

LABORATORY TESTING: HEMP PRODUCTS

Hemp-derived CBD Products Analyzed to California Cannabis Compliance Standard

Highlights: This technical report was prepared by Josh Wurzer, President and Co-Founder of SC Laboratories, Inc, and brought to you by the United Cannabis Business Association (UCBA). This overview report addresses a number of laboratory tests conducted on product samples purchased at unlicensed CBD shops and retailers throughout Los Angeles, California. The samples, all labeled as hemp or hemp-derived products, had the complete California regulatory compliant cannabis test panel performed on them.

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ABSTRACT

SC Laboratories tested 17 samples purchased at unlicensed CBD shops or retailers in the Los Angeles area by the United Cannabis Business Association (UCBA). The samples, all labeled as hemp or hemp-derived products, had the complete California regulatory compliant cannabis test panel performed on them. Over 70% of the samples failed either for excessive contamination or did not qualify as hemp. 42% of the samples failed the safety testing compared with approximately 1.5% of samples that fail for contaminants on the regulated market. Perhaps more concerning than the overall failure rate, is the level of contamination, which was several hundred times more than allowable limits in some cases. 53% of tested samples labeled as hemp or hemp-based did not qualify, by definition, as hemp. The 2018 Farm bill classifies hemp as cannabis that contains no more than 0.3% total THC. Furthermore, most of the tested products contained levels of THC sufficient to cause serious psychoactive effects which may be entirely unwanted by CBD users.

INTRODUCTION

Cannabis-based products in California are heavily regulated including robust requirements for quality control backed by mandatory testing of finished product batches. However, when marketed as hemp or hemp-derived, products are sold without any quality control requirements despite being, essentially, indistinguishable from their cannabis-based counterparts. SC Laboratories was contracted by the UCBA to test products purchased at unlicensed CBD retail outlets to the standards required by the state of California for their cannabis test panel. The purpose of the product survey was twofold; to determine whether or not the products were actually hemp derived and to assess levels of contamination in the products within the context of the regulated cannabis market.

UCBA provided the samples and delivered them to SC Laboratories in their retail packaging. The samples were predominantly marketed as hemp flower (14) in either raw (8) or pre-rolled (6) form.

Additionally, the laboratory tested a vape oil cartridge, a topical product, and an edible product all marketed as either containing a hemp derived extract or as infused with a hemp derived extract. All tests were performed within the scope of the laboratory's accreditation, through PJLA, to the ISO-17025:2017 standard.

Over 70% of the samples submitted by the UCBA failed the testing panel by containing excessive levels of contaminants or not qualifying as hemp. Most of the samples, based on THC concentration, would be classified as cannabis rather than hemp, the majority of which contained little CBD and significant levels of THC. Of the samples that failed for contamination at levels in excess of those allowed in cannabis products in California, many failed for multiple pesticide and heavy metal contaminants at alarming high concentrations. One sample contained 17 pesticides in concentrations up to several hundred times the state's action limit.

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MATERIALS AND METHODS

Table 1: UCBA provided seventeen samples in retail packaging.

LABELED PRODUCT NAME	PRODUCT TYPE
USC CBD Flower	Flower
Private Reserve	Flower
CBDDeez Hemp Flower	Flower
Northern Lights	Flower
Pot Shop CBD Flower	Flower
California Gold Company	Flower
Religious Cannabis Bubba Kush	Flower
DR. CBD	Flower
Old Soul Hemp	Pre-roll
Pure Hemp Farms	Pre-roll
Hemp Toke	Pre-roll
Sherbinski's Gelato	Pre-roll
Big Chief Hemp Cigarettes	Pre-roll
Hemp Zone Menthol Hemp Cigarettes	Pre-roll
Mario Carts	Oil filled vape cartridge
Religious Cannabis Brownie	Oil infused edible
Soothing Salve	Oil infused topical

TESTING STANDARD

Compliance tested at following standards established by the Bureau of Cannabis Control (BCC). The BCC is the lead agency in regulating commercial cannabis licenses for medical and adult-use cannabis in California.

Table 2: The following tests were performed on submitted samples.

TEST	PRODUCT TYPES	TECHNIQUE	ANALYTES MEASURED
Cannabinoids	All product types	HPLC-UV	15
Pesticides	All product types	LC-MS & GC-MS	66
Heavy Metals	All product types	ICPMS	4
Microbiological Contaminants	All product types	qPCR	6-flowers 2-other product types
Residual solvents and processing chemicals	Concentrates	GC-MS-HS	20
Mycotoxins	All product types	LC-MS	5
Moisture Content	Flowers and Pre-rolls	LOD	1
Water Activity	Flowers and Pre-rolls	Dew Point	1

TESTING ACCREDITATION

All tests were performed within the scope of the laboratory's accreditation, through PJA, to the ISO-17025:2017 standard.

QUALITY STANDARD PROCEDURES

(1152) Sample Preparation, (1157) Analysis of Cannabinoids by Thermo U3000 HPLC-DAD, (1160) Analysis of Heavy Metals by ICP-MS, (1204) Analysis of Residual Solvents by GC-MS, (1212) Analysis of Pesticides and Mycotoxins by LC-MS, (1221) Analysis of Microbial Impurities, (1224) Loss on Drying (Moisture), (1226) Analysis of Foreign Material in Cannabis and Cannabis Products, (1227) Analysis of Water Activity in Cannabis and Cannabis Products

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RESULTS

The majority of samples either failed for contaminants in excess of the states allowed limits or did not qualify, under the 2018 Farm Bill or the State of California hemp regulations, as hemp or hemp-derived. Seven of seventeen samples failed the required safety testing including five failures for heavy metals and three for pesticide contamination.

Nine of the seventeen samples had THC in excess of the amount allowed to be considered hemp, most had very little CBD and significant amounts of THC. None of the samples failed for microbiological contaminants, residual solvents and processing chemicals, mycotoxins, moisture content, or water activity.

Table 3: Summary

	PESTICIDE FAIL RATE	HEAVY METAL FAIL RATE	HEMP THC LIMIT FAIL
All Samples	3/17	5/17	9/17
Flower	2/8	1/8	7/8
Pre-roll	0/6	3/6	1/6
Concentrate	1/1	1/1	1/1
Topical	0/1	0/1	0/1**
Edible	0/1	0/1	0/1

Table 4: Sample Results Summary*

PRODUCT	PRODUCT TYPE	CONTAMINANTS	HEMP THC LIMIT	OVERALL RESULT
USC CBD Flower	Flower	Fail	Fail	Fail
Private Reserve	Flower	Warn	Fail	Fail
CBDDeez Hemp Flower	Flower	Fail	Fail	Fail
Northern Lights	Flower	Fail	Fail	Fail
Pot Shop CBD Flower	Flower	Warn	Fail	Fail
California Gold Company	Flower	Warn	Fail	Fail
Religious Cannabis Bubba Kush	Flower	Pass	Fail	Fail
DR. CBD (Hemp Flower)	Flower	Pass	Pass	Pass
Old Soul Hemp Pre-Rolls	Pre-roll	Fail	Pass	Fail
Pure Hemp Farms (Pre-Roll)	Pre-roll	Pass	Fail	Fail
Hemp Toke	Pre-roll	Pass	Pass	Pass
Sherbinskis Gelato	Pre-roll	Warn	Pass	Pass
Big Chief Hemp Cigarettes	Pre-roll	Fail	Pass	Fail
Hemp Zone Menthol Hemp Cigarettes	Pre-roll	Fail	Pass	Fail
Mario Carts	Oil filled vape cartridge	Fail	Fail	Fail
Religious Cannabis Brownie	Oil infused edible	Pass	Pass	Pass
Soothing Salve	Oil infused topical	Pass	Pass**	Pass**

*Detailed results available on individual certificates of analysis

**Sample passed Hemp THC limit but likely not hemp-derived

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RESULTS (continued)

The level of pesticide contamination found in the vape cartridge filled with concentrate oil stood out amongst the samples which failed for its' extreme levels of contamination. The tested sample contained failing concentrations of seventeen pesticides with some of those pesticides showing up in such high amounts they maxed out the laboratory instrumentation, measuring at least tens or hundreds of times the state limit. Furthermore, the cartridge contained at least 6.5 ppm of lead or over 13 times the legal limit. These levels are indicative of gross contamination of the extraction and/or

packaging equipment. If so, each batch produced on the shared equipment would likely be similarly contaminated. Furthermore, the concentration of total cannabinoids in this product is roughly half that of similar products tested for the regulated market which indicates the potential use of a 'cutting agent' to covertly dilute the expensive cannabinoid active ingredients with cheaper ingredients. Some cutting agents, like vitamin E acetate, have been linked to serious acute illnesses in vape users.

MARIO CARTS: Concentration of Failing Pesticides

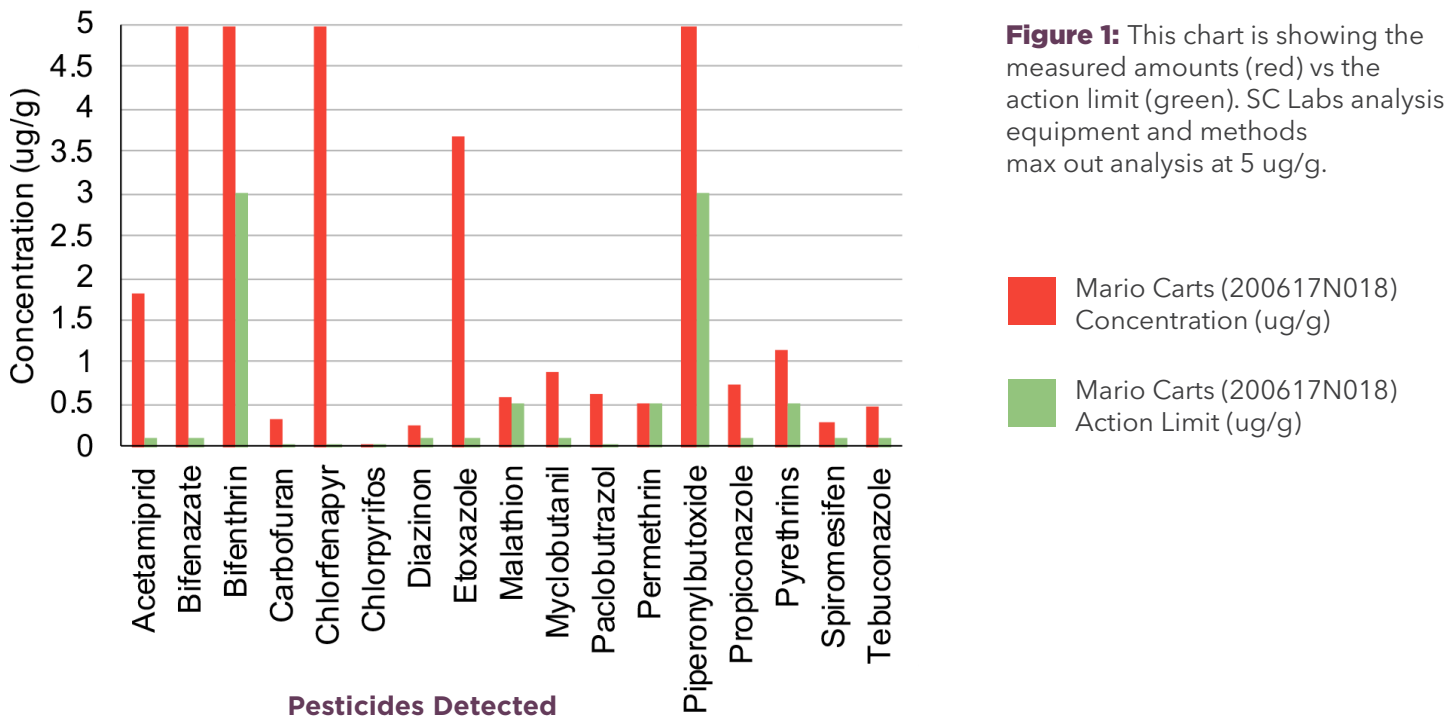


Figure 1: This chart is showing the measured amounts (red) vs the action limit (green). SC Labs analysis equipment and methods max out analysis at 5 ug/g.

The vape cartridge was not the only sample found to be grossly contaminated. One flower and several pre-rolled samples (3 of 6) contained failing levels of heavy metals. Three out of four of those samples failed for multiple metals. Both the frequency of

failures among flowers for heavy metals or pre-rolls as well as the occurrence of multiple failures per sample is anomalous when compared to the regulated market.

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PRE-ROLLS: Lead vs Action Limit

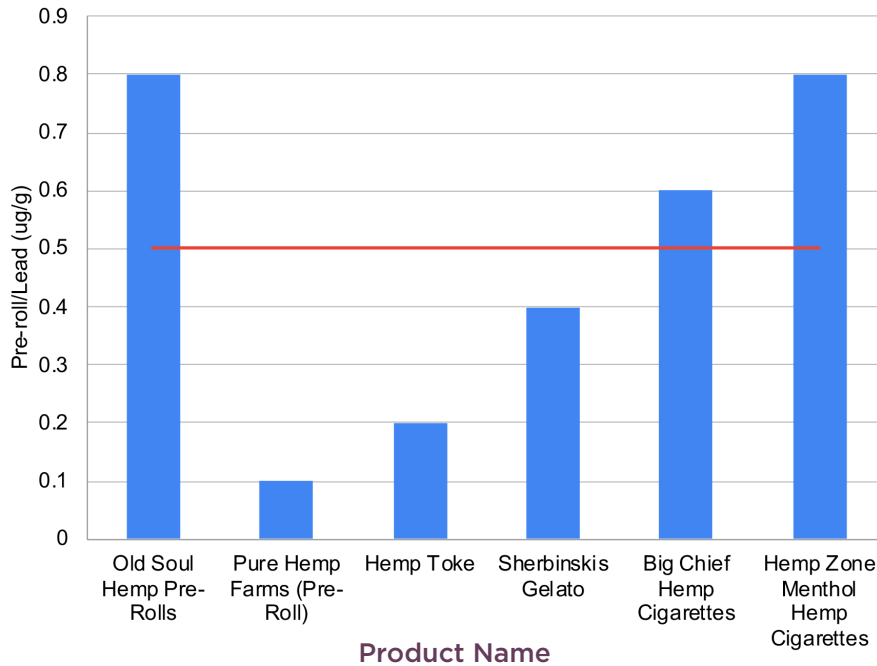


Figure 2: This chart is showing the measured amounts of the heavy metal Lead (blue) vs the action limit (red).

■ Pre-roll Lead (ug/g)
■ Pre-roll Action Limit

PRE-ROLLS: Arsenic vs Action Limit

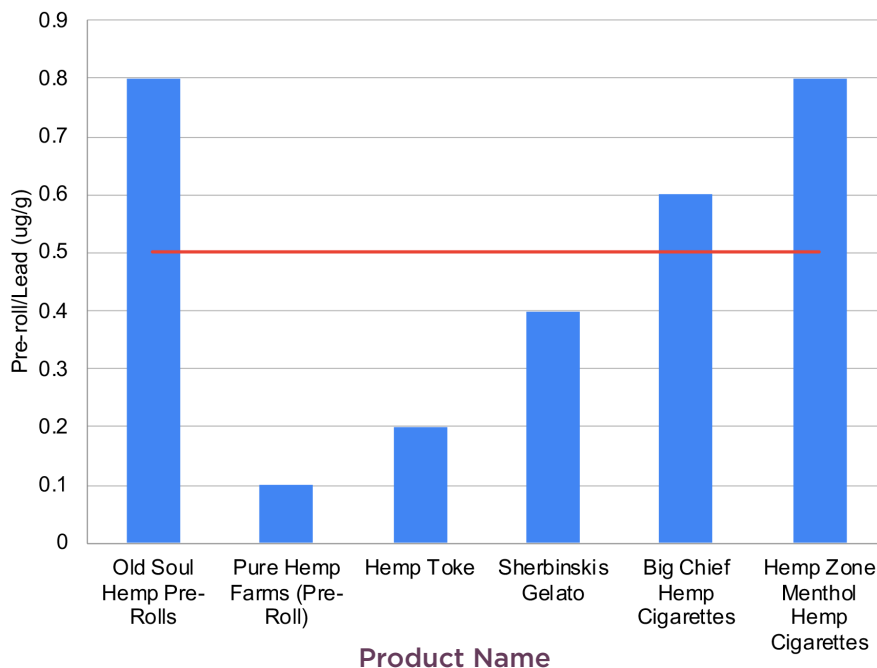


Figure 3: This chart is showing the measured amounts of the heavy metal Arsenic (blue) vs the action limit (red).

■ Pre-roll Arsenic (ug/g)
■ Pre-roll Action Limit

Hemp Products Analyzed to California Cannabis Compliance Standard

PRE-ROLLS: Cadmium vs Action Limit

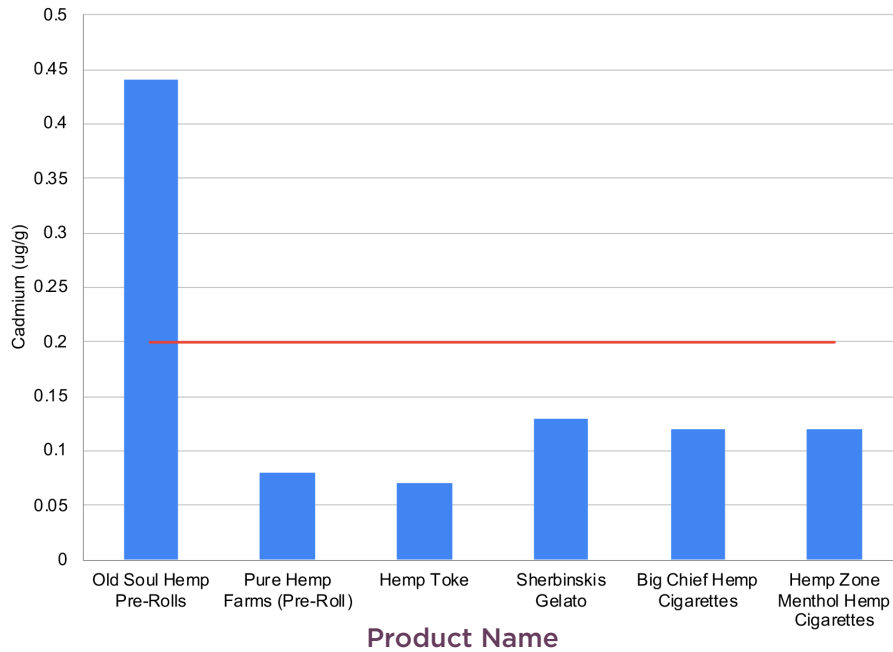


Figure 4: This chart is showing the measured amounts of the heavy metal Cadmium (blue) vs the action limit (red).

■ Pre-roll Cadmium (ug/g)
■ Pre-roll Action Limit

Total THC Content in CBD Products

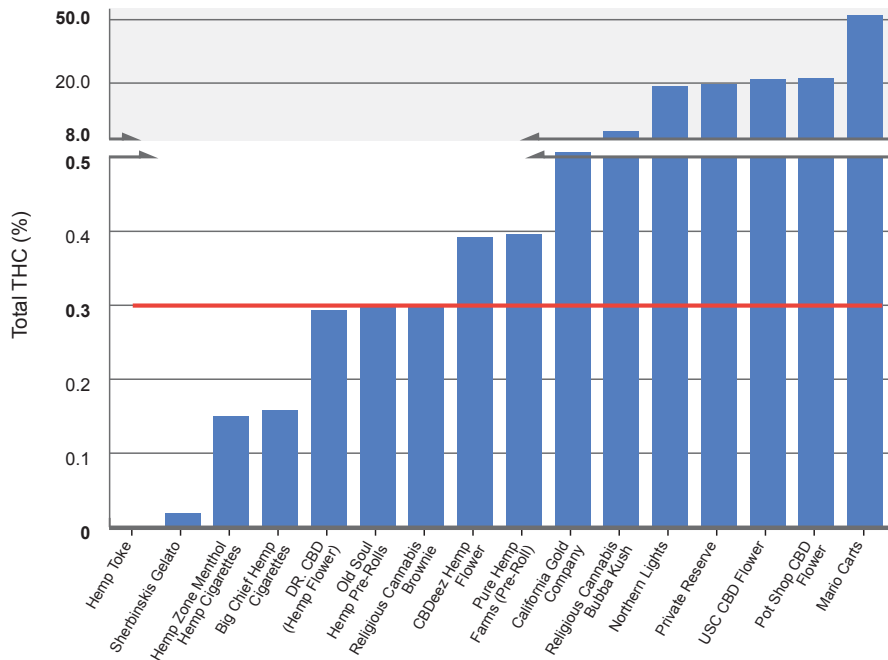


Figure 5: This chart is showing the Total THC % in each product tested (blue) vs the action limit (red) that classifies hemp as no more than 0.3% total THC.

■ Total THC (%)
■ THC Action Limit

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RESULTS (continued)

Nine of the seventeen samples failed to meet the THC content standard to be classified as hemp. Five of the flower samples, the vape cartridge, and the edible product all contain levels of THC sufficient to give an unsuspecting user a significant psychoactive experience. The topical product also contained mostly THC and very little CBD indicating it is cannabis and not hemp-derived. This sample did not fail based on our criteria as the low overall concentrations of cannabinoids did not force the THC percentage over the 0.3% threshold. However, this sample is clearly not hemp-derived.

DISCUSSION

This results of this small survey of products claiming to be hemp or hemp-based suggests that there needs to be better oversight of these types of products. Not only are these producers and the retail outlets that carry their products circumventing the regulated cannabis market, test results indicate they are putting consumers at considerable risk.

The oil vape cartridge in the study was one of the most grossly contaminated samples ever tested at the laboratory. Furthermore, the levels of contamination in some of these products are hundreds of times higher than even the most heavily contaminated cannabis samples tested at SC Laboratories.

Finally, it is apparent that unregulated cannabis from unknown sources is reaching store shelves labeled as hemp. This creates many issues, not least of which is the risk posed to unknowing consumers. A majority of samples labeled as hemp contain enough THC to cause serious impairment. It can be assumed that an unknowing consumer could become intoxicated unexpectedly while performing a dangerous or safety-sensitive task. Beyond that, it is clear that some retailers are using the cover of hemp laws to illegally sell dangerous, untested, cannabis.

ACKNOWLEDGEMENTS

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