CALIFORNIA ENVIRONMENTAL CONTAMINANT BIOMONITORING PROGRAM (BIOMONITORING CALIFORNIA) SCIENTIFIC GUIDANCE PANEL MEETING

CONVENED VIA HYBRID FORMAT BY:

OFFICE OF ENVIRONMENTAL HEALTH HAZARD ASSESSMENT

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

STATE OF CALIFORNIA

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THURSDAY, NOVEMBER 7, 2024

1 P.M.

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APPEARANCES

PANEL MEMBERS:

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Carl F. Cranor, PhD, MSL(Remote)

Lara Cushing, PhD, MPH

Oliver Fiehn, PhD(Remote)

Ulrike Luderer, MD, PhD

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CALIFORNIA DEPARTMENT OF PUBLIC HEALTH:

Kathleen Attfield, ScD, Chief, Exposure Surveillance and Epidemiology Unit, Environmental Health Investigations Branch

Jeff Wagner, PhD, Chief, Environmental Health Laboratory Branch

GUEST SPEAKER:

Kimberly Valle, MS, University of California, Merced

ALSO PRESENT:

Asa Bradman, PhD, University of California, Merced

Ahimsa Porter Sumchai, MD, Hunters Point Community Biomonitoring Program

INDEX

PROCEEDINGS

ACTING DIRECTOR EDWARDS: So good afternoon, everyone. And I'd like to welcome all the Panel members and the audience to the November meeting of the Scientific Guidance Panel for Biomonitoring California, more formerly known as the California Environmental Contaminant Biomonitoring Program. So thanks for all of you for joining today. It's great to see a good audience in the room as well.

So the Panel last met on July 19th, 2024. And the July meeting included updates on Biomonitoring California's Program activities, including an update on the East Bay Diesel Exposure Project analysis of urinary metabolite levels as predictors of air pollution exposures and a progress update on the laboratory method development for analysis of metabolites of VOCs, or volatile organic compounds, in urine.

In the second half of the meeting, the Panel heard from the Program staff presenting analyses of data from multiple Biomonitoring California studies on PFAS and other persistent organic pollutant levels measured in blood. And a guest speaker from OEHHA presented data on PFAS levels measured in fish caught in California and provided background on the office's process for developing fish advisories.

So key discussion topics included the examining East Bay Diesel Exposure Project results related to predictors of diesel exhaust exposure and observed exposure patterns, the Program's development of the laboratory methods analyzing VOC metabolites in urine, exploring how fish and shellfish consumption contributes to PFAS exposures in the San Francisco Bay through findings from the Asian Pacific Islander Community Exposures Project, considerations for OEHHA's process in developing PFAS-related fish advisories, trends of PFASs in persistent organic pollutants in pregnant Californians from data collected in the Measuring Analytes in Maternal Archived Samples, or MAMAS study.

A summary and transcript of this meeting is posted on the July meeting webpage at the Program's website, biomonitoring.ca.gov.

I'd also like to announce that for today Panel Member Tom McKone will be acting as the SGP Chair for this meeting. Thank you, Tom.

And now, I'd like to invite the Panel members to introduce themselves by name and affiliation. I'll start with Jenny Quintana, who is attending remotely. Jenny has been granted a reasonable accommodation to attend this meeting remotely. Her remote attendance will count towards the requirement that a majority of members shall

be physically present at the same time, same teleconference location.

Jenny.

PANEL MEMBER QUINTANA: Hi. My name is Penelope, or Jenny, Quintana. And I am a Professor in Environmental Health at the School of Public Health at San Diego State University.

ACTING DIRECTOR EDWARDS: Thanks.

All right. I'll next call on the other Panel members that are attending remotely starting with Carl.

PANEL MEMBER CRANOR: Carl Cranor, Department of Philosophy and faculty member of Environmental Toxicology, Emeritus in both cases. I just retired.

ACTING DIRECTOR EDWARDS: Thanks, Carl. Congrats on your retirement.

And next, Oliver.

PANEL MEMBER FIEHN: My name is Oliver Fiehn. I am Professor at the University of California in Davis. I'm in the Genome Center in the Department of Molecular and Cellular Biology.

ACTING DIRECTOR EDWARDS: Great. Thanks.

Now, I'll go around the room.

José.

PANEL MEMBER SUÁREZ: José Suárez, Associate Professor at UC San Diego and Director of the Climate and

Environmental Health Research Program and the Division as well.

PANEL MEMBER CUSHING: Hi. I'm Lara Cushing, Associate Professor at UC Los Angeles in the Department of Environmental Health Sciences.

ACTING CHAIR McKONE: Tom McKone. I'm Professor Emeritus in the School of Public Health at University of California, Berkeley, and also retired affiliate with the Lawrence-Berkeley National Laboratory.

PANEL MEMBER PADULA: My name is Amy Padula and I'm an Associate Professor in the Department of Obstetrics, Gynecology and Reproductive Sciences at University of San Francisco -- I'm sorry, University of California, San Francisco.

PANEL MEMBER LUDERER: Hi. My name is Ulrike Luderer. I'm Professor in the Department of Environmental and Occupational Health in the Wen School of Public Health at UC Irvine.

ACTING DIRECTOR EDWARDS: All right. Well, now I will hand this over to our Acting Panel Chair, Tom McKone, who will provide more details about today's meeting.

ACTING CHAIR McKONE: So I want to add my welcome to everybody. It's a nice experience to be chairing such a great organization. I want to begin with a reminder that the Panel members are asked to please comply with the

Bagley-Keene Opening Meeting requirements that all discussions and deliberations of the Panel about subject matters at issue today need to be conducted during the meeting, not on breaks or with individual members of the Panel, on or offline, including via phone, email, chats or text messages.

Panel members who have not been granted a reasonable accommodation and are attending remotely are expected to visibly appear on camera during the open portion of the meeting. If you are unable to keep your cam on during the meeting because it's technologically impractical, please make an announcement when you turn your camera off. Additionally, if someone older than 18 is in the room with Panelists, or attending remotely, you must disclose the presence of that person and their general relationship to you. I want to take a moment here if anyone has, to let us know there's someone else in the room?

I guess not.

So we have goals for today's meeting. We will first hear an update on the Program activities, including launching an evaluation study on results of return materials from the Biomonitoring component of the San Joaquin Valley Pollution and Health Environmental Research Study, also known as BiomSPHERE or the BiomSPHERE study.

The Panel will also hear updates from Program staff and a guest speaker on two air pollution community biomarker -- biomonitoring studies. Finally, we'll hear about and have an opportunity to provide input on plans for the Scientific Guidance Panel meetings in 2025.

There will be time for questions from Panel and audience after each presentation. If SGP members wish to speak or ask questions, please raise your hand and I will call on you at the appropriate time and then you can ask your question and provide your comment. If online webinar attendees have questions or comments during the question period after each talk, you can submit your questions via the Q&A feature of the Zoom webinar or by email to biomonitoring@oehha.ca.gov. We will not be using the chat function during meeting -- during the meeting.

Please keep your comments brief and focused on items under discussion. Relevant comments will be read aloud and paraphrased when necessary. If online attendees wish to speak during the public comment period and discussion sessions, please use the raise-hand feature in Zoom webinar and McKenna Thompson or Rebecca Belloso will call on you at the appropriate time.

If you're attending in person and wish to comment during the public comment period and discussion sessions, please come to the front, or raise your hand, and I will

call on you at the appropriate moment. For the benefit of the transcriber, please clearly identify yourself before providing comments and write your name and affiliation on the sign-in sheet at the back of the room.

So now, we'll move on to our Program. We're going to begin with our first presentation, which is by Kathleen Attfield. Kathleen is the Chief of the Exposure Surveillance and Epidemiology Unit in the Environmental Health Investigations Branch, that's EHIB, at the California Department of Public Health, CDPH. She will provide an update on current Program activities.

I turn the podium over.

(Slide presentation).

DR. KATHLEEN ATTFIELD: Good afternoon. Thank you.

Speak a little louder?

Okay. Thank you for attending today. And I'll get started with our Program update.

[SLIDE CHANGE]

DR. KATHLEEN ATTFIELD: Today, I'll walk through aspects of four components of our Program work, including updates on our surveillance and community focused studies, updates on our laboratory activities, and from our communications team.

[SLIDE CHANGE]

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DR. KATHLEEN ATTFIELD: Starting with Surveillance. As the Panel is aware, our primary Program mandate is to conduct surveillance studies to understand trends in environmental exposures across California. Our current activities include these three projects. And I'll spend the next few slides giving you some more details about the California Regional Exposure Study.

So as a reminder, this spanned three regions in California from 2018 to 2020 and covered a variety of analyte panels. Then I'll return with some information on our STEPS initiative and the work we're doing with planned future surveillance.

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DR. KATHLEEN ATTFIELD: Of course, the planning phase and sample collection for the CARE study is many years in the past now, but our laboratories have been willing to go back to banked samples that we had in order to fill in additional information about arsenic speciation and environmental phenols for participants who didn't receive those in the first round. And we've received that information back from the laboratories for arsenic speciation and anticipate returning that to our participants when we receive the phenols. And we're planning for this in the spring of 2024-25.

Our epi analysts have been diving deeper into the data of CARE. You earlier this year saw a presentation on associations with drinking water and PFAS, so that's being finalized, and it's in draft manuscript form. We've had a Boston University graduate student who's been looking into dietary factors from CARE a PFAS consumption, and that analysis is wrapping up with a manuscript also ready for submission.

I'll talk a little bit more about some of our metals work in a moment, but also wanted to acknowledge the other aspects of our communications, including fact sheets and other public-facing materials, as well as presentations just in the last month to the Regional Water Works Association and the International Society of Exposure Science.

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DR. KATHLEEN ATTFIELD: So to provide more information on our work with the metals, data from CARE, I'll break the analytes into two groups. So for those which -- for which we have levels of concern or LOCs, and for those we reach out to participants to do follow-up when we see the levels that are elevated. And so these metals are arsenic, cadmium, lead, and mercury. Our other groups of metals are those that actually don't often receive as much attention from our groups. So we are very

lucky to have a USC intern, Raymond Hughley who's been working on these other metals, which include antimony, cobalt, manganese, molybdenum, thallium and uranium.

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DR. KATHLEEN ATTFIELD: This table from left to right indicates how we walk through our analyses and activities related to analyte data that we receive. So our notification of -- to folks with elevated levels has already occurred for LOC metals. That, of course, is not applicable for the other metals. And we have returned all the results except for those speciated arsenic results that I just mentioned.

In our CARE report, we have already compared the LOC metals to national levels and are newly doing so for our other metals. So I'll give you a little sneak preview. We are seeing that levels are -- up here to be lower for urinary cobalt as compared to national data from concurrent time period in NHANES and a bit higher for manganese in blood compared to NHANES.

[SLIDE CHANGE]

DR. KATHLEEN ATTFIELD: Further, current work includes examining demographic and regional trends for the other metals as well as looking at associations of questionnaire data for the LOC metals.

[SLIDE CHANGE]

DR. KATHLEEN ATTFIELD: For our other two surveillance efforts, Studying Trends in Exposure in Prenatal Samples, or STEPS. This is a study you've heard of in the last year, where we're collecting prenatal samples, some banked, some freshly collected from three counties covering a wide range of time, so that we can look PFAS trends. So current work has been in receiving these freshly pulled samples for us in 2024 from Los Angeles County and ongoing laboratory work on those samples from Orange County in 2015, 2018, and 2021. We're in the very early phases of thinking about what's the next step in surveillance, once STEPS may be drawing to a close. And that our current activities involve exploring possible collaborations with other surveys, such as the California Health Interview Survey and developing criteria for study designs.

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DR. KATHLEEN ATTFIELD: So moving on to community focused studies.

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DR. KATHLEEN ATTFIELD: We have a lot of activity on several studies. So today, I'll just give a brief update on three of these.

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DR. KATHLEEN ATTFIELD: So for our first one the

Asian Pacific Islander Community Exposures Project. Last month there was a presentation on the work associating PFAS with fish consumption to the International Society of Exposure Science. And there is a draft paper that hopefully will soon be getting submitted.

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DR. KATHLEEN ATTFIELD: For FRESSCA-Mujeres, in late August the FRESSCA-Mujeres and FRESSCA studies held in-person community meetings with participants and community members in Coalinga and Arvin to discuss air monitoring results, recommendations, and next steps. The study partners, Public Health Institute and the Central California Environmental Justice Network led these meetings in Spanish and with support from the Biomonitoring California staff.

They did hear voluntary testimonials from participants on decreased allergies and asthma symptoms during the period when they had indoor air cleaners and filters affixed to the swamp coolers as part of this study. So that was gratifying to hear.

The study team continues to evaluate air monitoring and questionnaire data and await the results from the laboratories on urinary samples testing for VOCs, PAHs, and tobacco smoke.

[SLIDE CHANGE]

DR. KATHLEEN ATTFIELD: Moving on to the biomonitoring component of the San Joaquin Valley Pollution and Health Environmental Research, or BiomSPHERE, study. They returned results on biomarkers of response to participants. And as a reminder, this is involves 64 families in the Fresno, Stockton area with a parent and child pair per family. The study team continues to evaluate air monitoring and questionnaire data and awaiting results for VOCs from the laboratories. And in a moment, you will hear more information about preparations for evaluating the results return materials from Rebecca.

[SLIDE CHANGE]

DR. KATHLEEN ATTFIELD: Moving on to laboratory updates.

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DR. KATHLEEN ATTFIELD: Our Environmental Chemistry Lab at the Department of Toxic Substances Control is continuing to progress on developing methods for cyclosiloxanes and PAHs in serum. Some of that progress was shared at SETAC conference last month. For PFAS there's a number of activities with proficiency testing and standard material check, and I am very gratified to see that they have marched through 300 samples for our STEPS analysis. It will be very exciting

to see the results coming soon. For our POPs panel, there's proficiency testing occurring with data recently submitted.

[SLIDE CHANGE]

DR. KATHLEEN ATTFIELD: From our Environmental Health Lab at the Department of Public Health, first I'll talk a bit about the metals progress that's been going on. So there's -- I will talk a little bit more about the addition of nickel to the method. But in the meantime, let's acknowledge all the wonderful work that they've had to do to keep the methodology up-to-date and up to speed with proficiency testing, and standard material check, and certification. The metals -- the nickel method development was tested through our Intraprogram Pilot Project, where we received the data in June, which I'll give to you in just a moment, and have been applying the method to FRESSCA-Mujeres, which has been returned to the OEHHA staff with further arsenic speciation in progress.

[SLIDE CHANGE]

DR. KATHLEEN ATTFIELD: As I mentioned, there's phenols analysis ongoing for CARE-LA, finalizing the 346 samples. For our hydroxylated PAHs and VOCs continuing standard material check through materials provided by the CDC Biomonitoring Program. Both of these -- the analyte panels also have IPP testing, under -- which is undergoing

data review for 38 or 39 samples. And for hydroxylated PAHs, the FRESSCA-Mujeres is finalizing analysis, and for VOCs additional analysis is complete and under review for California Fire Fighters Study.

[SLIDE CHANGE]

DR. KATHLEEN ATTFIELD: So I was mentioning our Intraprogram Pilot Projects without giving a lot of context and I know we have some newer members of the Panel. So I just wanted to provide the context that the -- we perform these in order to demonstrate readiness of new or modified methods for use in studies involving the public. And we consider these dress rehearsals, where we follow the process from sample collection, to laboratory analysis, to participant report back. These also help provide evidence of having detectable values in the range that the assay can provide and in the media type that we choose, provide seed data for method publication for the laboratories, and we actually have interest in developing these similar procedures for work when we involve external laboratories to the Program.

So I was talking about some of the IPPs that are in progress, but recent examples of completed ones were expanded -- the expanded PFAS panel, our work with the University of Washington on quaternary ammonium compounds, and as I said nickel.

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DR. KATHLEEN ATTFIELD: So a little information about those results from the testing of the nickel method. This was added to our air polluting -- to our metals panel, because of its interest in the AB 617 related community studies. That's an air pollutant of interest. The addition to the metals panel did not involve -- did not require substantial changes to the methodology, though there is interest in lowering the method detection limits in the future with an acidic -- a switch to an acidic method. The IPP method, once supplied, was able to generate method detection limits similar to those of NHANES and pretty similar detection frequencies to 50th and 90th percentiles. And if you'd prefer to see this data adjusted for creatinine, which you can see here. It's a slight bit higher than NHANES but, of course, is a small sample size.

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DR. KATHLEEN ATTFIELD: Also, just to make note, that the Environmental Health Laboratory and both laboratories are interested in identifying additional biomarkers for inclusion in older methods and additions to the list of designated chemicals through their use semi-targeted new approaches, specifically related to

additional metabolites for PAHs and VOCs and for adding to the potential designated chemicals list of some environmental phenols.

[SLIDE CHANGE]

DR. KATHLEEN ATTFIELD: All right. So moving on to our communications team.

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DR. KATHLEEN ATTFIELD: You will hear more about this in a moment of all the hard work it takes to put together results return.

[SLIDE CHANGE]

DR. KATHLEEN ATTFIELD: But for those who haven't seen these before, just a quick look into what we supplied to our participants for our nickel results, where we provide the result comparison to 50th and 90th percentile in tabular and text format.

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DR. KATHLEEN ATTFIELD: Contextual information about where that analyte can be found, what the possible health concerns are, and what are possible ways to reduce exposure.

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DR. KATHLEEN ATTFIELD: Additional resources are made available and these are always posted online, so that it's open to the public who will also be able to benefit

from this information.

[SLIDE CHANGE]

DR. KATHLEEN ATTFIELD: Our Biomonitoring and Outreach Communications Unit has been hard at work on various fact sheets that reflect their pillars of communication and accessibility, engagement and outreach. These are lay-friendly, concise documents meant to distill the complex research.

Here on the left, we have the fact sheet for the Foam Replacement and Environmental Exposure Study, which is in review. And on the right, a fact sheet on arsenic in rice, where it's in its final editing stages and importantly has gone through a transcreation process, where it's both adjusted for language and cultural sensitivities for Chinese, Vietnamese, and Spanish audiences and language preference.

[SLIDE CHANGE]

DR. KATHLEEN ATTFIELD: Two additional fact sheets that are underway address the PFAS and seafood consumption and PFAS and drinking water consumption.

[SLIDE CHANGE]

DR. KATHLEEN ATTFIELD: So with that, I just want to acknowledge all the wonderful staff it takes to do this great work, say hello to some new staff members. We have Ian Tang in the back, a Senior Epidemiologist, Justin

Sturgess and Kaitlin Stitt at ECL, and saying goodbye to, and thank you to, Jonathan Gallardo.

[SLIDE CHANGE]

DR. KATHLEEN ATTFIELD: So with that, I will happily take any questions.

ACTING CHAIR McKONE: Okay. Well, thank you.

We have time -- just a brief time now for questions that are short and more of a clarification nature. We will take more substantive questions after our second Program overview presentation. So we can start with the Panel members. And actually, I can't see the people online to see who's asking a question, if they have questions. No, I mean, our Panel members.

Anyone around the table here, questions, comment, clarifications?

PANEL MEMBER LUDERER: I just have a quick question about the arsenic speciation. Is there -- do you have kind of a level that the total arsenic has to be at before you can speciate it or --

DR. KATHLEEN ATTFIELD: Well, that's what we did in the first round. Yeah, we had a threshold that we used and then now we're going back and speciating everyone, so that we can have additional information in order to really look into the inorganic species and have a full distribution of information rather than just on the select

few that we had the first go-round.

PANEL MEMBER LUDERER: The reason I ask is I'm very interested because the commercial labs usually when we request speciation, very often they don't do it, because they say they were -- the total level was too low for them to be able to do that. So I was just curious about that.

DR. KATHLEEN ATTFIELD: Oh, okay. I haven't --

(Question off the record).

DR. KATHLEEN ATTFIELD: Yes. Yeah, there is a -- yeah, there is a paper that recently came out that describes our protocol for following up with participants of the elevated arsenic levels.

ACTING CHAIR McKONE: Okay. Other brief questions and clarifications?

PANEL MEMBER SUÁREZ: Well, very nice presentation. Very -- just a quick question here. So you mentioned that you've been working on the development of the expanded measures of PFAS as well with -- and also the quaternary ammonium compounds, which is pretty exciting. Where is this development at right now and when do you think it might be ready to be implemented in different studies?

DR. KATHLEEN ATTFIELD: Which one?

PANEL MEMBER SUÁREZ: For both of them.

DR. KATHLEEN ATTFIELD: Oh, both of them. So the expanded PFAS method, that was presented -- whoops -- in March this year to the Panel. That's actually in use right now for the STEPS initiative on the banked maternal samples. The quaternary ammonium compounds, that was actually done by an external lab and I can pull up -- I had some extra slides about that, if you'd like to see them.

But for those, the initial look into them, for the urinary levels amongst sort of a general population type group, we had very few detects. And it was only when we moved to a group of more health care associated workers, and this is during the beginning of the pandemic, that we began to see some detections. So that hasn't been something that we decided to move forward with and bring in-house yet.

PANEL MEMBER SUÁREZ: Got it. Thank you.

ACTING CHAIR McKONE: Do we have enough time to move to the question. Rebecca was there an online question?

REBECCA BELLOSO: There was no online question.

ACTING CHAIR McKONE: Okay. We had one in the audience.

DR. AHIMSA PORTER SUMCHAI: My name is Dr. Ahimsa Porter Sumchai, the founder and principal investigator for

the Hunters Point Community Biomonitoring Program. As a physician, I want to commend you for the work that you're doing on biomonitoring of nickel. In our own program, we are serving in very Southeast San Francisco, the EPA screen assigns a 95 to a hundred percent ranking for diesel particulates. And we have evaluated two children and two adults who come in with severe eczema including a four year old who's had eczema since birth, which is kind of unbelievable. And in all four cases, nickel was elevated.

Nickel is a component of diesel exhaust, and as a physician, I am convinced that some of the atopic dermatitis exhibited symptoms that we haven't seen in children, especially those who are being transported on diesel-powered school buses may be the result of nickel. So I do want you to prioritize diesel exhaust as a source of nickel exposure.

ACTING CHAIR McKONE: Thank you.

DR. KATHLEEN ATTFIELD: Thank you for the information.

ACTING CHAIR McKONE: Okay. Other comments online?

No.

All right. I think we'll move on then to our -- so that we have more time at the end for discussion and

questions of both presentations. We're going to move on next to an overview of activities at OEHHA. This will be presented by Rebecca Belloso. Rebecca is a Health Program Specialist in the Safer Alternatives Assessment and Biomonitoring Section at OEHHA. She will give a presentation on the evaluation of results return materials from the biomonitoring component of the San Joaquin Valley Pollution and Health Environmental Research Study also known as BiomSPHERE.

(Slide presentation).

REBECCA BELLOSO: Great. Thank you so much. And as Acting Chair Tom McKone mentioned, my presentation today will cover the BiomSPHERE study, in which we are doing an evaluation of the results return materials.

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REBECCA BELLOSO: So as a reminder, Biomonitoring California has a mandate as a State program to return results to study participants. This is a statutory mandate for returning results to participants who request them. The participants are provided materials to help them understand the results. And we tailor those materials, depending on what the participant audience is. For example, we do our best to make them culturally and linguistically appropriate and understandable.

[SLIDE CHANGE]

REBECCA BELLOSO: These are our steps for general practice in creating the results return packets. As you can see, there are a number of steps. So I'll go through the steps.

First, we conduct a QA and QC on the data and that data is received from our laboratory. After that data is received, we do an analysis on the final data set for summary statistics. We create draft text and results tables that include comparison data, and if possible, we compare participants with other participants within the study, as well as national levels, such as NHANES. We then submit that for internal review as well as review with the principal investigator of the study and submit that draft to the IRB for approval. And in that case, sometimes we pre-translate before submitting to IRB and sometimes we translate afterwards. It really depends on the IRB. We'd update the tables after approval with personalized results for each participant and package all the materials into one document. And the PI would distribute the final packets to participants.

[SLIDE CHANGE]

REBECCA BELLOSO: So I'd like to go through each page of the results return packet. This is the packet that was returned for the BiomSPHERE study. So first, we include a cover letter with a summary of the project

since -- sometimes participants don't remember that they were participants. So we do like to provide an overview of what we collected, what compound we analyzed, and thank them for their time. We provide a table of contents to help them walk through the packet. We include a project description, which includes frequently asked questions and further information on the study. In the results table, we include information on how they can compare their results to either other people within the study or any other summary statistics that were included.

And here's an example of the results table with fictitious values, just so you have an idea of what that looks like. And we include a -- an informational fact sheet based on the chemicals that we analyzed. So, for example, this one is for biomarkers of response. We include recommendations within that fact sheet for how participants can reduce their exposures. And we tailor a community resource page with resources in the area in which they live or work, depending on -- depending on the study.

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REBECCA BELLOSO: So for distribution, we -- we, as a program, try to return the results within one year of sample collection. We send all the results to participants at the same time. Sometimes we receive

results in batches, but we -- since we do the summary statistics comparison, we do that and incorporate that into the results table. So we do send the results to participants all at the same time.

Participants have the option of how they choose to receive the results. So they can choose whether they receive it through mail, through a password-protected email document, or in-person delivery, if neither of those are feasible.

I do want to point out that the process is different, the protocol is different when elevated results are reported from our laboratory. So in that case, we would contact the participant as soon as possible for cases of -- that are above the level of concern.

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REBECCA BELLOSO: So as a reminder, we have brought up to the SGP a couple of studies that did try to evaluate results return and the challenges in reporting results back to participants. Two of those studies were the Chemicals in Our Bodies Study, also known as the MIEEP study, as well as the Biomonitoring Exposures Study, or known as BEST.

So sorry.

The Panel -- based on the discussion, the Program has agreed to move forward with returning results, even if

the health implications of the results are scientifically uncertain, with inclusion of recommendations for lowering potential exposures to compounds analyzed, as you see we did include that in this packet.

There have been other efforts by the Program as well to evaluate results return materials, such as in the FOX, ACE and CARE studies. And since it has been almost 10 years since we've visited this topic with the Panel - this was last presented in November 2015 - we thought that now would be a good time to see if there's any changes or improvements that we can make in our results return materials.

Communication since 2015 has changed. Especially after the pandemic, the world has kind of shifted to a more digital space. So we also wanted to evaluate whether we should incorporate a more digital platform when we do return results.

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REBECCA BELLOSO: So leading this project is PI Nancy Burke from UC Merced, co-PI Asa Bradman as well from UC Merced. And they are both professors in the Department of Public Health. And we (inaudible) CCAC, the Central California Asthma Collaborative with Tim Tyner, the founder and Executive Director, to conduct this evaluation.

And the study, we'll do surveys with participants and then they will go into more detailed focus groups and interviews on the subset of all the participants. So this study aims to understand how much the participants took away from the results, whether they made any behavioral changes or changes in their knowledge and understanding of these various compounds that we analyzed. And we'd also hope to recommend or get a recommendation on what the optimal approaches are in creating our results return materials.

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REBECCA BELLOSO: So for this particular study, we are returning urinary biomarkers specifically for the oxidative stress, inflammation and lung injury biomarkers and poly -- PAHs, polycyclic aromatic hydrocarbon metabolites, and volatile organic compound metabolites.

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REBECCA BELLOSO: Our timeline for this evaluation study. So in the summer of 2024, the PIs worked together to build a study team and identify key considerations for the project. By winter 2025, they will develop survey and interview questions and submit that to the IRB. And they plan to re-enroll BiomSPHERE participants, so that they can conduct the survey and the interviews. By spring 2025, they will conduct surveys,

interviews and focus groups. And by 2020 -- summer 2025 they plan to analyze the results and produce the summary findings with a final review on approaches for how we plan to optimize returning the study results.

[SLIDE CHANGE]

REBECCA BELLOSO: So I open it up now to the questions.

ACTING CHAIR McKONE: Okay. Thank you very much. We have quite a bit of time remaining, but what we want to do first is take roughly five minutes to focus just on this presentation with short questions of clarification. And then when we finish that, we'll move on to a broader discussion of both of the talks and open it up for a little more depth and substance.

So are there questions more of a brief nature on clarification for Rebecca's presentation from the Panel. I can't see the Panel members --

PANEL MEMBER QUINTANA: I'm on Zoom. I'm raising my hand. Is that okay?

ACTING CHAIR McKONE: We have one question from Dr. Cushing and then we can move to...

PANEL MEMBER CUSHING: Thank you. This is a question for Rebecca. I may have missed it in your presentation, but for the upcoming evaluation of results return in trying out different formats. It looked like

you were going to be evaluating whether different formats might be better received or better understood. So have those alternatives already been designed or is that something that will be designed like in response to the survey or the interviews?

REBECCA BELLOSO: That is a great question and something that we've discussed. So, the PI would like to move forward for the survey in asking their overall understanding and potentially changing the formatting of how the results look. Right now, it's in table form, so we've thought about maybe putting it in a graph form or an online platform and see how the participants react to that in a focus group.

PANEL MEMBER CUSHING: Okay.

ACTING CHAIR McKONE: And then Dr. Quintana, did you have a question?

PANEL MEMBER QUINTANA: Hi. Yes, I did. And I wanted to first say that I thank you for doing this important work, because it's an interest to anyone who works with communities want to give them the information in a very helpful way. So I guess my question is are you going to try and randomly sample the people who had the results return, because there might be a slight bias in who kind Of volunteers to participate in the focus groups. And I'm just wondering how the selection of participants

will be done.

REBECCA BELLOSO: Right. That is a great question as well. So for the survey -- initial survey, they will contact all participants that requested their results materials. And then after that, I believe it will be a randomized sample based on who responds to the survey. We can't control who actually picks up the phone and takes that time to fill out the survey, but we'll make the best effort to try to get everybody involved.

ACTING CHAIR McKONE: I think José was next.

PANEL MEMBER SUÁREZ: Just a very quick question. So for the presentation, your question to the SGP Panel was to get some feedback about the actual structure of the -- of the information being returned. And the second part was what are some considerations for different ways in doing that, right?

REBECCA BELLOSO: Correct.

PANEL MEMBER SUÁREZ: Would it be possible for us to get a sample of one of the -- I saw the presentation. It's kind of hard to see. It was a little small, but would we be able to get access then to a sample so we can take a look and give you some comments?

REBECCA BELLOSO: Sure. I think we can do that. We definitely have a -- that's what we submit to the IRB is like a fictitious values, so that shouldn't be a

problem. And then we'd have to, I think, make an agenda item at a future meeting. I don't know if we can provide that right now.

PANEL MEMBER SUÁREZ: It doesn't have to be right now, but I mean, if you want feedback from us, it would probably be better for us to actually see it.

REBECCA BELLOSO: That's a good idea.

PANEL MEMBER PADULA: I also just -- I was particularly curious about the oxidative stress -- whoops, I just turned it off.

Okay. I think I got it on.

The oxidative stress and inflammation biomarkers, since they are a little bit different than maybe the chemicals that we're used to returning. And so I'm also curious about how those results will be communicated given our lack of, maybe, understanding about what they all mean.

REBECCA BELLOSO: Right. So we've -- we've gone through a lot of internal discussions on how to best communicate that to the public, especially since they're not scientists, and they -- we can't assume that they're aware of the mechanisms within the body. So we do try to put it in as simple terms as possible. So we do return it as a separate packet for the biomarkers of response and then we'll do biomarkers of exposures in another packet.

And that will be delivered early next year.

ACTING CHAIR McKONE: We're moving into a little more substantive questions, but I thought maybe we should just take a minute to offer audience, both online and in the room, to ask short clarifying questions and then there's going to be roughly 15 to 20 minutes coming back to both presentations and getting into more detailed questions.

Are there clarification questions, McKenna, online or anyone in the audience at this point?

Comment. Get a microphone and identify yourself for the transcriber.

DR. ASA BRADMAN: Thank you. I'm Asa Bradman, and the co-PI on the project on return results -- in evaluating return results. And we'll have a survey. And then as part of the survey, we'll ask about possible interest in participating in a focus group and any follow-up to the -- to the written survey. And then we'll use that as a pool to select participants. So it will be kind of a staged process. And, you know, of course, (inaudible) small study, and in terms of, you know, focus groups can be very intensive and data analysis of text can -- has its own challenges, so -- but we are hoping to get -- you know, we'll get some interesting input, and thoughts, and comments from the participants.

ACTING CHAIR McKONE: If there are no more questions focused on this talk, I think we'd like to open it up to a more substantive discussion of both talks. So I invite Dr. Attfield. And again, it's open to the Panel and then we'll open it up to the audience also.

Comments?

Yes, Dr. Luderer.

PANEL MEMBER LUDERER: I'm kind of curious about the results that you've already returned to people and whether you've kept track of how often people maybe contact the Program with questions about their results. I mean, how frequent is that? Does it depend on the study? I mean, have you looked into sort of, you know, qualitative data about that, but I'm just wondering if you have done that.

REBECCA BELLOSO: Right. We definitely include our contact information on the cover letter, if anybody has any questions or concerns about their packets, or their results. And so far, we haven't received any questions on this study. And we've also returned for a couple of other studies, at least at OEHHA, and we haven't received any questions from the public, which is also one reason why we wanted to do this, because if they're not reading their packets then we're not doing our job, so we want to make sure that they read that.

DR. KATHLEEN ATTFIELD: And I'd add for the CARE study is we do get like a handful of people contacting us. And, of course, there are the people who, you know, are contacted by us. And those, of course, are much more interested in talking about their results. So we keep track of it. We haven't gone back to try to separate and tabulate it, but we could try to pull that into this effort to formalize that review.

ACTING CHAIR McKONE: Sandy has a comment or a clarification.

DR. MARTHA SANDY: Martha Sandy. I just wanted to say we also have community meetings and webinars for the CARE study for participants in others in the community to listen, and if there's a chance to discuss as well. So our most recent meetings where we've returned biomonitoring results for community studies was for the SAPEP study. We had a community meeting. We reported back to the Panel on that. And we had interest in, you know -- but no specific questions about how to interpret their results.

PANEL MEMBER SUÁREZ: Thank you. Touching on the second part of that question of the distribution method. So which ones have you -- I don't know, you've been doing mailing and password protected emails. What other thoughts have you been having in that sense? Like what

other methods would you be interested in exploring?

REBECCA BELLOSO: Specifically, we were thinking about the DERBI platform, which is -- which is a website style platform which requires a log-in from the participant and they can privately see their results that way, but it includes, you know, links. And they can open up some multiple pages to like do a further deep dive. Yeah, and I believe that is from the Silent Spring Institute.

PANEL MEMBER SUÁREZ: Um-hmm. What ages are the participants?

REBECCA BELLOSO: These participants -- would Kimberly --

KIMBERLY VALLE: Yeah. So the mean age is 42 years old.

PANEL MEMBER SUÁREZ: Okay.

KIMBERLY VALLE: But we did have three grandparents and a couple of parents. Most of them were mothers, but, yeah, the mean age is 42.

PANEL MEMBER SUÁREZ: Forty-two. And what's the range?

KIMBERLY VALLE: I can follow up.

PANEL MEMBER SUÁREZ: Okay. And the reason why I'm asking is depending on how -- which groups you may want to start focusing on for which types of distribution,

right. So a lot of people -- and the younger you are most likely you already have a smartphone and be glued to it. This is probably one of the better ways to get -- you know, people get ahold of people in different ways, right? So the other way, it's something that we've been doing in different studies in different parts of the world, where, for example, WhatsApp is the main way in which people communicate. And we've been distributing -- you know, getting in touch with participants with that, because it is end-to-end encrypted. And a lot of times, you can send them a link to that saying all right you can access your results if you click on this link, and then it takes them to the website. Then they can log in and do all that stuff. Or consider even using different platforms that you could deliver it straight through that WhatsApp. But, you know, there's different considerations into that.

Of course REDCap has an option for that as well, where you can have them do it. There's a few different platforms and you've been exploring one of them. So I think it would be a very valuable one to have a mixture of these things. And some of the groups may be more receptive than others to have that. And a lot of times, then you have to consider should it be a web app versus an app that they download. And the downloaded version of that would be if you're planning on following up with

them, that would be very powerful, because they don't have to keep updating that app.

So there's a lot of different things worth considering. We've been running this study just collecting a lot of information using cell phones from participants. This is in Ecuador and we've been doing cognitive law assessments over two and a half years, so it's like this constant interaction through the app. But at the same time, the apps don't allow you to communicate very well with participants. So then we've been using WhatsApp for -- to kind of guide them a little bit through that process. It's like a multi-step approach that you may want to consider.

REBECCA BELLOSO: Thank you. Thank you. I don't think we've thought about WhatsApp, so that's a great idea.

KIMBERLY VALLE: Hi. This is Kimberly with UC Merced. And the range for the adults age was from 28 to 66 with a mean age of 42.

ACTING CHAIR McKONE: So Dr. Quintana has had her hand up. And I apologize, because the screen I'm looking at blocks your hand. I have to look up to see that your hand was up.

(Laughter).

ACTING CHAIR McKONE: There something in the way

there. So please, I know you've had your hand up for a while.

PANEL MEMBER QUINTANA: I was just going to ask more about the results return of the biomarkers of response. Because as a previous person said, I think it was Ulrike, that they're a different type of marker besides the chemical markers. And I guess one of the things that we've been struggling with, because we also have been adopting your pioneering work and results return to our participants, is how do you communicate uncertainty, because some of these -- some biomarkers, of response are quite variable and even over time within the same person, but -- so I'm just wondering how you -- have you thought about trying to communicate the uncertainty in your measurement and how that might overlap.

So, for example, if somebody's, you know, 1.11 and their friend is 1.12 maybe that's not really that their friend is higher, you know, that kind of feeling. I was just curious if you had any discussions about that.

Thank you.

REBECCA BELLOSO: From what I can recall, we haven't really discussed that level of detail in the different results, but we can definitely consider that and maybe put something like a level of concern -- well, not level of concern, but, yeah, like a legend or something

like that, um-hmm.

ACTING CHAIR McKONE: Dr. Sandy has a quest -- has a response.

DR. MARTHA SANDY: So we've returned these results for two studies so far for biomarkers of response, SAPEP and BiomSPHERE. And we give them this fact sheet, FAQ, on what those biomarkers are, and what they mean, and the many different things that can cause variability, including time of day, et cetera, et cetera. So we're not -- we're just -- we're letting them know that there's many factors that can affect these levels, not just air pollution. We haven't gone any father than that, because...

PANEL MEMBER QUINTANA: Thank you.

Dr. Padula.

PANEL MEMBER PADULA: I was just going to add to follow up from José's comment that DERBI also does include a smartphone interface version. So, you could have the option of looking at it on a computer or on the smartphone. And it also has the capability of knowing whether they opened it or not. And so that's the tricky part with the mail I suppose, and even how long -- how much time they look -- spent looking at it, so if you're interested in that information that has that capability.

REBECCA BELLOSO: Thank you.

ACTING CHAIR McKONE: I have a brief question of Dr. Attfield's presentation, which relates to the comment we got about metals and diesel. So, you were talking more specifically about a metals study, but we also have air pollution and diesel biomonitoring programs. Is there a cross-over in the metals effort to work on the same --

DR. KATHLEEN ATTFIELD: I might have to defer to my colleagues that work more closely on the AB 617 studies, but there's the VOC panels and the PAH metabolites that are also being assessed in the studies that will complement the results from the metals.

ACTING CHAIR McKONE: Okay. Because I thought it was an interesting point that metals should be -- might be an important additional marker for efforts we already have underway looking at diesel exposures.

DR. KATHLEEN ATTFIELD: Definitely.

PANEL MEMBER SUÁREZ: I have just a comment here, so I'm looking at one of the documents here. This one for the returns of the results, in which you -- you're providing here. I suppose this would be the actual value the participant has, then the middle concentration in the study in the United States. This is useful, but I think it's a little hard for some people -- a lot of people to understand what the 90th percentile means for instance. I've seen some very good ways to do this with a more

graphical way, in which you have like a continuum of lines being lowest concentration here, just a line like that. And then within that, you'd say, well, your concentration was this and it's right here, so they can actually visually see where in the distribution they are.

Just making things a little more visual, I think you can convey this information, perhaps even more, in a more simple way to do that. So it's great that you're doing the results -- the returning the results. And I think there could be little tweaks there that would make it a little bit more understandable, I think, for all audiences

ACTING CHAIR McKONE: I mean, we're running a little short on time, so I want to make sure we take any comments or questions that have come in online or if there are comments from the audience or questions?

If not, the Panel can resume.

DR. KATHLEEN ATTFIELD: So I had a comment.

ACTING CHAIR McKONE: Yeah, please.

DR. KATHLEEN ATTFIELD: Just back to the comments about the DERBI platform. We are trying to plan for a -- one of these intra-program pilot projects of doing a test run of using that platform and to see and look at responses like -- you know, internally before we start moving externally. So that should complement the

evaluation efforts that they're embarking upon.

ACTING CHAIR McKONE: McKenna, we do have an online comment?

McKENNA THOMPSON: We do. Okay. We had an online comment that reads, what, if any, information for clinicians will be provided with participant's results? Will there be a component of the study that assesses how people can talk to their doctors about their results, particularly if they're above the level of concern.

REBECCA BELLOSO: Yes. So if participants have results above the level of concern, we do include a phrase within the notification letter that's encouraging them to approach their primary care doctor or a physician. But we also do offer with our studies, the opportunity for them to speak with physicians that are part of the study team. So, not only part of the study team, but there's also physicians that are working with our -- with our agencies, so we do offer that.

McKENNA THOMPSON: And we also have a hand -- we have a hand raised online. Jianwen has a comment.

I'll go ahead.

DR. JIANWEN SHE: Sorry. That's accidentally. You can lower -- I can lower it. Yeah, sorry about that.

McKENNA THOMPSON: Never mind.

ACTING CHAIR McKONE: Okay. Open for anymore

questions, comments.

We're close to 2:05, so I think we will -- Dr. Luderer, go ahead.

PANEL MEMBER LUDERER: I mean, I just had a quick comment regarding, you know, because getting medical, you know, input into if people have questions about that. And I would -- another suggestion I would have is that, you know, there are several academic, within the UC system, occupational and environmental medicine clinics, that, you know, at our clinic at UC Irvine and I know at UCSF also, they see patients with all kinds of, you know, environmental and occupational exposures, and that would be a resource you could also refer people to.

REBECCA BELLOSO: Thank you.

ACTING CHAIR McKONE: So now we've reached a point where we've finished our first two presentations and we're at a break. We're going to take -- I think, we're at -- yes, we are going to take a 10-minute break and then be back at 2:15 promptly, so that we can begin again.

(Off record: 2:05 p.m.)

(Thereupon a recess was taken.)

(On record: 2:15 p.m.)

ACTING CHAIR McKONE: We had with one slide and then we'll move to the program for the afternoon.

DR. AALEKHYA REDDAM: We just wanted to point out

for people who are interested in our publications -- and I'm just going to share my screen about where you can find them on our website. But I think if you navigate to our Biomonitoring California website, you go to our "Resources", and then under "Publications", we have a list of all our recent publications. And the first one was I think we spoke very briefly is the -- our latest protocol on arsenic speciation. So I just wanted to highlight it for people who are interested in it.

Thank you.

ACTING CHAIR McKONE: Okay. With that, now we're going to move into the next set of presentations. And in our next agenda item, we're going to be hearing from two speakers. Both of them are going to be talking about different aspects of biomonitoring for air pollution.

Our first presenter is Jeff Wagner. Jeff is the Chief of the Environmental Health Laboratory Branch at the California Department of Public Health. Today, he will be presenting on the analysis of VOCs, PAHs, heavy metals, and particle data collected in the FRESSCA-Mujeres project.

(Slide presentation).

DR. JEFF WAGNER: All right. Well, thank you very much. I -- as mentioned, I'm going to be talking about some of the air components of the FRESSCA-Mujeres

project. In the, unfortunately, small type, you can see that this is a great team effort between many different agencies, including CDPH, but also Tracking California from PHI, Central California EJ Network, OEHHA, IIT out in Chicago, an advisor from LBNL, and also great collaborators from UCSF.

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DR. JEFF WAGNER: Okay. So as an overview of the study, I just wanted to define again for people that FRESSCA stands for Filtration for Respiratory Exposure to Wildfire Smoke from Swamp Cooler Air. And swamp cooler is otherwise known as evaporative coolers. And this project was initiated by the community, who had identified the risks from summer wildfire events with their residents who use evaporative coolers, which is a very affordable way to cool down homes in hot environments -- hot dry environments in the summer. Unfortunately, they bring in a ton of outside air, which you don't really want to do, when there's a wildfire smoke event.

So from that, we put together a team that was designed to both provide a solution, as well as evaluate those solutions, how effective they were, and the community participants' exposures. And all these participants by design had evaporative coolers in their

homes. So we provided -- first of all, designed and then provided DIY filters for those evaporative coolers, as well as indoor air cleaners. And that was kind of the approach we took to provide cleaner indoor air -- cleaner cooler indoor air.

So those filters from the evaporative coolers were analyzed both for their particulate loading as well as metals, and now with our collaborators at Berkeley, looking potentially at cocci. We also incorporated low cost PM sensors and a variety of air measurements both indoor and outdoors at these residences. And then ultimately, we've begun some of the results return, which I'll mention later in the presentation at community meetings.

A huge part of the study, which I know all of you will be most interested in is in the biomonitoring, so urine samples that were taken, analyzed for chemical biomarkers. There's also saliva samples and some of our partners are working on biomarkers of stress.

And I just wanted to mention on the left, you see some of our great team out there putting some of these DIY filters on the evaporative coolers. And then below that, a typical indoor air sampling setup, you see also on the left -- lower left, the indoor air cleaner like a typical indoor air cleaner that was provided, along with the

sampling pumps. And then in the lower right, or the most lower -- my most lower right picture is a PurpleAir sensor with the tiny little passive particle sampler above it.

[SLIDE CHANGE]

DR. JEFF WAGNER: So in order to do this somewhat ambitious project, we assembled three different funding sources, which you can see in this diagram, the sort of overlapping collaborators that came from that. And then that in turn was able to fund and enable this huge variety of measurements that I just mentioned. And I just kind of wanted to visually show what part -- what proposals all those measurements corresponded to.

[SLIDE CHANGE]

DR. JEFF WAGNER: So the study design involved two and a half months primarily of indoor/outdoor PM data for 50 homes that all had swamp coolers, in Kern, Fresno, and Kings counties, primarily two study areas, one in Kern and then one around the Coalinga area and Fresno/Kings. And 50 percent of those homes were provided EC filters, 50 percent had the ECs, but no filters, and then all homes were provided air cleaners. And the diagram in the bottom just kind of highlights the facts that the EC filters are just by design going to work only on outdoor exposures, like wildfire events or other high outdoor PM events. Whereas, the indoor air cleaners can work on pollutants

that are generated both indoors and outdoors.

So in addition to this kind of two and a half month assessment, we did short-term airborne chemical samples timed with urine samples. And the ideal would be to target those during a major wildfire event in the study area. However, during this study, there were no major wildfire events. So, our default was to do it during the last week of the study and that's what ended up happening.

[SLIDE CHANGE]

DR. JEFF WAGNER: A little bit closer look at the air methods. As I may have mentioned for the continuous low cost PM2.5 sensors, these are PurpleAirs that we ended up using, and we did a co-location study ahead of time. And those worked pretty well for the study.

At the same time, we used passive PM samplers, which is a very different but complementary technique, which just takes one integrated sample over the entire period. They're analyzed with scanning electron microscopy. You get a thousand individual data sets per sample, corresponding to individual particles. And that can be used to give you PM size distributions, PM2.5, PM10, as well as major particle types kind of attributed to their likely sources.

For the short-term samples that were done in the final week timed with the urine, we took air samples with

pumps of metals, VOCs and PAHs. And those are three separate sampling setups that could be done and sent to the individual analyses, which in this case were ICP -- ICP-MS for the metals and then two different setups for GC-MS for the VOCs and PAHs, the gas phase compounds.

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DR. JEFF WAGNER: So a quick look at some of the results. For the passive PM, this is a look at indoor/outdoor ratio, which is obtained from the co-located indoor/outdoor samples for individual homes.

And the main point I wanted to convey with this slide was just that for PM2.5, in all these homes, the indoor/outdoor ratio was less than one slightly, to a lot of -- to which we attribute the indoor air cleaners. We didn't see a huge difference between the homes that had the EC filters, just because we think that there weren't -- there were no wildfire events of any significance during this time.

[SLIDE CHANGE]

DR. JEFF WAGNER: This slide adds the PM10. And you see that, in general, the indoor/outdoor issues were even lower, averaging about 0.4 across all homes. And that makes a lot of sense to us, based on the typical collection efficiency of the filters both on the ECs and

on the indoor air cleaners. They tend to work better for bigger particles in the range of two and a half to 10 microns. There's also somewhat of an effect of the building envelopes themselves tend to filter out the biggest particles. Although, these were not -- these were often trailer homes. So we're not sure about that building envelope filtration.

[SLIDE CHANGE]

DR. JEFF WAGNER: But this, in turn, was interesting to us, because it, as I'll show in the next slide here, the crustal component of this PM was just by far the biggest component that we measured with the passive samplers. And those tend to be coarse particles. And we had participants report back that they felt like the interiors of their homes even were qualitatively cleaner using these interventions, just because there's so much dust in this area. And as many of you know, the coarse component of PM10, though not as strong an association with health effects, does have an association with various respiratory health effects, including asthma.

You can also see in this picture the examples from the electron microscopy of some of the other types we found. So there's carbon rich particles which are comprised both of biogenic spores as well as vehicle emissions and smoke.

There's a sector we've associated with agricultural products that are rich in phosphorus, chlorine and potassium, such as fertilizers, salts, which were a very minor component, and another minor component that is nevertheless of interest is metals. This is a picture of a copper-rich particle.

[SLIDE CHANGE]

DR. JEFF WAGNER: And when you looked -- when I looked at the copper results across all samples, it was interesting. We found them in all indoor samples, but primarily in Kern County with higher levels. And that was the county where we found them outside as well. So because we were looking at individual particles, we could see that the copper was associated with chlorine and sulfur, which suggest a fungal or pathogen treatment for crops. And although, it is possible that it's also a consumer product that is used for indoor plants. The fact that we saw them outdoors to such an extent as you can see here suggests that they were an outdoor application and perhaps in Fresno and Kings counties where we didn't see them outdoors, that -- that suggests that they were not applied outdoors during the study period, but had been perhaps applied at a previous date and had accumulated indoors over time.

[SLIDE CHANGE]

DR. JEFF WAGNER: This is a look using electron microscopy, again at the swamp cooler filters themselves. And you can see just more qualitative evidence of their effectiveness of collecting PM. In this case, at this magnifications you're seeing mostly coarse PM. Those kind of crustal dust particles.

[SLIDE CHANGE]

DR. JEFF WAGNER: Now, look some of the data from the low-cost PM2.5 sensors. Those had the advantage of being able to take thousands of data points over time. And a really good example of what can be done with that is looking at -- in conjunction with the plug load loggers, which show whether the indoor air cleaners or the swamp coolers returned on at any given moment or turned off by monitoring the power draw. We could do a comparison of indoor PM2.5 when both the air cleaners and swamp coolers were both on compared to when they were both off. And this is a nice illustration of the effect of our indoor air interventions in a typical home.

[SLIDE CHANGE]

DR. JEFF WAGNER: You can also with the low-cost sensors see temporary transient spikes in PM, many of which we believe to be due to indoor events rather than outdoor events. But an exception would be in the section that's blown up from September of last year, you can see

this kind of bump in the outdoor concentration. And that did correspond to a minor wildfire smoke episode, I believe from the California-Oregon border.

[SLIDE CHANGE]

DR. JEFF WAGNER: Now, moving on to some of the short-term sampling. As far as the metals go, we measured across the typical range for an ICP-MS on the order of a dozen metals. But I'm showing in this slide the metals that were above detection limit in these homes. So iron was by far the most prevalent, which makes sense as a major component of soil and dust. It was much lower indoors, which is encouraging for all these homes with indoor interventions. We also detected manganese, copper, zinc and selenium.

And of all these, I only showed the OEHHA recommended exposure limit for manganese as being higher than what we found, but of the same order of magnitude. It was much higher for all the other metals -- or rather the REL was much higher and our -- the exposures were much lower than the REL.

[SLIDE CHANGE]

DR. JEFF WAGNER: So moving on to VOCs, the dominant compounds in these analyses ended up being the BTEX compounds, benzene, toluene, ethylbenzene, and xylene. The relationship between indoor and outdoor was

not consistent between compounds. Although, we're still finishing the data analysis for those. But that would make some sense since neither of our indoor interventions were targeted specifically at gas-phase compounds.

They did -- most of them did have a carbon layer on the filters designed for odor control. So we were hopeful, but we're still digging into that. There's some evidence that maybe those work over the short term but not so much over the long term. I should mention also that in homes where we detected rare -- relatively more rare VOCs, which were attributable to certain sources, we conveyed those in the results return, such as compounds which are found in nail polish, for example.

[SLIDE CHANGE]

DR. JEFF WAGNER: The polycyclic aromatic hydrocarbons measured indoors were dominated by the naphthalene compounds, but you can see perhaps a list going up to pyrene that we measured.

[SLIDE CHANGE]

DR. JEFF WAGNER: As far as indoor/outdoor ratios, again much the same for the VOCs. They tended to hover around 1, with some exceptions, but notably pyrene and we're looking into basically because the pyrene had such a low indoor/outdoor ratio that it looks like it has an outdoor source.

[SLIDE CHANGE]

DR. JEFF WAGNER: So I mentioned the community meetings and you heard about it earlier as well that we had in August that were targeted just on the aerosols, not the biomonitoring. And those were super valuable, not only to help clarify in-person what the packets represented as the packets are returned to participants, but also to communicate exposure, reduction strategies for any metals or chemicals that were detected in a given participant's home. And we also received a lot of valuable feedback about community concerns about things in their air, which will be very useful for informing our work in the future, I think, including things like local dust generation events due to agriculture and concerns about how to reduce VOC exposures from cleaning products in the home.

[SLIDE CHANGE]

[SLIDE CHANGE]

DR. JEFF WAGNER: So in conclusion, our FRESSCA and FRESSCA-Mujeres projects evaluated indoor air interventions to improve both air quality and thermal stress. And I feel that we were able to use an ideal combination of passive samplers, low-cost sensors and speciated chemistry samples to give a real balanced amount of information.

In general, we found that the PM was lower indoors with their combined interventions of air cleaners and EC filters, particularly perhaps due to dust reductions. The highest metal was iron, again lower indoors with other metals detected.

For the gas-phase compounds, BTEX and naphthalene were the most abundant species. And then just again, these community discussions were really valuable and will inform our future work.

[SLIDE CHANGE]

DR. JEFF WAGNER: And thank you for your time.

ACTING CHAIR McKONE: Thank you very much. We now have roughly five minutes for questions first from the Panel and then from the audience. So are there Panel members, I can't see online, or Panel members here on Zoom?

ACTING CHAIR McKONE: Jenny, yes, go ahead.

PANEL MEMBER QUINTANA: Hi. Jenny Quintana. I just had a clarifying question about you had a slide about the reduction in indoor PM in a situation where it was -- one, it was both for operational and then both were not operational. So, yes, air filters on and yes swamp cooler filter was in place. And then no swamp cooler filter and air condition -- and air purifier off. But did you have data on where the -- there was no filter on the swamp

cooler to make that comparison. So basically, you felt like the out -- the filtration was not useful from the external filtration?

DR. JEFF WAGNER: So, yeah --

PANEL MEMBER QUINTANA: You had one condition on that slide that I was confused at, but you didn't seem to have all the conditions for that PM -- indoor PM.

DR. JEFF WAGNER: Right, so -- yes, that is a good point and we -- we're actually still looking into that condition of when the swamp cooler was used a lot, but without a filter, and whether you would expect that to have like a negative impact on indoor concentrations. So, yes, I agree, and that's something we're looking into right now. I can't remember if there's another part of your question.

PANEL MEMBER QUINTANA: No, that was it.

DR. JEFF WAGNER: Yeah. Thank you for that.

PANEL MEMBER QUINTANA: Yeah, and thank you for this important work too, especially using DIY kind of interventions, which might be scalable. So did you collect any other -- did you collect indoor dust from the home as well or no? Besides the passive sampler, did you talk any bulk samples of --

DR. JEFF WAGNER: No. No, we did not. We did not. And I don't think I mentioned that there was also

some associated survey information collected though with this study, that I wasn't directly involved in, but I know part of that was targeted on willingness to pay, because you mentioned the DIY aspect of this. And I should have mentioned also that the goal of this solution was to be both effective, but also somewhat affordable, and being able to be implemented by the communities directly with tools they could easily attain.

So, I believe we arrived at something like one to two hundred dollars for an installation, which may be above. It's affordable for some, but not others, so that's not a caveat I should point out.

PANEL MEMBER QUINTANA: Thank you. I think Carl had a --

ACTING CHAIR McKONE: Carl.

PANEL MEMBER CRANOR: Yes. Thank you. Interesting study. What I would be interested in is the concentrations, let's say, of PM2.5, both outside and inside? Where do those stand vis-à-vis say CalEPA health standards or U.S. EPA health standards? Can you address that? I mean, do you -- you've got -- you have interesting inside/outside comparisons, but what are the health consequences one way or the other.

DR. JEFF WAGNER: Yeah. I'm wondering if I can succeed in resharing this slide.

Yeah. Thank you for that question. The closest that I showed was this slide where there is a -- the 24-hour current, 24-hour standard, and the current annual standard on this plot. And you can see that the 24 hour -- the scale on this graph is between September 20th and September 27th. It's too small to read. And it appears this was the highest episode that we saw. And it was not exceeding any 24-hour standards during this time. And we only ran for two and a half months, but I just put the annual standard as a comparison.

That's the question also that we're going to have to dig into deeper as we're writing our manuscripts at this point, is if this holds true for all locations, because the two study areas did span quite a wide range with a lot of heterogeneous exposures in that part of the valley. So I appreciate your question and we'll be comparing to the -- both the State and federal standards.

PANEL MEMBER CRANOR: Thank you.

ACTING CHAIR McKONE: Any questions?

PANEL MEMBER PADULA: I have two questions. The first is for the PAHs in urine and air. I was wondering if you've done comparisons between them and if the temporality is close?

DR. JEFF WAGNER: Yeah. That's definitely a challenge here. I believe, and somebody in the room can

correct me if I'm wrong, but I believe we took definitely first void in the morning on urine, and then overnight air sampling, and then I believe there was one before going to bed that night. So, we -- we're hopeful. The PAH results should be ready pretty soon from the urine, so, yeah.

Thank you.

PANEL MEMBER PADULA: My second question was I was also curious -- I think this is a really interesting and great study. I was wondering if you had any instructions for when to turn the indoor air filters on and if -- it sounded like you had a way of knowing when they were on by the electricity pull and if there was any -- if you needed to supplement for electricity bills or if that's a barrier for future studies?

DR. JEFF WAGNER: Yeah. That's a really good question. Since we have power draw data and I presume maybe we have electrical rates that's -- yeah, that would be -- that would be a good thing to include for the economic feasibility for residents for sure. And I've seen the instructions that we're provided to residents for putting things on and buying the materials, but I don't recall if they were more detailed than like if there's a -- if there's a wildfire smoke event, then yeah.

It's been an interesting dialogue actually, because that was definitely the original intent is to use

them only when there's a wildfire smoke event. But I think it was pretty popular with participants like other times too, especially if it's a dusty place, yeah.

ACTING CHAIR McKONE: And then I think Jenny has a question. Your hand is up.

PANEL MEMBER QUINTANA: Hi. I just wondered if the participants had similar home volumes and room volumes where the air filter was operated, because one thing we're struggling with with the filter intervention is do we give more air purifiers to people with larger homes or how do we kind of account for the volume that the air filtration unit will clean, and if you have any thoughts on that, I would love to hear them.

Thank you.

DR. JEFF WAGNER: Yeah. I definitely agree. We were doubling into the square footage data this week, to see if it would impact the indoor air cleaner effectiveness. Because as you say, that's a key component. I will say that the vast majority of these homes were manufactured homes, but I don't think a hundred percent of them were. So, yeah, we'll have a little bit of data to look at that spectrum.

PANEL MEMBER QUINTANA: I also wondered about window opening behavior. So if you had any measurements such as CO2 or anything that would help shed light on

that, or if you had any thoughts about recording that kind of behavior in terms of if the windows were open or not, or --

DR. JEFF WAGNER: Yeah. No, I think that's a very key component as well. And I think there was one survey question, but that can't really capture temporal variability. Some data, we were just looking at, there was a moment in this home we were looking at where the indoor air PM2.5 concentrations rose suddenly up to equal the outdoor air concentrations for like a half hour. And that spoke to me if some kind of window or door opening event. I wonder if that could be done with just the PM data with a -- with a co-located indoor/outdoor data.

PANEL MEMBER QUINTANA: Interesting.

ACTING CHAIR McKONE: I'd like to take a moment here to see if there are audience question or questions online. And then we'll come back. We have more time for in-depth discussion.

Nothing online. Okay.

Any audience questions at this point. And then we'll open it up to the audience again after we kind of go now into our more official deeper dive discussion and questions.

DR. JEFF WAGNER: Thank you.

ACTING CHAIR McKONE: No, you're still on.

(Laughter).

ACTING CHAIR McKONE: You're the subject of --

DR. JEFF WAGNER: Almost got away.

ACTING CHAIR McKONE: This is the time we talk with the detailed discussion after the talk, whereas before, we waited till both talks were done.

More questions?

Yes.

PANEL MEMBER LUDERER: I'm not sure this is somewhat of a deeper dive. It's related to the PAHs. So, you know, I was interested in the fact, that the naphthalene, you know, compounds were high in the indoor -- measured indoor air, but then when you look at the indoor versus outdoor, they were not the highest. And I'm wondering if you had some thoughts about, you know, what the sources of the compounds that were higher -- the PAH compounds that were higher in the indoor, you know, versus outdoor air? I think it was phenanthrene, acenaphthalene, I think. I can't really tell the colors exactly, but yeah, those two for sure -- oh, and fluoranthene -- no, not fluoranthene. Fluorene.

DR. JEFF WAGNER: Yeah. No, that's a very good point. And I only noticed it as jumping out for the pyrene as being a real outlier as far as indoor/outdoor, but I do expect especially from cooking to have some PAH

sources indoors for sure. Yeah. No, it's -- the short answer is we haven't gotten it yet, but I would like to do some PAH specific source identification. There's also quite a bit of petroleum industry down there as well. So I think that's relevant as well.

ACTING CHAIR McKONE: I had a question about Purple -- oh, were you -- yeah, about the PurpleAir. And you had those indoors, right?

DR. JEFF WAGNER: Yes.

ACTING CHAIR McKONE: Did you have any outdoors --

DR. JEFF WAGNER: Yes

ACTING CHAIR McKONE: -- at the same -- so you had it indoor and outdoor, right?

DR. JEFF WAGNER: Yeah. Although, it wasn't the same kind of coverage. It was -- it was basically like one outdoor per city. And we had to measure how many kilometers it was from the indoor. Yeah. They were considerably more difficult to deploy, I know, because of power sources, and shelter, and that sort of thing.

ACTING CHAIR McKONE: Yeah. And did you calibrate the PurpleAir? Again, coming -- there's -- I know people who've calibrated them and they worked fairly well, but it's useful to know --

DR. JEFF WAGNER: Yes.

ACTING CHAIR McKONE: -- because they have some variability, but on average, they do pretty well.

DR. JEFF WAGNER: Yeah. That was definitely an interest of ours. And I think we're going to be submitting a manuscript just on that part, because it was so complex. We initially thought that we would need to co-locate with the federal reference monitor. But then when we thought about the point of the study is not really -- the point of the study is indoor/outdoor ratio. So it was more important to make sure that they all agree with each other. The precision, in other words, was more important to us than the accuracy. But even that was a challenge, because we had something like 80 PurpleAirs. And we have a garage at CDPH, where that was not a problem, but getting WiFi access for that many units at the same time was unexpectedly challenging to have 80 WiFi connections in the same room.

So we're planning a study right now in Oakland that's going to have maybe four or five times that. And we're just really struggling with how are we going to run this many WiFi connected devices in the same place. What we did for this current study is we did three batches with some overlap between individual units and then regressed the mean of all 80 sensors against each individual one. And we did that pre- and post-study. I think that they

performed so well, as far as consistency over -- granted only two and a half months, but the main utility of that was identifying ones which were just never going to perform. They were just bad units from the moment they came out of the box, and there was a few of those. So it was real useful to not learn that after this study was over.

(Laughter).

ACTING CHAIR McKONE: I'm sorry. Now, that we're on PurpleAir, if people are cooking greasy foods and frying, did that -- did you see that show up?

DR. JEFF WAGNER: Yeah, I think all those spikes -- a lot of those spikes in that one plot were definitely cooking. And because this is a somewhat outdoor focused study, our colleagues at IIT are working on automated algorithms to identify very short-term spikes and do a separate analysis without them, with the assumption that that's a -- that's a screen for indoor generated exposures.

ACTING CHAIR McKONE: Other questions, discussion points, comments, on the Panel.

José.

PANEL MEMBER SUÁREZ: I have a question about the VOC's table for the chart that you show there. The first question is are there significant differences that -- were

there statistically significant differences? Did you have enough power to look at differences? I see that probably benzene had the biggest difference between the outdoor air versus the indoor air. So I see --

DR. JEFF WAGNER: I'll see if I can get that slide up.

Yeah, so I believe this is about -- oh.

PANEL MEMBER SUÁREZ: I think it may be 17 perhaps.

DR. JEFF WAGNER: Thank you.

PANEL MEMBER SUÁREZ: There, yeah.

DR. JEFF WAGNER: Apologize for the small view. Yeah, so you're speaking of the relatively low indoor/outdoor ratio for benzene.

PANEL MEMBER SUÁREZ: For benzene, yeah, there's like a big difference between outdoor air versus the indoor air there. Does that really suggest a statistically significant difference between them?

DR. JEFF WAGNER: I -- judging by the error bars, I would believe that the -- that it is not very significant, but we have yet to compute those stats. So I think what we will be planning to do would be to correlate those kinds of statistics with molecular weight, as well as typical indoor and outdoor sources. I mentioned a little bit before about the carbon filters that are on --

actually, we found filters for both the EC units and the indoor air cleaners ahead, like an odor control layer, which has some potential to capture some of these compounds. And our collaborators at IIT are also doing a lab study.

Unfortunately, I can't recall if benzene was one of the most highest catcher efficiencies, which would be one explanation for that relatively low indoor/outdoor ratio. But the problem with that type of activated carbon medium in general, is that things that adsorb to the media tend to desorb from the media eventually. They don't stay there forever. So -- but yeah, I appreciate your question. And, yeah, we will be looking at it.

Thank you.

PANEL MEMBER SUÁREZ: Yeah, we'd want -- so if you'd remind me, there were a total of 29 homes that were -- received the intervention, right? And they were divided how many in each one of the groups again?

DR. JEFF WAGNER: So for the EC filters, it was roughly -- it was roughly half and half for the 50 homes.

PANEL MEMBER SUÁREZ: Okay.

DR. JEFF WAGNER: Yeah.

PANEL MEMBER SUÁREZ: I'm just looking into the -- what you're presenting here. And maybe I'm overlooking into -- looking a little too hard at this, but

it's kind of interesting. So if you look at all the trends there and all of these different VOCs, the concentrations are highest outdoors and lowest with the indoor and the EC filter, with one exception, which is styrene. You see styrene is actually highest with the swamp cooler filter, plus the indoor air versus the indoor with just the indoor air filtration versus outdoors. It's very small, but it's kind of striking that it goes in the opposite direction of all the other ones.

DR. JEFF WAGNER: Yeah.

PANEL MEMBER SUÁREZ: And then, if you think about it -- and I wonder what type of filters they have. A lot of the filters do have some styrene in them, different plastic components into that --

DR. JEFF WAGNER: Yeah. Yeah.

PANEL MEMBER SUÁREZ: -- that I think tend to be relatively stable actually, unless there's heat involved. And so it makes you wonder a little bit, you know, if it's outdoors, and if it's hot, then they'll be releasing some. On the contrary though for that is that maybe you do see a little gradient there, but perhaps it doesn't -- the amount of release is so small, you're just tracking that. Maybe there was the use of something that included styrene, like in the filter or something like that, and maybe not necessarily a filter.

DR. JEFF WAGNER: Yea. It is a -- it is a pretty small difference statistically, but I appreciate your point that some of the materials used in those filters, we don't want -- we don't want those to become pollution sources. We are particularly concerned about filters that may get wet, in defective evaporative coolers, and then become a mold source. So that was one of the reasons we looked under the microscope at the filters to see if there was any evidence of like hyphae and like extreme mold growth. And we didn't see that luckily. Although, we did see a few units that were pretty wet.

They were mostly notable, because there was a lot of like lime and calcium deposits on the filters from all that water, so...

PANEL MEMBER SUÁREZ: Well, thank you.

ACTING CHAIR McKONE: All right, unless there are burning issues, we have one audience comment.

UNIDENTIFIED SPEAKER: Jenny online.

ACTING CHAIR McKONE: Oh, I can't see. So Jenny, you have a question.

PANEL MEMBER QUINTANA: Just a very quick one, which is you -- just when you left the participants when they exited the study, did you leave them the units and how many extra filters did you leave with them just in terms of participating in the study?

DR. JEFF WAGNER: So, for the -- for the swamp cooler filters, I believe that part of that community meeting was an exchange where they would get a new filter or, I'm sorry, can somebody correct me, I think that was for the indoor air cleaners, not the swamp cooler filters. I know that every participant received new filters on the way out. I think Rebecca is coming up.

And then we did have to take back the PurpleAirs, but we are working with the community to deploy PurpleAirs outdoors -- some of those units permanently outdoors.

REBECCA BELLOSO: Yeah. So all the participants that attended the community meetings received a replacement filter for the air purifiers as a -- as an incentive. And then we've left some replacement filters for swamps coolers with our community partner, if they were to request that, but we've also given them information on where to purchase.

PANEL MEMBER QUINTANA: Thank you.

DR. JEFF WAGNER: And we did hear anecdotally from our partners that there was -- there was a smoke event in the Coalinga area, unfortunately, after our study was over. But they observed some of the residents going out and deploying these swamp cooler filters, so it was encouraging.

ACTING CHAIR McKONE: Okay. Well, thank you.

Now, we're going to move on to the second presentation in this section. Our next speaker is Kimberly Valle. Kimberly is a doctoral candidate in public health at the University of California, Merced.

Today, she will be presenting on urinary biomarkers of response in relation to air pollutants in adults and children in the San Joaquin Valley.

(Slide presentation).

KIMBERLY VALLE: Hello, everybody. Today, I'll be presenting on the preliminary results for urinary biomarkers of response in adults and children from the San Joaquin Valley.

One second.

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KIMBERLY VALLE: Great. I would like to mention that the content is solely the responsibility of the authors and does not represent the official views of the collaborators involved. The authors declared no conflict of interest and this research was supported by grants from the California Air Resources Board and the California Office of Environmental Health Hazard Assessment.

[SLIDE CHANGE]

KIMBERLY VALLE: This work was made possible through the collaborators and support of these organizations.

[SLIDE CHANGE]

KIMBERLY VALLE: And I would like to begin by providing some background on air pollution. I'm pretty you all are very familiar with the topic, but just some general information that exposure to air pollutants such as particulate matter, nitrogen dioxide, and ozone have been associated with adverse health effects. The San Joaquin Valley is an area burdened by high air pollution. And indoor air quality is especially important, because children and adults spent most of their time indoors. Several factors contribute to poor air quality and that includes smoking, cooking, the use of candles or incense, poor ventilation, and of course the infiltration of traffic-related or other outdoor air pollutants.

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KIMBERLY VALLE: So today, we have heard about BiomSPHERE, which is a biomonitoring component of SPHERE. And as a friendly reminder, SPHERE is the San Joaquin Valley Pollution and Health Environmental Research Study. And this is the study where -- dedicated to the environmental measurements and adults were eligible participants, included adults 18 years or older with a child between the ages 3 to 13. This resulted in participant -- 64 parent-child pairs being part of the study. They were residents of Stockton and Fresno. Study

participants included 12 families in Stockton and 52 families in Fresno. They were Spanish or English speakers and the sampling took place between February through November of last year.

For BiomSPHERE, which of course is the biomonitoring component of the study, 64 parent-child urine samples were collected for a subset of eight families. Daily urine samples were collected over four consecutive days. Now, the urine -- the urinary sample measurements included biomarkers of exposure, VOCs, PAHs, tobacco in smoke, which I will not be talking about today. But I will be talking about the biomarkers of response indicating oxidative stress, inflammation, and airway injury.

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KIMBERLY VALLE: The biomarkers of oxidative stress included 8-isoprostane. And 8-isoprostane indicates like lipid peroxidation caused by reactive oxygen species. High levels of 8-isoprostane reflect oxidative stress. And the other biomarkers of oxidative stress is 8-OHdG, which reflects DNA damage. Increased levels of OHdG have been associated with oxidative damage and genetic material.

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KIMBERLY VALLE: Prostaglandin E2, it's a

biomarker of inflammation and may indicate the body's response to environmental stressors. And high levels of air pollution exposure have been associated with increased inflammatory responses.

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KIMBERLY VALLE: Clara Cell Protein 16, also known as CC16, is a biomarker of airway injury to the respiratory tract lining. Now, several studies show that long-term exposure to air pollutants damages CC16 producing club cells, leading to decreased levels of CC16, which might result in decreased lung function. However, other studies have demonstrated that increased concentrations of CC16 can also indicate airway injury, due to short-term air pollution exposure. So there's this -- according to the literature, there's this information that long-term exposure may lead to lower levels of CC16, but short-term exposure leads to increased levels.

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KIMBERLY VALLE: So for -- what I'm presenting today are the study objectives, which were to examine the distribution of four urinary biomarkers of response in adults and children from the San Joaquin Valley, to evaluate the association of the biomarkers with measurements of air pollutants in participants' homes, and

to characterize the temporal variability in the biomarker measurements over several days.

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KIMBERLY VALLE: In terms of the study design for the urine samples, this included 64 parent-child pairs. The urine samples were morning samples and most of them were first morning void. For a subset of eight families, samples were collected over four consecutive days and urine sample measurements included 8-isoprostane, 8-OHdG, PGE2 and CC16. All biomarker measurements were adjusted for specific gravity and log2 transformed.

Now metabolite concentrations were specific gravity adjusted to account for urine dilution. And we used specific gravity instead of creatinine to adjust concentrations, because age has a significant impact on urinary creatine levels.

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KIMBERLY VALLE: So the urine -- the urine samples were analyzed using ELISA kits. And they were analyzed by the Holland Lab at UC Berkeley. And each biomarker was evaluated using their respective ELISA kit, as we see on screen.

[SLIDE CHANGE]

KIMBERLY VALLE: Now, for the indoor air monitoring, average computed 12 hours prior to the urine

sample. And here what you see on screen is a picture of the indoor cart that was deployed. We used a SENSIT RAMP from SENSIT Technologies to collect real-time indoor air quality data. And we collected information on -- we collected data on nitrogen dioxide, ozone, and particulate matter. For the analysis, the air pollutants were log2 transformed.

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KIMBERLY VALLE: Now, this table presents the demographic characteristics of the parents or the guardians. And now, I want to point out that there -- the number is 63, because there was a participant that provided a very low volume. And therefore, when looking into the urine samples, we were able to analyze 63 of them. So here we have the demographic characteristics for the participants, which included nearly equal distributions, Spanish and English speakers. Most participants were female. Most participants were Hispanic or Latino. Most of the participants were the parent of the child with a mean average of 42 years old. Most participants have not graduated from high school, and the family annual income was up to $30,000.

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KIMBERLY VALLE: Now, this table presents addition -- sorry, this table presents the demographic

characteristics of the children and similar as the parent. We had two children who provided very little volume of urine. Therefore, we were not able to complete the analysis. So the -- we almost had an equal distribution of male and female children. The average age of the child was roughly nine years old. And roughly 60 percent of the children were in the BMI category of being overweight or obese.

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KIMBERLY VALLE: This figure presents the distribution of oxidative stress biomarkers in adults and children. To the left, we see the levels of 8-isoprostane and to the right, we see the levels of OHdG. Now, I do want to mention that they each have their different -- their respective values on the Y axis. And both biomarkers had it in a hundred percent detection rate in adults and children. We conducted a t-test to evaluate the differences between adults and the children, and we observed no significant difference in biomarkers of oxidative stress among adults and the children.

[SLIDE CHANGE]

KIMBERLY VALLE: Now, this figure presents a distribution of PGE2 and CC16 in adults and children. To the left, we have the levels of PGE2, and to the right, we have levels of CC16. Again, they have different values on

the Y axis. And for the adults, both biomarkers had 98 percent detection rate. However, for the children, they had a hundred percent detection rate. We conducted a T test to evaluate the difference for the adults and the children. And PGE2 was significantly different in adults and children with children having higher levels of PGE2, while CC16 did not statistically differ from the adults or the children.

[SLIDE CHANGE]

KIMBERLY VALLE: Now, previous scientific findings have explored the relationship between the four biomarkers in age and BMI. Although, the results are not displayed here, we did not observe a significant association between the biomarkers and age or BMI. Now, we did investigate the sex difference among male and female children. And that is what is displayed on screen. And this figure presents signif -- the significant mean difference in biomarkers of oxidative stress and airway injury in children. So females -- female children had higher levels of OHdG and female children have statistically significantly lower levels of CC16.

[SLIDE CHANGE]

KIMBERLY VALLE: We evaluated the short-term temporal variability of the four -- of the four biomarkers of response and this was the analysis conducted with the

subset of families which provided samples over four consecutive days. And we observed higher within-subject variability compared to between subject variability among adults and children for the biomarkers of oxidative stress and inflammation. However, we observed higher between subject variability compared to within-subject variability among adults and children for CC16.

These results suggest that while 8-isoprostane, 8-OHdG, PGE2 levels fluctuate considerably within individuals over time, CC16 levels are more stable with greater variability in participants.

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KIMBERLY VALLE: Now, in summary, so far, there was no significant difference among parent-child pairs for biomarkers of oxidative stress and airway injury. PGE2 was higher in children compared with adults. Female children had higher levels of 8-OHdG compared to male children. Female children had lower levels of CC16 compared to -- compared with male children. And there was higher within-subject variability compared with between subject variability among adults and children for biomarkers of oxidative stress and inflammation. Now, there was higher between subject variability compared with between -- within-subject variability among adults and children for CC16.

[SLIDE CHANGE]

KIMBERLY VALLE: We investigated the relationship between the biomarkers of response and indoor air quality.

[SLIDE CHANGE]

KIMBERLY VALLE: And here, we have on screen a table that shows -- that shows the indoor air quality measurements for the participants 12 hours prior to the urine collection. And I do want to point out that these are 12-hour averages, which make it difficult to compare the national air quality standards, especially because we're also focusing on indoor, but I do want to get your attention to the levels of PM2.5, which are very high. And the 24-hour average national air quality standard is 35 micrograms per cubic meter, but we do observe that in the Central Valley. We have families with 12-hour averages that reach above 90 micrograms per cubic meter.

[SLIDE CHANGE]

KIMBERLY VALLE: Now, we conducted linear regression models and we observed that a twofold increase in nitrogen dioxide exposure was significantly associated with a 2.4 increase in adult urinary PGE2 concentrations. And we also observed that a twofold increase in ozone was significantly associated with a 2.6 increase in adult urinary CC16 concentration. So among the children, we observed no significant associations between the indoor

air pollutant and the biomarkers of response.

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KIMBERLY VALLE: So in summary, few studies have examined these biomarkers in communities disproportionately impacted by air pollution. None have examined short-term temporal variability. Among adults, we found positive associations between indoor nitrogen dioxide levels and PGE2, and indoor ozone levels and CC16.

No significant association between air pollutants and the child biomarkers were observed. And except for CC16, the higher within-subject variability suggests that single measurements may not characterize long-term oxidative stress or inflammation status. And the high short-term variability could point to impacts of short-term exposures, although we did not observe the association between the measured air pollutants and response biomarkers in children. Additional studies are needed to better understand the nuances and utility of these biomarkers as indicators of air pollution exposure and morbidity.

[SLIDE CHANGE]

KIMBERLY VALLE: Now, there are additional extensive laboratory measurements. Here, we see a table of the additional laboratory measurements, where they're being analyzed and the status of each laboratory analysis.

So the additional laboratory analysis include VOCs -- urinary VOC metabolites, urinary PAHs metabolites, cotinine, PAHs in air and VOCs in air.

[SLIDE CHANGE]

KIMBERLY VALLE: The next steps are to evaluate the biomarker measurements in relationship to: urinary biomarkers of VOCs, PAHs, tobacco in smoke; looking into outdoor 24-hour monitoring for nitrogen dioxide, ozone, and particulate matter; PAHs in the air indoor and outdoor; VOCs in the air; also looking into nearby traffic matrix -- metrics - apologies - and looking into levels of criteria air pollutants from community science, which are PurpleAir monitors and regulatory monitors over short term and long term, for example looking at days, weeks, a month prior to urine collection; and we do have questionnaire information on asthma diagnosis, medications. Of course, looking into these biomarkers in the questionnaire data.

[SLIDE CHANGE]

KIMBERLY VALLE: We would like to give thank you to our community partners for their support and contributions to this project. And also, we would like to thank and acknowledge the support of the contributors, which the list is --

[SLIDE CHANGE]

KIMBERLY VALLE: -- much longer, but, yeah, we

want to say thank you.

ACTING CHAIR McKONE: Thank you very much.

KIMBERLY VALLE: Yeah.

ACTING CHAIR McKONE: Once again --

(Applause).

ACTING CHAIR McKONE: Once again, we're going to begin with a short period of questions, more of a clarifying nature starting with the Panel and then going to the audience. And then after that, we'll have roughly 15 minutes for more in-depth discussion and questions.

So we can begin with the Panel and the questions to begin.

Oh, Jenny, go head. Once again my view is blocked.

PANEL MEMBER QUINTANA: Hi. Jenny Quintana.

I was just wondering if in your future plans that you thought you might try to figure out how many subjects would be needed, given the variability, like just to inform future studies. If they could one take one sample, would they need 10 times as many participants that kind of thing and I'm sure it varied by biomarker, but it might be very useful to help inform future studies.

KIMBERLY VALLE: Yeah. I think that's a good -- yeah, of course, I'm going to invite Asa as one of the PIs of the project to answer that question.

DR. ASA BRADMAN: Sure. Thank you. And Kimberly, I want to congratulate you. Great job. Yeah, I think that's a really good point. And kind of like with the EBDEP study where we had repeat samples for the 1-nitropyrene. This is actually the first study here that I think we could find that's ever been done actually looking at consecutive daily samples with these biomarkers, and both to better understand the short-term variability but absolutely we can use that to see what kind of power do we need to do a larger study. And so as far as we know, this will be a contribution to the literature in that arena.

PANEL MEMBER QUINTANA: Thank you. And I forgot to congratulate the speaker on a really well presented talk and very clear. Thank you.

KIMBERLY VALLE: Thank you.

ACTING CHAIR McKONE: Other questions from the Panel?

PANEL MEMBER SUÁREZ: I just have question.

ACTING CHAIR McKONE: Yes, José.

PANEL MEMBER SUÁREZ: I have a question that I'm still trying to formulate.

(Laughter).

PANEL MEMBER SUÁREZ: So CC16 -- so I see the use, right, of trying to have certain biomarkers track

health that would be easily collected via urine in this case, and you select a few different ones. CC16 seems to be kind of a challenging one, right? As you a very well mentioned, chronic exposure, I think you said it was lower concentrations and then acute exposures higher or vice versa. I can't remember which, which is very puzzling in itself, right, these associations?

So the way that I interpreted that with the associations that you found there, would those be mainly tracking the chronic exposures? So the associations they were finding with the positive associations in adults of CC16 would that be more reflective of a chronic effect of the exposure?

KIMBERLY VALLE: So we saw a positive association between like ozone levels and CC16. So in this case, I think the biggest thing is how we are defining exposure. So in this case, since we were looking at 12 hours prior to the urine sample collection, that would be a short-term exposure. So we would expect an increase. However, I do think that that is one of the most challenging aspects of CC16, which goes into the definition of what exactly -- what is the time frame of exposure.

I know for individuals with chronic conditions, CC16 levels tend to be lower, given that their respiratory health is not functioning as, for example, healthy

individuals. So I think this is when you get into like the nitty-gritty of the study design and how exactly are we defining or measuring exposure with these biomarkers.

PANEL MEMBER SUÁREZ: Yeah, which is a challenge in general with environmental health.

KIMBERLY VALLE: Um-hmm, Of course.

PANEL MEMBER SUÁREZ: You have a biomarker and if it's a very short half-life biomarker, then you're really tracking a short exposure.

KIMBERLY VALLE: Of course.

PANEL MEMBER SUÁREZ: So then you can say, well, maybe the day-to-day exposures are correlated with each other, maybe that short-term exposure, you know, has a correlation with the long-term exposure, but challenging with this particular part. And I thought it was interesting also your finding there with just the differences comparing children versus adults with inflammation markers. What are you thoughts?

KIMBERLY VALLE: Yeah, definitely. So this was a question that came up during my practice run that it's like why did children have higher levels of inflammation? And I did do a little bit of more back-end.

And then a few children did report that they had flu-like symptoms, so they had -- they were experiencing flu symptoms, so that can be an indicator of why we see

these high levels of inflammation in the children. Then other children reported that one of them sprained their arm and another -- like they were -- they had some type of -- they were feeling sick, so I think that can -- that provides information on why we saw increased levels of inflammation in children.

Now, going back to your question about the differences, I think that this is just a tiny little -- these are just results compared to like the big picture. I'm definitely interested in looking at these biomarkers and looking at the outdoor, the traffic-related air, traffic-related air pollutant information. A lot of the literature has looked at one week, one month, six months. And as part of the questionnaire information -- as part of the questionnaire, we do have information on how long they ended -- the participants have lived in their home. So I think that provides -- that can provide -- that information can provide a better picture of the exposures the children and the adults are experiencing.

PANEL MEMBER SUÁREZ: Um-hmm. Yeah, well -- which kind of brings up an important point, right? So you would either want to account for that or perhaps restrict the participation -- inclusion of the data of participants that have some sort of a chronic health condition or --

KIMBERLY VALLE: Definitely.

PANEL MEMBER SUÁREZ: -- an acute inflammatory condition for these differences.

Although, interestingly though, in one of our prospective cohorts of children, we were surprised by this as well. So we looked a lot of different biomarkers in serum, including CRP, TNF-alpha, ICAM, VCAM, SAA, a few -- and a few others. And for all of them, the concentrations were much higher in younger adolescents than they were in older adolescents, very strong differences. And so we were scratching our heads. We would expect the younger people to have less inflammation than older ones. Maybe that really applies to older adults versus younger adults.

But it's something that we're thinking is happening is that there's a normal amount of inflammation happening in development. As children are growing, there's a lot of inflammation because, you know, their tissues are stretching. And so that could be something worth thinking about here in the write-up of things and what exactly this case is prostaglandin E2, what exactly it's tracking, and can you make that to what other studies have been observed for instance.

KIMBERLY VALLE: Of course. Thank you so much for that information.

ACTING CHAIR McKONE: Before we go into my substantive discussions on the panel, I would like to just

take a minute to open up for any early audience and online questions that we may have.

DR. AHIMSA PORTER SUMCHAI: I just had some thoughts that the --

ACTING CHAIR McKONE: Please identify.

DR. AHIMSA PORTER SUMCHAI: -- conversation is so stimulating. Excellent work. You know, I'm just so proud of you doing work that is so powerful and so vanguard, but, you know, perhaps we're looking, you know, at the differences between inflammation in biomarkers in terms -- versus adults, maybe we're looking at behavioral, you know, anthropometric differences. Children are outdoors. They're playing more actively. They are smaller creatures. They're closer to the ground, closer to the, you know, earth. They're breathing more rapidly and, you know, taking in potential sources of inflammation.

The other point I'd like to make very quickly is that obesity is a pro-inflammatory state. And I know that we're looking specifically at biomarkers for airway injury. But obesity itself is a pro-inflammatory state. And perhaps there's something there. And then, of course, there's the immaturity of the immune system.

So I just wanted to make those points.

Another quick point, excellent work. You know, PM2.5, the medical literature is very profound in

identifying that ultrafine particulates, you know, less than a tenth of a micron. Those are the ones that cause the most damage. They stay in the long -- in the long -- longer. They're associated with hypertension, inflamma -- excuse me ischemic heart disease, a stroke. So ultimately, that's the direction we're moving in.

And then the final point, Medicare does authorize a physician request for durable medical equipment for air purifiers in filters for individuals who, you know, meet medical necessity.

ACTING CHAIR McKONE: Could you identify.

DR. AHIMSA PORTER SUMCHAI: Oh, Dr. Ahimsa Sumchai, Hunters Point Biomonitoring Program.

ACTING CHAIR McKONE: Thank you.

Other audience or online questions?

Well, we can now move into more -- I mean, we were starting a more substantive discussion I think.

(Laughter).

ACTING CHAIR McKONE: I mean, I have -- I wanted to expand a little bit on this issue of, you know, this -- especially the effect biomarkers. How frequently are those associated with other factors that are not air pollution stressors -- I mean, other stressors in their environment, diet, but also even factors. People have shown linguistic isolation. Education levels. There's a

lot of things, employment status, that can trigger some of these markers in the same way that you would see from air pollution. And is there some ability at least to record what those factors are from questionnaires and how they might play in?

KIMBERLY VALLE: Thank you for your question. So we do have information as part of the survey questionnaire on diet. Some of the literature does indicate that diet can be a big factor like you mentioned influencing these biomarkers. So, of course, as we think about the future of -- the future projects or looking into the analysis I've conducted, of course taking into account all these different covariates, all these different variables that may be impacting their results, so that's definitely more work on our end that needs to be done. But the fortunate part is that we do have information on diet. We do have information on health insurance.

Asa can probably talk more on the future -- the future direction of the projects, but we are definitely thinking about how all these factors can be influencing the level -- the biomarkers levels -- biomarkers of response levels.

ACTING CHAIR McKONE: Thank you.

Any others?

José.

PANEL MEMBER SUÁREZ: I noticed that for adults, it's primarily the moms that are involved --

KIMBERLY VALLE: Yes.

PANEL MEMBER SUÁREZ: -- in the data. And we know that for a lot of different reasons, different studies and whatnot, but it was a very striking difference though. Was the recruitment -- tell me a little bit about the recruitment of the participants and why this got about.

KIMBERLY VALLE: For sure. So most of the participants were female. The participants were recruited with our community partners, so with Little Manila Rising and Central California Asthma Collaborative. I think this is the nature of conducting studies with, of course, individuals that we don't have control of who is recruited or who would like to participate in this study. However, I do want to mention that this also brings up a great opportunity for future studies to definitely do more outreach in different places where it mainly -- more male individuals would like to be part of the study.

So, yeah, going back to your question, the recruitment was done through our community partners. There was a list of interests. Individuals would reach out to our community partners to see if they were interested. From there, we would -- they would or we

would go through the eligibility criteria. But like I mentioned, I think that other studies also indicate that they have more enrollment of females, which that can potentially leave us with a question of, well, what are the biomarker levels in the male population, which, like I mentioned, could be a great opportunity for recruitment efforts to be tailor -- having more tailor recruitment efforts for future biomonitoring studies.

PANEL MEMBER SUÁREZ: Yeah. Certainly I think something worth thinking about at the --

KIMBERLY VALLE: Of course.

PANEL MEMBER SUÁREZ: -- next stages of the project, right, how can you start incorporating more males?

KIMBERLY VALLE: Of course.

PANEL MEMBER SUÁREZ: I mean, we don't want to give up on one particular group just because it's hard to focus on them, but you can still recruit them through the mothers, have them bring in, if possible. So I think this is a very interesting -- a very interesting study that opens up a lot of questions at the next stages of --

KIMBERLY VALLE: Of course. I agree. And I think that's the beauty of taking a step back and reflecting on what went well with certain studies, what didn't go well. And, of course, the things that didn't,

and also take a second to evaluate what growth opportunities for different research studies. So in this case, now we know that we should definitely spend maybe more time or do a little bit of more recruitment effort to see -- to hopefully have a representative sex -- like -- sample.

PANEL MEMBER SUÁREZ: Was this your dissertation?

KIMBERLY VALLE: This is one of the chapters.

(Laughter).

KIMBERLY VALLE: There -- each chapter focuses on a different data set. So, I'll be defending February 22nd, but --

PANEL MEMBER SUÁREZ: All right. So hopefully we're giving you some preparatory questions here.

KIMBERLY VALLEY: Yes. Yes.

(Laughter).

PANEL MEMBER SUÁREZ: Thank you very much.

KIMBERLY VALLE: Thank you so much for the questions.

ACTING CHAIR McKONE: Okay. Other questions? Yes, Amy.

PANEL MEMBER PADULA: I just have a small question. It was a great job, but I was wondering if you had the BMI of the adults?

KIMBERLY VALLE: Great question. Unfortunately,

we do not have BMI of the adults. A lot of the litera -- well, yeah, the literature indicates that we should be looking at the biomarkers in relation to BMI. We are fortunate that we can do this with the children. But with the adults, we just have the age, and the gender, and other health questions, but we do not have the height or the weight of the parti -- adult participant.

ACTING CHAIR McKONE: Questions from the audience? I should welcome anyone.

Well, if there's no other questions or comments, I think we can move on to our next topic. We're just slightly ahead of schedule, but not that much.

So thank you again, Kimberly, for your presentation.

(Applause).

ACTING CHAIR McKONE: Thank you, everyone for the enlightening discussion. So now the next topic we're going to cover is planning for the 2025 SGP meetings. And to lead us to start this discussion, Martha Sandy from OEHHA will be making a presentation. And then we'll have a period of time to ask questions and respond to comments.

(Slide presentation).

DR. MARTHA SANDY: Thank you, Tom. And I'm filling in for Stephanie Jarmul who is still out on maternity leave, but will be back for the next meeting.

So we're here to talk about the coming year and planning for the meeting. Let's see. So how do I advance? I'm pressing --

[SLIDE CHANGE]

DR. MARTHA SANDY: There we go. Thank you.

So we finally today have settled on the dates for next year. Hard to get you all together. We'll be meeting on March 25th from 1 to 4, and August 27th from 10 to 4, and November 14th from 1 to 4. So those are our expected dates for next year.

[SLIDE CHANGE]

DR. MARTHA SANDY: And now to talk about the topics. Similar to past years, our standing agenda is going to include Program updates, as well as more detailed project updates, just like we've done today. And so we'll hear updates on surveillance studies and community studies with those project updates. We'll have ample time allotted during the meetings for discussion and input from the Panel and the audience. And then as you look on the right-hand side, we've got a number of different potential topics of interest that we're considering to bring to you for the coming year. And we're looking for input today from the Panel on this list and what really strikes your fancy, because we can't do them all.

Potential topics include hearing from invited

speakers and having a discussion with the Panel on biomonitoring health-based guidance values, hearing from invited speakers on the use of creatinine adjustment versus specific gravity adjustment for urinary biomarker measurements, discussing how the impacts of climate change could be considered when we're designing our biomonitoring studies, hearing from invited speakers on studies using silicone wristbands, to detect chemical exposures. And we could also hear from experts on microplastics and discuss the challenges and opportunities associated with environmental monitoring and biomonitoring. And continuing with this past year's discussions of oil and gas exposures, we could hear from researchers on the latest findings from ongoing studies and exposed communities.

So I'll stop there and see if anybody has questions or suggestions about these plans for the coming year on any of the specific topics shown on the right side of this slide.

ACTING CHAIR McKONE: Okay. Someone -- question. I have -- I have one if nobody else -- so on that last topic of oil and gas exposures. One thing, and we've been seeing literature come out about exposures in homes to natural gas -- components in natural gas. And some of this is fairly new, but the -- there's benzene that comes

out of natural gas when you're not using the stove. It diffuses out. And they're measuring, you know, not trivial levels in some cases, depending upon the benzene levels. So that's kind of an extension of the oil and gas.

But I think it's an interesting topic, because the use of natural gas for heating and particularly in cooking. Again, it's linked to climate change. It's linked to climate mitigation solutions. I mean, it crosses over a number of things, but I don't know if there's a way to link some of the biomonitoring to measure exposures to natural gas components in homes. It's been done a lot with measurements of air, but not with a direct biomonitoring study. And it may be difficult to do, because the components you're looking at come from other sources, but...

DR. MARTHA SANDY: Right. And I think we heard last -- at our last meeting we had VOCs in the EBDEP study, right? And I think there were some elevations associated with gas -- having a gas stove or gas water heater. So we can we -- we do ask those types of questions in our questionnaires, so we can look at that a little more closely. But it is hard to separate out -- or pinpoint it to a certain source, because people don't just stay in their homes. They're out and about being exposed

to other sources of benzene perhaps. But good point.

ACTING CHAIR McKONE: Other thoughts.

I have another one. So, for climate change are there markers that -- biomarkers for heat stress that we can use?

DR. MARTHA SANDY: You know, that's something we will be looking into. I don't have -- maybe other Panelists have the answer to that right now, but that is something we could explore. That's why we -- I think you suggested this, Tom. At our July meeting, how can we incorporate these things into our study's concerns, you know. So we'll -- we will look into that.

ACTING CHAIR McKONE: Did you want a sense from the Panel about priorities among these or are these all topics you want to go ahead on that they've come up, and you're asking us if it's okay to keep moving forward on these or should we prioritize them?

DR. MARTHA SANDY: I think it's a mix of what can we do, what's available, who are the speakers, what new research is available, and what are Program priorities and hearing from the Panel is what you're most interested in. So we'd like to take all that into account. So I really would like to hear from the Panel if any of these topics are really high up on your list of things to dig into.

ACTING CHAIR McKONE: Carl. Okay. Carl, do you

have a comment?

PANEL MEMBER CRANOR: Yes. Thank you. Martha, this is a question that's probably way too far afield, but as I've listened to some of the presentations today, the Biomonitoring Program now has a substantial body of evidence that has been assembled from local studies, regional studies, and so forth. Can you make any inferences -- I mean, this is a -- this is a big project, a separate project I'm sure. Can one make any inferences from that about the environmental threats or safety of Californians from these studies that have been done? I know it's a big question, but you might put it out on your far, far calendar of something to consider sometime.

DR. MARTHA SANDY: Yes. It's an important overall question that we should always keep in mind. That's why we're doing these studies to find out what Californians are exposed to and are different communities within California exposed to higher levels than other communities or comparing them to NHANES data and other national data to suggest to us that maybe there's higher exposures to a certain environmental, you know, contaminant that we're more concerned about. So, I'll alternatively, it can show that Californians have lower levels of exposure to chemicals and that may be --

PANEL MEMBER CRANOR: Right. Well, we might

like -- we might like to think that we do better than elsewhere, but I don't know what's -- I don't know what's the case. But it might be an interesting -- an interesting separate but big project probably.

DR. MARTHA SANDY: Right. I -- yeah, I think it's best to take it sort of chemical at a time or groups of chemicals. And we've heard presentations on, for example, the SAPEP study with the school children, where we're seeing lower levels of some VOC metabolites in the urine compared to children in NHANES. So we do try to look at this. Sometimes we can tell, but it's something to keep in mind. Thank you for that.

PANEL MEMBER CRANOR: Thank you.

ACTING CHAIR McKONE: I see Jenny has her hand up.

PANEL MEMBER QUINTANA: I think Oliver was first.

ACTING CHAIR McKONE: Okay.

PANEL MEMBER QUINTANA: You're quicker off the mark, I think.

ACTING CHAIR McKONE: Oh, I couldn't see his hand. It's so --

PANEL MEMBER QUINTANA: Go ahead. Go ahead, Oliver.

PANEL MEMBER FIEHN: Okay. Well, thank you. Those were all great presentations.

For next year, I think the idea of looking at climate change and exposure to climate change and thinking about what to do or how to avoid these exposures, that's really relevant for California. It might be relevant for the nation for that matter. You know, especially with the wildfires and the droughts, I mean we will see more of that all the time. And so we need to think about how to monitor that and potentially at some point even biomarkers of exposures.

DR. MARTHA SANDY: Thank you.

ACTING CHAIR McKONE: Now, Jenny, it's your turn.

PANEL MEMBER QUINTANA: Hi. I wasn't expecting to have to memorize a list, so I don't know if I got everything on there, but -- because I was -- I didn't write it down before you took off the slide. But I think that -- I'm just thinking about the biomonitoring -- California Biomonitoring and what we should focus on in terms of value added from biomonitoring. I think the creatinine versus specific gravity is just a practical one that keeps coming up over and over again. I think it would be useful because it's very useful to interpret results and isn't as obvious as it might appear for those chemicals that are kind polar, kind of not polar, whatever.

And then also the health guidance values, what

does this mean or are they -- kind of having guidance for the community about what these things mean I think would be obviously a valuable contribution. Although I think all those topics are very interesting myself very much.

But also, I -- just to follow up a little bit on what you said earlier that comparing our results to NHANES is -- I've always wondered if we should do some downloading of the NHANES data and then make a subset we should really compare it to. For example, California has a much lower smoking rate than the nation and much lower exposure to secondhand smoke because of all of our policies. So, looking at values in the blood of people, they're from Tennessee or what have you, they have a lot of exposure from that, which Californians don't have, and it might mask exposures from wildfires or from fire fighting or something like that. So I'll also be interested to like what should we be comparing to nationally.

And since we talked about wide-ranging topics -- I'm sorry to go off topic a little bit, but I do want to come back to what makes California Biomonitoring special versus relying on NHANES and its ability to look for new and emerging chemicals. It's -- and potentially to look at populations that are not captured by NHANES, such as more immigrant populations, special worker populations,

things like that. So I just want to stay out there. Nice to have speakers to think about how we could move towards maximizing the value of the great program.

Thank you.

DR. MARTHA SANDY: Thank you. All good things to keep in mind. Thank you very much.

ACTING CHAIR McKONE: I want to point out this discussion is also open to the audience, both online and in the room.

PANEL MEMBER LUDERER: One of the -- I mean, interest -- one of the things that I find particularly interesting, but I think also challenging is the exposures to microplastics and how -- you know, I think most of the studies that have been done have looked at particles specifically and not necessarily measuring the chemical components of the microplastics. And so I was wondering if you had -- you know, the Program has done any work kind of thinking about how those kind of -- how you would want to go about measuring those exposures to microplastics?

DR. MARTHA SANDY: Well, I think that's why we suggested as a topic we'd invite people to have that discussion.

PANEL MEMBER LUDERER: Yes.

ACTING CHAIR McKONE: José.

PANEL MEMBER SUÁREZ: Yeah. So in two of the

talks today, there was discussion about presenting results to the participants and returning them. Would that be a topic of interest to the Biomonitoring Program to hear from other experts that are in the field who have been doing this for a while. But for one side is what are the best ways, and maybe you'd bring in some graphic designers, how is it that you can convey a topic that would be very easily understood, you know, methodological piece on one side.

But on the other side I think it's to there -- some investigators are concerned about presenting results about certain chronic exposures or persistent pollutants, for instance, for which the participants may not be able to do anything about it, which may cause stress. There's a lot of discussion back and forth about (inaudible). We have the data, everybody would benefit from at least knowing what they have. On the other side is could it cause stress, given that they can't do anything about it. So discussions like those, it could be something that may be of interest to the Biomonitoring Program.

DR. MARTHA SANDY: Certainly. And, you know, we may hear some updates next year on the project that Rebecca talked about that's just starting on getting, you know, focus groups and feedback from the BiomSPHERE participants as to how they like, and understood, and what

they wished we had told them better or described better for results return.

So that -- you may hear some updates in 2025. And we may in the following year have a session on that. That's a good idea.

PANEL MEMBER SUÁREZ: Yeah. No, that's wonderful. I -- do you do much work with the Silent Spring Institute?

DR. MARTHA SANDY: Yes. They have -- they have some really cool ways to convey a lot of the data too.

PANEL MEMBER SUÁREZ: So it's worth just looking at the different perspectives, different people doing things.

DR. MARTHA SANDY: Yes. Yeah. The DERBI Program for online platform, right, is that the -- so they have actually presented here maybe 10 years ago, maybe longer. I can't recall, but they have been at SGP meetings presenting. So we -- yeah, so we're -- that's certainly something that we'd definitely consider, yeah.

ACTING CHAIR McKONE: All right. Thank you. We have a comment from the audience.

Asa Bradman.

DR. ASA BRADMAN: I have just a few comments and maybe a couple of opinions too. But, you know, a few things. One, I'm enthusiastic about microplastics too. I

feel like that's something that we need to learn more about. And I don't know if California is unique relative to the rest of the nation, but there's certainly -- you know, it seems like every time I open the paper, and see a new journal article, there's talk about exposure and health impacts. Just to mention oil and gas, many of you know we had a conference on air quality and health at UC Merced a couple of weeks ago. And it was really well attended. And two or three times community members brought up concerns about the gas fields in the southern San Joaquin Valley. There was also some comments about San Ardo. And I know there's talk about working in the Los Angeles area and the Central Valley and that seems to be a real community concern. So just my two bits there.

And then, the conference also went well I think because we had great translators going on. And just another shout-out to Kimberly. We're going to -- her dissertation event, the first hour will be online and we're actually -- her idea and we're going to do it, we're going to have the same translators to be available online. And I wonder if biomonitoring programs, you know, for being streamed that we could consider having a -- you know, streaming these meetings. And that actually might open up a larger population. You know, we have 300 people now on our list for the conference. And it wasn't that

expensive. And the logistics, you know, are able to do it online.

So it might be less complicated than we -- than we think. Of course, there's -- you know, you have to comply with the State standards, but that could be an opportunity to kind of expand community engagement. So just a few thoughts. Thanks.

ACTING CHAIR McKONE: Thank you.

PANEL MEMBER SUÁREZ: Was that using AI or was it with --

DR. ASA BRADMAN: No. No. It was using some folks in the valley.

DR. MARTHA SANDY: And I think Rebecca wants to...

REBECCA BELLOSO: Could you repeat that question?

PANEL MEMBER SUÁREZ: Oh, the question. Oh, yeah. Okay. Sorry. The question was if AI was used for the translation and the response was no.

(Laughter).

DR. MARTHA SANDY: Okay. Sorry. And I thought Rebecca was going to tell us all that -- remind everyone that for the SAPEP community meeting, we had it simultaneously translated into Spanish by live people.

ACTING CHAIR McKONE: Real intelligence on our end.

(Laughter).

ACTING CHAIR McKONE: Ulrike, you have a question.

PANEL MEMBER LUDERER: I mean, actually one of the things that Asa said was exactly what I was going to say that I think oil and gas exposures -- you know, we were talking about exposures that are, you know, particularly -- I mean, not unique, but that occur widely in California in the oil and gas fields near residential areas is like an obvious one. So I would also support that.

ACTING CHAIR McKONE: It's a topic of broad interest, not just in California, but across the country.

I think we've kind of reached the time limit for this. I don't want to cut people off, but -- yeah.

ACTING DIRECTOR EDWARDS: I'll make it quick. All right. Just a quick aside on microplastics. A bill, many of you may have heard about it, SB 1147 passed earlier this year. And it requires OEHHA to do a risk assessment for the risk associated with microplastics in drinking water and bottled water. So, that's something that we're -- we just began a month or two ago. So, FYI.

ACTING CHAIR McKONE: Thank you.

Okay. In the five, ten minutes remaining, we do make a time period available for open public comment.

This doesn't have to be related to any talk. Just an open mic for the public to come up and make short comments. It's open again to both people in the room and people online, if there's anyone who wants to make a parting comment before we depart for the day.

Yes. And identify yourself for the transcriber.

DR. AHIMSA PORTER SUMCHAI: Dr. Ahimsa Porter Sumchai. I'm the Principal Investigator for the Hunters Point Biomonitoring Foundation and Program.

In March of 2019, I and other representatives of the Program met with representatives of OEHHA and Biomonitoring California to discuss the medical necessity for establishing a human biomonitoring program for residents and workers within the one mile perimeter of the system of federal Superfund sites in heavily industrialized southeast San Francisco. And in the five years that have passed, we have created what I believe might be a model for community exposure science research that centers on human biomonitoring as well as geospatial mapping for chemicals and radionuclides of concern documented to be, you know, detected in concentrations higher than reference range.

And then using information from environmental geographic information systems and enforcement tools, like the CalEnviroScreen, the EPA EJScreen, the EPA ECHO

enforcement device to, you know, further amplify information. And then condensing all of this information and comparing it with questionnaires that are based on the questionnaires used by the CARE project, and then, you know, also looking at historical data and environmental testing for industries and regions that are polluted.

So to make a long story short, the most significant findings, one that I need to bring to your attention. We screened 15 workers who are cited on the federal Superfund site within about 300 feet of a radiation contaminated methane-producing landfill. And all of them have chemicals of concern documented to be present in the environment. We are also detecting manganese. Your detection frequency for manganese in the urine is 19 percent. Ours is about 80 percent. We have people with manganese levels that are five times higher than the level that you define as being for the 95th percentile.

But we're also detecting radionuclides of concern. We are detecting radioactive biomarkers. And then in concert with Dr. James Dahlgren the founder of Pacific Toxicology Laboratories, we have detected products of nuclear fission and decay in 11 current and childhood residents, the majority of whom are living within half a mile of the perimeter of the landfill and the entry to the

Naval Radiological Defense Laboratories.

So I did want to bring that to your attention. I believe that I shared with you a book in which these findings are published called, *The Bomb in Our Bodies*. We detected potassium-40. In all of the people tested, we detected plutonium-244 in most of them. We have a family of four with products of nuclear fission, including a 12-year old boy. We have a woman diagnosed with acute leukemia given weeks to live who has both uranium-235 and plutonium-239 detected in extreme concentrations.

I do just want to say in closure that the 15 UC workers who are cited in Building 830 and Building 831 on the federal Superfund site. These are buildings that were never cleared by the California Department of Public Health for human occupancy. This is a violation of the federal Superfund law, and it is a human rights violation that these workers are being exposed and have these chemicals detected in the body.

The good news I want to share with you is that HOPO TX is moving into phase two clinical trials. HOPO TX is a an oral decorporating agent that was developed by a team of UC Berkeley scientists, including Rebecca Abergel, who is a professor of nuclear engineering. HOPO TX in pill form can get rid of some of the most dangerous toxins, including uranium isotopes, gadolinium, lead,

cadmium. And these researchers are looking at it and I believe at the Nobel Prize.

So we're entering the nuclear age and, you know, we're looking at the prospect of nuclear war. We need to be able to do things to get this stuff out of people's, you know, bodies who are facing this level of contamination. I think that you should be aware of the astounding work that these UC Berkeley nuclear chemists have done.

Thank you.

ACTING CHAIR McKONE: Thank you.

Other public comments. I don't want to cut people off, but we have kind a reached the -- okay.

So the trans--- I just want to end the meeting by making note that the transcript of this meeting will be posted on the Biomonitoring California website when it becomes available. As we saw from Martha Sandy's slide, the next SGP meeting will take place on March 25th, right. Not long. March 25th from 1 to 4 p.m. in Oakland. Is that true?

REBECCA BELLOSO: We think so, yes.

ACTING CHAIR McKONE: We think so. Okay. Okay. And information regarding options for attending the meeting will be available closer to that March meeting date. I want to thank all the Panel members and the

audience and the online participants for coming today and making an interesting meeting and have a good evening.

Thank you.

(Applause).

(Thereupon the California Environmental Contaminant Biomonitoring Program, Scientific Guidance Panel meeting adjourned at 3:47 p.m.)

CERTIFICATE OF REPORTER

I, JAMES F. PETERS, a Certified Shorthand Reporter of the State of California, do hereby certify:

That I am a disinterested person herein; that the foregoing California Environmental Contaminant Biomonitoring Program Scientific Guidance Panel meeting was reported in shorthand by me, James F. Peters, a Certified Shorthand Reporter of the State of California, and thereafter transcribed under my direction, by computer-assisted transcription.

I further certify that I am not of counsel or attorney for any of the parties to said meeting nor in any way interested in the outcome of said meeting.

IN WITNESS WHEREOF, I have hereunto set my hand this 22nd day of December, 2024.

JAMES F. PETERS, CSR
Certified Shorthand Reporter
License No. 10063