd [ng/g]	As [ng/g]
1682842	685	135
1682842	662	129
1682842	680	135
1682842	708	160
1682842	706	138
1682842	685	149
1682842	689	141
Average	688	141
Std. Dev.	16	11
L. Limit (95%)	673	131
U. Limit (95%)	702	151

Table 13: Moisture Content of Processed Tobacco

Sample ID	Dry Matter (%)	Moisture (%)
1682840	82.8	17.2
1682840	83.0	17.0
1682840	83.0	17.0
1682840	83.2	16.8
1682840	83.2	16.8
1682840	82.1	17.9
1682840	82.4	17.6
Average	82.8	17.2
Std. Dev.	0.4	0.4
L. Limit (95%)	82.4	16.8
U. Limit (95%)	83.2	17.6
1682841	81.5	18.5
1682841	82.4	17.6
1682841	82.2	17.8
1682841	82.9	17.1
1682841	82.7	17.3
1682841	82.7	17.3
1682841	83.0	17.0
Average	82.5	17.5
Std. Dev.	0.5	0.5
L. Limit (95%)	82.0	17.1
U. Limit (95%)	82.9	18.0
1682842	82.9	17.1
1682842	82.7	17.3
1682842	82.6	17.4
1682842	82.2	17.8
1682842	82.4	17.6
1682842	82.6	17.4
1682842	83.0	17.0
Average	82.6	17.4
Std. Dev.	0.3	0.3
L. Limit (95%)	82.4	17.1
U. Limit (95%)	82.9	17.6

TSNA Content of Processed Tobacco - LC-MS/MS Method
(per gram 'Dry Weight' Basis)

Sample ID	NNN [ng/g]	NNK [ng/g]
1682840	279	199
1682840	233	208
1682840	281	205
1682840	237	213
1682840	210	182
1682840	222	219
1682840	234	201
Average	242	204
Std. Dev.	27	12
L. Limit (95%)	217	193
U. Limit (95%)	268	215
1682841	250	206
1682841	234	199
1682841	249	194
1682841	249	207
1682841	250	204
1682841	285	204
1682841	266	175
Average	255	198
Std. Dev.	16	11
L. Limit (95%)	240	188
U. Limit (95%)	270	209
1682842	261	193
1682842	242	193
1682842	237	195
1682842	262	213
1682842	240	188
1682842	245	196
1682842	242	195
Average	247	196
Std. Dev.	10	8
L. Limit (95%)	238	189
U. Limit (95%)	257	203