ADVANCED ANALYTICAL RESEARCH
2517 Advance Rd, Ste A
Madison WI 53718
www.aarlab.com

HOP QUALITY REPORT
CERTIFICATE OF ANALYSIS

To: Wisconsin Hop Exchange

Sample ID: 23MAK1087-01LH

Variety: Mackinac™ Product: T-90 Pellet

Date : 11/21/2023

Certifying Officer: Zach Lilla - Lab Manager
TTB Certified Chemist - Member AOAC - ASBC - BJCP

Method				
Hops-4C	Moisture Analysis	% Moisture	10.5	
		% Dry Matter	89.5	
AAR	Xanthohumol by HPLC		**NT**	**mg/g**
Hops-12	Hop Storage Index	HSI	0.287	
Hops-13	Essential Oil by Steam Distillation	**mL/100g**	**1.95**	
Hops-14	Alpha and Beta Acids by HPLC	Cohumulone	30.3	(% of Total AA)
ICE-3		**% Alpha Acids**	**11.95**	
		Colupulone	55.7	(% of Total BA)
		% Beta Acids	**3.46**	
		a/b ratio	3.46	

Hops-17 Hop Essential Oil by GC-FID (as is)	% area	mg/100g
B-Pinene	NT	NT
Myrcene	NT	NT
Linalool	NT	NT
Caryophyllene	NT	NT
Farnesene	NT	NT
Humulene	NT	NT
Geraniol	NT	NT

NT=NOT TESTED

Signed: _____

Zachary Lilla - Lab Manager - TTB Certified Chemist
AAR LAB - ADVANCED ANALYTICAL RESEARCH
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info@aarlab.com
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AROMA QUALITY (AQ)

HOP QUALITY REPORT

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		Typical Range	
% Moisture	10.5	8 - 12 %	✓

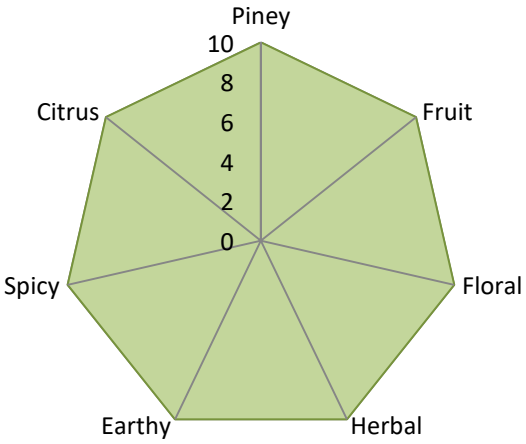
HOP QUALITY (adjusted to 10% moisture)

Total Oil ml/100g	1.97	1.2 - 1.8 ml	↑
cohumulone	30.3	27 - 32%	✓
Alpha Acids	12.02	9.0 - 13%	✓
Beta Acids	3.48	3.0 - 3.5%	✓
Myrcene	NT	15.00 - 25.00 %	

AROMA QUALITY (AQ)

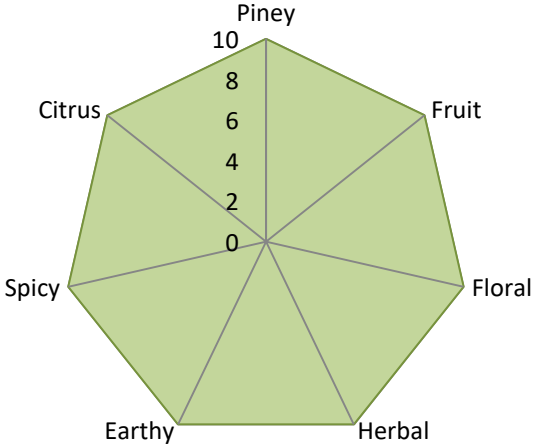
	% Area			mg/mL of Hop Oil			mg/100g of Hops (@10%H20)		
B-Pinene	NT	0.40 - 1.00 %		NT	4 - 10		NT	4.8 - 18	
Myrcene	NT	15.00 - 25.00 %		NT	150 - 250		NT	180 - 450	
Linalool	NT	0.6 - 1.20 %		NT	6 - 12		NT	7.2 - 21.6	
Caryophyllene	NT	9.00 - 12.00 %		NT	90 - 120		NT	108 - 216	
Farnesene	NT	0.01 - 1.00 %		NT	0.1 - 10		NT	0.12 - 18	
Humulene	NT	17.00 - 23.00 %		NT	170 - 230		NT	204 - 414	
Geraniol	NT	0.60 - 1.00 %		NT	6 - 10		NT	7.2 - 18	

AQ vs VARIETY SPECS



Aroma Intensity= 100

AQ vs ALL HOP VARIETIES



Aroma Intensity= 100

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