

*Supplementary Materials*

# Market Survey of Modern Oral Nicotine Products: Determination of Select HPHCs and Comparison to Traditional Smokeless Tobacco Products

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**Table S1.** Tabulated results on a per gram basis for select HPHC analytes in the chosen MONPs and STP comparators. Values are presented as the "average ± standard deviation". Analyses were performed in triplicate.

Product Name	ID	NAB (ng/g)	NAT (ng/g)	NNK (ng/g)	NNN (ng/g)	Nitrite (µg/g)	BaP (ng/g)	Acetaldehyde (µg/g)	Crotonaldehyde (µg/g)	Formaldehyde (µg/g)	Arsenic (ng/g)	Beryllium (ng/g)	Cadmium (ng/g)	Chromium (ng/g)	Cobalt (ng/g)	Lead (ng/g)	Nickel (ng/g)	Selenium (ng/g)
Velo Max Nicotine Pouches, 7 mg Wintergreen	A1	ND	ND	ND	<LOQ	1.21 ± 0.52	ND	<LOQ	ND	0.376 ± 0.092	<LOQ	ND	<LOQ	49.6 ± 22.3	6.41 ± 0.68	15.7 ± 1.3	45.8 ± 9.4	ND
Velo Max Nicotine Pouches, 7 mg Black Cherry	A2	ND	ND	ND	ND	1.42 ± 0.29	ND	ND	ND	0.334 ± 0.039	<LOQ	ND	ND	30.8 ± 1.2	4.49 ± 0.31	19.6 ± 4.1	39.4 ± 4.9	ND
Velo Nicotine Pouches, 4 mg Mint	A3	ND	ND	ND	ND	<LOQ	ND	ND	ND	3.33 ± 0.14	ND	ND	ND	27.3 ± 3.6	<LOQ	3.88 ± 0.49	<LOQ	ND
Velo Nicotine Pouches, 4 mg Citrus	A4	ND	ND	ND	ND	<LOQ	ND	ND	ND	2.81 ± 0.27	ND	ND	ND	30.6 ± 2.9	<LOQ	4.86 ± 0.55	<LOQ	ND
on! Nicotine Pouches, 8 mg Wintergreen	B1	ND	ND	ND	ND	<LOQ	ND	ND	ND	0.511 ± 0.016	ND	ND	ND	163 ± 11	5.38 ± 0.37	9.14 ± 0.42	55.0 ± 3.0	ND
on! Nicotine Pouches, 8 mg Citrus	B2	ND	ND	ND	ND	1.55 ± 0.05	ND	ND	ND	0.807 ± 0.144	ND	<LOQ	ND	142 ± 26	10.4 ± 2.0	10.5 ± 0.5	73.8 ± 9.5	ND
on! Nicotine Pouches, 8 mg Berry	B3	ND	ND	ND	ND	<LOQ	ND	0.557 ± 0.059	ND	0.534 ± 0.120	<LOQ	ND	ND	76.9 ± 2.5	5.85 ± 0.08	5.92 ± 0.85	<LOQ	<LOQ
Rogue Pouches, 6 mg Mango	C1	ND	ND	ND	ND	<LOQ	ND	ND	ND	2.62 ± 0.12	<LOQ	<LOQ	ND	236 ± 6	7.11 ± 0.28	81.9 ± 1.4	110 ± 6	<LOQ
Rogue Pouches, 6 mg Honey Lemon	C2	ND	ND	ND	ND	<LOQ	ND	ND	ND	2.51 ± 0.16	ND	<LOQ	ND	274 ± 4	8.47 ± 0.63	77.2 ± 1.0	138 ± 1	<LOQ
Rogue Pouches, 6 mg Wintergreen	C3	ND	ND	ND	ND	<LOQ	ND	ND	ND	0.737 ± 0.091	ND	<LOQ	ND	215 ± 4	7.93 ± 0.17	83.2 ± 2.0	92.5 ± 2.0	<LOQ
FRÉ, 12 mg Lush	D1	ND	ND	ND	ND	<LOQ	ND	ND	ND	0.326 ± 0.034	ND	ND	ND	129 ± 19	<LOQ	14.3 ± 6.7	75.1 ± 7.5	<LOQ
Zyn Nicotine Pouches, 6 mg Citrus	E1	ND	ND	ND	ND	1.26 ± 0.08	ND	0.256 ± 0.017	ND	13.4 ± 0.4	ND	ND	<LOQ	22.5 ± 6.4	<LOQ	17.2 ± 1.0	ND	<LOQ
Zyn Nicotine Pouches, 6 mg Wintergreen	E2	ND	ND	ND	ND	ND	ND	0.0958 ± 0.0147	ND	10.2 ± 0.7	ND	ND	<LOQ	31.0 ± 6.5	<LOQ	16.2 ± 0.5	<LOQ	<LOQ
Fully Loaded, Wintergreen Pouches	F1	ND	<LOQ	ND	<LOQ	<LOQ	ND	3.13 ± 0.17	ND	0.335 ± 0.043	66.7 ± 8.3	5.68 ± 0.83	17.6 ± 1.5	334 ± 46	94.1 ± 6.8	119 ± 5	513 ± 80	25.4 ± 5.1
Fully Loaded, Straight Pouches	F2	ND	ND	ND	ND	<LOQ	ND	4.61 ± 0.7	ND	0.176 ± 0.048	63.8 ± 2.4	5.64 ± 0.13	17.2 ± 0.7	317 ± 12	96.0 ± 1.9	115 ± 9	456 ± 12	19.8 ± 0.5
Fully Loaded, Peach Long Cut	F3	ND	ND	ND	ND	<LOQ	ND	23.5 ± 0.2	ND	1.10 ± 0.11	78.7 ± 2.9	<LOQ	16.0 ± 0.5	391 ± 27	113 ± 4	98.1 ± 2.4	867 ± 6	31.8 ± 0.5
Fully Loaded, Berry Long Cut	F4	ND	ND	ND	ND	<LOQ	1.27 ± 0.04	6.70 ± 0.10	ND	0.160 ± 0.043	78.3 ± 2.7	5.07 ± 0.12	18.1 ± 0.9	456 ± 12	139 ± 2	159 ± 1	1155 ± 12	81.8 ± 4.9
Black Buffalo, Straight Pouches	G1	ND	<LOQ	<LOQ	<LOQ	1.51 ± 0.06	ND	0.762 ± 0.042	ND	1.17 ± 0.08	17.9 ± 2.1	<LOQ	59.0 ± 0.7	233 ± 47	30.4 ± 2.2	35.4 ± 1.6	186 ± 36	12.4 ± 4.3
Black Buffalo, Wintergreen Pouches	G2	ND	<LOQ	<LOQ	<LOQ	7.81 ± 0.03	ND	0.502 ± 0.017	ND	0.848 ± 0.083	18.5 ± 0.8	<LOQ	70.7 ± 0.5	259 ± 29	29.0 ± 1.3	35.6 ± 0.2	175 ± 11	15.85 ± 3.6
Black Buffalo, Blood Orange Long Cut	G3	<LOQ	18.5 ± 0.3	13.7 ± 0.4	39.4 ± 1.3	<LOQ	ND	8.71 ± 0.47	ND	0.695 ± 0.048	30.4 ± 0.3	<LOQ	86.0 ± 2.2	333 ± 22	52.4 ± 1.1	27.96 ± 4.3	331 ± 5	51.7 ± 3.6
Black Buffalo, Peach Long Cut	G4	<LOQ	14.8 ± 1.3	<LOQ	32.4 ± 0.8	<LOQ	ND	17.5 ± 0.8	0.0665 ± 0.0051	0.597 ± 0.168	25.5 ± 0.8	<LOQ	83.7 ± 1.2	239 ± 47	45.6 ± 0.9	21.7 ± 2.2	294 ± 19	59.5 ± 5.5
General Wintergreen White Portion	H1	19.0 ± 0.6	256 ± 7	122 ± 2	337 ± 3	<LOQ	ND	5.71 ± 0.58	ND	0.853 ± 0.111	46.8 ± 0.8	5.69 ± 0.18	259 ± 3	242 ± 24	302 ± 3	107 ± 2	644 ± 11	93.5 ± 25.6
Grizzly Wintergreen Long Cut	I1	167 ± 0.2	2201 ± 8	363 ± 2	1454 ± 52	2.01 ± 0.03	77.2 ± 2.0	2.49 ± 0.07	ND	1.79 ± 0.10	90.4 ± 5.6	7.24 ± 0.25	632 ± 5	295 ± 18	546 ± 6	123 ± 2	792 ± 5	113 ± 2
CRP1.1	J1	9.04 ± 0.07	125 ± 5	40.2 ± 2.5	177 ± 2	<LOQ	ND	5.46 ± 0.19	ND	0.776 ± 0.043	49.6 ± 5.6	6.52 ± 0.60	233 ± 17	336 ± 29	293 ± 22	107 ± 7	676 ± 55	136 ± 14
CRP2.1	J2	274 ± 5	4168 ± 29	2104 ± 26	3380 ± 65	2.65 ± 0.12	151 ± 3	3.43 ± 0.08	ND	3.64 ± 0.30	71.4 ± 1.3	9.88 ± 0.40	735 ± 12	401 ± 15	446 ± 10	182 ± 2	657 ± 9	197 ± 37

**Notes**

ND = not detected, i.e., below the limit of detection

<LOQ = below the limit of quantitation

**Table S2.** Tabulated results on a per portion basis for select HPHC analytes in the chosen MONPs and STP comparators. Values are presented as the "average ± standard deviation". Analyses were performed in triplicate.

Product Name	ID	NAB (ng/portion)	NAT (ng/portion)	NNK (ng/portion)	NNN (ng/portion)	Nitrite (µg/portion)	BaP (ng/portion)	Acetaldehyde (µg/portion)	Crotonaldehyde (µg/portion)	Formaldehyde (µg/portion)	Arsenic (ng/portion)	Beryllium (ng/portion)	Cadmium (ng/portion)	Chromium (ng/portion)	Cobalt (ng/portion)	Lead (ng/portion)	Nickel (ng/portion)	Selenium (ng/portion)
Velo Max Nicotine Pouches, 7 mg Wintergreen	A1	ND	ND	ND	<LOQ	0.408 ± 0.179	ND	<LOQ	ND	0.138 ± 0.032	<LOQ	ND	<LOQ	18.5 ± 8.6	2.38 ± 0.30	5.82 ± 0.57	17.0 ± 3.7	ND
Velo Max Nicotine Pouches, 7 mg Black Cherry	A2	ND	ND	ND	ND	0.475 ± 0.095	ND	ND	ND	0.124 ± 0.013	<LOQ	ND	ND	11.3 ± 0.5	1.65 ± 0.11	7.20 ± 1.53	14.4 ± 1.8	ND
Velo Nicotine Pouches, 4 mg Mint	A3	ND	ND	ND	ND	<LOQ	ND	ND	ND	1.40 ± 0.07	ND	ND	ND	11.2 ± 1.5	<LOQ	1.6 ± 0.20	<LOQ	ND
Velo Nicotine Pouches, 4 mg Citrus	A4	ND	ND	ND	ND	<LOQ	ND	ND	ND	1.21 ± 0.12	ND	ND	ND	12.1 ± 0.9	<LOQ	1.92 ± 0.18	<LOQ	ND
on! Nicotine Pouches, 8 mg Wintergreen	B1	ND	ND	ND	ND	<LOQ	ND	ND	ND	0.139 ± 0.005	ND	ND	ND	43.5 ± 3.0	1.44 ± 0.10	2.44 ± 0.12	14.7 ± 0.9	ND
on! Nicotine Pouches, 8 mg Citrus	B2	ND	ND	ND	ND	0.463 ± 0.022	ND	ND	ND	0.210 ± 0.038	ND	<LOQ	ND	36.8 ± 7.4	2.69 ± 0.56	2.72 ± 0.07	19.1 ± 2.9	ND
on! Nicotine Pouches, 8 mg Berry	B3	ND	ND	ND	ND	<LOQ	ND	0.137 ± 0.008	ND	0.135 ± 0.046	<LOQ	ND	ND	20.7 ± 0.8	1.57 ± 0.03	1.59 ± 0.22	<LOQ	<LOQ
Rogue Pouches, 6 mg Mango	C1	ND	ND	ND	ND	<LOQ	ND	ND	ND	1.76 ± 0.11	<LOQ	<LOQ	ND	141 ± 17	4.25 ± 0.62	48.9 ± 6.5	65.7 ± 6.4	<LOQ
Rogue Pouches, 6 mg Honey Lemon	C2	ND	ND	ND	ND	<LOQ	ND	ND	ND	1.68 ± 0.15	ND	<LOQ	ND	177 ± 10	5.47 ± 0.61	49.8 ± 2.8	89.1 ± 4.4	<LOQ
Rogue Pouches, 6 mg Wintergreen	C3	ND	ND	ND	ND	<LOQ	ND	ND	ND	0.550 ± 0.060	ND	<LOQ	ND	145 ± 13	5.33 ± 0.43	56.0 ± 5.6	62.2 ± 4.8	<LOQ
FRÉ, 12 mg Lush	D1	ND	ND	ND	ND	<LOQ	ND	ND	ND	0.157 ± 0.017	ND	ND	ND	61.7 ± 11.9	<LOQ	6.79 ± 2.92	36.0 ± 5.1	<LOQ
Zyn Nicotine Pouches, 6 mg Citrus	E1	ND	ND	ND	ND	0.509 ± 0.029	ND	0.100 ± 0.007	ND	5.24 ± 0.15	ND	ND	<LOQ	7.57 ± 1.49	<LOQ	5.90 ± 0.90	ND	<LOQ
Zyn Nicotine Pouches, 6 mg Wintergreen	E2	ND	ND	ND	ND	0.489 ± 0.089	ND	0.0384 ± 0.0059	ND	4.08 ± 0.27	ND	ND	<LOQ	11.2 ± 3.0	<LOQ	5.43 ± 0.48	<LOQ	<LOQ
Fully Loaded, Wintergreen Pouches	F1	ND	<LOQ	ND	<LOQ	<LOQ	ND	4.58 ± 0.48	ND	0.488 ± 0.036	106 ± 15	9.04 ± 1.62	28.0 ± 2.2	530 ± 73	149 ± 14	188 ± 15	812 ± 106	39.1 ± 6.0
Fully Loaded, Straight Pouches	F2	ND	ND	ND	ND	<LOQ	ND	6.92 ± 1.32	ND	0.266 ± 0.087	99.4 ± 6.6	8.81 ± 1.01	26.8 ± 3.1	493 ± 32	150 ± 14	180 ± 28	711 ± 60	30.8 ± 2.6
Fully Loaded, Peach Long Cut	F3	ND	ND	ND	ND	<LOQ	ND	23.5 ± 0.2	ND	1.10 ± 0.11	78.7 ± 2.9	<LOQ	16.0 ± 0.5	391 ± 27	113 ± 4	98.1 ± 2.4	867 ± 6	31.8 ± 0.5
Fully Loaded, Berry Long Cut	F4	ND	ND	ND	ND	<LOQ	1.27 ± 0.04	6.70 ± 0.1	ND	0.160 ± 0.043	78.3 ± 2.7	5.07 ± 0.12	18.1 ± 0.9	456 ± 12	139 ± 2	159 ± 1	1155 ± 12	81.8 ± 4.9
Black Buffalo, Straight Pouches	G1	ND	<LOQ	<LOQ	<LOQ	1.63 ± 0.07	ND	0.836 ± 0.079	ND	1.28 ± 0.09	19.0 ± 6.4	<LOQ	69.6 ± 2.0	249 ± 96	35.9 ± 2.	41.8 ± 2.8	219 ± 41	14.6 ± 4.9
Black Buffalo, Wintergreen Pouches	G2	ND	<LOQ	<LOQ	<LOQ	8.25 ± 0.27	ND	0.503 ± 0.02	ND	0.847 ± 0.070	19.8 ± 0.8	<LOQ	75.7 ± 1.5	277 ± 31	31.0 ± 1.2	38.1 ± 0.5	187 ± 12	16.9 ± 4.0
Black Buffalo, Blood Orange Long Cut	G3	<LOQ	18.5 ± 0.3	13.7 ± 0.4	39.4 ± 1.3	<LOQ	ND	8.71 ± 0.47	ND	0.695 ± 0.048	30.4 ± 0.3	<LOQ	86.0 ± 2.2	333 ± 22	52.4 ± 1.1	27.9 ± 4.3	331 ± 5	51.7 ± 3.6
Black Buffalo, Peach Long Cut	G4	<LOQ	14.8 ± 1.3	<LOQ	32.4 ± 0.8	<LOQ	ND	17.5 ± 0.8	0.0665 ± 0.0051	0.597 ± 0.168	25.5 ± 0.8	<LOQ	83.7 ± 1.2	239 ± 47	45.6 ± 0.9	21.7 ± 2.2	294 ± 19	59.5 ± 5.5
General Wintergreen White Portion	H1	19.6 ± 0.3	264 ± 5	125 ± 6	348 ± 18	<LOQ	ND	5.40 ± 0.51	ND	0.806 ± 0.090	45.2 ± 2.0	5.49 ± 0.31	250 ± 10	234 ± 25	292 ± 9	104 ± 2	622 ± 19	90.8 ± 27.3
Grizzly Wintergreen Long Cut	I1	167 ± 0.2	2201 ± 8	363 ± 2	1454 ± 52	2.01 ± 0.03	77.2 ± 2.0	2.49 ± 0.07	ND	1.79 ± 0.10	90.4 ± 5.6	7.24 ± 0.25	632 ± 5	295 ± 18	546 ± 6	123 ± 2	792 ± 5	113 ± 2
CRP1.1	J1	8.90 ± 0.31	123 ± 6	39.5 ± 2.0	174 ± 3	<LOQ	ND	5.57 ± 0.10	ND	0.791 ± 0.059	51.7 ± 4.1	6.80 ± 0.39	244 ± 9	350 ± 14	306 ± 11	112 ± 4	705 ± 31	142 ± 14
CRP2.1	J2	274 ± 5	4168 ± 29	2104 ± 26	3380 ± 65	2.65 ± 0.12	151 ± 3	3.43 ± 0.08	ND	3.64 ± 0.30	71.4 ± 1.3	9.88 ± 0.40	735 ± 12	401 ± 15	446 ± 10	182 ± 2	657 ± 9	197 ± 37

**Notes**

ND = not detected, i.e., below the limit of detection

<LOQ = below the limit of quantitation

Pouch product results are based on the actual number of pouches used to meet the respective method sample mass requirements.

Long cut product results are based on a nominal 1 g portion size.