

Supplementary Materials File S4

1 Non-Intense and Intense Nicotine Normalized Analytical Stability Results

1.1 Virginia Tobacco 18 mg/mL Non-Intense Nicotine Normalized Analytical Stability Results

Parameter/ Constituent	Units	T0	T3	T6	T9	T12	Max
# of puffs	NA	150	134	141	132	114	150
pH	NA	6.01	6.19	6.14	5.90	5.93	6.19
Primary Constituents							
Nicotine	mg/mg nicotine	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00
Glycerol	mg/mg nicotine	3.82E+01	4.19E+01	4.03E+01	4.21E+01	4.35E+01	4.35E+01
Propylene Glycol	mg/mg nicotine	2.39E+01	2.50E+01	2.45E+01	2.44E+01	2.48E+01	2.50E+01
Water	mg/mg nicotine	4.52E+00	5.63E+00	5.68E+00	4.67E+00	5.21E+00	5.68E+00
Menthol	mg/mg nicotine	~ 4.30E-03	~ 5.26E-02	~ 4.57E-03	~ 4.29E-03	~ 5.69E-02	~ 5.69E-02
Diethylene Glycol	mg/mg nicotine	~ 4.57E-03	~ 4.90E-03	~ 4.69E-03	~ 4.40E-03	~ 5.33E-03	~ 5.33E-03
Ethylene Glycol	mg/mg nicotine	~ 4.86E-03	~ 5.24E-03	~ 5.01E-03	~ 4.70E-03	~ 5.71E-03	~ 5.71E-03
Carbonyls & Glycidol							
Acetaldehyde	mg/mg nicotine	1.93E-04	1.68E-04	1.82E-04	2.16E-04	2.74E-04	2.74E-04
Acrolein	mg/mg nicotine	8.82E-05	7.22E-05	~ 3.64E-05	~ 3.42E-05	1.78E-04	1.78E-04
Diacetyl	mg/mg nicotine	~ 3.45E-05	~ 3.78E-05	~ 3.26E-06	~ 3.06E-06	~ 3.90E-05	~ 3.90E-05
Formaldehyde	mg/mg nicotine	8.42E-04	9.52E-04	8.69E-04	1.04E-03	1.13E-03	1.13E-03
Glycidol	mg/mg nicotine	2.24E-04	1.96E-04	2.39E-04	2.35E-04	1.96E-04	2.39E-04
Acetyl Propionyl	mg/mg nicotine	~ 3.01E-06	~ 3.29E-06	~ 3.21E-06	~ 3.02E-06	~ 3.58E-06	~ 3.58E-06
Butyraldehyde	mg/mg nicotine	~ 3.33E-06	~ 3.64E-06	~ 3.21E-06	~ 3.01E-06	~ 3.58E-06	~ 3.64E-06
Crotonaldehyde	mg/mg nicotine	~ 3.05E-06	~ 3.33E-06	~ 5.15E-06	~ 4.84E-06	~ 5.74E-06	~ 5.74E-06
Furfural	mg/mg nicotine	~ 4.22E-06	~ 4.61E-06	~ 5.27E-06	~ 4.95E-06	~ 5.88E-06	~ 5.88E-06
Nicotine Degradants & TSNAs							

Supplementary Material

β-Nicotyrine	mg/mg nicotine	8.44E-05	6.92E-05	7.59E-05	1.35E-04	1.11E-04	1.35E-04
Cotinine	mg/mg nicotine	1.87E-03	2.41E-03	1.80E-03	2.09E-03	2.25E-03	2.41E-03
Myosmine	mg/mg nicotine	1.72E-03	1.99E-03	1.59E-03	1.61E-03	1.65E-03	1.99E-03
Nicotine N Oxide	mg/mg nicotine	~ 3.32E-05	~ 3.62E-05	7.73E-05	~ 2.65E-05	~ 3.14E-05	7.73E-05
Nornicotine	mg/mg nicotine	3.32E-04	5.48E-04	5.60E-04	6.62E-04	7.91E-04	7.91E-04
Anabasine	mg/mg nicotine	~ 2.50E-06	~ 2.73E-06	~ 2.58E-06	~ 2.43E-06	~ 2.88E-06	~ 2.88E-06
Anatabine	mg/mg nicotine	~ 2.49E-06	~ 2.72E-06	~ 2.57E-06	~ 2.66E-05	~ 2.87E-06	~ 2.66E-05
NNK	mg/mg nicotine	~ 7.49E-07	NT	NT	NT	NT	~ 7.49E-07
NNN	mg/mg nicotine	~ 8.99E-08	NT	NT	NT	NT	~ 8.99E-08
Metals							
Arsenic	mg/mg nicotine	~ 2.72E-07	~ 1.78E-06	~ 2.84E-07	~ 1.60E-06	~ 3.17E-07	~ 1.78E-06
Beryllium	mg/mg nicotine	~ 5.99E-08	~ 6.54E-08	~ 6.25E-08	~ 5.87E-08	~ 6.97E-08	~ 6.97E-08
Cadmium	mg/mg nicotine	~ 2.72E-08	~ 2.97E-08	~ 2.84E-08	~ 2.67E-08	~ 3.17E-08	~ 3.17E-08
Chromium	mg/mg nicotine	~ 1.63E-06	~ 2.97E-07	~ 2.84E-07	~ 2.67E-07	~ 1.90E-06	~ 1.90E-06
Cobalt	mg/mg nicotine	~ 1.36E-08	~ 1.49E-08	~ 1.42E-08	~ 1.33E-08	~ 1.58E-08	~ 1.58E-08
Copper	mg/mg nicotine	~ 2.72E-06	~ 7.43E-07	~ 7.11E-07	~ 6.67E-07	~ 7.92E-07	~ 2.72E-06
Gold	mg/mg nicotine	~ 4.63E-06	NT	NT	NT	NT	~ 4.63E-06
Iron	mg/mg nicotine	~ 8.17E-06	~ 2.97E-06	~ 2.84E-06	~ 2.67E-06	~ 3.17E-06	~ 8.17E-06
Lead	mg/mg nicotine	~ 6.81E-08	~ 7.43E-08	~ 7.11E-08	~ 6.67E-08	~ 7.92E-08	~ 7.92E-08
Nickel	mg/mg nicotine	~ 1.36E-07	~ 1.49E-07	~ 1.42E-07	~ 1.33E-07	~ 1.58E-07	~ 1.58E-07
Selenium	mg/mg nicotine	~ 6.51E-07	1.40E-06	~ 6.80E-07	~ 6.38E-07	~ 7.57E-07	1.40E-06
Silver	mg/mg nicotine	~ 2.72E-08	~ 2.97E-08	~ 2.84E-08	~ 2.67E-08	~ 3.17E-08	~ 3.17E-08
Tin	mg/mg nicotine	~ 1.63E-06	~ 2.97E-07	~ 2.84E-07	~ 1.60E-06	~ 3.17E-07	~ 1.63E-06
Zinc	mg/mg nicotine	~ 1.36E-05	~ 4.46E-06	~ 4.26E-06	~ 4.00E-06	~ 4.75E-06	~ 1.36E-05
Organic Acids							
Benzoic Acid	mg/mg nicotine	5.37E-01	4.90E-01	5.67E-01	4.96E-01	5.26E-01	5.67E-01
Propionic Acid	mg/mg nicotine	~ 9.60E-05	~ 1.05E-04	~ 1.76E-03	~ 1.04E-03	~ 1.12E-04	~ 1.76E-03
VOCs							

1,3-Butadiene	mg/mg nicotine	~ 1.49E-06	NT	NT	NT	NT	~ 1.49E-06
Acrylonitrile	mg/mg nicotine	~ 9.79E-07	NT	NT	NT	NT	~ 9.79E-07
Benzene	mg/mg nicotine	~ 1.71E-06	NT	NT	NT	NT	~ 1.71E-06
Isoprene	mg/mg nicotine	~ 2.30E-06	NT	NT	NT	NT	~ 2.30E-06
Propylene Oxide	mg/mg nicotine	~ 3.96E-06	NT	NT	NT	NT	~ 3.96E-06
Toluene	mg/mg nicotine	~ 1.21E-05	NT	NT	NT	NT	~ 1.21E-05
Esters & Alcohols							
1-Butanol	mg/mg nicotine	~ 4.41E-05	NT	NT	NT	NT	~ 4.41E-05
Benzyl Acetate	mg/mg nicotine	~ 6.84E-05	NT	NT	NT	NT	~ 6.84E-05
Ethyl Acetate	mg/mg nicotine	~ 7.83E-05	NT	NT	NT	NT	~ 7.83E-05
Ethyl Acetoacetate	mg/mg nicotine	~ 5.59E-05	NT	NT	NT	NT	~ 5.59E-05
Isoamyl Acetate	mg/mg nicotine	~ 4.77E-05	NT	NT	NT	NT	~ 4.77E-05
Isobutyl Acetate	mg/mg nicotine	~ 4.73E-05	NT	NT	NT	NT	~ 4.73E-05
Methyl Acetate	mg/mg nicotine	~ 5.08E-05	NT	NT	NT	NT	~ 5.08E-05

~ = approximated numeric value (see Supplemental Materials Appendix 1A) generated from the corresponding LOD and LOQ (See Supplemental Materials Appendix 1B)

1.2 Virginia Tobacco 18 mg/mL Intense Nicotine Normalized Analytical Stability Results

Parameter/ Constituent	Units	T0	T3	T6	T9	T12	Max
# of puffs	NA	85 (*86)	86	87	84	83	87
pH	NA	6.17	6.46	5.96	6.17	5.96	6.46
*Primary Constituents							
Nicotine	mg/mg nicotine	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00
Glycerol	mg/mg nicotine	3.77E+01	4.12E+01	4.11E+01	4.06E+01	4.16E+01	4.16E+01
Propylene Glycol	mg/mg nicotine	2.40E+01	2.53E+01	2.46E+01	2.50E+01	2.47E+01	2.53E+01
Water	mg/mg nicotine	3.97E+00	4.61E+00	4.55E+00	5.00E+00	4.85E+00	5.00E+00
Menthol	mg/mg nicotine	~ 4.50E-03	~ 4.38E-03	~ 4.45E-03	~ 4.51E-03	~ 4.74E-03	~ 4.74E-03

Diethylene Glycol	mg/mg nicotine	~ 4.78E-03	~ 4.49E-03	~ 4.56E-03	~ 4.63E-03	~ 5.00E-03	~ 5.00E-03
Ethylene Glycol	mg/mg nicotine	~ 5.09E-03	~ 4.80E-03	~ 4.88E-03	~ 4.95E-03	~ 5.36E-03	~ 5.36E-03
Carbonyls & Glycidol							
Acetaldehyde	mg/mg nicotine	2.56E-04	2.10E-04	2.30E-04	2.49E-04	3.96E-04	3.96E-04
Acrolein	mg/mg nicotine	1.80E-04	1.26E-04	1.14E-04	1.23E-04	4.05E-04	4.05E-04
Diacetyl	mg/mg nicotine	~ 4.21E-05	~ 4.04E-05	~ 4.07E-05	~ 3.75E-06	~ 4.27E-05	~ 4.27E-05
Formaldehyde	mg/mg nicotine	1.30E-03	1.18E-03	1.27E-03	1.29E-03	1.48E-03	1.48E-03
Glycidol	mg/mg nicotine	3.37E-04	2.11E-04	2.95E-04	2.11E-04	2.65E-04	3.37E-04
Acetyl Propionyl	mg/mg nicotine	~ 3.68E-06	~ 3.52E-06	~ 3.65E-06	~ 3.70E-06	~ 3.92E-06	~ 3.92E-06
Butyraldehyde	mg/mg nicotine	~ 4.06E-06	~ 3.89E-06	~ 4.01E-05	~ 3.70E-06	~ 3.92E-06	~ 4.01E-05
Crotonaldehyde	mg/mg nicotine	~ 3.72E-06	~ 3.56E-06	~ 5.85E-06	~ 5.93E-06	~ 6.29E-06	~ 6.29E-06
Furfural	mg/mg nicotine	~ 5.15E-06	~ 4.92E-06	~ 5.99E-06	~ 4.32E-05	~ 6.43E-06	~ 4.32E-05
Nicotine Degradants & TSNAs							
β-Nicotyrine	mg/mg nicotine	1.37E-04	1.16E-04	1.59E-04	1.74E-04	1.42E-04	1.74E-04
Cotinine	mg/mg nicotine	2.02E-03	1.98E-03	2.29E-03	1.93E-03	2.54E-03	2.54E-03
Myosmine	mg/mg nicotine	1.88E-03	1.63E-03	1.98E-03	1.48E-03	1.92E-03	1.98E-03
Nicotine N Oxide	mg/mg nicotine	~ 4.05E-05	~ 3.87E-05	6.33E-05	~ 3.25E-05	~ 3.44E-05	6.33E-05
Nornicotine	mg/mg nicotine	3.75E-04	4.38E-04	6.63E-04	6.07E-04	8.71E-04	8.71E-04
Anabasine	mg/mg nicotine	~ 3.05E-06	~ 2.92E-06	~ 2.93E-06	~ 2.98E-06	~ 3.15E-06	~ 3.15E-06
Anatabine	mg/mg nicotine	~ 3.04E-06	~ 2.91E-06	~ 2.92E-06	~ 3.26E-05	~ 3.14E-06	~ 3.26E-05
NNK	mg/mg nicotine	~ 7.83E-07	NT	NT	NT	NT	~ 7.83E-07
NNN	mg/mg nicotine	~ 9.41E-08	NT	NT	NT	NT	~ 9.41E-08
Metals							
Arsenic	mg/mg nicotine	~ 2.85E-07	~ 2.73E-07	~ 2.77E-07	~ 2.81E-07	~ 2.97E-07	~ 2.97E-07
Beryllium	mg/mg nicotine	~ 6.27E-08	~ 6.00E-08	~ 6.09E-08	~ 6.17E-08	~ 6.54E-08	~ 6.54E-08
Cadmium	mg/mg nicotine	~ 2.85E-08	~ 2.73E-08	~ 2.77E-08	~ 2.81E-08	~ 2.97E-08	~ 2.97E-08
Chromium	mg/mg nicotine	4.11E-06	~ 2.73E-07	~ 2.77E-07	~ 2.81E-07	~ 2.97E-07	4.11E-06
Cobalt	mg/mg nicotine	~ 1.42E-08	~ 1.36E-08	~ 1.38E-08	~ 1.40E-08	~ 1.49E-08	~ 1.49E-08

Copper	mg/mg nicotine	~ 7.12E-07	~ 6.81E-07	~ 6.92E-07	~ 7.01E-07	~ 7.43E-07	~ 7.43E-07
Gold	mg/mg nicotine	~ 4.84E-06	NT	NT	NT	NT	~ 4.84E-06
Iron	mg/mg nicotine	3.40E-05	~ 2.73E-06	~ 2.77E-06	~ 2.81E-06	~ 2.97E-06	3.40E-05
Lead	mg/mg nicotine	~ 7.12E-08	~ 6.81E-08	~ 6.92E-08	~ 7.01E-08	~ 7.43E-08	~ 7.43E-08
Nickel	mg/mg nicotine	~ 4.27E-07	~ 1.36E-07	~ 1.38E-07	~ 1.40E-07	~ 1.49E-07	~ 4.27E-07
Selenium	mg/mg nicotine	~ 6.81E-07	~ 6.51E-07	~ 6.61E-07	~ 6.71E-07	~ 7.11E-07	~ 7.11E-07
Silver	mg/mg nicotine	~ 2.85E-08	~ 1.64E-07	~ 2.77E-08	~ 2.81E-08	~ 2.97E-08	~ 1.64E-07
Tin	mg/mg nicotine	~ 1.71E-06	~ 1.64E-06	~ 1.66E-06	~ 2.81E-07	~ 2.97E-07	~ 1.71E-06
Zinc	mg/mg nicotine	~ 4.27E-06	~ 4.09E-06	~ 4.15E-06	~ 4.21E-06	~ 4.46E-06	~ 4.46E-06
Organic Acids							
Benzoic Acid	mg/mg nicotine	5.30E-01	6.25E-01	7.84E-01	6.46E-01	5.86E-01	7.84E-01
Propionic Acid	mg/mg nicotine	~ 1.01E-04	~ 1.06E-03	~ 2.43E-03	~ 9.90E-05	~ 1.15E-03	~ 2.43E-03
VOCs							
1,3-Butadiene	mg/mg nicotine	~ 1.56E-06	NT	NT	NT	NT	~ 1.56E-06
Acrylonitrile	mg/mg nicotine	~ 1.02E-06	NT	NT	NT	NT	~ 1.02E-06
Benzene	mg/mg nicotine	~ 1.79E-06	NT	NT	NT	NT	~ 1.79E-06
Isoprene	mg/mg nicotine	~ 2.41E-06	NT	NT	NT	NT	~ 2.41E-06
Propylene Oxide	mg/mg nicotine	~ 4.15E-06	NT	NT	NT	NT	~ 4.15E-06
Toluene	mg/mg nicotine	~ 1.27E-05	NT	NT	NT	NT	~ 1.27E-05
Esters & Alcohols							
1-Butanol	mg/mg nicotine	~ 4.61E-05	NT	NT	NT	NT	~ 4.61E-05
Benzyl Acetate	mg/mg nicotine	~ 7.16E-05	NT	NT	NT	NT	~ 7.16E-05
Ethyl Acetate	mg/mg nicotine	~ 8.19E-05	NT	NT	NT	NT	~ 8.19E-05
Ethyl Acetoacetate	mg/mg nicotine	~ 5.85E-05	NT	NT	NT	NT	~ 5.85E-05
Isoamyl Acetate	mg/mg nicotine	~ 4.99E-05	NT	NT	NT	NT	~ 4.99E-05
Isobutyl Acetate	mg/mg nicotine	~ 4.94E-05	NT	NT	NT	NT	~ 4.94E-05
Methyl Acetate	mg/mg nicotine	~ 5.32E-05	NT	NT	NT	NT	~ 5.32E-05

~ = approximated numeric value (see Supplemental Materials Appendix 1A) generated from the corresponding LOD and LOQ (See Supplemental Materials Appendix 1B)

1.3 Crisp Menthol 18 mg/mL Non-Intense Nicotine Normalized Analytical Stability Results

Parameter/ Constituent	Units	T0	T3	T6	T9	T12	Max
# of puffs	NA	125	112	121	120	115	125
pH	NA	6.26	6.36	6.33	6.30	6.11	6.36
Primary Constituents							
Nicotine	mg/mg nicotine	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00
Glycerol	mg/mg nicotine	2.56E+01	2.69E+01	2.58E+01	2.64E+01	2.65E+01	2.69E+01
Propylene Glycol	mg/mg nicotine	3.48E+01	3.77E+01	3.80E+01	3.76E+01	3.67E+01	3.80E+01
Water	mg/mg nicotine	4.46E+00	3.79E+00	4.41E+00	4.07E+00	4.66E+00	4.66E+00
Menthol	mg/mg nicotine	7.17E-01	7.27E-01	7.17E-01	7.39E-01	7.03E-01	7.39E-01
Diethylene Glycol	mg/mg nicotine	~ 4.79E-03	~ 4.98E-03	~ 4.93E-03	~ 4.83E-03	~ 5.19E-03	~ 5.19E-03
Ethylene Glycol	mg/mg nicotine	~ 5.10E-03	~ 5.32E-03	~ 5.27E-03	~ 5.16E-03	~ 5.55E-03	~ 5.55E-03
Carbonyls & Glycidol							
Acetaldehyde	mg/mg nicotine	1.37E-04	1.60E-04	1.60E-04	1.46E-04	1.67E-04	1.67E-04
Acrolein	mg/mg nicotine	~ 3.55E-05	~ 3.76E-05	~ 3.83E-05	~ 3.76E-05	1.06E-04	1.06E-04
Diacetyl	mg/mg nicotine	~ 3.61E-05	~ 3.83E-05	~ 3.77E-05	~ 3.36E-06	~ 3.80E-05	~ 3.83E-05
Formaldehyde	mg/mg nicotine	5.11E-04	6.98E-04	6.18E-04	6.64E-04	7.17E-04	7.17E-04
Glycidol	mg/mg nicotine	1.66E-04	1.26E-04	1.39E-04	1.58E-04	1.65E-04	1.66E-04
Acetyl Propionyl	mg/mg nicotine	~ 3.16E-06	~ 3.34E-06	~ 3.38E-06	~ 3.31E-06	~ 3.49E-06	~ 3.49E-06
Butyraldehyde	mg/mg nicotine	~ 3.49E-06	~ 3.69E-06	~ 3.38E-06	~ 3.31E-06	~ 3.48E-06	~ 3.69E-06
Crotonaldehyde	mg/mg nicotine	~ 3.19E-06	~ 3.38E-06	~ 5.42E-06	~ 5.31E-06	~ 5.59E-06	~ 5.59E-06
Furfural	mg/mg nicotine	~ 4.42E-06	~ 4.67E-06	~ 5.55E-06	~ 5.43E-06	~ 5.72E-06	~ 5.72E-06
Nicotine Degradants & TSNAs							
β-Nicotryne	mg/mg nicotine	1.07E-04	1.45E-04	1.69E-04	2.46E-04	2.25E-04	2.46E-04
Cotinine	mg/mg nicotine	~ 2.81E-05	~ 3.00E-05	~ 2.98E-05	~ 2.91E-05	~ 3.07E-05	~ 3.07E-05
Myosmine	mg/mg nicotine	8.75E-05	1.05E-04	1.32E-04	1.44E-04	1.66E-04	1.66E-04

Nicotine N Oxide	mg/mg nicotine	~ 3.48E-05	9.90E-05	8.09E-05	1.03E-04	6.04E-05	1.03E-04
Nornicotine	mg/mg nicotine	4.12E-04	5.39E-04	7.68E-04	7.26E-04	8.85E-04	8.85E-04
Anabasine	mg/mg nicotine	~ 2.62E-06	~ 2.77E-06	~ 2.72E-06	~ 2.66E-06	~ 2.80E-06	~ 2.80E-06
Anatabine	mg/mg nicotine	~ 2.61E-06	~ 2.76E-06	~ 2.71E-06	~ 2.65E-06	~ 2.79E-06	~ 2.79E-06
NNK	mg/mg nicotine	~ 7.85E-07	NT	NT	NT	NT	~ 7.85E-07
NNN	mg/mg nicotine	~ 9.42E-08	NT	NT	NT	NT	~ 9.42E-08
Metals							
Arsenic	mg/mg nicotine	~ 2.85E-07	~ 3.02E-07	~ 2.99E-07	~ 2.93E-07	~ 3.08E-07	~ 3.08E-07
Beryllium	mg/mg nicotine	~ 6.28E-08	~ 6.64E-08	~ 6.58E-08	~ 6.45E-08	~ 6.78E-08	~ 6.78E-08
Cadmium	mg/mg nicotine	~ 2.85E-08	~ 3.02E-08	~ 2.99E-08	~ 2.93E-08	~ 3.08E-08	~ 3.08E-08
Chromium	mg/mg nicotine	~ 1.71E-06	~ 3.02E-07	~ 2.99E-07	~ 2.93E-07	~ 3.08E-07	~ 1.71E-06
Cobalt	mg/mg nicotine	~ 1.43E-08	~ 1.51E-08	~ 1.50E-08	~ 1.46E-08	~ 1.54E-08	~ 1.54E-08
Copper	mg/mg nicotine	~ 2.85E-06	~ 7.55E-07	~ 7.48E-07	~ 7.32E-07	~ 7.71E-07	~ 2.85E-06
Gold	mg/mg nicotine	~ 4.85E-06	NT	NT	NT	NT	~ 4.85E-06
Iron	mg/mg nicotine	1.22E-05	~ 3.02E-06	~ 2.99E-06	~ 2.93E-06	~ 3.08E-06	1.22E-05
Lead	mg/mg nicotine	~ 7.13E-08	~ 7.55E-08	~ 7.48E-08	~ 7.32E-08	~ 7.71E-08	~ 7.71E-08
Nickel	mg/mg nicotine	~ 1.43E-07	~ 1.51E-07	~ 1.50E-07	~ 1.46E-07	~ 1.54E-07	~ 1.54E-07
Selenium	mg/mg nicotine	~ 6.82E-07	~ 7.21E-07	~ 7.15E-07	~ 7.00E-07	~ 7.37E-07	~ 7.37E-07
Silver	mg/mg nicotine	~ 2.85E-08	~ 3.02E-08	~ 2.99E-08	~ 2.93E-08	~ 3.08E-08	~ 3.08E-08
Tin	mg/mg nicotine	~ 1.71E-06	~ 1.81E-06	~ 2.99E-07	~ 2.93E-07	~ 3.08E-07	~ 1.81E-06
Zinc	mg/mg nicotine	~ 1.43E-05	~ 4.53E-06	~ 4.49E-06	~ 4.39E-06	~ 4.62E-06	~ 1.43E-05
Organic Acids							
Benzoic Acid	mg/mg nicotine	6.20E-01	5.16E-01	5.86E-01	5.39E-01	5.21E-01	6.20E-01
Propionic Acid	mg/mg nicotine	~ 1.77E-04	~ 1.87E-04	~ 1.05E-03	~ 1.14E-03	~ 1.20E-03	~ 1.20E-03
VOCs							
1,3-Butadiene	mg/mg nicotine	~ 1.57E-06	NT	NT	NT	NT	~ 1.57E-06
Acrylonitrile	mg/mg nicotine	~ 1.03E-06	NT	NT	NT	NT	~ 1.03E-06
Benzene	mg/mg nicotine	~ 1.80E-06	NT	NT	NT	NT	~ 1.80E-06
Isoprene	mg/mg nicotine	~ 2.41E-06	NT	NT	NT	NT	~ 2.41E-06

Propylene Oxide	mg/mg nicotine	~ 4.15E-06	NT	NT	NT	NT	~ 4.15E-06
Toluene	mg/mg nicotine	~ 2.64E-06	NT	NT	NT	NT	~ 2.64E-06
Esters & Alcohols							
1-Butanol	mg/mg nicotine	~ 4.62E-05	NT	NT	NT	NT	~ 4.62E-05
Benzyl Acetate	mg/mg nicotine	~ 7.17E-05	NT	NT	NT	NT	~ 7.17E-05
Ethyl Acetate	mg/mg nicotine	6.31E-03	NT	NT	NT	NT	6.31E-03
Ethyl Acetoacetate	mg/mg nicotine	~ 5.86E-05	NT	NT	NT	NT	~ 5.86E-05
Isoamyl Acetate	mg/mg nicotine	~ 5.00E-05	NT	NT	NT	NT	~ 5.00E-05
Isobutyl Acetate	mg/mg nicotine	~ 4.95E-05	NT	NT	NT	NT	~ 4.95E-05
Methyl Acetate	mg/mg nicotine	~ 5.33E-05	NT	NT	NT	NT	~ 5.33E-05

~ = approximated numeric value (see Supplemental Materials Appendix 1A) generated from the corresponding LOD and LOQ (See Supplemental Materials Appendix 1B)

1.4 Crisp Menthol 18 mg/mL Intense Nicotine Normalized Analytical Stability Results

Parameter/ Constituent	Units	T0	T3	T6	T9	T12	Max
# of puffs	NA	81	88	82	87	81	88
pH	NA	6.24	6.53	6.27	6.20	6.17	6.53
*Primary Constituents							
Nicotine	mg/mg nicotine	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00
Glycerol	mg/mg nicotine	2.52E+01	2.68E+01	2.60E+01	2.65E+01	2.67E+01	2.68E+01
Propylene Glycol	mg/mg nicotine	3.45E+01	3.76E+01	3.72E+01	3.75E+01	3.71E+01	3.76E+01
Water	mg/mg nicotine	3.83E+00	3.89E+00	4.28E+00	3.80E+00	4.29E+00	4.29E+00
Menthol	mg/mg nicotine	7.21E-01	7.09E-01	6.87E-01	7.18E-01	6.97E-01	7.21E-01
Diethylene Glycol	mg/mg nicotine	~ 4.67E-03	~ 4.57E-03	~ 4.62E-03	~ 4.19E-03	~ 4.61E-03	~ 4.67E-03
Ethylene Glycol	mg/mg nicotine	~ 4.97E-03	~ 4.89E-03	~ 4.93E-03	~ 4.48E-03	~ 4.93E-03	~ 4.97E-03
Carbonyls & Glycidol							
Acetaldehyde	mg/mg nicotine	1.54E-04	1.30E-04	1.47E-04	2.18E-04	2.23E-04	2.23E-04

Acrolein	mg/mg nicotine	~ 4.03E-05	~ 4.03E-05	~ 3.59E-05	8.46E-05	2.20E-04	2.20E-04
Diacetyl	mg/mg nicotine	~ 4.10E-05	~ 4.11E-05	~ 3.45E-05	~ 3.66E-05	~ 4.28E-05	~ 4.28E-05
Formaldehyde	mg/mg nicotine	7.76E-04	7.91E-04	7.23E-04	1.04E-03	7.74E-04	1.04E-03
Glycidol	mg/mg nicotine	1.63E-04	1.67E-04	2.80E-04	1.38E-04	1.47E-04	2.80E-04
Acetyl Propionyl	mg/mg nicotine	~ 3.59E-06	~ 3.58E-06	~ 3.17E-06	~ 3.35E-06	~ 4.96E-06	~ 4.96E-06
Butyraldehyde	mg/mg nicotine	~ 3.96E-06	~ 3.96E-06	~ 3.16E-06	~ 3.35E-06	~ 8.46E-06	~ 8.46E-06
Crotonaldehyde	mg/mg nicotine	~ 3.63E-06	~ 3.62E-06	~ 5.07E-06	~ 5.38E-06	~ 1.01E-05	~ 1.01E-05
Furfural	mg/mg nicotine	~ 5.02E-06	~ 5.01E-06	~ 5.19E-06	~ 5.50E-06	~ 8.32E-06	~ 8.32E-06
Nicotine Degradants & TSNAs							
β-Nicotyrine	mg/mg nicotine	1.26E-04	1.52E-04	1.94E-04	2.09E-04	2.03E-04	2.09E-04
Cotinine	mg/mg nicotine	~ 3.19E-05	~ 3.19E-05	~ 2.79E-05	6.08E-05	~ 3.18E-05	6.08E-05
Myosmine	mg/mg nicotine	1.04E-04	1.26E-04	1.44E-04	1.58E-04	1.46E-04	1.58E-04
Nicotine N Oxide	mg/mg nicotine	6.36E-05	~ 3.94E-05	~ 2.78E-05	6.01E-05	5.90E-05	6.36E-05
Nornicotine	mg/mg nicotine	4.48E-04	5.98E-04	7.51E-04	7.68E-04	7.12E-04	7.68E-04
Anabasine	mg/mg nicotine	~ 2.98E-06	~ 2.97E-06	~ 2.54E-06	~ 2.70E-06	~ 2.90E-06	~ 2.98E-06
Anatabine	mg/mg nicotine	~ 2.97E-06	~ 2.96E-06	~ 2.53E-06	~ 2.68E-06	~ 2.89E-06	~ 2.97E-06
NNK	mg/mg nicotine	~ 7.64E-07	NT	NT	NT	NT	~ 7.64E-07
NNN	mg/mg nicotine	~ 9.18E-08	NT	NT	NT	NT	~ 9.18E-08
Metals							
Arsenic	mg/mg nicotine	~ 2.78E-07	~ 2.77E-07	~ 2.80E-07	~ 2.54E-07	~ 2.74E-07	~ 2.80E-07
Beryllium	mg/mg nicotine	~ 6.11E-08	~ 6.10E-08	~ 6.16E-08	~ 5.59E-08	~ 6.02E-08	~ 6.16E-08
Cadmium	mg/mg nicotine	~ 2.78E-08	~ 2.77E-08	~ 2.80E-08	~ 2.54E-08	~ 2.74E-08	~ 2.80E-08
Chromium	mg/mg nicotine	~ 1.67E-06	~ 2.77E-07	~ 2.80E-07	~ 2.54E-07	~ 2.74E-07	~ 1.67E-06
Cobalt	mg/mg nicotine	~ 1.39E-08	~ 1.39E-08	~ 1.40E-08	~ 1.27E-08	~ 1.37E-08	~ 1.40E-08
Copper	mg/mg nicotine	~ 6.95E-07	~ 6.94E-07	~ 7.00E-07	~ 6.36E-07	~ 6.85E-07	~ 7.00E-07
Gold	mg/mg nicotine	~ 4.72E-06	NT	NT	NT	NT	~ 4.72E-06
Iron	mg/mg nicotine	1.23E-05	~ 2.77E-06	~ 2.80E-06	~ 2.54E-06	~ 2.74E-06	1.23E-05
Lead	mg/mg nicotine	~ 6.95E-08	~ 6.94E-08	~ 7.00E-08	~ 6.36E-08	~ 6.85E-08	~ 7.00E-08
Nickel	mg/mg nicotine	~ 1.39E-07	~ 1.39E-07	~ 1.40E-07	~ 1.27E-07	~ 1.37E-07	~ 1.40E-07

Selenium	mg/mg nicotine	~ 6.64E-07	~ 6.63E-07	~ 6.69E-07	~ 6.08E-07	~ 6.54E-07	~ 6.69E-07
Silver	mg/mg nicotine	~ 2.78E-08	~ 1.66E-07	~ 2.80E-08	~ 2.54E-08	~ 2.74E-08	~ 1.66E-07
Tin	mg/mg nicotine	~ 1.67E-06	~ 1.66E-06	~ 1.68E-06	~ 1.53E-06	~ 2.74E-07	~ 1.68E-06
Zinc	mg/mg nicotine	~ 4.17E-06	~ 4.16E-06	~ 4.20E-06	~ 3.81E-06	~ 4.11E-06	~ 4.20E-06
Organic Acids							
Benzoic Acid	mg/mg nicotine	7.34E-01	6.82E-01	5.36E-01	6.12E-01	6.29E-01	7.34E-01
Propionic Acid	mg/mg nicotine	~ 1.72E-04	~ 1.28E-04	~ 9.87E-05	~ 9.87E-04	~ 1.06E-03	~ 1.06E-03
VOCs							
1,3-Butadiene	mg/mg nicotine	~ 1.53E-06	NT	NT	NT	NT	~ 1.53E-06
Acrylonitrile	mg/mg nicotine	~ 9.99E-07	NT	NT	NT	NT	~ 9.99E-07
Benzene	mg/mg nicotine	~ 1.75E-06	NT	NT	NT	NT	~ 1.75E-06
Isoprene	mg/mg nicotine	~ 2.35E-06	NT	NT	NT	NT	~ 2.35E-06
Propylene Oxide	mg/mg nicotine	~ 4.05E-06	NT	NT	NT	NT	~ 4.05E-06
Toluene	mg/mg nicotine	~ 1.24E-05	NT	NT	NT	NT	~ 1.24E-05
Esters & Alcohols							
1-Butanol	mg/mg nicotine	~ 4.50E-05	NT	NT	NT	NT	~ 4.50E-05
Benzyl Acetate	mg/mg nicotine	~ 6.98E-05	NT	NT	NT	NT	~ 6.98E-05
Ethyl Acetate	mg/mg nicotine	6.60E-03	NT	NT	NT	NT	6.60E-03
Ethyl Acetoacetate	mg/mg nicotine	~ 5.71E-05	NT	NT	NT	NT	~ 5.71E-05
Isoamyl Acetate	mg/mg nicotine	~ 4.87E-05	NT	NT	NT	NT	~ 4.87E-05
Isobutyl Acetate	mg/mg nicotine	~ 4.82E-05	NT	NT	NT	NT	~ 4.82E-05
Methyl Acetate	mg/mg nicotine	~ 5.19E-05	NT	NT	NT	NT	~ 5.19E-05

~ = approximated numeric value (see Supplemental Materials Appendix 1A) generated from the corresponding LOD and LOQ (See Supplemental Materials Appendix 1B)

1.5 Polar Menthol 18 mg/mL Non-Intense Nicotine Normalized Analytical Stability Results

Parameter/ Constituent	Units	T0	T3	T6	T9	T12	Max
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# of puffs	NA	100	132	115	122	106	132
pH	NA	6.31	6.55	6.32	6.38	6.54	6.55
Primary Constituents							
Nicotine	mg/mg nicotine	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00
Glycerol	mg/mg nicotine	2.56E+01	2.72E+01	2.66E+01	2.67E+01	2.71E+01	2.72E+01
Propylene Glycol	mg/mg nicotine	3.54E+01	3.84E+01	4.50E+01	3.78E+01	3.72E+01	4.50E+01
Water	mg/mg nicotine	3.66E+00	4.77E+00	4.43E+00	3.84E+00	4.92E+00	4.92E+00
Menthol	mg/mg nicotine	7.72E-01	7.65E-01	7.67E-01	7.88E-01	7.57E-01	7.88E-01
Diethylene Glycol	mg/mg nicotine	~ 5.24E-03	~ 4.65E-03	~ 4.98E-03	~ 4.27E-03	~ 5.53E-03	~ 5.53E-03
Ethylene Glycol	mg/mg nicotine	~ 5.58E-03	~ 4.97E-03	~ 5.32E-03	~ 4.56E-03	~ 5.92E-03	~ 5.92E-03
Carbonyls & Glycidol							
Acetaldehyde	mg/mg nicotine	~ 4.06E-05	1.76E-04	1.56E-04	1.90E-04	2.90E-04	2.90E-04
Acrolein	mg/mg nicotine	~ 3.88E-05	~ 3.51E-05	~ 3.87E-05	~ 3.32E-05	1.28E-04	1.28E-04
Diacetyl	mg/mg nicotine	~ 3.87E-06	~ 3.50E-06	~ 3.46E-06	~ 2.97E-06	~ 3.77E-06	~ 3.87E-06
Formaldehyde	mg/mg nicotine	3.18E-04	6.73E-04	5.43E-04	6.40E-04	8.77E-04	8.77E-04
Glycidol	mg/mg nicotine	1.14E-04	1.31E-04	1.44E-04	1.41E-04	1.64E-04	1.64E-04
Acetyl Propionyl	mg/mg nicotine	~ 3.45E-06	~ 3.12E-06	~ 3.41E-06	~ 2.93E-06	~ 3.72E-06	~ 3.72E-06
Butyraldehyde	mg/mg nicotine	~ 3.82E-06	~ 3.45E-06	~ 3.41E-06	~ 2.92E-06	~ 3.71E-06	~ 3.82E-06
Crotonaldehyde	mg/mg nicotine	~ 3.49E-06	~ 3.16E-06	~ 5.47E-06	~ 4.69E-06	~ 5.96E-06	~ 5.96E-06
Furfural	mg/mg nicotine	~ 4.83E-06	~ 4.37E-06	~ 5.60E-06	~ 4.80E-06	~ 6.10E-06	~ 6.10E-06
Nicotine Degradants & TSNAs							
β-Nicotyrine	mg/mg nicotine	~ 3.08E-05	1.41E-04	1.45E-04	2.75E-04	3.08E-04	3.08E-04
Cotinine	mg/mg nicotine	~ 3.07E-05	8.76E-05	8.64E-05	6.74E-05	1.57E-04	1.57E-04
Myosmine	mg/mg nicotine	8.57E-05	2.12E-04	2.31E-04	2.76E-04	4.00E-04	4.00E-04
Nicotine N Oxide	mg/mg nicotine	~ 3.80E-05	7.32E-05	1.17E-04	9.71E-05	6.25E-05	1.17E-04
Nornicotine	mg/mg nicotine	1.34E-04	4.23E-04	5.18E-04	6.30E-04	9.36E-04	9.36E-04
Anabasine	mg/mg nicotine	~ 2.86E-06	~ 2.59E-06	~ 2.74E-06	~ 2.35E-06	~ 2.99E-06	~ 2.99E-06
Anatabine	mg/mg nicotine	~ 3.11E-05	~ 2.81E-05	~ 3.00E-05	~ 2.58E-05	~ 3.27E-05	~ 3.27E-05
NNK	mg/mg nicotine	~ 8.58E-07	NT	NT	NT	NT	~ 8.58E-07

NNN	mg/mg nicotine	~ 1.03E-07	NT	NT	NT	NT	~ 1.03E-07
Metals							
Arsenic	mg/mg nicotine	~ 3.12E-07	~ 1.69E-06	~ 1.81E-06	~ 1.55E-06	~ 3.29E-07	~ 1.81E-06
Beryllium	mg/mg nicotine	~ 6.87E-08	~ 6.21E-08	~ 6.64E-08	~ 5.70E-08	~ 7.23E-08	~ 7.23E-08
Cadmium	mg/mg nicotine	~ 3.12E-08	~ 2.82E-08	~ 3.02E-08	~ 2.59E-08	~ 3.29E-08	~ 3.29E-08
Chromium	mg/mg nicotine	~ 1.87E-06	~ 2.82E-07	~ 3.02E-07	~ 2.59E-07	~ 3.29E-07	~ 1.87E-06
Cobalt	mg/mg nicotine	~ 1.56E-08	~ 1.41E-08	~ 1.51E-08	~ 1.29E-08	~ 1.64E-08	~ 1.64E-08
Copper	mg/mg nicotine	~ 3.12E-06	~ 7.06E-07	~ 3.02E-06	~ 6.47E-07	~ 3.29E-06	~ 3.29E-06
Gold	mg/mg nicotine	~ 5.31E-06	NT	NT	NT	NT	~ 5.31E-06
Iron	mg/mg nicotine	~ 9.36E-06	~ 2.82E-06	~ 3.02E-06	~ 2.59E-06	~ 3.29E-06	~ 9.36E-06
Lead	mg/mg nicotine	~ 7.80E-08	~ 7.06E-08	~ 7.55E-08	~ 6.47E-08	~ 8.22E-08	~ 8.22E-08
Nickel	mg/mg nicotine	~ 1.56E-07	~ 4.23E-07	~ 4.53E-07	~ 1.29E-07	~ 1.64E-07	~ 4.53E-07
Selenium	mg/mg nicotine	~ 7.46E-07	~ 6.75E-07	1.21E-06	~ 6.19E-07	~ 7.86E-07	1.21E-06
Silver	mg/mg nicotine	~ 3.12E-08	~ 2.82E-08	~ 3.02E-08	~ 2.59E-08	~ 3.29E-08	~ 3.29E-08
Tin	mg/mg nicotine	~ 3.12E-07	~ 2.82E-07	~ 3.02E-07	~ 2.59E-07	~ 3.29E-07	~ 3.29E-07
Zinc	mg/mg nicotine	~ 1.56E-05	~ 4.23E-06	~ 4.53E-06	~ 3.88E-06	~ 4.93E-06	~ 1.56E-05
Organic Acids							
Benzoic Acid	mg/mg nicotine	5.08E-01	5.75E-01	5.81E-01	5.21E-01	5.46E-01	5.81E-01
Propionic Acid	mg/mg nicotine	~ 1.10E-04	~ 9.96E-05	~ 1.33E-03	~ 1.01E-03	~ 2.03E-04	~ 1.33E-03
VOCs							
1,3-Butadiene	mg/mg nicotine	~ 1.71E-06	NT	NT	NT	NT	~ 1.71E-06
Acrylonitrile	mg/mg nicotine	~ 1.12E-06	NT	NT	NT	NT	~ 1.12E-06
Benzene	mg/mg nicotine	~ 1.97E-06	NT	NT	NT	NT	~ 1.97E-06
Isoprene	mg/mg nicotine	~ 2.64E-06	NT	NT	NT	NT	~ 2.64E-06
Propylene Oxide	mg/mg nicotine	~ 4.54E-06	NT	NT	NT	NT	~ 4.54E-06
Toluene	mg/mg nicotine	~ 2.89E-06	NT	NT	NT	NT	~ 2.89E-06
Esters & Alcohols							
1-Butanol	mg/mg nicotine	~ 5.06E-05	NT	NT	NT	NT	~ 5.06E-05

Benzyl Acetate	mg/mg nicotine	~ 7.84E-05	NT	NT	NT	NT	~ 7.84E-05
Ethyl Acetate	mg/mg nicotine	~ 9.87E-04	NT	NT	NT	NT	~ 9.87E-04
Ethyl Acetoacetate	mg/mg nicotine	~ 6.41E-05	NT	NT	NT	NT	~ 6.41E-05
Isoamyl Acetate	mg/mg nicotine	~ 5.47E-05	NT	NT	NT	NT	~ 5.47E-05
Isobutyl Acetate	mg/mg nicotine	~ 5.42E-05	NT	NT	NT	NT	~ 5.42E-05
Methyl Acetate	mg/mg nicotine	~ 5.82E-05	NT	NT	NT	NT	~ 5.82E-05

~ = approximated numeric value (see Supplemental Materials Appendix 1A) generated from the corresponding LOD and LOQ (See Supplemental Materials Appendix 1B)

1.6 Polar Menthol 18 mg/mL Intense Nicotine Normalized Analytical Stability Results

Parameter/ Constituent	Units	T0	T3	T6	T9	T12	Max
# of puffs	NA	81	81	81	81	80	81
pH	NA	6.24	6.57	6.36	6.22	6.42	6.57
Primary Constituents							
Nicotine	mg/mg nicotine	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00
Glycerol	mg/mg nicotine	2.56E+01	2.73E+01	2.66E+01	2.69E+01	2.74E+01	2.74E+01
Propylene Glycol	mg/mg nicotine	3.53E+01	4.04E+01	3.76E+01	3.79E+01	3.75E+01	4.04E+01
Water	mg/mg nicotine	4.06E+00	4.00E+00	4.08E+00	3.61E+00	4.21E+00	4.21E+00
Menthol	mg/mg nicotine	7.67E-01	7.58E-01	7.27E-01	7.70E-01	7.37E-01	7.70E-01
Diethylene Glycol	mg/mg nicotine	~ 4.71E-03	~ 4.65E-03	~ 4.69E-03	~ 4.22E-03	~ 4.67E-03	~ 4.71E-03
Ethylene Glycol	mg/mg nicotine	~ 5.01E-03	~ 4.98E-03	~ 5.02E-03	~ 4.51E-03	~ 5.00E-03	~ 5.02E-03
Carbonyls & Glycidol							
Acetaldehyde	mg/mg nicotine	1.11E-04	1.51E-04	1.82E-04	2.38E-04	3.14E-04	3.14E-04
Acrolein	mg/mg nicotine	9.22E-05	9.07E-05	~ 4.26E-05	7.38E-05	2.79E-04	2.79E-04
Diacetyl	mg/mg nicotine	~ 4.06E-06	~ 4.18E-05	~ 4.19E-05	~ 3.42E-06	~ 4.33E-05	~ 4.33E-05
Formaldehyde	mg/mg nicotine	6.67E-04	7.61E-04	7.57E-04	8.64E-04	8.65E-04	8.65E-04
Glycidol	mg/mg nicotine	2.06E-04	1.75E-04	1.91E-04	1.17E-04	1.98E-04	2.06E-04

Acetyl Propionyl	mg/mg nicotine	~ 3.62E-06	~ 3.64E-06	~ 3.76E-06	~ 3.37E-06	~ 5.03E-06	~ 5.03E-06
Butyraldehyde	mg/mg nicotine	~ 4.00E-06	~ 4.03E-06	~ 3.75E-06	~ 3.37E-06	~ 8.57E-06	~ 8.57E-06
Crotonaldehyde	mg/mg nicotine	~ 3.66E-06	~ 3.69E-06	~ 6.02E-06	~ 5.41E-06	~ 1.02E-05	~ 1.02E-05
Furfural	mg/mg nicotine	~ 5.07E-06	~ 5.10E-06	~ 6.16E-06	~ 5.53E-06	~ 8.43E-06	~ 8.43E-06
Nicotine Degradants & TSNAs							
β-Nicotyrine	mg/mg nicotine	~ 3.23E-05	1.39E-04	1.79E-04	3.38E-04	2.55E-04	3.38E-04
Cotinine	mg/mg nicotine	~ 3.22E-05	5.96E-05	7.76E-05	1.01E-04	1.15E-04	1.15E-04
Myosmine	mg/mg nicotine	1.22E-04	2.15E-04	2.82E-04	2.92E-04	3.28E-04	3.28E-04
Nicotine N Oxide	mg/mg nicotine	~ 3.99E-05	~ 4.01E-05	~ 3.30E-05	~ 2.96E-05	~ 3.21E-05	~ 4.01E-05
Nornicotine	mg/mg nicotine	1.48E-04	3.79E-04	4.78E-04	6.46E-04	7.08E-04	7.08E-04
Anabasine	mg/mg nicotine	~ 3.00E-06	~ 3.02E-06	~ 3.02E-06	~ 2.98E-05	~ 2.94E-06	~ 2.98E-05
Anatabine	mg/mg nicotine	~ 3.26E-05	~ 3.28E-05	~ 3.31E-05	~ 2.97E-05	~ 3.22E-05	~ 3.31E-05
NNK	mg/mg nicotine	~ 7.71E-07	NT	NT	NT	NT	~ 7.71E-07
NNN	mg/mg nicotine	~ 9.26E-08	NT	NT	NT	NT	~ 9.26E-08
Metals							
Arsenic	mg/mg nicotine	~ 2.81E-07	~ 2.82E-07	~ 1.71E-06	~ 2.56E-07	~ 2.77E-07	~ 1.71E-06
Beryllium	mg/mg nicotine	~ 6.17E-08	~ 6.21E-08	~ 6.26E-08	~ 5.63E-08	~ 6.10E-08	~ 6.26E-08
Cadmium	mg/mg nicotine	~ 2.81E-08	~ 2.82E-08	~ 2.85E-08	~ 2.56E-08	~ 2.77E-08	~ 2.85E-08
Chromium	mg/mg nicotine	~ 1.68E-06	~ 2.82E-07	~ 2.85E-07	~ 2.56E-07	~ 1.66E-06	~ 1.68E-06
Cobalt	mg/mg nicotine	~ 1.40E-08	~ 1.41E-08	~ 1.42E-08	~ 1.28E-08	~ 1.39E-08	~ 1.42E-08
Copper	mg/mg nicotine	~ 7.01E-07	~ 7.06E-07	~ 7.12E-07	~ 6.39E-07	~ 6.94E-07	~ 7.12E-07
Gold	mg/mg nicotine	~ 4.77E-06	NT	NT	NT	NT	~ 4.77E-06
Iron	mg/mg nicotine	~ 8.42E-06	~ 2.82E-06	~ 2.85E-06	~ 2.56E-06	~ 2.77E-06	~ 8.42E-06
Lead	mg/mg nicotine	~ 7.01E-08	~ 7.06E-08	~ 7.12E-08	~ 6.39E-08	~ 6.94E-08	~ 7.12E-08
Nickel	mg/mg nicotine	~ 1.40E-07	~ 4.23E-07	~ 1.42E-07	~ 1.28E-07	~ 1.39E-07	~ 4.23E-07
Selenium	mg/mg nicotine	~ 6.70E-07	~ 6.75E-07	1.40E-06	~ 6.11E-07	~ 6.63E-07	1.40E-06
Silver	mg/mg nicotine	~ 2.81E-08	~ 1.69E-07	~ 2.85E-08	~ 2.56E-08	~ 2.77E-08	~ 1.69E-07
Tin	mg/mg nicotine	~ 2.81E-07	~ 1.69E-06	~ 1.71E-06	~ 1.53E-06	~ 2.77E-07	~ 1.71E-06

Zinc	mg/mg nicotine	~ 4.21E-06	~ 4.23E-06	~ 1.42E-05	~ 3.84E-06	~ 4.16E-06	~ 1.42E-05
Organic Acids							
Benzoic Acid	mg/mg nicotine	7.22E-01	7.14E-01	6.36E-01	6.35E-01	6.00E-01	7.22E-01
Propionic Acid	mg/mg nicotine	~ 9.90E-05	~ 1.10E-03	~ 1.76E-03	~ 9.93E-04	~ 1.72E-04	~ 1.76E-03
VOCs							
1,3-Butadiene	mg/mg nicotine	~ 1.54E-06	NT	NT	NT	NT	~ 1.54E-06
Acrylonitrile	mg/mg nicotine	~ 1.01E-06	NT	NT	NT	NT	~ 1.01E-06
Benzene	mg/mg nicotine	~ 1.77E-06	NT	NT	NT	NT	~ 1.77E-06
Isoprene	mg/mg nicotine	~ 2.37E-06	NT	NT	NT	NT	~ 2.37E-06
Propylene Oxide	mg/mg nicotine	~ 4.08E-06	NT	NT	NT	NT	~ 4.08E-06
Toluene	mg/mg nicotine	~ 2.60E-06	NT	NT	NT	NT	~ 2.60E-06
Esters & Alcohols							
1-Butanol	mg/mg nicotine	~ 4.54E-05	NT	NT	NT	NT	~ 4.54E-05
Benzyl Acetate	mg/mg nicotine	~ 7.05E-05	NT	NT	NT	NT	~ 7.05E-05
Ethyl Acetate	mg/mg nicotine	~ 8.88E-04	NT	NT	NT	NT	~ 8.88E-04
Ethyl Acetoacetate	mg/mg nicotine	~ 5.76E-05	NT	NT	NT	NT	~ 5.76E-05
Isoamyl Acetate	mg/mg nicotine	~ 4.92E-05	NT	NT	NT	NT	~ 4.92E-05
Isobutyl Acetate	mg/mg nicotine	~ 4.87E-05	NT	NT	NT	NT	~ 4.87E-05
Methyl Acetate	mg/mg nicotine	~ 5.24E-05	NT	NT	NT	NT	~ 5.24E-05

~ = approximated numeric value (see Supplemental Materials Appendix 1A) generated from the corresponding LOD and LOQ (See Supplemental Materials Appendix 1B)

1.7 Autumn Tobacco 18 mg/mL Non-Intense Nicotine Normalized Analytical Stability Results

Parameter/ Constituent	Units	T0	T3	T6	T9	T12	Max
# of puffs	NA	128	128	119	122	124	128
pH	NA	6.36	6.16	6.37	6.41	6.14	6.41
Primary Constituents							

Nicotine	mg/mg nicotine	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00
Glycerol	mg/mg nicotine	2.59E+01	2.58E+01	2.48E+01	2.44E+01	2.45E+01	2.59E+01
Propylene Glycol	mg/mg nicotine	3.40E+01	3.32E+01	3.16E+01	3.17E+01	3.32E+01	3.40E+01
Water	mg/mg nicotine	3.23E+00	4.48E+00	4.18E+00	4.44E+00	6.24E+00	6.24E+00
Menthol	mg/mg nicotine	~ 1.46E-03	~ 1.46E-03	~ 4.33E-04	~ 4.09E-04	~ 2.01E-03	~ 2.01E-03
Diethylene Glycol	mg/mg nicotine	~ 1.34E-03	~ 1.34E-03	~ 3.97E-04	~ 3.76E-04	~ 1.84E-03	~ 1.84E-03
Ethylene Glycol	mg/mg nicotine	~ 9.36E-04	~ 9.31E-04	~ 2.77E-04	~ 2.62E-04	~ 1.28E-03	~ 1.28E-03
Carbonyls & Glycidol							
Acetaldehyde	mg/mg nicotine	1.03E-04	1.37E-04	1.60E-04	1.56E-04	1.43E-04	1.60E-04
Acrolein	mg/mg nicotine	7.06E-05	~ 3.88E-05	~ 3.86E-05	~ 3.65E-05	~ 3.54E-05	7.06E-05
Diacetyl	mg/mg nicotine	~ 3.48E-06	~ 3.73E-05	~ 3.43E-06	~ 3.52E-05	~ 3.57E-05	~ 3.73E-05
Formaldehyde	mg/mg nicotine	5.57E-04	4.40E-04	4.68E-04	4.97E-04	5.39E-04	5.57E-04
Glycidol	mg/mg nicotine	1.15E-04	1.31E-04	1.23E-04	8.56E-05	1.61E-04	1.61E-04
Acetyl Propionyl	mg/mg nicotine	~ 3.43E-06	~ 3.42E-06	~ 3.39E-06	~ 3.20E-06	~ 4.29E-06	~ 4.29E-06
Butyraldehyde	mg/mg nicotine	~ 3.43E-06	~ 3.42E-06	~ 3.38E-06	~ 3.52E-05	~ 3.44E-06	~ 3.52E-05
Crotonaldehyde	mg/mg nicotine	~ 5.51E-06	~ 5.48E-06	~ 5.43E-06	~ 5.13E-06	~ 4.24E-06	~ 5.51E-06
Furfural	mg/mg nicotine	~ 5.63E-06	~ 5.61E-06	~ 5.56E-06	~ 5.25E-06	~ 5.88E-06	~ 5.88E-06
Nicotine Degradants & TSNAs							
β-Nicotyrine	mg/mg nicotine	5.68E-05	~ 3.00E-05	1.17E-04	6.83E-05	1.02E-04	1.17E-04
Cotinine	mg/mg nicotine	8.29E-05	~ 3.00E-05	7.51E-05	1.89E-04	9.78E-05	1.89E-04
Myosmine	mg/mg nicotine	1.16E-04	1.52E-04	1.72E-04	1.82E-04	1.88E-04	1.88E-04
Nicotine N Oxide	mg/mg nicotine	8.49E-05	~ 3.00E-05	8.41E-05	2.51E-04	7.43E-05	2.51E-04
Nornicotine	mg/mg nicotine	2.14E-04	2.67E-04	4.69E-04	5.91E-04	5.53E-04	5.91E-04
Anabasine	mg/mg nicotine	~ 2.76E-06	~ 3.09E-06	~ 2.72E-06	~ 2.57E-06	~ 3.69E-06	~ 3.69E-06
Anatabine	mg/mg nicotine	~ 2.75E-06	~ 2.76E-06	~ 2.71E-06	~ 2.56E-06	~ 2.93E-06	~ 2.93E-06
NNK	mg/mg nicotine	~ 9.18E-08	~ 9.14E-08	NT	NT	NT	~ 9.18E-08
NNN	mg/mg nicotine	~ 2.47E-08	~ 2.46E-08	NT	NT	NT	~ 2.47E-08
Metals							

Arsenic	mg/mg nicotine	~ 1.82E-06	~ 3.02E-07	~ 1.80E-06	~ 2.83E-07	~ 2.78E-07	~ 1.82E-06
Beryllium	mg/mg nicotine	~ 6.68E-08	~ 6.65E-08	~ 6.59E-08	~ 6.23E-08	~ 6.11E-08	~ 6.68E-08
Cadmium	mg/mg nicotine	~ 3.04E-08	~ 3.02E-08	~ 3.00E-08	~ 2.83E-08	~ 2.78E-08	~ 3.04E-08
Chromium	mg/mg nicotine	~ 3.04E-07	~ 3.02E-07	~ 1.80E-06	~ 2.83E-07	~ 2.78E-07	~ 1.80E-06
Cobalt	mg/mg nicotine	~ 1.52E-08	~ 1.51E-08	~ 1.50E-08	~ 1.42E-08	~ 1.39E-08	~ 1.52E-08
Copper	mg/mg nicotine	~ 7.59E-07	~ 7.56E-07	~ 7.49E-07	~ 7.08E-07	~ 6.95E-07	~ 7.59E-07
Gold	mg/mg nicotine	~ 5.16E-06	~ 5.14E-06	~ 5.09E-06	~ 4.81E-06	~ 4.72E-06	~ 5.16E-06
Iron	mg/mg nicotine	~ 3.04E-06	~ 3.02E-06	~ 3.00E-06	~ 2.83E-06	~ 2.78E-06	~ 3.04E-06
Lead	mg/mg nicotine	~ 7.59E-08	~ 7.56E-08	~ 7.49E-08	~ 7.08E-08	~ 6.95E-08	~ 7.59E-08
Nickel	mg/mg nicotine	~ 1.52E-07	~ 1.51E-07	~ 1.50E-07	~ 1.42E-07	~ 1.39E-07	~ 1.52E-07
Selenium	mg/mg nicotine	~ 7.26E-07	~ 7.23E-07	~ 7.16E-07	~ 6.77E-07	~ 1.08E-07	~ 7.26E-07
Silver	mg/mg nicotine	~ 3.04E-08	~ 3.02E-08	~ 3.00E-08	~ 2.83E-08	~ 2.78E-08	~ 3.04E-08
Tin	mg/mg nicotine	~ 3.04E-07	~ 3.02E-07	~ 1.80E-06	~ 1.70E-06	~ 2.78E-07	~ 1.80E-06
Zinc	mg/mg nicotine	~ 4.56E-06	~ 4.54E-06	~ 4.49E-06	~ 4.25E-06	~ 4.17E-06	~ 4.56E-06
Organic Acids							
Benzoic Acid	mg/mg nicotine	5.66E-01	5.67E-01	6.29E-01	7.08E-01	5.02E-01	7.08E-01
Propionic Acid	mg/mg nicotine	~ 1.07E-03	~ 1.87E-03	~ 1.06E-03	~ 9.99E-04	~ 1.96E-03	~ 1.96E-03
VOCs							
1,3-butadiene	mg/mg nicotine	~ 1.67E-06	~ 2.12E-06	NT	NT	NT	~ 2.12E-06
Acrylonitrile	mg/mg nicotine	~ 1.09E-06	~ 7.44E-07	NT	NT	NT	~ 1.09E-06
Benzene	mg/mg nicotine	~ 1.12E-05	~ 1.11E-05	NT	NT	NT	~ 1.12E-05
Isoprene	mg/mg nicotine	~ 2.57E-06	~ 1.71E-06	NT	NT	NT	~ 2.57E-06
Propylene Oxide	mg/mg nicotine	~ 4.42E-06	~ 6.89E-06	NT	NT	NT	~ 6.89E-06
Toluene	mg/mg nicotine	~ 1.35E-05	~ 1.24E-06	NT	NT	NT	~ 1.35E-05
Esters & Alcohols							
1-Butanol	mg/mg nicotine	~ 5.81E-05	~ 6.54E-04	NT	NT	NT	~ 6.54E-04
Benzyl Acetate	mg/mg nicotine	~ 7.65E-05	~ 7.61E-05	NT	NT	NT	~ 7.65E-05
Ethyl Acetate	mg/mg nicotine	~ 6.09E-05	~ 6.06E-05	NT	NT	NT	~ 6.09E-05
Ethyl Acetoacetate	mg/mg nicotine	~ 1.19E-04	~ 1.18E-04	NT	NT	NT	~ 1.19E-04

Isoamyl Acetate	mg/mg nicotine	~ 6.15E-05	~ 6.13E-05	NT	NT	NT	~ 6.15E-05
Isobutyl Acetate	mg/mg nicotine	~ 6.12E-05	~ 6.10E-05	NT	NT	NT	~ 6.12E-05
Methyl Acetate	mg/mg nicotine	~ 6.34E-05	~ 7.00E-04	NT	NT	NT	~ 7.00E-04

~ = approximated numeric value (see Supplemental Materials Appendix 1A) generated from the corresponding LOD and LOQ (See Supplemental Materials Appendix 1B)

1.8 Autumn Tobacco 18 mg/mL Intense Nicotine Normalized Analytical Stability Results

Parameter/ Constituent	Units	T0	T3	T6	T9	T12	Max
# of puffs	NA	80	76	68	72	68	80
pH	NA	6.43	6.27	6.35	6.06	6.12	6.43
Primary Constituents							
Nicotine	mg/mg nicotine	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00
Glycerol	mg/mg nicotine	2.62E+01	2.59E+01	2.52E+01	2.50E+01	2.47E+01	2.62E+01
Propylene Glycol	mg/mg nicotine	3.41E+01	3.38E+01	3.17E+01	3.20E+01	3.32E+01	3.41E+01
Water	mg/mg nicotine	3.14E+00	4.61E+00	4.01E+00	4.57E+00	5.42E+00	5.42E+00
Menthol	mg/mg nicotine	~ 1.55E-03	~ 1.62E-03	~ 4.90E-03	~ 4.75E-04	~ 2.30E-03	~ 4.90E-03
Diethylene Glycol	mg/mg nicotine	~ 1.42E-03	~ 1.49E-03	~ 4.21E-04	~ 4.36E-04	~ 2.10E-03	~ 2.10E-03
Ethylene Glycol	mg/mg nicotine	~ 9.89E-04	~ 1.04E-03	~ 2.93E-04	~ 3.04E-04	~ 1.47E-03	~ 1.47E-03
Carbonyls & Glycidol							
Acetaldehyde	mg/mg nicotine	1.26E-04	1.70E-04	1.61E-04	1.92E-04	1.39E-04	1.92E-04
Acrolein	mg/mg nicotine	1.27E-04	~ 5.03E-05	~ 4.09E-05	~ 4.94E-05	~ 4.72E-05	1.27E-04
Diacetyl	mg/mg nicotine	~ 4.72E-05	~ 4.84E-05	~ 3.91E-05	~ 4.77E-05	~ 5.80E-06	~ 4.84E-05
Formaldehyde	mg/mg nicotine	6.69E-04	6.99E-04	5.22E-04	6.91E-04	6.54E-04	6.99E-04
Glycidol	mg/mg nicotine	2.49E-04	2.19E-04	1.78E-04	1.44E-04	2.70E-04	2.70E-04
Acetyl Propionyl	mg/mg nicotine	~ 4.23E-06	~ 4.44E-06	~ 3.59E-06	~ 4.79E-05	~ 5.71E-06	~ 4.79E-05
Butyraldehyde	mg/mg nicotine	~ 4.23E-06	~ 4.43E-06	~ 3.58E-06	~ 4.33E-06	~ 4.58E-06	~ 4.58E-06
Crotonaldehyde	mg/mg nicotine	~ 6.79E-06	~ 7.12E-06	~ 5.75E-06	~ 6.95E-06	~ 5.65E-06	~ 7.12E-06

Furfural	mg/mg nicotine	~ 6.95E-06	~ 7.28E-06	~ 5.89E-06	~ 7.11E-06	~ 7.84E-06	~ 7.84E-06
Nicotine Degradants & TSNAs							
β-Nicotyrine	mg/mg nicotine	~ 3.73E-05	~ 3.90E-05	1.17E-04	8.57E-05	1.07E-04	1.17E-04
Cotinine	mg/mg nicotine	~ 3.73E-05	~ 3.90E-05	~ 3.68E-05	2.75E-04	1.07E-04	2.75E-04
Myosmine	mg/mg nicotine	1.09E-04	1.84E-04	1.71E-04	2.12E-04	2.02E-04	2.12E-04
Nicotine N Oxide	mg/mg nicotine	~ 3.71E-05	~ 3.89E-05	~ 3.67E-05	2.92E-04	~ 4.10E-05	2.92E-04
Nornicotine	mg/mg nicotine	2.06E-04	3.72E-04	4.30E-04	7.23E-04	4.26E-04	7.23E-04
Anabasine	mg/mg nicotine	~ 3.40E-06	~ 4.01E-06	~ 3.37E-06	~ 3.48E-06	~ 4.92E-06	~ 4.92E-06
Anatabine	mg/mg nicotine	~ 3.39E-06	~ 3.58E-06	~ 3.35E-06	~ 3.47E-06	~ 3.91E-06	~ 3.91E-06
NNK	mg/mg nicotine	~ 9.70E-08	~ 1.02E-07	NT	NT	NT	~ 1.02E-07
NNN	mg/mg nicotine	~ 2.61E-08	~ 1.11E-07	NT	NT	NT	~ 1.11E-07
Metals							
Arsenic	mg/mg nicotine	~ 3.21E-07	~ 3.37E-07	~ 1.90E-06	~ 3.29E-07	~ 3.17E-07	~ 1.90E-06
Beryllium	mg/mg nicotine	~ 7.06E-08	~ 7.40E-08	~ 6.98E-08	~ 7.23E-08	~ 6.98E-08	~ 7.40E-08
Cadmium	mg/mg nicotine	~ 3.21E-08	~ 3.37E-08	~ 3.17E-08	~ 3.29E-08	~ 3.17E-08	~ 3.37E-08
Chromium	mg/mg nicotine	~ 3.21E-07	~ 3.37E-07	~ 1.90E-06	~ 3.29E-07	~ 3.17E-07	~ 1.90E-06
Cobalt	mg/mg nicotine	~ 1.60E-08	~ 1.68E-08	~ 1.59E-08	~ 1.64E-08	~ 1.59E-08	~ 1.68E-08
Copper	mg/mg nicotine	~ 8.02E-07	~ 8.41E-07	~ 7.93E-07	~ 8.21E-07	~ 7.94E-07	~ 8.41E-07
Gold	mg/mg nicotine	~ 5.46E-06	~ 5.72E-06	~ 5.39E-06	~ 5.59E-06	~ 5.40E-06	~ 5.72E-06
Iron	mg/mg nicotine	~ 3.21E-06	~ 3.37E-06	~ 3.17E-06	~ 3.29E-06	~ 3.17E-06	~ 3.37E-06
Lead	mg/mg nicotine	~ 8.02E-08	~ 8.41E-08	~ 7.93E-08	~ 8.21E-08	~ 7.94E-08	~ 8.41E-08
Nickel	mg/mg nicotine	~ 1.60E-07	~ 1.68E-07	~ 1.59E-07	~ 1.64E-07	~ 1.59E-07	~ 1.68E-07
Selenium	mg/mg nicotine	~ 7.67E-07	~ 8.04E-07	~ 7.58E-07	~ 7.85E-07	~ 7.59E-07	~ 8.04E-07
Silver	mg/mg nicotine	~ 3.21E-08	~ 3.37E-08	~ 3.17E-08	~ 3.29E-08	~ 3.17E-08	~ 3.37E-08
Tin	mg/mg nicotine	~ 3.21E-07	~ 2.02E-06	~ 1.90E-06	~ 1.97E-06	~ 3.17E-07	~ 2.02E-06
Zinc	mg/mg nicotine	~ 4.81E-06	~ 5.05E-06	~ 4.76E-06	~ 4.93E-06	~ 4.76E-06	~ 5.05E-06
Organic Acids							
Benzoic Acid	mg/mg nicotine	7.47E-01	7.67E-01	5.83E-01	8.34E-01	6.23E-01	8.34E-01
Propionic Acid	mg/mg nicotine	~ 1.13E-03	~ 2.08E-03	~ 1.96E-03	~ 1.16E-03	~ 2.24E-03	~ 2.24E-03

VOCs							
1,3-butadiene	mg/mg nicotine	~ 1.76E-06	~ 1.85E-06	NT	NT	NT	~ 1.85E-06
Acrylonitrile	mg/mg nicotine	~ 1.15E-06	~ 1.21E-06	NT	NT	NT	~ 1.21E-06
Benzene	mg/mg nicotine	~ 1.19E-05	~ 1.24E-05	NT	NT	NT	~ 1.24E-05
Isoprene	mg/mg nicotine	~ 2.71E-06	~ 2.85E-06	NT	NT	NT	~ 2.85E-06
Propylene Oxide	mg/mg nicotine	~ 4.67E-06	~ 4.90E-06	NT	NT	NT	~ 4.90E-06
Toluene	mg/mg nicotine	~ 1.44E-05	~ 1.50E-05	NT	NT	NT	~ 1.50E-05
Esters & Alcohols							
1-Butanol	mg/mg nicotine	~ 6.86E-04	~ 7.26E-04	NT	NT	NT	~ 7.26E-04
Benzyl Acetate	mg/mg nicotine	~ 8.08E-05	~ 8.47E-05	NT	NT	NT	~ 8.47E-05
Ethyl Acetate	mg/mg nicotine	~ 6.43E-05	~ 6.75E-05	NT	NT	NT	~ 6.75E-05
Ethyl Acetoacetate	mg/mg nicotine	~ 1.25E-04	~ 1.31E-04	NT	NT	NT	~ 1.31E-04
Isoamyl Acetate	mg/mg nicotine	~ 6.50E-05	~ 6.82E-05	NT	NT	NT	~ 6.82E-05
Isobutyl Acetate	mg/mg nicotine	~ 6.47E-05	~ 6.78E-05	NT	NT	NT	~ 6.78E-05
Methyl Acetate	mg/mg nicotine	~ 6.70E-05	~ 7.03E-05	NT	NT	NT	~ 7.03E-05

~ = approximated numeric value (see Supplemental Materials Appendix 1A) generated from the corresponding LOD and LOQ (See Supplemental Materials Appendix 1B)

1.9 Ruby Menthol 18 mg/mL Non-Intense Nicotine Normalized Analytical Stability Results

Parameter/ Constituent	Units	T0	T3	T6	T9	T12	Max
# of puffs	NA	130	127	135	124	124	135
pH	NA	5.90	5.60	5.90	5.70	5.62	5.90
Primary Constituents							
Nicotine	mg/mg nicotine	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00
Glycerol	mg/mg nicotine	2.59E+01	2.60E+01	2.43E+01	2.43E+01	2.46E+01	2.60E+01
Propylene Glycol	mg/mg nicotine	3.50E+01	3.48E+01	3.27E+01	3.25E+01	3.41E+01	3.50E+01
Water	mg/mg nicotine	2.22E+00	4.17E+00	3.82E+00	3.81E+00	8.20E+00	8.20E+00

Menthol	mg/mg nicotine	5.73E-01	5.51E-01	5.33E-01	5.37E-01	5.23E-01	5.73E-01
Diethylene Glycol	mg/mg nicotine	~ 1.34E-03	~ 1.39E-03	~ 3.69E-04	~ 3.69E-04	~ 2.02E-03	~ 2.02E-03
Ethylene Glycol	mg/mg nicotine	~ 9.30E-04	~ 9.70E-04	~ 2.57E-04	~ 2.57E-04	~ 1.41E-03	~ 1.41E-03
Carbonyls & Glycidol							
Acetaldehyde	mg/mg nicotine	2.11E-04	2.22E-04	2.93E-04	2.84E-04	2.85E-04	2.93E-04
Acrolein	mg/mg nicotine	~ 3.87E-05	~ 4.04E-05	~ 3.59E-05	~ 3.59E-05	~ 3.89E-05	~ 4.04E-05
Diacetyl	mg/mg nicotine	~ 3.81E-05	~ 3.88E-05	~ 3.43E-05	~ 3.47E-05	~ 3.93E-05	~ 3.93E-05
Formaldehyde	mg/mg nicotine	5.88E-04	5.34E-04	6.40E-04	6.92E-04	8.18E-04	8.18E-04
Glycidol	mg/mg nicotine	1.24E-04	1.61E-04	1.41E-04	1.33E-04	1.84E-04	1.84E-04
Acetyl Propionyl	mg/mg nicotine	~ 3.42E-06	~ 3.56E-06	~ 3.15E-06	~ 3.15E-06	~ 4.71E-06	~ 4.71E-06
Butyraldehyde	mg/mg nicotine	~ 3.41E-06	~ 3.56E-06	~ 3.15E-06	~ 3.15E-06	~ 3.78E-06	~ 3.78E-06
Crotonaldehyde	mg/mg nicotine	~ 5.48E-06	~ 5.71E-06	~ 5.05E-06	~ 5.05E-06	~ 4.65E-06	~ 5.71E-06
Furfural	mg/mg nicotine	~ 5.60E-06	~ 5.84E-06	~ 5.17E-06	~ 5.17E-06	~ 6.46E-06	~ 6.46E-06
Nicotine Degradants & TSNAs							
β-Nicotyrine	mg/mg nicotine	9.08E-05	9.39E-05	2.07E-04	1.67E-04	1.62E-04	2.07E-04
Cotinine	mg/mg nicotine	6.27E-05	~ 3.13E-05	1.23E-04	2.42E-04	1.56E-04	2.42E-04
Myosmine	mg/mg nicotine	1.22E-04	1.96E-04	2.60E-04	2.90E-04	3.01E-04	3.01E-04
Nicotine N Oxide	mg/mg nicotine	5.90E-05	6.75E-05	5.08E-05	2.56E-04	~ 3.38E-05	2.56E-04
Nornicotine	mg/mg nicotine	1.81E-04	3.78E-04	4.46E-04	6.68E-04	6.40E-04	6.68E-04
Anabasine	mg/mg nicotine	~ 2.75E-06	~ 3.22E-06	~ 2.53E-06	~ 2.53E-06	~ 4.05E-06	~ 4.05E-06
Anatabine	mg/mg nicotine	~ 2.73E-06	~ 2.87E-06	~ 2.52E-06	~ 2.52E-06	~ 3.22E-06	~ 3.22E-06
NNK	mg/mg nicotine	~ 9.13E-08	~ 9.52E-08	NT	NT	NT	~ 9.52E-08
NNN	mg/mg nicotine	3.53E-07	~ 1.04E-07	NT	NT	NT	3.53E-07
Metals							
Arsenic	mg/mg nicotine	~ 3.02E-07	~ 3.15E-07	~ 2.79E-07	~ 2.79E-07	~ 3.05E-07	~ 3.15E-07
Beryllium	mg/mg nicotine	~ 6.65E-08	~ 6.93E-08	~ 6.13E-08	~ 6.13E-08	~ 6.71E-08	~ 6.93E-08
Cadmium	mg/mg nicotine	~ 3.02E-08	~ 3.15E-08	~ 2.79E-08	~ 2.79E-08	~ 3.05E-08	~ 3.15E-08
Chromium	mg/mg nicotine	~ 3.02E-07	~ 3.15E-07	~ 2.79E-07	~ 2.79E-07	~ 3.05E-07	~ 3.15E-07
Cobalt	mg/mg nicotine	~ 1.51E-08	~ 1.57E-08	~ 1.39E-08	~ 1.39E-08	~ 1.53E-08	~ 1.57E-08

Copper	mg/mg nicotine	~ 7.55E-07	~ 7.87E-07	~ 6.96E-07	~ 6.97E-07	~ 7.63E-07	~ 7.87E-07
Gold	mg/mg nicotine	~ 5.14E-06	~ 5.35E-06	~ 4.74E-06	~ 4.74E-06	~ 5.19E-06	~ 5.35E-06
Iron	mg/mg nicotine	~ 3.02E-06	~ 3.15E-06	~ 2.79E-06	~ 2.79E-06	~ 3.05E-06	~ 3.15E-06
Lead	mg/mg nicotine	~ 7.55E-08	~ 7.87E-08	~ 6.96E-08	~ 6.97E-08	~ 7.63E-08	~ 7.87E-08
Nickel	mg/mg nicotine	~ 1.51E-07	~ 1.57E-07	~ 1.39E-07	~ 1.39E-07	~ 1.53E-07	~ 1.57E-07
Selenium	mg/mg nicotine	~ 7.22E-07	~ 7.52E-07	~ 6.66E-07	~ 6.66E-07	~ 7.29E-07	~ 7.52E-07
Silver	mg/mg nicotine	~ 3.02E-08	~ 3.15E-08	~ 1.67E-07	~ 2.79E-08	~ 3.05E-08	~ 1.67E-07
Tin	mg/mg nicotine	~ 3.02E-07	~ 3.15E-07	~ 2.79E-07	~ 2.79E-07	~ 3.05E-07	~ 3.15E-07
Zinc	mg/mg nicotine	~ 4.53E-06	~ 4.72E-06	~ 4.18E-06	~ 4.18E-06	~ 4.58E-06	~ 4.72E-06
Organic Acids							
Benzoic Acid	mg/mg nicotine	5.03E-01	7.19E-01	6.42E-01	6.68E-01	5.72E-01	7.19E-01
Propionic Acid	mg/mg nicotine	~ 1.39E-03	~ 1.95E-03	~ 9.83E-04	~ 9.83E-04	~ 2.15E-03	~ 2.15E-03
VOCs							
1,3-butadiene	mg/mg nicotine	~ 1.66E-06	~ 2.20E-06	NT	NT	NT	~ 2.20E-06
Acrylonitrile	mg/mg nicotine	~ 1.09E-06	~ 7.75E-07	NT	NT	NT	~ 1.09E-06
Benzene	mg/mg nicotine	~ 1.11E-05	~ 1.15E-05	NT	NT	NT	~ 1.15E-05
Isoprene	mg/mg nicotine	~ 2.55E-06	~ 1.78E-06	NT	NT	NT	~ 2.55E-06
Propylene Oxide	mg/mg nicotine	~ 4.40E-06	~ 7.17E-06	NT	NT	NT	~ 7.17E-06
Toluene	mg/mg nicotine	~ 1.35E-05	~ 1.29E-06	NT	NT	NT	~ 1.35E-05
Esters & Alcohols							
1-Butanol	mg/mg nicotine	~ 5.78E-05	~ 6.02E-05	NT	NT	NT	~ 6.02E-05
Benzyl Acetate	mg/mg nicotine	~ 7.60E-05	~ 7.92E-05	NT	NT	NT	~ 7.92E-05
Ethyl Acetate	mg/mg nicotine	~ 6.06E-05	~ 6.31E-05	NT	NT	NT	~ 6.31E-05
Ethyl Acetoacetate	mg/mg nicotine	~ 1.18E-04	~ 1.23E-04	NT	NT	NT	~ 1.23E-04
Isoamyl Acetate	mg/mg nicotine	~ 6.12E-05	~ 6.38E-05	NT	NT	NT	~ 6.38E-05
Isobutyl Acetate	mg/mg nicotine	~ 6.09E-05	~ 6.35E-05	NT	NT	NT	~ 6.35E-05
Methyl Acetate	mg/mg nicotine	~ 6.31E-05	~ 7.29E-04	NT	NT	NT	~ 7.29E-04

~ = approximated numeric value (see Supplemental Materials Appendix 1A) generated from the corresponding LOD and LOQ (See Supplemental Materials Appendix 1B)

1.10 Ruby Menthol 18 mg/mL Intense Nicotine Normalized Analytical Stability Results

Parameter/ Constituent	Units	T0	T3	T6	T9	T12	Max
# of puffs	NA	90	76	79	85	73	90
pH	NA	6.09	5.96	5.89	5.61	5.68	6.09
Primary Constituents							
Nicotine	mg/mg nicotine	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00
Glycerol	mg/mg nicotine	2.62E+01	2.59E+01	2.48E+01	2.38E+01	2.48E+01	2.62E+01
Propylene Glycol	mg/mg nicotine	3.50E+01	3.48E+01	3.22E+01	3.22E+01	3.44E+01	3.50E+01
Water	mg/mg nicotine	2.97E+00	3.86E+00	4.02E+00	3.87E+00	6.18E+00	6.18E+00
Menthol	mg/mg nicotine	5.58E-01	5.47E-01	5.30E-01	5.17E-01	5.20E-01	5.58E-01
Diethylene Glycol	mg/mg nicotine	~ 1.51E-03	~ 1.47E-03	~ 3.95E-04	~ 3.54E-04	~ 2.09E-03	~ 2.09E-03
Ethylene Glycol	mg/mg nicotine	~ 1.05E-03	~ 1.03E-03	~ 2.75E-04	~ 2.47E-04	~ 1.46E-03	~ 1.46E-03
Carbonyls & Glycidol							
Acetaldehyde	mg/mg nicotine	2.61E-04	2.97E-04	3.23E-04	3.62E-04	2.97E-04	3.62E-04
Acrolein	mg/mg nicotine	1.25E-04	~ 4.99E-05	6.82E-05	~ 4.02E-05	~ 4.68E-05	1.25E-04
Diacetyl	mg/mg nicotine	~ 5.03E-05	~ 4.79E-05	~ 3.67E-05	~ 3.88E-05	~ 4.73E-05	~ 5.03E-05
Formaldehyde	mg/mg nicotine	7.08E-04	7.44E-04	6.94E-04	8.32E-04	9.31E-04	9.31E-04
Glycidol	mg/mg nicotine	3.21E-04	2.00E-04	2.22E-04	1.68E-04	3.04E-04	3.21E-04
Acetyl Propionyl	mg/mg nicotine	~ 4.51E-06	~ 4.40E-06	~ 3.37E-06	~ 3.53E-06	~ 5.67E-06	~ 5.67E-06
Butyraldehyde	mg/mg nicotine	~ 4.51E-06	~ 4.39E-06	~ 3.37E-06	~ 3.52E-06	~ 4.55E-06	~ 4.55E-06
Crotonaldehyde	mg/mg nicotine	~ 7.24E-06	~ 7.05E-06	~ 5.40E-06	~ 5.65E-06	~ 5.60E-06	~ 7.24E-06
Furfural	mg/mg nicotine	~ 7.41E-06	~ 7.21E-06	~ 5.53E-06	~ 5.78E-06	~ 7.78E-06	~ 7.78E-06
Nicotine Degradants & TSNAs							
β-Nicotyrine	mg/mg nicotine	~ 3.97E-05	1.30E-04	2.44E-04	2.94E-04	2.86E-04	2.94E-04
Cotinine	mg/mg nicotine	7.36E-05	~ 3.86E-05	1.24E-04	2.65E-04	1.68E-04	2.65E-04
Myosmine	mg/mg nicotine	1.21E-04	2.31E-04	2.71E-04	3.21E-04	3.03E-04	3.21E-04

Nicotine N Oxide	mg/mg nicotine	~ 3.96E-05	~ 3.86E-05	~ 3.45E-05	2.35E-04	~ 4.07E-05	2.35E-04
Nornicotine	mg/mg nicotine	1.93E-04	3.40E-04	4.85E-04	8.86E-04	7.34E-04	8.86E-04
Anabasine	mg/mg nicotine	~ 3.63E-06	~ 3.97E-06	~ 3.16E-06	~ 2.84E-06	~ 4.88E-06	~ 4.88E-06
Anatabine	mg/mg nicotine	~ 3.61E-06	~ 3.55E-06	~ 3.15E-06	~ 2.82E-06	~ 3.88E-06	~ 3.88E-06
NNK	mg/mg nicotine	~ 1.03E-07	~ 1.01E-07	NT	NT	NT	~ 1.03E-07
NNN	mg/mg nicotine	4.46E-07	2.60E-07	NT	NT	NT	4.46E-07
Metals							
Arsenic	mg/mg nicotine	~ 3.42E-07	~ 3.33E-07	~ 2.98E-07	~ 2.67E-07	~ 3.15E-07	~ 3.42E-07
Beryllium	mg/mg nicotine	~ 7.53E-08	~ 7.33E-08	~ 6.56E-08	~ 5.88E-08	~ 6.93E-08	~ 7.53E-08
Cadmium	mg/mg nicotine	~ 3.42E-08	~ 3.33E-08	~ 2.98E-08	~ 2.67E-08	~ 3.15E-08	~ 3.42E-08
Chromium	mg/mg nicotine	~ 3.42E-07	~ 3.33E-07	~ 2.98E-07	~ 2.67E-07	~ 3.15E-07	~ 3.42E-07
Cobalt	mg/mg nicotine	~ 1.71E-08	~ 1.67E-08	~ 1.49E-08	~ 1.34E-08	~ 1.58E-08	~ 1.71E-08
Copper	mg/mg nicotine	~ 8.56E-07	~ 8.33E-07	~ 7.45E-07	~ 6.68E-07	~ 7.88E-07	~ 8.56E-07
Gold	mg/mg nicotine	~ 5.82E-06	~ 5.67E-06	~ 5.07E-06	~ 4.54E-06	~ 5.36E-06	~ 5.82E-06
Iron	mg/mg nicotine	~ 3.42E-06	~ 3.33E-06	~ 2.98E-06	~ 2.67E-06	~ 3.15E-06	~ 3.42E-06
Lead	mg/mg nicotine	~ 8.56E-08	~ 4.17E-07	~ 7.45E-08	~ 6.68E-08	~ 7.88E-08	~ 4.17E-07
Nickel	mg/mg nicotine	~ 1.71E-07	~ 1.67E-07	~ 1.49E-07	~ 1.34E-07	~ 1.58E-07	~ 1.71E-07
Selenium	mg/mg nicotine	~ 8.18E-07	~ 7.97E-07	~ 7.12E-07	~ 6.39E-07	~ 7.53E-07	~ 8.18E-07
Silver	mg/mg nicotine	~ 3.42E-08	~ 3.33E-08	~ 1.79E-07	~ 2.67E-08	~ 3.15E-08	~ 1.79E-07
Tin	mg/mg nicotine	~ 3.42E-07	~ 2.00E-06	~ 2.98E-07	~ 2.67E-07	~ 3.15E-07	~ 2.00E-06
Zinc	mg/mg nicotine	~ 5.13E-06	~ 5.00E-06	~ 4.47E-06	~ 4.01E-06	~ 4.73E-06	~ 5.13E-06
Organic Acids							
Benzoic Acid	mg/mg nicotine	8.02E-01	7.94E-01	6.24E-01	7.45E-01	5.56E-01	8.02E-01
Propionic Acid	mg/mg nicotine	~ 2.12E-03	~ 2.06E-03	~ 1.84E-03	~ 1.35E-03	~ 2.22E-03	~ 2.22E-03
VOCs							
1,3-butadiene	mg/mg nicotine	~ 1.88E-06	~ 1.83E-06	NT	NT	NT	~ 1.88E-06
Acrylonitrile	mg/mg nicotine	~ 1.23E-06	~ 1.20E-06	NT	NT	NT	~ 1.23E-06
Benzene	mg/mg nicotine	~ 1.27E-05	~ 1.23E-05	NT	NT	NT	~ 1.27E-05

Isoprene	mg/mg nicotine	~ 2.89E-06	~ 2.82E-06	NT	NT	NT	~ 2.89E-06
Propylene Oxide	mg/mg nicotine	~ 4.98E-06	~ 4.85E-06	NT	NT	NT	~ 4.98E-06
Toluene	mg/mg nicotine	~ 1.53E-05	~ 1.48E-05	NT	NT	NT	~ 1.53E-05
Esters & Alcohols							
1-Butanol	mg/mg nicotine	~ 6.55E-05	~ 6.38E-05	NT	NT	NT	~ 6.55E-05
Benzyl Acetate	mg/mg nicotine	~ 8.62E-05	~ 8.39E-05	NT	NT	NT	~ 8.62E-05
Ethyl Acetate	mg/mg nicotine	~ 6.86E-05	~ 6.68E-05	NT	NT	NT	~ 6.86E-05
Ethyl Acetoacetate	mg/mg nicotine	~ 1.34E-04	~ 1.30E-04	NT	NT	NT	~ 1.34E-04
Isoamyl Acetate	mg/mg nicotine	~ 6.93E-05	~ 6.75E-05	NT	NT	NT	~ 6.93E-05
Isobutyl Acetate	mg/mg nicotine	~ 6.90E-05	~ 6.72E-05	NT	NT	NT	~ 6.90E-05
Methyl Acetate	mg/mg nicotine	~ 7.15E-05	~ 8.02E-04	NT	NT	NT	~ 8.02E-04

~ = approximated numeric value (see Supplemental Materials Appendix 1A) generated from the corresponding LOD and LOQ (See Supplemental Materials Appendix 1B)

1.11 Summer Menthol 18 mg/mL Non-Intense Nicotine Normalized Analytical Stability Results

Parameter/ Constituent	Units	T0	T3	T6	T9	T12	Max
# of puffs	NA	126	127	138	127	117	138
pH	NA	6.42	6.31	6.46	6.29	6.28	6.46
Primary Constituents							
Nicotine	mg/mg nicotine	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00
Glycerol	mg/mg nicotine	2.57E+01	2.57E+01	2.37E+01	2.33E+01	2.42E+01	2.57E+01
Propylene Glycol	mg/mg nicotine	3.34E+01	3.32E+01	3.13E+01	3.08E+01	3.25E+01	3.34E+01
Water	mg/mg nicotine	2.50E+00	4.31E+00	4.32E+00	4.19E+00	8.38E+00	8.38E+00
Menthol	mg/mg nicotine	5.65E-01	5.43E-01	5.24E-01	5.26E-01	5.23E-01	5.65E-01
Diethylene Glycol	mg/mg nicotine	~ 1.32E-03	~ 1.37E-03	~ 3.56E-04	~ 3.50E-04	~ 2.09E-03	~ 2.09E-03
Ethylene Glycol	mg/mg nicotine	~ 9.18E-04	~ 9.54E-04	~ 2.48E-04	~ 2.44E-04	~ 1.46E-03	~ 1.46E-03
Carbonyls & Glycidol							

Acetaldehyde	mg/mg nicotine	7.62E-05	9.50E-05	9.51E-05	9.13E-05	1.12E-04	1.12E-04
Acrolein	mg/mg nicotine	~ 3.82E-05	~ 3.97E-05	~ 3.46E-05	~ 3.40E-05	~ 4.02E-05	~ 4.02E-05
Diacetyl	mg/mg nicotine	~ 3.42E-06	~ 3.82E-05	~ 3.07E-06	~ 3.28E-05	~ 4.06E-05	~ 4.06E-05
Formaldehyde	mg/mg nicotine	4.90E-04	4.00E-04	4.26E-04	4.08E-04	5.38E-04	5.38E-04
Glycidol	mg/mg nicotine	1.09E-04	1.17E-04	1.00E-04	9.36E-05	1.12E-04	1.17E-04
Acetyl Propionyl	mg/mg nicotine	~ 3.37E-06	~ 3.50E-06	~ 3.03E-06	~ 3.30E-05	~ 4.87E-06	~ 3.30E-05
Butyraldehyde	mg/mg nicotine	~ 3.37E-06	~ 3.50E-06	~ 3.03E-06	~ 2.98E-06	~ 3.91E-06	~ 3.91E-06
Crotonaldehyde	mg/mg nicotine	~ 5.40E-06	~ 5.62E-06	~ 4.86E-06	~ 4.78E-06	~ 4.81E-06	~ 5.62E-06
Furfural	mg/mg nicotine	~ 5.53E-06	~ 5.75E-06	~ 4.98E-06	~ 4.89E-06	~ 6.68E-06	~ 6.68E-06
Nicotine Degradants & TSNAs							
β-Nicotyrine	mg/mg nicotine	~ 2.97E-05	~ 3.08E-05	7.87E-05	5.43E-05	~ 3.09E-05	7.87E-05
Cotinine	mg/mg nicotine	~ 2.97E-05	~ 2.74E-06	~ 2.67E-05	1.18E-04	~ 3.44E-05	1.18E-04
Myosmine	mg/mg nicotine	~ 2.96E-05	8.95E-05	8.50E-05	9.55E-05	1.13E-04	1.13E-04
Nicotine N Oxide	mg/mg nicotine	9.65E-05	~ 3.07E-05	5.04E-05	1.86E-04	~ 3.50E-05	1.86E-04
Nornicotine	mg/mg nicotine	1.40E-04	2.56E-04	3.08E-04	4.54E-04	4.14E-04	4.54E-04
Anabasine	mg/mg nicotine	~ 2.71E-06	~ 3.16E-06	~ 2.44E-06	~ 2.40E-06	~ 4.19E-06	~ 4.19E-06
Anatabine	mg/mg nicotine	~ 2.70E-06	~ 2.83E-06	~ 2.43E-06	~ 2.39E-06	~ 3.33E-06	~ 3.33E-06
NNK	mg/mg nicotine	~ 9.01E-08	~ 9.37E-08	NT	NT	NT	~ 9.37E-08
NNN	mg/mg nicotine	~ 2.42E-08	~ 2.52E-08	NT	NT	NT	~ 2.52E-08
Metals							
Arsenic	mg/mg nicotine	~ 2.98E-07	~ 3.10E-07	~ 2.68E-07	~ 2.64E-07	~ 3.16E-07	~ 3.16E-07
Beryllium	mg/mg nicotine	~ 6.56E-08	~ 6.82E-08	~ 5.90E-08	~ 5.80E-08	~ 6.95E-08	~ 6.95E-08
Cadmium	mg/mg nicotine	~ 2.98E-08	~ 3.10E-08	~ 2.68E-08	~ 2.64E-08	~ 3.16E-08	~ 3.16E-08
Chromium	mg/mg nicotine	~ 2.98E-07	~ 3.10E-07	~ 2.68E-07	~ 2.64E-07	~ 3.16E-07	~ 3.16E-07
Cobalt	mg/mg nicotine	~ 1.49E-08	~ 1.55E-08	~ 1.34E-08	~ 1.32E-08	~ 1.58E-08	~ 1.58E-08
Copper	mg/mg nicotine	~ 7.45E-07	~ 7.75E-07	~ 6.71E-07	~ 6.60E-07	~ 7.89E-07	~ 7.89E-07
Gold	mg/mg nicotine	~ 5.07E-06	~ 5.27E-06	~ 4.56E-06	~ 4.48E-06	~ 5.37E-06	~ 5.37E-06
Iron	mg/mg nicotine	~ 2.98E-06	~ 3.10E-06	~ 2.68E-06	~ 2.64E-06	~ 3.16E-06	~ 3.16E-06

Lead	mg/mg nicotine	~ 7.45E-08	~ 7.75E-08	~ 6.71E-08	~ 6.60E-08	~ 7.89E-08	~ 7.89E-08
Nickel	mg/mg nicotine	~ 1.49E-07	~ 1.55E-07	~ 1.34E-07	~ 1.32E-07	~ 1.58E-07	~ 1.58E-07
Selenium	mg/mg nicotine	~ 7.13E-07	~ 7.41E-07	~ 6.41E-07	~ 1.03E-07	~ 1.23E-07	~ 7.41E-07
Silver	mg/mg nicotine	~ 2.98E-08	~ 3.10E-08	~ 1.61E-07	~ 2.64E-08	~ 3.16E-08	~ 1.61E-07
Tin	mg/mg nicotine	~ 2.98E-07	~ 3.10E-07	~ 2.68E-07	~ 2.64E-07	~ 3.16E-07	~ 3.16E-07
Zinc	mg/mg nicotine	~ 1.49E-05	~ 4.65E-06	~ 4.02E-06	~ 3.96E-06	~ 4.74E-06	~ 1.49E-05
Organic Acids							
Benzoic Acid	mg/mg nicotine	5.01E-01	6.87E-01	5.84E-01	6.80E-01	5.77E-01	6.87E-01
Propionic Acid	mg/mg nicotine	~ 1.38E-03	~ 1.92E-03	~ 9.46E-04	~ 1.06E-03	~ 2.23E-03	~ 2.23E-03
VOCs							
1,3-butadiene	mg/mg nicotine	~ 1.64E-06	~ 2.17E-06	NT	NT	NT	~ 2.17E-06
Acrylonitrile	mg/mg nicotine	~ 1.07E-06	~ 7.62E-07	NT	NT	NT	~ 1.07E-06
Benzene	mg/mg nicotine	~ 1.10E-05	~ 1.13E-05	NT	NT	NT	~ 1.13E-05
Isoprene	mg/mg nicotine	~ 2.52E-06	~ 1.75E-06	NT	NT	NT	~ 2.52E-06
Propylene Oxide	mg/mg nicotine	~ 4.34E-06	~ 7.06E-06	NT	NT	NT	~ 7.06E-06
Toluene	mg/mg nicotine	~ 1.33E-05	~ 1.27E-06	NT	NT	NT	~ 1.33E-05
Esters & Alcohols							
1-Butanol	mg/mg nicotine	~ 5.70E-05	~ 5.93E-05	NT	NT	NT	~ 5.93E-05
Benzyl Acetate	mg/mg nicotine	~ 7.51E-05	~ 7.80E-05	NT	NT	NT	~ 7.80E-05
Ethyl Acetate	mg/mg nicotine	1.02E-02	8.11E-03	NT	NT	NT	1.02E-02
Ethyl Acetoacetate	mg/mg nicotine	~ 1.16E-04	~ 1.21E-04	NT	NT	NT	~ 1.21E-04
Isoamyl Acetate	mg/mg nicotine	~ 6.04E-05	~ 6.28E-05	NT	NT	NT	~ 6.28E-05
Isobutyl Acetate	mg/mg nicotine	~ 6.01E-05	~ 6.25E-05	NT	NT	NT	~ 6.25E-05
Methyl Acetate	mg/mg nicotine	~ 6.23E-05	~ 7.18E-04	NT	NT	NT	~ 7.18E-04

~ = approximated numeric value (see Supplemental Materials Appendix 1A) generated from the corresponding LOD and LOQ (See Supplemental Materials Appendix 1B)

1.12 Summer Menthol 18 mg/mL Intense Nicotine Normalized Analytical Stability Results

Parameter/ Constituent	Units	T0	T3	T6	T9	T12	Max
# of puffs	NA	86	80	74	86	69	86
pH	NA	6.40	6.51	6.40	6.25	6.29	6.51
Primary Constituents							
Nicotine	mg/mg nicotine	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00
Glycerol	mg/mg nicotine	2.59E+01	2.57E+01	2.44E+01	2.36E+01	2.45E+01	2.59E+01
Propylene Glycol	mg/mg nicotine	3.36E+01	3.33E+01	3.09E+01	3.08E+01	3.27E+01	3.36E+01
Water	mg/mg nicotine	3.17E+00	4.08E+00	4.14E+00	4.40E+00	6.47E+00	6.47E+00
Menthol	mg/mg nicotine	5.60E-01	5.46E-01	5.28E-01	5.14E-01	5.13E-01	5.60E-01
Diethylene Glycol	mg/mg nicotine	~ 1.32E-03	~ 1.31E-03	~ 3.80E-04	~ 3.57E-04	~ 2.19E-03	~ 2.19E-03
Ethylene Glycol	mg/mg nicotine	~ 9.20E-04	~ 9.14E-04	~ 2.65E-04	~ 2.49E-04	~ 1.52E-03	~ 1.52E-03
Carbonyls & Glycidol							
Acetaldehyde	mg/mg nicotine	1.16E-04	1.12E-04	8.92E-05	1.20E-04	~ 5.08E-05	1.20E-04
Acrolein	mg/mg nicotine	1.24E-04	~ 4.44E-05	~ 3.70E-05	~ 4.05E-05	~ 4.90E-05	1.24E-04
Diacetyl	mg/mg nicotine	~ 3.99E-06	~ 4.26E-05	~ 3.53E-05	~ 3.91E-05	~ 4.95E-05	~ 4.95E-05
Formaldehyde	mg/mg nicotine	6.56E-04	5.85E-04	4.44E-04	5.30E-04	5.42E-04	6.56E-04
Glycidol	mg/mg nicotine	2.13E-04	1.82E-04	1.65E-04	1.27E-04	2.62E-04	2.62E-04
Acetyl Propionyl	mg/mg nicotine	~ 3.94E-06	~ 3.91E-06	~ 3.24E-06	~ 3.55E-06	~ 5.94E-06	~ 5.94E-06
Butyraldehyde	mg/mg nicotine	~ 3.93E-06	~ 3.91E-06	~ 3.24E-06	~ 3.55E-06	~ 4.76E-06	~ 4.76E-06
Crotonaldehyde	mg/mg nicotine	~ 6.31E-06	~ 6.27E-06	~ 5.20E-06	~ 5.70E-06	~ 5.87E-06	~ 6.31E-06
Furfural	mg/mg nicotine	~ 6.46E-06	~ 6.42E-06	~ 5.32E-06	~ 5.83E-06	~ 8.15E-06	~ 8.15E-06
Nicotine Degradants & TSNAs							
β-Nicotyrine	mg/mg nicotine	~ 3.47E-05	~ 3.44E-05	7.81E-05	6.46E-05	7.54E-05	7.81E-05
Cotinine	mg/mg nicotine	~ 3.47E-05	~ 3.07E-06	~ 3.33E-05	1.23E-04	~ 4.20E-05	1.23E-04
Myosmine	mg/mg nicotine	~ 3.46E-05	1.00E-04	8.38E-05	1.08E-04	8.78E-05	1.08E-04
Nicotine N Oxide	mg/mg nicotine	~ 3.46E-05	~ 3.43E-05	~ 3.32E-05	1.72E-04	~ 4.26E-05	1.72E-04
Nornicotine	mg/mg nicotine	1.59E-04	2.64E-04	2.59E-04	4.49E-04	3.36E-04	4.49E-04
Anabasine	mg/mg nicotine	~ 3.17E-06	~ 3.54E-06	~ 3.04E-06	~ 2.86E-06	~ 5.11E-06	~ 5.11E-06

Anatabine	mg/mg nicotine	~ 3.15E-06	~ 3.16E-06	~ 3.03E-06	~ 2.84E-06	~ 4.06E-06	~ 4.06E-06
NNK	mg/mg nicotine	~ 9.03E-08	~ 8.97E-08	NT	NT	NT	~ 9.03E-08
NNN	mg/mg nicotine	~ 2.43E-08	~ 2.41E-08	NT	NT	NT	~ 2.43E-08
Metals							
Arsenic	mg/mg nicotine	~ 2.99E-07	~ 2.97E-07	~ 2.87E-07	~ 2.69E-07	~ 3.30E-07	~ 3.30E-07
Beryllium	mg/mg nicotine	~ 6.57E-08	~ 6.53E-08	~ 6.31E-08	~ 5.93E-08	~ 7.26E-08	~ 7.26E-08
Cadmium	mg/mg nicotine	~ 2.99E-08	~ 2.97E-08	~ 2.87E-08	~ 2.69E-08	~ 3.30E-08	~ 3.30E-08
Chromium	mg/mg nicotine	~ 2.99E-07	~ 2.97E-07	~ 2.87E-07	~ 2.69E-07	~ 3.30E-07	~ 3.30E-07
Cobalt	mg/mg nicotine	~ 1.49E-08	~ 1.48E-08	~ 1.43E-08	~ 1.35E-08	~ 1.65E-08	~ 1.65E-08
Copper	mg/mg nicotine	~ 7.46E-07	~ 7.42E-07	~ 7.17E-07	~ 6.74E-07	~ 8.25E-07	~ 8.25E-07
Gold	mg/mg nicotine	~ 5.08E-06	~ 5.04E-06	~ 4.87E-06	~ 4.58E-06	~ 5.61E-06	~ 5.61E-06
Iron	mg/mg nicotine	~ 2.99E-06	~ 2.97E-06	~ 2.87E-06	~ 2.69E-06	~ 3.30E-06	~ 3.30E-06
Lead	mg/mg nicotine	~ 7.46E-08	~ 7.42E-08	~ 7.17E-08	~ 6.74E-08	~ 8.25E-08	~ 8.25E-08
Nickel	mg/mg nicotine	~ 1.49E-07	~ 1.48E-07	~ 1.43E-07	~ 1.35E-07	~ 1.65E-07	~ 1.65E-07
Selenium	mg/mg nicotine	~ 7.14E-07	~ 7.09E-07	~ 6.85E-07	~ 6.44E-07	~ 7.89E-07	~ 7.89E-07
Silver	mg/mg nicotine	~ 2.99E-08	~ 2.97E-08	~ 1.72E-07	~ 2.69E-08	~ 3.30E-08	~ 1.72E-07
Tin	mg/mg nicotine	~ 2.99E-07	~ 2.97E-07	~ 2.87E-07	~ 2.69E-07	~ 3.30E-07	~ 3.30E-07
Zinc	mg/mg nicotine	~ 4.48E-06	~ 4.45E-06	~ 4.30E-06	~ 4.04E-06	~ 4.95E-06	~ 4.95E-06
Organic Acids							
Benzoic Acid	mg/mg nicotine	7.84E-01	6.83E-01	5.76E-01	7.68E-01	5.78E-01	7.84E-01
Propionic Acid	mg/mg nicotine	~ 1.85E-03	~ 1.84E-03	~ 1.77E-03	~ 1.49E-03	~ 2.33E-03	~ 2.33E-03
VOCs							
1,3-butadiene	mg/mg nicotine	~ 1.64E-06	~ 1.63E-06	NT	NT	NT	~ 1.64E-06
Acrylonitrile	mg/mg nicotine	~ 1.07E-06	~ 1.07E-06	NT	NT	NT	~ 1.07E-06
Benzene	mg/mg nicotine	~ 1.11E-05	~ 1.10E-05	NT	NT	NT	~ 1.11E-05
Isoprene	mg/mg nicotine	~ 2.52E-06	~ 2.51E-06	NT	NT	NT	~ 2.52E-06
Propylene Oxide	mg/mg nicotine	~ 4.35E-06	~ 4.32E-06	NT	NT	NT	~ 4.35E-06
Toluene	mg/mg nicotine	~ 1.34E-05	~ 1.32E-05	NT	NT	NT	~ 1.34E-05
Esters & Alcohols							

Supplementary Material

1-Butanol	mg/mg nicotine	~ 5.71E-05	~ 5.68E-05	NT	NT	NT	~ 5.71E-05
Benzyl Acetate	mg/mg nicotine	~ 7.52E-05	~ 7.47E-05	NT	NT	NT	~ 7.52E-05
Ethyl Acetate	mg/mg nicotine	1.07E-02	8.57E-03	NT	NT	NT	1.07E-02
Ethyl Acetoacetate	mg/mg nicotine	~ 1.17E-04	~ 1.16E-04	NT	NT	NT	~ 1.17E-04
Isoamyl Acetate	mg/mg nicotine	~ 6.05E-05	~ 6.01E-05	NT	NT	NT	~ 6.05E-05
Isobutyl Acetate	mg/mg nicotine	~ 6.02E-05	~ 5.98E-05	NT	NT	NT	~ 6.02E-05
Methyl Acetate	mg/mg nicotine	~ 6.23E-05	~ 7.14E-04	NT	NT	NT	~ 7.14E-04

~ = approximated numeric value (see Supplemental Materials Appendix 1A) generated from the corresponding LOD and LOQ (See Supplemental Materials Appendix 1B)

2 Non-Intense (ISO 3308:2012) Combustible Reference Cigarette Constituent Values

Parameter/ Constituent BLUE= 3R4F BLACK=1R6F	ISO 3308:2012 Mean	Unit	Imputed Formatted	Unit Conversion (mg)	Nicotine (mg/cig)	Nicotine Concentration Source	Nicotine Normalized (mg/mg nicotine)	Analyte Concentration Source
Primary Constituents								
Nicotine	0.721	mg/cig	7.21E-01	7.21E-01	0.72	CoA 1R6F (University of Kentucky)	1.00E+00	CoA 1R6F (University of Kentucky)
Propylene Glycol	3.20	mcg/ci g	3.20E+00	3.20E-03	0.76	Uchiyama et al. 2018	4.21E-03	Uchiyama et al. 2018
Glycerol	680.00	mcg/ci g	6.80E-01	6.80E-01	0.76	Uchiyama et al. 2018	8.95E-01	Uchiyama et al. 2018
Water	3.20	mg/cig	3.20E+00	3.20E+00	0.76	Uchiyama et al. 2018	4.21E+00	Uchiyama et al. 2018
Menthol	<0.01	mcg/ci g	<0.01	1.00E-02	0.76	Uchiyama et al. 2018	~1.32E-05	Uchiyama et al. 2018
Diethylene Glycol	BLOD	mg/cig	BLOD [~0.00]	1.00E-03	0.70	GRPT-02816	~1.42E-03	Internal Study
Ethylene Glycol	0.007	mg/cig	7.00E-03	7.00E-03	0.70	GRPT-02816	9.96E-03	Internal Study
Carbonyls & Glycidol								
Acetaldehyde	522	mcg/ci g	5.22E+02	5.22E-01	0.72	CoA 1R6F (University of Kentucky)	7.24E-01	CoA 1R6F (University of Kentucky)
Acrolein	43	mcg/ci g	4.30E+01	4.30E-02	0.72	CoA 1R6F (University of Kentucky)	5.96E-02	CoA 1R6F (University of Kentucky)
Diacetyl	114.78	mcg/ci g	1.15E+02	1.15E-01	0.70	Jaccard et al. 2019	1.64E-01	Moldoveanu et al. 2017
Formaldehyde	27	mcg/ci g	2.70E+01	2.70E-02	0.72	CoA 1R6F (University of Kentucky)	3.74E-02	CoA 1R6F (University of Kentucky)
Glycidol	0.75	mcg/ci g	7.47E-01	7.47E-04	0.72	CoA 1R6F (University of Kentucky)	1.04E-03	Internal Study
Acetoin	BLOQ	mcg/ci g	BLOQ [~1.22]	1.22E-03	0.70	GRPT-02816	~1.73E-03	GRPT-02816
Butyraldehyde	25.90	mcg/ci g	2.59E+01	2.59E-02	0.78	Jaccard et al. 2019	3.33E-02	Jaccard et al. 2019

Parameter/ Constituent BLUE= 3R4F BLACK=1R6F	ISO 3308:2012 Mean	Unit	Imputed Formatted	Unit Conversion (mg)	Nicotine (mg/cig)	Nicotine Concentration Source	Nicotine Normalized (mg/mg nicotine)	Analyte Concentration Source
Crotonaldehyde	11	mcg/ci g	1.10E+01	1.10E-02	0.72	CoA 1R6F (University of Kentucky)	1.53E-02	CoA 1R6F (University of Kentucky)
Furfural	14.00	mcg/ci g	14	0.014	0.76	Uchiyama et al. 2018	1.84E-02	Uchiyama et al. 2018
Acetyl Propionyl	29.52	mcg/ci g	2.95E+01	2.95E-02	0.70	Jaccard et al. 2019	4.21E-02	Moldoveanu et al. 2017
Nicotine Degradants & TSNAs								
Beta Nicotyrine	7.49	mcg/ci g	7.49E+00	7.49E-03	0.70	GRPT-02816	1.07E-02	Internal Study
Cotinine	4.89	mcg/ci g	4.89E+00	4.89E-03	0.70	GRPT-02816	6.96E-03	Internal Study
Myosmine	NA	NA	NA	NA	NA	NA	NA	NA
Nicotine N Oxide	BLOQ	mcg/ci g	BLOQ [~0.38]	3.78E-04	0.70	GRPT-02816	~5.37E-04	GRPT-02816
Nornicotine	5.70	mcg/ci g	5.70E+00	5.70E-03	0.60	Jain et al. 2019	9.50E-03	Jain et al. 2019
Anabasine	0.50	mcg/ci g	5.00E-01	5.00E-04	0.60	Jain et al. 2019	8.33E-04	Jain et al. 2019
Anatabine	3.60	mcg/ci g	3.60E+00	3.60E-03	0.60	Jain et al. 2019	6.00E-03	Jain et al. 2019
NNK	71	ng/cig	7.10E+01	7.10E-05	0.72	CoA 1R6F (University of Kentucky)	9.85E-05	CoA 1R6F (University of Kentucky)
NNN	85	ng/cig	8.50E+01	8.50E-05	0.72	CoA 1R6F (University of Kentucky)	1.18E-04	CoA 1R6F (University of Kentucky)
Metals								
Cadmium	26.10	ng/cig	2.61E+01	2.61E-05	0.78	Jaccard et al. 2019	3.35E-05	Jaccard et al. 2019
Chromium	BLOD	ng/cig	BLOD [~0.44]	4.40E-07	0.70	Jaccard et al. 2019	~6.27E-07	Pappas et al. 2014
Copper	11.5	ng/cig	1.15E+01	1.15E-05	0.70	GRPT-02816	1.64E-05	GRPT-02816

Parameter/ Constituent BLUE= 3R4F BLACK=1R6F	ISO 3308:2012 Mean	Unit	Imputed Formatted	Unit Conversion (mg)	Nicotine (mg/cig)	Nicotine Concentration Source	Nicotine Normalized (mg/mg nicotine)	Analyte Concentration Source
Lead	BLOQ	ng/cig	BLOQ [~0.33]	3.25E-07	0.78	Jaccard et al. 2019	~4.18E-07	Jaccard et al. 2019
Nickel	BLOD	ng/cig	BLOD [~0.75]	7.50E-07	0.78	Jaccard et al. 2019	~9.64E-07	Jaccard et al. 2019
Organic Acids								
Benzoic Acid	NA	NA	NA	NA	NA	NA	NA	NA
Acetic Acid	NA	NA	NA	NA	NA	NA	NA	NA
Lactic Acid	NA	NA	NA	NA	NA	NA	NA	NA
Propionic Acid	NA	NA	NA	NA	NA	NA	NA	NA
VOCs								
Acrylonitrile	7.0	mcg/ci g	7.00E+00	7.00E-03	0.72	CoA 1R6F (University of Kentucky)	9.71E-03	CoA 1R6F (University of Kentucky)
Benzene	33	mcg/ci g	3.30E+01	3.30E-02	0.72	CoA 1R6F (University of Kentucky)	4.58E-02	CoA 1R6F (University of Kentucky)
Propylene oxide	657.00	mcg/ci g	657	0.657	0.78	Jaccard et al. 2019	8.44E-01	Jaccard et al. 2019*
Toluene	53	mcg/ci g	53	0.053	0.72	CoA 1R6F (University of Kentucky)	7.35E-02	CoA 1R6F (University of Kentucky)
Esters and Alcohols								
1-Butanol	NA	NA	NA	NA	NA	NA	NA	NA
Benzyl acetate	NA	NA	NA	NA	NA	NA	NA	NA
Ethyl Acetate	NA	NA	NA	NA	NA	NA	NA	NA
Ethyl acetoacetate	NA	NA	NA	NA	NA	NA	NA	NA
Isoamyl acetate	NA	NA	NA	NA	NA	NA	NA	NA
Isobutyl acetate	NA	NA	NA	NA	NA	NA	NA	NA
Methyl Acetate	NA	NA	NA	NA	NA	NA	NA	NA
Carbon Monoxide								

Parameter/ Constituent BLUE= 3R4F BLACK=1R6F	ISO 3308:2012 Mean	Unit	Imputed Formatted	Unit Conversion (mg)	Nicotine (mg/cig)	Nicotine Concentration Source	Nicotine Normalized (mg/mg nicotine)	Analyte Concentration Source
Carbon Monoxide	10.1	mg/cig	1.01E+01	1.01E+01	0.72	CoA 1R6F (University of Kentucky)	1.40E+01	CoA 1R6F (University of Kentucky)

3 Intense (ISO 20778:2018) Combustible Reference Cigarette Constituent Values

Parameter/ Constituent BLUE= 3R4F BLACK=1R6F	ISO 20778: 2018 Mean	Unit	Imputed Formatted	Unit Conversion (mg)	Nicotine (mg/cig)	Nicotine Concentration Source	Nicotine Normalized (mg/mg nicotine)	Analyte Concentration Source
Primary Constituents								
Nicotine	1.896	mg/cig	1.90E+00	1.90E+00	1.90	CoA 1R6F (University of Kentucky)	1.00E+00	CoA 1R6F (University of Kentucky)
Glycerol	2.08	mg/cig	2.08E+00	2.08E+00	1.74	St. Helen et al. 2018	1.20E+00	St. Helen et al. 2018
Propylene Glycol	23.7	mcg/cig	2.37E+01	2.37E-02	1.74	St. Helen et al. 2018	1.36E-02	St. Helen et al. 2018
Water	15.8	mg/cig	1.58E+01	1.58E+01	1.99	Jaccard et al. 2019	7.94E+00	Schaller et al. 2016
Menthol	<0.01	mcg/cig	<0.01	1.00E-02	2.10	Uchiyama et al. 2018	~4.76E-03	Uchiyama et al. 2018
Diethylene Glycol	BLOD	mg/cig	BLOD [~0.00]	2.00E-03	2.02	Forster et al. 2018	~9.90E-04	Forster et al. 2018, Internal Study LOD/LOQ
Ethylene Glycol	0.035	mg/cig	3.50E-02	3.50E-02	2.02	Forster et al. 2018	1.73E-02	Forster et al. 2018
Carbonyls & Glycidol								
Acetaldehyde	1552	mcg/cig	1.55E+03	1.55E+00	1.90	CoA 1R6F (University of Kentucky)	8.19E-01	CoA 1R6F (University of Kentucky)
Acrolein	154	mcg/cig	1.54E+02	1.54E-01	1.90	CoA 1R6F (University of Kentucky)	8.12E-02	CoA 1R6F (University of Kentucky)

Parameter/ Constituent BLUE= 3R4F BLACK=1R6F	ISO 20778: 2018 Mean	Unit	Imputed Formatted	Unit Conversion (mg)	Nicotine (mg/cig)	Nicotine Concentration Source	Nicotine Normalized (mg/mg nicotine)	Analyte Concentration Source
Diacetyl	336.93	mcg/cig	3.37E+02	3.37E-01	1.99	Jaccard et al. 2019	1.69E-01	Moldoveanu et al. 2017
Formaldehyde	104.00	mcg/cig	1.04E+02	1.04E-01	1.90	Jaccard et al. 2019	5.47E-02	Jaccard et al. 2019
Glycidol	1.76	mcg/cig	1.76E+00	1.76E-03	1.74	St. Helen et al. 2018	1.01E-03	Jaccard et al. 2019
Acetoin	BLOQ	mg/cig	BLOQ [~3.65]	3.65E+00	2.02	Forster et al. 2018	~1.80E+00	Forster et al. 2018, Internal Study LOD/LOQ
Acetyl Propionyl	91.87	mcg/cig	9.19E+01	9.19E-02	1.99	Jaccard et al. 2019	4.62E-02	Moldoveanu et al. 2017
Butyraldehyde	80.30	mcg/cig	8.03E+01	8.03E-02	1.90	Jaccard et al. 2019	4.23E-02	Jaccard et al. 2019
Crotonaldehyde	55.00	mcg/cig	5.50E+01	5.50E-02	1.90	Jaccard et al. 2019	2.89E-02	Jaccard et al. 2019
Furfural	25.9	mcg/cig	2.59E+01	2.59E-02	1.74	St. Helen et al. 2018	1.49E-02	St. Helen et al. 2018
Nicotine Degradants & TSNAs								
Beta Nicotyrine	7071.00	ng/cig	7.07E+03	7.07E-03	2.02	Forster et al. 2018	3.50E-03	Forster et al. 2018
Cotinine	14320.00	ng/cig	1.43E+04	1.43E-02	2.02	Forster et al. 2018	7.09E-03	Forster et al. 2018
Myosmine	13226.00	ng/cig	1.32E+04	1.32E-02	2.02	Forster et al. 2018	6.55E-03	Forster et al. 2018
Nicotine N Oxide	BLOQ	mcg/cig	BLOQ [~0.63]	6.30E-04	1.93	GRPT-02816	~3.26E-04	Internal Study
Nornicotine	22117.00	ng/cig	2.21E+04	2.21E-02	2.02	Forster et al. 2018	1.09E-02	Forster et al. 2018
Anabasine	1030.00	ng/cig	1.03E+03	1.03E-03	2.02	Forster et al. 2018	5.10E-04	Forster et al. 2018
Anatabine	6218.00	ng/cig	6.22E+03	6.22E-03	2.02	Forster et al. 2018	3.08E-03	Forster et al. 2018
NNK	187	ng/cig	1.87E+02	1.87E-04	1.90	CoA 1R6F (University of Kentucky)	9.86E-05	CoA 1R6F (University of Kentucky)

Parameter/ Constituent BLUE= 3R4F BLACK=1R6F	ISO 20778: 2018 Mean	Unit	Imputed Formatted	Unit Conversion (mg)	Nicotine (mg/cig)	Nicotine Concentration Source	Nicotine Normalized (mg/mg nicotine)	Analyte Concentration Source
NNN	212	ng/cig	2.12E+02	2.12E-04	1.90	CoA 1R6F (University of Kentucky)	1.12E-04	CoA 1R6F (University of Kentucky)
Metals								
Cadmium	76.10	ng/cig	7.61E+01	7.61E-05	1.90	Jaccard et al. 2019	4.01E-05	Jaccard et al. 2019
Chromium	BLOD	ng/cig	BLOD [~0.75]	7.50E-07	1.90	Jaccard et al. 2019	~3.95E-07	Forster et al. 2018, Internal Study LOD/LOQ
Copper	24.80	ng/cig	2.48E+01	2.48E-05	2.02	Forster et al. 2018	1.23E-05	Forster et al. 2018
Lead	31.2	ng/cig	3.12E+01	3.12E-05	1.74	St. Helen et al. 2018	1.79E-05	St. Helen et al. 2018
Nickel	BLOD	ng/cig	BLOD [~1.50]	1.50E-06	1.90	Jaccard et al. 2019	~7.89E-07	Forster et al. 2018, Internal Study LOD/LOQ
Organic Acids								
Benzoic Acid	NA	NA	NA	NA	NA	NA	NA	NA
Acetic Acid	NA	NA	NA	NA	NA	NA	NA	NA
Lactic Acid	NA	NA	NA	NA	NA	NA	NA	NA
Propionic Acid	NA	NA	NA	NA	NA	NA	NA	NA
VOCs								
Acrylonitrile	24.00	mcg/cig	2.40E+01	2.40E-02	1.90	CoA 1R6F (University of Kentucky)	1.27E-02	CoA 1R6F (University of Kentucky)
Benzene	88	mcg/cig	8.80E+01	8.80E-02	1.9	CoA 1R6F (University of Kentucky)	4.67E-02	CoA 1R6F (University of Kentucky)
Propylene oxide	1710	ng/cig	1.71E+03	1.71E-03	1.9	Jaccard et al. 2019	9.00E-04	Jaccard et al. 2019

Parameter/ Constituent BLUE= 3R4F BLACK=1R6F	ISO 20778: 2018 Mean	Unit	Imputed Formatted	Unit Conversion (mg)	Nicotine (mg/cig)	Nicotine Concentration Source	Nicotine Normalized (mg/mg nicotine)	Analyte Concentration Source
Toluene	150	mcg/cig	1.50E+02	1.50E-01	1.9	CoA 1R6F (University of Kentucky)	7.91E-02	CoA 1R6F (University of Kentucky)
Esters and Alcohols								
1-Butanol	NA	NA	NA	NA	NA	NA	NA	NA
Benzyl acetate	NA	NA	NA	NA	NA	NA	NA	NA
Ethyl Acetate	NA	NA	NA	NA	NA	NA	NA	NA
Ethyl acetoacetate	NA	NA	NA	NA	NA	NA	NA	NA
Isoamyl acetate	NA	NA	NA	NA	NA	NA	NA	NA
Isobutyl acetate	NA	NA	NA	NA	NA	NA	NA	NA
Methyl Acetate	NA	NA	NA	NA	NA	NA	NA	NA
Carbon Monoxide								
Carbon Monoxide	28.0	mg/cig	2.80E+01	2.80E+01	1.90	CoA 1R6F (University of Kentucky)	1.48E+01	CoA 1R6F (University of Kentucky)