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YAKIMA CHIEF - HOPUNION LLC
CERTIFICATE OF ANALYSIS

Supplier: Yakima Chief-Hopunion, LLC
 203 Division Street
 Yakima, WA 98902

Date of Issue: 15-Nov-2017

Product Name: Type 90 Hop Pellets

Lot Number: P92-AAUCIT5231
Variety: Citra® Brand
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 | 12.9% |
| Beta Acids: | 3.0 - 9.0% (w/w) UV Spectro by ASBC HOPS - 6A | 3.8% |
| 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) | 1.7% |
| Oil Profile by GC, EBC Analytica V 7.12: | B-Pinene: 0.6 % Myrcene: 50.5 % Linalool: 0.9 % Caryophyllene: 8.2 % | Farnesene: 0.1 % Humulene: 13.1 % Geraniol: 0.6 % |

| | | |
|----------------------------|-----------------|-------------|
| 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