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White Labs, Inc-Brewery 9495 Candida St. San Diego, CA 92126 United States	Sample ID:	Received:	Completed:
	51505	09/27/2019	09/27/2019
Sample Type: Beer			
Sample Name: Tabberer IPA with WLP001 California Ale Yeast			

Testing Date: 09/27/2019 09:56 AM

TEST	METHOD	RESULT	UNITS	COMMENTS
Alcohol by Volume (20°C)	ASBC Beer-4G	6.79	Percent	
Alcohol by Weight	ASBC Beer-4G	5.30	Percent	
Apparent Attenuation	ASBC Beer-4G	78.49	Percent	
Apparent Extract	ASBC Beer-4G	3.41	Plato	
Original Extract	ASBC Beer-4G	15.85	Plato	
Real Degree Attenuation	ASBC Beer-4G	65.38	Percent	
Real Extract	ASBC Beer-4G	5.8	Plato	
Specific Gravity	ASBC Beer-4G	1.013	20°C	
Calories	ASBC Beer-4G	213.39	per 12 fl. oz.	
Color	ASBC Beer-10A	15.12	SRM	
pH	ASBC Beer-9	4.71		
Bitterness Units	ASBC Beer-23A	61	BU	
Diacetyl (As-Is)	ASBC Beer-25E	26.46	ppb	
Hsu's Lactobacillus and Pediococcus Medium (HLP)		None Detected	Colony Forming Units (CFUs)	1ml of sample was inoculated in HLP and incubated at 30°C for 5 days.
Lin's Cupric Sulfate Medium (LCSM)		None Detected	Colony Forming Units (CFUs)	400ul of sample was plated on the media and incubated at 30°C for 5 days.
Wallerstein Differential Medium (WLD)		None Detected	Colony Forming Units (CFUs)	400ul of sample was plated on the media and incubated at 30°C for 5 days.

Reviewed By:

*Katie Gardner*

Katie Gardner  
Analytical Lab Supervisor  
09/27/2019

### Alcohol by Volume 20°C/Alcohol by Weight

Performed on the Anton Paar Density Meter DMA 5000 and AlcoLyzer Beer ME.

### Apparent Extract

This analysis represents the % solids in the beverage, typically non-fermentable and fermentable carbohydrates. Apparent extract can be compared to specific gravity as a similar representation of the information.

### Apparent Attenuation

Attenuation is expressed as the percent difference between the original and final gravities of the beer. Attenuation will vary by beer and yeast strain, typical ranges for apparent attenuation are 65-90%. These values can be compared to your in-house data.

### Real Extract

This represents the actual % solids, typically carbohydrates and sugars left in the beer. Real extract involves a correction accounting for the alcohol in the beverage. This calculation is reported in degrees Plato.

### Real Attenuation

Real attenuation differs from apparent attenuation because it corrects for the alcohol in the sample. Attenuation will vary by beer and yeast strain. Typical ranges for real attenuation are 65-80%.

### Specific Gravity

This refers to the density of the beverage. This analysis is performed with the Anton Paar Density Meter DMA 5000.

### Calories

Calories are calculated from real extract and alcohol. This is calculated by the Anton Paar instrument.

### pH Test

The pH of beer is an important indicator of quality and consistency. A high pH can result in flavor problems and make the beer more prone to contamination.

### Color

A spectrophotometer is used to measure the absorbance of a sample at a certain wavelength. It can vary between 1 SRM to 200 SRM. The darker the beer, the higher the value.

### IBU

The IBU scale provides a measure of the hop derived bitterness of beer. The American Society of Brewing Chemists International Method, Beer-23A, is used.

### Diacetyl

Diacetyl is measured on our Perkin Elmer Clarus 500 Gas Chromatograph and Headspace Sampler. The lower the number the better, in most cases. Although it can depend on the style, typically breweries set standards of less than 100 ppb. The flavor threshold is very low, 10-40 ppb. The numbers vary depending on the yeast strain and fermentation procedure. If the number is high, perhaps in the 200 ppb range, the brewery may not be performing an adequate diacetyl rest. Examples of strains with higher diacetyl are the British strains and some lagers. Very high diacetyl levels can be an indication of contamination.

### Hsu's *Lactobacillus* and *Pediococcus* Medium (HLP)

This medium is used to look for the presence of *Lactobacillus* and *Pediococcus*. These bacteria are anaerobic. If this test is positive, the beer may develop flavor problems. Any CFUs found from this test should cause concern and an evaluation of your brewing and packaging process. If sample was taken from a tap line, the lines may be contaminated and show a positive result on this test. Additionally, some wild yeast can grow in HLP media.

### **Lin's Cupric Sulfate Medium (LCSM)**

This medium uses cupric sulfate to inhibit the growth of brewers yeast. This medium ensures no contamination of non-*Saccharomyces* wild yeast. Typical of flavors produced by wild yeast would be phenolic and band-aid flavors. LCSM is also capable of detecting *Saccharomyces cerevisiae* var. *diastaticus*. Note: There are several "classic" STA1 positive brewing strains that have been used and cultivated for more than 30 years and are generally classified as "high-attenuators." The strains we carry with known var. *S. diastaticus* genetics have been validated to perform without excessive over-attenuation through many years of experience, internal and external fermentation data. These strains are noted in our strain listing on our website. LCSM can show normal micro colony growth for some *Saccharomyces* sp. and may not be a STA1 positive strain.

### **Wallerstein Differential Medium (WLD)**

This medium is used to check for bacteria and some wild yeast. Most aerobic bacteria will grow on these plates, and some anaerobic bacteria also display growth. Positive aerobic bacteria results can be from sample collection, follow up tests are usually done to confirm contamination of product.

### **Gluten**

Our gluten testing is the R-Biopharm Gliadin Competitive Assay, the only assay available for alcoholic beverages. Foods under <20 ppm are considered gluten free. Because most beers have started with an ingredient containing gluten, the TTB does not consider products gluten free, but gluten reduced.

### ***Saccharomyces cerevisiae* var. *diastaticus***

*Saccharomyces cerevisiae* var. *diastaticus* is a natural variant of *Saccharomyces cerevisiae* that can cleave wort dextrins into fermentable sugars. This process has been linked to the presence of STA genes, which encode for the exoenzyme glucoamylase, also referred to as amyloglucosidase. The presence of *Saccharomyces cerevisiae* var. *diastaticus* was tested via PCR using Invisible Sentinel brewSTAT. Results are reported as positive or negative. Note: There are several "classic" STA1 positive brewing strains that have been used and cultivated for more than 30 years and are generally classified as "high-attenuators." The strains we carry with known var. *S. diastaticus* genetics have been validated to perform without excessive over-attenuation through many years of experience, internal and external fermentation data. These strains are noted in our strain listing on our website.