



YAKIMA CHIEF - HOPUNION LLC

CERTIFICATE OF ANALYSIS

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Supplier: Yakima Chief-Hopunion, LLC
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Date of Issue: 15-Nov-2017

Product Name: Type 90 Hop Pellets

Lot Number: P91-ZJUCBS0152
Variety: Columbus
Crop Year: 2016

<u>Characteristic</u>	<u>Typical Analysis</u>	<u>Actual Analysis</u>
Alpha Acids:	2.5 - 17.5% (w/w) UV Spectro by ASBC HOPS - 6A	14.5%
Beta Acids:	3.0 - 9.0% (w/w) UV Spectro by ASBC HOPS - 6A	5.6%
Hop Storage Index	Varies by Variety and Time from Harvest Hop Storage Index by ASBC Hops - 12	0.273
Oil by Distillation:	Varies by Variety ASBC Hops - 13 (%v/w)	2.9%
Oil Profile by GC, EBC Analytica V 7.12:	B-Pinene: 0.8 % Myrcene: 53.8 % Linalool: 0.4 % Caryophyllene: 7.7 %	Farnesene: 0.3 % Humulene: 11.6 % Geraniol: 0.4 %

Lead:	< 1.0 ppm	passes test
Arsenic:	< 0.5 ppm	passes test
Cadmium:	< 0.03 ppm	passes test
Total Heavy Metals:	< 10 ppm (asPb)	passes test

Missy Raver
Quality Control Manager