Industrial Hemp Advisory Board (IHAB) Task Force Meeting
California Department of Food & Agriculture (CDFA)

1220 N Street, Room 133
Sacramento, CA 95814

Thursday, February 22, 2018
10:00 a.m. – 12:00 p.m.

Attendees:

Allison Justice (IHAB member)	Joanna Hossack	Michelle Pham
Richard Soria (IHAB member)	Dorota Inerowicz	Chandra Poonam
Brent Burchett	Joshua Kress	Wayne Richman
Tamala Choma	Donald Land	Duane Sinning
John DeSantiago	Tyler Lueke	Brad Sumner
Daniel Donate	John Miller	Cathy Vue
Joshua Greene	Melissa Ortiz	Stacey Wooten

1. **Roll Call and Opening Remarks**
   Meeting called to order at 10:08 a.m. by Joshua Kress, Program Supervisor of the CDFA Nursery, Seed, and Cotton Program. Kress briefly welcomed attendees and noted that this meeting was being held to discuss sampling and testing procedures for THC content, as required by California Food and Agricultural Code (FAC) Section 81006(g).

   Kress noted that this task force was formed at the request of the Industrial Hemp Advisory Board (IHAB) Chair at the January 18, 2018 Meeting, in which he requested that Board Members Allison Justice and Richard Soria work with program staff to meet with subject matter experts to discuss sampling and testing procedures. Kress noted that the findings of this Task Force would be reported back to the IHAB by Justice and Soria at the next board meeting, tentatively scheduled for April 24, 2018.

   Board Members, CDFA staff, and subject matter experts provided self-introductions.

2. **Discussion of sampling and testing protocols and procedures for THC content in industrial hemp**
   Kress explained that CDFA staff had requested information on sampling and testing procedures from all other states. Michelle Pham presented a summary of responses (attached), including information on: sampling timelines, sample collection, sample handling, THC testing method, sample preparation and storage, sample retention and disposal, and THC determination and required actions.

   Sampling Timeline:
   Pham noted the timeframe for sampling in FAC § 81006(f)(1), as well as corresponding and related information in the procedures from Colorado, Kentucky, Minnesota, and Oregon.

   Brent Burchett, Kentucky Department of Agriculture, expressed the importance of providing flexibility to the grower to notify the State of a change in the harvesting date. Burchett explained the THC level could climb if sampling is done prematurely from the harvest date. He stated Kentucky allows harvesting as soon as sampling is completed, however the harvested material

could not be processed or moved into commerce until the registrant obtained passing testing results.

Duane Sinning, Colorado Department of Agriculture, stated that Colorado's standard of sampling 30 days prior to harvesting is due to the additional time needed to deliver the samples to the laboratory. He noted Colorado's laboratory takes approximately ten days for processing. Sinning reiterated the issue with sampling too early, noting that THC content continues to rise in the field, and a prematurely sampled crop risks later being found out of compliance by law enforcement.

Kress noted that California law did not specify a timeframe for sampling prior to harvesting.

Wayne Richman, California Hemp Association, asked if a determination was made from one test or an average of results. Burchett responded that Kentucky was taking one preharvest sample per plot, defined as a contiguous area of the same variety planted approximately at the same time. Burchett explained that Kentucky allowed post-harvest testing if the preharvest sample's THC content is too high. He stated that Kentucky collected five cuttings of 20 cm in length for a composite sample, and that sample selection varied.

Kress asked for clarification on lab processing times. Sinning responded that the timeframe was 10-14 days in Colorado. Sinning added that the hemp crop could not be moved from the growing field until results were received and confirmed as meeting the THC content requirement. Burchett responded that the timeframe was approximately 7-10 days in Kentucky, and noted that the main bottleneck in the process was the drying of the samples.

Sample Collection:

Pham noted the description of sample in FAC § 81006(f)(2), as well as corresponding and related information in the procedures from Colorado, Indiana, Kentucky, Minnesota, and Oregon.

Sinning explained that Colorado collects the top two inches of the plant because taking more could destroy the entire crop for seed breeders and could result in the loss of intellectual property. Sinning emphasized that all plantings were subjected to the same level of sampling regardless of purpose. Sinning also explained that field edges could give an artificially high THC test result, which could be significant due to the low threshold for THC content of 0.3%.

Sinning stated Colorado did not require samples from every variety due to many growers having small plots with multiple varieties. He noted sample selection was up to the inspector's discretion, but was coordinated with the registrant since the registrant paid for each sample. Sinning explained composite sampling was cost effective to the registrant, but that they risked subjecting everything to destruction if the THC level was too high. Colorado did not allow for retesting of a crop that was out of compliance.

Sinning noted that Colorado determined the number of plants to be sampled based on field size to ensure that the test result was not dependent on just one or two plants.

Burchett noted that medical or recreational marijuana was not allowed in Kentucky. He stated the minimum sample size was five plants. Burchett also explained that Kentucky had difficulties in determining a consistent method to remove seeds from a sample prior to grinding. He stated that hemp seeds did not contain THC content and may dilute THC content in sample. Burchett agreed with Sinning the level of sampling should be the same for all types of plantings.

Kress asked if either Kentucky or Colorado used a statistical chart to ensure that a representative sample was taken, and if the number of samples varied based on the type of planting. Sinning stated that Colorado did not have a statistical chart, but that the same amount of material was collected from all fields. Burchett concurred. Burchett and Sinning both noted that inspectors should not sample in a consistent pattern to prevent growers from being able to plant marijuana in portions of the field that would not be sampled.

Sinning added that Colorado had not found any attempts to grow marijuana in a hemp field, and he speculated that this may have been due to marijuana cultivation being legal in the state.

Kress asked if was common to see multiple varieties in one field. Sinning responded it was common early in Colorado's program to find plantings with a large range of varieties because growers did not know which varieties would comply with THC testing requirements in the state. Sinning stated that as compliant varieties were found, the number of varieties per planting had dropped to where plantings rarely contained more than a couple of varieties.

Sample Handling:
Pham noted that the handling of samples was not addressed in California law, and noted the sample handling procedures and related information from Colorado, Indiana, Kentucky, Minnesota, and Oregon.

Burchett explained Kentucky was not concerned with maintaining the temperature of the samples, since gas chromatography (GC) testing required combustion of the sample.

Sinning agreed with Burchett, noting that the conversion of THCA to THC due to high temperatures also happened through the GC testing process. Sinning noted Colorado did not pack the samples in ice anymore, and had stopped using Mylar bags for samples due to issues with mold.

Kress asked how states maintain chain of custody of the samples. Sinning responded Colorado had state inspectors collecting samples and the state laboratory testing them. Sinning explained private laboratories showed interest initially, but had backed off. Sinning stated that using state inspectors and the state laboratory helped to ensure consistency in sampling and testing for all growers. Burchett responded that Kentucky had procedures in place for inspectors, and that all samples were tested at the official state laboratory.

Kress noted California law regarding sample collection and laboratory requirements in FAC § 81006(f). Sinning expressed concerns with growers sampling instead of regulatory officials, noting significant differences between results from regulatory samples and privately collected samples from the same field. Kress stated that program staff had not yet discussed with the CDFA Center for Analytical Chemistry to see if the laboratory would be able to provide this testing service. Kress noted that California law required registration with the U.S. Drug Enforcement Administration (DEA).

THC Testing Method:
Pham noted that THC testing method was not addressed in California law, and noted the testing method used by Colorado, Indiana, Kentucky, Minnesota, and Oregon.

Burchett explained that high performance liquid chromatography (HPLC) required additional calculations, and that Kentucky already had the equipment to perform GC testing.

Sinning agreed with Burchett, noting that there were different opinions on the calculations for HPLC, and that GC was the same test used by law enforcement. Sinning suspected that Minnesota was using HPLC to calculate different forms of THC separately.

Donald Land, Steep Hill Laboratories, also noted that law enforcement used GC, and stated that the conversion rate for GC from THCA to THC was not 100% efficient, which generally resulted in a slightly lower calculated THC content than HPLC.

Poonam Chandra, CDFA Center for Analytical Chemistry, asked about the sample size sent to the laboratories and the minimum weight requirement for testing. Burchett responded Kentucky sampled the top 20 cm, which provided enough material for the laboratory to run multiple tests.

Sinning stated too little material was not an issue, but noted that large samples (up to a pound) took longer for drying and homogenizing.

Dorota Inerowicz, Purdue University, stated the samples weighed 200-400 grams after drying and removing seeds and stems. She noted 0.2 grams was needed for analysis.

Justice asked how the laboratories determined whether to remove stems and seeds. Burchett responded they had developed a protocol in cooperation with the University of Kentucky, and did not remove stems or seeds. Sinning stated that Colorado adopted Canada's protocol, and had not changed much since.

Later, Justice asked if HPLC also showed increased levels in CBD testing. Sinning and Land confirmed that HPLC provided elevated levels for all cannabinoids, including CBD.

Sample Preparation & Storage:
Pham noted that sample preparation and storage at the laboratory was not addressed in California law, and noted the procedures and related information from Colorado, Indiana, Kentucky, Minnesota, and Oregon.

Burchett noted that the grinding of samples was a bottleneck in the testing process, and was a significant factor in determining how many samples the lab could process.

Sample Retention/Disposal:
Pham noted that sample retention and disposal were not addressed in California law, and noted the procedures and related information from Colorado, Indiana, and Minnesota.

Burchett added that Kentucky retained samples for about one year from the sample date. Burchett also explained every field was sampled but not all samples were tested due to workload issues. Which samples were tested was based on a risk analysis of that field and variety. Sinning added that in Colorado the risk analysis was performed prior to sampling, rather than in the lab. Kress noted that California law required a test result for every field.

THC Determination & Actions:
Pham noted the reporting and enforcement actions related to THC test results outlined in FAC § 81006(f)(5), as well as corresponding and related information from Colorado, Indiana, Kentucky, Minnesota, and Oregon.

Sinning explained that THC test results of 0.3% or less were considered compliant in Colorado. Sinning stated Colorado had an allowance for a standard deviation, which was adjusted about every year as more information was available.

Sinning added that there was no civil penalty for growers who destroyed crops that tested over 0.3% but less than 1.0% in approved manner. He stated that approved destruction methods included: the failed crop was destroyed on the site; the crop could not be used for human consumption; and the crop could not enter commerce.

Sinning noted crops with a THC content over 1.0% were subject to a fine of up to $2,500 per violation, crop destruction in an approved manner, and law enforcement notification. He explained law enforcement could pursue criminal charges. Sinning stated Colorado had not exercised the civil penalty and law enforcement had not taken any action in situations where crops tested over 1.0%, and that all registrants had been compliant with crop destruction.

Burchett stated THC test results of 3,999 parts per million (ppm) or less were considered compliant in Kentucky. Burchett explained crops that test above 3,000 ppm were designated as "varieties concern" and that all growers were informed of all varieties of concern. Burchett noted Kentucky had prohibited 6 varieties due to high THC content.

Burchett added that Kentucky had seen several plantings test at 1%, and that most cases showed THC content between 0.3% and 1% when retested. He also noted that only 5-10% of the test results in Kentucky had initial THC readings above 0.5%.

Inerowicz stated THC test results with 0.3% or less is considered compliant in Indiana. Inerowicz noted crops that tested between 0.3% and 1.0% were disposed of by the university, and that law enforcement was notified to pick up and dispose of any material that tested above 1.0%.

Soria asked if the laboratories testing industrial hemp were also conducting tests on cannabis. Burchett responded Kentucky's laboratory was only testing industrial hemp since cannabis was not legal. Sinning responded Colorado conducted tests on cannabis in the same laboratory, but only for pesticides which used a different process and different equipment. Sinning explained that the potency test for marijuana was conducted by state-certified private laboratories.

A question was asked about the scope and methods of crop destruction. Burchett responded that initially destruction included burning, but that Kentucky has moved away from that due to weather and logistical issues. Burchett explained material was now physically removed and stored by the Department for incineration by the Kentucky State Police. He added that Kentucky allowed growers to keep stalk material as long as it was free of leaves and seeds, and the Department had discussed allowing destruction by composting as long as it was feasible for the state to confirm and witness destruction.

Sinning explained that Colorado considered an industrial hemp planting with excess THC levels as an unlicensed marijuana grow. Sinning noted that registrants submitted a proposal for destruction, which was verified by the Department. He also noted logistical issues with burning as a destruction method.

<u>Additional Questions/Concerns:</u>
Sinning noted that after the first year Colorado moved away from allowing resampling of out of compliance crops, as the crops consistently tested at a higher THC level upon the retest, which resulted in more severe enforcement actions for the grower.

Soria asked about the average laboratory test cost. Burchett responded Kentucky charged approximately $100, and the estimated laboratory cost was approximately $75. Burchett recommended charging up to double or triple the estimated cost due to the frequent underestimation of the cost for a statewide program. Sinning responded that Colorado charged $150 plus mileage and the inspector's time.

Richman asked about testing in Canada. After some discussion, Sinning noted that Canada had good protocols but expressed concerns regarding the predictability of the sampling method. He also noted varieties were preapproved and regulated federally in Canada, and that Canada used contracted private inspectors to complete the work.

Justice asked if retesting could be done from homogenized material and not in flower form. Burchett responded that Kentucky only provided for one test pre-harvest, but in 2016 had begun offering a post-harvest retest for an additional cost. Burchett related that in one case the post-harvest test found that the crop was in compliance.

Sinning emphasized Colorado's industrial hemp program only had jurisdiction over cultivation, and did not perform testing post-harvest. Sinning also expressed concerns with the use of 3,999 ppm as a regulatory threshold by other states, due to perceived conflict with federal law.

Soria asked if agricultural pesticide rules also applied to industrial hemp. Sinning responded that industrial hemp growers were required to follow agricultural pesticide rules, and noted that some chemicals, such as imidacloprid, were safe to apply in some situations, but could present a human health risk for certain uses. Sinning also noted Colorado has a list of acceptable pesticides for industrial hemp.

Kress asked if the other states required any testing other than for THC content. Burchett responded that Kentucky conducted random testing for pesticide residue. He stressed the importance of timing for the testing for pesticides.

Sinning responded Colorado only tested the THC content for industrial hemp regulatory compliance. Sinning explained that both industrial hemp and marijuana were required to comply with the state's pesticide rules for agricultural crops, and that pesticide testing was performed on a complaint basis.

Inerowicz responded that Indiana currently did not test for pesticides.

Kress asked if the other states had a required timeline from sampling to testing. Sinning responded that Colorado initially set a requirement that samples were delivered to the lab within 24 hours, but had realized that the timeframe for delivery to the lab did not impact the total THC content.

Inerowicz explained the laboratory received the samples the same day they were collected because hemp was only being grown in research fields run by universities, and that their sample volume each day was small.

Justice asked how the states controlled or regulated THC content during processing. Burchett responded that processors performed testing, the product leaving the facility was required to comply with a THC level of 0.3%, and that they retained the testing records for three years.

Sinning responded Colorado's industrial hemp program only had jurisdiction over cultivation, but explained that the final product was required to comply with a THC content of 0.3%. Sinning related the situation to a smog test, in that the THC content requirement was applied at the point where the product was leaving the system.

Program note: the presentation was corrected after the meeting. Kentucky's and Colorado's information regarding THC Determination & Actions were switched.

3. Adjournment

Meeting adjourned by Kress at 11:53 p.m.

Industrial Hemp Standards Comparison

IHAB Sampling and Testing Task Force – February 22, 2018

Sampling Timeline

FAC 81006(f)(1): Sampling shall occur as soon as practicable when the THC content of the leaves surrounding the seeds is at its peak and shall commence as the seeds begin to mature, when the first seeds of approximately 50 percent of the plants are resistant to compression.

State	Standard
Colorado	• Sampling must be completed 30 days prior to harvesting • Registrant must submit harvesting report 30 days prior to harvesting • Notify commissioner within 5 days of any harvesting date changes
Indiana	
Kentucky	• Pre-harvest sampling triggered by notification of harvesting • Notification of harvesting must occur 15 days prior to expected harvesting date
Minnesota	• Sampling should occur 70-90 days after planting (optimal date being 70 days after planting, and not later than 90 days after planting)
Oregon	• Sampling to occur no more than four (4) weeks (28 days) prior to harvest

Sampling Collection

FAC Section 81006(f)(2): The entire fruit-bearing part of the plant including the seeds shall be used as a sample. The sample cut shall be made directly underneath the inflorescence found in the top one-third of the plant.

State	Standard
Colorado	• Sample volume at inspector's discretion • Provides sample weight guidelines based on plot size • Inspector's discretion to combine varieties in one composite sample • Treat indoor and outdoor growing areas as separate sampling areas even if plant material is same variety • Collect top 2 inches of female plant flower should be sampled, 2 inches tips of female plants, or top 2 inches flowers of female plants in the top part of the plant in full sun • Do not sample male plants • Avoid field edges
Indiana	• Approximately 30 inflorescences per variety of plant from the top of the plant • Separate sample for aberrant or atypical plant from composite sample • Collect complete flower head of a plant including stems, stalks, and flowers as well as foliage leaf material, involucral leaves and buds • Inspector collects by walking at right angles to the rows of plants and take a representative sample of the variety of the plant.
Kentucky	• Cuttings will be collected to make one representative sample. • Clip the top 20 cm of hemp plant's primary stem, including female floral material. • Take cuttings from at least five (5) hemp plants within the plot. • A separate sample must be taken from each non-contiguous plot of a given variety. • A separate sample must be taken for each variety. • Material selected for Pre-Harvest sampling will be determined by inspector.

Sampling Collection

FAC Section 81006(f)(2): The entire fruit-bearing part of the plant including the seeds shall be used as a sample. The sample cut shall be made directly underneath the inflorescence found in the top one-third of the plant.

State	Standard

Minnesota	• Sampling volume and pattern at inspector's discretion
	• Provides sample count guidelines based on field size
	  ◦ Small fields may be sampled in a X pattern
	  ◦ Larger or irregular-shaped fields be sampled by walking field perimeter and taking paths into field to collect 1-2 samples along each path
	• Collect top 2 inches of female flowering plants or top 2 inches of available plant material for fiber and non-flowering fields
	• Avoid field edges

Oregon	• Sampling volume based on field condition for harvest lot (Harvest lot is defined as 1) industrial hemp that is grown in one contiguous growing area or 2) grown in a portion or portions of one contiguous growing area)
	  ◦ normal fields: sample in a X pattern; maximum 30 samples in one composite
	  ◦ dense fields: sample by walking field perimeter and taking paths (minimum 5 feet) into field to collect; maximum 30 samples in one composite
	  ◦ greenhouses or small fields: minimum composite sample size of 4 ounces
	• Provides table of number for random samples to be taken based on total number of plants (1-200,000)
	• No more than one sample per plant
	• Collect approximately 8 inches of flowering tops when flowering tops are present
	• Avoid field edges

Sample Handling

California Law - No statutory requirements.

State	Standard
Colorado	• Place samples in brown paper bag with chain of custody tape to seal • Keep samples out of sun and keep cool • Ideally same day delivery but can be held if necessary (weekend, etc.)
Indiana	• Seal sample with chain of custody labels • Keep sample in a dark, not hot, storage area • Store samples in locked freezer or dryer
Kentucky	• Place the complete sample in a paper bag. • Seal the bag by folding over the top once and stapling the bag shut. • Store samples in locked cabinet at lab
Minnesota	• Brown paper bag with chain of custody tape to seal • Keep out of sun and keep cool
Oregon	• Place each sample in a paper bag. • Seal in a manner to show evidence of tampering. • Store dried homogenized sample in a freezer

THC Testing Method

California Law - No statutory requirements.

State	Standard
Colorado	• Gas chromatography with a flame ionization detector
Indiana	• Gas chromatography with a flame ionization detector
Kentucky	• Gas chromatography with a flame ionization detector
Minnesota	• High performance liquid chromatography with ultraviolet light detector
Oregon	• Sampling policies and procedures must be accredited by Oregon Environmental Laboratory Accreditation Program (ORELAP)

Sample Lab Prep & Storage

California Law - No statutory requirements.

State	Standard
Colorado	• Dry sample until constant weight achieved • Sieve sample to discard seeds and stems • Homogenize sample by grinding for approximately 30 seconds or until a fine, even texture is achieved • Samples stored at room temperature in designated container in locked room
Indiana	• Dry sample to constant weight (weight change is less than 0.1g) • Sieve sample to remove seeds and stems • Homogenize sample by grinding to achieve uniform, powder-like consistency
Kentucky	• Grind dried material using 5 mm screen and 1 mm screen
Minnesota	• Samples with high moisture content may be dried on a drying rack or in a low heat dryer • Dried sample then ground up in a mortar and pestle
Oregon	• Dry leaf and flower sample until brittle • Pulverize and sieve sample using 1 mm screen • Blend and homogenize sieved material

Sample Retention/Disposal

No statutory requirements.

State	Standard
Colorado	• Dispose raw samples in trash receptacle if THC content is passing • Secure raw samples in secure storage if THC content fails • Sample and analytical extracts are disposed as non-chlorinated hazardous liquid waste
Indiana	• Sample extracts, analytical extracts and raw samples with THC levels above acceptance criteria will be retain and collected by law enforcement. • Sample extracts, analytical extracts and raw samples with THC levels at or below acceptance criteria will be incinerated.
Kentucky	
Minnesota	• Retained by the lab for 30 days
Oregon	

THC Determination and Actions

FAC Section 81006(f)(5) If the laboratory test report indicates a percentage content of THC that is equal to or less than three-tenths of 1 percent, the laboratory shall provide the person who requested the testing not less than 10 original copies signed by an employee authorized by the laboratory and shall retain one or more original copies of the laboratory test report for a minimum of two years from its date of sampling. FAC Section 81006(f)(6) If the laboratory test report indicates a percentage content of THC that is greater than three-tenths of 1 percent and does not exceed 1 percent, the registrant that grows industrial hemp shall submit additional samples for testing of the industrial hemp grown. FAC Section 81006(f)(7) A registrant that grows industrial hemp shall destroy the industrial hemp grown upon receipt of a first laboratory test report indicating a percentage content of THC that exceeds 1 percent or a second laboratory test report pursuant to paragraph (6) indicating a percentage content of THC that exceeds three-tenths of 1 percent but is less than 1 percent. If the percentage content of THC exceeds 1 percent, the destruction shall take place within 48 hours after receipt of the laboratory test report. If the percentage content of THC in the second laboratory test report exceeds three-tenths of 1 percent but is less than 1 percent, the destruction shall take place as soon as practicable, but no later than 45 days after receipt of the second test report.

State	Standard
Colorado	
Indiana	• Samples with the level of THC≤1.0% are considered passing. • Samples above the critical level are considered failing. • Composite test result greater than 0.3% THC will be considered not in compliance • Samples not passing acceptance criteria will be confirmed by being rerun
Kentucky	• Test results with the level of THC of less than or 3,999 ppm are considered passing and material allowed to market • Any variety testing above 3,000 ppm shall become designated as a Variety of Concern. • Any marketing of materials testing between 3,001 ppm and 3,999 ppm is at the License Holder's risk • Harvested materials of concern cannot comingle with other harvests • Floral materials harvested for phytocannabinoid extraction cannot move beyond the process, nor comingled, nor extracted until KDA releases material • Registrant will be notified within 45 days of sampling of testing and eligibility of harvested material to move into market research

THC Determination and Actions

FAC Section 81006(f)(5) If the laboratory test report indicates a percentage content of THC that is equal to or less than three-tenths of 1 percent, the laboratory shall provide the person who requested the testing not less than 10 original copies signed by an employee authorized by the laboratory and shall retain one or more original copies of the laboratory test report for a minimum of two years from its date of sampling. FAC Section 81006(f)(6) If the laboratory test report indicates a percentage content of THC that is greater than three-tenths of 1 percent and does not exceed 1 percent, the registrant that grows industrial hemp shall submit additional samples for testing of the industrial hemp grown. FAC Section 81006(f)(7) A registrant that grows industrial hemp shall destroy the industrial hemp grown upon receipt of a first laboratory test report indicating a percentage content of THC that exceeds 1 percent or a second laboratory test report pursuant to paragraph (6) indicating a percentage content of THC that exceeds three-tenths of 1 percent but is less than 1 percent. If the percentage content of THC exceeds 1 percent, the destruction shall take place within 48 hours after receipt of the laboratory test report. If the percentage content of THC in the second laboratory test report exceeds three-tenths of 1 percent but is less than 1 percent, the destruction shall take place as soon as practicable, but no later than 45 days after receipt of the second test report.

State	Standard
Minnesota	• THC concentration reported to approximately 0.00200% reporting limit by weight (dependent on exact mass of testing sub-sample) • Round test results down to nearest tenth of a percent for final determination • THC concentration above 0.3% is a failed test and original sample will be retested
Oregon	• Laboratory shall retest retained sample at the request from a grower after the sample failed initial testing for THC content