Washington State
Liquor and Cannabis Board

Washington State Liquor and Cannabis Board Cannabinoid Science Work Group Meeting

Thursday, October 5, 2023, 10:00 a.m. to 11:30 a.m.
The meeting was convened via Teams

Meeting Minutes

AGENDA ITEM 1: CALL TO ORDER AND ROLL CALL – 10:05AM

Kathy Hoffman opened the discussion.

Present:	Annie Rothrock	Loralei Walker
	Brooke Ella Davies	Matt Shepard-Koningsor
	Caitlein Ryan	Richard Sams (CSWG Member)
	David Northrop	Robert Bouvatte
	David Gang (CSWG Member)	Ryan McLaughlin (CSWG Member)
	Deb Brady	Tania Sasaki
	Douglas Henderson	Taylor Carter (CSWG Member)
	Gregory Foster	Tholo Johnson
	Jessica Tonani (CSWG Member)	Tracy Klein (CSWG Member)
	Johnny Wong	E.P. Hackenberg (WSLCB)
	Jordan Zager	Justin Nordhorn (WSLCB)
	Keegan Skeate	Kandra Tinnerstet (WSLCB)
	Kelle Davis	Kari Trumbull (WSLCB)
	Kelsey Stillman	Katherine Hoffman (WSLCB)
	Lachen Chernyha	Sarah Okey (WSLCB)
	Laurel Schmalz	Tierney Hamilton-Steele (WSLCB)
	Lauren Christiansen	
Absent:		
	Brad Douglass (CSWG Member)	Jim Vollendroff (WSLCB)
	Chris Beecher (CSWG Member)	Sarah Murray (CSWG Member)
	Holly Moody (CSWG Member)	

AGENDA ITEM 2: AUGUST 3, 2023 MINUTES AND ACTIVITY REVIEW

Kathy Hoffman asked group members to offer changes/concerns regarding the August 3, 2023, meeting minutes. There were no revisions offered by email before the meeting or during the meeting, and the group accepted meeting minutes as drafted. Kathy briefly discussed workgroup activity between the August 3rd and October 5th meetings:

Kathy Hoffman: After our meeting on August 3rd there was an additional meeting of the detectable levels of THC in future standard subgroup on August 22nd. There was a cannabinoid product safety guidance meeting on August 24th, and then we had another meeting of the detectable levels group on September 22nd where we decided to combine both groups because there was so much crossover in the subject matter. Between the end of August meetings and the September 22nd meeting we started to put together recommendations that we are going to be discussing today, and that is what we want to focus on today is the substance of the recommendations.

AGENDA ITEM 3: SUBGROUP REPORT OUTS AND DISCUSSION

Kathy Hoffman: We can move into subgroup activity, and there has been a lot of activity to get us to the point that we could discuss these draft recommendations and finalize them today. One thing that the group decided instead of having an additional meeting on September 29th because that was originally the plan, we decided to go ahead and do these revisions live, and that is the group had an opportunity to review a draft, provide feedback, and we are going to discuss the feedback on the recommendation portion of the document today. So that is document that you see in your screen here. There were some minor edits that were offered by some of the subgroup members on the executive summary. These are typographical errors, those sorts of things. There was a minor adjustment that we made to the background here that the agency made. And with respect to the introduction and background, it really just goes through the history of how the Cannabinoid Science Work Group came to be, the structure of the Cannabinoid Science Work Group, and I know I am going through this rapidly, but I want to get to the recommendations so we can have a good discussion about that.

And then what we did in terms of deciding how we were going to move forward with detectable levels and future standards, and cannabis product safety guidance. One update I do want to provide to everyone on the call and for those who were not working in the subgroups is our collaboration with the Washington State Department of Agriculture on a laboratory survey. Initially, the detectable level subgroup wanted to do a Survey Monkey or something similar to our labs to find out what some of their processes were, etc. We learned through collaboration with WSDA that they were doing a very similar survey, so they were happy to work with us on

providing feedback on their survey, and their survey is still out, and so we will incorporate and consider the results of that survey in the future. But as I understand it, it is not yet complete. Additionally, LCB Enforcement and Education staff now have information that they gleaned from R.J. Lea to determine cannabinoid LOD and LOQ values.

That will provide the agency with additional guidance moving forward, and so we will supplement the report with that information. Some of it has gone out to the subgroup, or that document has gone out to the subgroup but will make it publicly available in the very near future as part of this report. Okay. Anything that anyone wants to add there before we move into the recommendations? All right, Tracy, go ahead.

Tracy Klein: I just wondered if you could clarify that that survey has been distributed. It looks like in the report it had not been yet.

Kathy Hoffman: I have not received confirmation from WSDA that it has been distributed.

Jessica Tonani: Kathy, my understanding is it went out earlier this week.

Kathy Hoffman: Okay.

Jessica Tonani: But I don't believe it is anywhere -- I don't believe that it has been tabulated or all the responses are back, but I believe it did go out this week.

Kathy Hoffman: Okay, thanks for that update, Jessica. I really appreciate it. I don't know if we have anyone from WSDA on the call who can speak to that at all. I think I saw some folks join us from WSDA. If you are from WSDA and wish to provide an update, go ahead and raise your hand. We will give a moment there. Okay. I'm not seeing any hands going up. Tierney, did you see any hands go up?

Hamilton-Steele Tierney: I did not.

AGENDA ITEM 4: REVIEW AND DISCUSS RECOMMENDATION DOCUMENT

Kathy Hoffman: I will go ahead and start with an overview of the first recommendation topic, and that was providing implementation pathways for any detectable amount of THC and to bring that into the work that LCB is doing in terms of rule development. This has to do with the implementation of Senate Bill 5367. The group reviewed a variety of standards. Right? From the AOAC, the ASTM, and the US Pharmacopeia Food Chemical Code Acts, and there is the acronym

for that as well. There are two terms of analytical chemistry that are used throughout this document, and that refers to the limit of quantification (LOQ). That is the lowest concentration of an analyte that can be measured by a method with acceptable precision and accuracy. And then the second is (LOD) limit of detection, and that refers to the lowest quantity of a substance that can be distinguished from that absence of that substance as with a stated confidence level, and that is generally 99%. So you will hear those terms used today, and you will also see those terms used in the document.

So the first standard we looked at were AOAC SMP, so those are Standard Method Performance Requirements. I am not going to read through each of these bullet points because we want to discuss the changes here. One of the changes was offered by Brad Douglass, and that was a clarification here on this sentence that says even though the Department of Agriculture Survey results from Washington labs are being finalized, that only additional information that might be useful is instrument manufacturing confirmation instead of branding confirmation that may help to determine instrument and method sensitivity. Does that sound like an okay -- are we okay with that modification? I think it helps to clarify. Everybody okay with that one? Okay. Also, the AOAC SMPRs have several standards. I am wondering, Richard, could you speak to these since you are so instrumental in helping us understand these?

Richard Sams: Yes. The AOAC SMPRs are created based upon the perceived needs for each one of these different sample types or matrices, and those are goals for methods and because the different product types differ, the goals of the analytical method differ and, therefore, the SMPRs differ one from another. But they all specify an LOQ and LOD.

Kathy Hoffman: All right. Thank you for that, and that is reflective of the conversation that the subgroup had around contemplating standards for different product types because the detectable level might need to be adjusted based on the product type and the current testing standards that are in place in the LCB rule. So moving on to the ASTM standards. There were some additional edits offered here that I think are clarifying. Again, we have learned from Brad Douglass where it is just striking some language because there was a duplication. But I am wondering before we even talk about the edits, would one of the group members be able to speak to the ASTM standards and how they differ from the AOAC standards? Jessica? Richard? David? Anyone want to speak to this? I think the thing that I noticed about this was ASTM looked at mass spectrometry as the standard where the AOAC standards looked at HLPD.

Jessica Tonani: Yeah, HPLC.

Kathy Hoffman: HPLC, thank you.

Jessica Tonani: Yeah. And I think the thing that is important to note is that our labs predominantly use HPLC in the state. In fact, we would be surprised if one does not, and HPLC is often the technology that is used for cannabinoid quantitation. For example, California recently did a pretty in depth review of technology and did their standards based upon HPLC. It is a piece of equipment that is standardly used in production labs room for this.

Kathy Hoffman: Right. And one of the bases that we were thinking about, or I think the group was thinking about was what sort of recommendations can we make that are not going to have a huge impact on labs in order to implement 5367 or at least write rules around 5367, so that was really important. The other thing I want to point out about ASTM -- and thank you, Richard, for pointing this out -- is most of the ASTM standards are behind a paywall. There is a piece of literature that references them that Richard brought to our attention that we have mentioned here. So not everything is behind a paywall, but also, again, these were written primarily for mass spec and not HPLC.

So edits here. Again, this is just to clean up the repetitive sort of word in a sentence and then clean up the language. And truly I think the way this was originally written was kind of clunky, and so Brad Douglass offered some changes. Everybody okay with these changes? I think it clarifies quite a bit. Okay.

And then the other comment offered here from Brad. He says it may be worth noting that HPLC-UV or HPLC-PDA and maybe a scientist in the room can tell us the difference between those two. Noting these are here to explicitly denote the type of detector. It is implied by HPLC but for a report like this, it might be good to spell it out. So let's discuss that. What are thoughts on that?

Richard Sams: I think his comments are correct. A UV detector is kind of a generic term whereas the PDA detector refers specifically to a photo diode array detector, which is capable of recording absorption across a range of wavelengths and therefore it is a more specific term. I use the more specific designation in my tables.

Kathy Hoffman: Great. Okay. Others? Any other comment? So we will go ahead and add the additional information here, and I will just keep that note as is since it sounds like that is the direction we are going to go here, so thank you for that, and I think that will help to clarify. We also looked at the hemp seed protein monograph. It wasn't something that the group decided to go with. I think the group really leaned into the AOAC standards to kind of guide our thinking here. There was also the USP expert panel on medical cannabis flower that we took a look at,

and we did not lean into that report at all. Again, and this is in the executive summary, but this is kind of where we landed as a group. And so the level of detection corresponding to this regulatory requirement is 0.03%. There was some additional comment here, and I think there was a typo, and I believe, Richard, there was an email that was sent where you clarified this, and I'm just wondering if we want to keep this line in here or we just want to strike it or we want to clarify it. I want to have a discussion about that openly with everyone.

Jessica Tonani: I think I sent one of the emails, Kathy, and I would say potentially strike it. The labs are actually testing to 0.1 on a LOQ by statute, and so the LOD would be 0.03. And my thought is the 0.3 came in for them in hemp testing fields, so we may kind of comparing apples to oranges with this 0.3. I don't know if other people have feedback on that.

Kathy Hoffman: Everyone okay with us just striking the sentence?

David Gang: Yes.

Kathy Hoffman: Okay. It sounds good, so we will go ahead and strike that line. And so the group also discussed -- and I mentioned this earlier -- the potential variances in detectable amounts of THC across product type, and this was where some of the -- in our August 3rd report we were talking about bucketing, and Richard had already started doing work on this, and this is kind of the accumulation of this is Richard's work. Richard, would you mind speaking to this because it really is helpful in moving forward.

Richard Sams: I surveyed what is published both in peer review journals and in documents issued by organizations such as the AOAC, and I looked at different methods. As you can see under the left hand column, I used RP to represent Reversed Phase HPLC to represent high-performance liquid chromatography. There is the designation for the detector, the PDA detector. And then if there was some other identifying information such as the AOAC 2018.1 document, I included that. In the next column over, I identified the specific matrix to which the method applied. The MDL is the minimum concentration of analyte that can be detected in the calibrators, and then the LOD and the LOQ, which we have talked about, reflect the limits of detection and limit of quantification for the actual material that is in question, so this refers to the analyte in the matrix. And then the right most column is the minimum detectable amount of analyte that is actually injected into the instrument. I find that useful for comparison purposes, and you can see here a lot of these don’t differ very much.

Telling me that the major differences between methods revolve more around sample preparation, the mass of material is taken for analysis, the dilution factors that come into play

rather than the absolute sensitivity of detection of the instruments. So that was the purpose of this exercise from my point of view. In this table, there are methods that are used primarily by hemp-testing laboratories and methods that are used by cannabis-testing laboratories. And that is important because hemp-testing laboratories often work at much lower analyte concentrations than do cannabis-testing laboratories, and the yellow highlights in this table refer to the limits that are reported by cannabis-testing laboratories. The other limits are limits produced by hemp-testing laboratories.

Kathy Hoffman: All right. Thank you very much for that. And then I believe the table goes on in this way.

Richard Sams: Yes.

Kathy Hoffman: Okay.

Jessica Tonani: And I think, Kathy, one of the things that is important to point out here is that within our WAC we have specified that our cannabis-testing laboratories have to be a little bit more stringent than some of these other laboratories since they are state-by-state regulation, you will see differences. We are the 0.1, so you can see a number of those cannabis-testing labs would not qualify under the State of Washington to be sensitive enough.

Richard Sams: This is correct.

Kathy Hoffman: Okay, thank you. All right. So I think the conclusion here is that there is a range of limits if you will that the agency can consider, the LCB can consider in terms of setting a detectable level if that is the route that the agency wishes to take, that these are the recommendations of the Cannabinoid Science Work Group. I think we can leave that there. Any further discussion on this section of the report? Okay.

Kathy Hoffman: We will go ahead and move on. The next item that the report contains is a section on product safety, product specification, and manufacturing practices. We talked about defining some terms that seem to be really important to the subgroups. That is Ingredient, Processing, Conversion, Potency, and Synthetic because these terms do not seem to be defined in statute or rule and may help moving forward, and it may be that this is something that the Cannabinoid Science Work Group wishes to work on in the future in helping the agency define those terms.

There are several examples given here of some of these terms being used within terms and phrases in rule but not further defined, and so the group thought adding additional clarification to the some of these terms might help in setting product specifications and manufacturing practices in the future. So Jessica, I saw you were nodding. Did you want to add anything there?

Jessica Tonani: No. I think that one of the things that we had a lot of discussion around was the fact that at some level intermediate testing hemp as an ingredient would be optimal because it is a little bit more sensitive. But the reality is without definition of some of these processing and conversion into synthetics, it would be a giant loophole for people to use. It is a potential ingredient and creates impairing compounds downstream, so we really felt that these were important long-term for us to define as a state to kind of close some potential loopholes. I don't know if anybody else has comments on that.

David Gang: I wanted to add.

Kathy Hoffman: Go ahead, David.

David Gang: I was going to say something very similar to what Jessica just said. A lot of these terms when you look at them, they seem pretty obvious what they should mean, but the reality is unless they are actually -- because they have a potentially important role in the legislation and how it might be implemented, an actual definition for them is actually critical. Because as Jessica said, without that definition, it is possible for somebody to come up with an alternative definition and adding that loophole that she was just talking about. And so to avoid any kind of loopholes, avoid any kind of problems down the road, some of these terms need to have a definition. And especially when they have such a critical role in how the language plays out for the questions that we are talking about like the impairing compounds, etc.

Kathy Hoffman: Yeah, absolutely. And if I may, this really is a great example of how we bring the science and the regulation together in crafting these definitions into the future because there is definitely a place to bring those two ways of interpretation together, and I think this is the first step in that direction. And this is where the Cannabinoid Science Work Group might be able to take it even further, and that is around this thinking around product safety. All right. I think that is where we stop there. Any further discussion?

Justin Nordhorn: Yeah, just a question for the group just to kind of clarify on those recommendations around the definitions. So manufacturer is in the Uniform Controlled Substances Act, so is there something particular about manufacture that needed to be looked at, specified, clarified, or something along those lines since we do have that definition there?

Jessica Tonani: Justin, I think that we -- and I need to go back into our notes on this, but I think we saw some potential loopholes with processing and conversion in there, but I need to go back and look at my notes. I don't know, Kathy, if you remember exactly--

Kathy Hoffman: Yeah. I think that is exactly what we were talking about. The other thing I recall is manufacturing of food products sort of seem to be some confusions on crossover there as well.

Justin Nordhorn: Okay. So it looks like -- if I'm reading this right -- recommendations to build in the definitions around the processing conversion on those types of things into the manufacturing, so basically clarify the manufacturing definition in statute to go further to be more specific in this particular area. Is that accurate?

Kathy Hoffman: I think that is accurate.

Justin Nordhorn: I see some heads nodding, so thank you. I appreciate that.

Kathy Hoffman: We could do thumbs up, but I think the nods are okay. Okay. I will go ahead and move on if there is no further discussion. All right. So moving into the third section, and I want to stop really quickly here. There were two edits added here, and I believe these were offered by -- well, I can't remember. I think it was Brad, or it might have been you, Richard, but just to kind of clean up the language there.

The next section has to do with future discussion and consideration. And again, these are things that perhaps the Cannabinoid Science Work Group can talk about in the future. I am just going to read from this. The main concern was focused on what cannabis products are being consumed and that those products contained ingredients that are deemed to be safe. There was an additional comment from Richard here, and I will just read it. "I recommend inclusion of a statement that delta-8 THC and its derivatives are semi-synthetic substances that are often contaminated with side products that are new chemical entities that have not yet been subjected to toxicological investigation." What do others feel about adding that sentence?

David Gang: I agree with it.

Kathy Hoffman: Okay. We will go ahead -- others, thumbs up, nods? Add it? Okay. There was additional discussion around if pesticides are being used or when pesticides are being used and the environmental impact. That might be something that the Cannabinoid Science Work Group

looks at into the future. And this is primarily a contribution from Brad Douglass, and he has added clarification here that the issue of pesticide usage should be further explored because there is background contamination in many agricultural products and many of these products are consumed in greater amounts of cannabis, and then he provides examples there. But then he has also added a clarifier here where he says USDA organic regulations allow residues of prohibited pesticides and up to 5% of the EPA tolerance as long as the operator has not directly applied prohibited pesticides and has documented efforts to minimize exposure to them.

And so he says consumers become concerned about this, but these crops are not tested for these substances. So that might be something that the Cannabinoid Science Work Group looks at into the future. Are we okay with adding this? I mean, I think it is a great clarifier. I just want to weigh in with the rest of the group. Do we agree that is something we want to look at into the future? Especially the way Brad has framed it here.

Jessica Tonani: I think so, Kathy. And I think that our purpose kind of in this section was to say we need to continue to evolve our pesticide thresholds within this product, and it may end up being based upon product class. So if you are consuming 10 mg in an edible, that is a fraction of a drop of water versus inhaling a joint that may be very different. So at the end of the day we may have different pesticide thresholds based upon the risk to the consumer, and it most likely will be based upon also how they are consuming that product.

Kathy Hoffman: Thank you, Jessica. Go ahead, David.

David Gang: To add to that, what Jessica just said is really important that mode of entry into the human body is very important for exposure. So something that is inhaled versus smoked or otherwise inhaled those are not necessarily the same versus ingested. They have very different pathways and processes how those are metabolized in the body potentially, and so that needs to be evaluated and it needs to be a part of the conversation. You can't just say this is the threshold for these common pesticides across the board for whatever because it can have a significant difference.

Kathy Hoffman: Right. And if I remember correctly, that was one of our subgroup's robust conversations. I think that probably seeped over into the next hour. We didn't plan it to, but we had a lot of conversation around this. All right. Thanks to the group for that. We will go ahead and incorporate Brad's suggestion as well. So another topic that came up was cannabis as a remediator. I think we have heard this in more places than just the Cannabinoid Science Work Group. We talked about how cannabis pulls compounds from soils in different ways and having discussion around that into the future. There was an addition that Brad offered here, and this is

a footnote. I need to find out what the page number he was referring to here is. It looks like we have a pay period but no number, so I will follow up with Brad on getting a number, and this had to do with pesticide testing.

Turning to the groups and, again, there were a few typos, word changes here. I don't think they substantively change the content or the thinking of the group. But is there anyone from the work group who wants to speak to cannabis as a remediator and why this was important to the subgroup beyond what we have offered here?

Taylor Carter: Yeah, I can go real quick.

Kathy Hoffman: Thanks, Taylor.

Taylor Carter: Basically just that there is a lot of evidence out there and the ability of the cannabis plant itself with various metals, but it is something that new research is showing that basically based upon soil composition you can actually kind of alter it. So it is something that can be accounted for as we move forward, so I think it is something that is definitely important just to keep track of with the ability of the plant to pull up so much of these metals but also that there are ways to avoid some of these outcomes. So just something to keep up with the literature on.

Jessica Tonani: Thank you. And, Kathy, on a similar note, I think that the subgroup would like to see if possible the state continue to do research potentially on hemp or other potentially legal and little bit easier legal plans on how the soil affects the actual floral material that people are making these products out of and see if we could provide in the future guidance for producers on safety levels that could be in the soil that would allow them to create safe products.

Kathy Hoffman: Thank you.

David Gang: I think one thing I would add to this to go along with what they both just said is that there is also variation in how the plant will respond to different compounds, both organic compounds, halogenic compounds, heavy metals, those are not all identical. Not all heavy metals are identical. The plant doesn't respond to them identically, and the research is not very well established across the Board so there are a lot of open questions still on how the plant is going to interact with different types of compounds, different elements, and in different soils and different environments. So what I am trying to say is there is a lot that still needs to be figured out before we can make any really strong recommendations about what policy should be in this area. We just don't know really the answer in most cases.

Kathy Hoffman: All right, great. Thank you for the clarification, everyone. This is one of those areas that we had a very robust discussion around, and I really appreciated it. Okay, moving on. Food safety was the final discussion point that the work group wanted to highlight again. Jessica, if I could turn to you to speak to this because I think this was something you were very interested in and have a lot to share. Could you speak to this section?

Jessica Tonani: I think that this is kind of interlocked with the prior two sections in the sense that depending on how much cannabis product somebody is consuming and how we may have very different thresholds for what is safe. So there are a number of compounds that we have on our vegetables or our fruit that high levels are not safe but that in lower levels are allowable. And so I think we really felt that it was important to look at how much cannabis somebody is consuming and set threshold for safety around for these pesticides and heavy metals based upon consumption and quantity of consumption and maybe have a little bit more rules around that in the future, and we realize that this is a new and emerging market. The rules were set in the beginning by ourselves and done quickly.

Maybe that they could evolve in the future to allow potentially maybe certain forms of remediation in oil, different thresholds based upon how somebody is going to consume the product and really make sure that we keep safety in mind, but we also allow some tolerances if the products are still safe. I don't know if anybody else has any follow-up on that.

Kathy Hoffman: No. I think you covered it really well.

David Gang: One thing to add, we don't want to come up with a recommended daily allowance of these toxic compounds. All right? That is almost where you think this could go. But you want to have maybe a warning threshold. I remember years ago when I lived in Michigan, and we wanted to go fishing, and you would go and you would look at the map, and they would say you are allowed to catch one fish and eat one fish per day in this river. In this river, it was one per week. In this river, it was one per month. And in this river, it was like never because of the toxic compounds that were present in the rivers there. It is something like that. What is that threshold for these different compounds? Having that information available some way to people is going to be important, and figuring out the best way to make that available is something that we still need to come to conclusion on, I think.

Kathy Hoffman: Anyone else? So that concludes review of the report itself.

AGENDA ITEM 5: WRAP UP AND NEXT STEPS

Kathy Hoffman: We have done a lot of work over the last several months. So we will move into wrap up and next steps. So the next steps for this report are to make the revisions that we have discussed today, and then we will make this product publicly available on our website, and it can also be shared broadly. I'm trying to think if there is anything else we need to do with this report beyond us turning to staff. Anything I'm forgetting there? I don't think there is any. This is the conclusion of this phase of the Cannabinoid Science Work Group. Justin, you unmuted. Anything?

Justin Nordhorn: No. I don't think we have anything technically further.

Kathy Hoffman: Okay. All right. So that is the next step for this report and the recommendations that are contained in it. Logistically, we do have a meeting scheduled for December 7th that we are still going to conduct. However, it might be on a different day. Several staff from LCB will be returning from -- or in transit from the semi-annual CANNRA meeting out of state. And I guess that brings me to the next announcement that I know many of you are aware of. I am departing the agency as of October 15, and so Sarah Okey, who is on the call here with us today and part of the research program will be leading this workgroup after October 15th. So she will be your point of contact, and she will also be in contact with you about potential rescheduling of the December 7th meeting and then the meeting happening after that.

I want to share that during one of our last subgroup meetings, I asked the subgroup if they would like to continue to do this work beyond December 7th, and I heard from everyone in the room that were interested. So that is something I think that the group can talk about at the December meeting whenever it happens. And I think that's it. Turning to Justin. Anything that you want to add or that I forgotten to address?

Justin Nordhorn: No, just from the LCB overall really appreciate everybody spending so much time on this. You can tell that you have put a lot of thought into these recommendations. We have some good strong science based on these recommendations, and I think this is really going to help the agency move forward in some of the policy discussions that we are going to be having around this issue. So appreciate all of the back and forth. This subcommittee worked on these particular recommendations. I know there was a lot more going on behind the scenes versus just the Cannabinoid Science Work Group official meetings, so really appreciate all of the effort everybody has been putting into this. It really shows, so thank you.

Kathy Hoffman: Absolutely. It has been a pleasure to work with all of you. And to Justin's point, yes, we did a lot of work behind the scenes as it were. A lot of telephone calls, and I appreciate all the time and effort that you have put into this. I think we came up with a really meaningful, useful, work product. All right. If there is nothing else, we can go ahead and conclude this meeting a little early. I am just calling on the group for one last call. All right. Thanks very much, everyone, for joining us today. Thanks to the audience for joining us today as well and look forward maybe to seeing you in a different forum, but I know that LCB is looking forward to working with you and seeing you again in December. Thanks, everyone. Enjoy the rest of the day.

Justin Nordhorn: Thanks, Kathy.

Richard Sams: Thanks, Kathy.

Kathy Hoffman: Bye, everyone.

Ryan McLaughlin: Thanks, Kathy.

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