Welcome to our OSAC Materials (Trace) Interlaboratory Exercise kickoff presentation. I would like to take this opportunity to thank you in advance for your attention today and your participation with this exercise in the coming weeks.

My name is Andria Mehltretter, and for my primary job, I am a Supervisory Chemist at the FBI Laboratory, where I specialize in the analysis of paints, tapes, and other polymers. Since 2014, I have been the OSAC Materials Interpretation Task Group Chair and before that I was on a similar subcommittee within SWGMAT, which was OSAC's predecessor for trace evidence. It is safe to say that I have spent most of my career exploring ways we can improve report writing in our field. As difficult as this process is and has been, I really enjoy it, because I get to collaborate with many extremely knowledgeable scientists, and this exercise is the next step. So what is the goal of the exercise and why are we all here?

The goal of this exercise is to evaluate the OSAC Materials (Trace) Subcommittee's proposed Interpretation Standard Practice by providing practitioners with case scenarios to which they are to apply the proposed approach. This will assist in answering the following questions for OSAC and the greater forensic science community:

1. Does the proposed approach meet the objective of improving interpretation and report writing for the forensic science community and its customers?
2. Is the document clear and intelligible enough to be easily applied by practitioners?
3. Are there areas of the document that need to be improved or further developed?
4. Are the practitioners able to reach the anticipated answers?
5. Is there a consensus among practitioners regarding the significance of results in comparative examinations?

For this portion of the exercise we will be focusing only on paint, but our plan is to expand later once we have evaluated these results.

What is in it for you as a participant? The opportunity to:

- contribute to the development of an improved interpretation and report writing approach, which has been identified as a need across the field of forensic science;
- explore interpretation and report writing on realistic, but not actual, case scenarios in a low-stakes environment;
- compare your conclusions with other practitioners to ensure you are in alignment with the consensus conclusion; and
- identify areas for further independent study and professional development.

So what does this document include? Let's open it and see. The simplest way to find it is to go to the OSAC Materials (Trace) website and scroll down to the link.

Page 1 is the title page with a disclaimer statement. The disclaimer references this exercise specifically.

Page 2 is the Scope for the Practice. The first paragraph discusses a three-step process that examiners use in interpretation. You may not have previously considered the steps you take in forming an opinion about comparisons, but it's pretty safe to say that most of us on here right now do the following: 1) Decide whether the samples are alike or different; 2) Use our knowledge, experience, and available literature to evaluate whether the conclusion is a strong one or a weak one, and 3) Consider the concepts of transfer and persistence in determining whether the questioned sample was present due to a potential action or coincidental transfer. For this exercise, the only think you really need to understand from that is that we are focusing on step 2, the overall conclusion and strength of that conclusion.

This scope also acknowledges that the document focuses on several areas of trace evidence; however, for this initial exercise, we are limiting the scenarios to ones only involving PAINT. It also references the review article, which we provided to you when you registered. Thank you to Elsevier for extending the timeframe this article is available for free so that we can share it with all of you.

Page 3 includes a listing of ASTM standards and an ISO document, followed by a list of terms and their definitions.

The critical information starts at the bottom of Page 4 and continues from there. It states that all comparison reports shall include, among other things, an assessment of the significance of the results. Then it proceeds to describe how that can be accomplished. An Interpretation Scale is proposed, and it is that scale that we are evaluating through this exercise.

The scale includes various types of conclusions ordered from Physical Fit (the highest degree of association) to Exclusion/Elimination (the strongest type of non-association). Just below the Physical Fit conclusion type are the Associations of Evidence with Class Characteristics and the descriptions of what these are. You would probably traditionally refer to these as "class associations." We have listed three types. Let's start in the middle.

An Association with Discriminating Characteristics is your standard conclusion when you cannot differentiate two items following a comprehensive examination, yet you don't have a physical fit. An example would be four-layered OEM automotive paints.

If there is something that makes the materials under consideration more significant, let's say an OEM automotive paint system with architectural paint layers on top, then that would be an Association with Highly Discriminating Characteristics. Note HIGHLY discriminating as opposed to simply discriminating.

On the other hand, if there is some type of limitation to your examination, such as only a single-layer of automotive paint transferred rather than a full-system chip, or you don't have enough sample to do a comprehensive examination, then the conclusion type Association with Limitations would apply.

Below these class associations is an Inconclusive, which is a traditional conclusion so is probably self-explanatory, followed by an Exclusion with Limitations. As I will show you later specifically for paint, the Guidance Document indicates that this conclusion is not typically used in paint comparisons, so it will not be an option in this exercise.

Finally is the Exclusion/Elimination conclusion, which is traditionally used and continues to be used when the samples are different.

Next in 5.4.2, cross-transfers and multiple transfers are addressed. This is when you'd report two or more associations, such as if you have two vehicles whose paint appears to have transferred from one to the other and vice versa, or you have multiple types of materials transferring from one object to another. The guidance is that each one of those associations is reported separately, not combined to make a single stronger conclusion on the scale. In other words, two Associations with Discriminating Characteristics does not equal a single Association with Highly Discriminating Characteristics or a Physical Fit.

Section 5.5 addresses the option to use a statistical approach, which we are not evaluating through this exercise.

Sections 6 through 10 provide guidance for specific material types, in alphabetical order, namely Fiber, Glass, Hair, Paint, and Tape. While all these sections are available for review, you should only need to review Section 9 Paint for the purposes of this exercise, so let's skip ahead to page 28.

Section 9.1 provides general background on paint exams and why we would be asked to do them.

Section 9.2 describes the analytical methodologies used to analyze paint and how the selection of techniques and their results can affect conclusions.

Section 9.3 lists source factors that could *increase* the significance of an association, and Section 9.4 lists source factors that could *decrease* the significance of an association. Source factors are those characteristics of the samples or their possible sources that may affect how strong the conclusion is. These sections are talking in general terms and are not specific examples of which type of conclusion in the conclusion scale would be reached for a given sample type. That occurs in Section 9.5. Let's take a closer look there. In 9.5.2, for Association with Highly Discriminating Characteristics, the first example is an OEM automotive paint with aftermarket layers on top. Then for an Association with Discriminating Characteristics, in 9.5.3.2, we have a standard OEM system, no additional layers. Further down, this is where it is stated that the Exclusion with Limitations conclusion typically does not apply to paint.

Then in Section 9.6, Example Wordings for each of the Conclusion Types are provided. As you will see, the Practice proposes that for the most part the traditional verbiage is used in writing your conclusions: what samples were compared, whether they were alike or different, and then the therefore… statement. For example, therefore, they came from the same source or another source like it, or therefore, the samples could not have originated from the same source. This document proposes adding to that, the type of conclusion that was reached (with the scale included for context) and then a justification is provided as to why that type of conclusion was reached. These are only examples, and modifications can be made as needed to meet the needs of the case and your laboratory. Let's take a moment and read the example in 9.6.3.1. (Read example, pausing to emphasize what is what). In additional to asking you to provide us your chosen conclusion type for each scenario in your exercise, it is this portion after the bold and parenthetical that is the type of justification we will be asking for rather than a full written report. To emphasize, this portion is the only part of a report you will be asked to write.

The last section includes other considerations, such as activity factors that may come into play and how to report things like cross-transfers.

Should you choose to review the other discipline-specific sections, please note that they are all ordered in the same manner, and when possible, analogous sections have analogous numbering. For instance, like Section 9.3, Sections 6.3, 7.3, etc list factors that may increase significance. Similarly, like Section 9.6, Sections 8.6, 10.6, etc. provide example wording for the various types of conclusions.

So now that we have introduced the parts of this document, how do you proceed?

1) Step 1. Review the proposed Standard Practice and possibly any relevant references in the accompanying trace review article. Specifically, the Standard Practice is at

https://www.nist.gov/system/files/documents/2019/12/17/ChSAC-Mat_Interpretation_Document_Dec2019_with%20disclaimer2.pdf, but can also be found via the OSAC Materials (Trace) Subcommittee website under Documents in Process/Under Development.

2) Step 2. Open the exercise link that you receive by email from Donna Sirk with your individualized link once we confirm your training attendance. You have the choice to login once or several times if you want to complete the task in different time intervals. Donna will explain and demonstrate this process in a separate video. Once you start the exercise, you have **one week** (7 days) to complete it. August 14, 2020 is the absolute latest the exercise can be submitted. Answer the demographics questions and review the fifteen provided scenarios. No data collection or data interpretation is necessary; you are simply reviewing text-based details and deciding what you would conclude based on the interpretation guidance.

3) Step 3. Answer the questions for each of scenarios based on the guidance in the Standard Practice. You are free to review the guidance document for each scenario and to move forward and backward through the scenarios and even change your answers up until your week is up.

   It is imperative for the study design that you answer based on the contents of the provided guidance document, rather than relying on your own knowledge, experience, and intuition. Therefore, you must read and study the document and follow its guidance. However, if a specific scenario is not included in the document, then it is acceptable to use your knowledge and experience in conjunction with the document. Your justification will consist of a statement, like those suggested in the document, of why you chose a particular conclusion type. For the class associations, this would be the last part in most of the examples from the document right after the conclusion type appears in parentheses. There is no need to write full report text.

   Further, it is acknowledged in ASTM 1610 that there is more than one combination of techniques that might be appropriate for a comprehensive analysis. Please evaluate the scenarios on the merits of the techniques listed, when applicable, and not on the merits of the specific techniques you would use in your laboratory.

   Also, please note that there is not necessarily a scenario for each conclusion type or necessarily the same number of scenarios for each conclusion type. Not everyone will receive the same version of the exercise.

   All work is to be done independently and without input from others. Multiple examiners from a single lab may participate, but everyone should have their own individualized link and not review or discuss each other's work.

The time the survey itself will take will depend on your familiarity with the Standard Practice. It is available online now, so you are encouraged to begin the reading and reviewing process before receiving and then accessing your individualized link. As previously mentioned, you have one week to

complete the survey once you have accessed it, with August 14 of this year being when the entire exercise closes.

Now, I would like to take the opportunity to thank the following groups and individuals for their valuable contributions to this project. First, I would like to thank the other members of the Interpretation Task Group for their fruitful discussions and draft writing skills, as well as the entire Materials Subcommittee for their feedback throughout the process. Next, I would like to acknowledge Tatiana Trejos, who has been closely by my side through this entire Interpretation project since the inception of OSAC. Hal Arkes, a psychology professor, and Cedric Neuman, a forensic statistics professor, both also members of OSAC, contributed by providing valuable feedback and considerations for this study design. Retired colleagues, David Flohr and Scott Ryland, helped me and Tatiana Trejos write the scenarios you will have during the exercise. We discussed lots of hypothetical and real-life cases and literature to arrive at these final scenarios and in determining their intended answers. A huge thank you also to Donna Sirk who has allowed all our ideas to become a reality through this training session and by setting up all the exercises, links, and eventually providing us with each of your results. It has been no small feat.

Should you have any questions, please contact me, Andria Mehltretter, at ahmehltretter@fbi.gov.

My final thank you is to each of you for expressing an interest in this work, reviewing this training session, and in advance for your time and efforts in completing the exercise and in any recruitment you can do. Time is one of the most valuable things we have, and on behalf of the Materials Subcommittee, I would like to say we sincerely appreciate the time you are giving to us and this project. We are hopeful that we will get clear results that indicate whether we are on the correct path. I am welcome to any general feedback following the exercise, so please save my email address and reach out at any time.

Some Notes on Navigating the System:

- Please watch Donna Sirk's tutorial video as part of your training.
- You will have a unique link to work through the exercise. Please do not share this link with anyone else.
- In order for your answers to be saved, you will need to complete the exercise and click "Submit" at the end. Unfortunately, the system does not allow for saving part way through. In other words, "Submit" is equivalent to "Save." Please note, however, that once submitted you have seven days in which you can still edit, update, or make changes, and not all answers have to be filled in to submit and save.
- In order to review the scenarios all together out of the system, you do not need to answer all the questions initially. In other words, you do not have to answer to go to the next page. If you hit "Next" at the bottom of each page and go all the way to the end and click "Submit," you will receive a follow up email. This email will contain a link to the same exercise to allow you to edit your answers. From then on out, use that link rather than the one initially sent to you, if you want to keep all the previously entered answers. The email will also contain a compiled list of the questions and scenarios, and any responses you have entered. You can print this for review and study offline. Please keep any printed material confidential.
- Please keep in mind, though, that for the scenarios, a different set of follow-up questions will appear depending on which conclusion type you select. We recommend exploring these follow-up questions to know what they are so you can be prepared to answer them for each scenario depending on your chosen conclusion.
- As a reminder, if after you submit your answers you would like to edit them, in order for any changes or new answers to be saved, you have to go back to the end and hit "Submit" again.