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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Carl Cranor, PhD, MSL

Lara Cushing, PhD, MPH

Oliver Fiehn, PhD

Ulrike Luderer, MD, PhD

Thomas McKone, PhD

Penelope (Jenny) Quintana, PhD, MPH

José Suárez, MD, PHD, MPH

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Susan Hurley, MPH, Research Scientist III, Exposure Surveillance and Epidemiology Unit, Environmental Health Investigations Branch

Jianwen She, PhD, Chief, Biochemistry Section, Environmental Health Laboratory Branch

GUEST SPEAKERS:

Nina Holland, PhD, University of California Berkeley

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PROCEEDINGS

DR. EDWARDS: All right. Good afternoon. Welcome to the November meeting of the SGP. I feel like we were just here a second ago.

(Laughter).

DR. EDWARDS: And I would like to welcome all the Panel members and the audience to the November meeting of the Scientific Guidance Panel for Biomonitoring California, more formally known as the California Environmental Contaminant Biomonitoring Program. Thank you all for joining us today.

So as I mentioned, the Panel last met this morning from 9 o'clock to noon for the rescheduled August SGP meeting. The main items, we heard some updates from CDPH Program updates. We also heard a talk from DTSC on some updates to methodologies to detect PFAS compounds. And then we -- and we ended on an item that discussed an expansion of the designated group for PFAS, and that passed unanimously. So it was quite an active morning.

And just so every one knows, a summary and transcript will be posted for this morning's meetings -- this morning's meeting as well as this afternoon's meeting to the Biomonitoring webpage.

All right. So I will now invite the Panel members -- Panel members to introduce themselves by name

and affiliation. So let's start with Carl.

PANEL MEMBER CRANOR: I'm Carl Cranor, Department of Philosophy and also Environmental Toxicology at UC Riverside.

I have COVID today so I can't be present.

DR. EDWARDS: Thanks, Carl.

Lara.

PANEL MEMBER CUSHING: Good afternoon. Lara Cushing, assistant professor of environmental health sciences from UCLA.

DR. EDWARDS: Tom

PANEL MEMBER McKONE: Hello. Tom McKone, professor emeritus at the School of Public Health the University of California, Berkeley, and also a retired affiliate at Lawrence Berkeley National Laboratory.

PANEL MEMBER LUDERER: Hello. Ulrike Luderer, professor of environmental and occupational health in the Program of Public Health at UC Irvine.

DR. EDWARDS: Jenny.

PANEL MEMBER QUINTANA: Hi, everybody. I'm Penelope, or Jenny, Quintana. I'm a professor of environmental health at the School of Public Health at San Diego State University.

DR. EDWARDS: Meg.

CHAIRPERSON SCHWARZMAN: I'm Meg Schwarzman,

faculty at UC Berkeley School of Public Health, Environmental Health Sciences Division.

DR. EDWARDS: Oliver.

PANEL MEMBER FIEHN: Oliver Fiehn, professor at the College of Biological Sciences and the Genome Center at University of California, Davis.

DR. EDWARDS: José.

PANEL MEMBER SUÁREZ: José Suárez, associate professor at the Herbert Wertheim School of Public Health at UC San Diego.

DR. EDWARDS: All right. Great. Thanks for all the introductions. So now I'll hand this off to the Panel Chair, Meg Schwarzman.

CHAIRPERSON SCHWARZMAN: Okay. Our opening reminder for Panel members to please comply with Bagley-Keene requirements, that all discussions and deliberations of the Panel 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.

So the plan for this afternoon's meeting, we'll open with an update from the Program on the AB 617 community biomonitoring studies, followed by presentations on the results from the Stockton Air Pollution Exposure Project, SAPEP. There will be time for questions from the

Panel and the audience after each presentation.

Instructions for how to engage. If SGP members wish to speak or ask a question, please raise your hand. I'll call on you. If online webinar attendees have questions or comments during the question periods after each talk, you can submit them via the Q&A feature of Zoom webinar or by email to biomonitoring@oehha.ca.gov. Just to note that we will not be using the chat function of Zoom during this meeting. Please keep your comments brief and focused on the items under discussion relevant comments will be read aloud and paraphrased as necessary. If online attendees wish to speak during public comment periods and discussion sessions, please use the raised hand future in Zoom webinar and Rebecca Belloso will call you -- call on you at the appropriate time.

If you're attending in person and wish to comment during the public comment periods and discussion sessions, please come to the front or raise your hand and I'll call on you, and a reminder to please identify yourself before providing comment and write your name and affiliation on the sign-in sheet at the back of the room.

So I will now introduce again Stephanie Jarmul. Stephanie is the Section Chief of the Safer Alternatives Assessment and Biomonitoring Section at the Office of Environmental Health Hazard Assessment. She'll provide an

update on the Program's community biomonitoring studies to support AB 617 and the Community Air Protection Program.

(Thereupon a slide presentation).

MS. JARMUL: Thank you, Meg and hello, everyone. Today I'm going to be talking about the community biomonitoring studies we have going on at the moment, which support the goals of AB 617 and the Community Air Protection Program.

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MS. JARMUL: So I'll first give an update on our current studies, which are BiomSPHERE, FRESSCA Mujeres, and SAPEP. And I'll also talk briefly about our plans for future activities.

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MS. JARMUL: So BiomSPHERE is the biomonitoring component of the San Joaquin Valley Pollution and Health Environmental Research Study, or formally known as the Total Exposure Study, or SPHERE.

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MS. JARMUL: As a reminder of general study components, SPHERE is a CARB-funded study designed to assess exposures to air pollutants and noise among families living in Fresno and Stockton. They've recruited child-parent pairs from each household and are conducting household and personal air monitoring, measuring noise

levels, and collecting exposure survey data. And then for BiomSPHERE, we added on the biomonitoring component -- whoops -- which consists of collecting urine samples from the SPHERE participants and analyzing them for metabolites of PAHs and VOCs, biomarkers of oxidative stress, inflammation, and lung injury, and also cotinine, to identify potential exposures to tobacco smoke. And a reminder, these are the same biomarkers used for our SAPEP study in Stockton. And we also added on to SPHERE's air sampling to be able to measure PAHs.

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MS. JARMUL: So an update on BiomSPHERE. The team has completed a majority of the fieldwork in both Fresno and Stockton, and that includes collection of urine samples, administration of questionnaires, collection of air samples inside and outside of participants' homes, and also personal air monitor -- sampling of PM2.5.

Our original goal was to have 90 parent-child pairs, 45 in both Fresno and Stockton, but we did have some unforeseen staffing changes in Stockton, so we're only able to collect samples from 12 families in Stockton. However, we are on target to actually surpass our goal in the Fresno area, by a few participants. And so our new study target is 176 total urine samples from 64 parent-child pairs, or 128 participants, and that includes

repeat sampling for four consecutive days for eight of the families.

And we just have a couple of participants left to complete all study components, and that is scheduled to be finished by the end of November.

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MS. JARMUL: And then I can just show the top photo here -- I think there's a delay in my marker -- is of UCB and UC Merced project staff, including graduate students and staff from Central -- the Central California Asthma Collaborative, or CCAC, who was our community partner in Fresno.

And the bottom photo here shows a sphere sampling cart, which is deployed with a SENSIT RAMP for collecting real-time PM2.5 and criteria air pollutants, an aerosol black carbon detector or ABCD, a PAH air sampling pump and impacter, and a noise monitor. This cart was deployed both indoors and outdoors at each participant's home. And as shown on the top here, this is a passive PM sampler inside of a weather shield. And we deployed these at a subset of homes.

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MS. JARMUL: So that is it for BiomSPHERE.

Moving on to our FRESSCA-Mujeres study or the Farmworker women and Respiratory Exposure to Smoke from

Swamp Cooler Air Study. These are all a mouthful.

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MS. JARMUL: FRESSCA-Mujeres is the study where we are again able to add on a biomonitoring component to the existing FRESSCA study, and that was funded by the EPA. The goals of the original FRESSCA project were to reduce wildfire smoke exposures by designing, testing, and deploying an affordable and effective filtration system for residential, evaporative, or swamp coolers.

And you may recall hearing about this study more at the November 22 meeting, where Gina Solomon of PHI and Nayamin Martinez of CCEJN presented on this. And a reminder, this first part of the study took place in 2022 and completed then. So FRESSCA-Mujeres built upon the original FRESSCA study by focusing on farmworker women living in the Fresno, Kern, and Kings counties. Based on the field testing of the swamp cooler filters completed during FRESSCA, we deployed the swamp cooler filters, which are found to have the highest particle removal capacity in half of the homes. And then we also deployed portable air cleaners at all of participant's homes. We also collected urine samples to look at exposures to air pollutants and that includes metabolites of PAHS, VOCs, and heavy metals, and then also of oxidative stress and inflammation, both before and during the wildfire season.

For FRESSCA-Mujeres, our lab at EHL will be completing analysis for the PAHs and heavy metals. And then Peyton Jacob's lab at UCSF will be completing the analyses for the VOCs.

And the Wadsworth Center in New York will be analyzing the biomarkers of effect, which total about 19 biomarkers this time around, compared to the four that we measured in SAPEP and BiomSPHERE. And the biomarkers of effect for this study is funded by the larger FRESSCA-Mujeres study by the California Breast Cancer Research Program.

And then we also measured PAHs, VOCs, heavy metals, and particulate matter both inside and outside of participant's homes and also administered surveys to the participants.

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MS. JARMUL: Just to go into a bit more detail about all the study activities over the past six months or so. We finished recruitment over the summer and spring months of this year, and collected first morning voids from participants to hopefully establish a baseline exposure. We conducted pilot testing of the air monitoring equipment to make sure we limited the risk of oversaturation of our air sampling tubes. We installed PurpleAir monitors inside and outside of participants'

homes, and administered household and exposure surveys.

We also took the opportunity to have some of the participants wear wristbands in the spring and summer months when pesticides were more likely to be applied. And we're hoping to be able to test, analyze these wrist bands through a lab at USGS to identify which pesticides were more likely to be applied and hope to analyze these wristbands also for other contaminants as well. The study also performed maintenance on the swamp coolers at this time to ensure they would be functioning properly, in case of a wildfire event.

And over here, it is a quick breakdown of our study participants. They were 100 percent Hispanic, Latina, and female. Most of them are farmworkers or work in some sort of food packing facility. A majority of them rated their air quality as poor and reported health impacts from the heat in the last year. They were also dissatisfied with the current function of their swamp coolers. And this is information we collected before the filters were installed in the homes. And just again highlights the impacts of air pollution on these communities and the need for these types of studies in the San Joaquin Valley.

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MS. JARMUL: So once participants were recruited,

and we collected our first set of urine, we deployed the swamp cooler filters and portable air cleaners at participants' homes. This time around, we wanted to collect both evening and first morning void samples to assess levels of biomarkers of the PAHs, VOCs, and heavy metals before and after the intervention. And that was exposure to filtered air. We also administered exposure surveys and monitored indoor and outdoor air for PAHs, VOCs, heavy metals, and particulate matter.

And you can see in the photos here, the top one depicts one of our swamp cooler interventions, where we installed these filters on all three sides of the swamp coolers so it was completely enclosed by these filters.

And then the photo at the bottom here shows one of the indoor air cleaners at a participant's home and also the air sampling equipment.

FRESSCA-Mujeres also collected saliva to look at Telomere length and those will be analyzed by UCSF, again funded by the California Breast Cancer Research Program.

Unfortunately, or fortunately for Central Valley residents, there was not a major smoke event that occurred near the vicinity of our participants' homes. I'm sure many of you are aware that we had unprecedented amounts of rain and even a hurricane that swept through Southern California and parts of the Central Valley this year. So

it will not allow us to say much about the components of wildfire smoke and how these filters might reduce exposures during a wildfire event, but we believe the study will still prove valuable to identify exposures to these communities at two different time points and hopefully identify a low-cost solution to help improve air in homes that use swamp cooler filters, even more generally.

Some of these filters are really filthy when we picked them up, I'll just note. And so hopefully that presented -- prevented some of those larger particles from entering the home. And we did end up saving one filter per home. And we sent it to Jeff Wagner's lab at CDPH and he'll be doing some particle analyses to hopefully try to figure out the types of particles that are being absorbed by the filters.

And I will also mention that although we don't have our results yet, the participants also generally seemed very happy with the swamp cooler filters as they noticed less dust entering their homes. And we did also provide indoor portable air filters for the homes to keep and even provided new filters for these at the end of the study.

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MS. JARMUL: And here's just some photos from the

field. We had a great team out there in both the Bakersfield and Coalinga areas. You can see the photo on the left here is of the team in Coalinga, which includes staff from OEHHA, Public Health Institute, and our community partners from CCEJN without whom this study would not have been possible. They were really front and center with recruitment, scheduling appointments with participants, and even administered some of the surveys and collected biospecimen from some of the participants.

And then in the middle, we have one of OEHHA's scientists, switching out the filter of the air purifiers at the end of the study.

And then on the right is with an additional CCEJN staff member in the Bakersfield area, OEHHA and CDPH staff, and then one on our partners from the Illinois Institute of Technology, who actually designed the swamp cooler filter intervention. And again you can see right here another example of a swamp cooler with the filter attached to it.

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(Unidentified voices on Zoom).

MS. JARMUL: One second. Okay.

Well, that was it for FRESSCA-Mujeres update.

But last, but not least, our Stockton Air Pollution Exposure Project, which you heard quite a bit

about from previous meetings, and we'll be delving into the data analyses in the later presentations. But I just wanted to provide a quick reminder of the study elements and an update on some of the broader activities we've been working on.

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MS. JARMUL: So as a reminder, this is a study which took place at a school in Stockton in late 2021. And the goals of this study were to learn more about air pollution exposures to school children in Stockton, to evaluate the effectiveness of school air filtration at reducing children's air pollution exposures.

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MS. JARMUL: We completed results return for the biomarkers of response in October, and that included the development of a new fact sheet. So that completed our results return for this study. We also completed initial data analyses for both the biomonitoring and air sampling data, which you'll be hearing more about in detail later this afternoon. And we are currently in discussions with the Principal at the study school to plan a meeting to discuss results with the participants and the larger community sometime later this year or early winter of next year.

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MS. JARMUL: Okay. And then to discuss some of our short-term and long-term planned activities for these community studies focusing on air pollution exposures. So first up, we'll be working through all the laboratory and data analyses for FRESSCA and BiomSPHERE. As part of that, we also plan to support the analyses of the wristbands that we collected during FRESSCA. Of course results return from FRESSCA and BiomSPHERE. And I believe we've said this before, but we really want to take some time in the coming year to learn from our current studies, FRESSCA, BiomSPHERE, and SAPEP about the utility of our current suite of biomarkers we're using to assess exposures to air pollution and how we might design even smarter and more efficient studies moving forward.

We've also talked about potentially conducting additional listening sessions or receiving additional feedback on our results return materials, since it has been awhile since we've solicited input from outside partners.

We are also exploring the possibility of a pilot study on oil and gas exposures in California. And then we hope to continue to work to identify novel biomarkers for air pollution exposures and support the labs to validate laboratory methods for biomarkers of air pollution exposures.

Our more long-term plans are still to develop an RFI to identify opportunities for future community biomonitoring studies. We are now hoping to be able to issue the RFI in 2024 to develop studies that would be supported by contract funds from fiscal year 2025-2026, and beyond.

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MS. JARMUL: And that concludes my presentation.

Any questions?

(Applause).

CHAIRPERSON SCHWARZMAN: We have five minutes now for questions for Stephanie, clarifying questions.

PANEL MEMBER McKONE: Very interesting. Thank you. Just some technical clarifications. So the filters that you strapped onto the swamp coolers, do you know what MERV rating those were?

MS. JARMUL: I think they were 13.

PANEL MEMBER McKONE: Okay.

MS. JARMUL: They tested a number of them. I initially had actually a slide on that that I removed. I should have kept it. But yeah, they tested out a number of different MERVs and I think it was MERV 13 that -- they wanted to balance out the particle removal, but also prevent obstruction of air flow into the homes as well.

PANEL MEMBER McKONE: Yeah. That's what I mean.

What I was getting to is did you measure any degradation in performance, because --

MS. JARMUL: We did.

PANEL MEMBER McKONE: Okay.

MR. JARMUL: We don't have those results yet, but it didn't seem like it impacted too much. Although, for some of the filters, they were really filthy and completely covered in dust. And I will mention that these are not meant to be long-term solutions and even the team at IIT wanted to make sure that we removed the filters after a couple of months. Really this is to -- for the participants to help put on their swamp coolers during a wildfire event to prevent smoke from coming in.

PANEL MEMBER McKONE: And just another technical on the PurpleAir filters.

MS. JARMUL: Um-hmm.

PANEL MEMBER McKONE: So -- and you have to get that information online. Did you -- I mean, do you have a protocol for recording the data and do you -- which of the -- you know, there's several metrics that PurpleAir puts up, like raw particle count, EPA standard. Did you come up with a decision about which metric of air quality you would use and then how you would store that? Because, I mean, PurpleAir keeps it online. You don't get to --

MS. JARMUL: Right. I don't know if we've had

the discussion. Maybe McKenna, who is quickly becoming our PurpleAir expert might have further insights.

MS. THOMPSON: Yeah, not too much.

I can just say that they downloaded all of the data from the PurpleAirs, since a lot of them weren't actually online for participant preferences, I believe. And then I think right now, they're looking at the PM2.5 with the ATM calibration. But I know they're doing co-location and calibration I think now. So they'll be looking more into that in the future. I just pulled it off.

MS. JARMUL: Yeah. And this is all hot off the press. We were just in the field finishing up recruitment a few weeks ago, so, yeah.

CHAIRPERSON SCHWARZMAN: I had a -- I think you partially answered the question of like that it was important not to leave the filters on the swamp coolers --

MS. JARMUL: Yeah.

CHAIRPERSON SCHWARZMAN: -- because this isn't a permanent solution. But you referred to being able to put them on if there was a wildfire event like this. Did the participants have filters to put back on? How do you -- this is a minor question.

MS. JARMUL: We did not -- well, hopefully wildfire season for this year is over, we did have a

number of extras that we left with our community partner, because there was some interest from the community members, the participants to be able to put them back up. And so we have given them the green light, yes, please do go ahead and distribute these to those who want them. But we do want to make sure -- we want to do more testing and analyze our results to make sure it is an effective method, you know, before we go and tell them to use it. So that was it for the swamp coolers, yeah.

CHAIRPERSON SCHWARZMAN: Is there an increased energy demand when the swamps coolers are running with the filters?

MS. JARMUL: I think -- I don't know if there's a way to -- you mean, in terms of like electricity usage?

CHAIRPERSON SCHWARZMAN: Yeah. Right.

MS. JARMUL: I don't know if we collected that data. It would be kind of hard to pinpoint and, you know, blame an increase in electricity bills on the swamp cooler filters, but that is something that we can certainly look into, maybe even --

CHAIRPERSON SCHWARZMAN: I just didn't know if -- when the -- when the set up was tested, was there any testing about like the energy demand for running a swamp cooler with the externally applied filters?

MS. JARMUL: You mean, during FRESSCA original?

CHAIRPERSON SCHWARZMAN: I mean, even before that, like when the person who came up with this idea.

MS. JARMUL: Right.

(Laughter).

MS. JARMUL: I'm not sure. I'll have to get back to you on that point. I don't think Gina Solomon is online or Isabella Kaser, but just in case they are, please feel free to chime in. But that is a good question. We'll follow-up on that.

CHAIRPERSON SCHWARZMAN: Okay. Other questions? Yeah, Jenny.

MS. BELLOSO: I just wanted to -- I was part of the team that collected responses for the biomonitoring survey. And that was one of the questions whether the participants were satisfied with their swamp cooler and the intervention with the filter. And I recall there not being a lot of responses that mentioned the electricity use or higher costs associated with the filter.

MS. JARMUL: We did have HOBOs attached to it, so I know that they collect information on use. I don't know if they also collect information on electricity use. But yeah, we'll look into that.

PANEL MEMBER QUINTANA: Hi. Jenny Quintana.

Thank you for the presentation. I just -- I can't actually read this tiny print here, but --

(Laughter).

MS. JARMUL: Do you want me to go back?

PANEL MEMBER QUINTANA: -- the question about the BiomSPHERE update.

MS. JARMUL: Um-hmm.

PANEL MEMBER QUINTANA: I -- the first question I have is I didn't catch the time of year that you're collecting the urine samples. It says continuing through November, but was this a whole year of collection --

MS. JARMUL: Yes.

PANEL MEMBER QUINTANA: -- or was it a half year or what was --

MS. JARMUL: It started in, I think, around March or April of this year. The study was delayed. It was supposed to have started last year. And so yeah, we've been collecting samples kind of continuously or as people are being recruited since April or March of this year, and it should be completed by -- yeah, in the next couple of weeks.

PANEL MEMBER QUINTANA: And the reason I'm asking is it seems like a lot of those things you're measuring are going to be a lot higher in the winter months. And so -- and the reason I'm bringing this up is that I also do community air work.

MS. JARMUL: Um-hmm.

PANEL MEMBER QUINTANA: And I don't want to do harm to a community by measuring something that's much lower than would give the whole picture of the year, and saying that's -- because that will be published and that will be referred to as what the exposures are. So I'm just kind of -- I want to make sure that's put in context of how different it might have been if it was in winter or something.

I'm currently trying to get additional funding for an air study, because we measured in a really wet winter in San Diego --

MS. JARMUL: Yeah.

PANEL MEMBER QUINTANA: -- which was way lower than usual and I don't want to have that be the last word on that subject, so I'm being picky about this issue.

MS. JARMUL: I know and it's relevant, I guess, for both of our studies this year, since there was so much rain in California. I mean, the San Joaquin Valley is -- unfortunately, always has, you know, higher levels of these contaminants than I think we've seen in other parts of California. Regardless, for BiomSPHERE, we were hoping to be collecting last winter, but we did have some delays in the study. So we're not going to be able to capture the summer months, but I do still think we'd be able to see some differences, maybe even from March and November

of this year hopefully.

PANEL MEMBER QUINTANA: So the comparisons are longitudinal within the subject pretty much?

MS. JARMUL: Yes.

PANEL MEMBER QUINTANA: Because you do want variability to see differences?

MS. JARMUL: Exactly. And that's why we also are doing some sampling, where eight of the families were doing consecutive. So we're not only collecting urine samples -- four additional urine samples, but we're also collecting an additional time period of air sampling from those participants. So you may be able to see some variability there too.

PANEL MEMBER QUINTANA: And can you go over the sample size reduction from the original plan? I didn't write it down. Sorry.

MS. JARMUL: So it was 90. And with 90 parent-child pairs and now we're at 64 parent-child pairs, but we are collecting some additional samples from those families to try and make up a little bit of that gap since we won't have as many urine samples as we were originally hoping to.

PANEL MEMBER QUINTANA: Yeah, that's unfortunate, but it happens in field work.

MS. JARMUL: It does, yeah.

PANEL MEMBER QUINTANA: So I think it's really interesting that you're doing the parent urine and the child urine, right? So that's so interesting to see how kids might have higher --

MS. JARMUL: I know, yeah.

PANEL MEMBER QUINTANA: -- levels relative to the adults, so it's still very valuable.

Thank you.

MS. JARMUL: We'll be really interested to see those results.

PANEL MEMBER SUÁREZ: Hi. José Suárez.

Question about going back to FRESSCA actually.

MS. JARMUL: Okay.

PANEL MEMBER SUÁREZ: Could you remind me how long the intervention was for? And then I know that there was some biospecimen collection before and then during the intervention. Could you --

MS. JARMUL: So what our hope was, we did install the filters. We tried to pretty soon after we collected their first urine sample. So they were installed, I think, in August -- I want to say I think late August. So they had the filters on their homes, you know, for maybe a couple of months before -- or a month or so before we went and collected their urine. But our hope was to see a difference between their work exposures and exposures from

being in filtered air, and especially because we designed the study to take place during a wildfire event. We thought we'd be able to see some pretty extreme differences between being in wildfire smoke perhaps and then being at home in filtered air.

PANEL MEMBER SUÁREZ: Okay. So I understood correctly, in August is the installation of the intervention?

MS. JARMUL: Correct.

PANEL MEMBER SUÁREZ: And then the first biospecimen collection was two months afterward?

MS. JARMUL: It was before.

PANEL MEMBER SUÁREZ: Oh, it was before.

MS. JARMUL: Yes, before the filter installation, we collected their first morning void samples, just one, to try and help establish baseline exposures.

PANEL MEMBER SUÁREZ: Got it. And then after that, it was two weeks or two months after the air filtration?

MS. JARMUL: I think it ended up being about six weeks, yeah.

PANEL MEMBER SUÁREZ: Six weeks.

MS. JARMUL: More or less, there was -- we had installed the filters and then the hurricane came, and so we actually had to go and remove the filters, and then put

them back on. So it -- yeah, there was a bit of a gap in between that period, but --

PANEL MEMBER SUÁREZ: Okay. And so then the ultimately they were removed when?

MS. JARMUL: They were removed just a few weeks ago when we went and collected all other urine samples, we also removed all the filters from their homes, so mid-October.

PANEL MEMBER SUÁREZ: Okay. Mid-October. Okay. August to October. And then you collected biospecimens at one point in time during the intervention or after?

MS. JARMUL: Correct, just one point in time. So we would essentially go to their homes drop off the urine collection kit. Their first collection would be that evening after they've gotten home from work, and then we instructed them to collect their urine the next morning. And we came and picked it up the next day and administered the biomonitoring survey.

PANEL MEMBER SUÁREZ: Okay. Yeah. I'm just trying to get a sense of all the different components.

MS. JARMUL: I know, it's a lot.

PANEL MEMBER SUÁREZ: And then saliva. And finally, for the indoor measurements, those were constant or were they at certain points in time as well?

MS. JARMUL: They were also at certain points in

time. So what we wanted to do was hopefully capture exposures inside their homes, mostly not related to, you know, cooking, perhaps because we're looking at PAHs, VOCs and metals. And we wanted to see if outdoor exposures from the wildfire smoke was getting into participants' homes. So we collected, I think it was, 24 hours of the heavy metals and then six to eight hours for both the PAHs and the VOCs.

PANEL MEMBER SUÁREZ: Okay.

MS. JARMUL: And this is what -- part of what we did when we were pilot testing over the summer was to see -- because we had some fears that our tubes become oversaturated, especially for the VOCs. But we, from this pilot testing we're able to see that six hours seemed to be okay for the VOCs at least.

PANEL MEMBER SUÁREZ: And so when -- what are your next steps right now. Have you gotten into data analysis yet?

MS. JARMUL: Not yet. We still have to wait for the laboratory results to come back, so we're hoping to be able to start working on the data early next year.

PANEL MEMBER SUÁREZ: Okay. Yeah. I'm very curious to see how that pans out.

MS. JARMUL: Yes.

PANEL MEMBER SUÁREZ: Yeah. It's unfortunate

that there were no peak events to really --

MS. JARMUL: I know.

PANEL MEMBER SUÁREZ: -- find differences within the home.

MS. JARMUL: I know. I mean good for the San Joaquin Valley, but, yeah, unfortunate for our study purposes, yeah.

CHAIRPERSON SCHWARZMAN: Any other clarifying questions? We have discussion time.

Yes.

PANEL MEMBER CUSHING: Thanks for a great set of -- or a great presentation. Lara Cushing.

Could you just say a little bit more about the pilot studies for oil and gas that you're --

MS. JARMUL: That's just one of the --

PANEL MEMBER CUSHING: -- thinking about?

MS. JARMUL: -- options that we're looking into. And we're actually -- I'll be presenting at the end of this afternoon as well about our hopes for next year and maybe having some of the experts in the field come and present about, you know, challenges and opportunities with biomonitoring for oil and gas exposures. So yeah, that is something that we are considering.

CHAIRPERSON SCHWARZMAN: Okay. I want to check in about public comment. Rebecca --

MS. BELLOSO: We don't.

CHAIRPERSON SCHWARZMAN: -- do we have anyone who wants to weigh in.?

MS. BELLOSO: We didn't receive any public comments online yet.

MS. JARMUL: Nothing, yet.

CHAIRPERSON SCHWARZMAN: Okay. Then we can proceed into the Panel discussion. We have until just before 2, like five minutes before 2 to discuss, as a Panel, what's been presented. So I can open it up much more broadly beyond clarifying questions.

Jenny, go ahead.

PANEL MEMBER QUINTANA: I guess this is a clarifying question really actually it is. You said you provided an indoor air filtration unit in the BiomSPHERE or was that at the end of the study or beginning? You had a little indoor air filtration unit in the picture.

MS. JARMUL: Oh, for FRESSCA.

PANEL MEMBER QUINTANA: For FRESSCA. Sorry.

MS. JARMUL: We provided it around the same time that we installed the swamp cooler filters. And the reason that we did that, you know, for scientific purposes, we would have preferred to, you know, have maybe half the homes with a swamp cooler filter and half the homes with no filter, but our community partner was really

adamant about having some sort of protection for all of our participants, and so that's why we ended up giving these indoor air purifiers to all of the participants in FRESSCA and then the swamp cooler filters for half of them.

PANEL MEMBER QUINTANA: I see. So all of them had indoor air filtration. And this was just particles only or did it have like charcoal for vapors and stuff?

MS. JARMUL: I think -- actually, I think they did have the -- I know that at least the -- one of the brands definitely had the charcoal filters in it. So I think they should have removed some of the VOCs as well.

PANEL MEMBER QUINTANA: So I'm kind of wondering how do you know if it's -- except for that, but they all had filtration and only half of them had the swamp cooler I guess.

MS. JARMUL: I think we would hope to see a difference in between those who just had the indoor air filtration and then those who had the both indoor air filtration and the swamp cooler filters. And the swamp cooler filters definitely were filtering out a lot of the larger particles. As I mentioned, both visibly you could see on the filters and then also participants did mention that they noticed less dust in their homes, so -- and that was participants who had the swamp cooler filters versus

those who -- you know, we still have to analyze the data, but we're hoping to see a difference.

PANEL MEMBER QUINTANA: But you don't have PM10 measurements. In the home, you just had the PM2.5 or --

MS. JARMUL: I think we also did PM10, yeah. It's PurpleAir.

PANEL MEMBER QUINTANA: Well, it responds to PM10, but you can't tell what it is, right? I mean, they have a size thing, but it's not --

MS. JARMUL: Yeah. Well, and that's also part of our hope with Jeff Wagner's analysis that he can do some of -- figure out potential sources of the particles that we're seeing on the filters.

PANEL MEMBER QUINTANA: Okay. Great. Thank you.

PANEL MEMBER SUÁREZ: And just to follow up on that, it would become a little bit of a challenge, right --

MS. JARMUL: Yes.

PANEL MEMBER SUÁREZ: -- if you don't see a deference between the groups, how much is that, because there were not big enough events in the -- in the environment versus the introduction of a second intervention within that. What if the PurpleAir is good enough for everything and you don't really need that additional filter outside, right? And if it is good

enough, then you will not see a difference even if there are very high exposures outdoors.

Of course, we -- in this particular scenario, I would expect that you're hoping that there is some sort of a difference, but it sounds like there may be two competing challenges against you being able to detect anything.

MS. JARMUL: Yes. Definitely, it will be a challenge and we hope to work through it as best we can.

(Laughter).

MS. JARMUL: Yeah.

PANEL MEMBER SUÁREZ: I mean, that's the difficult part with designing interventions that, of course, it would benefit people.

MS. JARMUL: Yeah.

PANEL MEMBER SUÁREZ: And I see the push from the community partners saying, well, you know, everybody should have some sort of method in this.

MS. JARMUL: Yeah.

PANEL MEMBER SUÁREZ: But from the strictly scientific point, without you having that additional arm that did not have that extra intervention there, it might be a little challenge to discern.

MS. JARMUL: But also, if we're seeing a difference, you know, in the indoor air in general versus

outdoor air. And, you know, that even the indoor air purifiers are working, that's also good news to share with the participants, even if we can't see a difference between the indoor air cleaners and the filters outdoors.

PANEL MEMBER SUÁREZ: Right, but which then becomes the question, right? So if you don't find a difference, you say, well, it's good enough.

MS. JARMUL: Yes.

PANEL MEMBER SUÁREZ: Then does that mean that you don't recommend the swamp cooler filter or not, right?

MS. JARMUL: Yeah.

PANEL MEMBER SUÁREZ: And it's probably much cheaper the swamp cooler filter than it is the PurpleAir, right? How much of a diff -- cost difference is it?

MS. JARMUL: Well, and it's -- they're just different too, because you can have the air filter inside your home at all times, you know, whereas the swamp cooler filters that they were looking at were specifically for wildfire events, you know, for temporary solutions, for these extreme events. So they kind of serve different purposes as well.

PANEL MEMBER SUÁREZ: Well, hopefully, you'll see something.

MS. JARMUL: Yes.

PANEL MEMBER SUÁREZ: If not, you'll have to be

very creative about what the message is that's going to come out.

MS. JARMUL: Oh, yes. Yes

PANEL MEMBER LUDERER: Well, sort of following up on that and also maybe somewhat pie in the sky, but what I am sort of thinking about as I was listening to this is, you know, you have these community partners who clearly were very enthusiastic about this study. And I wonder if there's some way to kind of maintain that enthusiasm and maybe have some sort of a rapid response, you know, wildfire, you know, study that could be done to -- you know, to be able to get those data that you had hoped to get, especially because it seems like, I mean, people really were enthusiastic about participating, and about the interventions. You know, they actually could see benefits inside their homes, so that's a thought.

MS. JARMUL: Definitely. Thank you.

CHAIRPERSON SCHWARZMAN: Did the monitoring equipment stay? Did the PurpleAir monitors stay?

MS. JARMUL: We removed them, but I think we ended up, because we had to take all the data off, but we -- I believe we ended up returning them to the participants' homes after or it is our plan to return them to the participants' homes, so that we can continue monitoring, yeah.

CHAIRPERSON SCHWARZMAN: Jenny.

PANEL MEMBER QUINTANA: Hi. This is kind a vague advice, because I can't remember the details, but I was listening to a presentation on UC Riverside's Salton Sea study, because I work some in the Imperial Valley, which is to the east of San Diego in a valley, very similar to the Central Valley, and they had tested a bunch of low cost sensors and found ones that really were much more responsive to PM10 specifically, because they had the same questions about the coarse particles as being significant for health, in addition to the fine particles that we think of as being regulated. So I'll look for that, if you're interested and try to find it, because I think that might be the key for your air filters is to really make sure you're measuring those coarser particles that would be filtered out.

MS. JARMUL: Do you know, has that been published yet?

PANEL MEMBER QUINTANA: I was at a presentation. I could probably -- I'll try to look for the person in the slide show for you. Sorry about that. My brain is --

MS. JARMUL: That would be great. Thank you.

CHAIRPERSON SCHWARZMAN: Tom.

PANEL MEMBER McKONE: If you go down one slide. Not that one, the picture of the -- I guess it was --

MS. JARMUL: The pictures.

PANEL MEMBER McKONE: The one with the air filter in the room -- yeah, the indoor air. There. Okay.

MS. JARMUL: There. Okay.

PANEL MEMBER McKONE: Yeah. That's a Levoit. I just -- I mean, I recognize that --

MS. JARMUL: Yes.

PANEL MEMBER McKONE: -- because we had one, but so do other people. But those do -- the standard model, if that's a 300, which it looks like, does have activated carbon.

MS. JARMUL: Yeah.

PANEL MEMBER McKONE: Yeah. You're -- you know, it would --

MS. JARMUL: And the -- I'm forgetting the name of the other brand is actually the kind that I have in my house too. And so I'm sure that we had the activated carbon. Winix. Yes, Winix was the other brand that we deployed as well.

PANEL MEMBER McKONE: And I had another question again or comment, but I can't remember it now, because I got backtracked on this one.

Oh, in terms of -- do PurpleAirs, I didn't think they do PM10. I thought they just do the fine particle. They do the coarse?

MS. JARMUL: I believe they do PM10 as well.

PANEL MEMBER McKONE: They record it, but that's not what they're for. I mean, they're not -- you don't use them for that.

PANEL MEMBER QUINTANA: No.

PANEL MEMBER McKONE: Yeah. That was the other kind of technical question.

MS. JARMUL: Okay.

PANEL MEMBER McKONE: Oh, yeah, and the other point is given -- it's something that Jenny brought up about, you know -- so this year probably the worst air quality in the these areas in the Central Valley won't be during the summer, right? It's going to be during the winter when everybody is burning wood smoke. And I don't know if there's an opportunity to I mean, that's a lesser event.

MS. JARMUL: Right.

PANEL MEMBER McKONE: But, I mean, given -- I think the fire season is over, which is good news, but -- because right now there's seven inches of new snow up in the Sierra, so that's always a good sign that fire season is over. So that's today. They got seven inches of snow, Donner Pass. So that means fire season probably truly is over, because when you get the first snow it pretty much ends it.

MS. JARMUL: And people also around this time stop using their swamp coolers as well, because they turn them on when it's hot during the summer months.

PANEL MEMBER McKONE: So they won't be used, that's true.

MS. JARMUL: Right, so they won't be using those anyways during the winter.

PANEL MEMBER McKONE: Right.

CHAIRPERSON SCHWARZMAN: I know that another source of PM and PAH pollution in those areas is often from agricultural burning. I don't know how that intersected with what you were looking at.

MS. JARMUL: Well, I mean, we did collect outdoor air monitoring data regardless. And I think when they were in the field in Bakersfield, there was still pretty poor air quality, you know, just based on EPA AirNow. So again, we won't be able to see likely components of wildfire smoke, but there was certainly poor air quality in the San Joaquin Valley this summer just for different reasons.

CHAIRPERSON SCHWARZMAN: Yeah. I know this was designed around potentially an intervention for wildfire smoke events, but I can imagine a lot of useful information and health-relevant information still coming out of this, not to -- I know it's a downer when you're

doing field work and the thing you were trying to test doesn't happen.

MS. JARMUL: Environmental sampling is very difficult.

CHAIRPERSON SCHWARZMAN: Yeah, environmental sampling is difficult, but it seems like there's promise there anyway.

MS. JARMUL: Yeah, I hope so.

CHAIRPERSON SCHWARZMAN: I look forward to hearing about it.

José.

PANEL MEMBER SUÁREZ: So following up on it. Is -- do you have any plans about maybe bringing it back to life on a part two and hope to capture one of these wildfire events?

MS. JARMUL: It's not currently in the plans, but it is certainly something that we can consider for a future study. I know we've gotten a lot of questions about that and the study PIs as well. So I think it depends on, you know, interest in all parties involved, and funding, and all that.

PANEL MEMBER SUÁREZ: Yeah, funding is a big thing, and maybe we can talk about this offline or whatnot about how much it costs to do something like this with 51 participants and the feasibility of -- if you don't see

anything, do you --

MS. JARMUL: Right.

PANEL MEMBER SUÁREZ: You know, I guess you might be inclined to repeating this and hopefully catching a wildfire event.

MS. JARMUL: Right, um-hmm.

CHAIRPERSON SCHWARZMAN: Along those lines just to tag on with that of like you all probably could say even more than we could about how much -- how much work it takes to establish the community partners, the relationships with the study participants, and all of that. And in a way, you've done all that. And so the idea of repeating that seems like a good use of resources, if an event arises or there's some way that you could construct it around that. Then you're not -- it's not like a different study starting from scratch in a different population with different community partners. You've done all that huge amount of work that it takes to do that kind of community based study.

PANEL MEMBER SUÁREZ: And you wouldn't have to re-enroll participants, because they've already been enrolled.

MS. JARMUL: Right.

PANEL MEMBER SUÁREZ: You have to get a new IRB I supposed to do the extension, but that's the easier part,

right?

MS. JARMUL: That is maybe a larger program discussion too is, you know, we've seen that in some of our -- all of our studies that we've had recently is, you know, we have these opportunities maybe to go back and study for additional exposures, but then are we missing out on potential exposures in other communities that we haven't yet reached. So these are program discussions that we're having and not really easy with the limited resources and time, of course. We'd like to do it all and go everywhere.

CHAIRPERSON SCHWARZMAN: Yeah, I hear that. I think I just kind of wanted to support that of like just an acknowledgement of how much you have already invested in some of these partnerships in learning about the community, and the setting, and the intervention, and it's such an investment of staff resources, and community resources, and all of that, and not even like if nothing came of this, but also just keep thinking about ways to capitalize on that incredible investment, and what you all have learned, and who you've recruited, and how you've educated the community, and what the community partners now know, and all of that. It just -- like I understand, we can't get everything we wish for, because you'd also like to go design other studies, but just supporting from

the quality of what you've put together being able to continue to use that. I would support that.

MS. JARMUL: Thank you.

CHAIRPERSON SCHWARZMAN: Martha.

DR. SANDY: This is Martha Sandy. I wanted to say thank you. We hear you with your thoughts on this. I just wanted to also say this is a biomonitoring component put on to another study -- an existing study, so it's a larger conversation even than just within the Program, but we will take that back.

Thank you.

MS. JARMUL: Yes, lots of interest in expanding the study.

CHAIRPERSON SCHWARZMAN: Other thoughts, discussion points, comments?

Time for like one more.

Anything, Rebecca, that we should note from online?

MS. BELLOSO: We had -- Isabella pointed out that --

MS. JARMUL: Oh, Isabella's online. Great.

MS. BELLOSO: -- yeah -- that PurpleAirs only collect info on PM2.5.

MS. JARMUL: Oh, okay. Thank you. Isabella clarified that PurpleAir monitors were -- at least we're

only using them to collect PM2.5 data.

CHAIRPERSON SCHWARZMAN: Okay. Okay. So with that, thank you very much, Stephanie, for the presentation and really an acknowledgment of all the staff work that goes into all of those projects and it's really cool to see them coming through. We look forward to hearing results.

We will break for a 10-minute break now and I just -- my computer just turned off, so let me just check and see if there's anything else I need to tell you about that before we break.

Hang on one sec. We will reconvene at 2:05.

(Off record: 1:53 p.m.)

(Thereupon a recess was taken.)

(On record: 2:06 p.m.)

CHAIRPERSON SCHWARZMAN: Okay. So thanks everyone for coming back from the break.

In our next agenda item, we'll be hearing from two speakers. Our first presenter is Susan Hurley. She is currently a Research Scientist in the Exposure Surveillance and Epidemiology Unit and -- at CDPH and was previously a Research Scientist in SAABS at OEHHA. She will be presenting results from the Stockton Air Pollution Exposure Project.

(Thereupon a slide presentation).

MS. HURLEY: Thank you, Meg. Can you guys hear me okay? Should I move this?

Oh, it's -- okay. Good. Okay. Thank you.

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MS. HURLEY: So I just wanted to start by showing again the main objectives of this study. Stephanie showed this earlier, but we had two primary objectives, one is to learn more about air pollution exposures to school children in Stockton and then to evaluate the effectiveness of the air filtration at reducing those exposures.

So last March, I presented some preliminary findings pertaining to this first objective here, which is to learn more about air pollution exposures. And today, I will be presenting some follow-up to those findings and then sharing our results pertaining to the effectiveness of the school air filtration.

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MS. HURLEY: So this is just a brief overview of our study design. You've all seen this before, but we conducted the study in one small school in Stockton, where we measured air pollutant levels inside and outside of the school. And we installed portable air cleaners in about half the classrooms of participating students. And then we had parents complete online questionnaires about

demographics and some exposures. And then we collected children's urine before and after school and then measured chemicals in that urine that could indicate exposure to air pollution.

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MS. HURLEY: So the study was -- our goal was to enroll 50 children. Our actual enrollment was 18 kids. We collected a total of 69 valid urine samples on two consecutive -- two days of consecutive weeks in early December 2021, so we had one sample before school, one sample after school on each child for each day of the study.

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MS. HURLEY: And so back in March, I reported on the levels of the urinary metabolites of VOCs and PAHs and then compared them to those reported in the most recent available data from NHANES. And so this is just a quick reiteration of those findings. So we found evidence of nearly universal exposure to fluorene, naphthalene, phenanthrene, pyrene, acrolein, acrylonitrile, crotonaldehyde, and propylene oxide. Exposures to benzene and 1,3-butadiene were comparatively less common.

And then except for naphthalene, the metabolite levels for the other PAHs and the VOCs were comparable to or lower than what we saw in kids participating in NHANES.

So -- but for naphthalene, the median level of 2-naphthol, which is a metabolite of naphthalene, was nearly four times as high in SAPEP as what we saw in NHANES.

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MS. HURLEY: So while, you know, this study is a super small study, it's not meant to be representative of the population in general, just given how high the levels seem to be, we figured that warranted further investigation. So sort of -- our first step was just to figure out, well, are these exposures truly high or could our 2-naphthol results be an artifact of laboratory methods or some other kind of measurement issues. And then if they are high, then why? What chemicals are they being exposed to and how are they -- how are they being exposed? So that was kind of our strategy is setting out on this.

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MS. HURLEY: And to answer the first question about lab methods, there are some important differences. NHANES uses GC-MS and they report their results separately for 2-naphthol and 1-naphthol. Those are both metabolites of naphthalene. Our UCSF lab colleagues used LC/MS and they've reported their results for 2-naphthol, but indicated that there was probably some co-elution of 1-naphthol. And so what we did was we went back to the

NHANES data and we grabbed the 1-naphthol levels, added them -- I'm sorry. This pointer is really funky -- added them to the 2-naphthol and then compared our results again. And you can see, if you compare this middle bar, this is where the NHANES concludes one 1- and 2-naphthol compared to ours and our levels still seem to be considerably higher.

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MS. HURLEY: Okay. So then the other important difference between SAPEP and NHANES is the sampling time. So the most recent data on kids on 2-naphthol in NHANES was collected about five years before our samples were collected. And that's important, because we have -- we have seen some U.S. biomonitoring data that suggests a recent upward trend in 2-naphthol levels, especially in kids. So it might be that the apparent higher levels we're seeing in our study might just be explained by this underlying trend in the general population. And so it might not indicate that there's some kind of special exposure to our population, but it's just that something is going on in the general population.

Then the other time consideration is SAPEP samples were collected in the winter when naphthalene air concentrations -- whoops -- are typically high, especially in this area. And NHANES is collected -- they collect

their samples year-round. So our apparent higher levels could just be partially explained by these seasonal differences in sampling.

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MS. HURLEY: So given the limitations in comparing our data to NHANES, we did try to look to other sources of data, other studies, just to see how our levels compared. Unfortunately, there's not a lot of contemporary data on 2-naphthol in kids. But from what we could find, it did look like our levels are higher than what is being reported in other studies. And then it's also noteworthy to mention that Peyton Jacob's lab at UCSF, which did our laboratory analyses, also did some analyses on this other study if these adults in midwest who use tobacco and other kind of smoking things. And so they used the same methods and the samples were collected about the same time. And our levels are about twice as high as what he found in those other samples.

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MS. HURLEY: So the bottom line is we think, yeah, these levels do look like they're unusually high. And so then our next step is -- has been to try to figure out why. And so this is just kind of a roadmap for the steps that we've been taking to try to figure out what's going on. And it involves kind of a number of things.

One is looking more closely at the air and questionnaire data, to identify factors that are associated with the high 2-naphthol levels. We also -- the UCSF lab is going to be doing some follow-up -- or is doing some follow-up lab analysis, which will help us separate out 1-naphthol from 2-naphthol. And I'll say a little bit more about that in a little bit.

And then we've also been looking at environmental monitoring data to see if there's any data out there that might help us discern potential exposure sources in the community. So we're kind of working on all these things all at once, because we really are eager to get a better understanding of how to interpret our results so we can get the findings back to the community and be able to talk about the best way to interpret them.

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MS. HURLEY: But so what we know from what we've looked at so far from the data we have in hand, based on the questionnaire data, the only significant predictor of 2-naphthol was living in a home with an attached garage. And that is consistent with other exposure studies and likely just reflects exhaust and evaporative emissions from the vehicles that are parked in the garage.

We also did see a marginally significant increase levels in -- with kids who had recently consumed fried,

grilled, barbecued, smoked, or roasted food. We don't think our high levels are being driven by tobacco exposures. There was very little self-reported tobacco exposures in the study and they weren't associated with the level -- the 2-naphthol in the urine. And we also didn't see any kind of correlation between nicotine metabolites in the urine and 2-naphthol in the urine.

And then at the suggestion of someone on the Panel last time who suggested we look at agricultural burning as a source, we did look at data on that and it doesn't look like that's a likely explanation. There was no burning in the Stockton area during the first week of the study when our naphthalene air levels were actually at their highest.

So the -- so we're continuing to sort of pursue all of these, particularly the last one, which is looking at trying to figure out local -- potential local exposure sources. But those efforts are really going to be sort of driven or informed by what we find in our follow-up lab analyses.

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MS. HURLEY: So I wanted to say a little bit more about that. So the main purpose of these analyses is to separate 1-naphthol from 2-naphthol as a way to help identify the potential parent compounds of exposure of

concern. So naphthalene is metabolized -- I'll try to use this pointer -- to both 1-naphthol and 2-naphthol. And so 2-naphthol in the urine can also come from direct exposures to 2-naphthol which is an industrial chemical. It's used in a variety of manufacturing. But outside of occupational settings, it's not really thought to be a main driver of exposures in the community.

And 2-naphthol is just generally regarded as a pretty specific good biomarker for naphthalene exposures. 1-naphthol on the other hand is not as specific. It can be -- it can come from metabolizing -- metabolism of other chemical exposures and carbaryl, which is a pesticide, is the one that's probably most important. There have been multiple reports of people with super high levels of 1-naphthol who have -- who have known exposures to carbaryl. So our findings from the lab, we're very eager to see them, because it will really help us figure out what's going on here and we will share those when we get them.

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MS. HURLEY: But moving on, so that's all I'm going to say about naphthalene results for today.

And now I want to -- the second half of my talk is on evaluating the effectiveness of school air filtration.

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MS. HURLEY: And so some of -- we showed a little bit of this before. Oh, well, let me start with this. So I know there's a lot on this slide. This is just sort of a summary of where all the kids were in the classrooms and where we have the portable air cleaners, and where we have the air monitoring data. But the main thing I want to call your attention to is we have 18 participants, each one of these little people, and there's 10 who have the air quality data, so that's the PAHs, black carbon, PM2.5. Half of them have a portable air cleaner in their classrooms, the other half don't. And then we -- yeah, so -- and then we have these eight participants in classroom 5 and 6 through 8 who we only have the urine data. So this is for week one.

And then week two, we added the VOCs. We also added portable air cleaners to two of the classrooms, and unfortunately we lost two participants.

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MS. HURLEY: So this shows the physical layout of the school, along with which classrooms had the portable air cleaners. And I show this mainly just so you can kind of get a lay of the land. You can see it's a very small school. There's only a few classrooms, but it is kind of spread out. The playground is down here. I can -- here

it is here. And that's -- and then the road right next to the playground. That's where the kids get dropped off and picked up, so there's a lot of idling cars in the morning and after school.

And then the other thing is the classrooms are kind of spread out, so these classrooms in the front, these are all permanent structures. The ones in the back are portables. And so there's really a mix of structures with differing HVAC systems and differing ventilation characteristics.

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MS. HURLEY: Okay. So on to our results. So this is the -- our analysis -- a summary of our analysis of the effect of the portable air cleaners on air concentrations. And what you can see for both PM2.5 and black carbon, we see the highest levels are outdoors. These boxes. I'll just say it by color. I'll stop pointing. The box is in gray. And then in the middle, those brick color, brown, that's the classroom without the portable air cleaners. And we see that it goes from highest outdoors to the classrooms with no portable air cleaners and the lowest levels were in the classrooms with portable air cleaners.

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MS. HURLEY: Now, this is an auxiliary analysis

that was led by Jeff Wagner's group at CDPH. This is the same kind of thing that I believe is being done in FRESSCA. And this is to try to get at sources by looking at the types of particles that are found. So two passive samplers were deployed. Well, three, two in two classrooms and one in an outdoor location. And then they were analyzed by scanning electron microscopy. And what they found is that sodium salt fog particles aluminosilicate dust were the most abundant types of particles found in the sampling of the school.

And, you know, this is the first time I think Jeff's deployed these for such a short period of time and so we weren't sure it was going to work, but it actually looks like it worked quite well. So we think this could be a useful tool in future community biomonitoring studies.

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MS. HURLEY: Okay. So on to the PAHs. So these are based on 24-hour samples collected on each day of the study, two -- at two outdoor locations and then two classrooms with portable air cleaners and two without. We measured 17 different PAHs, including those in the particulate and vapor phase. And unfortunately, week two levels were very low due to a massive rain storm. And so we really couldn't do formal statistical analysis due to

small numbers. But for each of the 17 PAHs, we sort of just constructed these plots like I've shown here. This is just one example of naphthalene where we just took the average of day one and day two and just visually created a figure, so we could kind of see what's going on.

And so for all the classrooms -- for most of the PAHs, they all kind of had the same pattern, where the highest level is seen in the classrooms without a portable air cleaner and then the portable air cleaners are usually the lowest.

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MS. HURLEY: And then for the VOC analyses, these were based on 8-hour samples collected on each day at one outdoor location, then two classrooms with and without the portable air cleaners. These were only done during week two, because we only had the funds to do it during one week, and unfortunately we picked the week that it rained. So we had detectable levels reported for eight of the 68 VOC analytes that we measured. And here, these are the eight. And you can see the patterns of -- kind of similar where we see the lowest levels in the classrooms with the portable air cleaners.

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MS. HURLEY: So then on to our biomarker analyses. So for these, we ran just pretty simple

regression models, where we logged -- we regressed the p.m. metabolite level, so what was measured after school, on what they came to school with, so the a.m. level, and then put an indicator variable in there for whether or not they were in a classroom with a portable air cleaner or not. And so this is just a summary where the percent -- the PAC effect is just derived from the beta coefficients for the portable air cleaners. And all of these, the negative percentages indicate that -- or suggest that the portable air cleaners, the levels went down more in kids who were in a classroom with a portable air cleaner than not.

But as you can see, none of them were statistically significant, but the pattern is consistent with a positive effect. Using the same approach though for the VOC metabolites, here we really did not see any consistent evidence for an effect of the portable air cleaners. The regression coefficients go in both directions and and the p-values are very high.

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MS. HURLEY: So our overall summary is that the use of portable air cleaners modestly reduced the concentration of PM2.5 and black carbon in the classroom air. It may have also reduced the concentration for some of the PAHs and VOCs, but we can't say for certain. And

then the degree to which these reductions in air concentrations reduced children's overall exposures, so based on the biomonitoring data, is really difficult to ascertain just due to study limitations.

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MS. HURLEY: And really, the overarching limitation of our study is lack of statistical power. When we designed this study, our power calculations were based on a sample size of 50 kids and a reduction in air pollutants of at least 50 percent, and we didn't meet either of those expectations. We also -- the air pollution in Stockton at the time we conducted the study was actually not that bad, so we didn't have, you know, super high levels.

And then, as I mentioned earlier, the classrooms really had very -- there was a lot of variability in their HVAC systems and the ventilation conditions. So it was just very noisy data, and so it's hard to really pick up a signal for the portable air cleaners.

And then on top of that, you know, it was -- we were doing this during a pandemic, and so there were certain factors that may have modified exposure that we just didn't have any control over. So the doors were left open. All the kids were wearing masks.

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MS. HURLEY: But despite those limitations, we do think that we did get some things of value from this study. We really were able to refine our methods and tools for doing these kinds of studies. We could do it -- apply it in the future. The kits that we had for the do-it-yourself urine sample collection. But the kids, actually, they did a really nice, good job.

Also, for the first time as a Program, we were able to return individual results to the participants electronically. So that's -- that's I think going to make things a lot easier in the future, and then also open maybe some new strategies for communicating those findings.

And then, you know, we -- the participants did get information about their exposures and tips for how they can reduce them. And we did leave the school with portable air cleaners. And the PurpleAir monitors are still up and running, so they're providing important information about, you, know hyper local exposures in Stockton, where, at least as of when we started the study, there were almost no PurpleAir monitors there.

And so I guess, you know, while we -- there's not a lot of definitive conclusions we can make from SAPEP alone. We're hoping that when we get the data from BiomSPHERE, you know, we will learn more about these kinds

of exposures to kids and we also will get some insights into the utility of these biomarkers and understanding those exposures.

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MS. HURLEY: So with that, I am done. And I just want to give a shout-out to McKenna Thompson and Dan Sultana who did most of the data analyses and really helped put a lot of these slides together. So with that, I can take questions.

(Applause).

CHAIRPERSON SCHWARZMAN: We have five minutes for questions from the Panel and from the audience or online attendees.

I have one question when you mentioned that all of the students wore masks. I did a super quick Google about what volatiles are released from masks. And we don't know what kind of masks they were wearing, but --

MS. HURLEY: We actually do know what kind.

CHAIRPERSON SCHWARZMAN: Okay.

MS. HURLEY: Well, we don't know exactly what kind, but yes, we came across that as well.

CHAIRPERSON SCHWARZMAN: What did you conclude from that?

MS. HURLEY: Well, so half of our students wore cloth masks and half wore the disposable surgical masks.

And so -- and we didn't see any differences between the two, but, yeah.

CHAIRPERSON SCHWARZMAN: I guess that's helpful.

Other questions.

Jenny.

PANEL MEMBER QUINTANA: Hi. It's just a clarifying question. So for your biomonitoring data, you had morning and afternoon samples over each week, right?

MS. HURLEY: Yes.

PANEL MEMBER QUINTANA: So you had multiple samples per kid or was it --

MS. HURLEY: We had -- we mostly had four samples per kid.

PANEL MEMBER QUINTANA: Okay.

MS. HURLEY: So the plan was we would have one day in week one, before and after, and one day, the same day of the week, week two, before and after, so you'd have four per each, but, you know, there was a little --

PANEL MEMBER QUINTANA: Yeah.

MS. HURLEY: Things slipped a little.

PANEL MEMBER QUINTANA: So when you did the analysis of biomarker reduction, was that in the absolute? You're just combining all the morning and afternoon samples or was there a difference between morning and afternoon. I'm just thinking of the half-life of the

compounds that you're measuring.

MS. HURLEY: Yeah, it was a difference in that morning to after -- so we ran those regressions where the outcome was the afternoon and then it was regressed on the morning and then an IQ -- and then we had an indicator for IQAir. And so we used the beta coefficient for the indicator for IQAir to see were there differences in the changes between morning and afternoon in kids with and without classrooms with IQAir.

PANEL MEMBER QUINTANA: So just to remember the half-lives. I know for benzene it's super short. Maybe I should ask you about PAHs, Ulrike.

MS. HURLEY: They're short.

PANEL MEMBER QUINTANA: But the half-life --

MS. HURLEY: Yeah. So, I mean, that was why we thought we would be able to see something, yeah.

PANEL MEMBER QUINTANA: Okay. All right. Thank you.

CHAIRPERSON SCHWARZMAN: Ulrike. And then, Tom, did you have a question? We can go right around.

PANEL MEMBER LUDERER: So my question, you mentioned 2-naphthalene as being like barbecued foods was the source of exposure --

MS. HURLEY: Well --

PANEL MEMBER LUDERER: -- but 1-naphthalene is

not.

MS. HURLEY: Well, 1 --

PANEL MEMBER LUDERER: Naphthol, sorry.

MS. HURLEY: Yeah, 1-naphthol is not.

PANEL MEMBER LUDERER: Yeah.

MS. HURLEY: At least that's my understanding from my reading of the literature. And then even for 2-naphthol, you don't often see eating as being associated with that, but some of the studies of like -- like in Guatemala where they look at cook stoves and those kinds of exposures, the cooking does seem to be related to 2-naphthol in the urine.

Now, we did ask about cooking, but, you know, it was a very sort of crude indicator variable. So, you know, it could actually more reflect exposures from the cooking.

PANEL MEMBER LUDERER: I don't usually think of those -- I don't associate those with barbecue so much.

MS. HURLEY: Yeah. Yeah.

PANEL MEMBER McKONE: In your analysis of the major PM types, the major component was sodium salt in fog?

MS. HURLEY: Yeah.

PANEL MEMBER McKONE: Is there fog penetration into Stockton during this time from coastal? I mean, I

would expect to see salt fog particles to be of ocean origin, or bay, or something.

MS. HURLEY: Yeah, well -- and I might let Jeff Wagner, if he's on the line, jump in on this. But I think hypothesized sources are that fog coming in actually from the -- that might be ladened with sulfur from refinery emissions in Contra Costa County, that that may be carrying some of that in.

And then also at the Port of Stockton, there is typically a storage of sulfur pilings or -- you know, that is of by-product of refineries that's stored in the port and then transported out from there. So that's another possibility.

But, Jeff, if you want to say any more about that?

DR. WAGNER: Yeah. Hi. This is Jeff Wagner Chief of the CDPH Environmental Health Lab.

Yeah, Susan, I think -- I think you pretty much covered it. I would just add that, yeah, we're not really sure. We know it was humid and rainy during the study period, so certainly some type of water in there makes sense. But there's historically fogs that originate -- radiation fogs that originate in the valley as well as the possibility of fogs drifting in from the San Francisco Bay area past all these refineries we know, as well as the

local piles of sulfur that Susan mentioned.

PANEL MEMBER McKONE: They store -- I seem to recall going through the area, there's sulfur piles too, right, somewhere around this area where they --

MS. HURLEY: Yeah, I think that's what --

PANEL MEMBER McKONE: -- you know they ship -- they ship bulk sulfur out of -- somewhere around here.

MS. HURLEY: Yeah, out of the Port of Stockton. Yes. And the school is about three miles south of the port, southeast.

CHAIRPERSON SCHWARZMAN: Thank you so much, Susan. Appreciate the presentation and we'll move along to our next presenter.

I want to introduce Nina Holland, who is professor in the Environmental Health Sciences Division at the UC Berkeley School of Public Health. She is also the Director of the BPH biorepository and the children's Environmental Health Laboratory.

Her background is in genetics with extensive experience in molecular epidemiology, cytogenetics, and epigenetics. Her lab is involved in several ongoing projects including CHAMACOS and CHAPS cohorts, as well as the Stockton Air Pollution Exposure Project.

And today, she'll be presenting on the results of the biomarkers of response data collecting -- collected

from SAPEP.

(Thereupon a slide presentation).

DR. HOLLAND: Thank you, Meg.

It's a pleasure to be here. Thank you and good afternoon. Nice to see people live --

(Laughter).

DR. HOLLAND: -- not just on the screen.

So this was a small study. Thank you, Susan. And she described strengths and limitations of this study, some lack of --

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DR. HOLLAND: -- having lower exposure. Unfortunately, it turned out to be a somewhat disadvantage to the --

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DR. HOLLAND: -- addressing the goals of this exposure project. So there was a lot of collaborators involved.

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DR. HOLLAND: And my contribution -- my lab contribution was to look at the biomarkers of response, biomarkers of effect as otherwise known in molecular epidemiology. And not preaching to converted, but we all use to look at the effects of air pollution exposures from data that come from -- data from air pollution monitoring

system. We look at markers that noted indoor/outdoor, and also we really want to understand how all this exposure end up potentially harming internal system of the organism, children especially, because they're particularly susceptible, vulnerable, due to metabolic things, rate of inhalation. So advantage of using some of the urinary biomarkers, is that we are able to get kind of a general assessment, and then establish relationship between different markers of exposure on different levels and then potentially say, okay, what could be this early response changes that in turn that can link them with certain health outcomes

So it's a very noble goal. This study made a very small humble contribution to this data using this collection that took place in Stockton. And as Susan already mentioned, there was already aging school children that we got samples from. They repeated measurement, so they got actually 67 urines that we received to analyze the biomarkers.

And before the study, we kind of thought about what biomarkers can give us potentially somewhat complementary information, so we chose two biomarkers of primarily oxidative stress and other biomarkers of inflammation and all lung injury.

So your analysis are adjusted for specific

gravity, we focused on that, but we also did creatinine adjustment. Everything was log transformed for future analysis, and some of the analysis was done by Daniel who is not here, but some of that done by people in my lab.

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DR. HOLLAND: So given the limitations of the numbers, what we decided to do was kind of assess what potential sources of variability we can figure out, because there is not much data in children. So when you looked at the study participants in this one, 13 boys, five girls between 5 and 13 years of age. And the 61 percent were Hispanics.

So what was noticeable to us when we looked at this relationship between BMI and the age, so it's quite obvious that there is a strong increase in BMI with age. And unfortunately, quite a few of these children are overweight and obese. And people who collecting samples also told me then, especially boys tend to be quite, you know, large for their age.

However, when they compared with NHANES data, it's very consistent that even this small group of children in Stockton was the same range that is presented for the same age group in NHANES. So even they are not happy with this consistent increase in BMI, it's a reality that we all are facing. And I've done quite a bit of

studies on causes of obesity, so I'm not particularly surprised to see it in this study.

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DR. HOLLAND: So a few words about the biomarkers that emerged. Isoprostanes are well know biomarkers of oxidative stress. There are a bunch of studies. We've done some of the studies going back to '92, 2000. And recently, we published a paper based on CHAPS cohort. This is cohorts of children in Fresno County. And Fresno city one of the most polluted, using the same assay that we later employed for this particular study. There are studies internationally, so it's well established biomarkers, so we felt pretty confident. And this biomarker of lipid peroxidation.

In contrast, 8-hydroxy-2-deoxyguanosine assist in oxidative damage to DNA and other nucleic acids. So it was interesting to us to see of what we will find in the relationship to this air pollution in the children in Stockton. There are some other references available.

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DR. HOLLAND: But not much in children actually, mostly adults.

Okay. This is the prostaglandin. We looked at prostaglandin (PGE2), very abundant in body in different fluids related to inflammation immune response. So some

associated with impaired air function in children, in severe asthma, and demonstrated increased in former smoking -- smokers, but this is adults, the COPD.

CC16 it's another marker. It kind of gives us more insight and the effect on lung injury, so because when epithelium is injured that is this leaking in the bloodstream and (inaudible) in urine, where you can measure it. We've also done several of these studies over the years in children and adults, including CHAPS children that I mentioned earlier. It's a Fresno cohort that was published last year.

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DR. HOLLAND: So we've done several ELISAs before we engaged in this project, because we wanted to find the most reliable, reproducibility because we want to have a high throughput. So it's immunosorbent assay. Many of you have probably done ELISA, know it, and so I'm not going to go into too much detail, just to mention that for each of them, we used 96 well plate. Everything done in duplicate. And we do calibration curve. And then based on the calibration curve, we calculate the level in individual subjects for each of these biomarkers. So each biomarker has to be done in a separate assay.

So essentially for each of these subjects, we've done four assays, four experiments. And that on the

plate, we usually are able to estimate 32 subject per plate, but we've done multiple repeats, especially for the situations when you had some data that we wanted to make sure that we emerge it correctly.

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DR. HOLLAND: So this is a descriptive information on distribution of these biomarkers of response. We see four different lines of this data. And pretty much everything we were able to measure, one subject had very low level of CC16, but the rest of it was measurable, and we have distributions that we try to compare what we knew based on our previous study. For instance, in CHAPS children, our level here in Stockton was slightly lower, not that significantly lower, but slightly lower, 5.5, in Stockton, and here you have essentially 4.55 by geometric comparable.

We have a little higher level than CHAPS for CC16. We was somewhat surprised by that, but again given that we have so relatively few subjects, that is all this interindividual variability and that was interesting to us to kind of explore what other causes, because matrices biomarkers not only respond to air pollution, but they may depend on diet, they may depend on other exposures that children may have.

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DR. HOLLAND: So we looked at the distribution, and it was -- for each child, we had between two and four. This just shows for two biomarkers, but the same story we see for all four of them. So we can see that while some of them may have relatively tight vertical distribution. For instance, the very first subject on isoprostane chart is very, very tight and the measurements are across two weeks, morning and evening, and two weeks repeated.

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DR. HOLLAND: We did not attempt to look very closely why and how to compare week one, week two, morning and evening. I have to confess, we did look at it a little bit, but we -- the only difference we observed that two of these not very statistically reliable that week two was slightly lower for some of the children in general than week one. But we are not standing by this data, because just not strong enough study design and especially number of subjects.

So I just want to emphasize that there is this typical variability introverted -- intersubject variability, interindividual -- and interindividual variability.

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DR. HOLLAND: So what is behind this variability that we can possibly see? Okay. This is what we found,

that there is actually very interesting relationship between these different biomarkers looking at the different potential mechanisms. So we see highly significant correlation between prostaglandin and isoprostane and also this oxy -- deoxyguanosine. CC16 had statistically significant or closed statistically significant relationship with three other biomarkers. Okay. So they at least point in the same direction. So it is already good to know.

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DR. HOLLAND: So this is a little more detail on the results in relation to age and BMI. So red is BMI of children and age is blue. So for isoprostane we do see some were statistically significant, even not very high, but statistically significant correlation with both -- especially with BMI and some would align with age.

CC16, some of them values that are very low. Remember, they're log transformed. This is the negative portion of it, but the answer is the same, highly significant relationship increasing of these biomarkers with age and BMI. The same with PGE, with prostaglandin.

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DR. HOLLAND: Surprising somewhat to me was that deoxyguanosine actually negatively correlated to age, but not with BMI. So it was -- again, since not much known of

biomarkers in children, we really wanted to kind of feel our data. And this is the results of this kind of digging into them.

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DR. HOLLAND: So boys are in blue, girls in red for two biomarkers. Isoprostane and CC16, the levels were lower in girls compared to boys. We did see some similar relationship of isoprostane in CHAMACOS children. So again, this is also reported in some other previous studies.

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DR. HOLLAND: So as a result, we can summarize that most biomarkers of oxidative stress and inflammation were moderately correlated with each other. All showed variability over two weeks of collection. Differences by age and BMI were commonly observed and boys tend to have higher level than girls at least for two of these biomarkers that we looked at.

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DR. HOLLAND: So the next question, important question, for this study, was there anything in relationship of these biomarkers of response, these biomarkers of exposures that children was presenting?

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DR. HOLLAND: So we looked at that and red shows

some of the significant correlations between VOCs and PAHs. So let's look at isoprostane. It had the most numbers of statistically significant relationship. We have only six on this table, but total were 11 noted, but the rest of them did not show any statistical relationship -- statistically significant relationship, so we did not want to make this table even more crowded than it already is.

So another interesting fact, isoprostane correlated with five out of eight measurable relationship. However, 8-hydroxy-2'-deoxyguanosine had statistical correlation with yet another chemical, and in this case pyrene. And the prostaglandin and CC16 also had each of them had at least three -- correlations with three differing but different chemicals. So what it all means this complex picture.

In my mind, it means they're different biomarkers. All of them actually showed some relationship with exposure, but they complement one another. So if you would be using only one biomarker, they probably will meet some of these relationships that we -- we're able to demonstrate using this panel for biomarkers.

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DR. HOLLAND: So this is the summary of it, that I just mentioned. So they provide complementary insights

into biological response to air pollution exposure, and in this way, they are helpful for us in biomonitoring study.

So this is the first study to our knowledge to establish relationship between VOCs and PAHs to oxidative stress and inflammation in children living in a community heavily impacted by air pollution. So a panel of these four biomarkers present a comprehensive picture of the relationship with air pollution as they show correlation with different urine metabolites of VOCs and PAHs.

So -- and the good news biomarkers of oxidative stress and inflammation, as well as urinary biomarkers of exposure may be useful tools in biomonitoring air pollution in children.

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DR. HOLLAND: And this is my lab. I would just like to acknowledge people who actually did the job. My lab manager Weihong and doctoral student and some of my undergraduate students who also contributed to these many experiment that they actually had to do to analyze the data.

Thank you.

(Applause).

(Laughter).

DR. HOLLAND: I think I'm loud enough. Hopefully, it was possible to hear me.

CHAIRPERSON SCHWARZMAN: We have some time now for questions, both from the Panel and from the audience, including online.

Go ahead, Jenny.

PANEL MEMBER QUINTANA: Hi. Thank you for that presentation. I was wondering how to correct children's biomonitoring for age or size. I know that for NNAL in urine, which is a metabolite of the tobacco-specific nitrosamine NNK, it very much is much higher in younger children exposed to the same air pollution from tobacco smoke as older children in the same environment, like it's -- so I'm always wondering how you can correct for the age effect, and I'm wondering if you looked at actual -- not just BMI, but actual weight like how big they were just in pounds, you know, as an effect or some -- I was just wondering how to correct when you have children of multiple ages in a study, just something I've thought about and struggled with.

DR. HOLLAND: Well, when we have larger study, the typical approach if they're using this models, it would incorporate age, and in some cases BMI, and sex, depending on what is statistically appropriate, but it's not going to be simple regression-correlation relationship that they put here.

We did compare by age and by sex some of this

biomarker analysis. But when it goes to comparing these exposures like we had here, we have actual data for each individual urine sample that we were able to compare. Here, we did not do like mixed model with repeat measurement, because we just didn't have enough data. But should we have larger number of subject in repeat, this is how I would approach it.

PANEL MEMBER QUINTANA: I guess if someone had a very big-for-their-age kid as well as a small-for-their-age, I always wonder if it's only age or if we should be incorporating, you know, size as well, you know, that kind of thing.

Thank you.

DR. HOLLAND: Well, BMI is reflective of size obviously because we can -- we can account for age, but you're absolutely right, Jenny, children are all different. And this is why to do these more generalized conclusions, you do have larger numbers, so this variability between children would not hide important relationship with, let's say, this air pollution exposure. So I didn't like idea of repeated measurements in the same children. Here, we just looked, like I say, independent. It's not quite correct way to do it. But I think I would mention when we do -- and we actually plan to do very similar analysis of biomarkers in BiomSPHERE study that

was mentioned earlier that already have 64 pairs of parents and children. So I'm looking forward to get the samples in our hands, so we can look at the biomarkers in this larger study. So between these two, we will be pushing some more impressive number of observations and potentially more informative analysis, of relationship with exposure.

CHAIRPERSON SCHWARZMAN: Okay.

PANEL MEMBER SUÁREZ: Just following along those lines. So just a couple of comments more so than questions. It's amazing to see where you have one of those slides where you're showing us the change of BMI over age, which there are very substantial increases. I would suggest going through maybe showing BMI for age Z scores or percentiles --

DR. HOLLAND: Um-hmm.

PANEL MEMBER SUÁREZ: -- because normally, BMI does go up in adolescence, right?

DR. HOLLAND: Um-hmm.

PANEL MEMBER SUÁREZ: So BMI -- in this case, let me take a look here. So like BMI of 15 or you have children of 5 to 13 years old, right?

DR. HOLLAND: Yes. This is definitely something that we've done in other previous published study and we could do it here as well. But given limitations, I

thought let's do it simple way before we go into more complicated way that would give us more precise assessment and Z scores, obviously, will be one step to go towards this goal.

PANEL MEMBER SUÁREZ: Right. Right. This is just a minor thing, right? But still nonetheless, I mean, I'm looking at a BMI of 30 for a 13 year old. That is very high Z score we're talking about. Maybe a percentile of 96, 97. I'll have to take a look at that. But anyways, these are just smaller things, but kind of getting to your underlying question about what are the normal concentrations for a lot of these biomarkers in children and a lot of it hasn't been studied.

For example, within our study in ESPINA, it's pesticides in child development, in adolescents we're seeing that younger adolescents actually have much higher inflammation markers than older adolescents. So we initially started scratching our heads what's going on? Why are CRP, VCAM, ICAM, and pretty much everything that we measured were substantially higher in younger adolescents than older adolescents?

And so this -- all -- for a lot of this stuff this isn't described. So I'm guessing that for a lot of the markers here you have for oxidative stress and whatnot, I don't know. There -- I don't think they're

probably standard or normalized cutoffs of what those values are for children. But at least some of the things that we were scratching our heads with finding with our own studies is that maybe it's because they're -- the rate of growth is so much higher in younger ages, and that's actually causing some inflammation, but we -- we're still kind of scratching the surface of that. I don't know if you have any comments.

DR. HOLLAND: Two thoughts. Because we've done a lot of studies in Latinos, in Mexican American Latinos, CHAMACOS cohort is a very big cohort, which we followed for last 20 years from birth to now they're 20 years old. So we have quite a few data for instance from isoprostane, not so much on other biomarkers, but isoprostane will look this way and that way. And another aspect of that cohort, high prevalence of obesity. Children with age as their rate of obesity and overweight was aggressively increasing starting at 5 and on it goes.

But obesity is a strong -- has a strong relationship with oxidative stress, because it is known in adults. It's one of the mechanisms of adverse health outcomes with obesity, with oxidative stress that just body is overloaded with free radicals that they cannot cope with. So one of the things that's for me that's particularly interesting should we have a little more

data, how obesity in children and air pollution exposures, especially in the places such as Central Valley, such as Fresno, such as Stockton, where both are very high, how they interact with one another. Never mind socioeconomic status that may be another well known predictor of increased oxidative stress, not only in children, but in adults.

So it's a complex picture. So when we just pull one thing out, we see -- like the elephant, we see -- touch, you know, the trunk and we know one part of the story about elephants. But our goal is to continue do things to study it, to bring the picture together as much as possible, but it's difficult to collect these samples. It's absolutely important to have sufficient sample sizes. Nothing you can do about it.

CHAIRPERSON SCHWARZMAN: Thank you so much for that presentation. I just want to distinguish, because we had a question period and we now have a longer discussion time, but I need to call for public comment. So I just want to check in with Rebecca, if there's anybody online.

Nothing in public comment, so we can just sort of go ahead and bleed into our -- go on into our discussion session we have.

DR. HOLLAND: I may be excused or you want to discuss this in your time.

CHAIRPERSON SCHWARZMAN: Do you have a question. We have one more question for you.

DR. HOLLAND: Of course.

CHAIRPERSON SCHWARZMAN: And then you can be excused.

(Laughter).

PANEL MEMBER QUINTANA: I'm just also wondering about the role of physical activity as they age, because especially for air pollution, if you run around a playground, you're getting like three times as more as a kid than if you're sitting down, so I'm just -- it would be nice to have activity level to put on top of that for this particular exposure.

DR. HOLLAND: Absolutely. Wonderful suggestion, because we've actually done study of -- but it was done not in children. It was done on students primarily in chamber. And John Balmes and Mehrdad Arjomandi some of you know professor at UCSF done study in the chamber. We looked at the response to exposure to ozone at three different levels, just filtered air, 100 and 200, and later doing exercises on the bike periodically. So we were able this repeated measurement collecting samples and not just urine, but also blood samples from this controlled experiment. So we actually -- we were able to see, and known from other -- we published this paper, that

it is known that subject -- adults not children data, that definitely have relationship with these oxidative stress markers after they have exercised, especially intensive exercise or like climbing mountains when they also have like changes in oxidative exposures.

So with -- I hear what you're suggesting Jenny that we have to take into account these particular possible contributors and don't forget diet, because we also really would like to know diet especially when children are obese. There is very intricate interconnection, exercise and air pollution exposure, but what other exposures they may have. So the more the merrier.

So, you know, if you have sufficient finding, we can do stuff like that. So I hope you advise, you know, the subjects, you know, people who make decisions that this is what we need. Okay. I think I have --

CHAIRPERSON SCHWARZMAN: Thank you very much. Appreciate it.

(Applause).

CHAIRPERSON SCHWARZMAN: So we can continue our discussion through just about 2 -- 3:30, a little bit after. So we have open discussion now. And I will pass along some questions that are potentially -- to stimulate discussion that come from the Program. So a couple of

topics include what databases should the Program consider to help identify potential environmental sources of naphthalene or carbaryl in the Stockton area? They've already started exploring groundwater ambient monitoring and assessment, the GAMA Program, data and the Pesticide Use Reporting data. So any sources of information aside from those two sources that might help understand the exposures that they were seeing.

Another question. It will be challenging to explain some of the key concepts and limitations of the study to participants into the community members. Do you have any recommendations on how to communicate study limitations such as half-lives and specificity of biomarkers, statistical significance and small sample size, and any other guidance on key concepts that will be important to convey to the community and study participants?

So those are some questions from the Program to inform the discussion now. Although, I think any input that you want to provide to the Program is welcome.

Do you have a slide with them?

Yeah, go ahead.

PANEL MEMBER QUINTANA: Just a quick clarifying question about the air levels of naphthalene, because we didn't see a lot about the air levels of naphthalene

outside and how they can compare with the high -- I know you said the one week was higher than the other, but I didn't really hear how they were kind of objectively.

MS. HURLEY: Yeah. That was -- that's a good question, because we spent a lot of time looking for data to compare it to. You know, PAHs aren't routinely monitored in many places. But let's see, what we can say is we did -- I did find a review article that published all of the -- or as much as they could find on what typical outdoor air levels are like and our levels were right in the meat of what you would expect to see in an urban location. We did also compare them to -- so Betsy Noth, who is at UC Berkeley and actually ran the PAH analyses for us. She's done it in other studies and so we compared our levels to some of those levels. And they were, you know, high -- like she did some monitoring in Richmond during the Camp Fire, when anyone who was around here remembers it was super smoky, and our levels were about on par with that, so that's kind of high.

But then comparing to some levels of other -- in other studies that she's done in Fresno, you know, there's just a lot of variability, because -- well, I'm talking mostly about naphthalene, because this is what we were really kind of drilling down on. You know, it's -- it disperses really quickly, so there's huge variability. So

some of our levels were kind of on par with what you saw in Fresno in the winter, but in some cases, it was quite a bit lower than what she saw in Fresno. So I know it's not a great answer.

But the other thing I can say is that the levels indoors and outdoors were pretty similar. There were -- I think they were a little higher indoors during the first week, but they were close and that the levels were much lower than the U.S. EPA's, you know, chronic reference value for -- so for what that's worth, you know, as an order of magnitude -- our maximum level was lower than that, so does that answer your question?

PANEL MEMBER QUINTANA: Yes, it does. I was just thinking -- I was kind of wondering if it's really worth trying to get some more urine values, even anonymous just to make sure that you found that again before you worried the parents, or the school, or even make sure that school isn't full of mothballs or -- I don't know. I mean, just to see if that's kind of a more generalized finding.

MS. HURLEY: Well, we will have the results from BiomSPHERE, although I'm not sure when we will have them, not before we go to the community. So that is something definitely that we're grappling with is sort of how to communicate this with -- we don't want to cause unnecessary alarm, but -- and all of the re -- all of the

participants have already gotten their individual results return where it is compared to NHANES in those packets, but how carefully people actually read those packets and understand them. You know, we're not entirely sure, but -- yeah, so that's kind of why we put some of these questions out here. You'll all have suggestions about how to share these findings with the community.

PANEL MEMBER QUINTANA: I think -- sorry, did you want to -- I just think that, you know, the community can handle more uncertainties, people have shown, than people think. And saying, "We don't know what this is. We're really wondering if this is a marker for your kind of air pollution in the valley and we're following up on that," might be --

MS. HURELY: Enough.

PANEL MEMBER QUINTANA: -- the way to phrase it, because that is the truth, right?

MS. HURLEY: Yep.

PANEL MEMBER LUDERER: Just another question and maybe you mentioned this, but did you notice any difference in the concentrations of the naphthol in -- depending on which of the rooms they were in? Because it talks about the --

MS. HURLEY: Because they do not -- we didn't see any obvious pattern by class. I mean, it was -- so high

levels were seen in almost all the kids, you know, so it -- and so it was sort of across classrooms. We also found it in the morning urine and also in the afternoon urine. Like, there was really no -- I mean, it's small samples, so it's hard to really know what's going on, but we did do a lot of, you know, hunting and pecking and really trying to see if there was something that was driving it, and so far no luck.

MS. JARMUL: Susan, I think Dan wanted to weigh in. He's online.

MS. HURLEY: Okay.

MS. JARMUL: Go ahead, Dan.

MR. SULTANA: Hi. Dan Sultana with Biomonitoring California, OEHHA. I just want to make a quick comment. I think Susan touched on it that we saw high levels of, you know, 2-naphthol in a.m. samples. So those were, you know, kids coming in on Monday with a urine sample. That wasn't necessarily due to exposure at school. That was my comment.

Thank you.

MS. HURLEY: So I think Dan was just noting that we did see a lot of high levels or just as many relatively in the morning urine, the first Monday morning. So those kids have not been at school all weekend. So it doesn't seem like the exposure is necessarily tied to the school.

And then we did actually -- you know, we have the residential addresses. We did geocode them. There was no sort of obvious pattern. It wasn't like they were all from one neighborhood.

So, yeah, that's a mystery.

PANEL MEMBER SUÁREZ: I have a question.

CHAIRPERSON SCHWARZMAN: Go ahead. I have a -- I have a question after. Is this connected to --

DR. SANDY: Yes.

CHAIRPERSON SCHWARZMAN: Yeah, why don't you go first and then José and then I'll go.

DR. SANDY: So I found it interesting that you found an association of the naphthalene levels with having an attached garage. And also with consuming the foods that were barbecued or grilled or -- yeah. And so I'm not familiar with any other studies that have reported that naphthalene levels or biomarkers are associated with consuming those types of foods. I wondered if anyone on the Panel had heard that before?

PANEL MEMBER LUDERER: I mean, consumption of grilled and barbecued foods definitely is associated with increased metabolites of various PAHs. I mean, that is a major source. But, yeah, those specifically being elevated and then the other ones not, I mean, that's kind of what's puzzling about this to me for sure.

CHAIRPERSON SCHWARZMAN: José, did you have a question?

PANEL MEMBER SUÁREZ: Can you remind me, you measured also 1-naphthol --

MS. HURLEY: Yes.

PANEL MEMBER SUÁREZ: -- or is it only 2-naphthol?

MS. HURLEY: Well, yeah, we measured 2-naphthol.

PANEL MEMBER SUÁREZ: Okay.

MS. HURLEY: But the lab's method wasn't able to separate out completely 1-naphthol, so that's the -- what the idea of a follow-up lab analyses is, is what we're doing now. They're going back on -- we have some leftover extracts, not from every participant, but they're going back and using a different method, where they'll be able to separate out the 1-naphthol from 2-naphthol. And so that's going to be really critical in interpreting our initial results. And so we're eager to get those and we'll hopefully get them soon.

PANEL MEMBER SUÁREZ: Right. Right. Yeah, because that will help you if it's -- if you're thinking about carbaryl --

MS. HURLEY: Yeah.

PANEL MEMBER SUÁREZ: -- that's really only a 2-naphthol and you don't see that with the 1-naphthol.

MS. HURLEY: Other way around.

PANEL MEMBER SUÁREZ: Oh, you -- is it the other way around?

MS. HURLEY: Yeah.

PANEL MEMBER SUÁREZ: No. Okay. Either way.

MS. HURLEY: Yeah.

PANEL MEMBER SUÁREZ: It will help you discern if it is at least coming from the agricultural side, which is --

MS. HURLEY: Yeah.

PANEL MEMBER SUÁREZ: -- what you're trying to get at around ultimately, right?

MS. HURLEY: Right. Right.

PANEL MEMBER SUÁREZ: So I guess we'll have to wait for that to start --

MS. HURLEY: We were hopeful we might have it by today. But, you know, how it -- or the UCSF lab actually had to move labs at the end of the summer, so that really disrupted their timeline on everything.

CHAIRPERSON SCHWARZMAN: I have a question that is a little bit bigger picture about -- you know, we're talking about naphthol, because the measurement of the metabolite -- you know, the -- was nearly four times what was in NHANES as you presented early on. But when you presented those results also, you said that there was

nearly ubiquitous exposure to a long list of VOCs and PAHs. And I didn't follow whether that was ubiquitous in the sample and in NHANES. Like, are you -- are we mainly focusing on naphthol, because that was the only significant difference between this sample and NHANES?

MS. HURLEY: Yes. Well, so my comment the nearly ubiquitous exposure is just based on detection frequencies. And the --

CHAIRPERSON SCHWARZMAN: In the sample --

MS. HURLEY: In the sample. And the detection frequencies were pretty similar to what you also see in NHANES. And so what was really striking in comparing our differences to NHANES was the 2-naphthol levels.

CHAIRPERSON SCHWARZMAN: So that was the only thing that stood out as different from NHANES?

MS. HURLEY: Well, actually, the other thing that stood out was our 1-hydroxypyrene levels were lower than NHANES. But that one is more difficult to interpret, because our level of detection was quite different and we actually had a lower level of detection for ours, so we can't -- you know, we don't know if that's why our levels were lower.

CHAIRPERSON SCHWARZMAN: And when you did results return, obviously you reported everything that you had measured for participants and put it in the context of the

NHANES data.

MS. HURLEY: Yep.

CHAIRPERSON SCHWARZMAN: So you've already provided the guidance to participants on their other VOC and PAH exposures?

MS. HURLEY: Yes.

CHAIRPERSON SCHWARZMAN: And that that's why the key questions are just around this difference, is that right?

MS. HURLEY: Yeah. I mean, we anticipated that we might get some phone calls from the participants after they got their packets, but we didn't. But we are going to be holding community meetings where we're going to be presenting the summary of the findings. And I think, you know, that's when it will become kind of -- they'll take notice. So, you know, we want to be very careful about how we present that and what it might mean.

CHAIRPERSON SCHWARZMAN: Yeah. Go ahead, Lara.

PANEL MEMBER CUSHING: I was just wondering if there might be other opportunities maybe not in a formal way, maybe at these community meetings more informally to ask about other potential like household sources, like mothballs. I think these toilet bowl thing deodorizers have naphthalene in them, you know, especially since it seems like maybe it's not a school-based exposure or an

outdoor one --

MS. HURLEY: Yeah. So we --

PANEL MEMBER CUSHING: -- or I don't -- are there any household prod -- household pesticides that -- like are available, consumer pesticides that people could also be using at home?

MS. HURLEY: There could be. So for carbaryl, it -- restrictions were placed on its sale in California in 2019, I think, but that doesn't mean there might -- there could still be stockpiles on the shelves, stockpiles in their garage. Also, you can get whatever you want on Amazon. It doesn't matter what you're allowed to sell in California.

So for carbaryl -- yeah, so -- and then I -- for the -- yeah, so that's for pesticides. And then for naphthalene, we had been kind of poking around looking for consumer products that -- so naphthalene was removed from mothballs or it's not allowed to be sold in California, mothballs with naphthalene. But again, we did a quick search and actually naphthalene is -- well, it's very easy to get from Walmart or, you know, Amazon. And actually there's a lot of off-label uses that seem like possibly are going on.

So, you know, we found where there's a YouTube video where, you know, someone's grandma was recommending

you mix naphthalene balls with fabric softener and you spray it on your floors to deodorize them or use it as a pesticide or -- so who knows? But, you know, we -- in preparation for planning for these community meetings, we are going to be reaching out to our community partners and talking about, you know, potential next steps. It's such a small study and I think our IRB would allow us, although I'd have to go back and look, to do some kind of follow-up questions, because there may be some very simple explanation related to a consumer product. But, you know, we don't know, because we only ask, you know, the minimal number of questions on the questionnaire.

CHAIRPERSON SCHWARZMAN: I can go back and find our actual data, but I was just pulling up a quick figure from the analysis that we did and published in the ES&T looking at VOCs in consumer product categories from the CARB survey and found naphthalene in it looks like 12 different categories of consumer products. So we have those all laid out. And I'll give them to you. I just don't have them off the tip of my tongue.

MS. HURLEY: That would be great.

CHAIRPERSON SCHWARZMAN: Yeah.

PANEL MEMBER SUÁREZ: Were those like personal care products, any of those?

CHAIRPERSON SCHWARZMAN: It's -- I can look into

it and see what they were. We have the product categories. We don't have the products, because CARB groups them into product categories. And there's a whole range from, you know, things that are primarily used occupationally to consumer -- to like personal care, things like that.

PANEL MEMBER SUÁREZ: Yeah, which kind of brings me to the -- and the reason why I go down the line of personal care products is that adolescent women tend to use a lot more products than adolescent men. And I wonder if you saw any gender differences for --

MS. HURLEY: We did actually, but not in the direction that you would think.

PANEL MEMBER SUÁREZ: Okay.

MS. HURLEY: In fact, we actually found higher levels in boys than girls. I didn't actually mention that, because we also turned out that the boys were more likely to live in houses with attached garages. So we really couldn't separate that. And then also, in NHANES, you don't see a difference -- so, in NHANES you don't see a difference -- a gender difference for -- at least for naphthalene -- or 2-naphthol. And Meltem just handed me a summary of that paper that you were just talking about and it looks like -- well, there's a lot of numbers here.

(Laughter).

MS. HURLEY: So this -- it was old mothballs, general purpose cleaners was one of them, paint thinners, caulking and sealant. There was a lot of construction, you know, sort of housing construction stuff, adhesives, solvents. So, yeah, these look like they're mostly building materials and -- yeah.

DR. MUSA: That's something that they look at additional manufacturers. They gave like almost 5,000 for the general purpose cleaner and only one have not naphthalene in it. For mothballs, they have data for 28 different brands let's say, only one had naphthalene. So very -- they look at 300 different products, paints, almost 300, only two had naphthalene in them. This is the data from CARB between 2014 and '15.

CHAIRPERSON SCHWARZMAN: That is the difficulty with looking at the publicly available CARB data is because it's by product category, if there's even one product within that category that includes naphthalene, then it's just in the product category, and you don't know which product it's in. Thank you for mentioning that.

José.

PANEL MEMBER SUÁREZ: So I think I'm -- hopefully we'll go -- we'll get to see some of the results for the naphthol-1 versus 2 --

MS. HURLEY: We will share.

PANEL MEMBER SUÁREZ: -- for the next one to see --

MS. HURLEY: Yeah.

PANEL MEMBER SUÁREZ: -- if really there's some agri -- I mean, that would be one of the more intuitive ones, right? It is a very agricultural area. They're probably spraying by airplane over there. It might be worth while looking into it a little bit. It' just you're looking already at Pesticide Use Reporting.

MS. HURLEY: Yes. I mean, the thing is this was done in December. So I don't know that there would be a lot of applications to cover all in December in that area, but, you know, we can find out certainly.

PANEL MEMBER SUÁREZ: Um-hmm. And a lot of times with agriculture is whenever there's a rainy period, there's more pesticide use. Yeah. It typically, one to two weeks after the rain they start using it, especially if it's -- if it's been raining for more than three to four days, then they start spraying more pesticides too.

So that's the way about -- also, some of the weather data influencing the pesticide use --

MS. HURLEY: Um-hmm.

PANEL MEMBER SUÁREZ: -- and then translating into exposure to nearby populations or something, but -- so, yeah, I mean, it sounds like you're getting into the

air, right? You are looking at the associations with attached garage. Okay. Sure.

MS. HURLEY: Yeah.

PANEL MEMBER SUÁREZ: Yeah.

CHAIRPERSON SCHWARZMAN: Jenny.

PANEL MEMBER QUINTANA: Hi. Jenny Quintana. I'm just looking at your questions up there, like what key concepts to say to participants. And if I understand your PM2.5 went down after filtration -- this portable air filtration, your black carbon went down. Those are very important things. It worked. Putting the air filtration worked and I think that would be a major message.

PANEL MEMBER McKONE: When they use the air filters, did you know what setting? I mean most air filters have multiple settings and people won't use the one that really worked, because it's too noisy, especially in a classroom, so they may crank it down to the lowest setting. Is there a way of knowing whether they were -- did you ask them to like --

MS. HURLEY: Well, so when we initially set them up the first week, we set them I think it was at a level 5, which was fairly high and told them -- asked them not to touch them, But there were some complaints about the noise. And the second week I think we turned them down to like a level 3. I don't remember what that corresponds

to, you know, the filtration rate, but we do have information on the settings what they were.

PANEL MEMBER McKONE: So in terms of the advice to the community, that's like if you're going to use them, it's important to use them correctly. But again, that's a difficult thing.

MS. HURLEY: Yeah.

PANEL MEMBER McKONE: But I think what brand? Was this the same ones?

MS. HURLEY: It was the IQAir HealthPro Plus, I think.

PANEL MEMBER McKONE: Oh, okay. Because I don't know if that's a real quiet -- I mean some of these it's like -- like we have Austin Air and at the highest setting, it's noisy. I mean, it really -- it puts out 300 whatever, lots of cubic feet. And it can clean up the air, but it's really annoying. And I don't know if to Coway, or Levoit, or some of these are -- Levoit are quieter units?

MS. HURLEY: Yeah. Well, I mean, these are really designed for institutional settings, so, you know, classrooms and other big rooms. So they're not super quiet. Although, some of the teachers said, well, it's not like our classrooms are that quiet anyway, you know, so.

(Laughter).

MS. HURLEY: Compared to all the other stuff going on in the classroom.

CHAIRPERSON SCHWARZMAN: We have probably time for another comment or question before we move on.

Yeah, go ahead.

PANEL MEMBER CUSHING: This is Lara. On your fist question, maybe it's worth looking at the TRI emission. I don't know if it's a TRI listed chemical. I have no idea. Naphthalene. Sorry, going back to naphthalene.

MS. HURLEY: Yeah, I don't know. I haven't -- you know, I remember years ago the TRI data sort of became worthless for a while.

PANEL MEMBER CUSHING: Oh, really.

MS. HURLEY: And then I don't know if it's been resurrected.

PANEL MEMBER CUSHING: Okay. Yeah, I don't know how useful --

MS. HURLEY: Yeah, I just don't -- I remember like it was in the late nineties or something, where like they lost funding or something. I don't know, but we haven't looked at TRI yet. Why that's -- we should go back and look at it. Yeah.

DR. EDWARDS: Oh, Lara. A tangential one, once

again not super on the utility side, would be the CARB's facility search tool as part of the Cedar's database. That looks at air as well.

PANEL MEMBER McKONE: I was going to say CARB. And then the National Air Toxics Assessment from EPA has pretty high resolution emissions inventories and really released data. That's required, you know, for their assessment of residual risk assessment they have to go in. I think they go down -- in many places down to even census tract.

MS. HURLEY: Yeah, I think we started to -- I think we downloaded a bunch of that data, but we haven't looked at it yet.

PANEL MEMBER McKONE: And the EPA does both roadway emissions and point emissions and put them together in the inventory.

CHAIRPERSON SCHWARZMAN: Yes, there's -- is there an online comment?

MS. JARMUL: So one quick question from Jianwen. If you looked at 2-nap in dye and if that could contribute to exposures?

DR. SHE: Yes, that's the question. Thank you.

MS. HURLEY: I do know -- well, I'll let -- maybe I should let Meltem take this question.

DR. MUSA: So we looked into azo dyes, because

they are -- some of them like Sudan I is metabolized to 1-amino-2-naphthol. And we thought that it may be possible that we are getting perhaps an additive from some snacks they use, but it didn't go anywhere honestly, because it is not exactly 1 -- 2-naphthol. It is 1-amino-2-naphthol. I don't know if it affects the lab results or not. We know that some other dyes go to this -- give this -- metabolize similar, but not exactly the same one.

DR. SHE: Thank you. Thank you. And a related question. Also 2-naphthalene -- 2-naphthol could come from herbicide naproanilide, according my limited research. Does that means naphthol is very -- not a very specific indicator for the PAH metabolite.

Any comments?

MS. HURLEY: Yeah. Can you repeat that? I'm not sure I followed your question.

DR. SHE: So when you present, you compared 1-nap and the 2-nap, and I believe you said 1-nap might have two sources, one is data exposed to PAH, second one is for -- from carbaryl. And then literature also said the same thing regarding 2-nap, one come from PAH, one is come from herbicide naproanilide, but I don't know the scale how volume produced does resist when for you to exam that hypothesis 1-naphthol is from two different source, but

2-naphthalene -- naphthol is only from one source, at least -- at least literature indicate it could come from second source, because it's a pest -- a herbicide. Any comment?

MS. HURLEY: Well, I have not seen any data that suggests that 2-naphthol can come from a herbicide. I do know that it's used in making some herbicides and pesticides as the -- as a, you know, industrial chemical to -- in manufacturing. And from what I understand, there's not a lot of data out there that suggests that those exposures outside of a occupational setting are really important to the population. Now, it could be that if you're living right next to a -- you know, a site where that kind of manufacturing is going on, it could play a role. And that is part of the reason why we're looking to see what's going on in Stockton, and that there could be some other sources besides just naphthalene, if it could be direct exposures to 2-naphthol.

DR. SHE: Thank you very much. That's a piece of information for you to consider. Thank you very much.

MS. HURLEY: Okay.

CHAIRPERSON SCHWARZMAN: One more online comment.

MS. BELLOSO: Yes. This is from James Nakashima at OEHHA. More of a statement, but carbaryl is an insecticide and insect activity would be low in December.

And typically insecticides would be applied to protect the crop. If this was late in the year, the crop may have been harvested.

CHAIRPERSON SCHWARZMAN: Okay.

MS. HURLEY: I think that's a useful -- useful information. Thank you.

CHAIRPERSON SCHWARZMAN: Thanks very much for the contributions.

I know we have two panelists who have a tight plane connection, so they are going to go maybe before our last bit. Yeah.

And I am going to reintroduce our next presenter, who is Stephanie Jarmul, the Section Chief of the Safer Alternatives Assessment and Biomonitoring Section at OEHHA. She'll provide a brief overview of the plan for SGP meetings in 2024.

(Thereupon a slide presentation).

MS. JARMUL: So I'll keep this quick. Hello again. I'm just going to briefly discuss our plans for next year's Scientific Guidance Panel meetings.

--o0o--

MS. JARMUL: So at this point, we're planning to hold three meetings in 2024. And you'll see we've worked with the Panel to select the following dates. We have Wednesday, March 20th, 1 to 4 p.m., Friday, July 19th, 10

a.m. to 4 p.m., and then Thursday, November 7th, 1 p.m. to 4 p.m. You'll notice that our meeting in July is planned for a full day, so we can delve further into a few program items.

And we will make a determination on meeting location and format, so whether it will be in-person, virtual, or hybrid depending on any changes to the requirements of the Bagley-Keene Open Meetings Act. So hopefully, we'll have more information on that early next year.

--o0o--

MS. JARMUL: Similar to this year, our standing agenda will include a Program update, as well as more detailed project updates, such as updates on our community biomonitoring and surveillance studies. As always, we will have time for discussion and input from the Panel and the audience. There are other potential topics of interest we have planned or could consider exploring. These include the consideration of chemicals for the designated and priority lists, such as the expansion of the PFASs chemical group on Biomonitoring California's priority list.

We are also hoping to invite speakers and have a discussion with the Panel on biomonitoring -- for biomonitoring health-based guidance values later next

year. And we could also consider hearing from experts in the field on the challenges and opportunities for biomonitoring for oil and gas exposures that I had mentioned -- as I mentioned previously. And, of course, we welcome any input from the Panel and audience on these items and additional topics we should consider.

So I'll stop there and see if anyone has any questions or suggestions about this plan from the Panel or the audience.

CHAIRPERSON SCHWARZMAN: Great. Yeah. We have 10 minutes now for input to the Program, either from the Panel, or the audience, or online attendees.

PANEL MEMBER CUSHING: Hi. Lara. I guess I'll just second the -- my support -- or add my support to the idea of trying to do something with AB 496 and what opportunities that might provide to evaluate that policy. It sounded like --- that was the safe cosmetics one, maybe I got the number wrong --- but it sounded like maybe there's not good baseline studies available. But if there -- if there -- you feel that there might be more exploration that we could do around that, I think that would be -- would really leverage the power of biomonitoring. So maybe that could be a topic.

MS. JARMUL: Great, Thank you.

Any other suggestions or feelings of excitement?

(Laughter).

CHAIRPERSON SCHWARZMAN: I was glad to hear about the oil and gas exposure biomonitoring discussion. You know, it's not something I personally know a lot about, but I feel like it's one of the areas that communities are particularly very interested in knowing. Anybody who lives near, and there's so many people who do live near, oil and gas extraction sites and it's big in California, and certainly there is evidence connecting it to health outcomes, especially birth outcomes. So I just -- I think that's interesting and glad that you're thinking about it.

MS. JARMUL: Sure. And, yeah, we have a couple of people who might be interested in presenting to the Panel, so more to come next year.

CHAIRPERSON SCHWARZMAN: Is there anything from remote attendees?

MS. BELLOSO: No.

CHAIRPERSON SCHWARZMAN: In that case, we could -- I will then introduce the open public comment period, which is our final step of the afternoon. So we have 10 minutes allotted for open public comment and commenters can provide input on any topic related to Biomonitoring California, not necessarily to the agenda of today's meeting. I'll read the instructions again just so everybody has them.

Webinar attendees can submit written comments and questions via the Q&A function of Zoom webinar or by email to biomonitoring@oehha.ca.gov and we will read them aloud. If you wish to speak, please alert us by using the raise hand feature in Zoom webinar and we'll call on you. And if you're in person and wish to comment, please come to the front or raise your hand.

So open public comment period here for anything related to the Program, not necessarily just the contents of this meeting.

And I'll just wait a moment to see if something comes in online.

Nothing coming in online.

Okay. In that case, I just want to announce that there will be a transcript of this meeting posted on the Biomonitoring California website when it's available. And the next SGP meeting will take place in March on March 20th from 1 to 4 p.m. And there will be, as Stephanie said, information about options for attending that meeting closer to the meeting date.

Again, I want to thank Program staff and presenters for today, also the Panel and the audience, and adjourn the meeting.

Thank you.

(Thereupon the California Environmental

Contaminant Biomonitoring Program, Scientific Guidance Panel meeting adjourned at 3:42 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 25th day of November, 2023.

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